



APSA
American Pediatric
Surgical Association
Saving Lifetimes™

2023 ANNUAL MEETING



#APSA23

MAY 10 - 13, 2023
ORLANDO, FLORIDA
HYATT REGENCY GRAND CYPRESS

AMERICAN PEDIATRIC SURGICAL ASSOCIATION MISSION

To ensure optimal pediatric surgical care of patients and their families, to promote excellence in the field, and to foster a vibrant and viable community of pediatric surgeons.



WE DO THIS BY:

- Developing and advocating for standards of care for infants and children and influencing public policy around the surgical care of children
- Encouraging discovery, innovation and improvement of care
- Providing rich venues for the dissemination of up-to-date knowledge
- Offering high quality continuing education to members
- Creating identity and community among pediatric surgeons
- Promoting a supportive health care environment for patients, staff and surgeons and making certain that it is sustained by economic health



American Pediatric Surgical Association Administrative Offices

1061 East Main Street, Suite 300
East Dundee, IL 60118
Phone: 309-PED-SURG (309-733-7874)
Email: info@apsaped surg.org

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2023 - 2023 BOARD OF GOVERNORS



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2022-2023*



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INCOMING BOARD MEMBERS



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Steven Stylianos, MD
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2020-2026*



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Grosfeld Scholar 2021-2024*



Casey Calkins, MD
*Director, APSA Secretary
2021-2024*



Andrea A. Hayes Dixon, MD
Governor 2020-2023



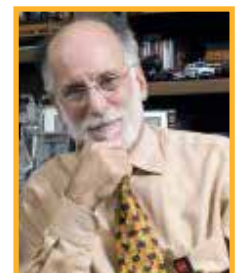
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*Director, APSA Past President
2021-2022*



John H.T. Waldhausen, MD
*Director, APSA Past President
2021-2024*



Brad W. Warner, MD
Director 2020-2026



Charles J. Stolar, MD
Director 2019-2025



Jessica J. Kandel, MD
Ex Officio APSA President



Thomas F. Tracy, Jr., MD MBA
Executive Director

NEW MEMBERS

ASSOCIATE

Chris Westgarth-Taylor
Adrian Curnow

CANDIDATE MEMBERS

Samantha Ahle
Kathryn Anderson
Paul Aylward
Michael Beckwith
Christina Bence
Alejandra Berazaluce
Megan Bouchard
Elissa Butler
Monica Chow
Maria Chulkov
Patrick Delaplain
Aodhnait Fahy
Bethany Farr
Anthony Ferrantella
Yousef Gohary
Devin Halleran
Courtney Harris
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Luai Jamal
Brittany Johnson
Michelle Kallis
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Victoria Ko
Michael LaQuaglia
Annie Le-Nguyen
Saunders Lin
Arin Madenci
Christopher Marengo
Christian McEvoy
Paul McGaha
Patrick McGovern
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Amanda Phares
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Kristen Seiler
Maren Shipe
Laura Stafman
Tim Tirrell
Andrew Trecartin
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Ahmed Hassan

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Srinithya Gillipelli
Bridget Kelly
Charles Meunier
Thuy-Linh Nguyen
Mohammad Nizamuddin
Hayley Petit
Savita Potarazu
Brendan Rosamond
Harleen Saini
Anthony Slaton
Isaiah Ware

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Ruchi Amin
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Mary Arbuthnot
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Faidah Badru
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Kendra Bowman
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Muriel Cleary
Megan Coughlin
Barrett Cromeens
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S Christopher Derderian
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Eileen Duggan
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Gilgamesh Eamer
Jeremy Fisher
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Kyle Glithero
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Sarah Greenberg
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Shannon Koehler

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Randi Lassiter
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Irene Lim-Beutel
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Alpin Malkin
Sarah Mansfield
Chris Metildi
Shin Miyata
Somala Mohammed
Julie Monteagudo
Colin Muncie
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Prathima Nandivada
Omar Nunez - Lopez
Natalie O'Neill
Ekene Onwuka
Dan Parrish
Emily Partridge
Felipe Pedroso
Christopher Pennell
Mercedes Pilkington
Eric Rellinger
Jamie Robinson
Avery Rossidis
Chethan Sathya
Kathy Schall
Dana Schwartz
Aaron Scott
Aaron Seims
Shahab Shaffiey
Bhairav Shah
Yan Shi
Meliissa Suh
Raphael Sun
Lindsay Talbot
Erin Teeple
Alfred Trappey
Robert Vandewalle
Chrstitine Velazco
Jesse Vrecenak
John Wiersch
Kibileri Williams
Nicole Wilson
Lindsay Wolf
Kaitlyn Wong
Andrew Yeh

RESIDENT MEMBERS

Emmanuel Abebrese
Olivia Atari
Amanpreet Brar
Morgan Brown
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Michela Carter
Miranda Chacon
Sarah Childs
Lindsay Devereux
Richard Eldredge
Andres Espinoza
Allison Frederick
Claire Gerall
Grant Gershner
Monalisa Hassan
Shawn Izadi
Janet Julson
Kristen Kaiser
Lisa Kenney
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Derek Krinock
Jieun Lee
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Sindhu Mannava
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Martha Teke
Cody Tragesser
Savas Tsikis
Colton Wayne
Keyonna Williams
Sarah Wright
Suhail Zeineddin

NEW MEMBERS (CONT'D)

SOAPPS

Ariella Adelman
 Katelyn Adler
 Salma Ali
 Katharine Alvarez
 William Anderson
 Abby Atchley
 Diane Bairas
 Christine Baker
 Erin Barreras
 Rachel Barton
 Amanda Becker
 Jennifer Berkbigler
 Tricia Beveridge-Choo
 Misti Blair
 Sarah Bochner
 Yovana Bontrager
 Nicole Boone
 Jennifer Bricker
 Sara Bryan
 Ana Burlison
 Cathleen Caltabiano
 Sarah Cannon
 Lauren Cardoni
 Natalie Chin
 Diana Choren
 Jessica Cowen
 Caroline Credille
 Teren Culbertson
 Samantha Dachenhaus
 Heather Danke
 Caroline Daoust
 Katherine Darby
 Melissa DeCola
 Amy Degener
 Hailey DeLeon
 Terry Derks
 Rachel Desimone
 Jeanette Diana-Zerpa
 Christine Dichter
 Lori Duesing
 Joyce Eapen
 Angela East

Ashley Ebanks
 Kristen Eberlein
 Jessica Elbaz
 Angela England
 Jacquelyn English
 Vanessa Fadul
 Cassidy Fischer
 Denise Fleig
 Theresa Foito
 Christa Fox
 Tamara Fuller
 Jacob Gere
 Kristina Gibson
 Katherine Golden
 Jane Gonzalez
 Devinn Gorey
 Katherine Grasso
 Tara Hadlock
 Sharon Haire
 Annie Harrington
 Kellianne Hawkins
 Nicole Hayes
 Christie Heinzman
 Ashley Hiep-Catarino
 Melisa Hill
 Monica Holder
 Marcy Horge
 Nicole Jenkins
 Rebecca John
 Susan Johnson
 Sam Jolley
 Lauren Kanamori
 Tara Kempker
 Richele Koehler
 Meagan Komondoreas
 Stephanie Kotz
 Kayla Kraus
 Jennifer Kreiss
 Paul Kupicha
 Leah Larkin
 Meera Laxman
 Lindsay Lemire
 Rebecca Leslie

Ethan Lew
 Connie Mantel
 Lauren Mayon
 Brooke McAllister
 Kim McHard
 Cindy McManaway
 Rosella Micalizzi
 Monica Milovancev
 Patricia Moore
 Jena Morcelle
 Christina Morice
 Morgan Morris
 Kelsey Namisnak
 Paige Naschke
 Chelsea Nearingarder
 Abigail Nelson
 Katy Noonan
 Emilie Nouvel
 Danuta Nowicki
 Beth Orrick
 Kristi Paquette
 Amy Pierce
 Nicole Pietrantonio
 Liana Pietrofesa
 Anna Plemmons
 Ruth Povlich
 Tomara Price
 Kelly Pruden
 Zachary Puckett
 Jennifer Quilty
 Rachel Reif
 Kathleen Renzi
 Ty Reutebuch
 Karisa Reynolds
 Karen Rodriguez
 Jennifer Rohall
 Megan Rushing
 Kelsi Sabbagh
 Taylor Sansevero
 Dianna Schmeda
 Julia Schrof
 Erika Schuller
 Paula Sever

Amy Seymore
 Anastacia Shaffer
 Sarah Shumate
 Sheena Snelgrove
 Anna Souders
 Amanda Spiritos
 Katie Stone
 Emily Sweeney
 Amanda Thomas
 Emily Ulloa
 Elke Ulloa
 Elise Van Etten
 Jessica Van Name
 Judy Varghese
 Stephany Walk
 Michelle Walker
 Abigail Walsh
 Dawn Welk
 Noreen White
 Catherine White
 David Wigginton
 Carly Windt
 Elise Wright
 Michele Young
 Lilly Yuen

IN MEMORIAM – MAY 2022 - MAY 2023



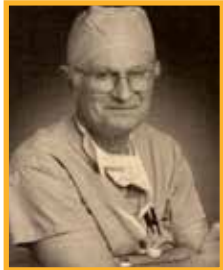
Dr. John Raffensperger
(1928 - 2022)



Dr. John Laurence Hill
(1936 - 2022)



Dr. Perry W.C. Stafford
(Died May 2022)



Dr. Marvin Glicklich
(1927 - 2022)



Dr. Donald Edward Meier
(1946 - 2022)



Dr. Anthony Shaw
(1929 - 2023)



Dr. Albert W. Dibbins, II
(1933-2022)



LEARNER NOTIFICATION

Client Name: American Pediatric Surgical Association
Meeting Title: APSA 2023
Meeting Dates Live: May 10 -13, 2023
Meeting Dates Enduring through: May 14, 2023 – April 1, 2024
Meeting Location: Orlando, Florida
Format (Live In-Person & Virtual, Enduring)

Acknowledgement of Financial Commercial Support

No financial commercial support was received for this educational activity.

Acknowledgement of In-Kind Support

No in-kind support was received for this educational activity.

Satisfactory Completion

Learners must complete an evaluation form to receive a certificate of completion. Partial credit for individual sessions is not available.

Learning Objectives

As a result of attending the sessions, attendees will be able to:

1. Identify the indication and mechanism of medical therapy for lymph vascular lesions.
2. Employ strategies to lessen the effects of burnout for themselves and their trainees.
3. Utilize methods to prevent penetrating trauma in their own communities.

Practice Gap

As a result of attending the sessions, attendees will be able to:

1. Pediatric Surgeons see lymphatic lesions rarely and may not be up to date on the medical and surgical care of these lesions.
2. Surgeons report high levels of burnout and lack of mitigation strategies.
3. Pediatric trauma surgeons care for patients with penetrating trauma and need strategies to communicate with families about prevention.

Learning Needs

As a result of attending the sessions, attendees will be able to:

1. Education is needed to be up to date on medical treatment for lymph vascular lesions.
2. Strategies for lessening the effects of burnout are not specific in the pediatric surgical specialty.
3. Prevention strategies to lessen the effects of gun violence are needed.

Accreditation Statement

APSA designates this activity for a maximum of **35 AMA PRA Category 1 Credits™**. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

DISCLOSURE OF CONFLICT OF INTEREST

As an accredited provider of the ACCME, APSA adheres to all ACCME Standards for Integrity and Independence in Accredited Continuing Education. APSA collects disclosures from all individuals who have the ability to control the content of CME activities. The following individuals in control of content development for this activity have indicated that they do have financial relationships with ACCME defined ineligible companies within the past 24 months. All financial relationships have been mitigated. No one in control of content is an employee or owner of an ACCME defined ineligible company. All others in control of content not listed below have indicated that they have no financial relationships to disclose.

Last Name/First Name	Name(s) of Ineligible Companies	Roles	Method of Mitigation
Bruzoni, Matias	Bolder Surgical: Consultant Revolve Surgical: Advisory Board Member	Planner, Panelist	Mitigation to direct recusal in committee work for any discussion around products or development form the disclosed entities.
Goldin, Adam	Inside Out Medicine: Consultant	Planner	COI mitigation determined that the relationship is not relevant to participant’s role.
Gray, Brian	MC3: Consulting Fees (e.g., advisory boards) Medtronic: Consulting Fees (e.g., advisory boards)	Co-Author, Instructional Faculty, Speaker	COI mitigation determined that the relationship is not relevant to participant’s role.
Grewal, Harsh	Simmer Spine: Consultant Auctus Surgical: Stock Ownership	Planner, Co-Author	COI mitigation determined that the relationship is not relevant to participant’s role.
Griggs, Cornelia	Atria: Consultant (Ended)	Planner, Speaker, Co-Author	COI mitigation determined that the relationship is not relevant to participant’s role.
Gulack, Brian	Pacira Pharmaceuticals: Consultant (Ended)	Planner, Speaker, Co-Author	COI mitigation determined that the relationship is not relevant to participant’s role.
Hallbeck, Susan	Intuitive Surgical, Inc.: Consulting Fees (e.g., advisory boards) (Terminated, February 28, 2023)	Speaker	COI mitigation determined that the relationship is not relevant to participant’s role.
Henry, Marion	Align Technology: Stockholder BEAM Therapeutics: Stockholder Dexcom: Stockholder Eurofins Scientific: Stockholder Exact Sciences: Stockholder Gingko Bioworks: Stockholder Insulet: Stockholder Invitae: Stockholder Lonza: Stockholder Pharmaron: Stockholder	Planner, Moderator	COI mitigation determined that the relationship is not relevant to participant’s role.
Ignacio, Romeo	Abbot Laboratories: Stockholder, Releasing Stock Ownership AbbVie: Stockholder, Releasing Stock Ownership	Planner	COI mitigation determined that the relationship is not relevant to participant’s role.
Jackson, Carl-Christian	Merck Sharp and Dohme: Stockholder & Consultant	Planner, Co-Author	COI mitigation determined that the relationship is not relevant to participant’s role.
Leraas, Harold	Ethicon: Consulting Fees (e.g., advisory boards)	Speaker	COI mitigation determined that the relationship is not relevant to participant’s role.

Levy, Brittany	Johnson and Johnson: Consulting Fees (e.g., advisory boards) (Terminated, August 1, 2022)	Oral Poster Presenter	COI mitigation determined that the relationship is not relevant to participant’s role.
Liu, Catherine	Medtronic: Salary (Employee Salary) (Terminated, July 29, 2022)	Speaker	COI mitigation determined that the relationship is not relevant to participant’s role.
Lopez, Monica	UpToDate: Royalties	Planner, Moderator, Co-Author	No conflict reflects subject matter expertise.
Nicksa, Grace	Gynesonics: Independent Contractor Johnson & Johnson: Shareholder Moderna: Shareholder LabCorp: Shareholder Quest: Shareholder Unitedhealth Group Inc: Shareholder	Planner	COI mitigation determined that the relationship is not relevant to participant’s role.
Notrica, David	Atricure: Consulting Fees (e.g., advisory boards) KLS Martin: Consulting Fees (e.g., advisory boards), Royalties	Speaker, Co-Author	COI mitigation determined that the relationship is not relevant to participant’s role.
Ponsky, Todd	Coaptch: Consulting Fees (e.g., advisory boards) (Terminated)	Speaker, Co-Author	COI mitigation determined that the relationship is not relevant to participant’s role.
Raval, Mehul	Abbott Laboratories: Consulting Fees (e.g., advisory boards) (Terminated, November 30, 2022)	Co-Author Panelist	COI mitigation determined that the relationship is not relevant to participant’s role.
Saltzman, Daniel	Salspera Inc.: Co-Founder and CMO	Planner, Co-Author	COI mitigation determined that the relationship is not relevant to participant’s role.
Siddiqui, Sabina	Saleha Medical Enterprises: CEO ButtonBeGone, LLC: CMO	Planner, Speaker, Instructional Faculty	COI mitigation determined that the relationship is not relevant to participant’s role.
Slater, Bethany	Cook Medical: Consultant Hologic: Consultant	Planner, Moderator, Speaker	Mitigation to direct recusal in committee work for any discussion around products or development form the disclosed entities.
Sullins, Veronica	Eclipse Regenesys: Consultant	Planner, Moderator	COI mitigation determined that the relationship is not relevant to participant’s role.
Sun, Raphael	OpComm Inc: Co-founder, CMO, Stockholder	Planner	COI mitigation determined that the relationship is not relevant to participant’s role.
Yoder, Suzanne	Bolder Surgical (now Hologic): Consultant, Medical Reviewer	Planner, Moderator	COI mitigation determined that the relationship is not relevant to participant’s role.
Zendejas, Benjamin	Stryker: Consultant	Planner, Co-Author	COI mitigation determined that the relationship is not relevant to participant’s role.
Zigman, Andrew	Abbott Labs: Stockholder	Planner, Co-Author	COI mitigation determined that the relationship is not relevant to participant’s role.

How to Claim Your CME:

1. Go to <https://www.pedsurglibrary.com/apsa/cme/Annual%20Meeting%20CME/browse> (link will become active at the conclusion of the meeting).
2. Login and evaluate the meeting.
3. Print all pages of your certificate for your records.

ANCILLARY MEETINGS ALPHABETICAL

MEETING	DATE	TIME	LOCATION
ACS Advisory Council	Wednesday, May 10	6:00 a.m. – 7:15 a.m.	Magnolia A
Advocacy Committee	Saturday, May 13	6:00 a.m. – 7:00 a.m.	Poinciana C - D
APSA Board of Governors Meeting	Tuesday, May 9	8:00 a.m. – 5:00 p.m.	Magnolia A - C
APSA Foundation Board Meeting	Thursday, May 11	6:00 a.m. – 7:00 a.m.	Magnolia B
Benjy Brooks Lunch	Friday, May 12	12:00 p.m. – 1:30 p.m.	Windsong Ballroom
Bethany Kids	Friday, May 12	6:00 a.m. – 7:00 a.m.	Poinciana A – B
Cancer Committee	Thursday, May 11	11:30 a.m. – 12:30 p.m.	Magnolia C
Childhood Obesity	Thursday, May 11	11:30 a.m. – 12:30 p.m.	Magnolia A
Coaching Get-Together (Professional Development Coaches) <i>Closed Event</i>	Wednesday, May 10	6:00 p.m. – 7:00 p.m.	Lobby Hub
Companion Breakfast	Thursday and Friday	8:00 a.m. – 10:00 a.m.	Lobby Hub
Competency Based Training Initiative Group	Wednesday, May 10	11:00 a.m. – 12:45 p.m.	Magnolia C
DEI Committee Meeting	Thursday, May 11	11:30 a.m. – 12:30 p.m.	Poinciana C
ECMO Simulation Course *	Tuesday, May 9	2:00 p.m. – 6:00 p.m.	Regency Hall
Education Committee	Wednesday, May 10	6:00 a.m. – 7:00 a.m.	Poinciana C - D
Ethics Committee	Thursday, May 11	11:30 a.m. – 12:30 p.m.	Poinciana B
Florida Association of Pediatric Surgeons (FAPS)	Saturday, May 13	6:00 a.m. – 7:00 a.m.	Poinciana A
Global Committee	Wednesday, May 10	12:00 p.m. – 1:00 p.m.	Magnolia A
Hirschsprung's Disease Interest Group	Friday, May 12	6:00 a.m. – 7:00 a.m.	Palm E - F
History Committee	Thursday, May 11	6:00 a.m. – 7:00 a.m.	Magnolia A
JPS Reception	Thursday, May 11	5:30 p.m. – 7:00 p.m.	Palm A – C
Lactation Room	Wednesday, Thursday, Friday	7:00 a.m. – 5:00 p.m.	Office #2 – Windsong Foyer
Membership Committee	Thursday, May 11	11:30 a.m. – 12:30 p.m.	Camelia
Mentorship Breakfast for General Surgery Residents *	Friday, May 12	6:00 a.m. – 7:00 a.m.	Palm A – D
Mentorship Lunch for General Surgery Residents *	Wednesday, May 10	12:00 p.m. – 1:00 p.m.	Palm A – F
Mercy Ships Reception	Friday, May 12	12:15 p.m. – 1:15 p.m.	Palm A – C
New Technology	Thursday, May 11	11:30 a.m. – 12:30 p.m.	Poinciana D
Outcomes Committee	Thursday, May 11	11:30 a.m. – 12:30 p.m.	Poinciana A
Pacira Product Theater	Thursday, May 11	6:00 a.m. – 7:00 a.m.	Palm A – F
Pediatric Surgery Firearm Injury Research Collaborative Symposium *	Tuesday, May 9	1:00 p.m. – 5:00 p.m.	Grand Cypress B-C
PedSRC	Wednesday, May 10	12:00 p.m. – 1:00 p.m.	Poinciana A - B

ANCILLARY MEETINGS (CONT'D)

MEETING	DATE	TIME	LOCATION
Professional Development Coaches Training ADVANCED IN-PERSON *	Tuesday, May 9	11:30 a.m. – 1:30 p.m.	Palm A - C
Professional Development Coaches Training ADVANCED VIRTUAL *	Tuesday, May 9	2:00 p.m. – 4:00 p.m.	Palm A - C
Professional Development Coaches Training BEGINNER IN-PERSON	Thursday, May	11 11:15 a.m. – 12:30 p.m.	Palm A – C
Program Committee Meeting	Tuesday, May 9	6:00 p.m. – 7:00 p.m.	Palm D - F
Program Directors Meeting (APSTPD)	Tuesday, May 9	2:00 p.m. – 6:00 p.m.	Grandy Cypress A
PSORC, Cancer Research Collaborative	Thursday, May 11	6:00 a.m. – 7:00 a.m.	Poinciana A – B
Publications Committee Meeting	Tuesday, May 9	6:00 p.m. – 10:00 p.m.	Poinciana A – B
Resident/Student/Fellow Reception	Thursday, May 11	6:00 p.m. – 7:30 p.m.	Magnolia A - C
SIG - APGAR	Wednesday, May 10	5:00 p.m. – 6:30 p.m.	Grand Cypress Foyer
SIG – Bethany Kids (Open House)	Wednesday and Thursday	Breakfast and Lunch Breaks	Regency Hall
SIG – Choledocholithiasis	All Days	Breakfast and Lunch Breaks	Exhibit Hall
SIG - Complex Hepatobiliary/Biliary Atresia	All Days	Breakfast and Lunch Breaks	Regency Hall
SIG - Critical Care (Open House)	All Days	Breakfast and Lunch Breaks	Regency Hall
SIG - Differences of Sex Development (DSD) (Open House)	All Days	Breakfast and Lunch Breaks	Regency Hall
SIG - Diversity, Equity and Inclusion (Open House)	All Days	Breakfast and Lunch Breaks	Regency Hall
SIG - Endocrine (Open House)	Thursday, May 11	Lunch Break	Regency Hall
SIG - Global Surgery (Open House)	Wednesday and Friday	Breakfast	Regency Hall
SIG - IBD (Open House)	All Days	Breakfast and Lunch Breaks	Regency Hall
SIG – Vascular (Open House)	All Days	Breakfast and Lunch Breaks	Regency Hall
SIG – Workforce (Open House)	All Days	Breakfast and Lunch Breaks	Regency Hall
SOAPPS Executive Committee	Wednesday, May 10	6:00 a.m. – 7:00 a.m.	Poinciana A - B
SOAPPS Lunch	Thursday, May 11	11:15 p.m. – 12:30 p.m.	Palm D – F
Trauma Committee	Thursday, May 11	5:30 p.m. – 6:30 p.m.	The Lobby Bar
Workforce Committee	Thursday, May 11	11:30 a.m. – 12:30 p.m.	Magnolia B

* Pre-registration is required


TUESDAY, MAY 9

All times are Eastern Standard Time USA

9:00am - 5:00pm	BOG Meeting	<i>Magnolia A-C</i>
11:30am - 1:30pm	Professional Development Coaches Training (ADVANCED - IN-PERSON)	<i>Palm A-C</i>
2:00pm - 4:00pm	Professional Development Coaches Training (ADVANCED - VIRTUAL)	<i>Palm A-C</i>
1:00pm - 5:00pm	Pediatric Surgery Firearm Injury Research Collaborative Symposium	<i>Grand Cypress B-C</i>
2:00pm - 6:00pm	Program Directors Meeting	<i>Grand Cypress A</i>
2:00pm - 6:00pm	ECMO Course	<i>Regency Hall</i>
6:00pm - 7:00pm	Program Committee	<i>Palm D-F</i>
6:30pm - 10:00pm	Publications Committee Meeting	<i>Poinciana A-B</i>

WEDNESDAY, MAY 10

Sessions with asterisk (*) indicate live streaming

6:00am - 7:00am	Committee Meetings	<i>See page 16-17 for ancillary meeting information</i>
6:30am - 7:00am	Continental Breakfast	<i>Exhibit Hall, Grand Cypress Foyer</i>
7:15am - 7:30am	Daily Roundup – SVS/APSA Pediatric Dialysis Access Kathleen van Leeuwen, MD ¹ , P. Stephen Almond, MD, MBA ² , Stephen P. Dunn, MD ³ <i>¹Phoenix Children’s Hospital, Phoenix, AZ, USA, ²Driscoll Children’s Hospital, Corpus Christi, TX, USA, ³Nemours Childrens Hospital, Wilmington, DE, USA</i>	<i>Grand Cypress D-I</i>
7:30am - 7:45am	President’s Welcome *  Jessica Kandel, MD Mary Campau Ryerson Professor and Chief, Pediatric Surgery; Surgeon-in-Chief, Comer Children’s Hospital University of Chicago	<i>Grand Cypress, D-I</i>
7:45am - 9:00am	Plenary Session 1 Moderators: Meghan A. Arnold, MD, <i>University of Michigan, Ann Arbor, MI, USA</i> Alejandro V. Garcia, MD, <i>Johns Hopkins University, Baltimore, MD, USA</i> Virtual Chat Monitor: Gwyneth A. Sullivan, MD, MS, Division of Pediatric Surgery, Northwestern University Feinberg School of Medicine, Ann & Robert H. Lurie Children’s Hospital; Division of Pediatric Surgery, Rush University Medical Center, Chicago, IL, USA	<i>Grand Cypress D-I</i>
	1 STATE OF GENDER EQUITY IN PEDIATRIC SURGERY – A REPORT FROM THE BENJY BROOKS COMMITTEE OF THE AMERICAN PEDIATRIC SURGICAL ASSOCIATION Megan T. Vu, MD ¹ , Erin E. Perrone, MD ² , Romeo C. Ignacio, MD, MSc, MPath ³ , Claudia N. Emami, MD MPH ⁴ , Mary E. Fallat, MD ⁵ , Marion C. W Henry, MD, MPH ⁶ <i>¹Baylor College of Medicine, Houston, TX, USA, ²University of Michigan, Ann Arbor, MI, USA, ³Rady Children’s Hospital San Diego/University of California San Diego School of Medicine, San Diego CA, USA, ⁴Huntington Memorial Hospital, Los Angeles, CA, USA, Hiram C. Polk, Jr, MD Department of Surgery, University of Louisville, Norton Children’s Hospital, Louisville, KY, USA, ⁶University of Chicago, Chicago, IL, USA</i>	

2**DIRECT THROMBIN INHIBITORS PARTIALLY RESCUE THE NEGATIVE EFFECTS OF HEPARIN ON LUNG GROWTH AND FUNCTION AFTER MURINE LEFT PNEUMONECTOMY**

Savas Tsikis, MD¹, Scott Fligor, MD², Thomas Hirsch, MD³, Amy Pan, BA⁴, Malachi Joiner³, Angela Devietro³, Paul Mitchell, MS⁵, Kathleen Gura, PharmD⁶, Mark Puder, MD, PhD¹

¹Boston Children's Hospital, Harvard Medical School, Boston, MA, USA, ²Boston Children's Hospital, ³Vascular Biology Program and Department of Surgery, Boston Children's Hospital, Harvard Medical School, Boston, MA, USA, ⁴Boston Children's Hospital, Boston, MA, USA, ⁵Institutional Centers for Clinical and Translational Research, Boston Children's Hospital, Boston, MA, USA, ⁶Department of Pharmacy and the Division of Gastroenterology and Nutrition, Boston Children's Hospital, Boston, MA, USA

3**DOES LENGTH OF EXTENDED RESECTION BEYOND TRANSITION ZONE CHANGE CLINICAL OUTCOME FOR HIRSCHSPRUNG PULL-THROUGH?**

Sarah J. Ullrich, MD, MHS¹, Naomi-Liza Denning, MD, PhD², Monica Holder, RN², Randi Witten, RN², Kevin Krebs², Ava Schwan², Abigail Verderber², Aaron P. Garrison, MD³, Beth A. Rymeski, DO³, Nelson Rosen, MD³, Jason S. Frischer, MD³

¹Yale Department of Surgery, New Haven, CT, USA, ²Cincinnati Children's Hospital Colorectal Center, Cincinnati, OH, USA, ³Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA

4**TRANSVERSUS ABDOMINIS PLANE (TAP) BLOCK VS. LOCAL WOUND INFILTRATION FOR ELECTIVE MINIMALLY INVASIVE CHOLECYSTECTOMY IN CHILDREN AND ADOLESCENTS: A PROSPECTIVE RANDOMIZED CONTROLLED TRIAL**

Sindhu V. Mannava, MD¹, Niloufar Hafezi, MD², Farheen Turk, MBA, CCRP³, Cameron L. Colgate, MS⁴, Nicole Horn, MD⁵, Johanna Askegard-Giesmann, MD⁶, Brian W. Gray, MD², Troy Markel, MD⁷

¹Division of Pediatric Surgery, Department of Surgery, Indiana University School of Medicine, Zionsville, IN, USA, ²Division of Pediatric Surgery, Department of Surgery, Indiana University School of Medicine, Indianapolis, IN, USA, ³Department of Surgery, Indiana University School of Medicine, Indianapolis, IN, USA, ⁴Center for Outcomes Research in Surgery, Indiana University School of Medicine, ⁵Department of Anesthesia, Indiana University School of Medicine, Indianapolis, IN, USA, ⁶University of North Dakota, Fargo, ND, USA, ⁷Riley Hospital for Children at IU Health, Indiana University School of Medicine, Indianapolis, IN, USA

5**ENTERAL ADMINISTRATION OF LACTOBACILLUS REUTERI IN ITS BIOFILM STATE IS PROTECTIVE IN A PIGLET MODEL OF NECROTIZING ENTEROCOLITIS (NEC)**

Mecklin V. Ragan, MD¹, Samantha J. Wala, MD, MSc², Nitin Sajankila, MD³, Belgacem Mihi, DVM², Miriam Conces, MD², Samuel Volpe, BS², Yijie Wang, MS⁴, Zachary Dumbauld³, Nanditha Purayil³, Adrian Rajab, BS⁵, Audrey Duff, PhD², Joseph Wickham, BS², Michael Bailey⁶, Steven D. Goodman⁶, Gail E. Besner, MD⁷

¹Nationwide Children's Hospital, Columbus, OH, Corpus Christi, TX, USA, ²Nationwide Children's Hospital, Columbus, OH, Columbus, OH, USA, ³Nationwide Children's Hospital, Ohio State University, Columbus, OH, Columbus, OH, USA, ⁴Nationwide Children's Hospital, ⁵Nationwide Children's Hospital, Ohio State University College of Medicine, Columbus, OH, Columbus, OH, USA, ⁶Nationwide Children's Hospital, Columbus, OH, USA, ⁷Nationwide Children's Hospital, Columbus, OH, USA

6**INFLUENCE OF SOCIODEMOGRAPHIC FACTORS ON SURGICAL MANAGEMENT OF PEDIATRIC LIVER CANCER: ARE WE TREATING ALL CHILDREN EQUALLY?**

Ioannis A. Ziogas, MD, MPH¹, Jose Diaz-Miron, MD², Shannon Acker, MD³, Ann Kulungowski, MD⁴, Jonathan Roach, MD⁵, Jonathan L. Hills-Dunlap, MD, MPH⁶

¹University of Colorado, Aurora, CO, USA, ²Children's Hospital Colorado, ³University of Colorado, Children's Hospital Colorado, Aurora, CO, USA, ⁴Division of Pediatric Surgery, Department of Surgery University of Colorado School of Medicine Children's Hospital Colorado, Aurora, CO, USA, ⁵Children's Hospital Colorado, Denver, CO, USA, ⁶Children's Hospital Colorado, Aurora, CO, USA

7
PRIMARY POSTERIOR TRACHEOPEXY AT TIME OF ESOPHAGEAL ATRESIA REPAIR SIGNIFICANTLY REDUCES RESPIRATORY MORBIDITY

Somala Mohammed, MD¹, Ali Kamran, Shawn Izadi, MD¹, Gary Visner¹, Leah Frain¹, Farokh R. Demehri, MD², Hester F. Shieh, MD³, Russell W. Jennings, MD⁴, Charles J. Smithers, MD⁴, Benjamin Zendejas, MD, MSc¹
¹*Boston Children's Hospital, Boston, MA, USA*, ²*Harvard Medical School, Department of Surgery, Boston Children's Hospital, Boston, MA, USA*, ³*Johns Hopkins All Children's Hospital, St Petersburg, FL, USA*, ⁴*Johns Hopkins All Children's Hospital, St. Petersburg, FL, USA*

8
A MINIMALLY INTERVENTIONAL APPROACH REDUCES RESOURCE USE AND FACILITATES RAPID RECOVERY FOLLOWING ESOPHAGEAL ATRESIA REPAIR

Nigel J. Hall, PhD¹, Ceri Jones², Lara Kitteringham³, Francesca Stedman³, Ori Ron³, Michael Stanton³, Robert Wheeler³, Charles Keys³
¹*University of Southampton, Southampton, England, United Kingdom*, ²*Southampton Children's Hospital, Southampton Children's Hospital, England, United Kingdom*, ³*Southampton Children's Hospital, Southampton, England, United Kingdom*

9
ANALYZING THE FINANCIAL IMPACT OF CHILD AND TEEN FIREARM-RELATED MORTALITY IN THE UNITED STATES

Megan E. Paul, BA¹, Brian Arrinza Coakley, MD, FACS, FAAP, Dipl ABOM²
¹*Icahn School of Medicine at Mount Sinai, Los Angeles, CA, USA*, ²*The Mount Sinai Health System, New York, NY, USA*

9:00am - 10:00am

Keynote Address – Firearm Injury as a Public Health Problem*Grand Cypress D-1*

Megan L. Ranney, MD, MPH, FACEP
 Brown University
 Providence, RI, USA

Learning objectives

By the end of this presentation attendees will be able to:

- Describe the epidemiology of the gun violence epidemic in the United States
- Identify 3 common risk factors for gun injury and death
- Identify two things that physicians can do to reduce gun injury and death

Biography

Dr. Megan L. Ranney is a practicing emergency physician, researcher, and national advocate for innovative approaches to public health. She is currently the Deputy Dean at the Brown University School of Public Health; the Warren Alpert Endowed Professor of Emergency Medicine at Alpert Medical School of Brown University; and the Founding Director of the Brown-Lifespan Center for Digital Health. In July 2023, she will become Dean of the Yale School of Public Health. Dr. Ranney's research focuses on developing, testing, and disseminating digital health interventions to prevent violence and related behavioral health problems, as well as on COVID-related risk reduction. She has had continuous external funding from federal and foundation grants for more than a decade. She is an elected member of the National Academy of Medicine. She has held multiple national leadership roles, including Co-Founder and Senior Strategic Advisor for the American Foundation for Firearm Injury Reduction in Medicine (AFFIRM) at the Aspen Institute (<http://www.affirmresearch.org>), a nonprofit committed to ending the gun violence epidemic through a non-partisan public health approach, and Co-Founder of GetUsPPE.org, a start-up nonprofit that delivered donated personal protective equipment to those who needed it most. She is a Fellow of the fifth class of the Aspen Institute's Health Innovators Fellowship Program and a member of the Aspen Global Leadership Network. She also serves on the Board of Trustees for the National Opioid Abatement Trust. She has received numerous awards for technology innovation, public health, and research, including Rhode Island "Woman of the Year" and the American College of Emergency Physicians' Policy Pioneer Award. A leading public voice on urgent topics in health and medicine, she offers expert analysis through testimony to Congress and guidance for non-governmental organizations. She is a frequent media commentator and author of op-eds for outlets that include the BBC, CNN, The Atlantic, MSNBC, The Wall Street Journal, Fox News, The Washington Post, and

The New York Times. Dr. Ranney earned her bachelor's degree in history of science, graduating summa cum laude, from Harvard University; her medical doctorate, graduating Alpha Omega Alpha, from Columbia University; and her master's degree in public health from Brown University. She completed her residency in Emergency Medicine and a fellowship in Injury Prevention Research at Brown University. She was previously a Peace Corps Volunteer in Cote d'Ivoire. She lives in Rhode Island with her husband and two children. She is active on Twitter @meganranney.

10:00am - 10:30am Refreshment Break *Exhibit Hall, Grand Cypress Foyer*

10:30am - 11:45am **Scientific Session I – General** *Grand Cypress D-I*

Moderators:

Diana Diesen, MD, *UT Southwestern, Dallas, TX, USA*
 Suzanne Yoder, MD, MPH, *Locum Tenens, Shell Beach, CA, USA*

Chat Room Moderator:

Ali A. Mokdad, MD, MS, *Johns Hopkins, Baltimore, MD, USA*

19

REAL-WORLD MULTI-INSTITUTIONAL DATA FROM THE MIDWEST PEDIATRIC SURGICAL CONSORTIUM (MWPC) TO ASSESS THE EFFECT OF DELAYED KASAI PROCEDURE ON BILIARY DRAINAGE IN PATIENTS WITH BILIARY ATRESIA

Zishaan A. Farooqui, MD PhD¹, Emily Schepers¹, Aaron Delman¹, K. Elizabeth Speck, MD, MS², Samir K. Gadepalli, MSc, MD, MBA², Kyle J. Van Arendonk, MD PhD³, Christina Georgeades, MD³, Dave R. Lal, MD, MPH⁴, Katherine J. Deans, MD, MHSc⁵, Peter C. Minneci, MD, MHSc⁶, Jordan Apfeld, MD⁷, Jacqueline Saito⁸, Grace Z. Mak, MD⁹, Mark B. Slidell, MD, MPH¹⁰, Caroline Lemoine, MD¹¹, Riccardo Superina, MD¹¹, Tiffany Wright, MD¹², Bhargava Mullapudi, MD¹³, Gregory Tiao, MD¹⁴

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COMPREHENSIVE FERTILITY PRESERVATION CAN BE OFFERED IN A TIMELY MANNER AROUND GONADOTOXIC THERAPY IN CHILDREN

Kathryn L. McElhinney, MD¹, Samantha K. McLean, BS², Monica M. Laronda, PhD², Erin E. Rowell, MD³
¹*Fertility & Hormone Preservation & Restoration Program, Department of Surgery, Division of Pediatric Surgery, Feinberg School of Medicine, Northwestern University, Stanley Manne Children's Research Institute, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA,* ²*Department of Pediatrics, Division of Endocrinology and Department of Surgery, Division of Pediatric Surgery, Feinberg School of Medicine, Northwestern University, Stanley Manne Children's Research Institute, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA,* ³*Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA*

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SUCCESSFUL USE OF AN ACELLULAR SMALL INTESTINAL SUBMUCOSAL GRAFT IN VAGINAL RECONSTRUCTION

Steven T. Papastefan, MD¹, Sarah A. Collins, MD², Margaret G. Mueller, MD², Julia Geynisman-Tan, MD², Marleta Reynolds, MD³, Elizabeth Yerkes, MD⁴, Julia E. Grabowski, MD⁵
¹*Department of Surgery, Northwestern University Feinberg School of Medicine Division of Pediatric Surgery, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA,* ²*McGaw Medical Center at Northwestern University, Chicago, IL, Chicago, IL, USA,* ³*Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA,* ⁴*Ann and Robert H. Lurie Children's Hospital, Chicago, IL, Chicago, IL, USA,* ⁵*Lurie Children's Hospital, on behalf of the Midwest Pediatric Surgery Consortium, Chicago, IL, USA*

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NEUROLOGIC COMPLICATIONS IN PEDIATRIC ECMO FOR RESPIRATORY FAILURE: RISK FACTORS AND TIME TO EVENT ANALYSIS

Kevin Johnson¹, Kylie Callier, MD², Katie W. Russell, MD³, Brian W. Gray, MD⁴, Niki Matsuko⁵, Samir K. Gadepalli, MSc, MD, MBA⁵, George B. Mychaliska, MD⁶
¹*University of Michigan C.S. Mott Children's Hospital, Ann Arbor, MI, USA,* ²*University of Chicago, Chicago, IL, USA,* ³*Primary Children's Hospital, Salt Lake City, UT, USA,* ⁴*Division of Pediatric Surgery, Department of Surgery, Indiana University School of Medicine, Indianapolis, IN, USA,* ⁵*University of Michigan, Ann Arbor, MI, USA,* ⁶*Section of Pediatric Surgery, Fetal Diagnosis and Treatment Center, University of Michigan Health System, Ann Arbor, MI, USA*

23

SUBMUCOSAL HYDROGEL FOR SPRING-MEDIATED INTESTINAL LENGTHENING

Fereshteh Salimi-Jazi, MD¹, Anne-Laure A. Thomas, MS², Narelli Paiva, MS³, Renato Samuel Navarro, PhD³, Talha Rafeeqi, MBBS¹, Akanksha Sabapaty, MD⁴, Siavash Shariatzadeh, MD, MPH⁵, Julie-Ann Nguyen, BA⁴, Sarah Heilshorn, PhD³, James C.Y. Dunn, MD, PhD²
¹Stanford University School of Medicine, Palo Alto, CA, USA, ²Stanford University School of Medicine, Stanford, CA, USA, ³Stanford, Stanford, CA, USA, ⁴Stanford, Palo Alto, CA, USA, ⁵Stanford School of Medicine, Stanford, CA, USA

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GASTROESOPHAGEAL REFLUX AND GASTROINTESTINAL SYMPTOMS AFTER METABOLIC AND BARIATRIC SURGERY IN ADOLESCENTS: AN 8-YEAR FOLLOW UP

Suhail Zeineddin, MD, MS¹, Jane Khoury, PhD², Todd M. Jenkins, PhD, MPH³, Stephanie Sisley, MD⁴, Justin Ryder, PhD⁵, Marc Michalsky⁶, Thomas H. Inge, MD⁷
¹Division of Pediatric Surgery, Ann & Robert H. Lurie Children’s Hospital of Chicago, Chicago, IL, USA, ²Cincinnati Children’s, Cincinnati, OH, USA, ³Cincinnati Children’s Hospital Medical Center, Cincinnati, OH, USA, ⁴Baylor College of Medicine, Houston, TX, USA, ⁵University of Minnesota, Minneapolis, MN, USA, ⁶Nationwide Children’s Hospital, Columbus, OH, USA, ⁷Division of Pediatric Surgery, Lurie Children’s Hospital, Northwestern University School of Medicine, Chicago, IL, USA

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COMPARING PEDIATRIC SURGEONS’ AND PALLIATIVE CARE PEDIATRICIANS’ PERSPECTIVES AND PRACTICES REGARDING PALLIATIVE CARE IN PEDIATRIC SURGICAL PATIENTS

Danielle I. Ellis, MD, MTS¹, Emanuele Mazzola, PhD², Joanne Wolfe, MD, MPH³, Cassandra M. Kelleher, MD⁴
¹Department of Surgery, Massachusetts General Hospital, Boston, MA, USA, ²Dana Farber Cancer Institute, Boston, MA, USA, ³Professor of Pediatrics, Boston, MA, USA, ⁴MassGeneral Hospital for Children, Boston, MA, USA

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ADVERSE EVENT RATES AND RESOURCE UTILIZATION ASSOCIATED WITH DIFFERENT METHODS OF LAPAROSCOPIC APPENDECTOMY IN CHILDREN WITH UNCOMPLICATED APPENDICITIS

Shannon L. Cramm, MD, MPH¹, Katherine He, MD, MS¹, Dionne Graham, PhD¹, Myron Allukian², Danielle Aronowitz³, Martin Blakely, MD, MS⁴, Brendan T. Campbell, MD MPH⁵, Nicole M. Chandler, MD⁶, Robert A. Cowles, MD⁷, Jennifer DeFazio, MD⁸, Katerina Dukleska, MD⁹, Justice Echols, BS¹⁰, Joseph Esparaz, MD, MPH¹¹, Christina Feng, MD¹², Cornelia Griggs, MD¹³, David N. Hanna, MD¹⁴, Olivia Keane, MD¹⁵, Shaun Kunisaki, MD¹⁶, Aaron M. Lipskar, MD¹⁷, Sean E. McLean, MD¹⁸, Claudia Orlas Bolanos¹³, Robert T. Russell, MD, MPH¹⁹, Matthew T. Santore, MD²⁰, Stefan Scholz, MD²¹, Shelby R. Sferra, MD, MPH²², Elisabeth (Lisa) Tracy, MD²³, Sacha Williams, MD, MS, MPH⁶, Lucy Zhang, MD²⁴, Shawn J. Rangel, MD, MSCE¹
¹Boston Children’s Hospital, Boston, MA, USA, ²Children’s Hospital of Philadelphia, Philadelphia, PA, USA, ³Cohen Children’s Medical Center at Hofstra/Northwell, ⁴Department of Pediatric Surgery, Vanderbilt University Medical Center, ⁵American College of Surgeons, Committee on Trauma, Hartford, CT, USA, ⁶Johns Hopkins All Children’s Hospital, St. Petersburg, FL, USA, ⁷Yale School of Medicine, Department of Pediatric Surgery, New Haven, CT, USA, ⁸New York Presbyterian Morgan Stanley Children’s Hospital, Columbia University Vagelos College of Physicians and Surgeons, New York, NY, USA, ⁹Connecticut Children’s Medical Center, University of Connecticut, Hartford, CT, USA, ¹⁰University of North Carolina Health System, Chapel Hill, NC, USA, ¹¹Children’s of Alabama, Birmingham, AL, USA, ¹²Children’s National Hospital, Washington, DC, USA, ¹³Massachusetts General Hospital, Boston, MA, USA, ¹⁴Vanderbilt University Medical Center, Nashville, TN, USA, ¹⁵Children’s Healthcare of Atlanta, Atlanta, GA, USA, ¹⁶Johns Hopkins University School of Medicine, Baltimore, MD, USA, ¹⁷Zucker School of at Hofstra/Northwell, Cohen Children’s Medical Center at Northwell Health, New Hyde Park, NY, USA, ¹⁸University of North Carolina at Chapel Hill, Chapel Hill, NC, USA, ¹⁹University of Alabama at Birmingham and Children’s of Alabama, Birmingham AL, USA, ²⁰Emory University, Atlanta, GA, USA, ²¹UPMC Children’s Hospital of Pittsburgh, Pittsburgh, PA, USA, ²²Johns Hopkins University, Baltimore, MD, USA, ²³Duke University Medical Center, Durham, NC, USA, ²⁴Yale New Haven Children’s Hospital, New Haven, CT, USA

11:45am - 1:00pm	Committee Meetings	See pg. 16-17 for ancillary meeting information
12:00pm - 1:00pm	Resident Speed Mentor Luncheon	Palm A-C

1:00pm - 1:15pm

JPS TEC Talk I – Contrast Challenges for Children with Adhesive SBO

Grand Cypress D-I

Introducer:

Sabina Siddiqui, MD, *Arkansas Children’s Hospital, Springdale, AR, USA*

Speaker:

K. Elizabeth Speck, MD, MS, *University of Michigan, Ann Arbor, MI, USA*

1:15pm - 2:30pm

Scientific Session II – Quality and General

Grand Cypress D-I

Moderators:

Pamela Choi, MD, *Naval Medical Center San Diego, San Diego, CA, USA*

Raquel Gonzalez, MD, MHCM, *Johns Hopkins All Children’s Hospital, St. Petersburg, FL, USA*

Chat Room Moderator:

Suhail Zeineddin, MD, MS, *Division of Pediatric Surgery, Ann & Robert H. Lurie Children’s Hospital of Chicago, Chicago, IL, USA*

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CESSATION OF ANTIBIOTICS FOR PERFORATED APPENDICITIS AT DISCHARGE DOES NOT INCREASE RISK OF POST-OPERATIVE INFECTION

Katie W. Russell, MD¹, Douglas C. Barnhart, MD², Robert A. Swendiman, MD³, David E. Skarda², Trahern Jones, **Scott S. Short**, MD⁴

¹*Primary Children’s Hospital, Salt Lake City, UT, USA*, ²*University of Utah, Salt Lake City, UT, USA*,

³*Primary Children’s Hospital/University of Utah, Salt Lake City, UT, USA*, ⁴*Primary Children’s Hospital / University of Utah, Salt Lake City, UT, USA*

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SAME-DAY DISCHARGE AND THE VALUE PROPOSITION IN CHILDREN UNDERGOING APPENDECTOMY FOR UNCOMPLICATED APPENDICITIS: THE DEVIL IS IN THE DETAILS

Katherine He, MD, MS, Lynne Ferrari, MD, Cathie T. Jones, MD, Kelly Connolly, RN, Shannon L. Cramm, MD, MPH, Shawn J. Rangel, MD, MSCE

Boston Children’s Hospital, Boston, MA, USA

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ACADEMIC PRODUCTIVITY OF APSA FOUNDATION GRANT RECIPIENTS

Oluyinka O. Olutoye, MD, MPH¹, Taylor Lee², Anjali Dagala², Ekene Onwuka, MD, MS³, Kristy Rialon, MD⁴, Alice King, MD⁵, Sundeep G. Keswani, MD¹, Lily S. Cheng, MD¹

¹*Baylor College of Medicine/Texas Children’s Hospital, Houston, TX, USA*, ²*Lab for Regenerative Tissue Repair, Texas Children’s Hospital & Baylor College of Medicine, Houston, TX, USA*, ³*Texas Children’s Hospital & Baylor College of Medicine, Houston, TX, USA*, ⁴*Baylor College of Medicine, Houston, TX, USA*, ⁵*Texas Children’s Hospital, Houston, TX, USA*

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HEALTH INFORMATION TECHNOLOGY AUGMENTS A QI-DIRECTED MORBIDITY AND MORTALITY CONFERENCE AND IMPROVES QUALITY OF CARE

Nitin Sajankila, MD¹, Thomas Javens, BS², Josh Hampl, BS², Courtney Coleman, RN, BSN², Brian D. Kenney, MD³, Gail E. Besner, MD⁴

¹*Nationwide Children’s Hospital, Ohio State University, Columbus, OH, Columbus, OH, USA*, ²*Nationwide Children’s Hospital, Columbus, OH, Columbus, OH, USA*, ³*Nationwide Children’s Hospital, Columbus, OH, USA*, ⁴*Nationwide Children’s Hospital, Columbus, OH, USA*

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THE VALUE OF A REMINDER: UTILIZING PATIENT TRACKING WITH PEDIATRIC GASTROSTOMY TUBE PATIENTS TO DECREASE EMERGENCY ROOM VISITS

Rachel L. Bank, BA¹, Victoria Deng, BA², Nadia Kobal, MSN, RN³, Anuja Sarode, MPH³, Anne K. Mackow, MD, MPH³, Eiichi Miyasaka, MD

¹*Case Western Reserve University School of Medicine, Cleveland Heights, OH, USA*, ²*Case Western Reserve University School of Medicine, Cleveland, OH, USA*, ³*UH Rainbow Babies and Children’s Hospital, Cleveland, OH, USA*

32**GASTROSTOMY TUBE PRE-OPERATIVE BOARDING PASS FOR CONGENITAL CARDIAC SURGERY PATIENTS IMPROVES DAYS TO SURGERY AND HOSPITAL DISCHARGE**

Brittany N. Hegde, MD¹, Jay Mendenhall, BS², Natalie A. Drucker, MD, MS², Thian Nguyen, MSPAS, PA-C², Christina Morice, MSPAS, PA-C², Elisa I. Garcia, BSN, RN, MPH³, Nutan B. Hebballi, BDS, MPH³, Maryam Broussard, MHA, CCRP⁴, KuoJen Tsao, MD⁴, Lauren Haley, BSA⁵, Nischal K. Gautam, MD⁶, Rebecca Sam, MSN, RN, CPN, CCRN-K⁷

¹Department of Pediatric Surgery, The University of Texas Health Science Center at Houston, Houston, TX, USA, ²McGovern Medical School at The University of Texas Health Science Center at Houston, Houston, TX, USA, ³McGovern Medical School at the University of Texas at Houston (UTHealth), Houston, TX, USA, ⁴McGovern Medical School at the University of Texas Health Science Center at Houston, Houston, TX, USA, ⁵University of Texas Health Science Center at Houston, McGovern Medical School, ⁶Department of Anesthesiology, McGovern Medical School at The University of Texas Health Science Center at Houston, ⁷Children's Heart Institute, Children's Memorial Hermann Hospital

33**DEVELOPMENT AND UTILITY OF A COMPARATIVE PERFORMANCE REPORT CARD FOR INFECTION PREVENTION AND ANTIMICROBIAL STEWARDSHIP IN CHILDREN WITH ADVANCED APPENDICITIS**

Shannon L. Cramm, MD, MPH¹, Dionne Graham, PhD¹, Myron Allukian², Danielle Aronowitz³, Martin Blakely, MD, MS⁴, Brendan T. Campbell, MD MPH⁵, Nicole M. Chandler, MD⁶, Robert A. Cowles, MD⁷, Jennifer DeFazio, MD⁸, Katerina Dukleska, MD⁹, Justice Echols, BS¹⁰, Joseph Esparaz, MD, MPH¹¹, Christina Feng, MD¹², Cornelia Griggs, MD¹³, David N. Hanna, MD¹⁴, Katherine He, MD, MS¹, Olivia Keane, MD¹⁵, Shaun Kunisaki, MD¹⁶, Aaron M. Lipskar, MD¹⁷, Sean E. McLean, MD¹⁸, Claudia Orlas Bolanos¹³, Robert T. Russell, MD, MPH¹⁹, Matthew T. Santore, MD²⁰, Stefan Scholz, MD²¹, Shelby R. Sferra, MD, MPH²², Elisabeth (Lisa) Tracy, MD²³, Sacha Williams, MD, MS, MPH⁶, Lucy Zhang, MD²⁴, Shawn J. Rangel, MD, MSCE¹

¹Boston Children's Hospital, Boston, MA, USA, ²Children's Hospital of Philadelphia, Philadelphia, PA, USA, ³Cohen Children's Medical Center at Hofstra/Northwell, ⁴Department of Pediatric Surgery, Vanderbilt University Medical Center, ⁵American College of Surgeons, Committee on Trauma, Hartford, CT, USA, ⁶Johns Hopkins All Children's Hospital, St. Petersburg, FL, USA, ⁷Yale School of Medicine, Department of Pediatric Surgery, New Haven, CT, USA, ⁸New York Presbyterian Morgan Stanley Children's Hospital, Columbia University Vagelos College of Physicians and Surgeons, New York, NY, USA, ⁹Connecticut Children's Medical Center, University of Connecticut, Hartford, CT, USA, ¹⁰University of North Carolina Health System, Chapel Hill, NC, USA, ¹¹Children's of Alabama, Birmingham, AL, USA, ¹²Children's National Hospital, Washington, DC, USA, ¹³Massachusetts General Hospital, Boston, MA, USA, ¹⁴Vanderbilt University Medical Center, Nashville, TN, USA, ¹⁵Children's Healthcare of Atlanta, Atlanta, GA, USA, ¹⁶Johns Hopkins University School of Medicine, Baltimore, MD, USA, ¹⁷Zucker School of Medicine at Hofstra/Northwell, Cohen Children's Medical Center at Northwell Health, New Hyde Park, NY, USA, ¹⁸University of North Carolina at Chapel Hill, Chapel Hill, NC, USA, ¹⁹University of Alabama at Birmingham and Children's of Alabama, Birmingham, AL, USA, ²⁰Emory University, Atlanta, GA, USA, ²¹UPMC Children's Hospital of Pittsburgh, Pittsburgh, PA, USA, ²²Johns Hopkins University, Baltimore, MD, USA, ²³Duke University Medical Center, Durham, NC, USA, ²⁴Yale New Haven Children's Hospital, New Haven, CT, USA

34**CURRENT BURNOUT AND WORK SATISFACTION AMONG PEDIATRIC SURGEONS**

Jason D. Fraser, MD¹, Yara Duran², Janelle Noel-MacDonnell, MD¹, Cynthia D. Downard, MD, MMSc³, Katherine T. Flynn-O'Brien, MD, MPH⁴, Samir K. Gadepalli, MSc, MD, MBA⁵, Mark B. Slidell, MD, MPH⁶, K. Elizabeth Speck, MD, MS⁵, Katherine J. Deans, MD, MHSc⁷, Mary E. Fallat, MD⁸, Julia E. Grabowski, MD, Michael A. Helmrath, MD, MS¹⁰, Ronald B. Hirschl, MD⁵, Rashmi D. Kabre, MD¹¹, Dave R. Lal, MD, MPH¹², Matthew P. Landman, MD¹³, Charles M. Leys, MD, MSCI¹⁴, Grace Z. Mak, MD¹⁵, Troy Markel, MD¹⁶, Peter C. Minneci, MD, MHSc¹⁷, Beth A. Rymeski, DO¹⁸, Jacqueline Saito¹⁹, Brad W. Warner, MD²⁰, Tiffany Wright, MD²¹, Shawn D. St. Peter, MD¹

¹Children's Mercy Kansas City, Kansas City, MO, USA, ²Mercy Children's Hospital, Kansas City, MO, USA, ³Division of Pediatric Surgery, Hiram C. Polk, Jr., M.D. Department of Surgery, University of Louisville, Louisville, KY, USA, ⁴Medical College of Wisconsin, Milwaukee, WI, USA, ⁵University of Michigan, Ann Arbor, MI, USA, ⁶Section of Pediatric Surgery, Department of Surgery, The University of Chicago Medicine and Biologic Sciences, Chicago, IL, USA, ⁷Nemours Children's Health-Delaware Valley, Nemours Children's Health, Wilmington, DE, USA, ⁸Hiram C. Polk, Jr MD Department of Surgery, University of Louisville, Norton Children's Hospital, Louisville, KY, USA, ⁹Lurie Children's Hospital, on behalf of the Midwest Pediatric Surgery Consortium, Chicago, IL, USA, ¹⁰Division of Pediatric Surgery, Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA, ¹¹Division of Pediatric Surgery,

Department of Surgery, Ann & Robert H. Lurie Children’s Hospital of Chicago Northwestern University Feinberg School of Medicine, Chicago, IL, USA, ¹²Division of Pediatric Surgery, Medical College of Wisconsin/Children’s Wisconsin, Milwaukee, WI, USA, ¹³Division of Pediatric Surgery, Department of Surgery, Indiana University School of Medicine, Indianapolis, IN, USA, ¹⁴Division of Pediatric Surgery, Department of Surgery, University of Wisconsin, Madison, WI, USA, ¹⁵The University of Chicago Pritzker School of Medicine, Chicago, IL, USA, ¹⁶Riley Hospital for Children at IU Health, Indiana University School of Medicine, Indianapolis, IN, USA, ¹⁷Center for Surgical Outcomes Research, The Research Institute and Department of Surgery, Nationwide Children’s Hospital, University of Ohio, Columbus, OH, USA, ¹⁸Cincinnati Children’s Hospital Medical Center, Cincinnati, OH, USA, ¹⁹Washington University, St. Louis Children’s Hospital, St. Louis, MO, USA, ²⁰Washington University, Division of Pediatric Surgery, St. Louis, MO, USA, ²¹Norton Children’s Hospital, University of Louisville School of Medicine, Louisville, KY, USA

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BURNOUT IN PEDIATRIC SURGERY FELLOWS - PREVALENCE AND ASSOCIATED FACTORS

Krista Lai, MD¹, Brielle Ochoa, MD², R Scott Eldredge, MD³, Cristine S. Velazco, MD, MS⁴, Erica M. Weidler, MEd³, Kathleen van Leeuwen, MD³

¹Phoenix Children’s Hospital/Dalhousie University, Halifax, NS, Canada, ²Phoenix Children’s, Phoenix, AZ, USA, ³Phoenix Children’s Hospital, Phoenix, AZ, USA, ⁴Arnold Palmer Hospital for Children, Orlando, FL, USA

2:30pm - 3:00pm

Wellness and Burnout – Wellness Committee Mitigating Burnout Building our Communities of Support and Fostering Intentional Change

Grand Cypress D-I

Learning objectives

By the end of this presentation, attendees will be able to:

- Work to develop a culture that supports our colleagues and builds safety nets within diverse practice settings
- How to recognize when we may not be fit to operate
- How and when to ask for help
- Assess whether we should acutely continue with subsequent cases and professional obligations after a significant complication, and how systems can normalize and support relieve;
- Explore how we balance the ethical tension between maintaining fiduciary responsibility to care for our patients with our own health and wellbeing
- Learn how to acutely support colleagues when they experience a complication
- Become familiar with resources available through APSA to support surgeon recovery after adverse events/personal stressors

Moderator:

Terry Buchmiller, MD, *Boston Children’s Hospital, Boston, MA, USA*

Sustaining Self and Our Teams

Mary Brandt, MD, MDiv, *Tulane University School of Medicine, New Orleans, LA, USA*

Fostering Institutional Change

Yue-Yung Hu, MD, MPH, *Ann & Robert H. Lurie Children’s Hospital of Chicago, Chicago, IL, USA*

#APSAWellness: Organizational Next Steps

Kurt F. Heiss, MD, *Emory University, CHOA, Stone Mountain, GA, USA*

3:00pm - 4:00pm

COMMITTEE BREAKOUT SESSIONS I-III

Breakout I *

Quality Committee – Real World Quality Improvement Implementation: Overcoming Challenges and Sharing Lessons Learned

Breakout II

New Technology Committee – Robotic Pediatric Surgery

Breakout III

Benjy Brooks Committee – Operating Room Ergonomics for ALL Surgeons

3:00pm - 4:00pm

BREAKOUT I – Quality Committee Real-World Quality Improvement Implementation: Overcoming Challenges and Sharing Lessons Learned

Grand Cypress D-I

Learning objectives

By the end of the presentation, attendees will be able to:

- Identify how disparity indices can be used to better understand populations at risk
- Review current publication standards on race and disparity reporting
- Discuss how to interpret research papers on disparities and how to apply findings to clinical practice

Moderator:

Monica E. Lopez, MD MS, *Monroe Carell Jr Children's Hospital at Vanderbilt, Nashville, TN, USA*

Speakers:

Daniel G. Solomon, MD, *Yale School of Medicine, Department of Pediatric Surgery, New Haven, CT, USA*

Raquel Gonzalez, MD, MHCM, *Johns Hopkins All Children's Hospital, St. Petersburg, FL, USA*

Afif N. Kulaylat, MD, MSc, *Division of Pediatric Surgery, Penn State Children's Hospital, Hershey, PA, USA*

Panelists:

R. Lawrence Moss, MD, Shawn J. Rangel, MD, MSCE, *Boston Children's Hospital, Boston, MA, USA*

Mehul V. Raval, MD, MS, *Division of Pediatric Surgery, Department of Surgery, Northwestern University*

Feinberg School of Medicine, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA

Barron H. Frazier, MD, *Monroe Carell Jr. Children's Hospital at Vanderbilt, Nashville, TN, USA*

3:00pm - 4:00pm

BREAKOUT II – New Technology Committee – Robotic Pediatric Surgery

Grand Cypress A

Learning objectives

By the end of the presentation, attendees will be able to:

- Review how to tailor surgical care delivery to involve more patient centered care
- Explain the importance of patient/family engagement and perspectives in quality improvement and value-driven care delivery

Moderators:

Bethany J. Slater, MD, MBA, *Division of Pediatric Surgery, Department of Surgery, Comer Children's Hospital University of Chicago, Chicago, IL, USA*

Brian C. Gulack, MD, MHS - MOD, *Rush University Medical Center, Chicago, IL, USA*

Panelists:

Karen A. Diefenbach, MD, *Nationwide Children's Hospital, Dublin, OH, USA*

Matias Bruzoni, MD, *Stanford University School of Medicine, Palo Alto, CA, USA*

Irving J. Zamora, MD, MPH, *Vanderbilt University Medical Center, Nashville, TN, USA*

Seth D. Goldstein, MD, MPhil, *Division of Pediatric Surgery, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA*

3:00pm - 4:00pm

BREAKOUT III – Benjy Brooks Committee Operating Room Ergonomics for ALL Surgeons

Grand Cypress B-C

Learning objectives

By the end of the presentation, attendees will be able to:

- Discuss the current state of technology for 3D bioprinting
- Describe the pitfalls of 3D bioprinting
- Explain the future applications for this technology

Moderators:

Denise B. Klinkner, MD, *Med, Mayo Clinic, Rochester, MN, USA*

Julie Monteagudo, MD, *Hasbro Children's Hospital/Brown University, Providence, RI, USA*

Speakers:

Mary Brandt, MD, MDiv, *Tulane University School of Medicine, New Orleans, LA, USA*

Brian A. Jones, MD, *The University of Chicago Medicine & Biological Sciences, Chicago, IL, USA*

Susan Hallbeck, PhD, *Mayo Clinic, Rochester, MN, USA*

Julia S. Shelton, MD, MPH, *University of Iowa Hospitals & Clinics Stead Family Children's Hospital, Iowa City, IA, USA*

4:00pm - 4:30pm	Refreshment Break	Grand Cypress Foyer
4:30pm - 5:00pm	Outcomes and Quality Committee Collaboration: Systematic Review/ Quality Tool Kit - Lymphatic Malformations	Grand Cypress D-I
	Learning objectives	
	By the end of the presentation, attendees will: <ul style="list-style-type: none"> • The participant should understand the efficacy and complications of treating lymphatic malformations with medical (pharmacologic) therapies • The participant should understand the efficacy and complications of treating lymphatic malformations with sclerotherapy • The participant should understand the efficacy and complications of treating lymphatic malformations with surgical excision 	
	Chat Room Moderator David Rothstein, MD, <i>Division of Pediatric Surgery, Seattle Children’s Hospital, Seattle, Washington, USA</i>	
	Speakers Jason P. Sulkowski, MD, <i>Children’s Hospital of Richmond at VCU, Richmond, VA, USA</i> Kristy Rialon, MD, <i>Baylor College of Medicine, Houston, TX, USA</i> Alana Beres, MDCM, MPH, <i>St. Christopher’s Hospital for Children, Philadelphia, PA, USA</i> Doug Miniati, MD, <i>Kaiser Permanente Roseville, Roseville, CA, USA</i> Tamar Levene, MD, MS, <i>Joe DiMaggio Children’s Hospital, Bay Harbor Islands, FL, USA</i> Brian Englum, MD, MHS, <i>University of Maryland School of Medicine, Baltimore, MD, USA</i> Carlos T. Huerta, MD, <i>University of Miami Department of Surgery, Miami, FL, USA</i>	
5:00pm - 6:00pm	Wine and Cheese Poster Reception	Grand Cypress Foyer
	History Posters can be viewed on pgxx	On display in Exhibit Hall
	H-1 PLAY THE WINNER: HISTORIC AND ETHICAL ASPECTS OF THE FIRST NEONATAL EXTRACORPOREAL MEMBRANE OXYGENATION CLINICAL TRIAL Russell B. Hawkins, MD, MS ¹ , Saleem Islam, MBBS, MPH ² , Shawn D. Larson, MD, FACS ¹ <i>¹University of Florida College of Medicine, Gainesville, FL, USA, ²The Aga Khan University, Karachi, Sindh, Pakistan</i>	
	H-2 ROBERT REPLOGLE: CONTRIBUTIONS TO PEDIATRIC AND CARDIOTHORACIC SURGERY Sarah L. Wright, MD, Carolyn Gosztyla <i>Walter Reed National Military Medical Center, Bethesda, MD, USA</i>	
	H-3 MAKING WAVES: THE COMMENSAL RELATIONSHIP BETWEEN THE DEVELOPMENT OF THE ULTRASOUND AND THE ADVENT OF FETAL SURGERY Roi Lynn ¹ , Carlos T. Huerta, MD ² , Eduardo A. Perez, MD ³ <i>¹University of Miami Miller School of Medicine, Miami, FL, USA, ²University of Miami Department of Surgery, Miami, FL, USA, ³DeWitt Daughtry Family Department of Surgery, Division of Pediatric Surgery, University of Miami Miller School of Medicine, USA</i>	
	H-4 THE EVISCERATION OF GASTROSCHISIS MANAGEMENT Marla A. Sacks, MD <i>Department of Surgery, SUNY Downstate Health Sciences Center, Brooklyn, NY, USA</i>	
	H-5 THE FOKER PROCESS FOR LONG-GAP ESOPHAGEAL ATRESIA: TWENTY-FIVE YEARS OF MAKING THE IMPOSSIBLE, POSSIBLE Shawn Izadi, MD ¹ , Benjamin Zendejas, MD, MSc ¹ , Thomas E. Hamilton, MD ² , Rusty Jennings, MD ¹ , John Foker, MD ³ , Charles J. Smithers, MD ⁴ <i>¹Boston Children’s Hospital, Boston, MA, USA, ²Children’s Hospital of Philadelphia, Philadelphia, PA, USA, ³University of Minnesota, Minneapolis, MN, USA, ⁴Johns Hopkins All Children’s Hospital, St. Petersburg, FL, USA</i>	

H-6**A HISTORICAL REVIEW OF ECMO INNOVATION AND OUTCOMES**Tyler D. Leiva, MD¹, Katherine B. Snyder, MD², Alena Golubkova, MD³, Catherine J. Hunter, MD⁴¹University of Oklahoma Health Science Center, Oklahoma City, OK, USA, ²University of Oklahoma Health Sciences Center, Oklahoma City, OK, USA, ³Oklahoma Children's Hospital, Oklahoma City, OK, USA, ⁴Oklahoma Children's Hospital, Oklahoma

5:00pm - 6:30pm

Quickshots and Poster I: Clinical and Innovation, Abstracts*Grand Cypress D-1***Moderators**

Brian Arrinza Coakley, MD, FACS, FAAP, Dipl ABOM

Marion C. W Henry, MD, MPH

QS 1**COMPREHENSIVE ANALYSIS OF GUT MICROBIOTA IN POSTOPERATIVE BILIARY ATRESIA PATIENTS. NATIVE LIVER VERSUS TRANSPLANTED LIVER**Takanori Ochi, MD, PhD¹, Masahiro Takeda, mstakeda@juntendo.ac.jp², Takashi Asahara³, Akinobu Kurita³, Yuzuru Ogata³, Mitsuyoshi Suzuki⁴, Hiroyuki Koga, MD, PhD¹, Geoffrey J. Lane, MD, PhD¹, Hiroshi Nittono⁵, Akio Saiura⁶, Koichi Mizuta⁷, Mureo Kasahara⁸, Tadaharu Okazaki⁹, Atsuyuki Yamataka, MD PhD¹⁰, Yuichiro Yamashiro¹¹¹Department of Pediatric General and Urogenital Surgery, Juntendo University School of Medicine, Tokyo, Tokyo, Japan, ²Department of Pediatric General & Urogenital Surgery, Juntendo University School of Medicine, Tokyo, Japan, Tokyo, Tokyo, Japan, ³Yakult Central Institute, Kunitachi, Tokyo, Japan, ⁴Department of Pediatrics, Juntendo University School of Medicine, Bunkyo-ku, Tokyo, Japan, ⁵Junshin Clinic, Bile Acid Institute, Meguro-ku, Tokyo, Japan, ⁶Department of Hepatobiliary-Pancreatic Surgery, Juntendo University School of Medicine, Bunkyo-ku, Tokyo, Japan, ⁷Department of Transplant Surgery, Saitama Children's Medical Center, Saitama-shi, Saitama, Japan, ⁸Organ Transplantation Center, National Center for Child Health and Development, Setagaya-ku, Tokyo, Japan, ⁹Department of Pediatric Surgery, Juntendo University Urayasu Hospital, Urayasu-shi, Chiba, Japan, ¹⁰Department of Pediatric General and Urogenital Surgery, Juntendo University School of Medicine, Tokyo, Japan, ¹¹Probiotics Research Laboratory, Juntendo University Graduate School of Medicine, Bunkyo-ku, Tokyo, Japan**QS 2****USEFULNESS OF 3D RECONSTRUCTION OF LOW DOSE PELVIC CT AS AN INNOVATIVE TOOL FOR SURGICAL PLANNING OF DEFINITIVE CORRECTION OF CLOACAL ANOMALIES. A COHORT STUDY FROM A REFERRAL CENTER**Karla Alejandra Santos-Jasso, MD PhD¹, Pablo Lezama-Del Valle, MD², Sandra Zaragoza-Huerta, n/a¹¹Instituto Nacional de Pediatría, Mexico City, Distrito Federal, Mexico, ²Hospital Infantil de Mexico Federico Gomez, Mexico City, Distrito Federal, Mexico**QS 3****UNCOVERING RISK FACTORS AND OUTCOMES OF PULMONARY EMBOLISM IN A NATIONWIDE COHORT OF HOSPITALIZED CHILDREN**Carlos T. Huerta, MD¹, Walter A. Ramsey, MD², Cindy Rodriguez, BS³, Karishma Kodia⁴, Joshua P. Parreco, MD⁵, Chad M. Thorson, MD, MSPH⁶, Juan E. Sola, MD⁷, Eduardo A. Perez, MD⁷¹University of Miami Department of Surgery, Miami, FL, USA, ²Jackson Memorial Hospital / University of Miami, Miami, FL, USA, ³Florida State University College of Medicine, ⁴University of Miami DeWitt Daughtry Department of Surgery, Miami, FL, USA, ⁵Memorial Healthcare System, Miami, FL, USA, ⁶DeWitt Daughtry Family Department of Surgery, Division of Pediatric Surgery, University of Miami Miller School of Medicine, Miami, FL, USA, ⁷DeWitt Daughtry Family Department of Surgery, Division of Pediatric Surgery, University of Miami Miller School of Medicine, USA**QS 4****POSTOPERATIVE HYDRATION WITH INTERMITTENT BOLUSES OF BALANCED SALT SOLUTION IS SAFE AND EFFECTIVE: PRELIMINARY RESULTS OF THE BOLUSES OF RINGERS IN SURGICAL KIDS (BRISK) RANDOMIZED CONTROLLED TRIAL**Allison Mak, MD¹, Stephanie Collins, BSN,MSN,CRNP-AC¹, Rosa Hwang, BS², Peter Mattei, MD²¹The Children's Hospital of Philadelphia, Philadelphia, PA, USA, ²Children's Hospital of Philadelphia, Philadelphia, PA, USA

QS 5**EFFICACY OF INTRALESIONAL BLEOMYCIN ALONE AND IN COMBINATION WITH DEXAMETHASONE IN INFANTILE HEMANGIOMA**

Siavash Shariatzadeh, MD, MPH
 Stanford School of Medicine, Stanford, CA, USA

QS 6**PEDIATRIC SURGEONS SPARE MORE OVARIES THAN THEIR GYNECOLOGIST COUNTERPARTS DURING SURGERY FOR OVARIAN TORSION**

Claire M. Wunker, MD, MSc¹, Joe Rodriguez, MD², Si-Min Park³, Elfadaly Ahmed³, Jordan Perkins³, Shin Miyata²
¹Saint Louis University, St Louis, MO, USA, ²SSM Cardinal Glennon Children's Hospital/Saint Louis University Hospital, St. Louis, MO, USA, ³SSM Cardinal Glennon Children's Hospital/Saint Louis University, St Louis, MO, USA

QS 7**ELECTROADHESION OF HYDROGEL PATCHES: A NOVEL AND SUTURE-LESS ALTERNATIVE FOR INTESTINAL REPAIR**

Michele S. Saruwatari, MD¹, Leah K. Borden, PhD², David Boegner, BS², Xiaofang Wu, PhD³, Priya Srinivasan, PhD³, Mousumi Basu³, Ian White, PhD², Srinivasa R. Raghavan, PhD², Anthony Sandler, MD⁴, Morine Nader, Paula Montero
¹Sheikh Zayed Institute for Pediatric Surgical Innovation at Children's National Hospital MedStar Georgetown University and Washington Hospital Center, Washington, DC, USA, ²Department of Chemical and Biomolecular Engineering, University of Maryland, College Park, MD, USA, ³Sheikh Zayed Institute for Pediatric Surgical Innovation, Children's National Medical Center, Washington, DC, USA, ⁴Children's National Medical Center, Washington, DC, USA

QS 8**DO BLINDED TEMPORARY GASTRIC STIMULATION TRIALS IMPROVE PATIENT SELECTION FOR PERMANENT IMPLANT?**

Andrea Gongora, BS¹, Christel Gharby, BS¹, Madison Wnuk¹, Saleem Islam, MBBS, MPH²
¹University of Florida, Gainesville, FL, USA, ²The Aga Khan University, Karachi, Sindh, Pakistan

QS 9**NOVEL SECUREMENT METHOD FOR EXTERNAL TUNNELED CENTRAL VENOUS ACCESS DEVICES**

Nicole A. Becher, MD¹, Tyler Mironuck², Bryan Norman³, Christopher Seighman³, Josh Eng-Morris³, Gabe Chapel³, Genevieve Kierulf⁴, Steven L. Moulton, MD⁵
¹Division of Pediatric Surgery, Children's Hospital Colorado, University of Colorado School of Medicine, Denver, CO, USA, ²EZaLife, Aurora, CO, USA, ³University of Colorado, Aurora, CO, USA, ⁴Division of Pediatric Surgery, Children's Hospital Colorado, University of Colorado School of Medicine, Aurora, CO, USA, ⁵Children's Hospital Colorado, Aurora, CO, USA

QS 10**ENHANCED FLUID DRAINAGE USING A NOVEL MULTI-POD DRAINAGE CATHETER: IN VITRO EVALUATION**

Abdulaziz Alhammad, Mana Almuhaideb, Sarah Aljazaeri, Ahmed Alyahya, Ayman Aljazaeri, MD
 King Saud University, Riyadh, Ar Riyad, Saudi Arabia

QS 11**TRENDS AND SATISFACTION OF TELEMEDICINE UTILIZATION FOR PEDIATRIC SURGICAL CLINIC VISITS THROUGHOUT THE COVID-19 PANDEMIC**

Walker D. Short, MD¹, Oluyinka O. Olutoye, MD, MPH¹, Steven Mehl, MD², Rachel Brock³, Ekene Onwuka, MD, MS⁴, Kristy Rialon, MD⁵, Lily S. Cheng, MD¹, Alice King, MD³, Sundeep G. Keswani, MD¹
¹Baylor College of Medicine/Texas Children's Hospital, Houston, TX, USA, ²Division of Pediatric Surgery, Department of Surgery, Texas Children's Hospital, Houston, TX, USA, ³Texas Children's Hospital, Houston, TX, USA, ⁴Texas Children's Hospital & Baylor College of Medicine, Houston, TX, USA, ⁵Baylor College of Medicine, Houston, TX, USA

QS 12**FACTORS AFFECTING EXTENDED LENGTH OF STAY IN THE PEDIATRIC PATIENT**

Michelle C. Coughlin, MD¹, Erika Ridelman, PhD², Christina M. Shanti, MD³
¹Wayne State Medical University/ Children's Hospital of Michigan/ Detroit Medical Center, Detroit, MI, USA, ²Wayne State University/ Children's Hospital of Michigan/ Detroit Medical Center, detroit, MI, USA, ³Wayne State University/ Children's Hospital of Michigan, Detroit, MI, USA

QS 13**IMPROVING THE PEDIATRIC PERI-PROCEDURAL EXPERIENCE: WHAT THE FAMILY WANTS US TO KNOW**

Maximilian A. Selbst, BA¹, Nutan B. Hebballi, BDS, MPH², Claire Egan, RN³, Alisha Godfrey, RN³, Laura Crain, CCLS³, KuoJen Tsao, MD⁴, Amy D. Graham-Carlson, MD⁴, Akemi L. Kawaguchi, MD⁵
¹McGovern Medical School at the University of Texas Health Science Center at Houston, Houston, TX, USA, ²McGovern Medical School at the University of Texas at Houston (UTHealth), Houston, TX, USA, ³Children's Memorial Hermann Hospital, Houston, TX, USA, ⁴McGovern Medical School at the University of Texas Health Science Center at Houston, Houston, TX, USA, ⁵McGovern Medical School at the University of Texas at Houston (UTHealth)

QS 14**DATA DRIVEN METHODOLOGY TO DECREASE PREFERENCE CARD WASTE: A QUALITY IMPROVEMENT INITIATIVE**

Brittany Levy, MD¹, David Worhunsky², Julia Hay, PharmD¹, Emily Eichinger, PharmD¹, Christopher DeSimone, MD¹, Andrew M. Harris, MD¹
¹University of Kentucky, Lexington, KY, USA, ²University of Kentucky, Kentucky Children's Hospital

QS 15**DEVELOPMENT AND IMPLEMENTATION OF AN ADD-ON CASE DELAY DASHBOARD FOR QUALITY IMPROVEMENT IN A CHILDREN'S OPERATING ROOM**

Pooja S. Salvi, MD¹, David H. Stitelman, MD², Emily R. Christison-Lagay, MD², Daniel G. Solomon, MD²
¹New York Presbyterian- Weill Cornell, New York, NY, USA, ²Yale School of Medicine, Department of Pediatric Surgery, New Haven, CT, USA

QS 16**IMPLEMENTING AN MRI PROTOCOL FOR THE EVALUATION OF PEDIATRIC POST-APPENDECTOMY ABSCESS: A QUALITY IMPROVEMENT PROJECT**

Alicia C. Greene, DO¹, Marc M. Mankarious, MD², Akshilkumar Patel, MD², Madeline Matzelle-Zywicki, BS³, Lilia M. Reyes, MD⁴, Anthony Tsai, MD⁵, Mary Santos, MD, Michael M. Moore, MD⁴, Afif N. Kulaylat, MD, MSc⁶
¹Penn State Hershey Medical Center, Harrisburg, PA, USA, ²Penn State Hershey Medical Center, Hershey, PA, USA, ³Penn State University College of Medicine, Hershey, PA, USA, ⁴Penn State Children's Hospital, Hershey, PA, USA, ⁵Division of Pediatric Surgery, Penn State Children's Hospital, Hershey, PA, USA, ⁶Division of Pediatric Surgery, Penn State Children's Hospital, Hershey, PA, USA

QS 17**IMPLEMENTATION OF STANDARDIZED CAREGIVER EDUCATION WITH PHOTOS OF EXPECTED HEALING REDUCES HEALTHCARE UTILIZATION FOLLOWING PLASTIBELL CIRCUMCISION**

Gerard R. Martusciello, MPA¹, Gwyneth A. Sullivan, MD, MS², Nathaniel Koo, MD¹, Srikumar Pillai, MD¹
¹Rush University Medical Center, Chicago, IL, USA, ²Division of Pediatric Surgery, Northwestern University Feinberg School of Medicine, Ann & Robert H. Lurie Children's Hospital; Division of Pediatric Surgery, Rush University Medical Center, Chicago, IL, USA, ³Division of Pediatric Surgery, Department of Surgery, Rush University Medical Center, Chicago, IL, USA

QS 18**IMPACT OF LINGUISTIC MINORITY STATUS AND INTERPRETER USE ON PEDIATRIC SURGICAL OUTCOMES**

Hannah Cockrell, MD, Dwight Barry, PhD, André Dick, MD MPH, Sarah Greenberg, MD MPH
 Seattle Children's Hospital, Seattle, WA, USA

QS 19**COMPLICATED APPENDICITIS READMISSIONS REDUCED FOLLOWING POSTOPERATIVE GUIDELINE AND ROUTINE INTRAOPERATIVE CULTURES: LONGITUDINAL BENEFITS OF QUALITY IMPROVEMENT**

Peter Juviler, MD¹, Marjorie J. Arca, MD², David Darcy, MD³, Michael H. Livingston, MD, MSc, FRCSC⁴, Elizabeth Levatino, BSN, RN¹, Walter Pegoli, MD⁵, Brenda Tesini, MD⁶, Sarah Verna, RDCS², Nicole A. Wilson, PhD, MD², Derek Wakeman, MD¹
¹University of Rochester, Rochester, NY, USA, ²University of Rochester | Golisano Children's Hospital, Rochester, NY, USA, Golisano Children's Hospital, University of Rochester Medical Center, Rochester, NY, USA, ⁴Division of Pediatric Surgery, McMaster University, Hamilton, ON, Canada, ⁵University of Rochester Department of Surgery, Rochester, NY, USA, ⁶University of Rochester

QS 20**TRACHEOBRONCHOPEXY TO AVOID TRACHEOSTOMY IN ESOPHAGEAL ATRESIA PATIENTS WITH SEVERE LIFE-THREATENING TRACHEOBRONCHOMALACIA**

Hester F. Shieh, MD¹, Russell W. Jennings, MD², Thomas E. Hamilton, MD³, Shawn Izadi, MD⁴, Ali Kamran, Gary Visner⁴, Leah Frain⁴, Benjamin Zendejas, MD, MSc⁴, Charles J. Smithers, MD²

¹Johns Hopkins All Children's Hospital, St Petersburg, FL, USA, ²Johns Hopkins All Children's Hospital, St. Petersburg, FL, USA, ³Children's Hospital of Philadelphia, Philadelphia, PA, USA, ⁴Boston Children's Hospital, Boston, MA, USA

QS 21**LONG-TERM RECURRENCE RATES AND PATIENT SATISFACTION AFTER REPAIR OF PECTUS EXCAVATUM**

Nelimar Cruz-Centeno, MD¹, James A. Fraser, MD², Shai Stewart, MD², Derek R. Marlor, MD¹, Tolu Oyetunji, MD, MPH², Shawn D. St. Peter, MD²

¹Children's Mercy Hospital, Kansas City, MO, USA, ²Children's Mercy Kansas City, Kansas City, MO, USA

QS 22**UTILITY OF A WHITE LIGHT SCAN INDEX AS AN ALTERNATIVE TO THE HALLER INDEX IN DETERMINING NEED FOR SURGICAL CORRECTION OF PECTUS EXCAVATUM**

Michela Carter, MD¹, Suhail Zeineddin, MD, MS², J. Benjamin Pitt, MD³, Amparo Perez, MA³, Mia DeTella, BS³, Owen Lieland¹, Christine State, DHA⁴, Yao Tian, MS, MPH⁵, Marleta Reynolds, MD⁴, Hassan Ghomrawi⁴, Seth D. Goldstein, MD, MPhil³, Fizan Abdullah, MD, PhD¹

¹Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, ²Division of Pediatric Surgery, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, ³Division of Pediatric Surgery, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, ⁴Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, ⁵Surgical Outcomes Quality Improvement Center (SOQIC), Feinberg School of Medicine, Northwestern University, Chicago, IL, USA

QS 23**PECTUS EXCAVATUM AND ITS CARDIOPULMONARY EFFECTS IN THE PEDIATRIC POPULATION**

R Scott Eldredge, MD¹, Brielle Ochoa, MD², Arash Sabati¹, Daniel J. Ostlie, MD¹, Lisa E. McMahon, MD¹, Justin Lee, MD³, David M. Notrica, MD¹, Benjamin Padilla, MD⁴

¹Phoenix Children's Hospital, Phoenix, AZ, USA, ²Phoenix Children's, Phoenix, AZ, USA, ³Phoenix Children's Hospital, Phoenix, AZ, USA, ⁴Phoenix Children's Hospital, San Francisco, CA, USA

QS 24**VASCULAR TRAUMA IN CHILDREN: ETIOLOGY, MANAGEMENT AND OUTCOMES OF PATIENTS AT A LEVEL 1 TRAUMA CENTER**

Derrick Williams, BA¹, Krislynn Mueck, MD, MPH, MS¹, Elisa I. Garcia, BSN, RN, MPH², Joan Griffin, BS¹, Mary High, BS¹, Charles S. Cox, MD³, Mary T. Austin, MD, MPH³

¹McGovern Medical School at the University of Texas Health Science Center Houston, Houston, TX, USA, ²McGovern Medical School at the University of Texas at Houston (UTHealth), Houston, TX, USA, ³McGovern Medical School at the University of Texas Health Science Center at Houston, Houston, TX, USA

QS 25**CAR SEAT AIRBAG: A CONCEPT DESIGN TO DECREASE INJURIES IN HORSE-DRAWN BUGGY ACCIDENTS**

Rachel E. Hanke, MD¹, Alicia C. Greene, DO², Raykal Adiansjah³, Alan Figueira³, Gilberto Lee³, Julia Wergeland³, Anilchandra Attaluri, PhD³, Shawn Safford, MD, MBA⁴

¹Penn State Health Milton S. Hershey Medical Center, Hummelstown, PA, USA, ²Penn State Hershey Medical Center, Harrisburg, PA, USA, ³Penn State School of Science, Engineering and Technology, Middletown, PA, USA, ⁴University of Pittsburgh Medical Center Children's Hospital, Pittsburgh, PA, USA

5:00pm - 6:30pm

Quick Shots and Poster II: Basic Science and Practice*Grand Cypress A***Moderators:**

Shannon L. Castle, MD

Kathleen van Leeuwen, MD

QS 26**NLRP3 INFLAMMASOME ASSOCIATED WITH MORTALITY IN PIGLET MODEL OF RESPIRATORY DISTRESS SYNDROME**

Evan S. Chernov, BS¹, Sarah Blair, BS¹, Qinghe Meng, MD¹, Harry Ramcharran, MD¹, Joshua Satalin, BS¹, Gary F. Nieman, BS¹, Michaela Kollisch-Singule, MD²

¹SUNY Upstate Medical University, Syracuse, NY, USA, ²SUNY Upstate Medical University, Jamesville, NY, USA

QS 27**ANALYSIS OF SOCIAL DETERMINANTS OF HEALTH IN THE PEDIATRIC GENERAL SURGICAL POPULATION OF A LARGE NORTHEASTERN URBAN HEALTH SYSTEM**

Devin Midura, MD¹, Samantha Levano, MPH², Kevin P. Fiori, MD, MPH, MSc³, Benjamin A. Farber, MD³

¹Montefiore Medical Center/Albert Einstein College of Medicine, Bronx, NY, USA, ²Albert Einstein College of Medicine, Bronx, NY, USA, ³Albert Einstein College of Medicine/Montefiore Medical Center, Bronx, NY, USA

QS 28**CNP-miR146a DECREASES INFLAMMATORY CELL INFILTRATE AND BRONCHOALVEOLAR PROTEIN LEAK IN METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS (MRSA)-INDUCED ACUTE LUNG INJURY**

Alyssa E. Vaughn, MD¹, Christina Sul, MD², Tanner Lehmann, BA³, Alison Wallbank, BS⁴, Bradford Smith, PhD⁴, Eva Nozik, MD², Christine Vohwinkel, MD, PhD², Carlos Zgheib, PhD⁵, Kenneth W. Liechty, MD⁶

¹Children's Hospital Colorado, Denver, CO, USA, ²Children's Hospital Colorado, Aurora, CO, USA, ³University of Colorado Denver, Aurora, CO, USA, ⁴Department of Bioengineering, University of Colorado Denver Anschutz Medical Campus, Aurora, CO, USA, ⁵Laboratory for Fetal and Regenerative Biology/Department of Surgery/University of Colorado Denver School of Medicine and Children's Hospital Colorado, Aurora, CO, USA, ⁶University of Arizona Tucson College of Medicine, Tucson, AZ, USA

QS 29**INHIBITION OF DEOXYNUCLEOTIDE TRIPHOSPHATE SYNTHESIS AS A NOVEL METHOD FOR SENSITIZING NEUROBLASTOMA TO RADIATION**

Jennifer T. Castle, MD¹, B. Mark Evers, MD¹, Piotr Rychahou, MD¹, Jill M. Kolesar, PharmD², Eric J. Rellinger, MD³

¹Department of Surgery, Markey Cancer Center, University of Kentucky, Lexington, KY, USA, ²Department of Pharmaceutical Practice and Science, Markey Cancer Center, University of Kentucky, Lexington, KY, USA, ³University of Kentucky, Lexington, KY, USA

QS 30**LIPID NANOPARTICLE DELIVERY OF HUMAN MILK DERIVED MIRNAS TO ATTENUATE INTESTINAL INJURY**

Mina Yeganeh, HBSc¹, Jingan Chen, Bachelor's², Dorothy Lee, Bachelor's³, Bo Li, PhD⁴, Bowen Li, PhD⁵, Agostino Pierro, MD⁴

¹Hospital for Sick Children, Toronto, ON, Canada, ²University of Toronto, Toronto, ON, Canada, ³Hospital for Sick Children, Toronto, ON, Canada, ⁴The Hospital for Sick Children, Toronto, ON, Canada, ⁵Leslie Dan Faculty of Pharmacy, University of Toronto, Toronto, ON, Canada

QS 32**UPREGULATION OF P-REX1 IS ASSOCIATED WITH ENHANCED INVASION AND METASTASIS IN NEUROBLASTOMA**

Jillian C. Jacobson, MD¹, Jingbo Qiao, PhD², Elizabeth D. Cochran, MD², Dai H. Chung, MD²

¹UT Southwestern Medical Center, Dallas, TX, USA, ²University of Texas Southwestern Medical Center, Dallas, TX, USA

QS 33**OPTIMIZING THE MICROENVIRONMENT TO ENHANCE THE SUCCESS OF ENTERIC NEURONAL STEM CELL TRANSPLANTATION FOR HIRSCHSPRUNG DISEASE**

Jessica Mueller, MD, Rhian Stavely, PhD, Richard A. Guyer, MD, PhD, Sukhada Bhawe, PhD, Ryo Hotta, MD, PhD, Allan Goldstein, MD

Massachusetts General Hospital, Boston, MA, USA

QS 34**LOSS OF CAVEOLIN-1 IS ASSOCIATED WITH NECROTIZING ENTEROCOLITIS IN HUMANS AND MICE**

Tyler D. Leiva, MD¹, Alena Golubkova, MD², Katherine B. Snyder, MD³, Heather L. Liebe, MD², Camille Schlegel³, Jeffery Eckert, PhD⁴, Zhongxin Yu, MD⁵, William Berry⁴, Catherine J. Hunter, MD⁶
¹University of Oklahoma Health Science Center, Oklahoma City, OK, USA, ²Oklahoma Children's Hospital, Oklahoma City, OK, USA, ³University of Oklahoma Health Sciences Center, Oklahoma City, OK, USA, ⁴University of Oklahoma Health Science Center, Oklahoma City, OK, USA, ⁵University of Oklahoma Health Science center, Oklahoma City, OK, USA, ⁶Oklahoma Children's Hospital, Oklahoma City, OK, USA

QS 35**PHARMACOLOGIC TOLL-LIKE RECEPTOR 4 INHIBITION AMELIORATES EARLY ASTROGLIOSIS TO IMPROVE NEUROCOGNITIVE OUTCOMES FOLLOWING TRAUMATIC BRAIN INJURY**

Mahmoud El Baassiri, MD¹, William B. Fulton², Chhinder P. Sodhi², David J. Hackam, MD, PhD³, Isam W. Nasr, MD⁴
¹Division of Pediatric Surgery, The Johns Hopkins Medical Institutions, Baltimore, MD, USA, Baltimore, MD, USA, ²Johns Hopkins University School of Medicine, Baltimore, MD, USA, ³Johns Hopkins Children's Center, Baltimore, MD, USA, ⁴Johns Hopkins, Baltimore, MD, USA

QS 36**EFFECTS OF PRENATAL LIPOSOMAL SIHF-2A ON CARDIO-METABOLIC GENE REMODELING IN CDH-ASSOCIATED CARDIAC DYSFUNCTION**

Siqinzhaoorigetu Saljuud, PhD¹, Vikas S. Gupta, MD², Di Jin, MS¹, Hannah V. Breitschopf³, Kylie W. Holden, MD³, Matthew T. Harting, MD, MS, FAAP, FACS¹, Cristian Rodriguez-Aguayo, Gabriel Lopez-Berestein
¹McGovern Medical School at UTHHealth, Houston, TX, USA, ²McGovern Medical School, University of Texas, Houston, Dallas, TX, USA, ³McGovern Medical School, University of Texas, Houston, Houston, TX, USA

QS 37**SECRETORY IGA DELIVERED VIA TRANSAMNIOTIC FETAL IMMUNOTHERAPY (TRAFIT) FUNCTIONALLY BINDS INTESTINAL BACTERIA INTO THE POSTNATAL PERIOD: A POTENTIAL NOVEL STRATEGY TO PREVENT NECROTIZING**

Ashlyn E. Whitlock, MD¹, Kamila Moskowitsova, MD², Ina Kycia, PhD³, Jeffery Nelson, MS⁴, David Zurakowski, MS, PhD⁵, Dario O. Fauza, MD, PhD³
¹Boston Children's Hospital, Harvard Medical School, Brookline, MA, USA, ²Boston Children's Hospital, Harvard Medical School, Boston, MA, USA, ³Boston Children's Hospital, Department of Surgery, Boston, MA, USA, ⁴Harvard Medical School, Boston, MA, USA, ⁵Boston Children's Hospital, Department of Anesthesia, Critical Care, and Pain Medicine Research, Boston, MA, USA

QS 38**WHOLE GENOME SEQUENCING IDENTIFIES NOVEL TARGETS IN GASTROSCHISIS**

John P. Marquart, MD¹, Qian Nie, PhD², Brandon Smith, MS², Kala Schilter, PhD², Angie Jelin, MD³, Honey Reddi, PhD, FACMG², Amy J. Wagner, MD⁴
¹Childrens of Wisconsin, Milwaukee, WI, USA, ²Precision Medicine Lab, Medical College of Wisconsin, Milwaukee, WI, USA, ³The Johns Hopkins Medical Institutions, Baltimore, MD, USA, Baltimore, MD, USA, ⁴Children's Wisconsin, Milwaukee, WI, USA

QS 39**WEIGHT-FOR-AGE Z-SCORE AT BIRTH AS A PREDICTOR OF 30-DAY SURGICAL WOUND COMPLICATION AND OUTCOMES IN TERM NEONATES**

Gabriel J. Ramos Gonzalez, MD¹, Maua Mosha, MPH², S. Alex Rottgers, MD³, Christopher W. Snyder, MD⁴, Nicole M. Chandler, MD⁴
¹Division of Pediatric Surgery, Johns Hopkins All Children's Hospital, St. Petersburg, FL, USA, ²Department of Health Informatics, Johns Hopkins All Children's Hospital, St. Petersburg, FL, USA, ³Pediatric Plastic Surgery, Johns Hopkins All Children's Hospital, St. Petersburg, FL, USA, ⁴Johns Hopkins All Children's Hospital, St. Petersburg, FL, USA

QS 40**THE COST OF DIVERSITY: LANGUAGE BARRIERS IN PEDIATRIC APPENDICITIS**

Brittany Levy, MD¹, Jennifer T. Castle, MD², Wesley S. Wilt, MD¹, Daniel L. Davenport, PhD¹, Eric J. Rellinger, MD¹, David Worhunsky³
¹University of Kentucky, Lexington, KY, USA, ²Department of Surgery, Markey Cancer Center, University of Kentucky, Lexington, KY, USA, ³University of Kentucky, Kentucky Children's Hospital

QS 41**PRODUCTION OF A NEW AND IMPROVED GUT-ON-A-CHIP**

Adrian Rajab, BS¹, Belgacem Mihi, DVM², Samuel Volpe, BS², Gail E. Besner, MD³

¹Nationwide Children's Hospital, Ohio State University College of Medicine, Columbus, OH, Columbus, OH, USA, ²Nationwide Children's Hospital, Columbus, OH, Columbus, OH, USA, ³Nationwide Children's Hospital, Columbus, OH, USA

QS 42**THE HYPERINFLAMMATORY STATE: INCREASING PROCLIVITY TO DEVELOP NECROTIZING ENTEROCOLITIS**

Katherine B. Snyder, MD¹, Heather L. Liebe, MD², Camille Schlegel¹, Alena Golubkova, MD², Tyler D. Leiva, MD³, Catherine J. Hunter, MD⁴

¹University of Oklahoma Health Sciences Center, Oklahoma City, OK, USA, ²Oklahoma Children's Hospital, Oklahoma City, OK, USA, ³University of Oklahoma Health Science Center, Oklahoma City, OK, USA, ⁴Oklahoma Children's Hospital, Oklahoma City, OK, USA

QS 44**A SCOPING ANALYSIS OF SOCIAL MEDIA UTILIZATION AMONGST PEDIATRIC SURGERY FELLOWSHIP PROGRAMS**

Nikhil R. Shah, MD, Christine G. DeFilippo, BS, Jana DeJesus, MD, Keyan Mobli, MD, Bindi Naik-Mathuria, MD, MPH, Ravi S. Radhakrishnan, MD, MBA

University of Texas Medical Branch, Galveston, TX, USA

QS 45**A NATIONAL SURVEY EXPLORING COMMUNICATION AND BIAS AMONG PEDIATRIC SURGEONS**

Ellen M. Reynolds, MD¹, Julia Metzger², Jason C. Fisher, MD³

¹St Lukes Children's Hospital, Boise, ID, USA, ²NYU Grossman School of Medicine, ³Hassenfeld Children's Hospital at NYU Langone, New York, NY, USA

QS 46**DISCHARGE ANTIBIOTICS IN PEDIATRIC PERFORATED APPENDICITIS: AN UNNECESSARY BURDEN?**

Su Yeon Lee, MD¹, Kathleen E. Doyle, MD¹, Emily Byrd, MD, PhD¹, Monalisa Hassan, MD¹, Zoe M. Saenz, MD¹, Minna Minsing Chen Wieck, MD, FACS², Jonathan Kohler, MD³, Shinjiro Hirose, MD⁴, Payam Saadai, MD⁴, Erin G. Brown, MD⁴

¹UC Davis Medical Center, Sacramento, CA, USA, ²University of California Davis, USA, ³University of Wisconsin, Madison, WI, USA, ⁴University of California, Davis Medical Center, Sacramento, CA, USA

QS 47**USING QUALITY IMPROVEMENT METHODOLOGY TO IMPROVE STANDARDIZED REPORTING OF PEDIATRIC THYROID ULTRASOUNDS USING TI-RADS**

Ameer Al-Hadidi, MD¹, Lamyia Atweh, MD², Jasmeet Singh³, Reham Alzahrani, MD³, Kelly Kersey³, Adam Bobbey, MD³, Robert Hoffman, MD³, Summit Shah, MD², Jennifer H. Aldrink, MD⁴

¹Nationwide Children's Hospital, Bloomfield Hills, MI, USA, ²Nationwide Children's Hospital, Columbus, OH, USA, ³Nationwide Children's Hospital, ⁴The Ohio State University College of Medicine, Nationwide Children's Hospital, Columbus, OH, USA

QS 48**A PROCESS IMPROVEMENT PROJECT TO INCREASE COMPLIANCE WITH CEPHALOSPORIN-BASED SURGICAL PROPHYLAXIS IN CHILDREN WITH NON-SEVERE PENICILLIN ALLERGIES**

Katherine He, MD, MS, Michele Dawson, CPHQ, Crystal Stroh, MSN, RN, CPN, Kristina M. Taylor, BS, BSN, RN, Susan Quigley, RN, BSN, Mari M. Nakamura, MD, MPH, Sarah Jones, PharmD, BCPS, Shawn J. Rangel, MD, MSCE

Boston Children's Hospital, Boston, MA, USA

QS 49**MESENCHYMAL DEVELOPMENT IS ENHANCED BY INNERVATION OF TRANSPLANTED HUMAN INTESTINAL ORGANIDS**

Andie C. Dorn¹, Eoin P. McNeill, PhD¹, David J. Sequeira¹, Partha S. Chakraborty, MD¹, Justin E. Lewis¹, Hasen Xue, MD¹, Scott D. Olson, PhD², Allison L. Speer, MD¹

¹McGovern Medical School at UTHHealth, Houston, TX, USA, ²McGovern Medical School at the University of Texas Health Science Center at Houston, Houston, TX, USA

QS 50**CILIARY-MEDIATED HEDGEHOG SIGNALING UNDERLYING MECHANICAL INTESTINAL LENGTHENING**

Siavash Shariatzadeh, MD, MPH¹, Katherine Portelli¹, Jun-Beom Park¹, Anne-Laure A. Thomas, MS², James C.Y. Dunn, MD, PhD²

¹Stanford School of Medicine, Stanford, CA, USA, ²Stanford University School of Medicine, Stanford, CA, USA

5:00pm - 6:30pm

Quick Shots and Poster III: Fetal, Cancer, Colorectal*Grand Cypress B-C***Moderators:**

Bethany J. Slater, MD, MBA
 David Rothstein, MD

QS 51**PRIMING OF NATURAL KILLER CELLS WITH NEUROBLASTOMA CELLS ENHANCES NATURAL KILLER CELL RELEASE OF GRANZYME B**

Colin H. Quinn, BS¹, Janet R. Julson, MD², John Laue³, Jerry E. Stewart, BS¹, Elizabeth A. Beierle, MD¹

¹Division of Pediatric Surgery, Department of Surgery, University of Alabama at Birmingham, Birmingham, AL, USA, ²University of Alabama at Birmingham, Birmingham, AL, USA, ³University of Alabama at Birmingham Heersink School of Medicine, Birmingham, AL, USA

QS 52**A NOVEL METHOD OF ULTRASOUND-GUIDED IN-UTERO INJECTION TO COLONIZE MOUSE EMBRYONIC INTESTINE WITH THE HUMAN GUT MICROBIOME**

Koichi Tsuboi, MD¹, David J. Hackam, MD, PhD², Chhinder P. Sodhi¹, William B. Fulton¹, Sanxia Wang¹, Peng Lu¹, Thomas Prindle¹, Steve Steinway, MD, PhD³, Hannah Moore¹, Hee-Seong Jang, PhD³, Johannes Duess, MD, PHD¹, Menghan Wang⁴, Carla M. Lopez, MD¹, Maame Sampah, MD, PhD⁵, Daniel J. Scheese, MD, MBS³, Zachariah Raouf⁶, Asuka Ishiyama¹

¹Johns Hopkins University School of Medicine, Baltimore, MD, USA, ²Johns Hopkins Children's Center, Baltimore, MD, USA, ³Division of Pediatric Surgery, Department of Surgery, Johns Hopkins University School of Medicine, Baltimore, MD, USA, Baltimore, MD, USA, ⁴Johns Hopkins University, Baltimore, MD, USA, ⁵Johns Hopkins School of Medicine, Baltimore, MD, USA, ⁶The Johns Hopkins Hospital, Baltimore, MD, USA

QS 53**TRANSAMNIOTIC STEM CELL THERAPY (TRASCET) MODULATES UTERINE NATURAL KILLER CELL ACTIVITY IN A MODEL OF INTRAUTERINE GROWTH RESTRICTION (IUGR)**

Ashlyn E. Whitlock, MD¹, Kamila Moskowitsova, MD², Ina Kycia, PhD³, David Zurakowski, MS, PhD⁴, Dario O. Fauza, MD, PhD³

¹Boston Children's Hospital, Harvard Medical School, Brookline, MA, USA, ²Boston Children's Hospital, Harvard Medical School, Boston, MA, USA, ³Boston Children's Hospital, Department of Surgery, Boston, MA, USA, ⁴Boston Children's Hospital, Department of Anesthesia, Critical Care, and Pain Medicine Research, Boston, MA, USA

QS 54**PROSPECTIVE VALIDATION OF HIRSCHSPRUNG-ASSOCIATED ENTEROCOLITIS SCORING SYSTEMS**

Ruth Lewit, MD, MPH¹, Lauren Camp², Lawrence Willis, MD³, Joseph Tobias, MD⁴, Rebecca Peil, FNP⁴, Andrew Mason, MA⁵, Elisa Ornelas⁶, Madelyn Hill, MPH⁷, Arturo Aranda, MD⁸, Ashish Chogle⁶, Yigit Guner MD, MS⁹, Andrew Zigman, MD CM¹⁰, Ankush Gosain, MD, PhD¹¹

¹Le Bonheur Children's Hospital, Augusta, GA, USA, ²Le Bonheur Children's Hospital, ³University of Tennessee Health Science Center, Le Bonheur Children's Hospital, Memphis, TN, USA, ⁴Oregon Health and Science University, Portland, OR, USA, ⁵Oregon Health and Science University, Beaverton, OR, USA, ⁶Children's Hospital of Orange County, Memphis, TN, USA, ⁷Division of Pediatric Surgery, Dayton Children's Hospital, Wright State University, Dayton, OH, USA, ⁸Dayton Children's Hospital, Dayton, OH, USA, ⁹Children's Hospital of Orange County and University of California Irvine, Orange, CA, USA, ¹⁰NW Permanente, OHSU/ Doernbecher Children's Hospital, Portland, OR, USA, ¹¹Le Bonheur Children's Hospital, Memphis, TN, USA

QS 55**NEURODIVERGENT PATIENTS WHO UNDERGO MALONE APPENDICOSTOMY ACHIEVE FECAL SOCIAL CONTINENCE IN THE SAME AMOUNT OF TIME AS NEUROTYPICAL PATIENTS**

Shimon E. Jacobs, MD, Laura Tiusaba, MD, Elizaveta Bokova, MD, Teresa Russell, MS, Athanasios Tyraskis, MD, Christina Feng, MD, Briony K. Varda, MD, MPH, Marc A. Levitt, MD, Andrea T. Badillo, MD
Children's National Hospital, Washington, DC, USA

QS 56**CONTEMPORARY MANAGEMENT OF CONGENITAL DIAPHRAGMATIC HERNIA REPAIR: A SURVEY OF PEDIATRIC SURGEONS**

Christina M. Theodorou, MD¹, Manisha Bhatia, MD MPH², Mary T. Austin, MD, MPH³, Brian W. Gray, MD⁴, Rebecca A. Saberi, MD⁵, Payam Saadai, MD⁶, Darrell Cass, MD⁷, Rony Marwan, MD⁸
¹*UC Davis Medical Center, SACRAMENTO, CA, USA*, ²*Indiana University School of Medicine Department of Surgery, Indianapolis, IN, USA*, ³*McGovern Medical School at the University of Texas Health Science Center at Houston, Houston, TX, USA*, ⁴*Division of Pediatric Surgery, Department of Surgery, Indiana University School of Medicine, Indianapolis, IN, USA*, ⁵*DeWitt Daughtry Family Department of Surgery, Division of Pediatric Surgery, University of Miami Miller School of Medicine, Miami, FL, USA*, ⁶*University of California, Davis Medical Center, Sacramento, CA, USA*, ⁷*Cleveland Clinic*, ⁸*University of Missouri, Columbia, MO, Greenwood Village, CO, USA*

QS 57**AIRWAY MANAGEMENT AND OUTCOMES FOLLOWING FETO: A SINGLE-CENTER DESCRIPTIVE ANALYSIS**

Oluyinka O. Olutoye, MD, MPH¹, Y. Deniz Sevilimis, BSA², Pamela Ketwaroo, MD², Timothy Lee³, Sundeep G. Keswani, MD¹, Alice King, MD³
¹*Baylor College of Medicine/Texas Children's Hospital, Houston, TX, USA*, ²*Texas Children's Hospital & Baylor College of Medicine, Houston, TX, USA*, ³*Texas Children's Hospital, Houston, TX, USA*

QS 58**SMALL BOWEL OBSTRUCTION FOLLOWING CONGENITAL DIAPHRAGMATIC HERNIA REPAIR: EVALUATION OF RISK FACTORS AND OPERATIVE APPROACH**

Nicholas Schmoke, MD¹, Francesca Cali, BA², Terri Wilken, BA², Weijia Fan, MS³, Julie Khlevner³, Vincent P. Duron, MD⁴
¹*Columbia University Irving Medical Center, New York City, NY, USA*, ²*Columbia University, New York, NY, USA*, ³*Columbia University Irving Medical Center, New York, NY, USA*, ⁴*CUMC, New York, NY, USA*

QS 59**LIDOCAINE INFUSIONS REDUCE POSTOPERATIVE ANTI-EMETIC USE AFTER SLEEVE GASTRECTOMY**

Devon J. Pace, MD¹, Julia Brothers, DO¹, Aditi Kale, n/a², Nadine Abi-Younes, MD¹, Manish Purohit, MD¹, Robert S. Lang, MD¹, Connie Lin, MD¹, Kirk Reichard, MD, MBA³
¹*Nemours Children's Health, Wilmington, DE, USA*, ²*Sidney Kimmel Medical College, Philadelphia, PA, USA*, ³*Nemours Children's Health, Wilmington, DE, USA*

QS 60**POSTNATAL FATE OF DONOR HEMATOPOIETIC STEM CELLS AFTER TRANSAMNIOTIC STEM CELL THERAPY (TRASCET) IN A HEALTHY SYNGENEIC MODEL**

Kamila Moskowitsova, MD¹, Ashlyn E. Whitlock, MD², Ina Kycia, PhD³, David Zurakowski, MS, PhD⁴, Dario O. Fauza, MD, PhD³
¹*Boston Children's Hospital, Harvard Medical School, Boston, MA, USA*, ²*Boston Children's Hospital, Harvard Medical School, Brookline, MA, USA*, ³*Boston Children's Hospital, Department of Surgery, Boston, MA, USA*, ⁴*Boston Children's Hospital, Department of Anesthesia, Critical Care, and Pain Medicine Research, Boston, MA, USA*

QS 61**MIRNAS CONTAINED INSIDE HUMAN AMNIOTIC FLUID-DERIVED EXTRACELLULAR VESICLES CAN BE USED AS BIOMARKERS OF NEUROINFLAMMATION SEVERITY IN SPINA BIFIDA APERTA**

Lina Antounians, MSc¹, Marc Oria², Foong-Yen Lim, MD³, Jose L. Peiro⁴, Augusto Zani, MD, PhD, FACS, FAAP⁵
¹*The Hospital for Sick Children, Toronto, ON, Canada*, ²*Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA*, ³*Cincinnati Children's Hospital, Cincinnati, OH, USA*, ⁴*Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA*, ⁵*The Hospital for Sick Children / University of Toronto, Toronto, ON, Canada*

QS 62**FACTORS ASSOCIATED WITH HOSPITALIZATION COST IN THE INITIAL MANAGEMENT OF ESOPHAGEAL ATRESIA: A NATIONAL COHORT STUDY**

Annalise B. Penikis, MD¹, Pooja S. Salvi, MD², Shelby R. Sferra, MD, MPH¹, Abigail Engwall-Gill³, Daniel G. Solomon, MD⁴, Shaun Kunisaki, MD³

¹Johns Hopkins University, Baltimore, MD, USA, ²New York Presbyterian- Weill Cornell, New York, NY, USA,

³Johns Hopkins University School of Medicine, Baltimore, MD, USA, ⁴Yale School of Medicine, Department of Pediatric Surgery, New Haven, CT, USA

QS 63**C-ARM CONE BEAM CT LOCALIZATION OF PULMONARY NODULES FOR THORACOSCOPIC RESECTION: A COLLABORATIVE IR/SURGERY APPROACH IN A HYBRID OR**

John M. Racadio, MD¹, Roshni Dasgupta, MD, MPH², Nicole A. Hilvert, RT¹, Manish Patel, DO¹, Neil Johnson, MD³, Daniel von Allmen, MD¹

¹Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA, ²Cincinnati Children's Medical Center, Cincinnati, OH, USA, ³Cincinnati Children's Hospital, Cincinnati, OH, USA

QS 64**LEVERAGING CONSUMER WEARABLE DEVICES TO EXAMINE DISPARITIES IN POSTOPERATIVE RECOVERY TRAJECTORIES AFTER PEDIATRIC APPENDECTOMY**

Suhail Zeineddin, MD, MS¹, J. Benjamin Pitt, MD², Michela Carter, MD³, Gwyneth A. Sullivan, MD, MS⁴, Muhammad Faateh, MBBS⁵, Angie Figueroa, MS⁵, Erica Park, n/a⁵, Soyang Kwon, PhD⁶, Hassan Ghomrawi⁷, Fizan Abdullah, MD, PhD³

¹Division of Pediatric Surgery, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA,

²Division of Pediatric Surgery, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA,

³Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, ⁴Division of Pediatric Surgery, Northwestern University Feinberg School of Medicine, Ann & Robert H. Lurie Children's Hospital; Division

of Pediatric Surgery, Rush University Medical Center, Chicago, IL, USA, ⁵Ann and Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, ⁶Anne and Robert H. Lurie Children's Hospital, Chicago,

IL, USA, ⁷Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA

QS 65**SURGICAL APPROACHES FOR RESECTION OF PRIMARY ADRENAL AND PARAVERTEBRAL NEUROGENIC TUMORS IN PEDIATRIC PATIENTS**

Ana L. Melero-Pardo¹, Tarek M. Zaghloula, MD², Andrew J. Murphy², Lindsay J. Talbot, MD², Suraj Sarvode Mothi², Andrew M. Davidoff, MD², Hafeez Abdelhafeez, MD²

¹St. Jude Children's Hospital, San Juan, Puerto Rico, USA, ²St. Jude Children's Research Hospital, Memphis, TN, USA

QS 66**RISK OF NEURODEVELOPMENTAL DISABILITY AND HEALTHCARE NEEDS IN EXTREMELY LOW BIRTH WEIGHT INFANTS WITH NECROTIZING ENTEROCOLITIS OR SPONTANEOUS INTESTINAL PERFORATION**

Priyanka V. Chugh, MD¹, Emily Nes, MD¹, Katherine D. Culbreath, MD¹, Gregory Keefe, MD¹, Erika M. Edwards, PhD, MPH², Kate A. Morrow, MS², Danielle Ehret, MD, MPH³, Roger F. Soll, MD², Biren P. Modi, MD, MPH⁴, Jeffrey D. Horbar, MD², Tom Jaksic, MD, PhD¹

¹Boston Children's Hospital, Boston, MA, USA, ²Vermont Oxford Network, Burlington, VT, USA, ³Vermont

Oxford Network, Burlington, VT, US, Boston, MA, USA, ⁴Boston Children's Hospital and Harvard Medical School, Boston, MA, USA

QS 67**METABOLIC BONE DISEASE AND THE EFFECT OF PUBERTAL ONSET IN PEDIATRIC INTESTINAL FAILURE**

Emily Nes, MD¹, Katherine D. Culbreath, MD¹, Gregory Keefe, MD¹, Steven J. Staffa¹, Sam M. Han, MD², E. Reese, MPH, RDN, LDN³, Julia Arsenault⁴, Biren P. Modi, MD, MPH⁵, Tom Jaksic, MD, PhD¹,

Christopher Duggan⁶, Christina M. Jacobsen, MD, PhD⁷, Alexandra N. Carey⁶

¹Boston Children's Hospital, Boston, MA, USA, ²Department of Surgery, Boston Children's Hospital, Boston, MA, USA, ³Boston Children's Hospital, Division of Gastroenterology, Hepatology, and Nutrition and Center

for Advanced Intestinal Rehabilitation, Boston, MA, USA, ⁴Bowdoin College, Boston, MA, USA, ⁵Boston

Children's Hospital and Harvard Medical School, Boston, MA, USA, ⁶Center for Advanced Intestinal Rehabilitation and Department of Gastroenterology, Hepatology and Nutrition, Boston Children's Hospital

and Harvard Medical School, Boston, MA, USA, ⁷Boston Children's Hospital, Division of Endocrinology, Boston, MA, USA

QS 68**FACTORS ASSOCIATED WITH NON-COMPLETION OF A PEDIATRIC BARIATRIC SURGERY PROGRAM**

Hannah M. Phelps, MD¹, Megan Shelton, PhD², Ginger Nicol, MD¹, Melissa Sicard, MSN, RN, CPNP¹, Marilyn Tanner-Blasiar, MHS, RDN, LD², Shaina R. Eckhouse, MD¹, Jennifer E. Sprague, MD, PhD¹, Baddr A. Shakhsheer, MD¹

¹Washington University in St. Louis, Saint Louis, MO, USA, ²St. Louis Children's Hospital, Saint Louis, MO, USA

QS 69**PEDIATRIC, ADOLESCENT AND YOUNG ADULT (AYA) PERITONEAL AND PLEURAL MESOTHELIOMA: A NATIONAL CANCER DATABASE REVIEW**

Colleen P. Nofi, DO, MBA, MSc¹, Bailey Roberts, MD², Barrie S. Rich, MD³, Richard D. Glick, MD³

¹Cohen Children's Medical Center at Northwell Health, Manhasset, NY, USA, ²Cohen Children's Medical Center at Hofstra/Northwell, Long Island City, NY, USA, ³Cohen Children's Medical Center, New Hyde Park, NY, USA

QS 70**IMPLEMENTATION AND VALIDATION OF A NOVEL SEVERITY GRADING SYSTEM FOR UNEXPECTED EVENTS IN PEDIATRIC SURGERY: THE CLAVIEN-MADADI CLASSIFICATION**

Omid Madadi-Sanjani¹, Joachim Kuebler¹, Julia Brendel², Soeren Wiesner¹, Annika Mutanen³, Simon Eaton⁴, Anja Domenghino⁵, Pierre-Alain Clavien⁵, Benno Ure¹

¹Hannover Medical School, Hannover, Niedersachsen, Germany, ²Hannover Me, Hannover, Niedersachsen, Germany, ³Helsinki University Hospital and University of Helsinki, Finland, Uusimaa, Finland, ⁴Great Ormond Street Institute of Child Health, London, England, United Kingdom, ⁵Department of Surgery and Transplantation, University Hospital Zurich, Zurich, Zurich, Switzerland

QS 71**BETTER LATE THAN NEVER: A CONTEMPORARY ANALYSIS OF AGE AT ORCHIOPEXY IN US HOSPITALS**

Sarah Gans¹, Katerina Dukleska, MD², Matt Hall, PhD³, Brendan T. Campbell, MD MPH⁴

¹University of Connecticut School of Medicine, Hartford, CT, USA, ²Connecticut Children's Medical Center, University of Connecticut, Hartford, CT, USA, ³Children's Hospital Association, Lenexa, KS, USA, ⁴American College of Surgeons, Committee on Trauma, Hartford, CT, USA

QS 72**TRENDS IN THE OPERATIVE MANAGEMENT AND TIMING OF RESECTION IN PEDIATRIC CONGENITAL PULMONARY AIRWAY MALFORMATIONS: AN ACS NSQIP-PEDIATRIC STUDY**

Marc M. Mankarious, MD¹, Alicia C. Greene, DO², Meloria A. Hoskins, MS³, Michael Stack, MD¹, Anthony Tsai, MD⁴, Afif N. Kulaylat, MD, MSc⁵

¹Penn State Hershey Medical Center, Hershey, PA, USA, ²Penn State Hershey Medical Center, Harrisburg, PA, USA, ³The Pennsylvania State University College of Medicine, Hershey, PA, USA, ⁴Division of Pediatric Surgery, Penn State Children's Hospital, Hershey, PA, USA, ⁵Division of Pediatric Surgery, Penn State Children's Hospital, Hershey, PA, USA

QS 73**OPTIMIZED TIMING FOR SURGICAL CORRECTION OF PECTUS EXCAVATUM BASED ON MEDIAL CLAVICLE EPIPHYSEAL OSSIFICATION**

Michela Carter, MD¹, Francis Prendergast, MD¹, Jillian Krauss, MD¹, Suhail Zeineddin, MD, MS², J.

Benjamin Pitt, MD³, Gwyneth A. Sullivan, MD, MS⁴, Fizan Abdullah, MD, PhD¹, Brian C. Gulack, MD, MHS⁵, Seth D. Goldstein, MD, MPhil³

¹Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, ²Division of Pediatric Surgery, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, ³Division of Pediatric Surgery, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, ⁴Division of Pediatric Surgery, Northwestern University Feinberg School of Medicine, Ann & Robert H. Lurie Children's Hospital; Division of Pediatric Surgery, Rush University Medical Center, Chicago, IL, USA, ⁵Rush University Medical Center, Chicago, IL, USA

QS 74**EARLY EXPERIENCE IN DEVELOPING 3D PRINTING-BASED THORACOSCOPIC SURGERY SIMULATOR FOR ESOPHAGEAL ATRESIA**

Joong Kee Youn, MD¹, Hyun-Young Kim², Sang Joon Park³, Dayoung Ko⁴

¹Seoul National University Hospital, Seongbuk, Seoul-t'ukpyolsi, Republic of Korea, ²Seoul National University Jongro, Seoul-t'ukpyolsi, Republic of Korea, ³Seoul National University Hospital, Jongro, Seoul-t'ukpyolsi, Republic of Korea, ⁴Seoul National University Hospital, Jongro-gu, Seoul-t'ukpyolsi, Republic of Korea

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Evaluating Car Safety Compliance for Children Involved in Motor Vehicle Accidents: Identifying High-Risk Groups for Improper Restraint Usage

Claudio B. Ghetti, BA¹, Alexadra Rooney, MPH², Victor de Cos¹, Alicia G. Sykes, M.D., M.A.³, Vishal Bansal, MD², Michael Sise, MD², Stephen W. Bickler, MD⁴, Benjamin Keller, MD⁴, Romeo Ignacio, MD, MSc, MPath⁴
¹University of California San Diego School of Medicine, San Diego, CA, USA, ²Scripps Mercy Hospital, San Diego, CA, USA, ³Naval Medical Center San Diego, San Diego, CA, USA, ⁴Rady Children's Hospital San Diego/University of California San Diego School of Medicine, San Diego, CA, USA

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Disparities in Pediatric Surgery Telehealth Access During the CoVID-19 Pandemic

Steven Mehl, MD¹, Adam M. Vogel, MD², Monica E. Lopez, MD MS³
¹Division of Pediatric Surgery, Department of Surgery, Texas Children's Hospital, Houston, TX, USA, ²Texas Children's Hospital, Houston, TX, USA, ³Monroe Carell Jr Children's Hospital at Vanderbilt, Nashville, TN, USA

7:00pm - 9:00pm

Welcome Reception

Grand Cypress Foyer

THURSDAY, MAY 11

All times are Eastern Standard Time USA

6:00am - 7:30am

Committee Meetings

See page 16-17 for ancillary meeting information

6:30am - 7:30am

Continental Breakfast

Exhibit Hall, Grand Cypress Foyer

6:00am - 7:00am

Industry Product Theater

Speaker: Timothy J. Fairbanks, MD, MBA

Palm A-F

7:10am - 7:30am

Daily Roundup – SVS/APSA Current Management of Pediatric Vascular Trauma

Grand Cypress D-I

Moderator:
 Kathleen van Leeuwen, MD, Phoenix Children's Hospital, Phoenix, AZ, USA

Speakers:

David M. Notrica, MD, Phoenix Children's Hospital, Phoenix, AZ, USA
 Regan F. Williams, MD, MS, Le Bonheur Children's Hospital, Memphis, TN, USA
 Timothy Schaub, MD

7:30am - 8:45am

Plenary Session II

Grand Cypress D-I

Moderators:

Kim G. Wallenstein, MD, PhD
 Melissa E. Danko, MD

Chat Room Moderator:

Nicole J. Kus, MD

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MODELING THE RELATIONSHIPS BETWEEN POLITICAL PARTISANSHIP, MEDICAID EXPANSION AND FIREARM LAWS WITH YEARS OF POTENTIAL LIVES LOST FROM GUNS AMONG US CHILDREN

Megan E. Paul, BA¹, Brian Arrinza Coakley, MD, FACS, FAAP, Dipl ABOM²
¹Icahn School of Medicine at Mount Sinai, Los Angeles, CA, USA, ²The Mount Sinai Health System, New York, NY, USA

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A NOVEL MFG-E8-DERIVED OLIGOPEPTIDE PROTECTS AGAINST INFLAMMATION AND ORGAN INJURY IN NEONATAL SEPSIS

Colleen P. Nofi, DO, MBA, MSc¹, Monowar Aziz, PhD², Jose M. Prince, MD³, Ping Wang, MD²
¹Cohen Children's Medical Center at Northwell Health, Manhasset, NY, USA, ²Center for Immunology and Inflammation, The Feinstein Institutes for Medical Research, Manhasset, NY, USA, ³Cohen Children's Medical Center, Zucker School of Medicine at Hofstra/Northwell, Queens, NY, USA

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EXTRACORPOREAL LIFE SUPPORT IN CONGENITAL DIAPHRAGMATIC HERNIA: IS CENTER VOLUME ASSOCIATED WITH MORTALITY?

Alice M. Martino, MD¹, Danh Nguyen², Patrick T. Delaplain, MD³, Tim Jancelewicz, MD, MA, MS⁴, Matthew T. Harting, MD, MS, FAAP, FACS⁵, Peter T. Yu, MD, MPH⁶, Matteo Di Nardo, MD⁷, Sharada H. Gowda, MD⁸, Laura F. Goodman, MD, MPH⁶, Yigit Guner, MD, MS⁹

¹Department of Surgery, University of California Irvine Medical Center, Orange, CA, USA, ²University of California Irvine, ³Department of Surgery, Boston Children's Hospital, Boston, MA, USA, ⁴Le Bonheur Children's Hospital, University of Tennessee Health Science Center, Memphis, TN, USA, ⁵McGovern Medical School at UTHealth, Houston, TX, USA, ⁶Children's Hospital of Orange County and University of California - Irvine, Orange, CA, USA, ⁷Pediatric Intensive Care Unit, Bambino Gesù Children's Hospital, Rome, Lazio, Italy, ⁸Division of Neonatology, Texas Children's Hospital, Houston, TX, USA, ⁹Children's Hospital of Orange County and University of California Irvine, Orange, CA, USA

13**HOW MANY OPERATIVE RATINGS DOES A PEDIATRIC SURGERY FELLOW NEED TO BE DEEMED PRACTICE-READY?**

Andrew Krumm, PhD¹, Brianna L. Spencer, MD¹, Shawn Izadi, MD², Ronald B. Hirschl, MD¹, Biren P. Modi, MD, MPH³, Peter F. Ehrlich, MD⁴, Erika A. Newman, MD⁵, Benjamin Zendejas, MD, MSc²

¹University of Michigan, Ann Arbor, MI, USA, ²Boston Children's Hospital, Boston, MA, USA, ³Boston Children's Hospital and Harvard Medical School, Boston, MA, USA, ⁴University of Michigan, C.S. Mott Children's Hospital, Department of Pediatric Surgery, Ann Arbor, MI, USA, ⁵C. S Mott Children's Hospital, University of Michigan, Ann Arbor, MI, USA

14**IMMEDIATE VERSUS DELAYED SURGICAL MANAGEMENT OF INFANT CRYPTORCHIDISM WITH INGUINAL HERNIA**

Walter A. Ramsey, MD¹, Carlos T. Huerta, MD², Christopher F. O'Neil, MD³, Rebecca A. Saberi, MD⁴, Gareth P. Gilna, MD⁵, Nicole B. Lyons, MD³, Brianna L. Cohen, MD³, Joshua P. Parreco, MD⁶, Chad M. Thorson, MD, MSPH⁴, Juan E. Sola, MD⁷, Eduardo A. Perez, MD⁷

¹Jackson Memorial Hospital / University of Miami, Miami, FL, USA, ²University of Miami Department of Surgery, Miami, FL, USA, ³DeWitt Daughtry Family Department of Surgery, University of Miami, MIAMI, FL, USA, ⁴DeWitt Daughtry Family Department of Surgery, Division of Pediatric Surgery, University of Miami Miller School of Medicine, Miami, FL, USA, ⁵DeWitt Daughtry Family Department of Surgery, Division of Pediatric Surgery, University of Miami Miller School of Medicine, ⁶Memorial Healthcare System, Miami, FL, USA, ⁷DeWitt Daughtry Family Department of Surgery, Division of Pediatric Surgery, University of Miami Miller School of Medicine, USA

15**POST-OPERATION OPIOID REDUCTION PROTOCOL REDUCES RACIAL DISPARITY OF CLINICAL OUTCOMES IN CHILDREN**

David F. Grabski, MD PhD¹, Rick Vavolizza², Heron D. Baumgarten, MD, MPH³, Mark A. Fleming, MD⁴, Chioma Moneme, MD¹, Eugene McGahren, MD¹, Sandra Kabagambe, MD⁵, Michael Williams, MD¹, Jeffrey W. Gander, MD⁶

¹University of Virginia, Charlottesville, VA, USA, ²University of Virginia, ³University of Virginia, Children's Hospital of Philadelphia, Charlottesville, VA, USA, ⁴University of Virginia Health, VA, USA, ⁵University of Virginia, New York, NY, USA, ⁶University of Virginia Children's Hospital, Charlottesville, VA, USA

16**ASSOCIATION BETWEEN PROPHYLACTIC ANTIBIOTICS AND RISK OF EARLY INFECTIOUS COMPLICATIONS AFTER PEDIATRIC CENTRAL VENOUS ACCESS**

Steven T. Papastefan, MD¹, Suhail Zeineddin, MD, MS², Martin Blakely, MD, MS³, Harold N. Lovvorn, MD⁴, Mehul V. Raval, MD, MS⁵, Timothy B. Lautz, MD⁶

¹Department of Surgery, Northwestern University Feinberg School of Medicine Division of Pediatric Surgery, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, ²Division of Pediatric Surgery, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, ³Department of Pediatric Surgery, Vanderbilt University Medical Center, ⁴Vanderbilt University Medical Center, Nashville, TN, USA, ⁵Division of Pediatric Surgery, Department of Surgery, Northwestern University Feinberg School of Medicine, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, ⁶Division of Pediatric Surgery, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA

17**REDUCTION IN UNPLANNED INTUBATIONS AFTER CHILDREN'S SURGERY: A QUALITY IMPROVEMENT PROJECT**

Peter Juviler, MD¹, Jeffrey Meyers, MD², Elizabeth Levatino, BSN, RN¹, Jessica Axford, MS, RN², Erin Barker, MD², Linnie Correll, MD, PhD³, Marjorie Gloff, MD², Margo McKenna Benoit, MD², Jan Schriefer, DrPH, MSN, MBA⁴, Sarah Verna, RDCS², Sarah Wegman, BA⁵, Derek Wakeman, MD¹

¹University of Rochester, Rochester, NY, USA, ²University of Rochester | Golisano Children’s Hospital, Rochester, NY, USA, ³BC Children’s Hospital, Rochester, NY, USA, ⁴University of Rochester Medical Center, Rochester, NY, USA, ⁵University of Rochester

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BALANCED RESUSCITATION WITH WHOLE BLOOD VERSUS COMPONENT THERAPY IN SEVERELY INJURED PRE-ADOLESCENT CHILDREN

Robert J. McLoughlin, MD, MSCI¹, Cassandra D. Josephson, MD¹, Lucas Neff², Nicole M. Chandler, MD³, Raquel Gonzalez, MD, MHCM³, Robert T. Russell, MD, MPH⁴, Christopher W. Snyder, MD³

¹John Hopkins All Children’s Hospital, Saint Petersburg, FL, USA, ²Wake Forest School of Medicine, Winston-Salem, NC, USA, ³Johns Hopkins All Children’s Hospital, St. Petersburg, FL, USA, ⁴University of Alabama at Birmingham and Children’s of Alabama, Birmingham, AL, USA

8:45am - 9:30am **New Member Induction** *Grand Cypress D-I*

9:30am - 9:45am **JPS TEC Talk II**
What is Discoverable (Peer Counseling) *Grand Cypress D-I*

Learning objectives

By the end of the presentation, attendees will be able to:

- Learn what is discoverable during the litigation of a medical malpractice case
- Learn the difference between “discoverable” evidence” and “admissible evidence”
- Learn what evidence is privileged or otherwise protected from the discovery process

Moderators:

Brian Arrinza Coakley, MD, FACS, FAAP, Dipl ABOM, *The Mount Sinai Health System, New York, NY, USA*
 Mark A. Hoffman, MD, JD, LLM, MBIOTH, MBA, *Ross Feller Casey, LLP, Chatham, MA, USA*

9:45am - 10:15am Refreshment Break *Exhibit Hall, Grand Cypress D-I*

10:15am - 11:15am **COMMITTEE BREAKOUT SESSIONS IV - VI**

Breakout IV **DEI Committee Gender Informed Care: What Every Pediatric Surgeon Should Know** *Grand Cypress D-I*

Breakout V **Global Pediatric Surgery Committee – Integrating Sustainable Global Engagement into Your Academic Pediatric Surgical Practice** *Grand Cypress A*

Breakout VI **Ethics, Advocacy, and Fetal Committees Collaboration**
The Changing Legal Landscape Around Abortion Post-Dobbs: Impact On *Grand Cypress B-C*

10:15am - 11:15am **Breakout IV: DEI Committee Gender Informed Care: What Every Pediatric Surgeon Should Know** *Grand Cypress D-I*

Learning objectives

By the end of this presentation, attendees will be able to:

- Gain an understanding of the difference between sex and gender and how they are experienced
- Learn about the importance of gender affirmation and its dimension
- Discuss how medical providers can provide gender informed care to all patients

Moderators:

Kathryn Martin, MD, MPH, FACS, FRCSC
 Maria Fareri *Children’s Hospital @ Westchester Medical Center, Valhalla, NY, USA*
 Morgan K. Richards, MD, MPH, *St. Luke’s Health System, Boise, ID, USA*

Why Gender-Informed Care Matters

Hannah Cockrell, MD, *Seattle Children’s Hospital, Seattle, WA, USA*

Understanding Gender Affirmation: What it Means to Transition

Nikhil R. Shah, MD, *University of Texas Medical Branch, Galveston, TX, USA*

Learning from Kids with Intersex Traits

Kathleen van Leeuwen, MD, *Phoenix Children’s Hospital, Phoenix, AZ, USA*

Failing Upwards: The Magic of Messing Up Together

River Graziano, *Arizona State University, Phoenix, AZ, USA*

Tips and Tricks for Allyship

Kathryn Martin, MD, MPH, FACS, FRCSC¹, Morgan K. Richards, MD, MPH²

¹Maria Fareri Children’s Hospital @ Westchester Medical Center, Valhalla, NY, USA, ²St. Luke’s Health System, Boise, ID, USA

10:15am - 11:15am

Breakout IV: Global Pediatric Surgery Committee: Integrating Sustainable Global Engagement into Your Academic Pediatric Surgical Practice

Grand Cypress A

Learning objectives

By the end of the presentation, attendees will be able to:

- To explore pathways for incorporating global engagement into your pediatric surgical practice, including contract negotiation, promotion and tenure, and capacity building
- To listen to various pediatric surgeons describe their global surgery practice model, including academic and missionary-based at various stages of career development

Moderators

Sanjay Krishnaswami, MD,
Robin T. Petroze, MD, MPH

Academic Global Surgery at a US-based Children’s Hospital

Meera Kotagal, MD, MPH, Cincinnati Children’s Hospital Medical Center, Cincinnati, OH, USA

Senior Surgeon – Rationale, Opportunities, and Obstacles to Hiring a Global Surgeon

Henry E. Rice, MD, Duke University Medical Center, Durham, NC, USA

Academic Global Surgery as a Missionary Surgeon

Britney L. Grayson, MD, PhD, AIC Kijabe Hospital and Indiana University, Indianapolis, IN, USA

10:15am - 11:15am

Breakout IV: Ethics, Advocacy, and Fetal Committees Collaboration. The Changing Legal Landscape Around Abortion Post-Dobbs: Impact on Pediatric Surgery

Grand Cypress B-C

Learning objectives

By the end of the presentation, attendees will be able to:

- Describe foundational skills for participation in advocacy
- Discuss simple and time effective ways for physicians to lend their voice towards improving the lives of children
- Discuss how surgeons can engage in activism to effect change

Moderators:

Ronnie Sullins, MD
Jennifer Leslie Knod, MD
Connecticut Children’s Medical Center, Hartford, CT, USA

Panelists:

Erin E. Perrone, MD, University of Michigan, Ann Arbor, MI, USA
KuoJen Tsao, MD, McGovern Medical School at the University of Texas Health Science Center at Houston, Houston, TX, USA
Cole Greves, MD
Patrick V. Bailey, MD MLS JD FACS, American College of Surgeons, Washington, DC, USA
Catherine J. Hunter, MD, Oklahoma Children’s Hospital, Oklahoma City, OK, OK, USA

11:15am - 12:30pm

Lunch

Exhibit Hall - Grand Cypress Foyer

11:15am - 1:00pm

Committee Meetings See page 16-17 for ancillary meeting information

Grand Cypress D-I

11:15am - 12:30pm

SOAPPS Member Luncheon – Grab Your Lunch and Meet APSA’s President and Secretary

Palm D-F

12:30pm - 1:45pm

Scientific Session III: Colorectal and General

Grand Cypress D-I

Moderators:

Cristine S. Velazco, MD, MS
Jason S. Frischer, MD

Chat Room Moderator:

David Darcy, MD

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LONG-TERM MANAGEMENT OF PROBLEMS IN CLOACAL EXSTROPHY; A SINGLE-INSTITUTION REVIEW

 Nora M. Haney, MD/MBA¹, Ahmad Haffar, MD², **Christian Morrill**³, Chad Crigger¹, John P. Gearhart⁴
¹James Buchanan Brady Urological Institutions, Johns Hopkins Hospital, Johns Hopkins Medical Institutions, Charlotte Bloomberg Children's Hospital, Baltimore, MD, USA, Baltimore, MD, USA,

²James Buchanan Brady Urological Institute, The Johns Hopkins Medical Institutions, Baltimore, MD, USA, Baltimore, MD, USA, ³Johns Hopkins Hospital, Baltimore, MD, USA, ⁴Johns Hopkins School of Medicine, Baltimore, MD, USA

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GDNF PROMOTES ENTERIC NEURAL PROGENITOR MIGRATION BY RESTORING THE MISREGULATED RET PATHWAY IN A KNOCKOUT MODEL OF HIRSCHSPRUNG'S DISEASE
Dorothy Lee, Bachelor's¹, Bo Li, PhD², Atsuyuki Yamataka, MD PhD³, Agostino Pierro, MD²
¹Hospital for Sick Children, Toronto, ON, Canada, ²The Hospital for Sick Children, Toronto, ON, Canada,

³Department of Pediatric General and Urogenital Surgery, Juntendo University School of Medicine, Tokyo, Japan

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SOCIAL DETERMINANTS OF HEALTH ARE ASSOCIATED WITH FAILED BOWEL MANAGEMENT FOR CHILDREN WITH ANORECTAL MALFORMATIONS
Shruthi Srinivas, MD¹, Maria Knaus, MD¹, Drayson Campbell, BS¹, Alberta Negri Jimenez, BA¹, Gabriella Pendola, Richard J. Wood, MD², Ihab Halaweish, MD¹, Alessandra Gasior, DO³
¹Nationwide Children's Hospital, Columbus, OH, USA, ²Center for Colorectal and Pelvic Reconstruction, Columbus, OH, USA, ³Center for Colorectal and Pelvic Reconstruction, Nationwide Children's Hospital, Columbus, OH, USA

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FUNCTIONAL OUTCOMES OF PATIENTS WHO UNDERWENT ANORECTAL MALFORMATION REPAIR USING REAL-TIME MAGNETIC RESONANCE IMAGING GUIDANCE
Danielle Dougherty, MD¹, Matthew W. Ralls, MD², Laurie Wild, NP², Maria Ladino Torres, MD, Connor Plagens, BS, Marcus D. Jarboe, MD²
¹University of Michigan, Ann Arbor, MI, USA, ²University of Michigan, Ann Arbor, MI, USA

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GASTROINTESTINAL QUALITY OF LIFE AND BOWEL FUNCTION IN ADULTS BORN WITH ANORECTAL MALFORMATION OR HIRSCHSPRUNG DISEASE
Lea A. Wehrli, MD¹, Marina L. Reppucci, MD², Luis de La Torre, MD³, Alberto Pena, MD, Jill Ketzer, BS⁴, Laura Judd-Glossy⁵, Jared Rieck⁶, Emily Cooper⁷, Andrea Bischoff, MD³
¹Children's Hospital Colorado, Denver, CO, USA, ²Children's Hospital Colorado, Denver, CO, USA,

³International Center for Colorectal and Urogenital Care, Children's Hospital Colorado, Aurora, CO, USA,

⁴Children's Hospital Colorado, ⁵Children's Hospital Colorado, Aurora, CO, USA, ⁶Child Health Biostatistics Core / University of Colorado Anschutz Medical Campus, Aurora, CO, USA, ⁷University of Colorado, Aurora, CO, USA

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CONTEMPORARY TRENDS IN CHOLEDOCHAL CYST EXCISION: AN ANALYSIS OF THE PEDIATRIC NATIONAL SURGICAL QUALITY IMPROVEMENT PROGRAM (NSQIP)
Thomas Clark Howell, MD, MSHS¹, Henry E. Rice, MD¹, Tamara N. Fitzgerald, MD¹, Ryan M. Antiel, MD, MS¹, Alisha Mavis, MD¹, Kadiyala Ravindra, MBBS¹, Elisabeth (Lisa) Tracy, MD¹, Catherine Beckhorn²
¹Duke University Medical Center, Durham, NC, USA, ²Duke University School of Medicine, Durham, NC, USA

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OUTCOMES OF SPLENECTOMY VERSUS SPLENECTOMY WITH CHOLECYSTECTOMY IN PATIENTS WITH HEMOLYTIC ANEMIA: A PEDIATRIC NSQIP ANALYSIS
Shale Mack¹, Devon J. Pace, MD², Sanath Patil¹, Matthew Boelig, MD², Loren Berman, MD³
¹Sidney Kimmel Medical College at Thomas Jefferson University, Philadelphia, PA, USA, ²Nemours Children's Health, Wilmington, DE, USA, ³Nemours | Alfred I. duPont Hospital for Children, Wilmington, DE, USA

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EARLY RESULTS OF SKIN SENSORY CHANGES AND DEVELOPMENT OF NEUROPATHIC PAIN IN PEDIATRIC PATIENTS AFTER NUSS PROCEDURE WITH CRYOABLATION

R Scott Eldredge, MD¹, Brielle Ochoa, MD², Krista Lai, MD³, Emily Khory¹, Kristin Mihalcin¹, Daniel J. Ostlie, MD¹, Lisa E. McMahon, MD¹, Justin Lee, MD⁴, David M. Notrica, MD¹, Benjamin Padilla, MD⁵
¹Phoenix Children’s Hospital, Phoenix, AZ, USA, ²Phoenix Children’s, Phoenix, AZ, USA, ³Phoenix Children’s Hospital/Dalhousie University, Halifax, NS, Canada, ⁴Phoenix Children’s Hospital, Phoenix, AZ, USA, ⁵Phoenix Children’s Hospital, San Francisco, CA, USA

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WHAT DOES SCHOLARLY ACTIVITY LOOK LIKE IN APSA MEMBERS?

Brett D. Haeffner, B.S¹, James Cooper, MD², Austin Kerr, B.S¹, Miranda Solly, B.S¹, Russell B. Hawkins, MD, MS¹, Saleem Islam, MBBS, MPH³
¹University of Florida College of Medicine, Gainesville, FL, USA, ²UPMC Children’s Hospital of Pittsburgh, Pittsburgh, PA, USA, ³The Aga Khan University, Karachi, Sindh, Pakistan

1:45pm - 2:15pm **Variations in Care: Primary Anastomosis vs Early Stoma Closure for NEC and/or SIP** *Grand Cypress D-I*

Learning objectives

- By the end of the presentation, attendees will be able to:
- Assess current practice of the audience for babies with NEC and/or SIP re: primary anastomosis vs early stoma closure
 - Discuss the pros and cons of Primary Anastomosis for NEC and/or SIP
 - Discuss the pros and cons of Early Stoma closure for NEC and/or SIP

Moderators:

Grace Z. Mak, MD
 Gerald Gollin, MD
 Michael Dingeldein, MD
 Margaret Gallagher, MD

Chat Room Moderator:

David Darcy, MD

Panelists:

Helene Flageole, MD, MSc, *McMaster University, dundas, ON, Canada*
 Augusto Zani, MD, PhD, FACS, FAAP, *The Hospital for Sick Children / University of Toronto, Toronto, ON, Canada*

2:15pm - 2:45pm Refreshment Break *Exhibit Hall, Grand Cypress Foyer*

2:45pm - 4:00pm **Scientific Session IV: Oncology** *Grand Cypress D-I*

Moderators:

Jennifer H. Aldrink, MD
 Barrie S. Rich, MD

Chat Moderator:

Diana Diesen, MD

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WHERE ARE THE CHILDREN? A THEMATIC ANALYSIS OF STATE, TERRITORY, AND TRIBAL ORGANIZATION COMPREHENSIVE CANCER CONTROL PLANS

Harold J. Leraas, MD, MSPHS, MHS, MA¹, Catherine Beckhorn², Claire Washabaugh², Julie Thamby², Rachel Greenup, MD MPH³, Krista Haines, DO, MA⁴, Laura Allen⁵, Elisabeth (Lisa) Tracy, MD¹
¹Duke University Medical Center, Durham, NC, USA, ²Duke University School of Medicine, Durham, NC, USA, ³Yale University Department of Surgery, New Haven, CT, USA, ⁴Duke University Department of Surgery, Durham, NC, USA, ⁵Children’s Cancer Partners of the Carolinas, Spartanburg, SC, USA

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SONOPERMEATION WITH SIMB4-5 SYNERGISTICALLY ENHANCES L-DOX UPTAKE AND TUMOR APOPTOSIS BY DECREASING ZONA OCCLUDENS 1

Rachel Sundland, MD¹, Donia Ballan², Aditi Bellary³, Isabella Iwanicki², Lydia Wu², Fernando Flores Guzman², Jameel Feshitan⁴, Jessica Kandel, MD⁵, Shashank Sirsi⁶, Sonia Hernandez⁵

¹Department of Surgery, University of Chicago Medical School, Chicago, IL, USA, Brooklyn, NY, USA,

²Department of Surgery, University of Chicago Medical School, Chicago, IL, USA., Chicago, IL, USA, ³Department of Biomedical Engineering, University of Texas at Dallas, Richardson, TX, USA., Chicago, IL, USA, ⁴Advanced Microbubbles Inc, Newark, CA, USA, ⁵University of Chicago, Chicago, IL, USA, ⁶University of Texas at Dallas, Richardson, TX, USA

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THE SURVIVAL ADVANTAGE OF ZIKA VIRAL THERAPY IN HUMAN NEUROBLASTOMA IN VIVO MODELS IS DEPENDENT UPON CD24

Joseph Mazar, PhD¹, Emma Sutton, BS², Rosa Rosario², Jeanne Brooks, MS¹, Matthew Peloquin, MS², Matthew Longo, BS², Tamarah Westmoreland, MD/PhD²

¹Nemours Children's Hospital, Orlando, FL, USA, ²Nemour's Children's Health, Orlando, FL, USA

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LOSS OF IRF5 IS ASSOCIATED WITH INCREASED METASTASES AND WORSE PROGNOSIS IN OSTEOSARCOMA

Bailey Roberts, MD¹, Betsy J. Barnes, PhD², Samuel Z. Soffer, MD³

¹Cohen Children's Medical Center at Hofstra/Northwell, Long Island City, NY, USA, ²Feinstein Institutes for Medical Research, Northwell Health, New Hyde Park, NY, USA, Cohen Children's Medical Center at Hofstra/Northwell, New Hyde Park, NY, USA

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PRECLINICAL TESTING PIPELINE REVEALS NOVEL TREATMENT STRATEGIES FOR CHEMOTHERAPY RESISTANT HEPATOBLASTOMA

Andy F. Espinoza, MD¹, Richard S. Whitlock, MD², Roma Patel³, Sai Govindu³, Sarah Woodfield, PhD³, Sanjeev Vasudevan, MD³

¹Michael E. DeBakey Department of Surgery - Baylor College of Medicine, Sugar Land, TX, USA,

²Baylor College of Medicine, Pearland, TX, USA, ³Texas Children's Hospital, Houston, TX, USA

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HOW MANY LYMPH NODES ARE ENOUGH FOR STAGING IN PARATESTICULAR RHABDOMYOSARCOMA?

Brittany Levy, MD¹, Will Cranford, MS¹, Adam Dugan, PhD¹, Christopher McLouth, PhD¹, Jonathan Routh, MD², David Rodeberg, MD¹, Amanda Saltzman, MD¹

¹University of Kentucky, Lexington, KY, USA, ²Duke University, Raleigh, NC, USA

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APOBEC2: ITS ROLE IN THE PANNEXIN 1-MEDIATED INHIBITION OF RHABDOMYOSARCOMA PROGRESSION AND POTENTIAL AS A NOVEL THERAPEUTIC TARGET

Alexandra Welten, MSc¹, Stephanie Langlois, PhD¹, Xiao Xiang², Kyle N. Cowan, MD, PhD²

¹Children's Hospital of Eastern Ontario Research Institute, Ottawa, ON, Canada, ²CHEO Research Institute, Ottawa, ON, Canada

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LEVERAGING A NOVEL EX-VIVO HUMAN TUMOR SYSTEM TO INTERROGATE PERITONEAL SURFACE MALIGNANCIES IN CHILDREN

Martha E. Teke, MD, Emily A. Verbus, MD, Areeba Saif, MD, Kirsten Remmert, PhD, Amber Leila Sarvestani, MD, Stephanie N. Gregory, MD, Carrie E. Ryan, MD, Tracey Pu, MD, Andrew M. Blakely, MD, Jeremy L. Davis, MD, Jonathan M. Hernandez, MD

National Institute of Health, Bethesda, MD, USA

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JUVENILE GRANULOSA CELL TUMOR OF THE OVARY: A CLINICOPATHOLOGIC STUDY OF 10 PATIENTS

Heba M. Taher, MD pediatric surgery¹, Aya Abuelenean¹, Rahma Mohamadein², Ahmed Lymona³, Yasser Saadeldein⁴


¹Cairo university, Cairo, Al Qahirah, Egypt, ²Cairo University, Cairo, Al Qahirah, Egypt, ³National cancer institute, Cairo, Al Qahirah, Egypt, ⁴Alexandria University, Alexandria, Al Iskandariyah, Egypt

4:00pm - 4:30pm	Transition to Practice Task Force Best Practice	Grand Cypress D-I
Learning objectives		
By the end of the presentation, attendees will be able to:		
<ul style="list-style-type: none"> • Review the background and mission of the APSA Transition to Practice Task Force • Discuss the creation of the Needs Assessment Survey • Discuss the findings of the Task Force including Best Practice Recommendations 		
Chat Room Moderator:		
Marisa E. Schwab, MD		
Speaker:		
Grace Z. Mak, MD, <i>The University of Chicago Pritzker School of Medicine, Chicago, IL, USA</i>		
Panelists:		
Ellen M. Reynolds, MD, <i>St Lukes Children’s Hospital, Boise, ID, USA</i>		
Brian A. Jones, MD, <i>The University of Chicago Medicine & Biological Sciences, Chicago, IL, USA</i>		
KuoJen Tsao, MD, <i>McGovern Medical School at the University of Texas Health Science Center at Houston, Houston, TX, USA</i>		
Baddr A. Shakhsheer, MD, <i>Washington University in St. Louis, Saint Louis, MO, USA</i>		
Patrick Javid, MD, <i>University of Washington School of Medicine, Seattle, WA, USA</i>		
4:30pm - 5:00pm	Trauma: Blood Product Resuscitation	Grand Cypress D-I
Learning objectives		
By the end of the presentation, attendees will be able to:		
<ul style="list-style-type: none"> • To examine Trauma team dynamics and best practices during resuscitation Review the background and mission of the APSA Transition to Practice Task Force • To describe the results of a consensus conference on pediatric trauma resuscitation specifically focusing on blood products • To review two common blunt vascular injuries with treatment recommendations based on a systematic review 		
Moderators:		
Regan F. Williams, MD, MS		
Christian Streck, MD		
Chat Room Moderator:		
Marisa E. Schwab, MD		
Speakers:		
Stephanie F. Polites, MD, MPH, <i>Mayo Clinic, Rochester, MN, USA</i>		
Barbara A. Gaines, MD, <i>Pediatric General and Thoracic Surgery, University of Pittsburgh Medical Center, Pittsburgh, PA, USA</i>		
Robert T. Russell, MD, MPH, <i>University of Alabama at Birmingham and Children’s of Alabama, Birmingham, AL, USA</i>		
5:00pm - 5:30pm	Outcomes and Quality Committee Collaboration: Systematic Review/Quality Tool Kit – Biliary Dyskinesia	Grand Cypress D-I
Learning objectives		
By the end of the presentation, attendees will be able to:		
<ul style="list-style-type: none"> • Identify criteria for diagnosis of biliary dyskinesia and indications for surgical intervention • Describe short and long-term outcomes after cholecystectomy for biliary dyskinesia • Compare outcomes and options for medical management of biliary dyskinesia 		
Chat Room Moderator:		
Meghan A. Arnold, MD		
Speakers:		
Stephanie F. Polites, MD, MPH, <i>Mayo Clinic, Rochester, MN, USA</i>		
Barbara A. Gaines, MD, <i>Pediatric General and Thoracic Surgery, University of Pittsburgh Medical Center, Pittsburgh, PA, USA</i>		
Robert T. Russell, MD, MPH, <i>University of Alabama at Birmingham and Children’s of Alabama, Birmingham, AL, USA</i>		

5:30pm - 6:30pm	Trauma Committee Meeting	Lobby Bar
5:00pm - 7:00pm	JPS Reception	Palm A-C
6:00pm - 7:00pm	Resident/Student/Fellow Reception Moderators: Brian A. Jones, MD Jill S. Whitehouse, MD Panelists: Georges Azzie, MD, <i>Hospital for Sick Children, Toronto, ON, Canada</i> Courtney J. Harris, MD, <i>Ann & Robert H Lurie Children's Hospital of Chicago, Chicago, IL, USA</i> Grace Z. Mak, MD, <i>The University of Chicago Pritzker School of Medicine, Chicago, IL, USA</i> Russell B. Hawkins, MD, MS, <i>University of Florida College of Medicine, Gainesville, FL, USA</i> Dave R. Lal, MD, MPH, <i>Division of Pediatric Surgery, Medical College of Wisconsin/Children's Wisconsin, Milwaukee, WI, USA</i> Brittany Hasty, MD, MHPE, <i>Alberta Children's Hospital, Calgary, AB, Canada</i> Patrick Javid, MD, <i>University of Washington School of Medicine, Seattle, WA, USA</i>	Magnolia A-C

FRIDAY, MAY 12

All times are Eastern Standard Time USA

6:00am - 7:00am	Committee Meetings	See page 16-17 for ancillary meeting information
6:30am - 7:00am	Continental Breakfast	Exhibit Hall, Grand Cypress Foyer
6:00am - 7:00am	Resident Mentorship Breakfast – Pre-Registration Required Mentors: Samir K. Gadepalli, MSc, MD, MBA, <i>University of Michigan, Ann Arbor, MI, USA</i> Jason D. Fraser, MD, <i>Children's Mercy Kansas City, Kansas City, MO, USA</i> Brian W. Gray, MD, <i>Division of Pediatric Surgery, Department of Surgery, Indiana University School of Medicine, Indianapolis, IN, USA</i> Alan P. Ladd, MD, <i>Riley Hospital for Children, Indianapolis, IN, USA</i> Romeo C. Ignacio, MD, MSc, MPath, <i>Rady Children's Hospital San Diego/University of California San Diego School of Medicine, San Diego, CA, USA</i> Holly L. Neville, MD, <i>Joe Di Maggio Children's Hospital, Memorial Healthcare system, Coral Gables, FL, USA</i> Callie Y. Baker, MD, MS, <i>Department of Pediatric Surgery, Vanderbilt University Medical Center, Monroe Carell Jr. Children's Hospital, Nashville, TN, USA</i> Caitlin A. Smith, MD, <i>Seattle Children's, University of Washington, Seattle, WA, USA</i> Matthew Boelig, MD, <i>Nemours Children's Health, Wilmington, DE, USA</i> Eunice Huang, MD, MS, <i>Vanderbilt University Medical Center, Nashville, TN, USA</i> Minna Minsing Chen Wieck, MD, FACS, <i>University of California Davis, USA</i>	Palm A-D
7:00am - 8:45am	Business Meeting and Town Hall	Grand Cypress D-I
8:00am - 10:00am	Companion Hospitality Suite	Lobby Hub
8:45am - 9:45am	Presidential Address –  Mentorship: Finding the Way Forward in Pediatric Surgery Jessica Kandel, MD University of Chicago Chicago, IL, USA	Grand Cypress D-I
	Presidential Introduction Charles J. Stolar, MD, <i>Columbia University, Santa Barbara, CA, USA</i>	
9:45am - 10:15am	Refreshment Break	Exhibit Hall, Grand Cypress Foyer

10:15am - 10:30am	Grosfeld Scholar – Investigating the Role of Biomechanical Forces in the Enteric Nervous System	<i>Grand Cypress D-I</i>
	Learning objectives	
	<p>By the end of this presentation attendees will be able to:</p> <ul style="list-style-type: none"> • Enteric nervous appear to be susceptible to extrinsic forces such as stretch • The mechanoreceptor Piezo1 may be a mechanism by which force is transduced in enteric neurons 	
	Moderator: Stewart R. Carter, MD	
	Speaker: Lily S. Cheng, MD, <i>Baylor College of Medicine/Texas Children’s Hospital, Houston, TX, USA</i>	
10:30am - 11:15am	Young Investigators Symposium	<i>Grand Cypress D-I</i>
	Moderator: Stewart R. Carter, MD	
	<p>From the Bench to the Bedside to the EHR: A Career in Surgical Informatics Brian T. Bucher, MD, MS, <i>University of Utah, Salt Lake City, UT, USA</i></p> <p>Translational Science at the Intersection of Surgery and Immunotherapy for Pediatric Solid Tumors Lindsay J. Talbot, MD, <i>St. Jude Children’s Research Hospital, Memphis, TN, USA</i></p> <p>The Impact of Opioids on Health Outcomes for Hospitalized Infants Lorraine I. Kelley-Quon, MD, MSHS, <i>Children’s Hospital Los Angeles/University of Southern California, Los Angeles, CA, USA</i></p> <p>Unconventional Research Collaboration: A Risk Worth Taking Chethan Sathya, MD MSc, <i>Chethan Sathya, MD MSc, Cohen Children’s Medical Center at Hofstra Northwell, Roslyn, NY, USA</i></p>	
11:15am - 11:30am	JPS TEC TALK III – Regional Anesthesia for Abdominal Surgery Intraoperatively	<i>Grand Cypress D-I</i>
	Speakers: Pramod S. Puligandla, MD, MSc, <i>Montreal Children’s Hospital, Montreal, PQ, Canada</i> Stefan Scholz, MD, <i>UPMC Children’s Hospital of Pittsburgh, Pittsburgh, PA, USA</i>	
11:30am - 11:45am	JPS TEC TALK IV – Pharmacotherapy for Lymphatic Malformations	<i>Grand Cypress D-I</i>
	Learning objectives	
	<p>By the end of this presentation attendees will be able to:</p> <ul style="list-style-type: none"> • To select appropriate pharmacotherapies and timing for treatment of lymphatic malformations • To understand the genetics of lymphatic malformation and implication for biopsy consideration 	
	Speakers: Craig W. Lillehei, MD, <i>Boston Children’s Hospital, Boston, MA, USA</i> Ann Kulungowski, MD, <i>Division of Pediatric Surgery, Department of Surgery University of Colorado School of Medicine Children’s Hospital Colorado, Aurora, CO, USA</i>	
12:00pm - 1:30pm	Lunch	<i>Exhibit Hall - Grand Cypress Foyer</i>
12:00pm - 1:30pm	Benjy Brooks Luncheon – Women in Leadership (Ticketed Event)	<i>Windsong</i>
	Moderator: Erin E. Perrone, MD	
	Speakers: Lorraine I. Kelley-Quon, MD, MSHS, <i>Children’s Hospital Los Angeles/University of Southern California, Los Angeles, CA, USA</i> Gail E. Besner, MD, <i>Nationwide Childrens Hospital, Columbus, OH, USA</i> Brianna L. Spencer, MD, <i>University of Michigan, Ann Arbor, MI, USA</i> Jennifer Timmons, MD, <i>Bronson Methodist Hospital, Western Michigan University School of Medicine, Kalamazoo, MI, USA</i>	
12:00pm - 1:30pm	Committee Meetings	<i>See page 16-17 for ancillary meeting information</i>

1:30pm - 2:45pm

Scientific Session V: Trauma**Moderators:**

Shannon L. Castle, MD
 Michael Dingeldein, MD

Chat Room Moderator:

Kim G. Wallenstein, MD, PhD

Grand Cypress D-I

54**POSTOPERATIVE WOUND INFECTION AFTER PRIMARY CLOSURE IN PEDIATRIC DOG BITE INJURIES: ANALYSIS OF A POSTOPERATIVE ANTIBIOTIC PROTOCOL**

Brielle Ochoa, MD¹, R Scott Eldredge, MD², Megan Gilbert, CPNP-AC1, Tiffany J. Zens, MD, Anthony Ferrantella, MD¹, Lisa E. McMahon, MD², Benjamin Padilla, MD³, David M. Notrica, MD², Justin Lee, MD

¹Phoenix Children's, Phoenix, AZ, USA, ²Phoenix Children's Hospital, Phoenix, AZ, USA,

³Phoenix Children's Hospital, San Francisco, CA, USA, ⁴Phoenix Children's Hospital, Phoenix, AZ, USA

55**NEIGHBORHOOD CHILD OPPORTUNITY IS ASSOCIATED WITH HOSPITAL LENGTH OF STAY FOLLOWING PEDIATRIC BURN INJURY**

Adesola Akinkuotu, MD¹, Laura Burkbauer, MD², Michael R. Phillips, MD³, Jared Gallaher, MD, MPH², Felicia Williams, MD², Sean E. McLean, MD³, Anthony Charles, MD, MPH³

¹University of North Carolina-Chapel Hill, ²University of North Carolina-Chapel Hill, Chapel Hill, NC, USA,

³University of North Carolina at Chapel Hill, Chapel Hill

56**PEDIATRIC FIREARM INCIDENCE AND MORTALITY DIFFERS BY LEVEL OF CHILDHOOD OPPORTUNITY**

Gwyneth A. Sullivan, MD, MS¹, Yao Tian, MS, MPH², Suhail Zeineddin, MD, MS³, Anne M. Stey, MD, MSc⁴, Mehul V. Raval, MD, MS⁵

¹Division of Pediatric Surgery, Northwestern University Feinberg School of Medicine, Ann & Robert H. Lurie Children's Hospital; Division of Pediatric Surgery, Rush University Medical Center, Chicago, IL, USA, ²Surgical Outcomes Quality Improvement Center (SOQIC), Feinberg School of Medicine, Northwestern University, Chicago, IL, USA, ³Division of Pediatric Surgery, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, ⁴Department of Surgery, Northwestern University Feinberg School of Medicine, Chicago, IL, USA, ⁵Division of Pediatric Surgery, Department of Surgery, Northwestern University Feinberg School of Medicine, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA

57**RETROSPECTIVE REVIEW OF ANGIOEMBOLIZATION IN HIGH GRADE BLUNT TRAUMATIC LIVER INJURIES IN ADOLESCENT AGE CHILDREN**

Samara L. Lewis, MD¹, Kenneth L. Stewart, PhD², Zoon L. Sarwar, MS², Ryan Kennedy, MD², Jeremy Johnson²

¹Oklahoma University Health Science Center, Department of Surgery, Division of Pediatric Surgery, Oklahoma City, OK, USA, ²University of Oklahoma Health Science Center, Oklahoma City, OK, USA

58**PEDIATRIC BURN INJURIES AND MORTALITY: RISK FACTORS AT PLAY**

Samantha M. Koenig, MD¹, Luqin Deng, PhD², Chinwendu Onwubiko, MD, PhD¹, Elizabeth A. Beierle, MD³, Robert T. Russell, MD, MPH⁴

¹Children's of Alabama, Birmingham, AL, USA, ²The University of Alabama at Birmingham, Birmingham, AL, USA, ³Division of Pediatric Surgery, Department of Surgery, University of Alabama at Birmingham, Birmingham, AL, USA, ⁴University of Alabama at Birmingham and Children's of Alabama, Birmingham, AL, USA

59**APPLICATION OF A MACHINE LEARNING ALGORITHM IN PREDICTION OF ABUSIVE HEAD TRAUMA IN CHILDREN**

Priyanka Jadhav, BS¹, Timothy Sears², Gretchen Floan, MD³, Katie Joskowitz, MS⁴, Shalon Nienow⁴, Sheena Cruz⁵, Maya David⁶, Victor de Cos⁷, Pamela Choi, MD³, Romeo C. Ignacio, MD, MSc, MPath⁸

¹University of California San Diego, San Diego, CA, USA, ²University of California, San Diego, La Jolla, CA, USA, ³Naval Medical Center San Diego, San Diego, CA, USA, ⁴Rady Children's Hospital San Diego, San Diego, CA, USA, ⁵University of California School of Medicine, La Jolla, CA, USA, ⁶Tulane University School of Medicine, New Orleans, LA, USA, ⁷University of California San Diego School of Medicine, San Diego, CA, USA, ⁸Rady Children's Hospital San Diego/University of California San Diego School of Medicine, San Diego, CA, USA

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IN SEARCH OF TRUTH: MODELING ACTIVATION LEVEL IN PEDIATRIC TRAUMA

Catherine W. Liu, BS¹, Miranda Chacon, MD², Hadassah Polydore, BS³, Tiffany Ting, BA¹, Marjorie J. Arca, MD⁴, David Darcy, MD⁵, Derek Wakeman, MD⁶, Nicole A. Wilson, PhD, MD⁴

¹University of Rochester School of Medicine & Dentistry, Rochester, NY, USA, ²University of Rochester Medical Center | Golisano Children's Hospital, Rochester, NY, USA, ³University of Rochester Medical Center, Rochester, NY, USA, ⁴University of Rochester | Golisano Children's Hospital, Rochester, NY, USA, ⁵Golisano Children's Hospital, University of Rochester Medical Center, Rochester, NY, USA, ⁶University of Rochester, Rochester, NY, USA

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PEDIATRIC TRAUMA TRANSFER PATIENTS HAVE LOW RATES OF ADDITIONAL TRAUMATIC INJURIES

Su Yeon Lee, MD¹, Jordan Jackson, MD², Sarah C. Stokes, MD³, Olivia Vukceovich, BSc⁴, Holly Leshikar, MD, MPH¹, Tanya Rinderknecht, MD¹, Jonathan Kohler, MD⁵, Shinjiro Hirose, MD³, Erin G. Brown, MD³

¹UC Davis Medical Center, Sacramento, CA, USA, ²UCSF-East Bay, Oakland, CA, USA, ³University of California, Davis Medical Center, Sacramento, CA, USA, ⁴UC Riverside School of Medicine, Riverside, CA, USA, ⁵University of Wisconsin, Madison, WI, USA

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A NOVEL TECHNIQUE TO IDENTIFY CHILDREN AT HIGH RISK FOR PHYSICAL ABUSE IN A NATIONWIDE TRAUMA REGISTRY

Stephanie Papillon, MD¹, Sahal Master, MPH¹, Matthew Klein², Allison Toth², Norrell Atkinson³, Harsh Grewal⁴

¹St. Christopher's Hospital for Children, Philadelphia, PA, USA, ²Drexel University College of Medicine, Philadelphia, PA, USA, ³St. Christopher's Hospital for Children, ⁴St. Christopher's Hospital for Children/ Drexel University College of Medicine

2:45pm - 4:00pm

Scientific Session VI: Global*Grand Cypress D-I***Moderators:**

Allison F. Linden, MD MPH
Christa N. Grant, MD

Chat Room Moderator:

Kim G. Wallenstein, MD, PhD

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IMPACT OF INVESTMENT IN PEDIATRIC SURGICAL INFRASTRUCTURE ON INCOME EQUITY IN ETHIOPIA

Ava Yap, MD, MHS¹, Samuel Negash, MD², Caroline Stephens, MD MPH³, Emma Bryce, MPH⁴,

¹Department of Surgery, University of California San Francisco, San Francisco, CA, USA, ²Menelik II Hospital, Addis Ababa, Adis Abeba, Ethiopia, ³UCSF Center of Health Equity in Surgery and Anesthesia, San Francisco, CA, USA, ⁴University of Edinburgh Usher Institute of Population Health Sciences and Informatics, San Francisco, CA, USA, ⁵Yale School of Medicine, New Haven, CT, USA, ⁶Kids Operating Room, Edinburgh, UK, ⁷School of Medicine, University of California San Francisco, San Francisco, CA, USA, ⁸Addis Ababa University, Addis Ababa, Adis Abeba, Ethiopia, ⁹Addis Ababa University, Addis Ababa, Ethiopia, ¹⁰St. Paul Hospital, Addis Ababa, Ethiopia

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IMPACT OF BOWEL COVERAGE ON GASTROSCHISIS MORTALITY IN LOW-INCOME COUNTRIES: EXPERIENCE AND LESSONS FROM UGANDA

Caroline Stephens, MD MPH¹, Stella Nimanya, MD², Ava Yap, MD, MHS³, Phyllis Kisa, MD², Nasser Kakembo, MD⁴, Anne Wesonga, MD², Innocent Okello, MD², Rovine Naluyimbazi, MD², Fiona Mbwali², Peter Kayima, MD², Yasin Ssewanyana, MD⁵, Bindi Naik-Mathuria, MD, MPH⁶, Doruk Ozgediz, MD, MSc³, John Sekabira, MD²

¹UCSF Center of Health Equity in Surgery and Anesthesia, San Francisco, CA, USA, ²Mulago National Referral Hospital, Kampala, Kampala, Uganda, ³Department of Surgery, University of California San Francisco, San Francisco, CA, USA, ⁴Makerere University, Kampala, Uganda, ⁵Mulago National Referral Hospital, Kampala, Kampala, Uganda, ⁶University of Texas Medical Branch, Galveston, TX, USA

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ADVANCING GASTROSCHISIS CARE IN LOW-INCOME SETTINGS – THE EXPERIENCE IN RWANDA

Edmond Ntaganda, MD¹, Thomas M. Diehl, MD², Michael Adam Lemma¹, Mohammed Javed¹,
 Elisée Rwagahirima, MD¹, Japhet Ntezamizero, MD¹, Axelle-Aimee Nduwimana, MD¹,
 Gisèle Juru Bunogerane, MD¹, Alain Jules Ndibanje, MD¹, Robin T. Petroze, MD, MPH³

¹Centre Hospitalier Universitaire de Kigali, Kigali, Kigali, Rwanda, ²UW Hospitals and Clinics, Madison, WI, USA, ³University of Florida College of Medicine, Gainesville, FL, USA

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SOCIAL IMPACT OF A COLOSTOMY ON FAMILIES OF CHILDREN WITH COLORECTAL DISORDERS

Samuel Negash, MD¹, Melat Anania, MPH², Beimnet Negussie, MD³, Tihitena N Mammo, MD⁴,
 Fisseha Temesgen, MD⁵

¹Menelik II Hospital, Addis Ababa, Adis Abeba, Ethiopia, ²Plan International Ethiopia, ³St. Paul Hospital, Addis Ababa, Ethiopia, ⁴Addis Ababa University, Addis Ababa, Adis Abeba, Ethiopia, ⁵Addis Ababa University

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PILOT BOWEL MANAGEMENT PROGRAM AT MBARARA HOSPITAL, UGANDA

Stephen Trinidad, MD, MPH¹, Felix Oyania², Crispus Bingana, NR³, Ivan Nuwagaba³, Maria Obermeyer,
 MSN APRN¹, Charles Odongo, MD MB ChB, MMED³, Meera Kotagal, MD, MPH¹, Martin Situma²

¹Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA, ²Mbarara Regional Referral Hospital, Mbarara, Mbarara, Uganda, ³Mbarara Hospital, Mbarara, Mbarara, Uganda

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IMPROVISED LOW-COST SILO BAG USING WIDELY AVAILABLE MATERIALS AND SIMPLE ASSEMBLY TO MANAGE GASTROSCHISIS IN LOW RESOURCE SETTINGS

Vanshika P. Jhonsa, BA¹, Shreya Jindal², Shriya Shah², Meaghan Bond, PhD³, Timothy Jumbi, MBBS⁴,
 Bindi Naik-Mathuria, MD, MPH⁵

¹Rice University, Rice 360 Program, Pearland, TX, USA, ²Rice University, Rice 360 Program, Houston, TX, USA, ³Rice360 Institute for Global Health Technologies, Rice University, Houston, TX, USA, ⁴Kenyatta National Hospital, Nairobi, Nairobi Area, Kenya, ⁵University of Texas Medical Branch, Galveston, TX, USA

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THE PEDIATRIC EMERGENCY SURGERY COURSE: IMPACT ON PROVIDER PRACTICE IN RURAL UGANDA

Greg Klazura, MD, MPH¹, Martin Situma², Edwin Musinguzi³, Robert Mugarura⁴, James Nyonyintono⁵,
 Ava Yap, MD, MHS⁶, Sarah J. Ullrich, MD, MHS⁷, Doruk Ozgediz, MD, MSc⁶, John Sekabira, MD⁸, Nasser
 Kakembo, MD⁹, Augustine Ssemaju³, Max Bwesigye⁵, Deborah Muzaki⁵, Thomas Sims¹⁰, Nalukenge
 Proscovia³, Jennifer Bandu³, Franklin Arinda⁴, Doreen Kundiye⁴, Phyllis Kisa, MD⁸, Caroline Stephens,
 MD MPH¹¹

¹Loyola University Medical Center, Chicago, IL, USA, ²Mbarara Regional Referral Hospital, Mbarara, Mbarara, Uganda, ³Fort Portal Regional Referral Hospital, Fort Portal, Kabarole, Uganda, ⁴Kabale Regional Referral Hospital, Kabale, Kabale, Uganda, ⁵Kiwoko Hospital, Kiwoko, Nakaseke, Uganda, ⁶Department of Surgery, University of California San Francisco, San Francisco, CA, San Francisco, CA, USA, ⁷Yale Department of Surgery, New Haven, CT, USA, ⁸Mulago National Referral Hospital, Kampala, Kampala, Uganda, ⁹Makerere University, Kampala, Uganda, ¹⁰UIC Department of Surgery, Chicago, IL, USA, ¹¹UCSF Center of Health Equity in Surgery and Anesthesia, San Francisco, CA, USA

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12-MONTH PROSPECTIVE ANALYSIS OF NEONATAL SURGICAL OUTCOMES IN A LOW-INCOME SETTING: IDENTIFYING AND ADDRESSING MODIFIABLE RISK FACTORS FOR IN-HOSPITAL DEATHS

Thomas M. Diehl, MD¹, Elisée Rwagahirima, MD², Japhet Ntezamizero, MD², Axelle-Aimee Nduwimana,
 MD², Germaine Mukankuranga², Gisèle Juru Bunogerane, MD², Alain Jules Ndibanje, MD², **Robin T.
 Petroze, MD, MPH³**, Edmond Ntaganda, MD²

¹UW Hospitals and Clinics, Madison, WI, USA, ²Centre Hospitalier Universitaire de Kigali, Kigali, Kigali, Rwanda, ³University of Florida College of Medicine, Gainesville, FL, USA

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THE GLOBAL REACH OF A FREE PEDIATRIC SURGERY EDUCATION INITIATIVE

Ellen M. Encisco, MD¹, Cecilia Gigena, MD², Kiersten P. Miller, BA³, Todd Ponsky, MD⁴

¹Cincinnati Children's Hospital Medical Center, Akron Children's Hospital, Wadsworth, OH, USA,

²Cincinnati Children's Hospital Medical Center, Cincinnati, OH, Cincinnati, OH, USA, ³Bambino Gesù'

Children's Hospital, Roma, Lazio, Italy, ⁴Cincinnati Children's Hospital Medical Center, Pepper Pike, OH, USA

4:15pm - 5:45pm

Case Controversies

Grand Cypress D-I

Learning objectives

By the end of this presentation attendees will be able to:

- Differentiate varied approaches common to pediatric surgical problems
- Discuss changing trends in pediatric surgery
- Restate recent data that may change their historical practice
- State common controversies facing general pediatric surgeons

Speakers:

Todd Ponsky, MD, *Cincinnati Children’s Hospital Medical Center, Pepper Pike, OH, USA*
 Carroll (Mac) M. Harmon, MD PhD, *John R Oisehi Children’s Hospital, Buffalo, NY, USA*
 Katie W. Russell, MD, *Primary Children’s Hospital, Salt Lake City, UT, USA*

SATURDAY, MAY 13

All times are Eastern Standard Time USA

6:00am - 7:00am

Committee Meeting

See page 16-17 for ancillary meeting information

6:30am - 7:00am

Continental Breakfast

Grand Cypress Foyer

7:15am - 7:30am

**Daily Roundup – Education Committee Button Battery Ingestion:
 What Should Every Pediatric Surgeon Know?**

Grand Cypress D-I

Learning objectives

By the end of this presentation attendees will be able to:

- Define the most current strategies to diagnose and treat BB ingestions, limit injury progression through mitigation strategies, and monitor injured children long term
- Build a multidisciplinary, institution-specific protocol for addressing these emergent injuries
- Report the ingestion events to drive industry change through apps like the GIRC app

Speakers:

Joanne E. Baerg, MD, FACS, EMHA¹, Minna Minsing Chen Wieck, MD, FACS², Regan F. Williams, MD, MS³
¹Presbyterian Health Services, Foothill Ranch, CA, USA, ²University of California Davis, USA, ³Le Bonheur Children’s Hospital, Memphis, TN, USA

7:30am - 8:45am

**Scientific Session VII: Fetal
 Moderator:**

Grand Cypress D-I

Tim Jancelewicz, MD, MA, MS

Chat Room Moderator:

Pamela Choi, MD

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PHYSIOLOGIC AND HISTOLOGIC OUTCOMES OF PROLONGED PARTIAL LIQUID VENTILATION IN PUMPLESS EXTRACORPOREAL MEMBRANE OXYGENATION-SUPPORTED CDH MODEL LAMBS

Alicia L. Eubanks, MD¹, Emily C. Hodgson, MDCM¹, Samantha A. Tilden¹, Jeffrey Dicker, MS¹, Mia E. Kwechin¹, Nicholas A. Wachowski¹, Travis Kotzur¹, Abby C. Larson, MD², Jonathan Chang, MD, MS³, Christopher G. Halline¹, Ash E. Spina¹, Gabriela Daszewska-Smith, MS⁴, William W. Fox, MD⁵, Emily A. Partridge, MD, PhD¹

¹Children’s Hospital of Philadelphia, Philadelphia, PA, USA, ²Brigham and Women’s Hospital, Boston, MA, USA, ³University of Connecticut Department of General Surgery, Farmington, CT, USA, ⁴Children’s Hospital of Philadelphia, Philadelphia, PA, USA, ⁵Perelman School of Medicine at The University of Pennsylvania, Narberth, PA, USA

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A PUMPLESS PEDIATRIC ARTIFICIAL LUNG MAINTAINS FUNCTION FOR 72 HOURS WITHOUT SYSTEMIC ANTICOAGULATION USING THE NITRIC OXIDE SURFACE ANTICOAGULATION SYSTEM

Brianna L. Spencer, MD¹, Matthew Johnson², Spencer K. Wilhelm, MD¹, Orsolya Lautner-Csorba², Hannah Match, BS¹, Gergely Lautner², Brian P. Fallon, MD³, Leah Gudex, BS¹, Tyler Dann, BS¹, Mark Meyerhoff, PhD¹, Joseph Potkay, PhD¹, Robert Bartlett², Alvaro Rojas-Pena², Ronald B. Hirschl, MD¹

¹University of Michigan, Ann Arbor, MI, USA, ²Extracorporeal Life Support Lab, Department of Surgery, Michigan Medicine, ³Extracorporeal Life Support Laboratory, Department of Surgery, Michigan Medicine

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A PUMPLESS PEDIATRIC ARTIFICIAL LUNG MAINTAINS FUNCTION FOR 72 HOURS WITHOUT SYSTEMIC ANTICOAGULATION USING THE NITRIC OXIDE SURFACE ANTICOAGULATION SYSTEM

Brianna L. Spencer, MD¹, Matthew Johnson², Spencer K. Wilhelm, MD¹, Orsolya Lautner-Csorba², Hannah Match, BS¹, Gergely Lautner², Brian P. Fallon, MD³, Leah Gudex, BS¹, Tyler Dann, BS¹, Mark Meyerhoff, PhD¹, Joseph Potkay, PhD¹, Robert Bartlett², Alvaro Rojas-Pena², Ronald B. Hirschl, MD¹

¹University of Michigan, Ann Arbor, MI, USA, ²Extracorporeal Life Support Lab, Department of Surgery, Michigan Medicine, ³Extracorporeal Life Support Laboratory, Department of Surgery, Michigan Medicine

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TRANSAMNIOTIC DELIVERY OF SURFACTANT PROTEIN B (SPB) MRNA: A POTENTIAL NOVEL STRATEGY FOR THE PERINATAL MANAGEMENT OF CONGENITAL SPB DEFICIENCIES AND SURFACTANT REPLACEMENT THERAPY

Kamila Moskowitsova, MD¹, Abbie E. Naus, MD¹, Tanya T. Dang², David Zurakowski, MS, PhD³, Dario O. Fauza, MD, PhD⁴

¹Boston Children's Hospital, Harvard Medical School, Boston, MA, USA, ²Boston Children's Hospital, Boston, MA, USA, ³Boston Children's Hospital, Department of Anesthesia, Critical Care, and Pain Medicine Research, Boston, MA, USA, ⁴Boston Children's Hospital, Department of Surgery, Boston, MA, USA

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SEVERITY MISCLASSIFICATION IN PRENATALLY DIAGNOSED CONGENITAL DIAPHRAGMATIC HERNIA: HOW OFTEN ARE WE WRONG?

Lawrence Willis, MD¹, Ashley Ebanks², Matthew T. Harting, MD, MS, FAAP, FACS³, Tim Jancelewicz, MD, MA, MS⁴

¹University of Tennessee Health Science Center, Le Bonheur Children's Hospital, Memphis, TN, USA, ²University of Texas Health Sciences Center at Houston, ³McGovern Medical School at UTHealth, Houston, TX, USA, ⁴Le Bonheur Children's Hospital, University of Tennessee Health Science Center, Memphis, TN, USA

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FUNCTIONAL AND MOLECULAR SEXUAL DIMORPHISM IN CONGENITAL DIAPHRAGMATIC HERNIA

Oluyinka O. Olutoye, MD, MPH¹, JD Hammond, MD², Jamie Gilley³, Walker D. Short, MD¹, Hui Li, PhD¹, Sandra Grimm, PhD⁴, Christian Coarfa, PhD⁵, Jason Gleghorn, PhD⁶, Krithika Lingappan, MD, MS, PhD⁷, Sundeep G. Keswani, MD¹

¹Baylor College of Medicine/Texas Children's Hospital, Houston, TX, USA, ²Texas Children's Hospital & Baylor College of Medicine, Houston, TX, USA, ³Baylor College of Medicine, ⁴Baylor College of Medicine, Houston, TX, USA, ⁵Baylor, Houston, TX, USA, ⁶University of Delaware, Newark, DE, USA, ⁷Children's Hospital of Philadelphia, Houston, TX, USA

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FUNCTIONAL ACTIVITY OF SPINAL CORD ORGANOIDs GENERATED FROM HUMAN AMNIOTIC FLUID STEM CELLS: A NOVEL APPROACH FOR DISEASE MODELING AND AUTOLOGOUS THERAPY IN MYELOMENINGOCELE

Juan C. Biancotti, PhD¹, Shelby R. Sferra, MD, MPH¹, Annalise B. Penikis, MD¹, Jena L. Miller, MD¹, Shaun Kunisaki, MD²

¹Johns Hopkins University, Baltimore, MD, USA, ²Johns Hopkins University School of Medicine, Baltimore, MD, USA

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Ernesto J. Rojas, B.S¹, Maria Clarke, B.S.¹, Steven Cincotta, PhD¹, Lan Vu, MD², Soo-Jin Cho, MD, PhD¹, Stephan Sanders, BMBS, PhD¹, Diana Laird, PhD¹, Tippi Mackenzie¹

¹UCSF, San Francisco, CA, USA, ²University of California San Francisco, San Francisco, CA, USA

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FETAL GENE EDITING EVADES MATERNAL T CELL IMMUNITY TO CAS9 ENDONUCLEASE

John S. Riley, MD MS¹, Valerie L. Luks², Cara L. Berkowitz, MD³, Apeksha Dave, MD⁴, Philip Zoltick, MD⁴, William H. Peranteau, MD¹

¹Children's Hospital of Philadelphia, Philadelphia, PA, USA, ²University of Pennsylvania Health System, Philadelphia, PA, USA, ³Children's Hospital of Philadelphia, ⁴Center for Fetal Research, Children's Hospital of Philadelphia, Philadelphia, PA, USA

80**FETOSCOPIC MYELOMENINGOCELE REPAIR IS ASSOCIATED WITH LESS FETAL BRADYCARDIA COMPARED TO OPEN REPAIR**

Steven T. Papastefan, MD¹, Amir Alhajjat², Katherine Ott, MD³, Joy Ito, RN, CCRP⁴, Xavier F. Pombar, DO⁵, Erin E. Rowell, MD⁶, Robin M. Bowman, MD⁷, Aimen Shaaban²

¹Department of Surgery, Northwestern University Feinberg School of Medicine Division of Pediatric Surgery, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, ²Center for Fetal Cellular and Molecular Therapy, Ann and Robert H. Lurie Children's Hospital, ³Center for Fetal Cellular and Molecular Therapy, Ann and Robert H. Lurie Children's Hospital, Chicago, IL, USA, ⁴Division of Pediatric Surgery, Ann and Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, ⁵Department of Obstetrics and Gynecology, Rush Medical College, Chicago, IL, USA, ⁶Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, ⁷Division of Pediatric Neurosurgery, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA

8:45am - 10:00am

Scientific Session VII: Neonatal and General*Grand Cypress D-I***Moderators:**

Brielle Ochoa, MD
 David A. Lazar, MD

Chat Room Moderator:

Rachel Sundland, MD

81**ACID SUPPRESSION AFTER ESOPHAGEAL ATRESIA REPAIR: SOME INFANTS DO BENEFIT**

Suhail Zeineddin, MD, MS¹, Gwyneth A. Sullivan, MD, MS², J. Benjamin Pitt, MD³, Michela Carter, MD⁴, Seth D. Goldstein, MD, MPhil³, Brian C. Gulack, MD, MHS⁵

¹Division of Pediatric Surgery, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, ²Division of Pediatric Surgery, Northwestern University Feinberg School of Medicine, Ann & Robert H. Lurie Children's Hospital; Division of Pediatric Surgery, Rush University Medical Center, Chicago, IL, USA, ³Division of Pediatric Surgery, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, ⁴Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, ⁵Rush University Medical Center, Chicago, IL, USA

82**OUTCOMES OF PRIMARY AND DELAYED SUTURELESS CLOSURE FOR GASTROSCHISIS**

Ranjeet S. Kalsi, BS, DO, K. T. Anderson, Charles R. Hong, Stefan Scholz, MD
 UPMC Children's Hospital of Pittsburgh, Pittsburgh, PA, USA

83**THE SHORT CHAIN FATTY ACID BUTYRATE AMELIORATES NECROTIZING ENTEROCOLITIS AND INHIBITS EXAGGERATED BACTERIAL SIGNALING IN THE PREMATURE INTESTINE OF MICE AND HUMANS**

Andres J. Gonzalez Salazar, MD¹, Carla M. Lopez, MD², Maame Sampah, MD, PhD³, Asuka Ishiyama², Thomas Prindle², William B. Fulton², Sanxia Wang², Menghan Wang⁴, Peng Lu², Chhinder P. Sodhi², David J. Hackam, MD, PhD⁵

¹Johns Hopkins Hospital, Division of General Pediatric Surgery, Baltimore, MD, USA, ²Johns Hopkins University School of Medicine, Baltimore, MD, USA, ³Johns Hopkins School of Medicine, Baltimore, MD, USA, ⁴Johns Hopkins University, Baltimore, MD, USA, ⁵Johns Hopkins Children's Center, Baltimore, MD, USA

84**PERCUTANEOUS ULTRASOUND-GUIDED PERITONEAL ACCESS WITH A CENTRAL VENOUS CATHETER AS A TEMPORARY METHOD FOR PERITONEAL DIALYSIS**

Fernando Montes-Tapia, MD, PhD, Antonio Rodríguez-Taméz, MD, Daniela R. Padilla-Alanis, MD, Arturo Garza-Alatorre, MD PhD, Manuel De la O-Cavazos, MD PhD
 Universidad Autónoma de Nuevo León / Hospital Universitario "Dr. José Eleuterio González", Monterrey, Nuevo Leon, Mexico

85**PEDIATRIC NECK VESSEL REPAIR FOLLOWING ECMO DECANNULATION - IS IT WORTH THE RISK?**

Tania Gennell, MD¹, Nicholas Schmoke, MD¹, Devin Midura, MD², Melody Gomez, BA¹

¹Columbia University Irving Medical Center, New York City, NY, USA, ²Montefiore Medical Center/Albert Einstein College of Medicine, Bronx, NY, USA

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SURGICAL MANAGEMENT OF NEONATAL SEVERE HYPERPARATHYROIDISM

Saud Alshanafey, MBBS, MSc, MBA, FRCSC¹, Sabreen Maqbol¹, Ali Alameer², Abdullah Alashwal¹
¹King Faisal Specialist Hospital and Research Center, Riyadh, Ar Riyad, Saudi Arabia, ²King Faisal Specialist Hospital and Resarch Center, Riayadh, Ar Riyad, Saudi Arabia

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ASSOCIATION OF AGE AT DUODENAL ATRESIA REPAIR WITH OUTCOMES: A PEDIATRIC NSQIP ANALYSIS

Shale Mack¹, Devon J. Pace, MD², Loren Berman, MD³, Matthew Boelig, MD²
¹Sidney Kimmel Medical College at Thomas Jefferson University, Philadelphia, PA, USA, ²Nemours Children’s Health, Wilmington, DE, USA, ³Nemours | Alfred I. duPont Hospital for Children, Wilmington, DE, USA

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PREDICTORS OF POOR GROWTH IN NEONATES WITH A SMALL BOWEL STOMA

Martina Mudri¹, Rhonda Van Oerle², Alyssa Ramanzin¹, Jason Silverman³, Hannah Piper, MD⁴
¹BC Children’s Hospital, Vancouver, BC, Canada, ²BC Women’s Hospital, ³Stollery Children’s Hospital, Edmonton, BC, Canada, ⁴Division of Pediatric Surgery, University of British Columbia/BC Children’s Hospital, Vancouver, BC, Canada, Vancouver, BC, Canada

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DIAGNOSTIC ACCURACY OF LARYNGEAL ULTRASOUND FOR EVALUATING VOCAL FOLD MOVEMENT IMPAIRMENT IN CHILDREN

Shawn Izadi, MD¹, Benjamin Zendejas, MD, MSc¹, Jay Meisner, MD², Ali Kamran, Somala Mohammed, MD¹, Farokh R. Demehri, MD³, Anne Hseu, MD¹, Steven J. Staffa¹, David Zurakowski, MS, PhD⁴, Carol E. Barnewolt, MD¹, Sukgi Choi, MD⁵
¹Boston Children’s Hospital, Boston, MA, USA, ²Boston Children’s Hospital, ³Harvard Medical School, Department of Surgery, Boston Children’s Hospital, Boston, MA, USA, ⁴Boston Children’s Hospital, Department of Anesthesia, Critical Care, and Pain Medicine Research, Boston, MA, USA, ⁵Esophageal and Airway Treatment Center, Boston Children’s Hospital

10:00am - 10:15am

Refreshment Break

Grand Cypress Foyer

10:15am - 11:15am

COMMITTEE BREAKOUT SESSIONS IX - VIII

Breakout IX

Fetal Committee – Artificial Placenta: Fantasy or Reality

Cypress B-C

Breakout VI

**APSA Ethics Committee and the CAPS Ethics Committee Collaboration
 The Late Career Surgeon**

Grand Cypress A

Breakout VII

**Joint APSA and AAP Advocacy Committee – Let Food Be Thy Medicine:
 Pediatric Surgical Advocacy and Activism Addresses Food Insecurity**

Grand Cypress D-I

10:15am - 11:15am

Breakout IX: Fetal Committee – Artificial Placenta: Fantasy or Reality

Grand Cypress B-C

Learning objectives

By the end of this presentation, attendees will be able to:

- Discuss current clinical outcomes of ELGANs
- Outline the evolution of the artificial placenta Learn about the importance of gender affirmation and its dimension
- Discuss similarities and differences of the VV and AV ECLS approach to extracorporeal support of premature infants and their clinical applications

Moderator:

Shaun Kunisaki, MD

Development of the Artificial Placenta: Historical Perspectives and Opportunities for Divergent Approaches

Alan W. W. Flake, MD, *Children’s Hospital of Philadelphia, Philadelphia, PA, USA*

George B. Mychaliska, MD, *Section of Pediatric Surgery, Fetal Diagnosis and Treatment Center, University of Michigan Health System, Ann Arbor, MI, USA*

Problems of Prematurity: Current Update of Outcomes

Barbara Warner, MD, *Washington University in St. Louis, School of Medicine, Saint Louis, MO, USA*

10:15am - 11:15am **Breakout VII: Joint APSA and AAP Advocacy Committee – Let Food Be Thy Medicine: Pediatric Surgical Advocacy and Activism Addresses Food Insecurity** *Grand Cypress D-I*

Learning objectives

By the end of this presentation, attendees will be able to:

- Incorporate inquiring about access to healthy foods using best practices (AAP Policy Statement- Promoting Food Security for All Children.)
- Learn from your colleagues who have leveraged programs such as Fresh Rx or Fresh Pharmacy for pediatric surgery patients, and have received grants and funding to connect families to local and federal nutrition programs
- Identify the association in children between obesity and food insecurity, as well as the role of obesity surgery
- Integrate outcomes data collection into daily practice, particularly if a new program is adopted. To advocate for policy change and impact food insecurity in a broader sphere, data is essential. Understand the role of ICD10 diagnosis codes for food insecurity and vulnerable populations

Moderator:

Joanne E. Baerg, MD, FACS, EMHA, *Presbyterian Health Services, Foothill Ranch, CA, USA*

Speakers:

Jeffrey W. Gander, MD, *University of Virginia Children’s Hospital, Charlottesville, VA, USA*

Kirk Reichard, MD, MBA, *Nemours Children’s Health, Wilmington, DE, USA*

Marshall M. Stone, MD, *Jupiter Medical Center, Jupiter, FL., Co-Founder Fresh Rx, Jupiter, FL, USA*

10:15am - 11:15am **Breakout VIII: APSA Ethics Committee and CAPS Ethics Committee Collaboration. The Late Career Surgeon** *Grand Cypress A*

Moderator:

Charles Bagwell, MD

Learning objectives

By the end of this presentation, attendees will be able to:

- Identify how early career surgeons can prepare themselves for their eventual retirement from a clinical and financial perspective
- Discuss how mid-career surgeons can prolong their career and possibly pivot to lay the foundation for their post surgical career
- Explore why, when, and how late-career surgeons can transition from their surgical practices to their next phase of life
- Identify the ethical issues involved in career transitions for pediatric surgeons at all stages of work

Discussion of Middle Career Surgeon Issues

Kenneth Gow, MD, *Seattle Children’s Hospital, Seattle, WA, USA*

Discussion of Early Career Surgeon Issues

Baddr A. Shakhsheer, MD, *Washington University in St. Louis, Saint Louis, MO, USA*

11:15am - 11:30am Refreshment Break *Grand Cypress Foyer*

11:30am - 12:00pm **Scientific Awards** *Grand Cypress D-I*

Wednesday, May 10, 2023

Plenary Session I

7:45 AM – 9:00 AM

1

STATE OF GENDER EQUITY IN PEDIATRIC SURGERY – A REPORT FROM THE BENJY BROOKS COMMITTEE OF THE AMERICAN PEDIATRIC SURGICAL ASSOCIATION

Megan T. Vu, MD¹, Erin E. Perrone, MD², Romeo C. Ignacio, MD, MSc, MPath³, Claudia N. Emami, MD MPH⁴, Mary E. Fallat, MD⁵, Marion C. W Henry, MD, MPH⁶

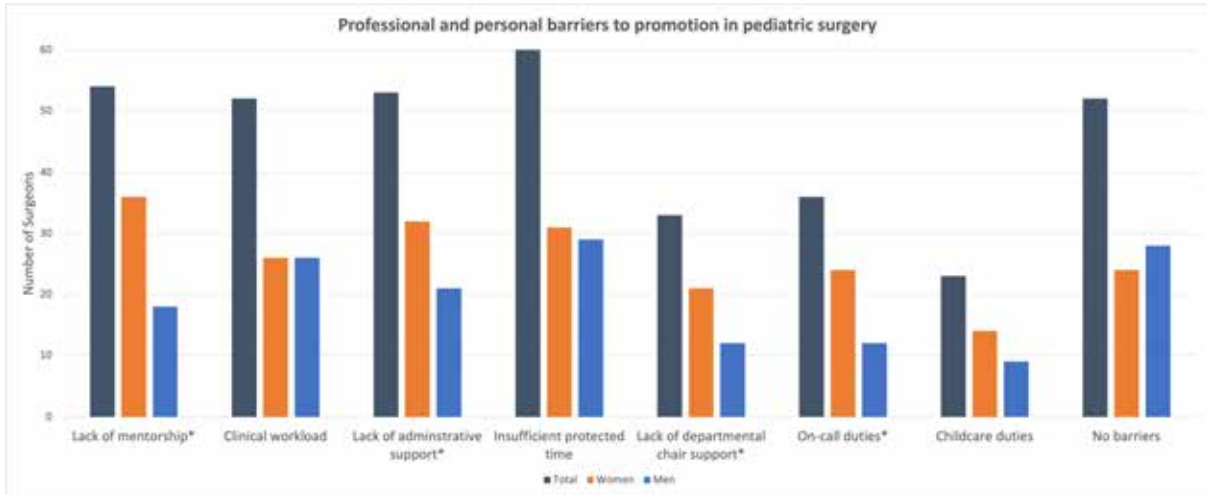
¹Baylor College of Medicine, Houston, TX, USA, ²University of Michigan, Ann Arbor, MI, USA, ³Rady Children's Hospital San Diego/University of California San Diego School of Medicine, San Diego, CA, USA, ⁴Huntington Memorial Hospital, Los Angeles, CA, USA, ⁵Hiram C. Polk, Jr, MD Department of Surgery, University of Louisville, Norton Children's Hospital, Louisville, KY, USA, ⁶University of Chicago, Chicago, IL, USA

Purpose: In 2021, 29% of active members of the American Pediatric Surgical Association (APSA) and 52% of pediatric surgery fellows in the US were women. A study from 2004 found that women pediatric surgeons reported career satisfaction but also identified obstacles to successful careers. Our study aimed to elucidate the current career status of APSA pediatric surgeons.

Methods: We distributed an IRB-approved survey to all APSA members across four areas: Demographics; Advancement & Career Satisfaction; Family & Childcare Issues; APSA & Committee Involvement.

Results: 276 surgeons responded. 75% were in academic practice. 57% were women. Age ranged from 31-71 (median 43). Figure 1 depicts the most common barriers to promotion. When analyzed for gender, women had higher odds of reporting lack of mentorship (OR 2.9, 95% CI 1.5, 5.8), excessive on-call commitments (OR 2.7, 95% CI 1.3, 6.2), lack of departmental chair support (OR 2.33, 95% CI 1.04, 5.39), and inadequate administrative support (OR 2.1, 95% CI 1.1, 4.1). More female surgeons (45.2%) take primary responsibility for household tasks compared to men (5.6%), while more male surgeons' spouses (41.6%) take primary responsibility compared to women surgeons' spouses (13.5%). 38.1% of women respondents have been pregnant; 72% waited until the completion of training. Women surgeons are 12.4 times more likely to serve as the primary childcare provider (95% CI 2.9, 111.5) and 3.2 times more likely to hire an employee for childcare (95% CI 1.3, 8.1). Most pediatric surgeons (92.3%) would choose a career in pediatric surgery again.

Conclusions: Pediatric surgeons express career satisfaction. However, many obstacles still remain, particularly for women. Salary and childbearing issues persist. Men and women still report similar barriers to promotion including insufficient protected time, excessive clinical workload, excessive on-call duties, and lack of mentorship. Addressing these challenges will require dedicated intervention by all pediatric surgeons.



2

DIRECT THROMBIN INHIBITORS PARTIALLY RESCUE THE NEGATIVE EFFECTS OF HEPARIN ON LUNG GROWTH AND FUNCTION AFTER MURINE LEFT PNEUMONECTOMY

Savas Tsikis, MD¹, Scott Fligor, MD², Thomas Hirsch, MD³, Amy Pan, BA⁴, Malachi Joiner³, Angela Devietro³, Paul Mitchell, MS⁵, Kathleen Gura, PharmD⁶, Mark Puder, MD, PhD¹

¹*Boston Children's Hospital, Harvard Medical School, Boston, MA, USA*, ²*Boston Children's Hospital, Harvard Medical School, Boston, MA, USA*, ³*Vascular Biology Program and Department of Surgery, Boston Children's Hospital, Harvard Medical School, Boston, MA, USA*, ⁴*Boston Children's Hospital, Boston, MA, USA*, ⁵*Institutional Centers for Clinical and Translational Research, Boston Children's Hospital, Boston, MA, USA*, ⁶*Department of Pharmacy and the Division of Gastroenterology and Nutrition, Boston Children's Hospital, Boston, MA, USA*

Purpose: Infants with congenital diaphragmatic hernia (CDH) may require cardiopulmonary bypass and systemic anticoagulation. Expedient lung growth while on bypass is essential for survival. Previously, we demonstrated that heparin impairs lung growth and function in a murine model of compensatory lung growth (CLG). The direct thrombin inhibitors (DTIs) bivalirudin and argatroban preserved growth. While DTIs are increasingly used for systemic anticoagulation clinically, CDH patients may still receive subtherapeutic heparin. We investigated the effects of subtherapeutic heparin with or without DTIs in a murine CLG model.

Methods: Lung endothelial cell proliferation was assessed following treatment with heparin alone (0.5IU/mL) or mixed with increasing concentrations of bivalirudin or argatroban. C57BL/6J mice (N=63) underwent left pneumonectomy and subcutaneous osmotic pump implantation. Pumps were pre-loaded with normal saline, bivalirudin, or argatroban to achieve systemic anticoagulation. Treated animals received daily intraperitoneal injection of low-dose heparin (250IU/kg); controls received normal saline. On postoperative-day 8, mice underwent partial thromboplastin time (PTT) assessment, pulmonary function testing, lung volume measurement, and treadmill exercise tolerance testing (TETT).

Results: In vitro, heparin-alone decreased endothelial cell proliferation. This effect was reversed with increasing concentrations of bivalirudin (A) and argatroban (B). In vivo, mixed bivalirudin- and argatroban-treated mice had elevated PTTs, while heparin-alone did not alter PTT (C). Inspiratory capacity was lowest in heparin-alone mice (D) and heparin decreased lung volume (E). Lung volume was not significantly changed in the mixed bivalirudin/argatroban groups. Low-dose heparin decreased TETT as measured by the percent change from baseline in distance run (F) and time spent running (G). There were no significant differences in TETT in the mixed bivalirudin/argatroban groups.

Conclusion: Bivalirudin and argatroban partially reverse the inhibitory effects of subtherapeutic heparin on lung growth and function in a murine model of CLG. Clinical studies on the impact of low-dose heparin with DTIs on CDH outcomes are warranted.

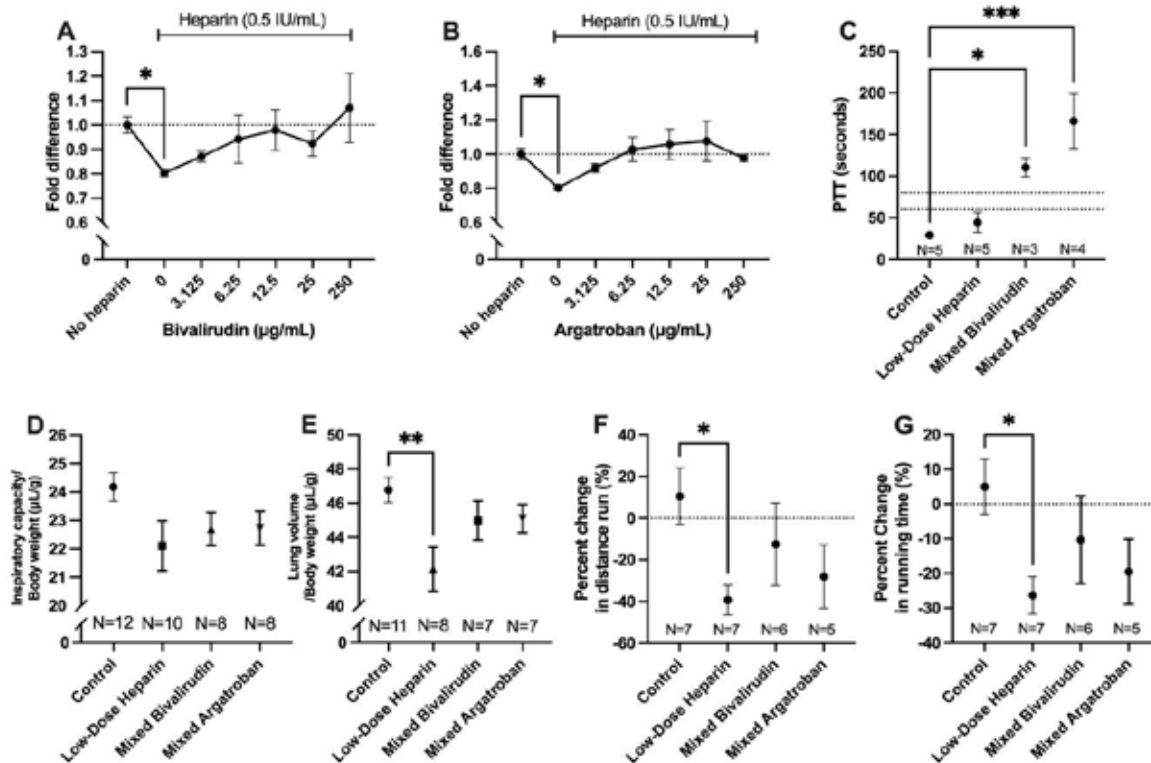


Figure 1. Bivalirudin and argatroban partially reverse the inhibitory effects of heparin on lung endothelial cell proliferation and pulmonary functional outcome.

A. Lung endothelial cell proliferation decreased 0.8-fold ($P=0.02$) with the addition of low-dose heparin. This effect was reversed with increasing concentrations of bivalirudin. **B.** A similar effect on cell proliferation was observed with the addition of argatroban. **C.** Partial thromboplastin time (PTT) was elevated compared to controls in the mixed bivalirudin (110.6 vs. 29.0 sec, $P=0.02$) and argatroban (166.2 vs. 29.0 sec, $P=0.0002$) groups. Low-dose heparin did not significantly change PTT levels (44.5 vs. 29.0 sec, $P=0.84$). **D.** Inspiratory capacity was lowest for mice receiving low-dose heparin compared to controls (22.1 vs. 24.2 $\mu\text{L/g}$, $P=0.068$), although not reaching statistical significance. **E.** Lung volume was lower in heparin-alone mice compared to controls (42.1 vs. 46.8 $\mu\text{L/g}$, $P=0.004$). There were no significant differences in the mixed bivalirudin (45.0 vs. 46.8 $\mu\text{L/g}$, $P=0.45$), or argatroban (45.1 vs. 46.8 $\mu\text{L/g}$, $P=0.51$) groups. **F-G.** Treadmill exercise tolerance was decreased in heparin-alone mice compared to controls, as measured by the percent change from baseline in distance run (-39.3 vs. +10.5%, $P=0.04$) and time spent running (-26.4 vs. +5.0%, $P=0.04$). There were no significant differences observed in exercise performance with the simultaneous use of subtherapeutic heparin and therapeutic bivalirudin ($P=0.53$) or argatroban ($P=0.19$). Statistical analysis of the experimental groups was done using analysis of variance (ANOVA) with Dunnett's adjustment for multiple comparisons. Inspiratory capacity and lung volumes were normalized to mouse body weight. Shown are mean \pm standard error. * $P<0.05$, ** $P<0.01$, *** $P<0.001$ indicate statistical significance.

3

DOES LENGTH OF EXTENDED RESECTION BEYOND TRANSITION ZONE CHANGE CLINICAL OUTCOME FOR HIRSCHSPRUNG PULL-THROUGH?

Sarah J. Ullrich, MD, MHS¹, Naomi-Liza Denning, MD, PhD², Monica Holder, RN², Randi Witten, RN², Kevin Krebs², Ava Schwan², Abigail Verderber², Aaron P. Garrison, MD³, Beth A. Rymeski, DO³, Nelson Rosen, MD³, Jason S. Frischer, MD³

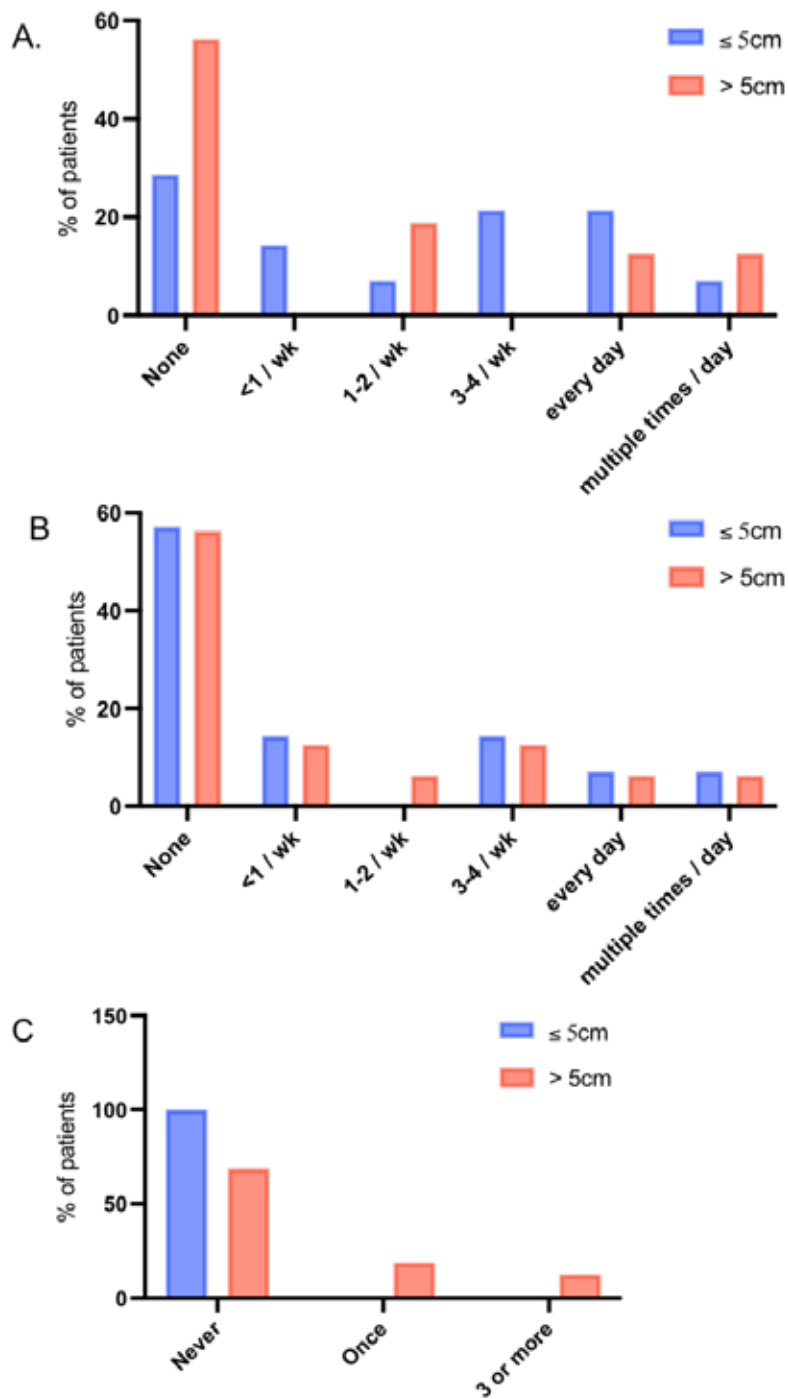
¹*Yale Department of Surgery, New Haven, CT, USA*, ²*Cincinnati Children's Hospital Colorectal Center, Cincinnati, OH, USA*, ³*Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA*

Purpose: An extended proximal resection margin greater than 5cm from the intra-operative histologically determined transition zone has been deemed necessary to minimize transition zone pull-through. This extended resection may require the sacrifice of vascular supply and even further bowel resection. The impact of extended proximal resection margin on post-operative complications and functional outcomes is unclear.

Methods: Retrospective chart review of patients who underwent primary pull-through for Hirschsprung disease at a single institution between January 2008 and December 2019 was performed. An adequate proximal margin was determined by a normal ganglionated ring and absence of hypertrophic nerves. The extended margin was defined as the total length of proximal colon with ganglion cells and without hypertrophic nerves. A functional measure of fecal incontinence was assessed with the Cincinnati Fecal Incontinence Scale (CINCY-FIS). Univariate analysis using Pearson χ^2 was performed.

Results: Sixty patients met criteria for inclusion. Median age at primary pull-through was 14 days (IQR 8-27 days), 52%(n=31) of patients had a proximal extended margin ≤ 5 cm, 48%(n=29) had an extended margin > 5 cm. A proximal extended margin ≤ 5 cm was not associated with increased rates of post-operative admission for enterocolitis (≤ 5 cm 50%, > 5 cm 41%, $p = 0.506$), differences in the need for surgical dilation (≤ 5 cm 13%, > 5 cm 7%, $p=0.438$), post-operative Botox injections (≤ 5 cm 23%, > 5 cm 32%, $p=0.409$), diversion post pull-through (≤ 5 cm 19%, > 5 cm 10%, $p=0.329$) or reoperation for transition zone pull-through (≤ 5 cm 10%, > 5 cm 7%, $p=0.697$). CINCY-FIS scores were available for 30 patients with a median follow up time of 1,240 days (IQR 550-2,717 days). Proximal ganglionated margin ≤ 5 cm was not associated with significant changes in fecal incontinence (Figure 1).

Conclusions: Shorter proximal extended margins beyond the adequate ganglionated margin do not significantly impact post-operative complication rates or fecal incontinence. More extensive mobilization and resection of the colon may increase surgical morbidity with limited benefit.



Proximal extended margin length is not associated with differences in fecal incontinence. A) Bar graph showing the rates of involuntary daytime bowel movements. Pearson Chi square, $p = 0.137$ B) Bar graph showing the rates of involuntary nighttime bowel movements. Pearson Chi square, $p = 0.968$ C) Bar graph showing rates of Emergency Department visits for disimpaction over a 3 month period. Pearson Chi square, $p = 0.072$.

4

TRANSVERSUS ABDOMINIS PLANE (TAP) BLOCK VS. LOCAL WOUND INFILTRATION FOR ELECTIVE MINIMALLY INVASIVE CHOLECYSTECTOMY IN CHILDREN AND ADOLESCENTS: A PROSPECTIVE RANDOMIZED CONTROLLED TRIAL

Sindhu V. Mannava, MD¹, Niloufar Hafezi, MD², Farheen Turk, MBA, CCRP³, Cameron L. Colgate, MS⁴, Nicole Horn, MD⁵, Johanna Askegard-Giesmann, MD⁶, Brian W. Gray, MD², Troy Markel, MD⁷

¹*Division of Pediatric Surgery, Department of Surgery, Indiana University School of Medicine, Zionsville, IN, USA,* ²*Division of Pediatric Surgery, Department of Surgery, Indiana University School of Medicine, Indianapolis, IN, USA,* ³*Department of Surgery, Indiana University School of Medicine, Indianapolis, IN, USA,* ⁴*Center for Outcomes Research in Surgery, Indiana University School of Medicine, Indianapolis, IN, USA,* ⁵*Department of Anesthesia, Indiana University School of Medicine, Indianapolis, IN, USA,* ⁶*University of North Dakota, Fargo, ND, USA,* ⁷*Riley Hospital for Children at IU Health, Indiana University School of Medicine, Indianapolis, IN, USA*

Purpose: The efficacy of transversus abdominis plane (TAP) block versus local anesthetic wound infiltration (local) in pediatric laparoscopic surgery is largely unknown. The objective of this study is to prospectively analyze this in minimally invasive cholecystectomy. We hypothesize that TAP block will be superior to local in terms of pain control and post-operative complications.

Methods: We conducted a prospective randomized, single-blinded, controlled trial between 2017 and 2022 after obtaining Institutional Review Board (IRB) approval. After randomization, patients received 0.2% ropivacaine (1 milliliter per kilogram up to 60 kilograms) via the following: ultrasound-guided TAP block performed by anesthesia after induction or local injected by surgeon at port insertion. We placed all patients on a scheduled non-opioid pain control regimen. We collected data including operative time, pain scores, and opioid medication usage post-operatively. We used descriptive statistics to report all endpoints and t-tests and Fisher's exact tests to obtain p values.

Results: We enrolled 85 patients (43 local, 42 TAP). Mean [standard deviation] age, body mass index (BMI), and number [percentage] of males in the local and TAP groups were as follows: 14.8 [1.9] and 14.7 [2] years, 29.9 [7.2] and 27.4 [8.2] kilogram/meter², and 4 (9.3%) and 10 (23.8%) respectively. Table 1 outlines primary and secondary outcomes. We did not find any significant differences in inpatient emesis ($p = 0.965$) or post-discharge constipation ($p = 1.000$) between the TAP and local groups. TAP patients had significantly longer time between anesthesia-start and procedure-start ($p < 0.001$), although total time under anesthesia was not significantly different ($p = 0.540$).

Conclusion: When an appropriate local anesthetic dose is administered, there are no significant differences between TAP block and surgeon-administered local anesthetic during minimally invasive cholecystectomy in terms of operating room times, time under anesthesia, post-operative opioid use, pain scores, and constipation.

	Local Wound Infiltration (n=43) <i>Mean [SD] or Count (%)</i>	TAP block (n=42) <i>Mean (SD) or Count (%)</i>	p values
Length of stay (days)	1.1 [0.6]	1.0 [0.5]	0.569
Time in operating room (hours)	2.2 [0.6]	2.3 [0.7]	0.496
Anesthesia start-time to procedure start-time (hours)	0.6 [0.2]	0.7 [0.2]	< 0.001
Procedure length (hours)	1.3 [0.4]	1.3 [0.6]	0.772
Inpatient maximum pain score (0-10)	6.4 [1.9]	6.3 [2.4]	0.855
Total doses of inpatient opioids administered	4.5 [3.4]	4.9 [2.4]	0.462
Pain score at post-discharge phone call (0-10)	3.9 [2.6]	3.4 [2.3]	0.508
Dosage of oxycodone taken on post-discharge day 1 (mg/day)	6.8 [8.6]	8.9 [11.3]	0.408

Comparison of Outcomes Between TAP and Local Arms

5

ENTERAL ADMINISTRATION OF LACTOBACILLUS REUTERI IN ITS BIOFILM STATE IS PROTECTIVE IN A PIGLET MODEL OF NECROTIZING ENTEROCOLITIS (NEC)

Mecklin V. Ragan, MD¹, Samantha J. Wala, MD, MSc², Nitin Sajankila, MD³, Belgacem Mihi, DVM², Miriam Conces, MD², Samuel Volpe, BS², Yijie Wang, MS⁴, Zachary Dumbauld³, Nanditha Purayil³, Adrian Rajab, BS⁵, Audrey Duff, PhD², Joseph Wickham, BS², Michael Bailey⁶, Steven D. Goodman⁶, Gail E. Besner, MD⁷

¹Nationwide Children's Hospital, Columbus, OH, Corpus Christi, TX, USA, ²Nationwide Children's Hospital, Columbus, OH, Columbus, OH, USA, ³Nationwide Children's Hospital, Ohio State University, Columbus, OH, Columbus, OH, USA, ⁴Nationwide Children's Hospital, ⁵Nationwide Children's Hospital, Ohio State University College of Medicine, Columbus, OH, Columbus, OH, USA, ⁶Nationwide Children's Hospital, Columbus, OH, USA, ⁷Nationwide Children's Hospital, Columbus, OH, USA

Purpose: NEC is the most common cause of death in premature infants. We previously showed that enteral Lactobacillus reuteri administered in its biofilm state by incubation with maltose-loaded dextranomer microspheres (Lr-DM-maltose) protects the intestines from NEC in rats. Given similar intestinal development and physiology between piglets and humans, piglet NEC models can be used for pre-clinical testing of emerging therapies. To move this novel therapeutic from bench to bedside, we tested Lr-DM-maltose in a piglet model of NEC.

Methods: Premature piglets were delivered by C-section at E-104 (full-term=114 days). Negative control piglets (n=20) received bovine colostrum feeds only, and piglets in the NEC groups received colostrum followed by Neocate Jr formula to exacerbate intestinal injury. NEC piglets received daily Saline (n=45) or Lr-DM-maltose treatment (n=47). The presence of at least 3 of the 4 following criteria were required to diagnose Definitive-NEC: (1) gross injury ≥ 4 of 6 points; (2) histologic injury ≥ 3 of 5 points; (3) clinical sickness ≥ 5 of 8 points in the last 12h of life; and (4) bacterial translocation to ≥ 2 internal organs (liver, spleen, mesenteric lymph nodes). Criteria 1-3 were assessed using defined scoring systems.

Results: NEC + Saline piglets had a higher incidence of Definitive-NEC (42% vs. 20%, $p=0.0710$) (Fig.1A) and death due to NEC (Fig.1B) compared to colostrum piglets. NEC + Lr-DM-maltose piglets had a significantly lower incidence of Definitive-NEC (21% vs. 42%, $p=0.0283$) (Fig.1A), a lower incidence of severe histologic intestinal injury (2.1% vs. 13.3%, data not shown), and a significantly lower incidence of death due to NEC compared to NEC + Saline piglets ($p=0.0073$) (Fig.1B).

Conclusions: Lactobacillus reuteri in its biofilm state reduces the incidence, severity, and mortality of NEC in piglets. This strengthens our previous body of pre-clinical evidence that this novel probiotic delivery system is beneficial in preventing experimental NEC.

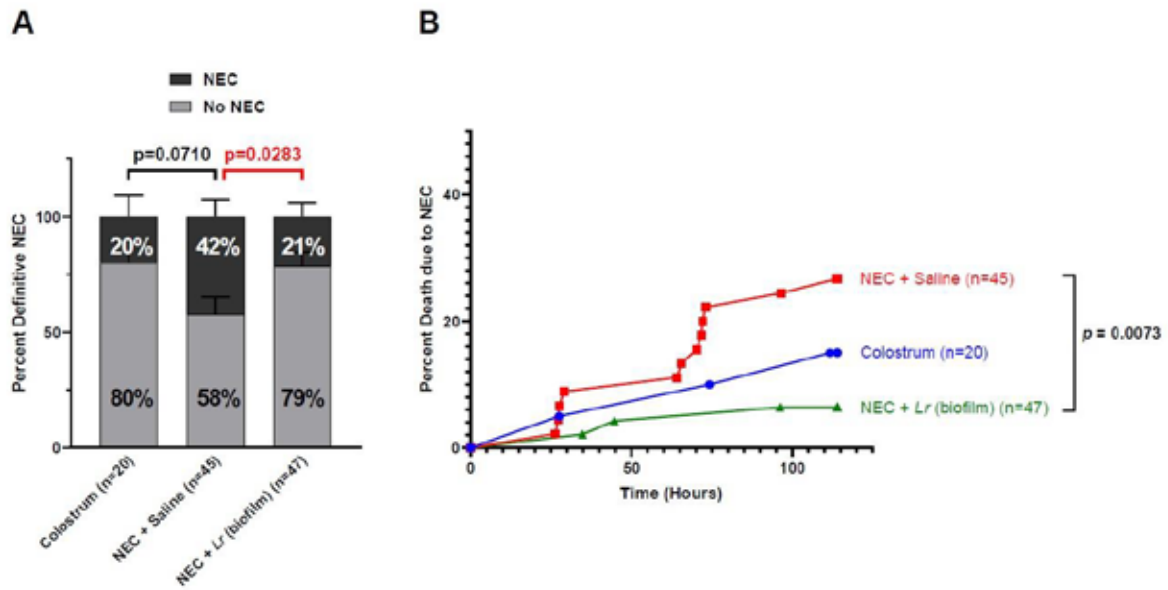


Figure 1: Definitive-NEC incidence and death due to Definitive-NEC. (A) Definitive-NEC scores. (B) Percent death due to Definitive-NEC over time. All data are expressed as mean \pm SEM. Definitive NEC incidence data were analyzed using a Kruskal-Wallis test. Death due to Definitive NEC data were analyzed using a Mantel-Cox test.

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INFLUENCE OF SOCIODEMOGRAPHIC FACTORS ON SURGICAL MANAGEMENT OF PEDIATRIC LIVER CANCER: ARE WE TREATING ALL CHILDREN EQUALLY?

Ioannis A. Ziogas, MD, MPH¹, Jose Diaz-Miron, MD², Shannon Acker, MD³, Ann Kulungowski, MD⁴, Jonathan Roach, MD⁵, Jonathan L. Hills-Dunlap, MD, MPH⁶

¹University of Colorado, Aurora, CO, USA, ²Children's Hospital Colorado, ³University of Colorado, Children's Hospital Colorado, Aurora, CO, USA, ⁴Division of Pediatric Surgery, Department of Surgery University of Colorado School of Medicine Children's Hospital Colorado, Aurora, CO, USA, ⁵Children's Hospital Colorado, Denver, CO, USA, ⁶Children's Hospital Colorado, Aurora, CO, USA

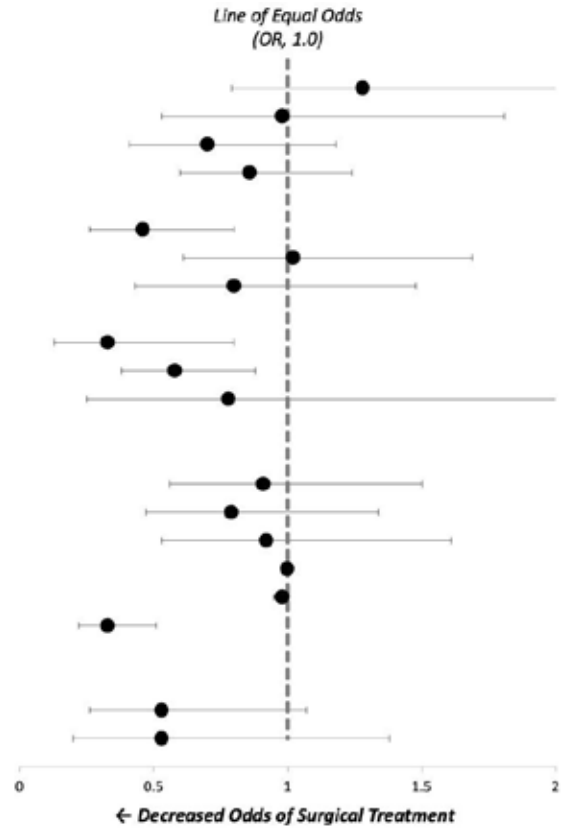
Purpose: Surgical resection and liver transplantation remain essential for cure in children with primary hepatic malignancies. However, 25%-33% of US children with hepatoblastoma (HB) or hepatocellular carcinoma (HCC) do not undergo surgical treatment. We sought to examine whether disparities in surgical care exist among children with HB or HCC.

Methods: Retrospective cohort study of children with HB or HCC registered in the National Cancer Database (2004-2015). Patients with missing sociodemographic, treatment data or multiple cancers were excluded. Multivariate mixed-effects logistic regression was used to measure the influence of sociodemographic factors (age, sex, race/ethnicity, insurance status, income quartile, proximity to treating hospital) on rates of surgical treatment after adjusting for disease-related factors (tumor size, metastatic disease, co-morbidities) and hospital-level effects. Subgroup analysis by tumor histology was performed.

Results: 811 children were included (HB: 80.9%; HCC: 19.1%), with 610 children (75.2%) undergoing surgical treatment. Among all children and following adjustment, Black race (OR=0.46 vs White, 95%CI: 0.26-0.80, p=0.01), and having Medicaid (OR=0.58 vs private, 95%CI: 0.38-0.88, p=0.01) or no insurance (OR=0.33 vs private, 95%CI: 0.33-0.80, p=0.02) were associated with decreased odds of surgical treatment (Figure). For children with HB, Black race was associated with decreased odds of surgical treatment (OR=0.47 vs White, 95%CI: 0.25-0.89, p=0.02). For children with HCC, having Medicaid (OR=0.10 vs private, 95%CI: 0.03-0.35, p< 0.001) or no insurance (OR=0.10 vs private, 95%CI: 0.01-0.83, p=0.03) were associated with decreased odds of surgical treatment. No other factors, except metastatic disease, were associated with differences in surgical care in the overall or subgroup analysis.

Conclusion: Black race and having Medicaid or no insurance are independently associated with decreased odds of undergoing surgical treatment in children with HB and HCC, respectively. Further investigation is needed to better understand these findings and address potential disparities in surgical care for children with primary hepatic malignancies.

Covariate	Category	OR [95% CI]	P-value
Age group	< 1 year (ref)	1.00	
	≥ 1 to < 3 years	1.28 [0.79-2.06]	0.31
	≥ 3 to < 8 years	0.98 [0.53-1.81]	0.94
	≥ 8 years	0.70 [0.41-1.18]	0.18
Sex	Female	0.86 [0.60-1.24]	0.41
	Male (ref)	1.00	
Race/Ethnicity	Black	0.46 [0.26-0.80]	0.01
	Hispanic	1.02 [0.61-1.69]	0.95
	Other	0.80 [0.43-1.48]	0.47
	White (ref)	1.00	
Insurance status	No insurance	0.33 [0.13-0.80]	0.02
	Medicaid	0.58 [0.38-0.88]	0.01
	Other government	0.78 [0.25-2.42]	0.66
	Private (ref)	1.00	
Income quartile	≥ \$63,332 (ref)	1.00	
	\$50,354-\$63,332	0.91 [0.56-1.50]	0.77
	\$40,227-\$50,353	0.79 [0.47-1.34]	0.38
	< \$40,227	0.92 [0.53-1.61]	0.72
Distance between patient's residence and hospital (miles)		1.00 [0.99-1.00]	0.30
Tumor size (cm)		0.98 [0.95-1.00]	0.08
Metastasis at diagnosis	Yes	0.33 [0.22-0.51]	<0.001
	No (ref)	1.00	
Charlson/Deyo score	0 (ref)	1.00	
	1	0.53 [0.26-1.07]	0.08
	2	0.53 [0.20-1.38]	0.20



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PRIMARY POSTERIOR TRACHEOPEXY AT TIME OF ESOPHAGEAL ATRESIA REPAIR SIGNIFICANTLY REDUCES RESPIRATORY MORBIDITY

Somala Mohammed, MD¹, Ali Kamran, Shawn Izadi, MD¹, Gary Visner¹, Leah Frain¹, Farokh R. Demehri, MD², Hester F. Shieh, MD³, Russell W. Jennings, MD⁴, Charles J. Smithers, MD⁴, Benjamin Zendejas, MD, MSc¹

¹*Boston Children's Hospital, Boston, MA, USA*, ²*Harvard Medical School, Department of Surgery, Boston Children's Hospital, Boston, MA, USA*, ³*Johns Hopkins All Children's Hospital, St Petersburg, FL, USA*, ⁴*Johns Hopkins All Children's Hospital, St. Petersburg, FL, USA*

Purpose: Esophageal atresia with tracheoesophageal fistula (EA/TEF) is often associated with tracheobronchomalacia (TBM), which can contribute to respiratory morbidity. Posterior tracheopexy (PT) is an established technique to treat TBM that develops after EA/TEF repair. This study investigates the impact of prophylactic PT at the time of initial EA/TEF repair on respiratory and perioperative outcomes.

Methods: Review of all consecutive newborns with EA/TEF (Gross Type C) who underwent primary repair between 2016-2021 at two separate institutions. Patients with EA/TEF repair requiring traction-induced esophageal lengthening (Foker) and/or reoperation were excluded. Based on surgeon preference and preoperative bronchoscopy, patients underwent prophylactic PT (Group 1) or not (Group 2). Outcomes evaluated included demographics, surgical details, postoperative complications/outcomes, and respiratory and nutritional outcomes within the first year of life.

Results: Among 63 patients, 21 (33%) underwent prophylactic PT during EA/TEF repair (Group 1). Groups were relatively similar in terms of demographics, operative approach and times, and complications (Table). Patients in Group 1 were significantly less likely to have respiratory infections requiring hospitalization within the first year of life (0% vs 26%, $p=0.01$) or episodes of blue spells (0% vs 19%, $p=0.04$). Also, they demonstrated significantly improved nutritional status at 12 months of age, with a median Z-score of 0.24 vs -1.02 in Group 2 ($p < 0.001$). Of the patients who did not undergo prophylactic PT (Group 2), 10 (24%) developed severe TBM symptoms and underwent tracheopexy during the first year of life, whereas no patient in Group 1 needed additional airway surgery ($p=0.01$).

Conclusion: Incorporation of posterior tracheopexy during newborn EA/TEF repair is associated with significantly reduced respiratory morbidity within the first year of life. While continued evaluation is necessary, we recommend that a prophylactic posterior tracheopexy under bronchoscopic guidance be considered at the time of initial EA/TEF repair.

	GROUP 1 (with prophylactic PT) [n=21]	GROUP 2 (without prophylactic PT) [n=42]	p-value
Gestational age, median (wks, IQR)	39 (37.5 - 39)	37 (35 - 39)	0.08
Birth weight, median (IQR), grams	2840 (2565 - 3190)	2400 (2020 - 2980)	0.02*
Operative time, median (IQR), minutes	279 (240 - 351)	286 (217 - 324)	0.57
Need for reintubation within 72 hrs post-extubation, n (%)	1 (5%)	5 (12%)	0.65
Hospital length of stay, median (IQR), days	18 (16 - 32)	30 (19 - 59)	0.02*
Blue spells within first year of life, n (%)	0	8 (19%)	0.04*
Respiratory infections requiring hospitalization within first year of life, n (%)	0	11 (26%)	0.01*
Need for delayed tracheopexy within first year of life, n (%)	0	10 (24%)	0.01*
Nutrition status (Z score) at 12 months of age, median (IQR)	0.24 (-0.91 to 0.71)	-1.02 (-1.74 to -0.61)	< 0.001*

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A MINIMALLY INTERVENTIONAL APPROACH REDUCES RESOURCE USE AND FACILITATES RAPID RECOVERY FOLLOWING ESOPHAGEAL ATRESIA REPAIR

Nigel J. Hall, PhD¹, Ceri Jones², Lara Kitteringham³, Francesca Stedman³, Ori Ron³, Michael Stanton³, Robert Wheeler³, Charles Keys³

¹University of Southampton, Southampton, England, United Kingdom, ²Southampton Children's Hospital, Southampton Children's Hospital, England, United Kingdom, ³Southampton Children's Hospital, Southampton, England, United Kingdom

Purpose: Recent series of newborn repair of Esophageal Atresia (EA) continue to report widespread use of chest drains, gastrostomy, routine contrast studies and parenteral nutrition (PN) despite evidence suggesting these are superfluous. We report outcomes using a minimally interventional approach to post-operative recovery.

Methods: Ethically approved (15/WA/0153), single-centre, retrospective case-note review of consecutive infants with EA 2000-2022. Infants with EA and distal trache-esophageal fistula (TEF) undergoing primary esophageal anastomosis at initial surgery were included (including those with comorbidities such as duodenal atresia, anorectal malformation and cardiac lesions). Our practice includes routine use of a trans-anastomotic tube (TAT), no routine chest drain nor gastrostomy, early enteral and oral feeding, no routine PN and no routine contrast study. Data are median (IQR).

Results: Of total 186 EA cases treated during the time period, 157 met inclusion criteria of which 2 were excluded as casenotes unavailable. TAT was used in 150 infants. A chest drain was required in 13(8%) and one infant had a neonatal gastrostomy. Enteral feeds were started on postoperative day 2(2-3), full enteral feeds established by day 4(4-6) and oral feeds started on day 5(4-8). PN was required in 15%. Median postoperative length of stay was 10 days (8-17). Progress was quicker in term infants than preterm (Table). One infant died of cardiac disease prior to neonatal discharge.

Two planned post-operative contrast studies were performed (surgeon preference) and a further 7 due to clinical suspicion of anastomotic leak. Contrast study was therefore avoided in 94%. There were 2 anastomotic leaks; both presented clinically following introduction of oral feeds (day 4 and day 8).

Conclusion: Our minimally interventional approach is safe. It facilitates prompt recovery with lower resource use, reduced demand on nursing staff, reduced radiation burden, and early discharge home compared to published series without adversely affecting outcomes.

Outcomes for Term VS Preterm Cases

		n	Enteral feed start (days)	Full enteral feeds (days)	Oral feed start (days)	PN	Chest drain	Gastrostomy	Leak
Term	>37wks	116	2 (2-3)	4 (4-5)	5 (4-6)	9	9	0	1
Preterm	< 37wks	39	3 (2-4)	9 (5-14)	11 (5-25)	14	4	1	1

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ANALYZING THE FINANCIAL IMPACT OF CHILD AND TEEN FIREARM-RELATED MORTALITY IN THE UNITED STATES**Megan E. Paul, BA¹**, Brian Arrinza Coakley, MD, FACS, FAAP, Dipl ABOM²¹*Icahn School of Medicine at Mount Sinai, Los Angeles, CA, USA*, ²*The Mount Sinai Health System, New York, NY, USA*

Purpose: Firearms are now the leading cause of pediatric mortality in the U.S., yet little research has quantified the economic impact of these deaths. Thus, we set out to assess if 8 different gun-related measures and Medicaid expansion were related to the economic burden of pediatric firearm-related deaths.

Methods: Direct medical costs and the value of statistical life lost, relating to pediatric firearm-related mortality, were extracted for each state from the CDC's WISQARS database between 2015 to 2020. Further, eight gun measures (assault weapons bans, child access prevention laws, firearm registration and permit requirements, permit to purchase requirements, safe storage laws, Giffords Center ranking, and the number of firearm provisions) and the status of Medicaid expansion were recorded for each state. Bivariate analysis compared each measure and the economic burden of all pediatric firearm-related death. Finally, multivariate analysis, controlling for poverty, educational attainment, poor mental health, and race, compared each gun variable with the economic burden of pediatric firearm-related death.

Results: Alabama and Arizona had the highest medical costs and value of statistical life lost per person, respectively. Bivariate analyses revealed that 7/9 variables were significantly associated with increased medical costs per person, including higher Giffords ranking, no Medicaid expansion, fewer firearm provisions, no firearm registration or permit requirements, and no safe storage laws or assault weapon bans. These, along with lack of child access prevention laws, were associated with higher value of statistical life lost. Multivariate analyses revealed that 6/9 variables were associated with medical costs vs. 6/9 associated with the value of statistical life lost.

Conclusion: States with fewer firearm restrictions and no Medicaid expansion were more likely to experience a higher financial burden of pediatric firearm-related death. Quantifying the financial impact of pediatric gun deaths can demonstrate the social costs of gun violence to policy makers.

Variable	Medical Costs per Person		Value of Statistical Life Lost per Person	
	Beta	P Value	Beta	P Value
Giffords Center Ranking	0.02	< 0.001*	41.64	< 0.001*
Medicaid Expansion	-0.32	0.01*	-307.49	0.16
Number of Firearm Provisions in State	-0.01	< 0.001*	-19.39	< 0.001*
Permit Required to Carry	0.17	0.24	176.26	0.45
Firearm Registration Required	-0.41	0.03*	-646.70	0.04*
Permit Required to Purchase	-0.45	< 0.001*	-909.17	< 0.001*
Safe Storage Laws	-0.26	0.16	-636.19	0.04*
Child Access Prevention Laws	-0.06	0.67	-299.44	0.16
Assault Weapon Bans	-424.33	0.02*	-424.33	0.02*

Each gun-related measure and Medicaid expansion was compared to the medical cost per person and value of statistical life lost per person after controlling for poor mental health, educational attainment, race, and poverty. The beta value denotes the slope of the linear regression while the p value determines statistical significance at a level of $p < 0.05$ (*). Higher Giffords Center Ranking indicates looser gun restrictions.

Scientific Session I - General

10:30 AM – 11:45 AM

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REAL-WORLD MULTI-INSTITUTIONAL DATA FROM THE MIDWEST PEDIATRIC SURGICAL CONSORTIUM (MWPS) TO ASSESS THE EFFECT OF DELAYED KASAI PROCEDURE ON BILIARY DRAINAGE IN PATIENTS WITH BILIARY ATRESIA

Zishaan A. Farooqui, MD PhD¹, Emily Schepers¹, Aaron Delman¹, K. Elizabeth Speck, MD, MS², Samir K. Gadepalli, MSc, MD, MBA², Kyle J. Van Arendonk, MD PhD³, Christina Georgeades, MD³, Dave R. Lal, MD, MPH⁴, Katherine J. Deans, MD, MHSc⁵, Peter C. Minneci, MD, MHSc⁶, Jordan Apfeld, MD⁷, Jacqueline Saito⁸, Grace Z. Mak, MD⁹, Mark B. Slidell, MD, MPH¹⁰, Caroline Lemoine, MD¹¹, Riccardo Superina, MD¹¹, Tiffany Wright, MD¹², Bhargava Mullapudi, MD¹³, Gregory Tiao, MD¹⁴

¹University of Cincinnati General Surgery, Cincinnati, OH, USA, ²University of Michigan, Ann Arbor, MI, USA, ³Children's Wisconsin, Milwaukee, WI, USA, ⁴Division of Pediatric Surgery, Medical College of Wisconsin/Children's Wisconsin, Milwaukee, WI, USA, ⁵Nemours Children's Health-Delaware Valley, Nemours Children's Health, Wilmington, DE, USA, ⁶Center for Surgical Outcomes Research, The Research Institute and Department of Surgery, Nationwide Children's Hospital, University of Ohio, Columbus, OH, USA, ⁷Cleveland Clinic Foundation General Surgery, Cleveland, OH, USA, ⁸Washington University, St. Louis Children's Hospital, St. Louis, MO, USA, ⁹The University of Chicago Pritzker School of Medicine, Chicago, IL, USA, ¹⁰Section of Pediatric Surgery, Department of Surgery, The University of Chicago Medicine and Biologic Sciences, Chicago, IL, USA, ¹¹Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, ¹²Norton Children's Hospital, University of Louisville School of Medicine, Louisville, KY, USA, ¹³University of Missouri-Kansas City School of Medicine, Kansas City, MO, USA, ¹⁴Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA

Purpose: National consensus has recognized the benefit of performing an early Kasai portoenterostomy (KPE) for infants with biliary atresia (BA). However, shorter time to KPE has yet to be achieved in the United States. We investigated institutional variability in the initiation of jaundice workup and operative timing of patients with confirmed BA and aimed to identify factors associated with early clearance of jaundice, a factor shown to improve 2-year transplant-free survival.

Methods: A multi-institutional, retrospective five-year study was performed at eleven US tertiary children's hospitals. Infants who underwent KPE (10/1/2015–10/1/2020) were identified. Age at initiation of diagnostic workup and age at the time of KPE were collected. Adjusted multivariable logistic regression was used to determine factors associated with direct bilirubin normalization at three months following KPE.

Results: In 163 infants diagnosed with BA, the median age at initiation of jaundice workup was 39 days (IQR 10-63). For 148 patients who underwent KPE, median age at surgery was 53 days (IQR 37.5-67). Each 10-day increase in age at KPE was associated with a 18.8% decrease in odds of normalizing bilirubin at three months (Odds Ratio (OR) 0.81, 95% CI:0.66-

0.99). Time from initiation of workup to performing the KPE (range 0-117 days, p=0.027) and the odds of having patients normalize direct bilirubin at three months (range 0.04-0.89, p=0.042) varied significantly among institutions (Table).

Conclusion: Our results confirmed that increasing age at KPE decreases the odds of clearing bilirubin at three months post-KPE. There was also a significant effect of institutional variability on both the time from workup to KPE and the likelihood of achieving successful biliary drainage. This study provides a basis for leveraging institutional variability to address systems-related barriers to diagnosis and treatment of KPE, as well as a justification for establishing a collaborative national registry for BA.

Variable	Adjusted Odds Ratio	95% Confidence Interval	p-value
10-day delay in age at Kasai*	0.81	0.66 - 0.99	0.046
Variable by Institution †			Aggregate p-value
Reference Institution, n=31	1		0.042
Institution A, n=16	0.10	0.02 - 0.63	0.014
Institution B, n=17	0.89	0.18 - 4.4	0.891
Institution C, n=2	< 0.001	0	0.998
Institution D, n=11	0.04	0.002 - 0.57	0.019
Institution E, n=7	0.46	0.07 - 3.1	0.424
Institution F, n=13	0.37	0.07 - 1.9	0.236
Institution G, n=4	>1000	0	0.998
Institution H, n=6	0.31	0.02 - 4.5	0.391
Institution I, n=21	0.34	0.09 - 1.24	0.102
Institution J, n=12	0.33	0.06 - 2.0	0.226
* Model adjusted for gender, race, birthweight, and insurance status			
† Model adjusted for gender, race, birthweight, age at Kasai, and insurance. Model inaccurate for Institutions C and H due to low volumes. Odds ratios by institution are listed in comparison to center with highest proportion of patients with normalized bilirubin at 3 months post-Kasai (median age at Kasai = 52 days at reference institution)			

Multivariable Logistic Regression Analysis of Adjusted Odds Ratios for Normalization of Direct Bilirubin at 3 Months Following Kasai Procedure

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COMPREHENSIVE FERTILITY PRESERVATION CAN BE OFFERED IN A TIMELY MANNER AROUND GONADOTOXIC THERAPY IN CHILDREN

Kathryn L. McElhinney, MD¹, Samantha K. McLean, BS², Monica M. Laronda, PhD², Erin E. Rowell, MD³

¹*Fertility & Hormone Preservation & Restoration Program, Department of Surgery, Division of Pediatric Surgery, Feinberg School of Medicine, Northwestern University, Stanley Manne Children's Research Institute, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA,* ²*Department of Pediatrics, Division of Endocrinology and Department of Surgery, Division of Pediatric Surgery, Feinberg School of Medicine, Northwestern University, Stanley Manne Children's Research Institute, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA,* ³*Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA*

Purpose: The American Society of Clinical Oncology recommends that fertility preservation (FP) options be discussed with patients early in their treatment. Prompt FP education and counseling have become particularly important for pediatric cancer patients, especially for those whose only FP option may be surgical removal of ovarian or testicular tissue. Here we describe our experience with fertility preservation procedures for children with planned gonadotoxic therapy.

Methods: An IRB-approved institutional retrospective review was performed of children who underwent ovarian tissue cryopreservation (OTC), testicular tissue cryopreservation (TTC), ovarian stimulation and egg retrieval (OSER), or sperm banking (SB) between 2018 and 2022. Patient diagnosis, age, characteristics of treatment and procedure were collected.

Results: Between 2018 and 2022, 365 patients at our institution underwent a FP procedure including unilateral oophorectomy for OTC (n=105; prepubertal n=72), unilateral testes biopsy for TTC (n=97; prepubertal n=87), OSER (n=39), or SB (n=124). Most patients had a primary diagnosis of a solid tumor malignancy (50.4%); other diagnoses included liquid tumors (25.5%), benign hematologic conditions (9.8%), immunological/rheumatologic conditions (4.9%), and other conditions (9.3%). We further explored the timing of treatment around FP procedures in relation to the start of medical therapy. For OTC, 95% of patients received gonadotoxic therapy following unilateral oophorectomy; 31 patients continued therapy the same day or on post-operative day 1. The average time between OTC and start or resumption of gonadotoxic therapy was 4 days (IQR 1-7 days). Post-operative rehospitalization occurred in 3 patients (2.9%), all requiring pain control and IV fluids. No patients required reoperation. All postpubertal patients who underwent OSER and SB did so within the timeline for their definitive therapy.

Conclusion: FP procedures can be coordinated for children across ages and diagnoses within the timeline for gonadotoxic treatment for their primary medical condition.

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SUCCESSFUL USE OF AN ACELLULAR SMALL INTESTINAL SUBMUCOSAL GRAFT IN VAGINAL RECONSTRUCTION

Steven T. Papastefan, MD¹, Sarah A. Collins, MD², Margaret G. Mueller, MD², Julia Geynisman-Tan, MD², Marleta Reynolds, MD³, Elizabeth Yerkes, MD⁴, Julia E. Grabowski, MD⁵

¹ Department of Surgery, Northwestern University Feinberg School of Medicine Division of Pediatric Surgery, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, ²McGaw Medical Center at Northwestern University, Chicago, IL, Chicago, IL, USA, ³Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, ⁴Ann and Robert H. Lurie Children's Hospital, Chicago, IL, Chicago, IL, USA, ⁵Lurie Children's Hospital, on behalf of the Midwest Pediatric Surgery Consortium, Chicago, IL, USA

Purpose: Various techniques for neovaginal construction have been employed in the pediatric and adult populations, including the use of intestinal segments, buccal mucosal grafts and skin grafts. Small intestinal submucosa (SIS) extracellular matrix grafts have been described as a viable alternative, though prior experience is limited. Our purpose was to assess operative characteristics and patient outcomes with neovaginal construction using SIS grafts.

Methods: Thirteen patients underwent vaginoplasty with porcine SIS grafts (OASIS®, Smith and Nephew) at our institution between 2018-2022. Operative and clinical data, postoperative mold management, vaginal dilating length, and complications were reviewed.

Results: Age at time of repair ranged from 13-30 years (median 19 years). Patient diagnosis included cloacal anomalies (n=5), Mayer-Rokitansky-Küster-Hauser syndrome (n = 4), isolated vaginal atresia with or without a transverse vaginal septum (n=4), and vaginal rhabdomyosarcoma requiring partial vaginectomy (n=1). Following dissection of the neovaginal space, a polyacetal mold wrapped with SIS graft was placed with retention sutures and removed on postoperative day 7. Median (IQR) operative time was 171 (118-192) minutes, estimated blood loss was 10 (5-20) mL, and length of stay was 2 (1-3) days. The follow-up period ranged from 1 week to 4 years (median 7 months). Two patients developed postoperative vaginal stenosis that resolved with dilation under anesthesia. Mean vaginal length on latest follow-up was 8.97 cm. All thirteen patients had successful engraftment and progressed to performing self-dilations or initiating intercourse to maintain patency. There were no cases of graft reaction or graft extrusion.

Conclusions: We conclude that acellular small intestinal submucosa grafts are effective and safe alternatives for mold coverage in neovaginal construction. Our experience demonstrates minimal perioperative morbidity, early mold removal, and progression to successful dilation with maintenance of a functional vaginal length. Future study on sexual outcomes, patient satisfaction, and comparison against alternative techniques has been initiated.

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NEUROLOGIC COMPLICATIONS IN PEDIATRIC ECMO FOR RESPIRATORY FAILURE: RISK FACTORS AND TIME TO EVENT ANALYSIS

Kevin Johnson¹, **Kylie Callier, MD²**, Katie W. Russell, MD³, Brian W. Gray, MD⁴, Niki Matsuko⁵, Samir K. Gadepalli, MSc, MD, MBA⁵, George B. Mychaliska, MD⁶

¹University of Michigan C.S. Mott Children's Hospital, Ann Arbor, MI, USA, ²University of Chicago, Chicago, IL, USA, ³Primary Children's Hospital, Salt Lake City, UT, USA, ⁴Division of Pediatric Surgery, Department of Surgery, Indiana University School of Medicine, Indianapolis, IN, USA, ⁵University of Michigan, Ann Arbor, MI, USA, ⁶Section of Pediatric Surgery, Fetal Diagnosis and Treatment Center, University of Michigan Health System, Ann Arbor, MI, USA

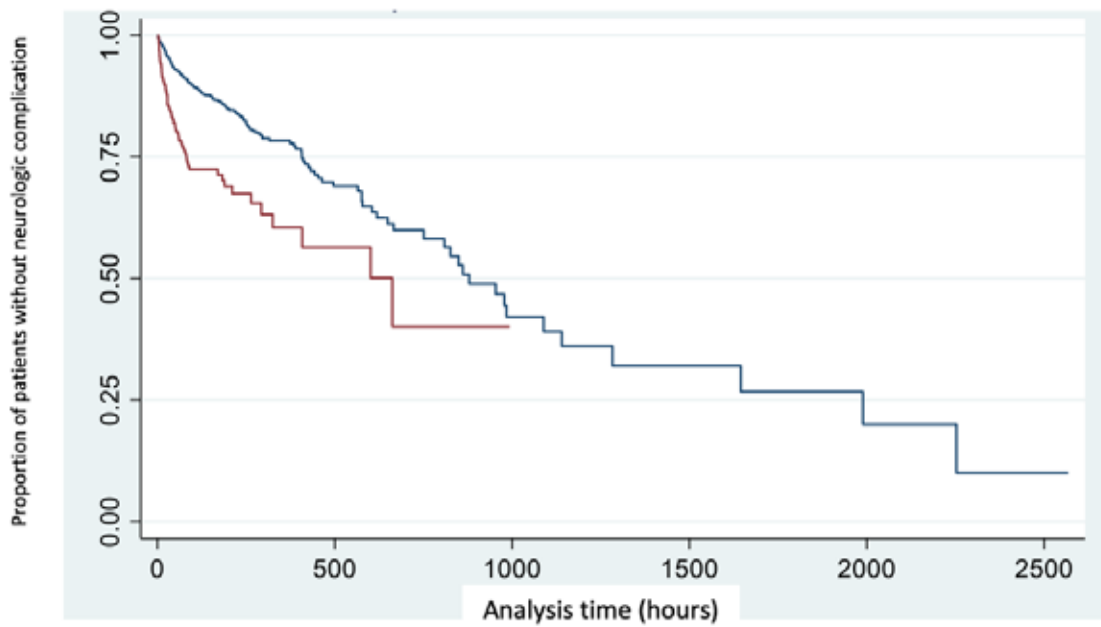
Purpose: Neurologic complications are amongst the most devastating for patients that undergo ECMO (extra-corporeal membrane oxygenation) support, dramatically increasing morbidity and mortality. Multiple studies have identified factors that affect neurologic complication rates, including cannulation strategy and several patient related factors. Using pre-ECMO factors, we sought how time-to-event analysis could aid in identifying factors that contribute to neurologic complications.

Methods: Following IRB approval using the ELSO database (Extracorporeal Life Support Organization), a retrospective review of all pediatric respiratory failure patients (ages >28 days to 18 years) from 2016-2021 was undertaken. Primary outcomes included neurologic complications as defined by the ELSO database. Demographics, pre-ECMO data, and cannulation information (mode, cannulation site) were abstracted from the database. Multivariable and time-to-event analysis were performed.

Results: A total of 1,650 patients were found within the database. Of those, a total of 324 (19.6%) had a neurologic complication during their ECMO run. Multivariable analysis showed that pre-ECMO use of vasoactive agents ($p < 0.01$), pre-ECMO arrest ($p < 0.01$), and lower pH ($p < 0.01$) were associated with a higher risk of neurologic complications. Mode of ECMO support and cannulation site were not significant factors when correcting for severity in the multivariable analysis. Kaplan Meier curves were created showing the increased risk for neurologic complications with pre-ECMO arrest and pre-ECMO vasoactive use.

Conclusion: Lower pH, pre-ECMO arrest, and pre-ECMO vasoactive use were all associated with an increased risk of neurologic complications, suggesting that progressing to ECMO support prior to cardiovascular dysfunction for patients in respiratory failure may decrease morbidity. Time-to-event analysis suggests that this increased risk is higher around the time of cannulation, demonstrating that this time period could offer opportunities for reducing complications in this high-risk population.

Figure 1 - Pre-ECLS Arrest, Rate of Neurologic Complications Over Time



Blue – No Pre-ECMO Arrest
Red – Pre-ECMO Arrest
p<0.01

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SUBMUCOSAL HYDROGEL FOR SPRING-MEDIATED INTESTINAL LENGTHENING

Fereshteh Salimi-Jazi, MD¹, Anne-Laure A. Thomas, MS², Narelli Paiva, MS³, Renato Samuel Navarro, PhD³, Talha Rafeeqi, MBBS¹, Akanksha Sabapaty, MD⁴, Siavash Shariatzadeh, MD, MPH⁵, Julie-Ann Nguyen, BA⁴, Sarah Heilshorn, PhD³, James C.Y Dunn, MD, PhD²

¹Stanford University School of Medicine, Palo Alto, CA, USA, ²Stanford University School of Medicine, Stanford, CA, USA, ³Stanford, Stanford, CA, USA, ⁴Stanford, Palo Alto, CA, USA, ⁵Stanford School of Medicine, Stanford, CA, USA

Purpose: We have proposed spring-mediated distraction enterogenesis for lengthening of intestinal segments as a treatment option for short bowel syndrome. Our goal is to develop endoscopic spring implantation to minimize morbidity associated with device insertion. Entrapment of a spring within an intestinal segment by submucosal injection of hydrogel proximal and distal to the compressed spring was examined here.

Methods: Hyaluronic-acid-based hydrogel was developed and injected into the submucosa of porcine intestine to partially occlude the lumen. Transected jejunum was everted, and 1 cc of hydrogel was injected into the submucosa to create adequate swelling. Gelatin encapsulated compressed nitinol spring was placed next to the injected hydrogel. Everted jejunum was unfolded over the spring, and another 1 cc of hydrogel was injected distal to the spring to keep it in place. Non-absorbable sutures were placed on the serosa of control and spring-containing intestinal segments for length comparison. Jejunojejunostomy was performed to restore continuity. Pigs were euthanized on POD 2 and 7.

Results: Pigs recovered well and did not have intestinal obstruction. The injected hydrogel was found in the submucosal space (Figure 1). On POD 2, spring was confined between the two injection sites. The length of the intestinal segment increased to 161%. On POD 7, hydrogel was mostly degraded, and the spring passed into the distal intestine. The length of the intestinal segment between the hydrogel injection sites increased to 233% of the control segment.

Conclusion: Hydrogel can be used to confine springs within intestinal segments without adverse effects. This is the first experiment toward endoscopic suture-less spring implantation. Further experiments to optimize hydrogel properties for spring-mediated distraction enterogenesis may lead to successful therapy in patients with short bowel syndrome.

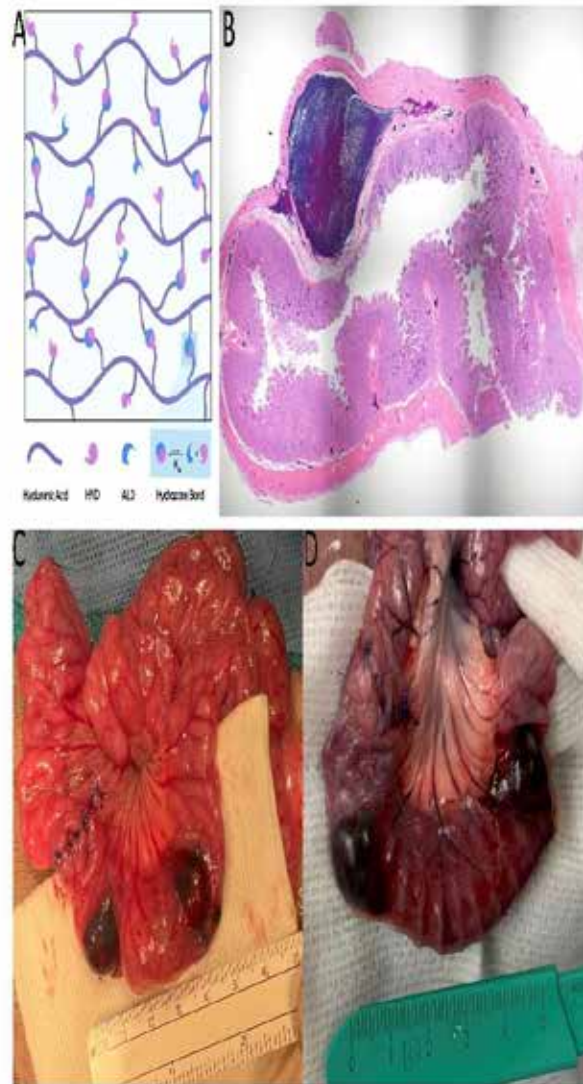


Figure 1. A: Representation of hydrogel formation when mixing hyaluronic acid (HA) modified with hydrazine (HYD) and HA modified with aldehyde (ALD), through dynamically covalent crosslinks (Hydrazone Bond) with an equilibrium constant (K_{eq}) that favors bonding. B: Histologic appearance of hydrogel in the submucosa. C: Spring contained within jejunal lumen with hydrogel; Compressed spring within gelatin capsule placed during index operation. D: Expanded spring contained within plications on POD2 with segmental lengthening.

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GASTROESOPHAGEAL REFLUX AND GASTROINTESTINAL SYMPTOMS AFTER METABOLIC AND BARIATRIC SURGERY IN ADOLESCENTS: AN 8-YEAR FOLLOW UP

Suhail Zeineddin, MD, MS¹, Jane Khoury, PhD², Todd M. Jenkins, PhD, MPH³, Stephanie Sisley, MD⁴, Justin Ryder, PhD⁵, Marc Michalsky⁶, Thomas H. Inge, MD⁷

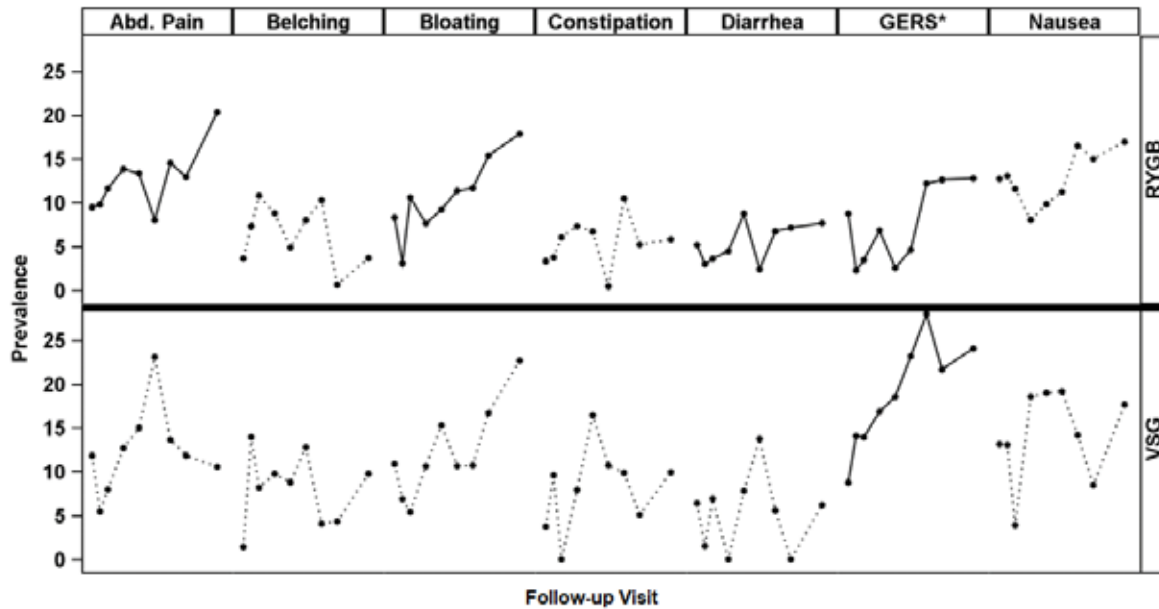
¹*Division of Pediatric Surgery, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA,* ²*Cincinnati Children's, Cincinnati, OH, USA,* ³*Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA,* ⁴*Baylor College of Medicine, Houston, TX, USA,* ⁵*University of Minnesota, Minneapolis, MN, USA,* ⁶*Nationwide Children's Hospital, Columbus, OH, USA,* ⁷*Division of Pediatric Surgery, Lurie Children's Hospital, Northwestern University School of Medicine, Chicago, IL, USA*

Purpose: Vertical sleeve gastrectomy (VSG) and Roux-en-Y gastric bypass (RYGB) are the most common metabolic and bariatric surgeries (MBS) performed. Despite their safety and effectiveness, there is concern over postoperative gastrointestinal symptoms (GIS), especially gastroesophageal reflux symptoms (GERS) after VSG. Our objective was to examine postoperative GIS 8 years after MBS in adolescents.

Methods: We evaluated 228 adolescents (161 RYGB, 67 VSG) undergoing MBS from the Teen-LABS cohort. Patient-reported GIS and medication use before surgery, at 6-months, and yearly to 8 years after surgery were assessed. Symptom severity was dichotomized for analysis. Post-surgery symptoms were evaluated with adjusted regression models.

Results: At surgery, participants were 17±2 years old, 75% female, with BMI of 53±9 kg/m². Among reported symptoms in our cohort, abdominal pain (10% vs 17%) and bloating (8% vs 20%) demonstrated significant increases between baseline and 8 years, $p < 0.05$. Prevalence of GERS decreased initially from 12% to 1% at 6 months after RYGB but increased to 13% by 8 years postoperatively. After VSG, GERS prevalence demonstrated an increasing trajectory from 9% preoperatively to 27% at 8 years. In adjusted analyses, the VSG group experienced 4-fold (aOR 3.9, 95%CI 2.19-6.96) greater odds of reporting GERS at 8 years compared to RYGB. The use of antacid or acid reflux medication was not statistically different between the two procedures. Females demonstrated higher odds of developing GERS (aOR 2.18, 95%CI 1.06-4.46) as well as other GIS. Observed changes in GERS were not associated with baseline or percent change in BMI.

Conclusions: Gastrointestinal symptoms such as abdominal pain, bloating and GERS are common after MBS in adolescents. GERS remain a significant concern after VSG, affecting a quarter of the patients postoperatively. Counseling and routine monitoring for pathologic consequences of GERS after VSG is warranted.



Solid line denotes statistically significant change 6 months to 8 years postoperatively (p<0.05)

Time Since Gastric Bypass

Baseline	N = 161
6 Months	N = 144
12 Months	N = 140
24 Months	N = 137
36 Months	N = 129
48 Months	N = 130
60 Months	N = 135
72 Months	N = 136
96 Months	N = 126

Time Since Sleeve

Baseline	N = 67
6 Months	N = 53
12 Months	N = 58
24 Months	N = 54
36 Months	N = 50
48 Months	N = 55
60 Months	N = 50
72 Months	N = 53
96 Months	N = 49

*GERS - Gastroesophageal reflux (defined as the presence of heartburn or acid reflux)

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COMPARING PEDIATRIC SURGEONS' AND PALLIATIVE CARE PEDIATRICIANS' PERSPECTIVES AND PRACTICES REGARDING PALLIATIVE CARE IN PEDIATRIC SURGICAL PATIENTS

Danielle I. Ellis, MD, MTS¹, Emanuele Mazzola, PhD², Joanne Wolfe, MD, MPH³, Cassandra M. Kelleher, MD⁴

¹*Department of Surgery, Massachusetts General Hospital, Boston, MA, USA,* ²*Dana Farber Cancer Institute, Boston, MA, USA,* ³*Professor of Pediatrics, Boston, MA, USA,* ⁴*MassGeneral Hospital for Children, Boston, MA, USA*

Purpose: The nature of interactions between surgical and pediatric palliative care (PPC) teams caring for seriously ill children is unknown. This study compares pediatric surgeons' and PPC physicians' perspectives and practices regarding PPC in surgical patients.

Methods: A survey was administered to members of the American Pediatric Surgical Association and Pediatric Interest Group of the American Academy of Hospice and Palliative Medicine.

Results: One hundred twenty-four pediatric surgeons (31% female, 17.2 mean years of experience) and 71 PPC physicians (69% female, 10.1 mean years of experience) participated. Forty-three percent of surgeons reported consulting PPC often for children with serious illnesses. However, most PPC physicians (67%), said they are rarely/never consulted by surgeons ($p=0.002$). PPC physicians were more likely to report that PPC involvement was too late (43% vs 21%, $p=0.005$). More surgeons than PPC physicians felt that an appropriate time for PPC consultation was during serious illness deterioration (30% vs 7%, $p=0.05$), whereas PPC physicians preferred consultation at diagnosis (54% vs 34%, $p=0.05$). More PPC physicians (67%) than surgeons (17%) agreed that invasive interventions could be considered a form of PPC ($p=0.002$). The most reported barrier to PPC consultation by surgeons (29%) was concern that parents would think the surgical team was giving up. PPC physicians were more likely to perceive barriers to consultation by surgeons than surgeons themselves ($p<0.001$).

Conclusion: Pediatric surgeons value PPC consultation but involve PPC less often, later, and in more acute clinical situations than PPC physicians would prefer. Barriers to PPC consultation are not as frequently reported by surgeons as are thought to exist by PPC physicians, and differences in understanding of invasive interventions as PPC may contribute to underutilization of PPC services. Education for pediatric surgeons and PPC physicians may lead to PPC integration for seriously ill surgical patients earlier and more often.

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ADVERSE EVENT RATES AND RESOURCE UTILIZATION ASSOCIATED WITH DIFFERENT METHODS OF LAPAROSCOPIC APPENDECTOMY IN CHILDREN WITH UNCOMPLICATED APPENDICITIS

Shannon L. Cramm, MD, MPH¹, Katherine He, MD, MS¹, Dionne Graham, PhD¹, Myron Allukian², Danielle Aronowitz³, Martin Blakely, MD, MS⁴, Brendan T. Campbell, MD MPH⁵, Nicole M. Chandler, MD⁶, Robert A. Cowles, MD⁷, Jennifer DeFazio, MD⁸, Katerina Dukleska, MD⁹, Justice Echols, BS¹⁰, Joseph Esparaz, MD, MPH¹¹, Christina Feng, MD¹², Cornelia Griggs, MD¹³, David N. Hanna, MD¹⁴, Olivia Keane, MD¹⁵, Shaun Kunisaki, MD¹⁶, Aaron M. Lipskar, MD¹⁷, Sean E. McLean, MD¹⁸, Claudia Orlas Bolanos¹³, Robert T. Russell, MD, MPH¹⁹, Matthew T. Santore, MD²⁰, Stefan Scholz, MD²¹, Shelby R. Sferra, MD, MPH²², Elisabeth (Lisa) Tracy, MD²³, Sacha Williams, MD, MS, MPH⁶, Lucy Zhang, MD²⁴, Shawn J. Rangel, MD, MSCE¹

¹*Boston Children's Hospital, Boston, MA, USA*, ²*Children's Hospital of Philadelphia, Philadelphia, PA, USA*, ³*Cohen Children's Medical Center at Hofstra/Northwell, Philadelphia, PA, USA*, ⁴*Department of Pediatric Surgery, Vanderbilt University Medical Center, Nashville, TN, USA*, ⁵*American College of Surgeons, Committee on Trauma, Hartford, CT, USA*, ⁶*Johns Hopkins All Children's Hospital, St. Petersburg, FL, USA*, ⁷*Yale School of Medicine, Department of Pediatric Surgery, New Haven, CT, USA*, ⁸*New York Presbyterian Morgan Stanley Children's Hospital, Columbia University Vagelos College of Physicians and Surgeons, New York, NY, USA*, ⁹*Connecticut Children's Medical Center, University of Connecticut, Hartford, CT, USA*, ¹⁰*University of North Carolina Health System, Chapel Hill, NC, USA*, ¹¹*Children's of Alabama, Birmingham, AL, USA*, ¹²*Children's National Hospital, Washington, DC, USA*, ¹³*Massachusetts General Hospital, Boston, MA, USA*, ¹⁴*Vanderbilt University Medical Center, Nashville, TN, USA*, ¹⁵*Children's Healthcare of Atlanta, Atlanta, GA, USA*, ¹⁶*Johns Hopkins University School of Medicine, Baltimore, MD, USA*, ¹⁷*Zucker School of Medicine at Hofstra/Northwell, Cohen Children's Medical Center at Northwell Health, New Hyde Park, NY, USA*, ¹⁸*University of North Carolina at Chapel Hill, Chapel Hill, NC, USA*, ¹⁹*University of Alabama at Birmingham and Children's of Alabama, Birmingham, AL, USA*, ²⁰*Emory University, Atlanta, GA, USA*, ²¹*UPMC Children's Hospital of Pittsburgh, Pittsburgh, PA, USA*, ²²*Johns Hopkins University, Baltimore, MD, USA*, ²³*Duke University Medical Center, Durham, NC, USA*, ²⁴*Yale New Haven Children's Hospital, New Haven, CT, USA*

Purpose: The objective of this study was to explore the association of different appendectomy methods on resource utilization and adverse events in children with uncomplicated appendicitis.

Methods: This was a multicenter study including 15 hospitals participating in a regional research consortium. NSQIP-Pediatric data were collected at each hospital and augmented with operative report data via supplemental chart review. Cost data obtained from the Pediatric Health Information System database were available for 8 hospitals. Children who underwent laparoscopic appendectomy for uncomplicated appendicitis as defined by NSQIP-Pediatric were included. Automated keyword review, developed through an iterative manual evaluation of 600 operative reports, was used to categorize appendectomy method (stapler, endoloop ligation, hem-o-lok ligation, or suture/tie ligation by exteriorization). Mixed effects regression

was used to compare outcomes among appendectomy methods adjusting for patient demographics, use of an advanced energy device, and hospital-level clustering.

Results: 5592 children were included. Stapler use was the most common approach (75.5% of cases; hospital range: 8.1-100%), followed by endoloop ligation (13.8%; range: 0-50.1%), suture/tie ligation (7.1%; range: 0-82.0%), and hem-o-lok ligation (3.7%; range: 0-34.0%). Although adverse events did not differ between individual appendectomy methods (table), stapler use was associated with a higher reoperation rate when compared to other methods in aggregate (0.87% vs. 0.32%; OR 3.12 [95%CI:1.09-8.91]). Resource utilization was significantly influenced by appendectomy method, with a 35% adjusted mean cost difference (\$967/case) found between use of staplers and hem-o-lok ligation (p< 0.01), and a 15% adjusted mean difference in case duration (6.6 minutes/case) found between use of hem-o-lok and suture/tie ligation (p< 0.01; table).

Conclusions: All methods of appendectomy appear to be safe, though stapler use may be associated with a modest increase in reoperation risk. Stapler utilization was the most expensive method of appendectomy, and suture/tie ligation was associated with the shortest operative duration.

	Stapler		Endoloop Ligation		Hemolock Ligation		Suture/Tie Ligation	
	Mean/Rate	OR/RR[95%CI]	Mean/Rate	OR/RR[95%CI]	Mean/Rate	OR/RR[95%CI]	Mean/Rate	OR/RR[95%CI]
Resource utilization								
Total operative cost	\$2,776	ref	\$2,229	0.80 [0.76-0.85]	\$1,809	0.65 [0.57-0.74]	\$1,865	0.67 [0.62-0.72]
Case duration (min)	43.3	ref	44.1	1.02 [0.99-1.05]	44.2	1.02 [0.97-1.08]	37.6	0.87 [0.84-0.91]
Adverse events								
Reoperation	0.87%	ref	0.29%	0.30 [0.07-1.26]	0%	***	0.56%	0.54 [0.13-2.28]
Any SSI	2.37%	ref	1.95%	0.91 [0.52-1.59]	0.97%	0.47 [0.11-1.93]	1.77%	0.80 [0.36-1.76]

Adverse Event Rates and Resource Utilization Associated with Different Methods of Appendectomy In Children With Uncomplicated Appendicitis. (*)Due To Zero Events, Model Did Not Converge)**

Scientific Session II - Quality and General

1:15 PM – 2:30 PM

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CESSATION OF ANTIBIOTICS FOR PERFORATED APPENDICITIS AT DISCHARGE DOES NOT INCREASE RISK OF POST-OPERATIVE INFECTION.

Katie W. Russell, MD¹, Douglas C. Barnhart, MD², Robert A. Swendiman, MD³, David E. Skarda², Trahern Jones, **Scott S. Short, MD⁴**

¹Primary Children's Hospital, Salt Lake City, UT, USA, ²University of Utah, Salt Lake City, UT, USA, ³Primary Children's Hospital/University of Utah, Salt Lake City, UT, USA, ⁴Primary Children's Hospital / University of Utah, Salt Lake City, UT, USA

Purpose: Data from Peds-NSQIP indicate use of oral antibiotics at discharge following surgery for complicated appendicitis to be highly variable (4.9% to 100%). In 2019, our hospital modified our post-operative protocol for children with complicated appendicitis and stopped administering antibiotic therapy when children met criteria for discharge. We sought to evaluate our outcomes following this protocol change.

Methods: Following IRB approval we queried our institutional Peds-NSQIP data for all children undergoing appendectomy for appendicitis with documented complicated appendicitis as defined by NSQIP between January 2015 and April 2022. We identified two cohorts: those discharged with original protocol (01/2015 to 04/2019) and those discharged under the new protocol (05/2019 to 05/2022). Our primary outcomes include infectious complications, need for additional procedures, and unexpected readmission.

Results: 306 cases were identified. 185 were identified in the original protocol; 83% were discharged with antibiotics and 121 were identified in the new protocol; 8.3% received antibiotics following discharge. Comparing the two groups no significant differences were identified with age, gender, race, body mass index, or underlying co-morbid condition. No significant differences were seen with superficial surgical site infection (SSI), organ space SSI, need for percutaneous drainage/aspiration, or length of stay (Table 1). No differences in ER visits (8.7% vs. 9.9%, $p = 0.69$), post-operative CT imaging (10.3% vs. 8.3%, $p = 0.69$), or readmission (5.9% vs. 7.4%, $p = 0.64$) were observed. All patients had documented follow-up at least 30 days following discharge.

Conclusions: Continued use of antibiotics following hospital discharge after surgery for complicated appendicitis should be reconsidered. Our data indicate that stopping antibiotic therapy after discharge is not associated with increased incidence of superficial or organ space SSI. Further, there was no observed increase in initial hospital length of stay, post-discharge ER visits, CT imaging, percutaneous intervention, or readmission for those not receiving antibiotics.

Factor	Old protocol (n=185)	New Protocol (n=121)	P-value
Superficial SSI*	1.62%	2.48%	0.46
Organ Space SSI*	7.03%	7.44%	0.69
Percutaneous Drainage/Aspiration	5.95%	4.1%	0.60
Length of Stay median(IQR)	4 (3, 5)	3 (2, 5)	0.33

*SSI – Surgical Site Infection

Outcomes in Children with and without Post Discharge Antibiotics

28

SAME-DAY DISCHARGE AND THE VALUE PROPOSITION IN CHILDREN UNDERGOING APPENDECTOMY FOR UNCOMPLICATED APPENDICITIS: THE DEVIL IS IN THE DETAILS

Katherine He, MD, MS, Lynne Ferrari, MD, Cathie T. Jones, MD, Kelly Connolly, RN, Shannon L. Cramm, MD, MPH, Shawn J. Rangel, MD, MSCE

Boston Children's Hospital, Boston, MA, USA

Purpose: The objective of this study was to compare hospital charges associated with same day discharge (SDD) between different throughput pathways from emergency department (ED) presentation to discharge.

Methods: In January 2020, a clinical pathway was implemented at a single children's hospital to facilitate SDD in children with uncomplicated appendicitis. Although all patients were discharged on the same calendar day as appendectomy, use of inpatient admission and nursing services before and after appendectomy varied among cases. Hospital charges were compared for three common SDD throughput scenarios based on relative use of inpatient services (ED-OR-PACU-Home, ED-OR-PACU-Inpatient-Home, and ED-Inpatient-OR-PACU-Inpatient-Home). Total OR charges and case duration were compared between groups as a measure of disease severity and surgical complexity.

Results: 567 SDD cases were included. Median OR charges and case duration were similar between pathways (Table). Median total charges differed among pathways, as did individual charge buckets associated with emergency department, PACU, and inpatient ward/nursing services (Table). Avoidance of inpatient admission prior to appendectomy was associated with similar to slightly higher ED charges (due to longer observation periods for some patients prior to OR), although an overall net savings by avoiding preoperative inpatient ward/nursing charges (Table). Direct discharge from the PACU was associated with higher median PACU charges (due to extended PACU observation periods), although an overall net savings by avoiding charges associated with postoperative inpatient ward/nursing services (Table).

Conclusion: Relative value associated with SDD in children with uncomplicated appendicitis is significantly influenced by admission pathway. Strategies to optimize value include extended overnight boarding in the ED and discharge directly from the PACU to avoid inpatient admission services before and after appendectomy.

	Pre- And Postoperative Inpatient Admission (ED-Inpatient-OR-PACU-Inpatient-Home)	Postoperative Inpatient Admission (ED-OR-PACU-Inpatient-Home)	No Inpatient Admission (ED-OR-PACU-Home)	
	(n=84)	(n=127)	(n=356)	p-value
Median Charge				
(\$, IQR)				
ED	3687 [3376, 3912]	3641 [3139, 4111]	3895 [3499, 4333]	< 0.001
Inpatient*	2310 [1980, 2708]	1580 [1386, 1896]	0 [0, 0]	< 0.001
OR	10857 [10035, 11685]	10300 [9486, 11262]	10599 [9443, 11567]	0.096
PACU	1620 [1443, 1770]	1534 [1437, 1752]	2219 [1961, 2603]	< 0.001
Total	21051 [19327, 22990]	19975 [18100, 22697]	19342 [17519, 21990]	< 0.001
Case Duration (minutes, IQR)	44 [37, 51]	45 [36, 56]	44 [37, 55]	0.941

Median Charges and Operative Duration for Same Day Discharge In Children With Uncomplicated Appendicitis, Stratified By Relative Utilization Of Inpatient Services. (*Includes Inpatient Facility and Nursing Services)

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ACADEMIC PRODUCTIVITY OF APSA FOUNDATION GRANT RECIPIENTS

Oluyinka O. Olutoye, MD, MPH¹, Taylor Lee², Anjali Dagala², Ekene Onwuka, MD, MS³, Kristy Rialon, MD⁴, Alice King, MD⁵, Sundeep G. Keswani, MD¹, Lily S. Cheng, MD¹

¹Baylor College of Medicine/Texas Children's Hospital, Houston, TX, USA, ²Lab for Regenerative Tissue Repair, Texas Children's Hospital & Baylor College of Medicine, Houston, TX, USA, ³Texas Children's Hospital & Baylor College of Medicine, Houston, TX, USA, ⁴Baylor College of Medicine, Houston, TX, USA, ⁵Texas Children's Hospital, Houston, TX, USA

Purpose: The surgeon-scientist brings a unique perspective to pediatric surgical research. The American Pediatric Surgical Association (APSA) encourages the enrichment of early-stage pediatric surgeon-scientists through foundation awards to junior faculty. We evaluated the academic success of surgeons who received an APSA research scholarship.

Methods: Information was collected for junior faculty who received the APSA Foundation's Jay Grosfeld, MD Scholar Grant from 1996-2022. Google Scholar, Scopus, and the National Institutes of Health (NIH) RePORTER were used to assess scholarly achievements such as number of publications, number of citations, H-index, and NIH grants.

Results: Forty-seven faculty received Grosfeld scholar grants from 1996-2022. Seventeen (36%) are female, compared to the 34% female representation in the APSA population. Forty-five (96%) remain in academic surgery, and of those, 18 (38%) hold a title of Professor. Fourteen (30%) are division chiefs, and 7 (15%) hold a chair position. Fifteen (33%) received NIH funding following their award including: 5 (11%) K01, K08, or K23 grants, 7 (15%) R03 or R21 grants, and 7 (15%) R01 grants, for a total of about \$157 million in NIH funding (159-fold return on investment). The median number of years from faculty award to NIH funding was 7 (IQR 4-8).

Conclusion: Jay Grosfeld Scholar Grant recipients experience high degrees of success in academic surgery. A high percentage of these faculty go on to hold leadership positions and receive NIH funding.

30

HEALTH INFORMATION TECHNOLOGY AUGMENTS A QI-DIRECTED MORBIDITY AND MORTALITY CONFERENCE AND IMPROVES QUALITY OF CARE

Nitin Sajankila, MD¹, Thomas Javens, BS², Josh Hampl, BS², Courtney Coleman, RN, BSN², Brian D. Kenney, MD³, Gail E. Besner, MD⁴

¹Nationwide Children's Hospital, Ohio State University, Columbus, OH, Columbus, OH, USA, ²Nationwide Children's Hospital, Columbus, OH, Columbus, OH, USA, ³Nationwide Children's Hospital, Columbus, OH, USA, ⁴Nationwide Children's Hospital, Columbus, OH, USA

Purpose: In 2014, we developed a QI-directed M&M conference using a standardized taxonomy of failure modes adapted from Healthcare Performance Improvement, LLC. Prior analysis revealed that this unique conference identified system-level failures that were not captured by other quality metrics such as NSQIP-Pediatric. In 2019, the QI-directed M&M conference was further improved by uploading all cases into an eDatabase. In this study, we utilized this novel eDatabase to examine trends in system failures from 2014-2021 in order to understand the impact of our QI-directed M&M process on quality of care.

Methods: After each QI-M&M case was presented, a recorder summarized the discussion and noted the level of preventability, classification as system or individual failure, and corrective Action Items assigned. Prior to 2019, case information was stored as individual electronic documents. Starting in March 2019, case information was uploaded into the eDatabase. We analyzed all M&M cases presented from 2014 to 2021 to track trends in system failures and to understand the resulting impact of corrective Action Items that were assigned. System failures studied included failures in Structure (Resource Allocation/Collaboration Mechanisms); Culture (Non-Collaboration); Process (Inadequate Interface/Inadequate Checks); Policy & Protocol (Lacking or Informal/Usability/Understandability) and Technology & Environment (Environment).

Results: 1513 cases were reviewed, with 165 system failures identified. The majority of system failures (81%) were from 5 of 9 categories. The 5 most common system failures decreased by 63% between 2014-2021 (see Figure) as a result of closure of specific Action Items assigned in order to avoid repeating similar complications. Discussion of system failures resulted in many meaningful changes in departmental policies and practices. Additionally, the eDatabase significantly simplified tracking of complications.

Conclusion: The QI-directed M&M process led to significant improvements in system-level care, with this novel eDatabase providing easy tracking of system-level failures.

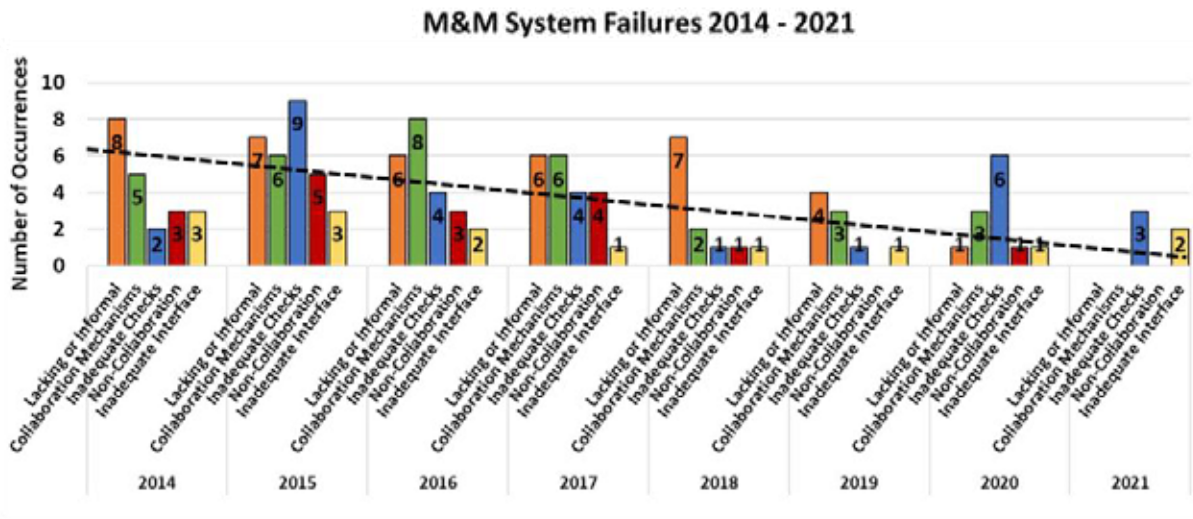


Figure 1: Trend in Top 5 System Failures Over Time. System failures decreased by 63% between 2014-2021 as a result of closure of specific Action Items assigned in order to avoid repeating similar complications.

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THE VALUE OF A REMINDER: UTILIZING PATIENT TRACKING WITH PEDIATRIC GASTROSTOMY TUBE PATIENTS TO DECREASE EMERGENCY ROOM VISITS

Rachel L. Bank, BA¹, Victoria Deng, BA², Nadia Kobal, MSN, RN³, Anuja Sarode, MPH³, Anne K. Mackow, MD, MPH³, Eiichi Miyasaka, MD

¹Case Western Reserve University School of Medicine, Cleveland Heights, OH, USA, ²Case Western Reserve University School of Medicine, Cleveland, OH, USA, ³UH Rainbow Babies and Children's Hospital, Cleveland, OH, USA

Purpose: Few studies explore long-term post-operative outcomes following gastrostomy tube placement, despite the potential for ongoing care issues. Providing education and reminders to increase patient adherence to follow-up recommendations may decrease their Emergency Room (ER) utilization. Our study explored whether a reliable post-operative tracking system and reminders led to decreased gastrostomy tube-related emergency room visits in the 3-7-month post-operative period.

Methods: Retrospective review of 152 pediatric patients undergoing gastrostomy placement was performed, with identified two cohorts: patients tracked post-operatively and given reminders via a patient-facing app (intervention) or a less-reliable handwritten system (control). The study spanned two consecutive 12-month periods, before and after implementing the patient app, from August 2019 to July 2021. Patients hospitalized >90 days were excluded. Data included demographics, extrapolations of median income, co-morbidities and post-operative outcomes including follow up, ER visits and clinic utilization. Cohort comparison was done through two independent sample t-test and chi-square test ($p < 0.05$).

Results: Between the control ($n=76$) and intervention groups ($n=62$), patients in the intervention group were significantly less likely to have gastrostomy tube-related emergency room visits in the 3-7-month post-operative period (11/62 (18%) vs. 30/76 (40%), $p=0.005$). There was no significant difference in three-month follow-up clinic visits. Patients with public insurance, regardless of system used, were more likely to have at least one gastrostomy tube-related emergency room visit in the 3-7-month post-operative period ($p=0.04$).

Conclusion: A tracking system that ensures reminders for tube change-outs and/or post-operative visits in clinic may provide opportunities to educate patients, answer questions about gastrostomy tube management, and increase adherence with g-tube maintenance protocols. This opportunity may help reduce preventable emergency room visits and encourage outpatient follow-up in this patient population.

32

GASTROSTOMY TUBE PRE-OPERATIVE BOARDING PASS FOR CONGENITAL CARDIAC SURGERY PATIENTS IMPROVES DAYS TO SURGERY AND HOSPITAL DISCHARGE

Brittany N. Hegde, MD¹, Jay Mendenhall, BS², Natalie A. Drucker, MD, MS², Thian Nguyen, MSPAS, PA-C², Christina Morice, MSPAS, PA-C², Elisa I. Garcia, BSN, RN, MPH³, Nutan B. Hebballi, BDS, MPH³, Maryam Broussard, MHA, CCRP⁴, KuoJen Tsao, MD⁴, Lauren Haley, BSA⁵, Nischal K. Gautam, MD⁶, Rebecca Sam, MSN, RN, CPN, CCRN-K⁷

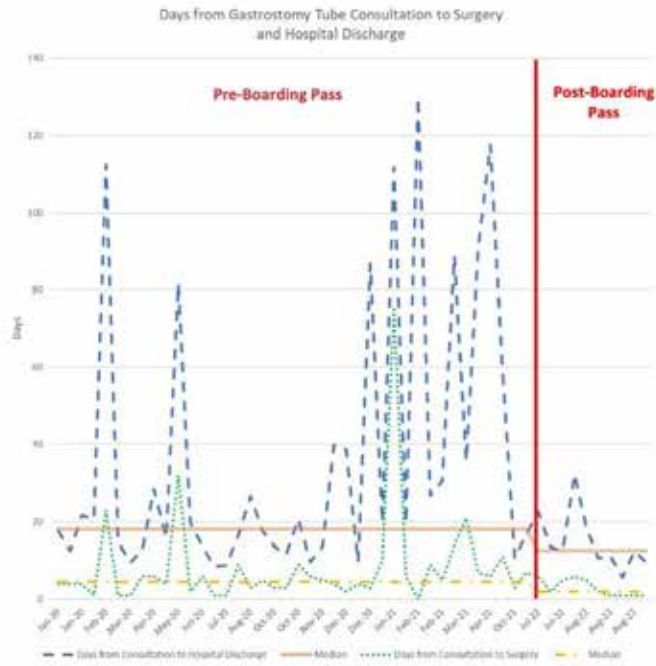
¹*Department of Pediatric Surgery, The University of Texas Health Science Center at Houston, Houston, TX, USA,* ²*McGovern Medical School at The University of Texas Health Science Center at Houston, Houston, TX, USA,* ³*McGovern Medical School at the University of Texas at Houston (UTHealth), Houston, TX, USA,* ⁴*McGovern Medical School at the University of Texas Health Science Center at Houston, Houston, TX, USA,* ⁵*University of Texas Health Science Center at Houston, McGovern Medical School,* ⁶*Department of Anesthesiology, McGovern Medical School at The University of Texas Health Science Center at Houston,* ⁷*Children's Heart Institute, Children's Memorial Hermann Hospital*

Purpose: Congenital cardiac surgery patients requiring gastrostomy tubes (GTs) at our institution were found to have delays in time to surgery and hospital discharge. We aimed to standardize the pre-operative process and utilize a stakeholder agreed upon boarding pass (BP) prior to consulting pediatric surgery for GT placement. We hypothesized time from consultation to surgery and hospital discharge would decrease.

Methods: A quality improvement study was performed at a tertiary pediatric center of cardiac surgery patients undergoing GT placement. In coordination with cardiac surgeons, cardiologists, anesthesiologist, and pediatric surgeons the BP, to be completed prior to consultation, was developed and implemented May 2022. Stakeholder interviews, consensus building, and process mapping were used to develop the BP. Data was collected on pre-BP patients (n=40) from January 2019-April 2022, and post-BP patients (n=10) from May 2022-August 2022. Patient demographics, hospital/operative details, and post-operative complications within 30 days were collected. Univariate analysis was performed. A P-value < 0.05 was deemed significant.

Results: Of the 50 patients, there was no difference in age, gestational age at birth, weight, gender, race, or insurance status between groups. Primary drivers of delays in care included pre-operative workup, coordination with anesthesia, and parent/family preparedness. Pre-BP patients trended towards having a longer median hospital length of stay (64.0 days, IQR: 36.2, 89.6) compared to post-BP patients (36.1 days, IQR: 30.0, 71.6)(p=0.055). Likewise, pre-BP patients had a longer time from consultation to surgery (5 days, IQR: 3, 8) compared to post-BP patients (2 days, IQR: 1, 5)(p=0.048), and a longer time to hospital discharge (Pre-BP: 19.8 days, IQR: 13.7, 39.2)(Post-BP: 12.6 days, IQR: 10.7, 18.5)(p=0.026).(Figure).

Conclusion: Implementation of a pre-operative BP for congenital cardiac surgery patients requiring GTs was associated with decreased median time from consultation to surgery of 3 days and time to hospital discharge of 7 days.



33

DEVELOPMENT AND UTILITY OF A COMPARATIVE PERFORMANCE REPORT CARD FOR INFECTION PREVENTION AND ANTIMICROBIAL STEWARDSHIP IN CHILDREN WITH ADVANCED APPENDICITIS

Shannon L. Cramm, MD, MPH¹, Dionne Graham, PhD¹, Myron Allukian², Danielle Aronowitz³, Martin Blakely, MD, MS⁴, Brendan T. Campbell, MD MPH⁵, Nicole M. Chandler, MD⁶, Robert A. Cowles, MD⁷, Jennifer DeFazio, MD⁸, Katerina Dukleska, MD⁹, Justice Echols, BS¹⁰, Joseph Esparaz, MD, MPH¹¹, Christina Feng, MD¹², Cornelia Griggs, MD¹³, David N. Hanna, MD¹⁴, Katherine He, MD, MS¹, Olivia Keane, MD¹⁵, Shaun Kunisaki, MD¹⁶, Aaron M. Lipskar, MD¹⁷, Sean E. McLean, MD¹⁸, Claudia Orlas Bolanos¹³, Robert T. Russell, MD, MPH¹⁹, Matthew T. Santore, MD²⁰, Stefan Scholz, MD²¹, Shelby R. Sferra, MD, MPH²², Elisabeth (Lisa) Tracy, MD²³, Sacha Williams, MD, MS, MPH⁶, Lucy Zhang, MD²⁴, Shawn J. Rangel, MD, MSCE¹

¹Boston Children's Hospital, Boston, MA, USA, ²Children's Hospital of Philadelphia, Philadelphia, PA, USA, ³Cohen Children's Medical Center at Hofstra/Northwell, ⁴Department of Pediatric Surgery, Vanderbilt University Medical Center, ⁵American College of Surgeons, Committee on Trauma, Hartford, CT, USA, ⁶Johns Hopkins All Children's Hospital, St. Petersburg, FL, USA, ⁷Yale School of Medicine, Department of Pediatric Surgery, New Haven, CT, USA, ⁸New York Presbyterian Morgan Stanley Children's Hospital, Columbia University Vagelos College of Physicians and Surgeons, New York, NY, USA, ⁹Connecticut Children's Medical Center, University of Connecticut, Hartford, CT, USA, ¹⁰University of North Carolina Health System, Chapel Hill, NC, USA, ¹¹Children's of Alabama, Birmingham, AL, USA, ¹²Children's National Hospital, Washington, DC, USA, ¹³Massachusetts General Hospital, Boston, MA, USA, ¹⁴Vanderbilt University Medical Center, Nashville, TN, USA, ¹⁵Children's Healthcare of Atlanta, Atlanta, GA, USA, ¹⁶Johns Hopkins University School of Medicine, Baltimore, MD, USA, ¹⁷Zucker School of Medicine at Hofstra/Northwell, Cohen Children's Medical Center at Northwell Health, New Hyde Park, NY, USA, ¹⁸University of North Carolina at Chapel Hill, Chapel Hill, NC, USA, ¹⁹University of Alabama at Birmingham and Children's of Alabama, Birmingham, AL, USA, ²⁰Emory University, Atlanta, GA, USA, ²¹UPMC Children's Hospital of Pittsburgh, Pittsburgh, PA, USA, ²²Johns Hopkins University, Baltimore, MD, USA, ²³Duke University Medical Center, Durham, NC, USA, ²⁴Yale New Haven Children's Hospital, New Haven, CT, USA

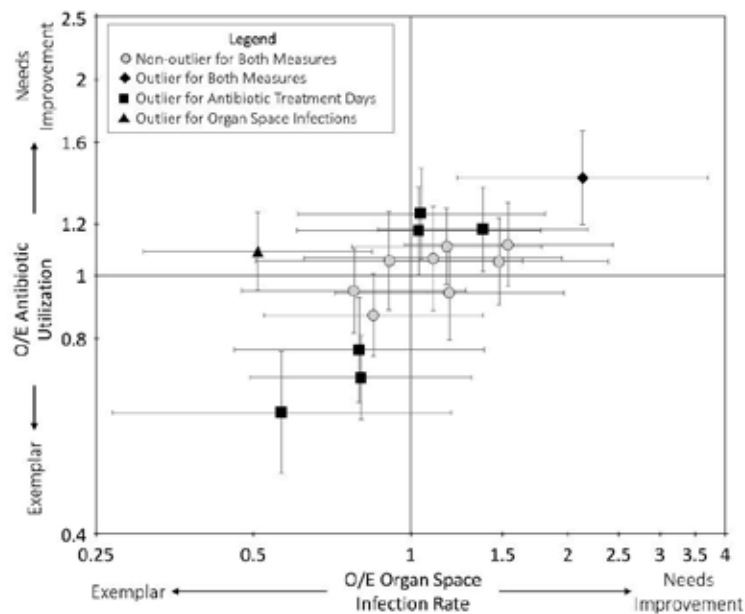
Purpose: The objective of this study was to explore the utility of a benchmarking report card for 30-day postoperative organ space infection (OSI) rate and cumulative antibiotic utilization as balancing measures for infection prevention and antimicrobial stewardship in children with appendicitis.

Methods: This was a multicenter study including 16 hospitals participating in a regional research consortium. NSQIP-Pediatric data were augmented with antibiotic utilization and operative report data obtained through supplemental chart review at each hospital. Children with advanced appendicitis (complicated appendicitis as defined by NSQIP-Pediatric criteria and uncomplicated appendicitis with gangrene, suppuration, or exudate) were included. Hospital-level observed-to-expected (O/E) ratios were calculated for 30-day postoperative OSI

rates and cumulative antibiotic treatment days after adjusting for patient demographics and disease severity using mixed effects models. Hospitals were considered performance outliers for a measure if the O/E ratio and 95% confidence interval did not include 1.

Results: 2750 children were included (hospital median: 154). The overall rate of OSI was 11.0% and median total antibiotic treatment days was 7.0 (IQR: 2.0-11.0). O/E ratios for total antibiotic days ranged 2.3-fold across hospitals (0.62 to 1.41), while O/E ratios for OSI ranged 4.2-fold (0.51 to 2.13; Figure). Seven (43.8%) hospitals were antibiotic utilization outliers (4 high and 3 low utilizers), and 2 (12.5%) were outliers for OSI (1 low and 1 high performer). Overall, 8 (50%) hospitals were either a high or low an outlier in at least one measure.

Conclusions: Antibiotic utilization and OSI rates varied greatly among hospitals in the management of advanced appendicitis. These data suggest a balancing measure report card may have great utility for identifying hospital-level opportunities for both improved antimicrobial stewardship and OSI prevention. The report card could further be leveraged to identify and disseminate best practices from high-performing centers with favorable antimicrobial stewardship and OSI prevention profiles.



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CURRENT BURNOUT AND WORK SATISFACTION AMONG PEDIATRIC SURGEONS

Jason D. Fraser, MD¹, Yara Duran², Janelle Noel-MacDonnell, MD¹, Cynthia D. Downard, MD, MMSc³, Katherine T. Flynn-O'Brien, MD, MPH⁴, Samir K. Gadepalli, MSc, MD, MBA⁵, Mark B. Slidell, MD, MPH⁶, K. Elizabeth Speck, MD, MS⁵, Katherine J. Deans, MD, MHSc⁷, Mary E. Fallat, MD⁸, Julia E. Grabowski, MD⁹, Michael A. Helmrath, MD, MS¹⁰, Ronald B. Hirschl, MD⁵, Rashmi D. Kabre, MD¹¹, Dave R. Lal, MD, MPH¹², Matthew P. Landman, MD¹³, Charles M. Leys, MD, MSCI¹⁴, Grace Z. Mak, MD¹⁵, Troy Markel, MD¹⁶, Peter C. Minneci, MD, MHSc¹⁷, Beth A. Rymeski, DO¹⁸, Jacqueline Saito¹⁹, Brad W. Warner, MD²⁰, Tiffany Wright, MD²¹, Shawn D. St. Peter, MD¹

¹Children's Mercy Kansas City, Kansas City, MO, USA, ²Mercy Children's Hospital, Kansas City, MO, USA, ³Division of Pediatric Surgery, Hiram C. Polk, Jr., M.D. Department of Surgery, University of Louisville, Louisville, KY, USA, ⁴Medical College of Wisconsin, Milwaukee, WI, USA, ⁵University of Michigan, Ann Arbor, MI, USA, ⁶Section of Pediatric Surgery, Department of Surgery, The University of Chicago Medicine and Biologic Sciences, Chicago, IL, USA, ⁷Nemours Children's Health-Delaware Valley, Nemours Children's Health, Wilmington, DE, USA, ⁸Hiram C. Polk, Jr, MD Department of Surgery, University of Louisville, Norton Children's Hospital, Louisville, KY, USA, ⁹Lurie Children's Hospital, on behalf of the Midwest Pediatric Surgery Consortium, Chicago, IL, USA, ¹⁰Division of Pediatric Surgery, Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA, ¹¹Division of Pediatric Surgery, Department of Surgery, Ann & Robert H. Lurie Children's Hospital of Chicago Northwestern University Feinberg School of Medicine, Chicago, IL, USA, ¹²Division of Pediatric Surgery, Medical College of Wisconsin/Children's Wisconsin, Milwaukee, WI, USA, ¹³Division of Pediatric Surgery, Department of Surgery, Indiana University School of Medicine, Indianapolis, IN, USA, ¹⁴Division of Pediatric Surgery, Department of Surgery, University of Wisconsin, Madison, WI, USA, ¹⁵The University of Chicago Pritzker School of Medicine, Chicago, IL, USA, ¹⁶Riley Hospital for Children at IU Health, Indiana University School of Medicine, Indianapolis, IN, USA, ¹⁷Center for Surgical Outcomes Research, The Research Institute and Department of Surgery, Nationwide Children's Hospital, University of Ohio, Columbus, OH, USA, ¹⁸Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA, ¹⁹Washington University, St. Louis Children's Hospital, St. Louis, MO, USA, ²⁰Washington University, Division of Pediatric Surgery, St. Louis, MO, USA, ²¹Norton Children's Hospital, University of Louisville School of Medicine, Louisville, KY, USA

Purpose: Evidence has shown many physicians experience burnout, which can affect performance and outcomes. To assess prevalence and severity of burnout and to establish a contemporary baseline in pediatric surgeons, we performed a 3-year longitudinal study that began prior to, and serendipitously spanned, the COVID-19 pandemic.

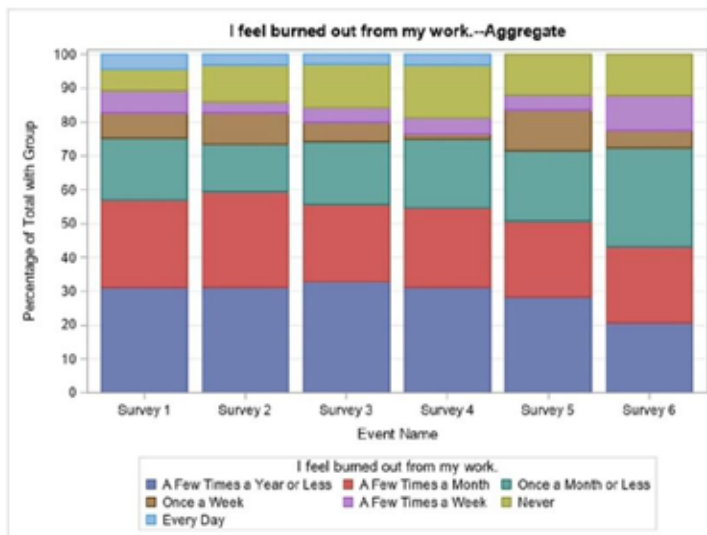
Methods: A prospective longitudinal study was conducted with pediatric surgeons at 11 academic children's hospitals. From 9/2019–9/2022 anonymous surveys were administered every 6-months measuring burnout with domains addressing work satisfaction, overall/EMR/patient stress, and work engagement. In 9/2020, questions were added examining effects of the COVID-19 pandemic. Demographic data and survey questions were summarized

descriptively. Kruskal-Wallis tests were used to compare responses across survey timepoints and assess differences in academic rank. $P < 0.05$ was considered statistically significant.

Results: 738 surveys were sent to 131 surgeons; 417 (56.6%) were completed. 114 surgeons completed at least 1 survey (114/131, 87%); 30% completed all six. Overall, 89% reported burnout - 30% a few times/year or less, 24% a few times/month, 20% once/month or less, 7% once/week, 6% a few times/week, and 2% every day. There were no significant differences in work satisfaction, work-related stress, EMR stress, or work engagement scores in surgeons who completed all surveys compared to those who did not. Surgeons completing all surveys reported less burnout. Professors spent significantly less time on EMR, felt more “bursting with energy,” less job stress, less callousness, and the least amount of moral distress due to the pandemic. Burnout levels remained steady throughout the study period inclusive of the pandemic (Figure 1).

Conclusion: In this longitudinal study, most pediatric surgeons reported overall job satisfaction, but the vast majority reported some degree of burnout that was present pre-pandemic and continued through the pandemic. This demonstrates the need for burnout awareness and to commit resources to reduce burden and mitigate effects.

Figure 1. Stacked bar graph demonstrating most (nearly 90%) pediatric surgeons experience some level of burnout, which remained relatively stable throughout the study period including the COVID-19 pandemic.



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BURNOUT IN PEDIATRIC SURGERY FELLOWS - PREVALENCE AND ASSOCIATED FACTORS

Krista Lai, MD¹, Brielle Ochoa, MD², R Scott Eldredge, MD³, Cristine S. Velazco, MD, MS⁴, Erica M. Weidler, MEd³, Kathleen van Leeuwen, MD³

¹Phoenix Children's Hospital/Dalhousie University, Halifax, NS, Canada, ²Phoenix Children's, Phoenix, AZ, USA, ³Phoenix Children's Hospital, Phoenix, AZ, USA, ⁴Arnold Palmer Hospital for Children, Orlando, FL, USA

Purpose: Pediatric surgeons are experiencing burnout at similar rates to other subspecialists; however, little is known about its prevalence in pediatric surgery fellows. This study aims to determine the prevalence of burnout in pediatric surgery trainees.

Methods: The Maslach Burnout Inventory (MBI) and a survey of personal and training characteristics were distributed to three years of pediatric surgery fellows – current and recently graduated. The MBI is comprised of three subscales – Emotional Exhaustion (EE), Depersonalization (DP), and Personal Accomplishment (PA). Higher scores in EE and DP, and lower score in PA indicate greater burnout. Linear regressions were used to identify factors associated with subscales.

Results: The response rate was 41% (52/126); 15% 1st year, 54% 2nd year, 31% recent graduates. The majority were aged 30-39 years (83%), female (71%), married (85%), and parents (64%). Median subscale scores were 23 for EE, 8 for DP, and 38 for PA, with no significant difference between years. Sleep (81%) and family time (71%) were the most cited coping mechanisms. Factors associated with EE were numbers of hours slept each night and home call. Less than 4 hours of sleep resulted in higher EE ($p=0.03$). If a fellow did not take home call, EE was lower ($p=0.004$). Frequency of call did not correlate with any subscale. History of depression/anxiety trended toward higher DP scores ($p=0.08$) and lower PA scores ($p=0.07$). Comments cited the unsustainability of high frequency call and emphasized the need for advanced practice provider support.

Conclusion: Pediatric surgery fellows experience high levels of burnout with higher Emotional Exhaustion and Depersonalization scores, and lower Personal Accomplishment scores. Lack of sleep and home call may be contributory and efforts to combat burnout should specifically address these factors. The findings are limited by a low response rate and warrant further investigation.

History Posters

5:00 PM – 6:30 PM

H-1

PLAY THE WINNER: HISTORIC AND ETHICAL ASPECTS OF THE FIRST NEONATAL EXTRACORPOREAL MEMBRANE OXYGENATION CLINICAL TRIAL

Russell B. Hawkins, MD, MS¹, Saleem Islam, MBBS, MPH², Shawn D. Larson, MD, FACS¹

¹University of Florida College of Medicine, Gainesville, FL, USA, ²The Aga Khan University, Karachi, Sindh, Pakistan

Purpose: Extracorporeal membrane oxygenation (ECMO) is a lifesaving technology that is considered standard of care for severe cardiopulmonary failure in neonates. During the early days of ECMO, however, it was highly controversial. The purpose of this study is to examine the historic and ethical aspects of the randomized “play the winner” study comparing ECMO to conventional care for neonatal respiratory failure.

Methods: A literature search was performed evaluating the development, execution, controversy, and impact of the first RCT of neonatal ECMO versus conventional treatment published in 1985.

Results: A novel statistical method coined “play the winner” was selected for the trial, in which randomization of each case was adapted based on the outcome of the previous case. This was the first ever human trial to utilize this adaptive study design. The first patient had a 50% chance of randomization to ECMO or conventional care. This patient was randomized to ECMO and survived. The second patient was randomized to conventional care and died. Given the adaptive design, all of the 10 subsequent randomized neonates were assigned to ECMO and survived. The study was initially criticized for its adaptive design, unclear confidence intervals and power, and for the treatment being “complex with undefined indications.” The initial reaction was a call for additional randomized trials. Two years later, a subsequent randomized trial was rebuked for denying ECMO to the control group, a clear sign of the rapid adoption of ECMO.

Conclusions: The first neonatal randomized trial of ECMO used a novel adaptive design and attempted to balance the moral dilemma of conducting a rigorous scientific study while potentially withholding lifesaving therapy to children who would die with conventional therapy. The study highlights both the innovative design and adaptability of the authors and the incalculable impact of neonatal ECMO.

Figure 1: The first successful neonatal use of extracorporeal membrane oxygenation in 1975. American Society for Artificial Internal Organs Journal, 2017. PMID 29084039.



H-2**ROBERT REPLOGLE: CONTRIBUTIONS TO PEDIATRIC AND CARDIOTHORACIC SURGERY****Sarah L. Wright, MD**, Carolyn Gosztyla*Walter Reed National Military Medical Center, Bethesda, MD, USA*

Propose: As a surgical research resident in 1963, Robert L. Replogle invented a double-lumen sump tube for management of patients with esophageal atresia that still bears his name today. He started his career heavily influenced by pediatric surgeons and ended it as a leader in cardiothoracic surgery.

Methods: Replogle's interest in medicine was kindled when he was called to serve in the Navy at the start of the Korean War and began working at the Naval Research Institute in Bethesda, Maryland. Upon entering Harvard Medical School he replaced Judah Folkman in Robert Gross' research laboratory at Boston Children's Hospital to work on topics in blood viscosity and renal failure related to cardiopulmonary bypass. In 2003, in celebration of the 50th anniversary of the first successful use of the heart-lung machine, Replogle spoke about his experience as a medical student tasked with setting up the oxygenator and dismantling the pump and tubing – sometimes even acting as a backup perfusionist – during the first decade of heart-lung bypass. He completed residency under Gross in 1966 and remained in the surgical department for a year before taking a position as a pediatric surgeon and faculty at University of Chicago in 1967. He ultimately served his career as a cardiothoracic surgeon with a focus on mentorship and certification for trainees in the specialty. He continued to publish about surgical history until two years before his death in 2016 at age 84.

Conclusion: Replogle's contributions to pediatric surgery are long-standing; the Replogle tube continues to be a mainstay in the management of esophageal atresia and other neonatal gastrointestinal obstructions. His passion for congenital and cardiac surgery is reflected in his work on cardiopulmonary bypass and hemorrhagic shock and he was instrumental in bringing cardiothoracic surgery and its specialty training into the digital era.

H-3**MAKING WAVES: THE COMMENSAL RELATIONSHIP BETWEEN THE DEVELOPMENT OF THE ULTRASOUND AND THE ADVENT OF FETAL SURGERY****Royi Lynn**¹, Carlos T. Huerta, MD², Eduardo A. Perez, MD³

¹University of Miami Miller School of Medicine, Miami, FL, USA, ²University of Miami Department of Surgery, Miami, FL, USA, ³DeWitt Daughtry Family Department of Surgery, Division of Pediatric Surgery, University of Miami Miller School of Medicine, USA

Background: Ultrasound (US) technology has become inseparably linked to maternal-fetal care worldwide. This technology, which originated as a tool to identify structural faults in metal, is now the gold-standard for identifying many fetal anatomic anomalies requiring surgical intervention among multiple medical uses. While US has garnered invaluable utility as a diagnostic modality, it has also served as an essential tool for medical interventions, specifically in fetal surgery. This historical review aims to characterize the interdependent development of US technology and fetal surgery techniques.

Purpose: To elucidate how the evolution of modern-day fetal surgery techniques is closely related to the development of US technology.

Methods: This study utilized a literature review of currently published literature on the topics of US technology, applications of US, development of fetal surgery practice, and the relationship between US and fetal surgical techniques.

Results: US technology first debuted in medical practice in 1949 to detect implanted human gallstones in animal models. US outpaced fetoscopy as the modality of choice over the following two decades due to its minimally invasive nature and favorable complication profile compared to imaging utilizing ionizing radiation. By 1977, US guidance allowed for accurate in-utero diagnosis of congenital diaphragmatic hernia and five years later, aided in the first direct umbilical vessel puncture in utero. US concurrently revolutionized surgical research and management by contributing to the success of multiple animal models of fetal anomalies that paved the way for novel fetal surgical techniques to be developed. The dissemination of US into this practice guided the transition from high mortality fetal procedures to minimally invasive, safer, and more successful operations.

Conclusion: Advancements in US technology have immeasurably impacted the evolution of modern-day fetal surgery techniques. Recognizing the commensal relationship between US and this surgical field is critical in guiding the future of fetal surgical techniques.

H-4**THE EVISCERATION OF GASTROSCHISIS MANAGEMENT****Marla A. Sacks, MD***Department of Surgery, SUNY Downstate Health Sciences Center, Brooklyn, NY, USA*

Synopsis: After initially describing the unique situation of an infant born with eviscerated organs in the late 1800s, Dr. Fear introduced a new challenge born into neonatal medicine. Although the title of this diagnosis would not solidify for almost a decade, this realm would later be referred to as Gastroschisis.

Clinical Significance: With the assistance of identifying this new diagnosis, the incidence rose overtime from 2 to 5 in 10,000 live births. Although Dr. Fear was successful at treating his described patient, many physicians struggled to save the intestinal contents that eviscerated from the abdominal cavity and could not be immediately reduced. This challenge sparked physicians to become innovative and design bags used for intestinal coverage and the abdominal contents expanded. In addition to autologous skin flaps, several materials were used for experimentation to aid in closure of the abdominal wall defect. Overtime, this contributed to the development of the silo bag. The Silo bag has been modified and optimized to include a spring-loaded base for securing beneath the abdominal wall and is now widely used in the US.

Timeline: In 1878, Dr. Fear first described an infant born with abdominal contents outside of the abdominal and his simple, effective procedure to reduce the contents. The first primary gastroschisis closure was described by Watkins in 1943. Closure of the gastroschisis defect using a skin flap was reported in 1953. Attempts in the 1960s tried to stretch the abdominal wall to accommodate the bowel contents. Between 1967 and 1975, multiple techniques utilizing a variety of materials to close the defect resulted in a soft thin, plastic. Physicians started to suspend the bowel bag to reduce the bowel edema. Finally, in 1997, two US companies introduced the 1st commercialized, modern-day silo that began distribution for use.

H-5

THE FOKER PROCESS FOR LONG-GAP ESOPHAGEAL ATRESIA: TWENTY-FIVE YEARS OF MAKING THE IMPOSSIBLE, POSSIBLE

Shawn Izadi, MD¹, Benjamin Zendejas, MD, MSc¹, Thomas E. Hamilton, MD², Rusty Jennings, MD¹, John Foker, MD³, Charles J. Smithers, MD⁴

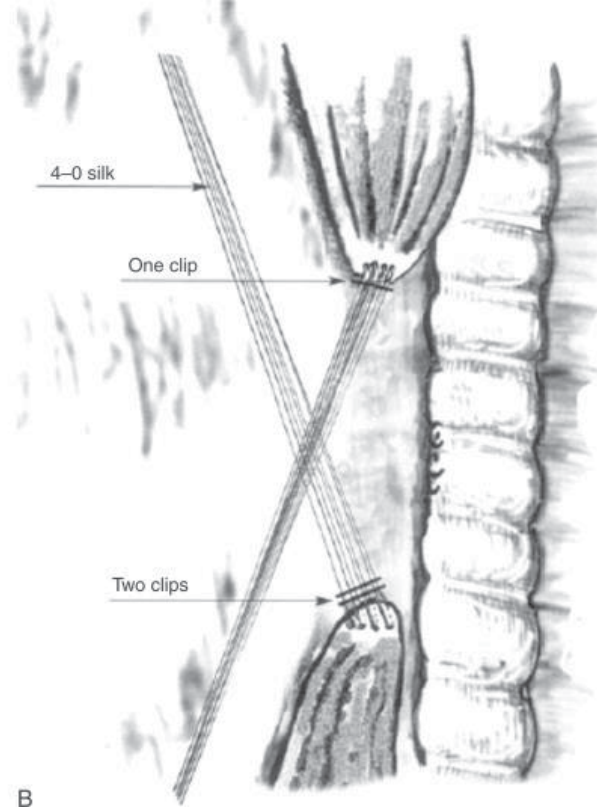
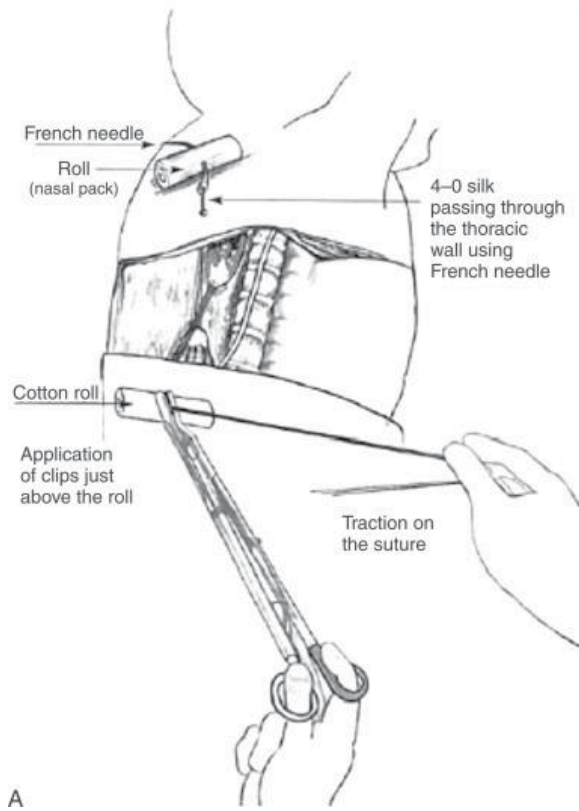
¹Boston Children's Hospital, Boston, MA, USA, ²Children's Hospital of Philadelphia, Philadelphia, PA, USA, ³University of Minnesota, Minneapolis, MN, USA, ⁴Johns Hopkins All Children's Hospital, St. Petersburg, FL, USA

Cameron Haight from Michigan had the first successful primary repair of esophageal atresia (EA) and distal tracheoesophageal fistula (TEF) in 1941, giving hope to infants who previously would die. Until the 1990s, patients with long gap EA (LGEA) were considered the pinnacle of challenges for pediatric surgeons and had few viable options, either esophageal replacement or a life of gastrostomy feeds.

In 1997, John Foker from Minnesota described a technique revolutionizing the treatment of LGEA. This procedure focused on “traction-induced growth” in situations where the esophageal ends were too far apart for a primary repair. Foker would place pledgeted sutures on both esophageal pouches connected to an externalized traction system which would be serially tightened allowing for growth and eventual primary repair (image).

The Foker process was met with stark criticism surrounding the principle of growth vs stretch of the esophagus, but this did not deter early adopters. Rusty Jennings of Boston implemented Foker's principles of “one's own esophagus is best” in 2004 and harbored in an era of esophageal preservation. Ever since, the Foker process has continued to evolve, now incorporating techniques such as the posterior tracheopexy for tracheomalacia, as well as thoracoscopic approaches with internalized traction systems. Yet, despite its potential, the Foker process has not achieved widespread implementation, as it requires not only a mastery of technique but significant operative volume and expert multidisciplinary perioperative care to achieve excellent outcomes.

The revolution of the Foker process can be traced from a once fatal condition to one where not just survival, but normalcy became the expected outcome. Twenty-five years later, history recognizes Foker and Jennings for their work with EA, not only with the creation and evolution of a novel repair emphasizing esophageal preservation, but a lifelong dedication to the training of others to carry on the practice.



H-6**A HISTORICAL REVIEW OF ECMO INNOVATION AND OUTCOMES**

Tyler D. Leiva, MD¹, Katherine B. Snyder, MD², **Alena Golubkova, MD³**, Catherine J. Hunter, MD⁴

¹University of Oklahoma Health Science Center, Oklahoma City, OK, USA, ²University of Oklahoma Health Sciences Center, Oklahoma City, OK, USA, ³Oklahoma Children's Hospital, Oklahoma City, OK, USA, ⁴Oklahoma Children's Hospital, Oklahoma City, OK, OK, USA

Purpose: The development of Extracorporeal Life Support (ECLS), or Extracorporeal Membrane Oxygenation (ECMO), has altered the landscape of pediatric critical care since its conception. By providing an alternative method of oxygenation, ECMO is used in both pediatric and adult patients as a “last resort” to combat life-threatening conditions including cardiopulmonary failure and sepsis. While ECMO is widely used in the adult population, its utility and widespread use emerged in neonates. We sought to explore the historical development of ECMO, review different methods, and analyze outcome data.

Methods: Current and historic literature was reviewed regarding the changes in the indications and use of ECMO. Extracorporeal Life Support Organization (ELSO) database was used to analyze the number of ECMO cases and survival data.

Results: The first successful case of neonatal ECMO took place in 1975 in a 1-day old infant with meconium aspiration syndrome. By the 1980's the survival rate for neonatal ECMO was reported to be approximately 70%. In a 1996 trial, the UK Collaborative ECMO Trial Group randomized 185 neonatal patients with primary respiratory failure to either conventional ventilator support or ECMO. The trial was ended early due to compelling evidence that ECMO had a statistically significant benefit. Indications for ECMO have also expanded to respiratory and cardiogenic causes. While venoarterial (VA) ECMO was initially favored over venovenous (VV), recent studies have shown improved outcomes and neurologic sequelae with VV-ECMO and is being increasingly utilized. According to the ELSO, there have been approximately 63,968 pediatric and neonatal ECMO cases reported with a survival rate of 65% in neonates and 53% in the pediatric population.

Conclusion: Since its emergence in 1975, ECMO is a widely used lifesaving strategy with improving survival rates. Although ECMO was pioneered in the neonatal population, its use has expanded to pediatric and adult patients as well.

Quick Shots and Posters I: Clinical and Innovation

5:00 PM – 6:30 PM

QS 1**COMPREHENSIVE ANALYSIS OF GUT MICROBIOTA IN POSTOPERATIVE BILIARY ATRESIA PATIENTS. NATIVE LIVER VERSUS TRANSPLANTED LIVER.**

Takanori Ochi, MD, PhD¹, Masahiro Takeda, mstakeda@juntendo.ac.jp², Takashi Asahara³, Akinobu Kurita³, Yuzuru Ogata³, Mitsuyoshi Suzuki⁴, Hiroyuki Koga, M.D., Ph.D.¹, Geoffrey J. Lane, M.D., Ph.D.¹, Hiroshi Nittono⁵, Akio Saiura⁶, Koichi Mizuta⁷, Mureo Kasahara⁸, Tadaharu Okazaki⁹, Atsuyuki Yamataka, MD PhD¹⁰, Yuichiro Yamashiro¹¹

¹Department of Pediatric General and Urogenital Surgery, Juntendo University School of Medicine, Tokyo, Tokyo, Japan, ²Department of Pediatric General & Urogenital Surgery, Juntendo University School of Medicine, Tokyo, Japan, Tokyo, Tokyo, Japan, ³Yakult Central Institute, Kunitachi, Tokyo, Japan, ⁴Department of Pediatrics, Juntendo University School of Medicine, Bunkyo-ku, Tokyo, Japan, ⁵Junshin Clinic, Bile Acid Institute, Meguro-ku, Tokyo, Japan, ⁶Department of Hepatobiliary-Pancreatic Surgery, Juntendo University School of Medicine, Bunkyo-ku, Tokyo, Japan, ⁷Department of Transplant Surgery, Saitama Children's Medical Center, Saitama-shi, Saitama, Japan, ⁸Organ Transplantation Center, National Center for Child Health and Development, Setagaya-ku, Tokyo, Japan, ⁹Department of Pediatric Surgery, Juntendo University Urayasu Hospital, Urayasu-shi, Chiba, Japan, ¹⁰Department of Pediatric General and Urogenital Surgery, Juntendo University School of Medicine, Tokyo, Japan, ¹¹Probiotics Research Laboratory, Juntendo University Graduate School of Medicine, Bunkyo-ku, Tokyo, Japan

Purpose: Bacterial translocation and gut microbiome-derived metabolites may be implicated in the pathogenesis of liver disease through a host-microbiome pathway mechanism. As all biliary atresia (BA) patients require surgical intervention to survive, native liver survivors (NLS) after portoenterostomy (PE), liver transplant survivors (LTxS) after failed PE, and age-matched healthy controls (CL) were compared for gut microbiota.

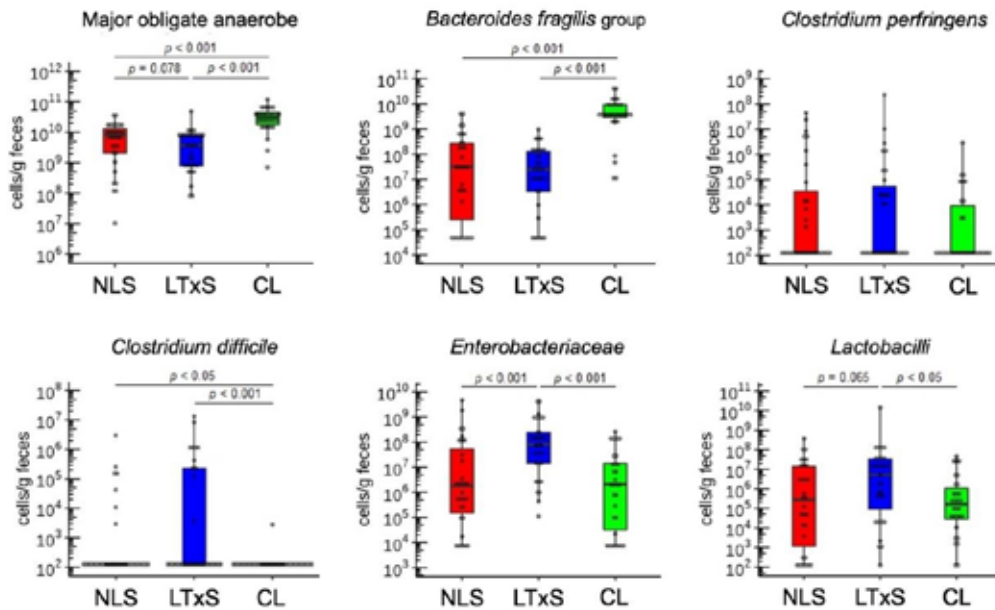
Methods: All subjects were Japanese with no dietary restrictions and clinically stable throughout the study period. LTxS were PE cases who deteriorated; CL were healthy age-matched individuals with no history of surgery. Subjects were: NLS (n=31; age range: 0.3-36 years), LTxS (n=31; age range: 1-33 years), and CL (n=30; age range: 2-38 years). LTx subjects were immunosuppressed. Blood and stool samples were collected at routine outpatient visits. Quantitative analysis of intestinal microflora, and high performance liquid chromatography was performed for fecal organic acids including small chain fatty acids (SCFAs).

Results: Gut microbiota was disrupted in both NLS and LTxS (Figure) compared with CL with reduced predominance of obligate anaerobes and decreased total bacteria ($p < 0.001$) and an abundance of potential pathogens such as Clostridium perfringens, Clostridium difficile and Enterobacteriaceae, while Lactobacilli, generally considered as beneficial bacteria, were normal in NLS, LTxS, and CL. Notably, Enterobacteriaceae were more abundant in LTxS compared with NLS ($p < 0.001$). Serum biochemical markers were normal in LTxS but when evaluated in NLS, elevated liver enzymes (AST/ALT) correlated with increased Clostridium difficile, and

decreased Lactobacilli ($p < 0.05$, respectively). Concentrations of fecal organic acids (total and acetic) were significantly lower in LTxS ($p < 0.05$).

Conclusions: Dysbiosis was observed in both NLS and LTxS but was worse in LTxS, an unexpected finding because LTxS had normal serum biochemical markers. This discrepancy may be related to immunosuppression. This study provides insight into the effect of surgical intervention and the impact of immunosuppression in postoperative BA patients.

Figure: Quantitative analysis of intestinal microflora



NLS: Native liver survivors, LTxS: Liver transplant survivors, CL: Healthy controls

QS 2
USEFULNESS OF 3D RECONSTRUCTION OF LOW DOSE PELVIC CT AS AN INNOVATIVE TOOL FOR SURGICAL PLANNING OF DEFINITIVE CORRECTION OF CLOACAL ANOMALIES. A COHORT STUDY FROM A REFERRAL CENTER.

Karla Alejandra Santos-Jasso, MD PhD¹, Pablo Lezama-Del Valle, MD², Sandra Zaragoza-Huerta, n/a¹

¹*Instituto Nacional de Pediatría, Mexico City, Distrito Federal, Mexico*, ²*Hospital Infantil de Mexico Federico Gomez, Mexico City, Distrito Federal, Mexico*

Purpose: To describe the results of the use of a low dose pelvic CT protocol for preoperative imaging in cloacal anomalies at a referral center.

Methods: patient charts and imaging records of patients with cloacal anomalies treated at our institution from 2012 to 2022. Imaging protocol: after consent is obtained, the patients undergo a cystoscopy under general anesthesia, with measurement of the common channel and the urethra, and visualization of the Müllerian structures, and a Foley catheter is placed in the bladder. Then the patient is transferred to the CT suite for a low dose pelvic CT, filling the bladder, the vagina (by overflow) and the sigmoid/rectum (as in a distal colostogram) with diluted meglumine. Volume rendering was obtained at the CT station.

Results: 43 girls were treated our institution, with 40 of them operated on for correction. The median effective radiation dose was of 2.19mSv, mean 2.04 mSv (0.81 - 2.96 mSv). The study allowed measurement of the common channel, with a Pearson coefficient of 0.96 when correlated with the actual measurement. The length was < 1 cm in 3 cases, 1-3 cm in 18, 3-5 cm in 15, and >5 cm in 4. Total urogenital mobilization was possible in 28 patients. We found vaginal duplication in 16 patients, and vaginal reconstruction was performed in 13 other cases, with replacement in 12, and a vaginal switch in 1. In all cases this imaging technique showed the relevant anatomy.

Conclusion: This technique provided us with adequate images to understand the spatial anatomy of the urinary, Müllerian, and colorectal components, with a higher fidelity than two-dimensional fluoroscopy. Since we do not have rotational fluoroscopy, we overcame that limitation with this modality, and found it to be an improvement for planning, allowing the best outcomes.



QS 3**UNCOVERING RISK FACTORS AND OUTCOMES OF PULMONARY EMBOLISM IN A NATIONWIDE COHORT OF HOSPITALIZED CHILDREN**

Carlos T. Huerta, MD¹, Walter A. Ramsey, MD², Cindy Rodriguez, BS³, Karishma Kodia⁴, Joshua P. Parreco, MD⁵, Chad M. Thorson, MD, MSPH⁶, Juan E. Sola, MD⁷, Eduardo A. Perez, MD⁷

¹University of Miami Department of Surgery, Miami, FL, USA, ²Jackson Memorial Hospital / University of Miami, Miami, FL, USA, ³Florida State University College of Medicine, ⁴University of Miami DeWitt Daughtry Department of Surgery, Miami, FL, USA, ⁵Memorial Healthcare System, Miami, FL, USA, ⁶DeWitt Daughtry Family Department of Surgery, Division of Pediatric Surgery, University of Miami Miller School of Medicine, Miami, FL, USA, ⁷DeWitt Daughtry Family Department of Surgery, Division of Pediatric Surgery, University of Miami Miller School of Medicine, USA

Purpose: The incidence of pulmonary embolism (PE) in hospitalized children has increased in recent years. However, suspected risk factors and management guidelines often mirror those in adults, with few pediatric-specific studies undertaken. This study sought to characterize factors and outcomes associated with PE using a nationally representative pediatric cohort.

Methods: The Nationwide Readmissions Database was queried (2016-2018) for patients (< 18 years) with a diagnosis of PE. Those with septic PE were excluded. Index and prior hospitalizations within one year were analyzed using standard statistical tests. A binary logistic regression utilizing 37 covariates (demographics, procedures, comorbidities, hospital characteristics) was constructed to examine a primary outcome of in-hospital mortality.

Results: 3,440 patients were identified (57% female) with the majority >12 years old (77%). One-third had a known DVT (69% lower and 31% upper extremity), and 10% were on long-term anticoagulation. Frequent concomitant diagnoses included obesity (20%), solid tumor or hematologic malignancies (11%), and hypercoagulable disorders (5%; antithrombin III, protein C and S deficiencies, etc). Admissions for traumatic injuries comprised 8%. During index hospitalization, 19% underwent central venous catheter (CVC) placement, with 21% placed in oncologic patients. Nine percent underwent an operation, the majority being cardiothoracic (5%) or spine surgeries (4%). Within the prior year, 21% had a previous hospitalization, during which 12% had a DVT (78% lower and 22% upper extremity). Overall mortality was 5%. Concomitant congestive heart failure, extremity fracture, neurocranial surgery, cardiothoracic surgery, and CVC placement were associated with the highest odds of inpatient mortality after PE upon logistic regression (Table 1).

Conclusion: Pediatric patients with PE have a high rate of prior hospitalizations within one year and frequency of CVC placement and inpatient operations, which is associated with higher mortality. This information can be utilized to improve screening measures and clinical suspicion for PE in hospitalized children.

Characteristic	Odds Ratio	95% Confidence Interval	P Value
Prior Admission, DH^a	4.34	1.86 - 10.12	0.011
Concomitant Diagnoses			
Congestive Heart Failure	6.10	3.74 - 9.90	< 0.001
Extremity Fracture (Upper or Lower)	6.08	2.90 - 12.79	< 0.001
Index Surgery Type			
Neurocranial ^b	5.48	1.94 - 15.50	0.001
Cardiothoracic ^c	4.70	2.64 - 8.33	< 0.001
Central Venous Catheter	3.16	2.04 - 4.91	< 0.001
Chest Tube	2.22	1.18 - 4.16	0.013

Table 1. Binary Logistic Regression of Characteristics Associated with In-Hospital Mortality After PE In Hospitalized Pediatric Patients.

- a. Different Hospital.
- b. Neurocranial operations included cerebral parenchymal excision, ventricular drainage and/or bypass, ventriculoperitoneal shunt, etc.
- c. Cardiothoracic operations included coronary and/or atrial bypass, pulmonary resection, etc

QS 4**POSTOPERATIVE HYDRATION WITH INTERMITTENT BOLUSES OF BALANCED SALT SOLUTION IS SAFE AND EFFECTIVE: PRELIMINARY RESULTS OF THE BOLUSES OF RINGERS IN SURGICAL KIDS (BRISK) RANDOMIZED CONTROLLED TRIAL**

Allison Mak, MD¹, Stephanie Collins, BSN,MSN,CRNP-AC¹, Rosa Hwang, BS², Peter Mattei, MD²

¹The Children's Hospital of Philadelphia, Philadelphia, PA, USA, ²Children's Hospital of Philadelphia, Philadelphia, PA, USA

Purpose: Postoperative hydration is traditionally provided in the form of intravenous crystalloids at a maintenance rate, particularly after major abdominal or thoracic surgery when children may not have adequate oral intake. We hypothesized that hydration with scheduled weight-based boluses of balanced fluids (Lactated Ringer's, LR) may be more physiologic and could improve patient mobility and comfort. We performed a randomized controlled trial to compare boluses of balanced salt solution to standard continuous fluids in postoperative pediatric patients.

Methods: Subjects were enrolled between 2/2022 and 9/2022 and included patients aged 1 to 21 years who were admitted to the surgical ward after elective abdominal or thoracic surgery. Patients discharged or admitted to an intensive care unit were excluded, as were those with nephropathy, diabetes, or parenteral nutrition. Patients were randomized to receive either standard fluids (D5 0.45 NS+20 mEq/L KCl at continuous 2/3 "maintenance" rate) or intermittent boluses of LR (100mL+10mL/kg q8h). All other therapies including oral intake were determined by the clinical team and additional boluses of crystalloid were administered as needed. We measured urine output, serum glucose, electrolytes, creatinine, and urine specific gravity.

Results: Of 105 eligible patients, 60 were consented, enrolled, and successfully randomized: 31 to boluses (treatment), 29 to continuous (control). Mean age was 12.4 years (1.3-19.8). We had one withdrawal, one crossover, and three patients who received no intravenous fluids. There were no serious adverse events in either arm. Urine output did not differ significantly and there were no significant differences in laboratory values.

Conclusions: Based on the preliminary results of this randomized control trial, a regimen that includes boluses of balanced salt solution appears to be safe and effective for intravenous hydration in healthy children who have undergone major abdominal or thoracic surgery.

QS 5**EFFICACY OF INTRALESIONAL BLEOMYCIN ALONE AND IN COMBINATION WITH DEXAMETHASONE IN INFANTILE HEMANGIOMA**

Siavash Shariatzadeh, MD, MPH

Stanford School of Medicine, Stanford, CA, USA

Purpose: To compare the outcome of intralesional bleomycin with dexamethasone versus the bleomycin alone in infantile haemangioma.

Methods: This Randomized control study was performed after the ethical approval and informed consent. 114 patients were divided in two groups A and groups with 57 patients each by lottery method. Group A was administered intralesional bleomycin with dexamethasone and group B was given intralesional bleomycin alone with an interval of 4 weeks. Selection of patients was made according to inclusions and exclusion criteria. The intralesional dose of bleomycin was 1 mg/kg/dose but for hemangiomas on neck and face it was used as 0.5 mg/kg/dose and similarly intralesional dexamethasone was given as 0.8-1.6 mg/kg/dose.

Results: Mean age of patients in Group-A and in Group-B was 3.61 ± 3.74 and 3.16 ± 3.23 months. Mean weight of patients in Group-A and in Group-B was 12.71 ± 8.27 and 12.30 ± 8.37 Kg respectively. Mean lesion volume in Group-A and in Group-B was 61.80 ± 150.56 cm³ and 52.62 ± 84.61 cm³. In Group-A lesion size ranged between 0.52 cm³ to 960 cm³ and in Group-B it ranges between 0.75 cm³-500 cm³. Reduction in size until flattening of lesion was possible in both groups although rate of reduction in size was higher in group A with a P-value of < 0.001. None of the groups had any recurrence.

Conclusions: Both bleomycin alone and in combination with dexamethasone were effective in reducing volume of infantile haemangioma until flattening of the lesion but the rate of reduction of volume was higher in combination group A (bleomycin with dexamethasone) than group B (Bleomycin alone). None of the groups had recurrence of lesion and side effects of either drug.

QS 6**PEDIATRIC SURGEONS SPARE MORE OVARIES THAN THEIR GYNECOLOGIST COUNTERPARTS DURING SURGERY FOR OVARIAN TORSION**

Claire M. Wunker, MD, MSc¹, Joe Rodriguez, MD², Si-Min Park³, Elfadaly Ahmed³, Jordan Perkins³, Shin Miyata²

¹*Saint Louis University, St Louis, MO, USA*, ²*SSM Cardinal Glennon Children's Hospital/Saint Louis University Hospital, St. Louis, MO, USA*, ³*SSM Cardinal Glennon Children's Hospital/Saint Louis University, St Louis, MO, USA*

Introduction: Ovarian torsion accounts for 3% of all pediatric acute abdominal pain and occurs in 4.9/100,000 females under the age of 20 yearly. This condition is painful and potentially fertility altering if an oophorectomy is required. Urgent surgical intervention is indicated. At non-pediatric surgery centers these cases are often referred to gynecology. We sought to determine operative outcomes, including the rates of oophorectomy, performed by pediatric surgeons compared to gynecologists.

Methods: Data from 2015-2020 was obtained from the American College of Surgeons National Surgical Quality Improvement Program Pediatric database. All patients who had a diagnosis of ovarian torsion as their primary ICD 10 diagnosis and operated on by a gynecologist or pediatric surgeon were included. Patient characteristics and post-operative outcomes were compared. Bivariate analysis and logistic regression analysis were performed with a significant P-value of < 0.05.

Results: 1707 ovarian torsion cases were included. 23.9% (n=404) cases were performed by gynecologists while the remaining 76.1% (n=1299) were performed by pediatric surgeons. Pediatric surgeons operated on younger, lighter patients, with less bleeding comorbidities, had lower readmissions (OR 0.10, 0.02-0.50) and took a shorter length of time (62.4 ± 33.5 vs 82.8 ± 44.4 min). There was a significant difference in race between the groups. Gynecologists had a shorter length of stay and days from operation to discharge with less conversions to open procedures (OR 2.61, 1.17-5.82). There was no difference in ASA class, re-operation rate, readmission rate, case status, or year of operation. There were no deaths. Pediatric surgeons performed more ovarian sparing operations (OR 0.46, 0.32-0.59). Our study was limited by selection bias of patients referred for concern for malignancy to gynecology.

Conclusions: Our study demonstrated a decreased rate of oophorectomy in patients operated on by pediatric surgeons which could lead to improved fertility in these young patients.

	Crude OR (95% CI)	Adjusted OR* (95% CI)
Oophorectomy	0.62 (0.49-0.78)	0.46 (0.35-0.59)
Operative Approach		
Laparoscopic vs Open	0.73 (0.50-1.07)	0.77 (0.50-1.20)
Laparoscopic vs Both	0.38 (0.18-0.80)	2.61 (1.17-5.82)
Any Reoperation	5.68 (0.76-42.69)	3.68 (0.67-20.23)
Any Readmission	0.49 (0.22-1.09)	0.10 (0.02-0.50)
Readmission Related to Operation	0.68 (0.24-1.98)	3.51 (0.48-25.70)
*Adjusted for age, ASA classification, weight, bleeding/hematologic comorbidity, pulmonary comorbidity, gastrointestinal comorbidity, cardiac comorbidity, neurologic comorbidity, year of operation, and case status.		

Crude and Adjusted Odds Ratios From Logistic Regression Comparing Pediatric Surgeons to Gynecologists

QS 7**ELECTROADHESION OF HYDROGEL PATCHES: A NOVEL AND SUTURE-LESS ALTERNATIVE FOR INTESTINAL REPAIR**

Michele S. Saruwatari, MD¹, Leah K. Borden, PhD², David Boegner, BS², Xiaofang Wu, PhD³, Priya Srinivasan, PhD³, Mousumi Basu³, Ian White, PhD², Srinivasa R. Raghavan, PhD², Anthony Sandler, MD⁴, Morine Nader, Paula Montero

¹Sheikh Zayed Institute for Pediatric Surgical Innovation at Children's National Hospital MedStar Georgetown University and Washington Hospital Center, Washington, DC, USA, ²Department of Chemical and Biomolecular Engineering, University of Maryland, College Park, MD, USA, ³Sheikh Zayed Institute for Pediatric Surgical Innovation, Children's National Medical Center, Washington, DC, USA, ⁴Children's National Medical Center, Washington, DC, USA

Purpose: Electroadhesion (EA) is the strong and permanent adhesion that can be induced between cationic hydrogels and anionic tissues by applying a low DC voltage (< 10 V) for a short time (< 60 s). This work investigates the use of electroadhesion for managing intestinal injury without the use of sutures.

Methods: Cationic hydrogels were assessed for cytotoxicity in vitro using the WST-8 Cell Proliferation Assay. A cecal enterotomy was created and then repaired either with sutures or a 1x5 mm round gel-patch adhered using EA (Fig 1a) using 9V for 30 seconds, 7V for 60 seconds, or just by contact adhesion, (n=5 mice/group). Surgical time, animal weight, and intraabdominal adhesion severity were assessed during initial surgery and on postoperative day (POD) 6.

Results: No significant cytotoxic effect was observed after 24- and 48-hour incubation with the hydrogel (Fig 1b, relative viability = $104.0 \pm 4.3\%$ at 24hr, $93.0 \pm 6.3\%$ at 48hr). One mouse from the contact adhesion group died on POD1. All other animals survived to the study endpoint. All hydrogel patches in the EA groups remained adhered to the cecal enterotomy site on final assessment. The EA gel application procedure did not significantly alter operative time, weight loss, or abdominal adhesion severity, however abdominal adhesion score was significantly higher for mice in which gels were applied as contact (Fig 1c).

Conclusions: Electroadhesion induces strong adhesion of the gel to injured intestine for at least 6 days with equivalent healing outcomes and without adversely impacting procedural time, abdominal adhesion formation, or mortality in this model. A larger cecal enterotomy may elicit a more significant benefit. In non-survival and ex-vivo trials, gels adhered strongly to cut surfaces of liver, aorta, cornea, lung, cartilage, dermis, and intestine. Future work will aim to expand the application of electroadhesion as a surgical tool.

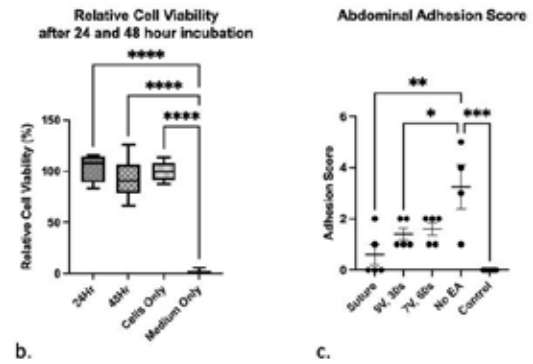


Figure 1. (a) Electroadhesion set-up for repairing a mouse cecal enterotomy with a hydrogel patch and electric fields. A 1.5mm enterotomy was created and covered with a 1mm thick and 5mm diameter QDM hydrogel patch. EF was applied using an external voltage generator and silver electrodes. (b) Relative cell viability (%) of L929 mouse fibroblasts incubated for 24- or 48- hours with QDM hydrogel versus cells incubated alone as determined by relative absorbance at 450 nm using a WST-8 cell proliferation assay. (c) Abdominal adhesion score assessed on postoperative day 6. 0 = No adhesions, 1 = Loose adhesions, no sharp dissection required, 2 = <50% of adhesions require sharp dissection, 3 = >50% of adhesions require sharp dissection, 4 = serosal injury, 5 = full-thickness injury. (*= p<0.05, ** = p<0.005, *** = p<0.001, **** = p<0.0001).

QS 8**DO BLINDED TEMPORARY GASTRIC STIMULATION TRIALS IMPROVE PATIENT SELECTION FOR PERMANENT IMPLANT?**

Andrea Gongora, BS¹, Christel Gharby, BS¹, Madison Wnuk¹, Saleem Islam, MBBS, MPH²

¹University of Florida, Gainesville, FL, USA, ²The Aga Khan University, Karachi, Sindh, Pakistan

Purpose: Gastric electrical stimulation (GES) has been shown to improve symptoms in children with gastroparesis (GP). Trials with temporary gastric stimulation (tGES) guide selection for permanent implantation; however, there remains a number of non-responders and early failures who require explant within 6 months. This study reports our experience on patient selection with blinding patients during their tGES trial as the stimulator is switched between ON and OFF settings.

Methods: A cohort study was conducted on patients aged 4-26 who underwent blinded (B) and nonblinded (NB) tGES for gastroparesis from January 2014 to April 2022. Both endoscopic and trans gastrostomy tGES were included. Blinded cases began the trial as either ON or OFF and then crossed over. Gastroparesis cardinal symptom index (GCSI), nutritional intake, and permanent stimulator implant outcomes were measured and compared between the groups using Fisher's exact test.

Results: A total of 84 patients underwent tGES of which 57 were NB and 27 B. There were no differences in age, gender, race, or insurance status. Table 1 shows the differences in severity, duration, comorbid conditions, and others. Of the NB, 55 (96.5%) had improved GCSI, of whom 49 (86%) underwent permanent implantation. In the blinded group, 14 (51.9%) were improved when ON and worse when OFF (concordant), while the others had either discordant or no response to the ON/OFF phase. 12/27 (44.4%) blinded cases were implanted. Early failures were noted in 1/12 blinded vs. 9/49 in NB cases.

Conclusions: Overall, GES remained an effective therapy for severe gastroparesis in our experience. Blinded temporary gastric electrical stimulation trials allowed better patient selection for those with concordant responses, and therefore, resulted in lower implant rates and fewer early failures. Long-term outcomes of blinded patients who received a permanent implant need to be further studied.

	Non-Blinded (n=57)	Blinded (n=27)	P value
Average Age (yrs)	15.37	14.96	0.78
Average Symptom Duration (yrs)	4.25	3.09	0.17
Comorbidities (n)	34	17	0.78
Average Baseline GCSI	17.02	15.62	0.15
Average tGES GCSI (ON)	5.81	7.04	0.313
Increased Appetite (n)	33	13	0.48
Improved to PO Intake (n)	23	7	0.103
Permanent Implant (n)	49	12	< 0.0001
Implants Removed (n)	9	1	0.67

Table 1: Blinded vs. Non Blinded

QS 9

NOVEL SECUREMENT METHOD FOR EXTERNAL TUNNELED CENTRAL VENOUS ACCESS DEVICES

Nicole A. Becher, MD¹, Tyler Mironuck², Bryan Norman³, Christopher Seighman³, Josh Eng-Morris³, Gabe Chapel³, Genevieve Kierulf⁴, Steven L. Moulton, MD⁵

¹*Division of Pediatric Surgery, Children's Hospital Colorado, University of Colorado School of Medicine, Denver, CO, USA,* ²*EZaLife, Aurora, CO, USA,* ³*University of Colorado, Aurora, CO, USA,* ⁴*Division of Pediatric Surgery, Children's Hospital Colorado, University of Colorado School of Medicine, Aurora, CO, USA,* ⁵*Children's Hospital Colorado, Aurora, CO, USA*

Background: External tunneled central venous access devices (CVAD) play an essential role in the management of many patients with acute and chronic illnesses. Unfortunately, current dressings and securement methods do not adequately protect patients from catheter fracture and bloodstream infections, nor do they safeguard from inadvertent dislodgement, all of which can result in catheter failure prior to completion of therapy. This universal problem provided an opportunity for innovation, with the aim to develop a simple yet comfortable securement device for external tunneled CVADs.

Methods: In 2019, a pediatric surgeon and a small team of graduate engineering students outlined the problem, created a list of design requirements, and began to iterate on a variety of device designs.

Results: Many design ideas were discussed and the best were presented to a small group of oncology nurses, who are intimately involved in central line care. A first-generation prototype featured a base layer with a skin friendly adhesive, a central wrapping post to absorb tensile forces applied to the catheter, a lid with a living hinge, and a clip to hold the venous port (Figure 1). Testing confirmed that wrapping any size catheter (2.7 Fr – 12 Fr.) will not restrict flow. Design changes included a soft, polymeric lid to prevent pinching of the catheter, and a unique D-shaped wrapping post to securely attach the lid to the base layer and obviate a choking hazard (Figure 2).

Conclusions: A securement device for external tunneled CVADs was created to work with existing exit site dressings to reduce catheter fracture, infection, and accidental dislodgement. A randomized controlled clinical trial comparing use of the securement device to standard-of-care clear plastic dressings is planned for mid-2023.



Figure 1: First Generation Prototype

Figure 2: Second Generation Prototype

QS 10

Abdulaziz Alhammad, Mana Almuhaideb, Sarah Aljazaeri, Ahmed Alyahya, Ayman Aljazaeri, MD

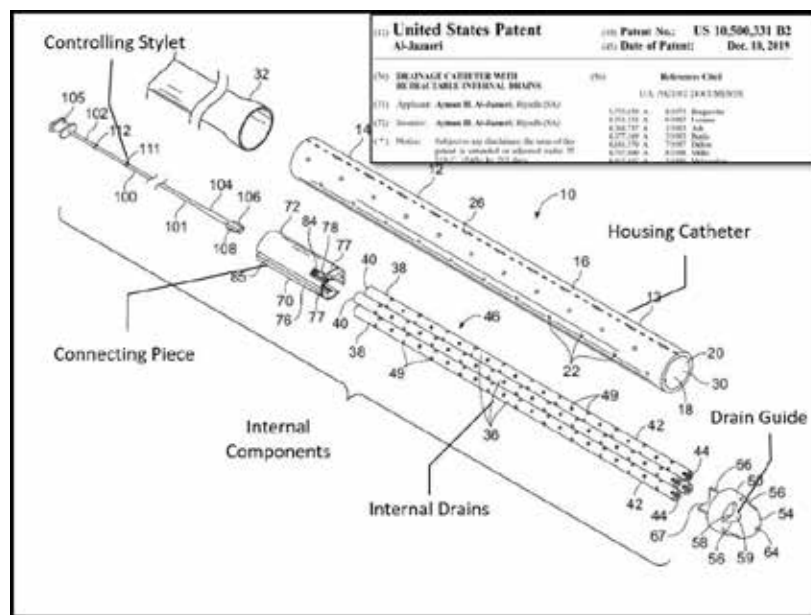
King Saud University, Riyadh, Ar Riyad, Saudi Arabia

Purpose: Implanted draining catheters failure is a frequent problem that might have serious health impactions. We evaluated the drainage capabilities and resistance to clogging of our novel remotely deployed multi-pod catheter (MPC) using an in vitro model.

Methodology: The MPC comprises a large drainage catheter housing multiple smaller catheters that can be retracted (MPC-R) and deployed (MPC-D) once placed within the targeted body cavity. The drainage capabilities of the design are evaluated by placing the MPC in a bag filled with either a non-clogging medium (H₂O) or a clogging medium. The results are then compared to matched-size single-lumen catheters with either a close (CTC) or open-tip (OTC). Each catheter type underwent five test runs in both mediums, and the results means were calculated. Measured outcomes included drainage rate, maximum drained volume (MaxDV), and time to drain the first 200 mL (TTD200).

Results: In a non-clogging medium, most catheters achieved similar drainage capabilities. However, MPC-D had a slightly higher MaxDV than the MPC-R (978.4 vs. 963 mL, P=0.03), a higher flow rate than the CTC and MPC-R (188.58: vs. 155.86 and vs. 166.78 mL/s; P=0.001 and 0.015, respectively). Moreover, MPC-D needed less TTD200 than the MPC-R (53.2 vs. 58.4 s, P=0.025). In a clogging medium, MPC-D had a remarkably higher MaxDV than the CTC and OTC (314: vs. 247.2 and 94.8 mL; P=0.032 and 0.008, respectively), a higher flow rate (57.28: vs. 19.34 and 30.26 mL/s, P=0.001 and 0.014, respectively), and a faster TTD200 than CTC (82.2 vs. 546 s; P=0.009). However, no significant difference was found when all the above parameters were compared to MPC-R.

Conclusion: The new catheter design may offer superior drainage capabilities compared to the widely used single-lumen control when placed in the clogging medium. Further testing might be required to simulate other realistic clinical scenarios.



QS 11**TRENDS AND SATISFACTION OF TELEMEDICINE UTILIZATION FOR PEDIATRIC SURGICAL CLINIC VISITS THROUGHOUT THE COVID-19 PANDEMIC**

Walker D. Short, MD¹, Oluyinka O. Olutoye, MD, MPH¹, Steven Mehl, MD², Rachel Brock³, Ekene Onwuka, MD, MS⁴, Kristy Rialon, MD⁵, Lily S. Cheng, MD¹, Alice King, MD³, Sundeep G. Keswani, MD¹

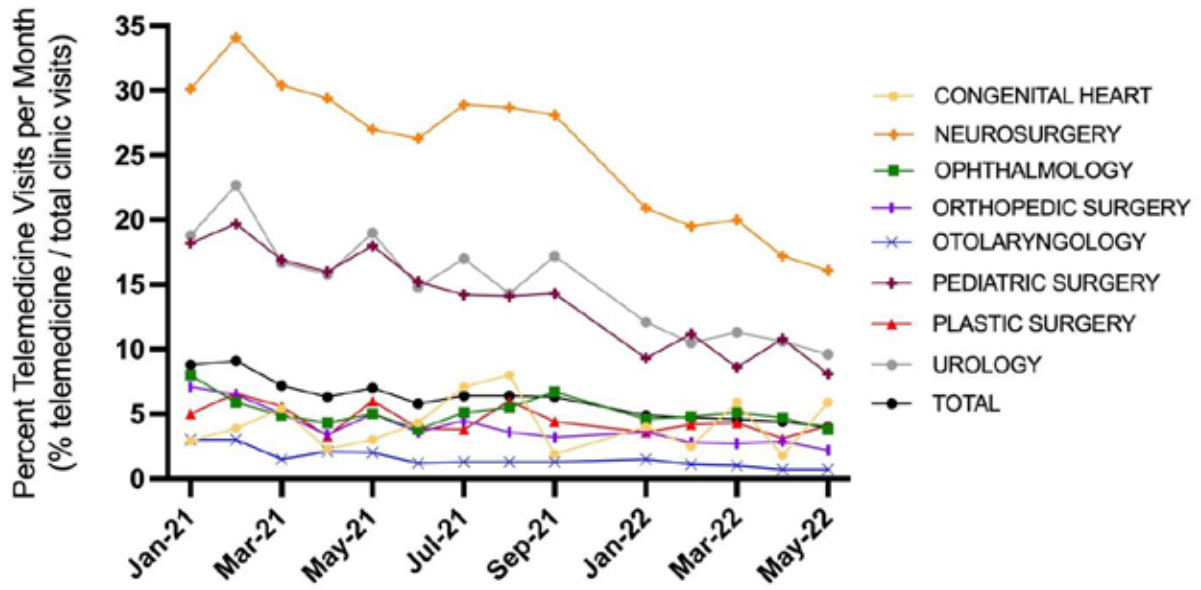
¹Baylor College of Medicine/Texas Children's Hospital, Houston, TX, USA, ²Division of Pediatric Surgery, Department of Surgery, Texas Children's Hospital, Houston, TX, USA, ³Texas Children's Hospital, Houston, TX, USA, ⁴Texas Children's Hospital & Baylor College of Medicine, Houston, TX, USA, ⁵Baylor College of Medicine, Houston, TX, USA

Purpose: The COVID-19 pandemic provided substantial opportunities for the adoption of telemedicine. However, the impact of telemedicine on surgical care in the pediatric patient population has been inadequately characterized. This study aims to: 1) assess the efficacy of telemedicine, 2) compare the adoption of telemedicine by various pediatric surgical specialties.

Methods: Data was extracted from the medical records of patients who received a surgical clinic visit at a tertiary pediatric center from January 2019 to May 2022. Press Ganey satisfaction scores were compared between in-person and telemedicine visits. Scores were characterized as satisfied (good, very good) or not satisfied (very poor, poor, fair). Univariate analysis was performed using 2-sample t-test or Fisher's Chi-squared test. The number of patients seen monthly by various surgical subspecialties via each modality was extracted from hospital administrative reports.

Results: There were 265,586 surgical clinic visits over the time period queried. Of these, 24,356 (9.2%) were telemedicine visits. Pediatric general surgery, urology, and neurosurgery had the highest mean rates of telemedicine utilization (13.9%, 15.0%, and 25.5%, respectively) while otolaryngology, orthopedic surgery, and congenital heart surgery had the lowest rates (1.6%, 4.0%, and 4.2%, respectively). Telemedicine patients reported greater satisfaction with providers and greater likelihood of recommending their provider; however, over the course of the pandemic, the utilization of telemedicine visits has declined. Since the COVID-19 vaccine was made publicly available in January 2021, the percent of telemedicine visits had decreased by more than half (Figure 1) while total number of clinic visits per month has remained relatively unchanged (18,828±1,722).

Conclusions: Utilization of telemedicine has decreased since the peak of the COVID-19 pandemic, despite high patient satisfaction with this modality. Telemedicine may still be impactful in serving select patient populations and further study may help shape hospital policy regarding the continuation of telemedicine services beyond the pandemic.



QS 12**FACTORS AFFECTING EXTENDED LENGTH OF STAY IN THE PEDIATRIC PATIENT**

Michelle C. Coughlin, MD¹, Elika Ridelman, PhD², Christina M. Shanti, M.D.³

¹Wayne State Medical University/ Children's Hospital of Michigan/ Detroit Medical Center, Detroit, MI, USA, ²Wayne State University/ Children's Hospital of Michigan/ Detroit Medical Center, Detroit, MI, USA, ³Wayne State University/ Children's Hospital of Michigan, Detroit, MI, USA

Background: The Center for Medicare and Medicaid Services (CMS) predicts the hospital length-of-stay (LOS) for pediatric patients using adult diagnostic-related group (DRG) codes. Studies have looked at clinical factors that influence LOS, but not factors related to CMS predictions and DRG codes. The purpose of this study is to identify all factors affecting LOS in pediatric patients to better understand and address them.

Methods: We conducted a retrospective review of admissions between January-2018 and December-2020 to our academic pediatric hospital where CMS-predicted LOS was exceeded. Data was analyzed to compare surgical and medical admissions with significance given for $p < 0.05$.

Results: 6985 included admissions exceeded LOS by 53596 days. Significant differences were seen between the surgical and medical admissions. 71.6% of admissions had chronic medical/congenital conditions. Surgical patients had more congenital malformations, while medical patients had more chronic diseases. We identified three main categories of factors that resulted in extended LOS: 1. clinical care related factors 2. errors in coding by our billing department and 3. adult-specific DRGs applied to pediatric patients. Example subgroups can be seen in Table 1. Extended LOS in surgical subgroups revealed different opportunities for improvement. For patients with intestinal failure admitted with line sepsis we developed an improved treatment algorithm. Burn patients who underwent skin grafting were coded as non-grafted. We reviewed with hospital billing department these errors provided education. In trauma patients, 33.1% of those exceeding CMS LOS had CPS involvement illustrating factors not represented in DRG coding.

Conclusions: We conclude no one solution will address how to shorten LOS. We identified multiple factors associated with extended hospital stays within subgroups, which we have used to revise treatment plans. We have also found a need for improved hospital coding, and recommend that CMS revise DRG codes and LOS predictions to be specific to pediatric patients.

Subgroup	Number of admissions	Number of Patients	Number of exceeded Days total*	Admissions/patient	Exceeded Days/ Patients
Trauma					
-Burn	104	103	830.6	1.0	8.1
-NonBurn	182	182	1315.4	1.0	7.2
General					
-Laparoscopic	222	218	1570.8	1.0	7.2
-Thoracic	42	40	537.8	1.1	13.4
-Other	342	317	6788.7	1.1	21.4
Transplant	79	51	1129.3	1.5	22.1
Cardiovascular	297	261	9515.7	1.1	36.5
Short Bowel Syndrome	148	32	1172.2	4.6	36.6
Sickle Cell Crisis	547	242	1388.2	2.3	5.7
Cystic Fibrosis Exacerbation	68	29	501	2.3	17.3
Cancer Treatment	369	129	2841	2.9	22.0
Neonatal	258	258	3916.8	1.0	15.18

Sample Surgical and Medical subgroups for Admissions Exceeding CMS LOS Predictions

Table 1: Sample comparison of the 16 surgical (shaded gray) and 13 medical (non-shaded) subgroups for admissions exceeding CMS LOS predictions

*The 2721 surgical admissions resulted in 33768 exceeded days total and the 4264 medical admissions resulted in 19828 exceeded days.

QS 13**IMPROVING THE PEDIATRIC PERI-PROCEDURAL EXPERIENCE: WHAT THE FAMILY WANTS US TO KNOW**

Maximilian A. Selbst, BA¹, Nutan B. Hebballi, BDS, MPH², Claire Egan, RN³, Alisha Godfrey, RN³, Laura Crain, CCLS³, KuoJen Tsao, MD⁴, Amy D. Graham-Carlson, MD⁴, Akemi L. Kawaguchi, MD⁵

¹McGovern Medical School at the University of Texas Health Science Center at Houston, HOUSTON, TX, USA, ²McGovern Medical School at the University of Texas at Houston (UTHealth), Houston, TX, USA, ³Children's Memorial Hermann Hospital, Houston, TX, USA, ⁴McGovern Medical School at the University of Texas Health Science Center at Houston, Houston, TX, USA, ⁵McGovern Medical School at The University of Texas at Houston (UTHealth)

Abstract: Engaging parents and families can help improve their healthcare experience and patient safety. Our Pediatric Procedural Parent Advisory Council recommended that parents/guardians be asked to provide personalized input that could improve the peri-procedural experience for their children. We describe a program with a written pre-procedural tool that allows healthcare providers to utilize pre-preprocedural parental input.

Methods: A retrospective review of these pre-procedural tools (in English & Spanish) completed by parents/guardians of pediatric patients (< 18 years) was conducted between April 2021-July 2022 at a tertiary children's hospital. A multidisciplinary team of parents, pediatric surgeons, anesthesiologists, child life specialists, and nurses designed a tool for parents to describe previous anesthetic experiences, nicknames, feelings about the procedure, things to ask the patient about, things to do, and things to avoid. Two team members independently coded the responses for the six open-ended statements and thematic and descriptive analyses were performed.

Results: For the 1005 collected forms, the mean patient age was 6.9 ± 6.5 years, with 55% male patients, and 89% were completed in English. Parents/guardians reported that 26% of the patients preferred a nickname, while 48% reported that their child was scared/anxious and 24% were happy about the upcoming procedure. A total of 54% of patients had previous anesthesia experience, which had made the patient feel tired (59%), confused (29%), scared (19%), angry (16%), nauseated (16%), other (14%), silly (13%), sad (10%), and happy (8%). Themes included patient emotions, distraction/comforting techniques, things that scare/aggravate the patient, behavioral details, pain management, and additional medical and non-medical information. (Table 1)

Conclusion: Parents/guardians can provide useful, personalized patient information that is unavailable in the medical record, but can help healthcare providers deliver both safer care and a better patient experience. Parental/guardian insight into their child is valuable and should be included in patient care.

Theme	n	%	Example
Additional medical information	208	36	"She has probable Ehlers Danlos. Some anesthetics (especially local) don't work as well. Excessive use of seizure meds can cause suicidal ideations. Be careful with bright lights and loud noises - cause seizures."
Things that comfort the patient	191	33	"Just let her know Mommy and daddy are outside waiting to see her soon as possible. She loves Encanto, favorite characters Mirabel and Isabela. Music possible? She pretends to create flowers out of thin air."
Behavioral information	164	28	"If she starts to get angry, just give her a minute to calm down, without touching her. She will head bang if she gets angry."
Pain information	111	19	"She will let you know how she is feeling if she is uncomfortable, in pain, please listen to her, look at her facial expressions and sound of her cry, sometimes it will be a cry or a moan. She is nonverbal and need us all to advocate for her."
Things that scare/aggravate the patient	90	15	"He does not deal well away from us upon awakening."
Additional non-medical information	47	8	"2 Dads, fussy when hungry."

Table 1. Statement "It May Help You To Know:" (N=582 Responses) Thematic Analysis

QS 14

DATA DRIVEN METHODOLOGY TO DECREASE PREFERENCE CARD WASTE: A QUALITY IMPROVEMENT INITIATIVE

Brittany Levy, MD¹, David Worhunsky², Julia Hay, PharmD¹, Emily Eichinger, PharmD¹, Christopher DeSimone, MD¹, Andrew M. Harris, MD¹

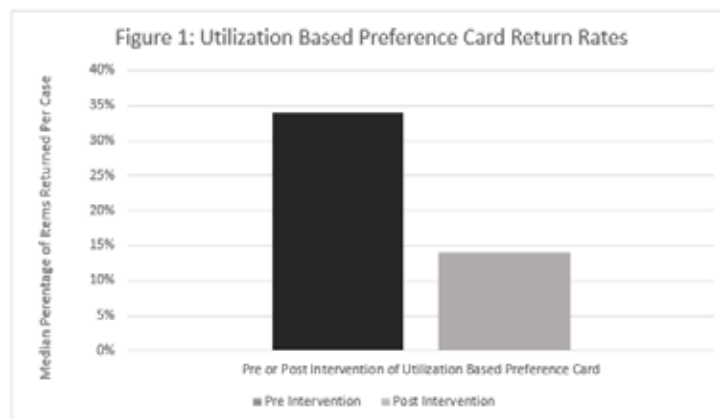
¹University of Kentucky, Lexington, KY, USA, ²University of Kentucky, Kentucky Children's Hospital

Purpose: The purpose of this quality improvement initiative is to create a data driven, utilization-based preference card, with the goal of reducing operating room item return rates and operative costs.

Methods: This initiative commenced at a quaternary care, academic medical center from 1/2022-9/2022 as a pilot study. A listing of opened supplies during each laparoscopic appendectomy, by a single surgeon, over a 6-month period was obtained. The percentage of utilization for each item was calculated to identify high utilization and low utilization items. A multidisciplinary collaboration compared the existing preference card to the utilization-based preference card, to identify which low utilization items should be removed. Items easily retrieved from room stock, or within nearby sterile cores were deemed appropriate for removal. Items unable to obtain quickly, remained on the preference card to retain patient safety, despite low utilization. Following the intervention, supply records were queried for the following 1 month to determine return rates. Cost savings were modeled by accounting for the reduction in time to obtain items on the preference card for the selected case over 1 year.

Results: Pre intervention, 32 laparoscopic appendectomies, over 6 months, were analyzed. The preference card originally contained 44 items, 4 of which were used in less than 20% of cases and 6 in 20-40% of cases. Overall, the pre intervention median return rate was 34% (range=14-55%). Collaboratively, 8 items were removed from the preference card. Post intervention, the preference card included 36 items and the return rate reduced to 14%. (Figure 1) The 18% reduction in preference card items conferred an estimated \$4,789.30 cost savings annually, for a single surgeon in one procedure.

Conclusion: We conclude, utilization-based preference cards provide a data driven strategy for preference card revision and maintenance, conferring reduced waste, reduced returns, and reduced operating room procedural costs.



QS 15**DEVELOPMENT AND IMPLEMENTATION OF AN ADD-ON CASE DELAY DASHBOARD FOR QUALITY IMPROVEMENT IN A CHILDREN'S OPERATING ROOM**

Pooja S. Salvi, MD¹, David H. Stitelman, MD², Emily R. Christison-Lagay, MD², Daniel G. Solomon, MD²

¹New York Presbyterian- Weill Cornell, New York, NY, USA, ²Yale School of Medicine, Department of Pediatric Surgery, New Haven, CT, USA

Purpose: Delays in the amount of time between when an add-on case is booked and when the operation is started can represent significant impediments to providing appropriate and timely care as well as adversely effect the experience of patients and their families as well as the quality of life of operating room staff. In an effort to perform continuous quality improvement, we developed a real-time tool to measure and report the time from case booking to case initiation with the aim of improving the efficiency and equity to add-on case delays.

Methods: The Joint Data and Analytics Team (JDAT) within an academic children's hospital within a hospital utilized data from the hospital EMR to create a widely distributed dashboard that presented add-on case delays. The dashboard was searchable and sortable not only based on standard factors such as case acuity and time and date, but also on demographic factors important to DEI including patient race and payor status and surgeon gender. This data was reviewed regularly by the children's hospital quality and safety committee.

Results: As expected, case acuity is the strongest predictor of the time between case booking and start time. Case delays were agnostic of patient race and payor status. (Table 1). Case delays continuously increase to a total of 23 minutes as the booking time approached change of shift . Female surgeons' cases started on average 17 minutes faster than their male colleagues (173 vs 190 min, p=0.11).

Conclusion: Utilization of an Add-On Case Delay dashboard allows for identification of targets of key drivers for rapid PDSA cycles for quality improvement, as well as allows for frequent and rapid monitoring to guard against health care disparities. This is an efficient and low cost tool for children's hospital's quality infrastructure.

Variable	Univariate regression coefficient	p-value	Multivariate regression coefficient	p-value
Age	1.7 (0.60, 2.81)	p = 0.002	0.59 (-0.5, 1.6)	p = 0.27
Race				
Non-Hispanic White	REF		REF	
Non-Hispanic Black	-2.3 (-21.8, 17.2)	p = 0.82	11.3 (-6.9, 29.5)	p = 0.22
Hispanic	7.28 (-8.4, 22.9)	p = 0.36	3.1 (-13.1, 19.3)	p = 0.71
Asian	9.7 (-26.7, 46.2)	p = 0.60	-6.8 (-38.8, 25.2)	p = 0.68
Other	-12.6 (-46.8, 21.6)	p = 0.47	-4.4 (-35.1, 26.3)	p = 0.78
Insurance Payor				
Medicaid	REF		REF	
Commercial	-9.3 (-23.1, 4.5)	p = 0.19	-7.7 (-21.6, 6.3)	p = 0.28
Other	15.9 (-14.8, 46.6)	p = 0.31	-10.7 (-38.2, 16.7)	p = 0.44
Case booking urgency				
Level 1 - Now	REF		REF	
Level 2 - Within 2 hours	119 (97, 141)	p < 0.001	99.7 (77.6, 121.8)	p < 0.001
Level 3 - Within 4 hours	238 (216, 260)	p < 0.001	224.8 (202.7, 247.0)	p < 0.001
Level 4 - Within 24 hours	230 (202, 258)	p < 0.001	230.2 (202.4, 257.9)	p < 0.001

Impact of Patient and Case Variables on Time From Booking to Case Start

QS 16**IMPLEMENTING AN MRI PROTOCOL FOR THE EVALUATION OF PEDIATRIC POST-APPENDECTOMY ABSCESS: A QUALITY IMPROVEMENT PROJECT**

Alicia C. Greene, DO¹, Marc M. Mankarious, MD², Akshilkumar Patel, MD², Madeline Matzelle-Zywicki, BS³, Lilia M. Reyes, MD⁴, Anthony Tsai, MD⁵, Mary Santos, MD, Michael M. Moore, MD⁴, Afif N. Kulaylat, MD, MSc⁶

¹Penn State Hershey Medical Center, Harrisburg, PA, USA, ²Penn State Hershey Medical Center, Hershey, PA, USA, ³Penn State University College of Medicine, Hershey, PA, USA, ⁴Penn State Children's Hospital, Hershey, PA, USA, ⁵Division of Pediatric Surgery, Penn State Children's Hospital, Hershey, PA, USA, ⁶Division of Pediatric Surgery, Penn State Children's Hospital, Hershey, PA, USA

Purpose: CT scans are often used when cross-axial imaging is required in the evaluation of post-appendectomy abscess. Our aim was to decrease the use of CT scans in pediatric post-appendectomy patients by 50% in 12 months and to sustain those results for one year.

Methods: An MRI protocol was introduced in 2018 at a tertiary children's hospital to replace CT scans in suspected pediatric post-appendectomy abscess. Patients with prior imaging from referring hospitals were excluded. Patient characteristics and clinical parameters were compared pre-(2014-2017) and post-(2018-2022) protocol implementation using standard univariate statistics. $P < 0.05$ was considered significant. QI methodology was used to design and implement the protocol.

Results: Patient characteristics and rates of perforated appendicitis were similar in both periods. While less abscesses were described in the post-protocol period (67% vs. 89%, $p=0.03$), drainage results, length of stay, ED visits, and re-operative rates were comparable between groups. There were no missed abscesses in the pre-implementation period. There were two missed abscesses in the post-implementation period, one by MRI (3.7% of MRIs) and one by CT (7.7% of CTs), both identified subsequently with the alternative imaging modality. Time to scan was longer in the post-implementation period (MRI-specific median 198 minutes vs. CT-specific median 108 minutes). Overall, 96% of patients ($n=27$) received CT scans in the pre-implementation period compared to 31% ($n=13$) in the post-implementation period. However, in the first year of protocol implementation, CT scan use only decreased to 78% of cross-axial studies performed. The majority of protocol deviations (54%, $n=7$) also occurred in this time period, primarily due to provider unfamiliarity with protocol. With improved education and reinforcement, CT scan utilization decreased to approximately 25% of cross-axial studies annually.

Conclusions: Implementation of a post-appendectomy abscess MRI protocol decreased CT utilization in the pediatric population with comparable clinical outcomes.

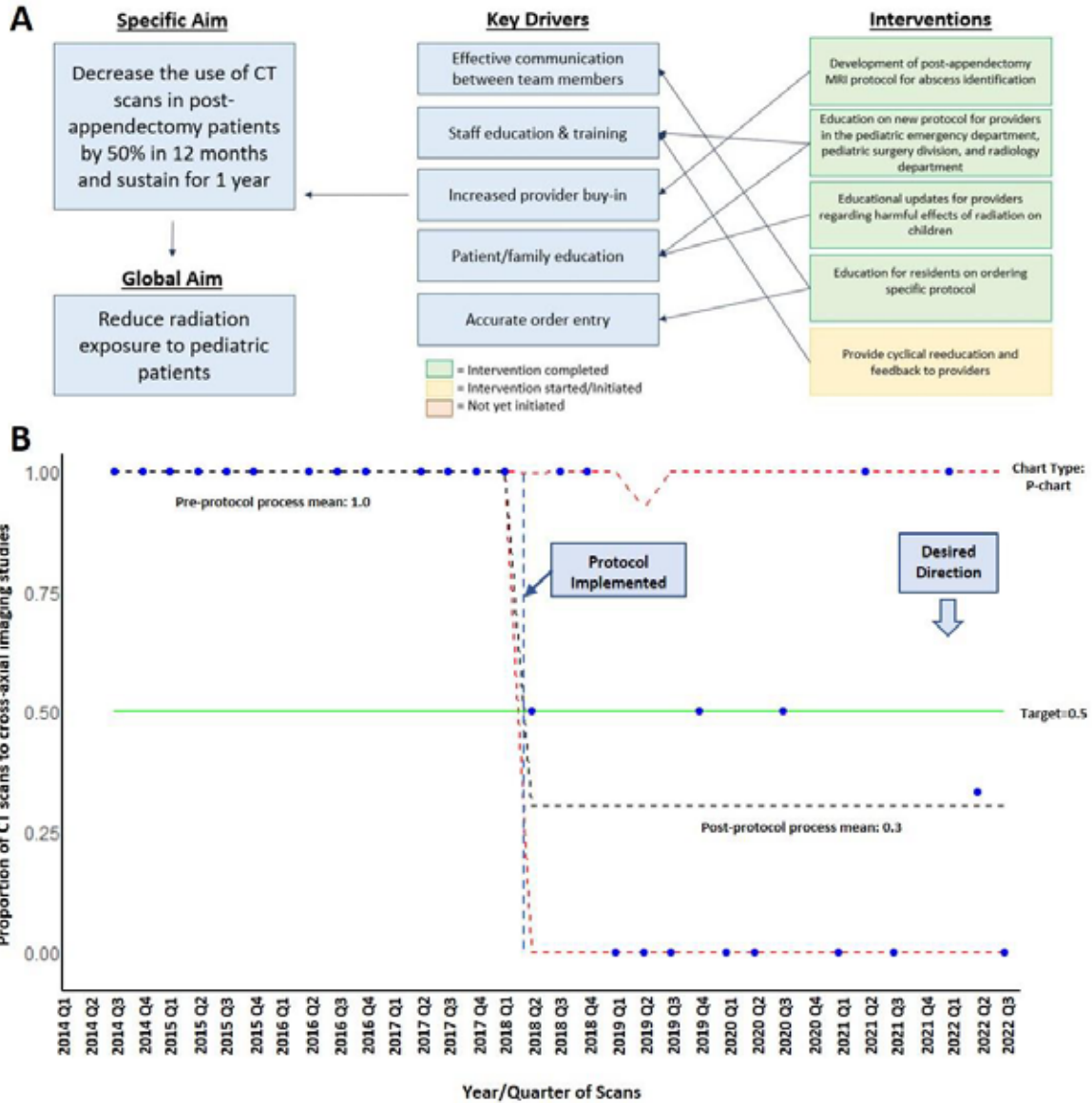


Figure 1. Quality Improvement Tools. A: Key Driver Diagram. B: Control Chart (P-chart) demonstrating CT scan utilization as a proportion of total cross-axial imaging studies.

QS 17

IMPLEMENTATION OF STANDARDIZED CAREGIVER EDUCATION WITH PHOTOS OF EXPECTED HEALING REDUCES HEALTHCARE UTILIZATION FOLLOWING PLASTIBELL CIRCUMCISION

Gerard R. Martusciello, MPA¹, Gwyneth A. Sullivan, MD, MS², Nathaniel Koo, MD¹, Srikumar Pillai, MD¹, Mary Beth Madonna, MD³, Ami Shah, MD³, Brian C. Gulack, MD, MHS¹

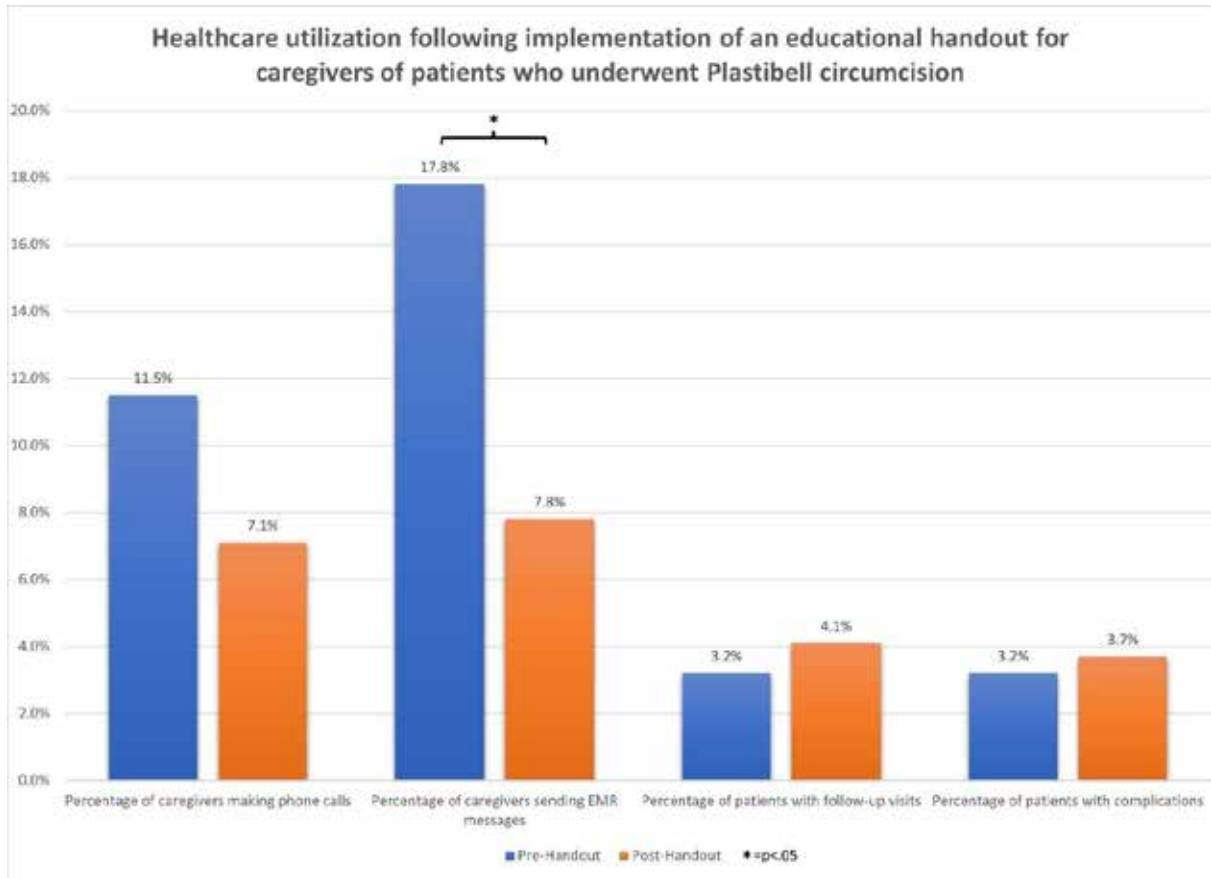
¹Rush University Medical Center, Chicago, IL, USA, ²Division of Pediatric Surgery, Northwestern University Feinberg School of Medicine, Ann & Robert H. Lurie Children's Hospital; Division of Pediatric Surgery, Rush University Medical Center, Chicago, IL, USA, ³Division of Pediatric Surgery, Department of Surgery, Rush University Medical Center, Chicago, IL, USA

Purpose:Plastibell circumcisions can cause high levels of caregiver anxiety regarding healing of the circumcision site, which may increase post-procedure communications and visits. Providing educational materials that describe the post-procedural course may help to reduce these encounters. Our aim was to create and implement a post Plastibell circumcision caregiver handout including photos of expected healing and measure post-procedure healthcare utilization.

Methods: All patients who underwent an outpatient Plastibell circumcision at a single academic institution between 04/2021 – 03/2022 were included. A handout was developed that provided information about the Plastibell device, how to care for the surgical site, when to follow up, and pictures demonstrating expected healing by day. Caregivers received the handout beginning 10/2021. Measures of healthcare utilization included electronic medical record (EMR) messages, phone calls, and follow-up visits. Post-procedure healthcare utilization was compared between patient records during the six months prior to (n=314) and following (n=295) implementation. Complications were followed as a balancing measure. Over a one month-period post implementation, all caregivers of children who underwent circumcision (n=46) were invited to be interviewed regarding the educational materials. Chi-squared test was used to compare outcomes (significance: p<.05).

Results: Following implementation, the percentage of caregivers sending EMR messages significantly decreased (7.8% vs 17.8%, p<.001). The percentage of patients who called (7.1% vs 11.5%, p=0.09) and required follow-up visits (4.1% vs 3.2%, p=0.73) was not significantly different. The overall complication rate was unchanged (3.7% vs 3.2% p=0.88). Thirteen semi-structured interviews among the 46 caregivers contacted (28.3%) were completed. Most (n=12, 92.3%) found the materials informative and helpful, particularly the included images.

Conclusion: Education materials that included photographic images of expected healing following Plastibell circumcision were effective in reducing healthcare utilization. Development of materials focused on the expected post-procedural course should be considered following other surgical procedures.



QS 18**IMPACT OF LINGUISTIC MINORITY STATUS AND INTERPRETER USE ON PEDIATRIC SURGICAL OUTCOMES**

Hannah Cockrell, MD, Dwight Barry, PhD, André Dick, MD MPH, Sarah Greenberg, MD MPH
Seattle Children's Hospital, Seattle, WA, USA

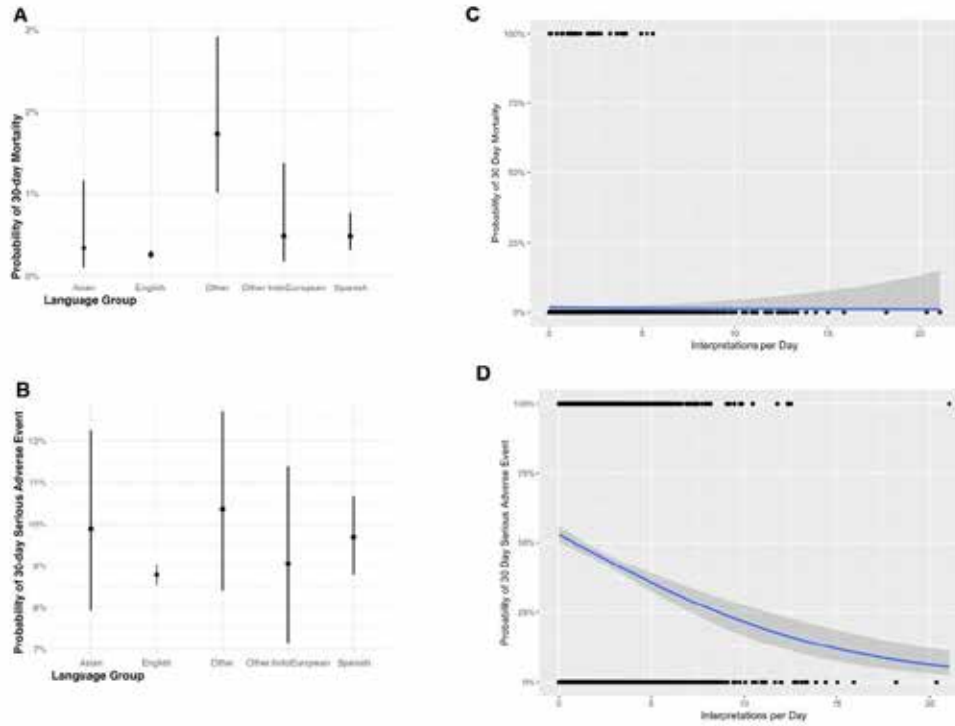
Purpose: We aimed to evaluate the impact of linguistic minority status and interpreter use on pediatric surgical outcomes.

Methods: We performed a single-institution retrospective cohort study of patients 0-21 years who underwent surgery between 1/1/2016-12/31/2020. Outcomes were 30-day postoperative mortality and serious adverse events (SAE). 95 languages spoken by our patient cohort were grouped for analysis. Logistic regression assessed the effects of language and interpreter use. Deviation contrasts avoided centering non-Hispanic white English speakers as the referent. All-pairs comparisons determined differences between language groups.

Results: Of 56,655 patients, 89% spoke English, 7% Spanish, 1.3% Asian languages, 1.3% Other Indo-European languages, and 1.4% Other languages. Incidence of 30-day postoperative mortality and SAE was 0.3% and 8.9%. English speakers had 51% decreased odds of mortality (OR 0.49, 95% CI: 0.35, 0.75). Other language speakers experienced 242% increased odds of mortality (OR 3.42, 95% CI: 1.94, 5.93). English speakers had significantly decreased odds of mortality when compared to Other language speakers (OR 0.14, 95% CI: 0.74, 0.28), and Spanish speakers had significantly higher odds of mortality compared to English speakers (OR 1.92, 95% CI: 1.08, 3.44). On univariable regression, English speakers had 9% decreased odds of SAE (OR 0.91, 95% CI: 0.84, 1.00). Although Spanish, Asian language, and Other language speakers had increased odds of SAE, these results were not significant. The average number of interpreted sessions per day was 2.3 (SD 2.3). Interpreter use was associated with modest decreased odds of mortality (OR 0.92, 95% CI: 0.77, 1.05) and SAE (OR 0.89, 95% CI 0.86, 0.93).

Conclusion: Linguistic minority status was associated with significantly increased odds of postoperative mortality among pediatric surgical patients. Interpreter use had only modest protective effect. Additional inquiry into how language preference exacerbate inequities in pediatric surgical outcomes, and how to eliminate those inequities, is needed.

Predicted Probabilities of 30-day Mortality and Serious Adverse Events¹



¹ Serious adverse events were defined as cardiac arrest, sepsis, unplanned return to the operating room, and unplanned hospital readmission

QS 19**COMPLICATED APPENDICITIS READMISSIONS REDUCED FOLLOWING POSTOPERATIVE GUIDELINE AND ROUTINE INTRAOPERATIVE CULTURES: LONGITUDINAL BENEFITS OF QUALITY IMPROVEMENT**

Peter Juviler, MD¹, Marjorie J. Arca, MD², David Darcy, MD³, Michael H. Livingston, MD, MSc, FRCSC⁴, Elizabeth Levatino, BSN, RN¹, Walter Pegoli, MD⁵, Brenda Tesini, MD⁶, Sarah Verna, RDCS², Nicole A. Wilson, PhD, MD², Derek Wakeman, MD¹

¹University of Rochester, Rochester, NY, USA, ²University of Rochester | Golisano Children's Hospital, Rochester, NY, USA, ³Golisano Children's Hospital, University of Rochester Medical Center, Rochester, NY, USA, ⁴Division of Pediatric Surgery, McMaster University, Hamilton, ON, Canada, ⁵University of Rochester Department of Surgery, Rochester, NY, USA, ⁶University of Rochester

Purpose: Through quality improvement methodology, our hospital reduced the rate of postoperative surgical site infection in patients undergoing appendectomy for complicated appendicitis. We measured longitudinal effects to target continued areas of improvement. We hypothesized that decreased surgical site infection would be associated with a decrease in postoperative ED visits and readmissions.

Methods: Records for children ages 0-15 years with complicated appendicitis treated at our children's hospital were gathered from our NSQIP-Pediatric database. Our quality improvement team standardized empiric antibiotic choice (piperacillin-tazobactam) and intraoperative fluid culture as part of a clinical practice guideline for management of complicated appendicitis in December 2019. Patients from January 2018 through December 2019 in the pre-implementation group (n = 86) were compared to patients from January 2020 through June 2022 in the post-implementation group (n = 119). Chi-square and Mann-Whitney U tests were employed for analysis as appropriate (p < 0.05 considered significant).

Results: Before antibiotic standardization and practice guideline implementation, 8 (9.3%) children were readmitted to the pediatric surgical service compared to 2 (1.7%) afterwards (p = 0.012, Figure). The proportion of postoperative emergency department visits declined (15.1% vs 5.0%, p = 0.014, Figure). Reduction in postoperative organ space infection rate was maintained (22.1% vs 8.4%, p = 0.006). Parenteral antibiotics at discharge decreased (8.1% vs 0.8%, p = 0.008). Intraoperative fluid culture was obtained for 118 (99.2%) children and proportion of oral antibiotics at discharge increased (72.1% vs 90.8%, p < 0.001), consistent with guideline compliance. There was no difference in balancing measures including median length of stay (5 vs 5 days, p = 0.200) and Clostridioides difficile infection (0% vs 0%, p = 1.000).

Conclusions: Decreased postoperative readmission rate and emergency department visits associated with reduced organ space infections are longitudinal benefits from care standardization via routine intraoperative fluid culture and standard antibiotics.

Percent Complicated Appendicitis Postoperative Readmissions and ED Visits

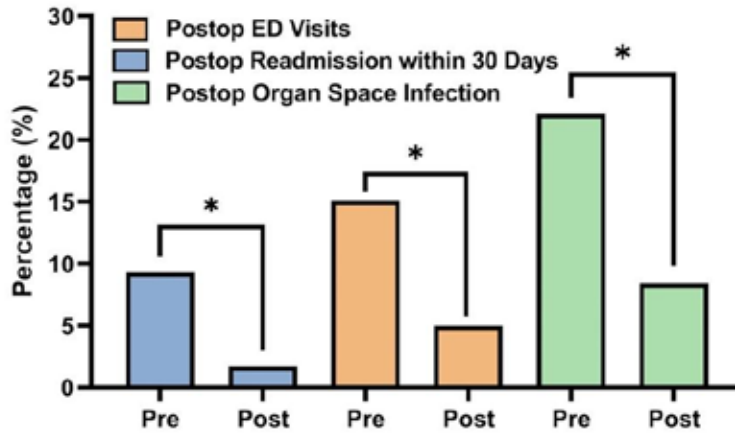


Figure. Percentage of postoperative complicated appendicitis patients with readmission, emergency department (ED) visit, and organ space infection pre- and post-implementation of clinical practice guideline and standardization of antibiotics (* indicates $p = 0.01$)

QS 20

TRACHEOBRONCHOPEXY TO AVOID TRACHEOSTOMY IN ESOPHAGEAL ATRESIA PATIENTS WITH SEVERE LIFE-THREATENING TRACHEOBRONCHOMALACIA

Hester F. Shieh, MD¹, Russell W. Jennings, MD², Thomas E. Hamilton, MD³, Shawn Izadi, MD⁴, Ali Kamran, Gary Visner⁴, Leah Frain⁴, Benjamin Zendejas, MD, MSc⁴, Charles J. Smithers, MD²

¹Johns Hopkins All Children's Hospital, St Petersburg, FL, USA, ²Johns Hopkins All Children's Hospital, St. Petersburg, FL, USA, ³Children's Hospital of Philadelphia, Philadelphia, PA, USA, ⁴Boston Children's Hospital, Boston, MA, USA

Background: Esophageal atresia (EA) is associated with tracheobronchomalacia (TBM), which in its most severe form, causes blue spells, brief resolved unexplained events (BRUEs) that can require cardiopulmonary resuscitation (CPR), and positive pressure ventilation (PPV) or ventilator dependence, often requiring tracheostomy. We study the role of tracheobronchopexy, as an alternative to tracheostomy, in EA patients with severe life-threatening TBM.

Methods: We reviewed EA patients who underwent tracheobronchopexy for blue spells, BRUEs, and failure to wean PPV or extubate from February 2013 to September 2021 at two institutions. Patient characteristics, surgical techniques, and respiratory outcomes were reviewed.

Results: 80 EA patients (male 66%; type A 2.5%, B 2.5%, C 92.5%, E 2.5%) underwent 91 tracheobronchopexies at median age 6 (IQR 3-14) months for blue spells/BRUEs (53%), PPV (21%), and ventilator dependence (26%). On preoperative dynamic bronchoscopy, most (90%) demonstrated complete airway collapse (32% with shallow breathing, 58% with cough). Surgical approach for tracheobronchopexy was posterior (73%), anterior (23%), and concomitant posterior and anterior (4%). Tracheopexy included thoracic trachea alone (58%), trachea and bronchus (41%), and bronchus alone (1%). Concomitant procedures included cervical tracheopexy (18%), posterior descending aortopexy (37%), resorbable external airway splint (4%), esophageal work (29%), and cardiac or vascular ring repair (15%). At latest follow up of median 22 (IQR 11-42.5) months, there were no recurrent blue spells/BRUEs ($p < 0.001$) and significantly reduced PPV and ventilator dependence ($p < 0.001$, Table). Nearly all patients ($n=75$, 94%) avoided tracheostomy. Mortality was 4%, one 30-day operative mortality and three long-term mortalities related to underlying comorbidities.

Conclusions: In EA patients with severe life-threatening TBM, tracheobronchopexy significantly reduces blue spells/BRUEs, PPV, and ventilator dependence, and avoids tracheostomy. This surgical strategy should be considered the treatment of choice for EA patients with severe life-threatening TBM symptoms.

	Preoperative (n=91 operations)	Postoperative at latest follow up (n=91 operations)	P value
Blue spells/BRUEs	48 (53%)	0	< 0.001*
Respiratory status - Room air	45 (49%)	77 (85%)	< 0.001*
Supplemental oxygen	3 (3%)	8 (9%)	0.12
Positive pressure ventilation	19 (21%)	1 (1%)	< 0.001*
Ventilator dependence	24 (26%)	5 (5%)	< 0.001*

Clinical Symptoms and Respiratory Status

QS 21**LONG-TERM RECURRENCE RATES AND PATIENT SATISFACTION AFTER REPAIR OF PECTUS EXCAVATUM**

Nelimar Cruz-Centeno, MD¹, James A. Fraser, MD², Shai Stewart, MD², Derek R. Marlor, MD¹, Tolu Oyetunji, MD, MPH², Shawn D. St. Peter, MD²

¹Children's Mercy Hospital, Kansas City, MO, USA, ²Children's Mercy Kansas City, Kansas City, MO, USA

Purpose: To evaluate the incidence of recurrent chest deformity after bar removal and overall patient satisfaction with the appearance of their chest after surgical correction of pectus excavatum. We hypothesize that recurrent deformities will be minimal, and patients will maintain high levels of satisfaction with long-term postoperative cosmesis.

Methods: After obtaining Institutional Review Board approval, patients who underwent pectus excavatum repair with subsequent bar removal at a single tertiary care center from January 2000 to December 2020 were identified. A total of 583 patients were included. Retrospective chart review was performed to collect data including demographics, surgery details and the need for surgical re-intervention. A telephone survey was conducted to evaluate perceived recurrence of chest wall deformity, surgeon re-evaluation, surgical re-intervention, and overall satisfaction. Data are presented as medians with interquartile ranges (IQR) and frequencies with percentages.

Results: Survey response rate was 26.2% (n=153). The respondents were predominantly male (80.4%, n=123) with a median age at surgical correction of 14.9 years (IQR 12.9,16.1) and a median Haller index of 3.8 (IQR 3.4,4.5). Median time to bar removal was 2.9 years (IQR 2.5,3.0) with a median age at removal of 17.7 years (IQR 15.5,19.0). The median time from initial surgery to survey follow-up was 9.6 years (IQR 5.0, 11.4) with respondents having a median age at follow-up of 25 years (IQR 22.0, 28.4). Overall satisfaction rate was 96.7% (n=148) with a re-intervention rate of 2.0% (n=3). Perceived recurrence rate was 30.7% (n=47) with 12.8% (n=6) of those requesting surgical re-evaluation.

Conclusion: There appears to be a high level of patient satisfaction many years after correction of pectus excavatum and bar removal. Re-intervention rate is low despite some patients reporting a perceived chest wall deformity recurrence.

Abbreviations: IQR: interquartile range

QS 22**UTILITY OF A WHITE LIGHT SCAN INDEX AS AN ALTERNATIVE TO THE HALLER INDEX IN DETERMINING NEED FOR SURGICAL CORRECTION OF PECTUS EXCAVATUM**

Michela Carter, MD¹, Suhail Zeineddin, MD, MS², J. Benjamin Pitt, MD³, Amparo Perez, MA³, Mia DeTella, BS³, Owen Lieland¹, Christine State, DHA⁴, Yao Tian, MS, MPH⁵, Marleta Reynolds, MD⁴, Hassan Ghomrawi⁴, Seth D. Goldstein, MD, MPhil³, Fizan Abdullah, MD, PhD¹

¹Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, ²Division of Pediatric Surgery, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, ³Division of Pediatric Surgery, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, ⁴Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, ⁵Surgical Outcomes Quality Improvement Center (SOQIC), Feinberg School of Medicine, Northwestern University, Chicago, IL, USA

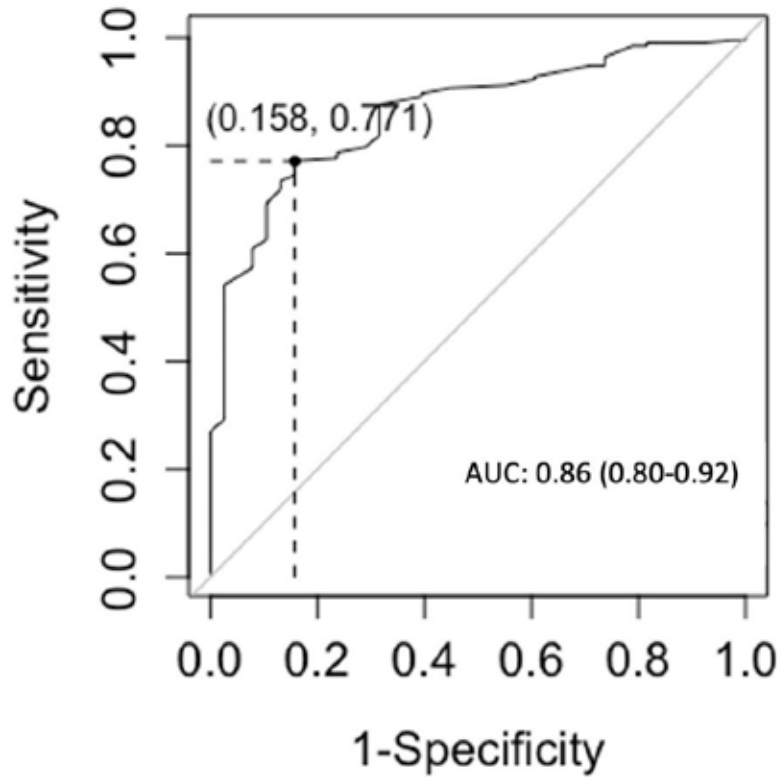
Purpose: Severity of pectus excavatum (PE) is determined by the Haller Index (HI)—a computed tomography (CT) scan delineated measure with surgical correction indicated for values ≥ 3.25 . White Light Scanning (WLS) has been proposed as a non-ionizing alternative to determine PE severity and need for surgery. We sought to evaluate the correlation between CT-derived HI and a WLS-derived index (WLSI) and to identify the WLSI value that indicates need for surgical correction.

Methods: Between 2015-2022, CT and WLS were performed for children ≤ 18 years with PE undergoing surgical evaluation at a high-volume, chest-wall deformity clinic. WLSI was determined by dividing the chest's mediolateral diameter by its anteroposterior diameter at the point of greatest deformity. Correlation between CT HI and WLSI was determined by Spearman correlation. To determine the WLSI predictive of HI ≥ 3.25 , a receiver operating characteristic (ROC) curve was generated by Youden's method.

Results: A cohort of 230 children with both CT and WLS was analyzed (mean +/- SD age 15.2 +/- 1.3 years, 86% male). Mean +/- SD for HI was 4.34 +/- 1.36 and for WLSI was 1.96 +/- 0.22. Moderate correlation was identified between HI and WLSI ($r=0.72$, $p < 0.001$) and on subset analysis correlation was greatest for males ($r=0.75$, $p < 0.001$) and younger ages (13-15 years, $r=0.75$, $p < 0.001$). ROC curve analysis determined a WLSI cut-off of 1.85 was indicative of a HI ≥ 3.25 with sensitivity of 77%, specificity of 84% and positive predictive value of 96% (AUC 0.86, 95% CI: 0.80-0.92).

Conclusions: For children with PE undergoing evaluation for surgical correction, a simple WLS-derived index ≥ 1.85 is indicative of a CT-derived HI ≥ 3.25 and need for surgical correction with 96% certainty. More sophisticated indices are in need of development, and with further research, a WLS-derived index could be an alternative to HI.

**Receiver Operating Characteristic Curve to
Determine Need for Surgical Correction of Pectus
Excavatum based on White Light Scan Index**



QS 23**PECTUS EXCAVATUM AND ITS CARDIOPULMONARY EFFECTS IN THE PEDIATRIC POPULATION**

R Scott Eldredge, MD¹, Brielle Ochoa, MD², Arash Sabati¹, Daniel J. Ostlie, MD¹, Lisa E. McMahon, MD¹, Justin Lee, MD³, David M. Notrica, MD¹, Benjamin Padilla, MD⁴

¹Phoenix Children's Hospital, Phoenix, AZ, USA, ²Phoenix Children's, Phoenix, AZ, USA, ³Phoenix Children's Hospital, Phoenix, AZ, USA, ⁴Phoenix Children's Hospital, San Francisco, CA, USA

Purpose: Pectus excavatum (PE) is characterized by depression of the sternum. The anatomical severity is measured chest by the Haller Index (HI) and Correction Index (CI). The primary aim of this study is to describe how well these indices correlate with physiologic outcomes.

Methods: We performed a retrospective review at a single tertiary chest wall referral center of patients aged ≤ 21 years with PE who had cardiopulmonary exercise testing (CPET) prior to pectus repair between 1/1/2015 to 8/31/2022. Demographics, HI, CI, and CPET data were collected. HI and CI were compared to CPET data.

Results: Of 537 patients, 84% were male. Mean age was 14.8 ± 1.8 years; and BMI was 18.2 ± 2.4 kg/m²; mean HI and CI were 5.4 ± 5.2 and $35.3 \pm 14.5\%$. 64.6% and 49.4% of patients tested had an abnormal peak VO₂/kg and O₂-pulse (< 80% predicted). Dividing the population into quartiles based on HI, the mean percent predicted peak VO₂/kg decreased from 77.3% [95% confidence interval] [74.0-80.5] in Q1 to 70.8% [68.0-73.5] in Q4 ($p < .001$). Similarly, O₂-Pulse decreased linearly from 86.1% [82.2-89.9] in Q1 to 78.2% [74.7-81.7] ($p = .029$) in Q4. The 25% of patients with BMI < 10th percentile had significantly lower percent predicted peak VO₂/kg 77.7% vs 64.2% ($p < .001$) and O₂-Pulse 86.3% vs 73.0% ($p < .001$) irrespective of HI or CI. The percentage of patients with abnormal peak VO₂/kg (not pictured) and O₂-Pulse increased significantly across HI quartiles, Figure 1. There was no relationship between HI or CI and all elements of CPET on linear regression analysis.

Conclusion: PE severity correlates with cardiopulmonary performance when HI and CI are stratified and may predict suboptimal performance as assessed by CPET. Low BMI is an independent predictor of poor CPET performance. While PE patients frequently have abnormal CPET, the relationship between indices and CPET does not appear to be strictly linear.

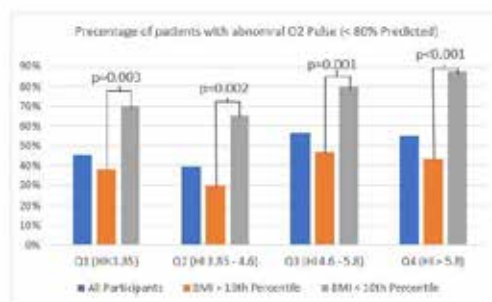


Figure 1. Percentage of patients with abnormal O₂ Pulse based on HI quartile. The quartile groups were stratified based on BMI. χ^2 analysis was performed between quartile groups; A significant difference was found between quartile groups among all participants ($p = .024$). This effect was confounded when compared between groups with BMI less than the 10th percentile and BMI greater than and equal to 10th percentile. A significant difference between BMI groups was noted in each quartile.

QS 24**VASCULAR TRAUMA IN CHILDREN: ETIOLOGY, MANAGEMENT AND OUTCOMES OF PATIENTS AT A LEVEL 1 TRAUMA CENTER**

Derrick Williams, BA¹, Krislynn Mueck, MD, MPH, MS¹, Elisa I. Garcia, BSN, RN, MPH², Joan Griffin, BS¹, Mary High, BS¹, Charles S. Cox, MD³, Mary T. Austin, MD, MPH³

¹McGovern Medical School at the University of Texas Health Science Center Houston, Houston, TX, USA, ²McGovern Medical School at the University of Texas at Houston (UTHealth), Houston, TX, USA, ³McGovern Medical School at the University of Texas Health Science Center at Houston, Houston, TX, USA

Purpose: Vascular trauma in children is relatively uncommon and therefore, poses unique challenges in this population. The purpose of this study is to evaluate the etiology, management and outcomes of pediatric vascular injuries in a Level 1 pediatric and adult trauma center.

Methods: After IRB approval, we performed a retrospective review of patients < 16 years old that underwent vascular trauma repair between 3/30/2011-6/20/2021 at our institution. The primary outcome was any complication defined as hemorrhage, occlusion/stenosis, anastomotic aneurysm, local infection, reoperation, amputation or death. Univariate analyses were performed using chi square and Wilcoxon rank sum for categorical and nonparametric continuous variables, respectively. A multivariable logistic regression was performed to identify predictors of any complication.

Results: 125 patients were included with median age=12 years (IQ range 8-15) and 76% were male. Penetrating trauma accounted for 56% of cases with accidental laceration (n=30, 24%) followed by gunshot wound (n=22, 18%) being most common. The overall complication rate was 24% and included 3 amputations (2.4%) and 7 deaths (5.6%). Truncal injury was associated with increased LOS and higher mortality (Table). The majority of repairs were open (94%); however, endovascular repair was associated with a higher complication rate (67% vs 22% for open repair, p=0.04). The time to operation, duration of operation, use of tourniquet, type of open repair, use of graft and performance of fasciotomy did not differ between those patients with and those without complications. GCS ≤ 8 was independently associated with risk of complication (OR=11.71, 95% CI 3.03-45.31, p< 0.001).

Conclusion: Although 1 in 4 patients experienced postoperative complications, the limb salvage rate was extremely high and mortality low in patients managed at a Level 1 combined pediatric and adult trauma center. This work demonstrates that these injuries while rare, can be successfully managed in centers with appropriate resources and skills.

	Trunk (N=13)	Upper Extremity (N=59)	Lower Extremity (N=47)	P Value
Any Complication	5 (38%)	11 (19%)	14 (30%)	0.304
Amputation	0 (0%)	0 (0%)	3 (6%)	0.165
Death	4 (31%)	1 (2%)	2 (4%)	< 0.001
Vascular Complications				
Limb Functional Deficit	0 (0%)	0 (0%)	0 (0%)	1.000
Local Infection	0 (0%)	3 (5%)	3 (6%)	0.747
Anastomotic Aneurysm	0 (0%)	0 (0%)	0 (0%)	1.000
Occlusion/Stenosis	0 (0%)	1 (2%)	3 (6%)	0.458
Hemorrhage	2 (15%)	1 (2%)	0 (0%)	0.013
Reoperation	2 (15%)	7 (12%)	7 (15%)	0.739
ICU Length of Stay (days, IQ range)	3.9 (3.8 – 10.5)	6.2 (1.6 – 12.6)	7.0 (3.0 – 11.6)	0.945
Hospital Length of Stay (days, IQ range)	10.8 (7.8 – 22.3)	2.7 (1.3 – 7.6)	14.3 (10.8 – 20.8)	< 0.001
Readmission at 90 days	2 (15%)	4 (7%)	8 (17%)	0.324
*Head and neck vascular trauma patients (n=6) experienced no complications.				

QS 25**CAR SEAT AIRBAG: A CONCEPT DESIGN TO DECREASE INJURIES IN HORSE-DRAWN BUGGY ACCIDENTS**

Rachel E. Hanke, MD¹, Alicia C. Greene, DO², Raykal Adiansjah³, Alan Figueira³, Gilberto Lee³, Julia Wergeland³, Anilchandra Attaluri, PhD³, Shawn Safford, MD, MBA⁴

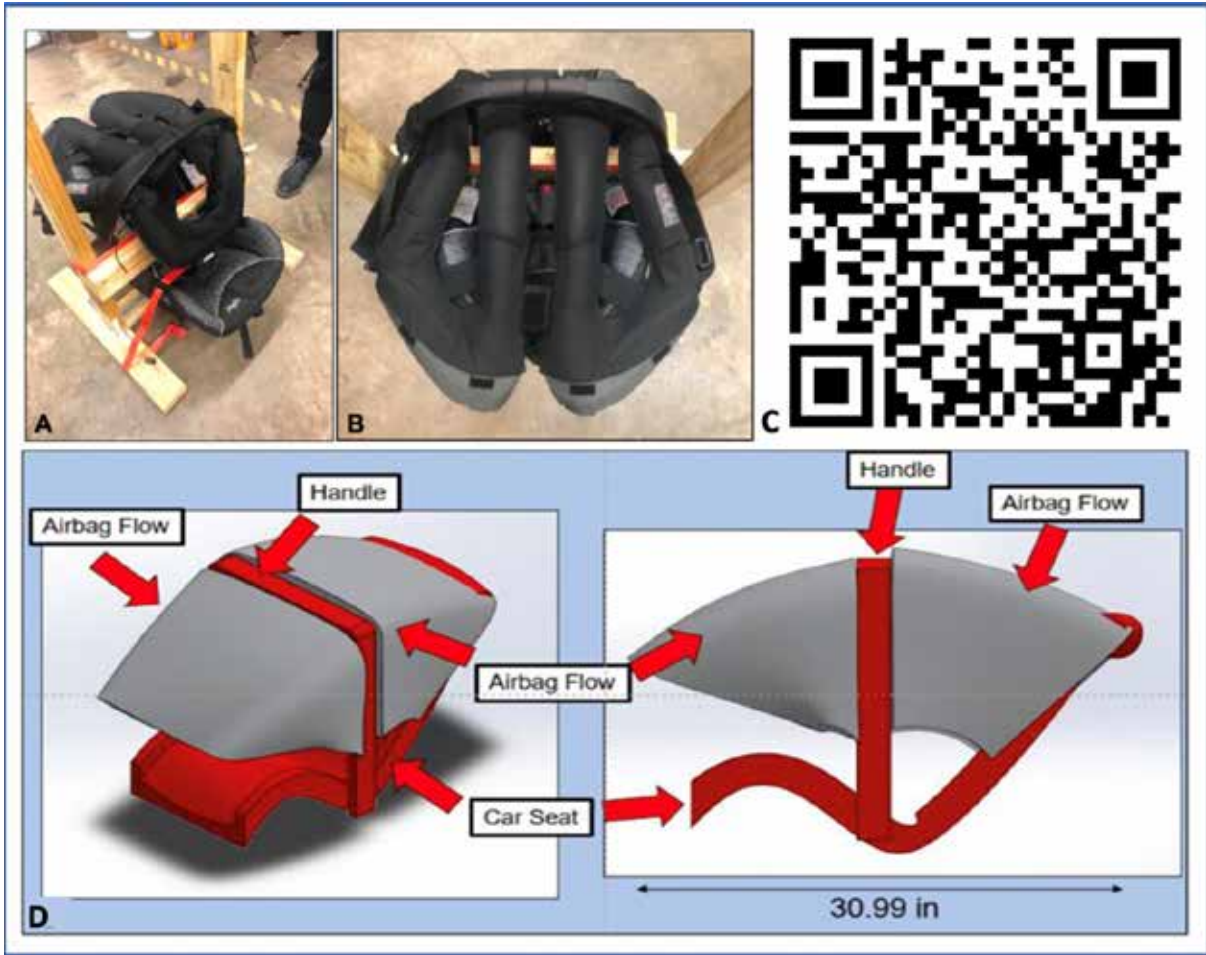
¹*Penn State Health Milton S. Hershey Medical Center, Hummelstown, PA, USA*, ²*Penn State Hershey Medical Center, Harrisburg, PA, USA*, ³*Penn State School of Science, Engineering and Technology, Middletown, PA, USA*, ⁴*University of Pittsburgh Medical Center Children's Hospital, Pittsburgh, PA, USA*

Purpose: Traumatic head injuries during motor vehicle collisions are the most common injury in children of all ages. When a horse-drawn buggy and vehicle collide, the occupants of the buggy are often propelled with children restrained in a car seat landing face down. Protection of these infants relies solely on the safety features of the mobile car seat, leaving the head most vulnerable for impact and resulting injury. The Amish population often rely on buggy transportation and are eager to decrease the morbidity and mortality often seen with buggy-motor vehicle collisions.

Methods: Through interdisciplinary collaboration with engineering experts and individuals within the Amish population, we set out to create a culturally-sensitive safety feature for travel. This required consideration of many elements, as the developed technology must be electronic-free, take up minimal space in a buggy, and easily integrate into day-to-day transportation. Several design concepts were generated and finessed using a concept design matrix, with the final solution being a car seat airbag. The prototype incorporated previously tested safety vests, which used a mechanical tether system with reusable tubing and trigger mechanism designed to deploy quickly. Testing ensured that this design would be triggered by the expected force generated from a collision.

Results: After development of the prototype and multiple rounds of testing, we created a concept-design for a compact, culturally-sensitive, self-contained, portable airbag attachment housed within the car seat handle (Figure 1A-D). When deployed it would provide protection of the entire body upon impact.

Conclusion: We developed a safety solution for infants transported via car seat in a horse drawn-buggy through interdisciplinary collaboration. This technology could be applied to children transported using other non-traditional modalities. Further development and implementation of this safety solution has the potential to impact the lives of children within the Amish community and beyond.



Quick Shots and Posters II: Basic Science and Practice

5:00 PM – 6:30 PM

QS 26**NLRP3 INFLAMMASOME ASSOCIATED WITH MORTALITY IN PIGLET MODEL OF RESPIRATORY DISTRESS SYNDROME**

Evan S. Chernov, BS¹, Sarah Blair, BS¹, Qinghe Meng, MD¹, Harry Ramcharran, MD¹, Joshua Satalin, BS¹, Gary F. Nieman, BS¹, Michaela Kollisch-Singule, MD²

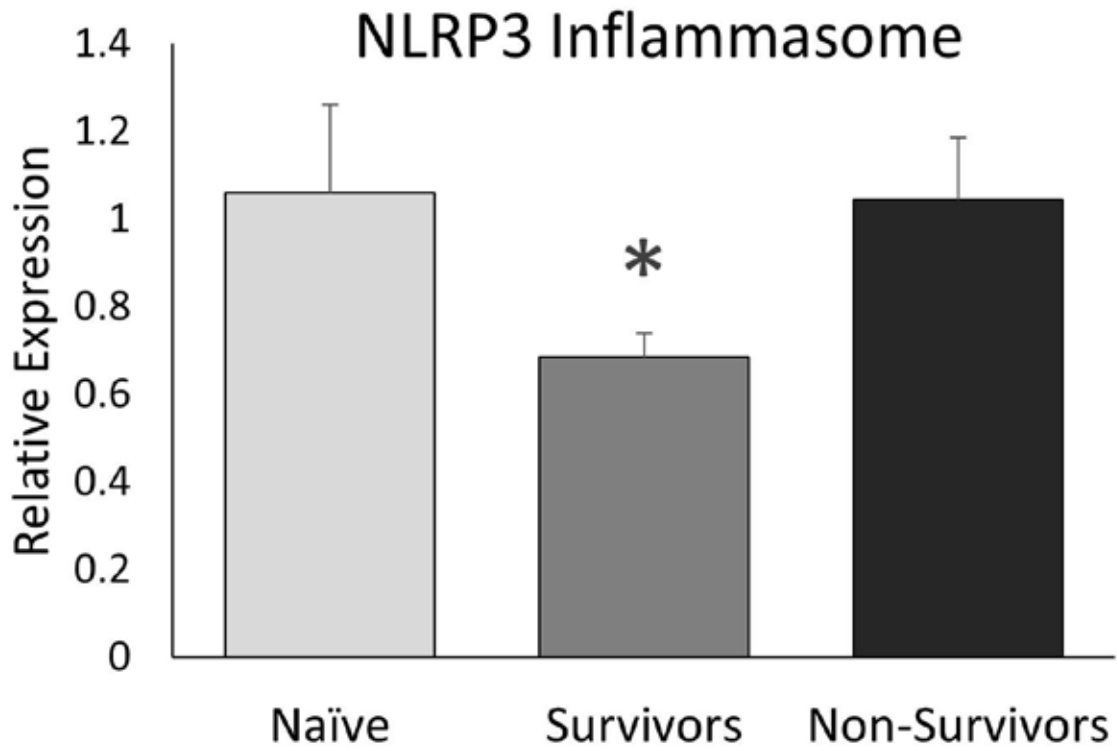
¹SUNY Upstate Medical University, Syracuse, NY, USA, ²SUNY Upstate Medical University, Jamesville, NY, USA

Purpose: Preterm infants are at risk for developing respiratory distress syndrome (RDS) and subsequent bronchopulmonary dysplasia (BPD), which is associated with increased mortality and long-term morbidity. Activation of the NLRP3 inflammasome has previously been implicated in the pathogenesis of BPD as a mediator of inflammation and alveolarization. We therefore hypothesized that the NLRP3 inflammasome would be associated with mortality in a pre-term piglet model of RDS.

Methods: All experiments were conducted with IACUC approval. Preterm piglets were delivered by cesarean section on gestational day 98 (85% of 115-day term), instrumented, and placed on mechanical ventilation set with low tidal volumes or airway pressure release ventilation. Animals were monitored continuously and resuscitated for 24 hours or until early death. The right apical lung was harvested for quantification of mRNA NLRP3 expression. Piglets were assessed according to whether they survived the study duration (Survivor; n=11) or did not (Non-Survivor; n=9) and compared against Naïve animals (n=6) that were sacrificed upon delivery.

Results: Non-Survivor animals all died by T12. NLRP3 inflammasome expression was significantly upregulated in preterm piglets with early mortality (1.05 ± 0.14) as compared with piglets that survived the 24-hour study duration (0.69 ± 0.05 ; $p < 0.05$; Figure). This correlated with decreased oxygenation (PaO₂/FiO₂ ratio 59.2 ± 33.7 versus 231.6 ± 16.2 at T12; $p < 0.05$) and ventilation (PaCO₂ 118.1 ± 12.1 versus 48.7 ± 6.1 mmHg; $p > 0.05$). There was no significant difference between Non-Survivors and Survivors by T12 in terms of heart rate (158.8 ± 11.5 versus 126.0 ± 7.8 beats/min; $p > 0.05$), mean arterial pressure (39.4 ± 3.4 versus 35.5 ± 1.2 mmHg; $p > 0.05$), plateau pressure (17.9 ± 0.7 versus 17.3 ± 0.8 cmH₂O; $p > 0.05$), or respiratory compliance (0.48 ± 0.06 versus 0.37 ± 0.05 L/cmH₂O).

Conclusion: Standard clinical assessments of health including hemodynamic stability, fluid requirements, and ventilation requirements were not associated with mortality. Rather, NLRP3 inflammasome expression correlated with oxygenation and ventilation, and may be predictive of survival in pre-term infants with RDS.



QS 27**ANALYSIS OF SOCIAL DETERMINANTS OF HEALTH IN THE PEDIATRIC GENERAL SURGICAL POPULATION OF A LARGE NORTHEASTERN URBAN HEALTH SYSTEM**

Devin Midura, MD¹, Samantha Levano, MPH², Kevin P. Fiori, MD, MPH, MSc³, Benjamin A. Farber, MD³

¹Montefiore Medical Center/Albert Einstein College of Medicine, Bronx, NY, USA, ²Albert Einstein College of Medicine, Bronx, NY, USA, ³Albert Einstein College of Medicine/Montefiore Medical Center, Bronx, NY, USA

Purpose: Social determinants of health (SDH) have been identified as factors that influence health outcomes. These have been well described in adult and pediatric general populations, however, there is a paucity of data for surgical patients. The objective of this study was to measure the prevalence of unmet social needs (USN) among pediatric general surgery (PS) patients in comparison to the pediatric population.

Methods: We retrospectively assessed patients who completed a social needs screener within our health system and underwent surgery by a pediatric surgeon between January 2019 and December 2021. We compared this PS population to non-surgical pediatric patients who were screened during this time. The primary outcome was whether a patient reported at least one USN. Demographic characteristics were collected, including: age, gender, language, ethnicity, and insurance status. Bivariate and multivariable logistic regressions were conducted to estimate the likelihood of having an USN given a patient's surgery status. Logistic and linear regressions were conducted to estimate healthcare utilization in PS patients given their SDH status.

Results: 33,989 pediatric patients (age < 21 years) were screened for social needs, and 2,112 operations were performed by pediatric surgeons. 342 (16%) of the surgical patients were screened for social needs. Surgical patients were more likely to be younger, Latinx, Spanish-speaking, and non-Commercially insured (X², p < 0.0001). Surgical patients with USN were less likely to speak English (40% vs 21%, X², p=0.0008). Surgical patients were 51% more likely to report USN, when adjusting for demographic characteristics (aOR: 1.51, 95%CI 1.17- 1.95). While not statistically significant, patients with USN had a longer average length of stay (p=0.059).

Conclusion: PS patients are more likely to report USN compared to the general pediatric population. Surgical patients may represent an at-risk group, and universal implementation of screening and support should be considered to improve outcomes.

QS 28
CNP-MIR146A DECREASES INFLAMMATORY CELL INFILTRATE AND BRONCHOALVEOLAR PROTEIN LEAK IN METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS (MRSA)-INDUCED ACUTE LUNG INJURY

Alyssa E. Vaughn, MD¹, Christina Sul, MD², Tanner Lehmann, BA³, Alison Wallbank, BS⁴, Bradford Smith, PhD⁴, Eva Nozik, MD², Christine Vohwinkel, MD, PhD², Carlos Zgheib, PhD⁵, Kenneth W. Liechty, MD⁶

¹Children's Hospital Colorado, Denver, CO, USA, ²Children's Hospital Colorado, Aurora, CO, USA, ³University of Colorado Denver, Aurora, CO, USA, ⁴Department of Bioengineering, University of Colorado Denver Anschutz Medical Campus, Aurora, CO, USA, ⁵Laboratory for Fetal and Regenerative Biology/Department of Surgery/University of Colorado Denver School of Medicine and Children's Hospital Colorado, Aurora, CO, USA, ⁶University of Arizona Tucson College of Medicine, Tucson, AZ, USA

Purpose: Pediatric acute respiratory distress syndrome (PARDS) has an estimated 18-35% mortality and current treatment is largely limited to supportive care and lung protective ventilation. Respiratory infection is the most common etiology of PARDS, with unrestrained inflammation and oxidative stress as central pathophysiologic features which promote the progression from acute lung injury (ALI) to ARDS and can result in pulmonary fibrosis. We have previously shown that CNP-miR146a, a radical scavenging cerium oxide nanoparticle (CNP) conjugated to the anti-inflammatory microRNA(miR)-146a, reduces bleomycin-induced ALI by decreasing inflammation and oxidative stress. We therefore hypothesized that CNP-miR146a would decrease inflammatory infiltrate and alveolar-capillary leak in an infectious MRSA-induced model of ALI.

Methods: 8-10 week old adolescent C57BL/6 mice (n = 46) were given intratracheal (IT) MRSA or saline (control) followed 4 hours later by 1ng/50µL IT CNP-miR146a (MRSA + CNP-miR146a) or saline (control, MRSA). At 24 hours post-infection, bronchoalveolar lavage fluid (BALF) was analyzed by ELISA for pro-inflammatory cytokines. Lungs were processed for histological analysis with tissue sections stained for CD45, a pan-leukocyte marker, and trichrome, a stain for collagen. Ten random high-powered fields (HPF, 200x) were imaged and analyzed using NIS Elements – Advanced Research imaging software to quantify the number of CD45+ cells and the area of collagen deposition. Statistical significance was determined by one-way ANOVA (p< 0.05 significant).

Results: MRSA injury significantly increased BALF protein concentration of IL-6 (p=0.001) and IL-8 (p< 0.0001) compared to control, and treatment with CNP-miR146a returned this to control levels (p=0.02 and 0.01, respectively). Treatment of MRSA-injured lungs with CNP-miR146a significantly lowered inflammatory cell infiltrate (p=0.01) and collagen deposition (p=0.03) (Figure 1).

Conclusion: CNP-miR146a rescues the MRSA-injured lung by decreasing bronchoalveolar pro-inflammatory protein leak, inflammatory cell infiltrate, and collagen deposition. CNP-miR146a has significant promise as a potential therapeutic for pediatric acute respiratory distress syndrome.

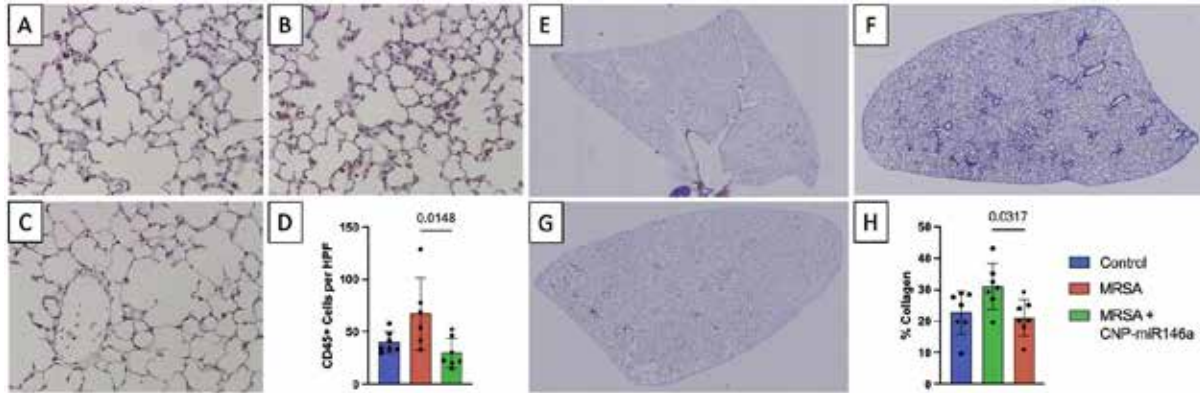


Figure 1. Representative images of CD45+ stained images (A-C) and trichrome stained images (E-G) for controls (A, E), MRSA (B, F), and MRSA + CNP-miR146a (C, G). CNP-miR146a treatment 4 hours after injury significantly decreased CD45+ cell infiltrate (D) and collagen deposition (H) when compared to control mice.

QS 29**INHIBITION OF DEOXYNUCLEOTIDE TRIPHOSPHATE SYNTHESIS AS A NOVEL METHOD FOR SENSITIZING NEUROBLASTOMA TO RADIATION**

Jennifer T. Castle, MD¹, B. Mark Evers, MD¹, Piotr Rychahou, MD¹, Jill M. Kolesar, PharmD², Eric J. Rellinger, MD³

¹Department of Surgery, Markey Cancer Center, University of Kentucky, Lexington, KY, USA,

²Department of Pharmaceutical Practice and Science, Markey Cancer Center, University of Kentucky, Lexington, KY, USA, ³University of Kentucky, Lexington, KY, USA

Purpose: Ribonucleotide Reductase (RNR) and Ataxia Telangiectasia and Rad3-Related protein (ATR) are key enzymes in the synthesis of deoxynucleotide triphosphates (dNTPs). dNTPs are necessary precursors to DNA repair. We hypothesized that blocking dNTP synthesis would sensitize neuroblastoma cells to radiation therapy.

Methods: (i) We used a cell viability assay (CellTiter-Glo) to measure the sensitivity of MYCN-amplified BE(2)-C and MYCN non-amplified SK-N-SH cells to the RNR inhibitor (triapine) alone and in combination with ATR inhibitors (AZD6738, VX-970, BAY1895344). Assays were performed in triplicate. Data were fit using a four-parameter log-logistic model, and IC₅₀ values were calculated with R statistical software. (ii) Loewe synergy models were used to calculate the two-drug combination effects in both cell lines with synergy scores greater than 0 indicating synergy. (iii) Clonogenic assays were performed and analyzed via colorimetry with sulforhodamine B to assess the effect of the drugs in combination with radiation (comparisons done with one-way ANOVA and post-hoc Bonferroni). (iv) Immunoblots were used to assess apoptosis following radiation, RNR inhibition, and ATR inhibition.

Results: (i) All drugs were cytotoxic in both cell lines with the lowest IC₅₀ observed with BAY1895344 (SK-N-SH: 23.1±1.8nM and BE(2)-C: 47.2±6.5nM). (ii) Loewe synergy models estimated the combination of BAY1895344 and triapine to be synergistic in both cell lines (SK-N-SH 7.52, p=0.006; BE(2)-C 3.25, p=0.003). (iii) Clonogenic assays demonstrated SK-N-SH was sensitive to radiation therapy. However, BE(2)-C demonstrated more radiation resistance which was overcome with the addition of triapine and BAY1895344 (p< 0.01). (iv) Immunoblotting demonstrated increased apoptosis with triapine, BAY1895344, and radiation therapy in both cell lines.

Conclusion: We conclude that dNTP synthesis inhibitors sensitize neuroblastoma cells to radiation therapy in vitro and may represent a novel treatment strategy for this challenging childhood cancer.

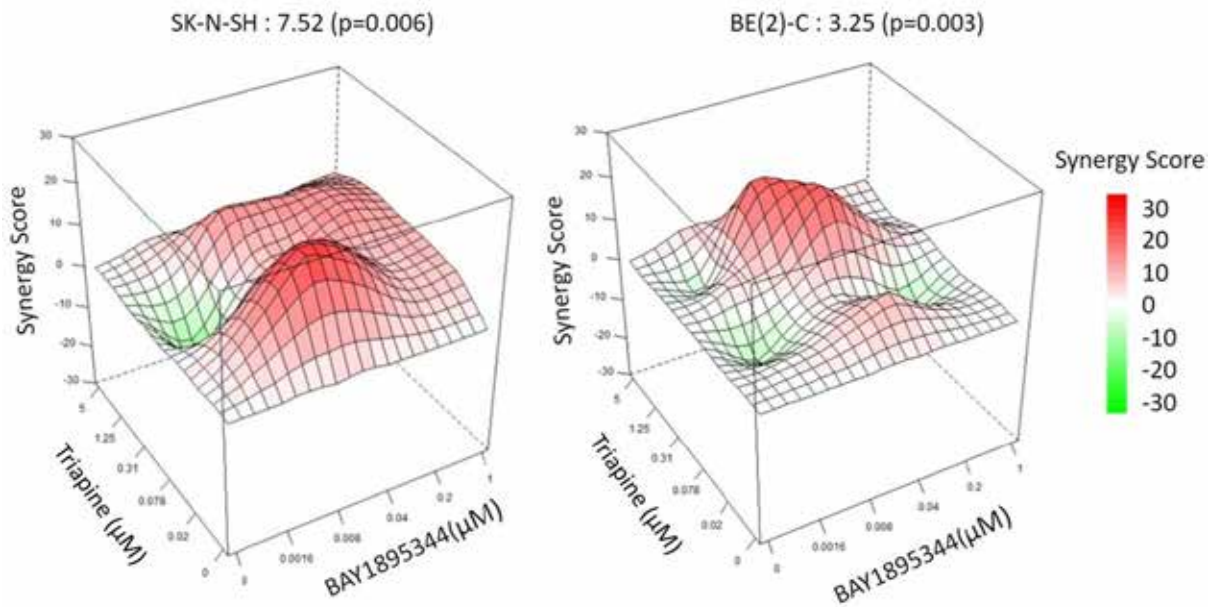


Figure: Loewe synergy models and scores for triapine combined with BAY1894355 in two neuroblastoma cell lines

QS 30**LIPID NANOPARTICLE DELIVERY OF HUMAN MILK DERIVED MIRNAS TO ATTENUATE INTESTINAL INJURY**

Mina Yeganeh, HBSc¹, Jingan Chen, Bachelor's², Dorothy Lee, Bachelor's³, Bo Li, PhD⁴, Bowen Li, PhD⁵, Agostino Pierro, MD⁴

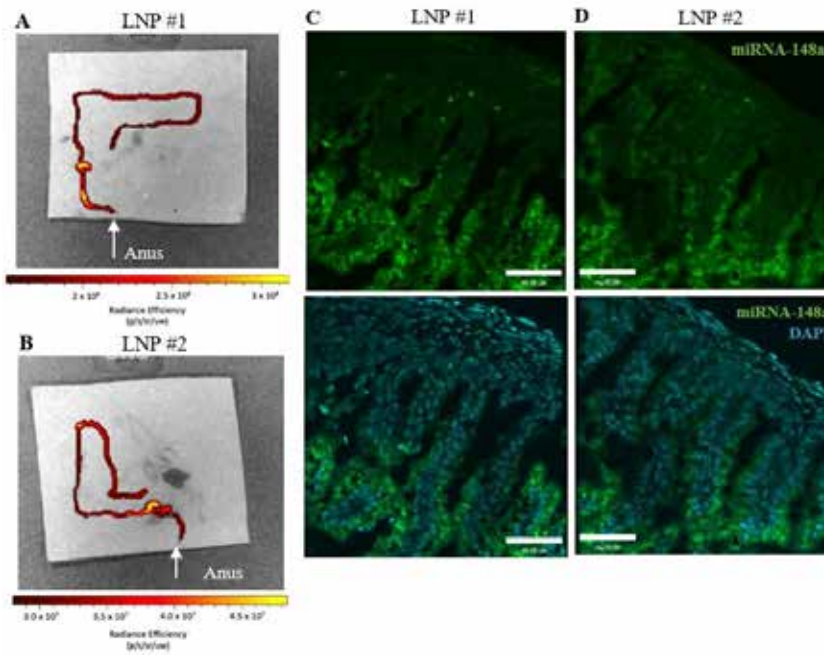
¹Hospital for Sick Children, Toronto, ON, Canada, ²University of Toronto, Toronto, ON, Canada, ³Hospital for Sick Children, Toronto, ON, Canada, ⁴The Hospital for Sick Children, Toronto, ON, Canada, ⁵Leslie Dan Faculty of Pharmacy, University of Toronto, Toronto, ON, Canada

Purpose: miRNAs derived from human breast milk extracellular vesicles have shown therapeutic potential for inflammatory conditions of gastro-intestinal (GI) tract such as necrotizing enterocolitis, inflammatory bowel disease, or sepsis. However, the acidic and enzymatic nature of the intestines hinders the delivery of nucleic acids. To overcome the harsh environment of the intestines, lipid nanoparticles (LNPs) can be employed. LNPs are vesicles made up of ionizable lipids that encapsulate nucleic acids and enhance their stable delivery to the intestines. In this study, we aim to investigate the rectal delivery of LNP-encapsulated miRNA-148a, the most abundant miRNA in human breast milk extracellular vesicles.

Methods: Two LNP formulations were developed: LNP #1 and LNP #2. Both formulations were tested in healthy postnatal day (P) 9 C57BL/6 mouse pups. miRNA-148a, fluorescently tagged with Cy3, was encapsulated in LNPs. The formulations were then administered in fasting pups via enema. After 6 hours, animals were sacrificed, the GI tract was harvested and imaged immediately. The GI tract was embedded for frozen sectioning and stained with DAPI to visualize nuclei.

Results: Fluorescent signal from miRNA-148a was observed in parts of the GI tract for both LNP formulations, with cecum presenting the highest fluorescence intensity (Figure 1 A, B). The presence of miRNA-148a was validated in tissue sections (Figure 1C, D). Both LNPs transfected the cells residing in the intestinal epithelium and delivered miRNA-148a (green) to the cytoplasm. miRNA-148a was expressed in the small intestine but not in the colon.

Conclusion: The challenges in the delivery of miRNA-148a to the gastrointestinal tract has hindered its progression towards clinical translation. In this study, we describe a novel methodology for the delivery of miRNA-148a to the small intestine. This new technology paves the way for the therapeutic use and delivery of miRNAs in gastro-intestinal inflammatory conditions.



QS 32**UPREGULATION OF P-REX1 IS ASSOCIATED WITH ENHANCED INVASION AND METASTASIS IN NEUROBLASTOMA**

Jillian C. Jacobson, MD¹, Jingbo Qiao, PhD², Elizabeth D. Cochran, MD², Dai H. Chung, MD²

¹UT Southwestern Medical Center, Dallas, TX, USA, ²University of Texas Southwestern Medical Center, Dallas, TX, USA

Purpose: Phosphatidylinositol-3,4,5-trisphosphate-dependent Rac exchange factor 1 (P-Rex1) is a gene that encodes Rho GTPase guanine nucleotide exchange factors (GEFs). P-Rex1 is activated downstream of phosphoinositide 3-kinase (PI3K) and G-protein-coupled receptors (GPCRs) to promote activation of Rac, which has been implicated in cellular migration and invasion. Upregulation of P-Rex1 has been associated with increased migration, invasion, and metastasis in several adult cancers. However, its role in neuroblastoma is unknown. The purpose of this study is to evaluate the role of P-Rex1 in neuroblastoma tumorigenesis.

Methods: Using a serial in vivo splenic injection model, we had previously isolated an aggressive subclone (BE(2)-C/LM2) from MYCN-amplified neuroblastoma that demonstrated an enhanced propensity to develop liver metastases. Antibody array analysis and fluorescent immunohistochemistry (IHC) were performed on murine tumor samples to assess for changes in P-Rex1 expression between the BE(2)-C cell line and the pro-metastatic LM2 subclone. The publicly accessible Versteeg clinical database was used to evaluate the relationship between P-Rex1 expression and patient outcomes.

Results: Antibody array analysis demonstrated a 1.8-fold increase in P-Rex1 expression between the BE(2)-C and LM2 cell lines (0.66 vs. 1.21 a.u., respectively). IHC analysis of P-Rex1 expression of hepatic metastases produced after splenic injection of BE(2)-C vs. LM2 cells demonstrated a mean fluorescent intensity, calculated as peak fluorescence minus background fluorescence, of 7849 ± 1290.48 vs. 20452.3 ± 1373.27 a.u., respectively ($p=.0012$). Analysis of the Versteeg database demonstrated that patients who had events or died had significantly higher mean 2log expression of P-Rex1 (5.381 vs. 5.965, $p=.0009$; 5.397 vs. 5.895, $p=.0038$, respectively).

Conclusion: Aggressive, pro-metastatic models of neuroblastoma demonstrate upregulation of P-Rex1 in vivo. Furthermore, increased expression of P-Rex1 was associated with increased incidence of events and mortality in clinical database analysis. P-Rex1 expression may be a novel, independent prognostic indicator and potential therapeutic target in neuroblastoma.

QS 33**OPTIMIZING THE MICROENVIRONMENT TO ENHANCE THE SUCCESS OF ENTERIC NEURONAL STEM CELL TRANSPLANTATION FOR HIRSCHSPRUNG DISEASE**

Jessica Mueller, MD, Rhian Stavely, PhD, Richard A. Guyer, MD, PhD, Sukhada Bhawe, PhD, Ryo Hotta, MD, PhD, Allan Goldstein, MD

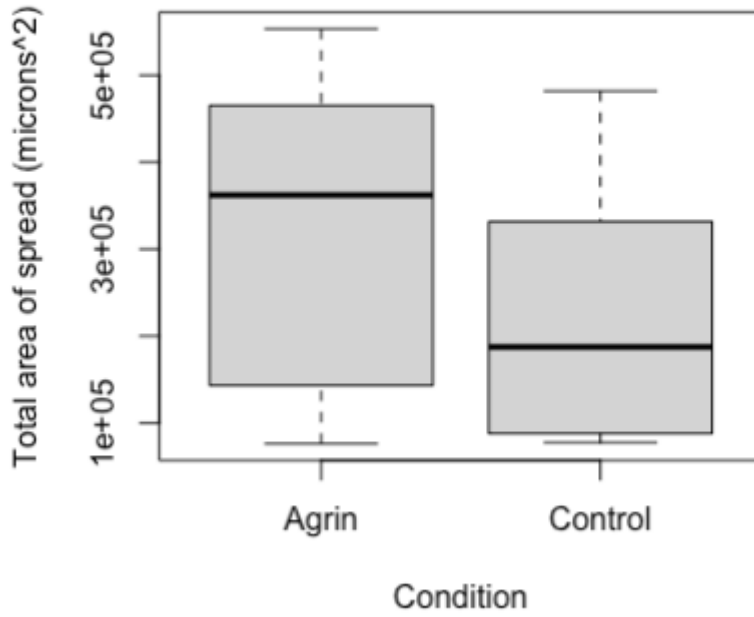
Massachusetts General Hospital, Boston, MA, USA

Background: Development of a functional enteric nervous system (ENS) relies on coordinated interactions between enteric neural crest-derived cells (ENCCs) and the extracellular matrix (ECM) through which they migrate. Numerous ECM proteins promote ENCC migration while others inhibit it, demonstrating a critical role of the ECM in ENS formation. We hypothesize that modification of transplanted stem cells to behave like the highly migratory embryonic ENCCs will enhance the success of cell therapy.

Methods: We compared the transcriptomes of embryonic progenitors from a previously published database (Morarach et al.) to the progenitor cells in postnatal-derived neurospheres using single-cell RNA sequencing. Agrin was identified as a target for migration optimization. Neurospheres from 4-week-old Wnt1;tdT mice were transplanted onto fibronectin surfaces with function-blocking agrin antibody or modified with an agrin-shRNA lentivirus and transplanted onto ex vivo gut organ cultures (n=29) or in vivo to the colon of C57/B6 wild-type mice (n=23). Total area of cell spread was evaluated by ImageJ. Results were compared using t-tests and two-way ANOVA.

Results: Single-cell analysis revealed over-expression of agrin, a heparin sulfate proteoglycan inhibitory to neural crest migration, in postnatal-derived neurospheres. In the presence of function-blocking agrin antibody, neurospheres cultured on fibronectin migrate 114% farther than control conditions. After seven days, neurospheres transduced with an agrin-shRNA lentivirus migrate significantly farther both ex vivo (total area covered 592,795 versus 378,282 microns², p=0.05) and following in vivo transplantation (316,856 versus 222,330 microns², p=0.03, Figure).

Discussion: For enteric neurospheres to be an effective cell therapy for Hirschsprung disease, their expression of anti-migratory ECM genes is problematic. We identified agrin as a potential target and show that agrin inhibition increases cell migration in vitro, ex vivo, and in vivo. Direct modification of the neurosphere to produce a permissive environment offers a unique opportunity to enhance the success of cell therapy.



QS 34**LOSS OF CAVEOLIN-1 IS ASSOCIATED WITH NECROTIZING ENTEROCOLITIS IN HUMANS AND MICE**

Tyler D. Leiva, MD¹, Alena Golubkova, MD², Katherine B. Snyder, MD³, Heather L. Liebe, MD², Camille Schlegel³, Jeffery Eckert, PhD⁴, Zhongxin Yu, MD⁵, William Berry⁴, Catherine J. Hunter, MD⁶

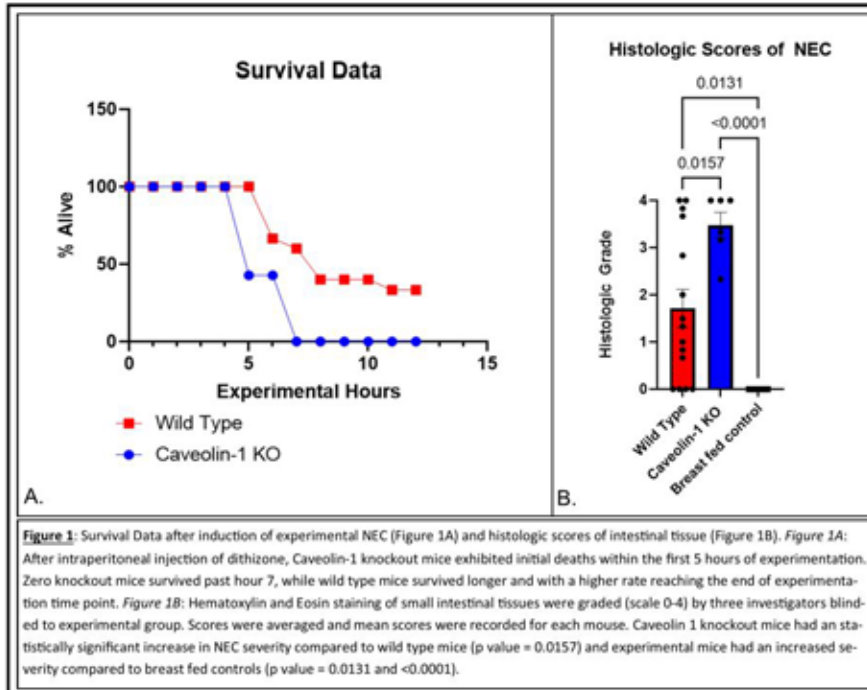
¹University of Oklahoma Health Science Center, Oklahoma City, OK, USA, ²Oklahoma Children's Hospital, Oklahoma City, OK, USA, ³University of Oklahoma Health Sciences Center, Oklahoma City, OK, USA, ⁴University of Oklahoma Health Science Center, Oklahoma City, OK, USA, ⁵University of Oklahoma Health Science center, Oklahoma City, OK, USA, ⁶Oklahoma Children's Hospital, Oklahoma City, OK, OK, USA

Purpose: Necrotizing enterocolitis (NEC) is a devastating disease of prematurity. NEC has been associated with increased intestinal epithelium permeability due to dysregulation of tight junction (TJ) proteins. Caveolin-1 is a membrane protein involved in signal transduction and cellular membrane maintenance and TJ assembly. We hypothesize that caveolin-1 expression differs in patients with NEC compared with controls, and that caveolin-1 knock out mice would exhibit an increased severity of NEC.

Methods: Human intestinal tissue was collected from age-matched preterm (< 37 weeks) infants undergoing bowel resection for NEC or non-NEC indications. Tissue was analyzed by western blot and immunofluorescence for cav-1. Genetically modified caveolin-1 knockout (KO) and wild type (WT) mice (commercially available) were subject to intraperitoneal injection of dithizone to induce experimental NEC. Intestine was harvested and graded (0-4) by Hematoxylin and Eosin (H&E) for injury scoring by a pathologist blinded to experimental groups. ANOVA analysis was performed and significance was determined to be a p value < 0.05.

Results: Infant intestinal tissue demonstrated decreased expression of epithelial caveolin-1 in NEC tissues when compared to controls. Caveolin-1 KO mice had a higher mortality rate compared with controls (Figure 1a). After 7 hours of experimentation, 100% of caveolin-1 KO mice expired, compared to 60% of wild type mice. Histologic scoring revealed greater injury scoring in cav-1 KO mice compared with wild type (3.5 vs. 1.5, respectively) (p=0.0157) (Figure 1b).

Conclusion: Analysis of human intestinal samples demonstrate a decrease in caveolin-1 in infants with NEC compared to age matched patients without NEC. Moreover, cav-1 knock out in mice is associated with increased experimental NEC susceptibility. We conclude that decreased caveolin-1 levels in intestinal epithelium may increase susceptibility to the development of necrotizing enterocolitis.



QS 35**PHARMACOLOGIC TOLL-LIKE RECEPTOR 4 INHIBITION AMELIORATES EARLY ASTROGLIOSIS TO IMPROVE NEUROCOGNITIVE OUTCOMES FOLLOWING TRAUMATIC BRAIN INJURY**

Mahmoud El Baassiri, MD¹, William B. Fulton², Chhinder P. Sodhi², David J. Hackam, MD, PhD³, Isam W. Nasr, MD⁴

¹*Division of Pediatric Surgery, The Johns Hopkins Medical Institutions, Baltimore, MD, USA, Baltimore, MD, USA,* ²*Johns Hopkins University School of Medicine, Baltimore, MD, USA,*

³*Johns Hopkins Children's Center, Baltimore, MD, USA,* ⁴*Johns Hopkins, Baltimore, MD, USA*

Purpose: Astrocytes are crucial neuroimmune cells that modulate neuronal plasticity following traumatic brain injury (TBI) by undergoing reactive astrogliosis. They are double-edge sword cells which regulate central nervous system (CNS) repair by either accelerating or suppressing synaptogenesis, neurogenesis and angiogenesis. In our study, we investigated the effects on these various physiological processes by inhibiting the toll-like receptor 4 (TLR4) signaling pathway.

Methods: We established a controlled cortical impact (CCI) model to study the outcomes of TLR4 blockade at different time points after injury including post injury day (PID) 1, 7 and 28. Real time PCR (qRT-PCR) was used to quantify gene expression associated with astrocyte activation, endothelial cell proliferation and neurite extension using GFAP, VEGF and NGF, respectively. The injured left parietal cortex was micro dissected, and brains were immunostained for GFAP, MBP, NG2 and DAPI. Neurocognitive outcomes were evaluated using the morris water maze (MWM) test.

Results: On qRT-PCR, TLR4 inhibition did not show significant differences in GFAP expression both acutely ($p=0.954$) and chronically ($p=0.594$). However, on immunohistochemistry (IHC), TLR4 blockade revealed an upregulation in the intensity of GFAP and NG2 around the lesion site on PID 1 followed by a significant reduction in GFAP expression on PID 7 and 28. On MWM, groups with TLR4 blockade showed a significant increase in platform entries on PID 7 (4.77 ± 0.4 , $n=9$) and 28 (5.18 ± 0.58 , $n=11$).

Conclusion: Following TBI, TLR4 blockade increases the activation of reactive astrocytes during acute inflammation followed by attenuation in their activation during chronic inflammation. TLR4 inhibition also induces early oligodendrocyte activation eventually leading to more myelin regeneration. These changes possibly lead to improvements in neurologic outcomes. Targeting the TLR4 signaling pathways therefore provides a promising therapeutic potential to alleviate the deleterious sequelae of TBI.

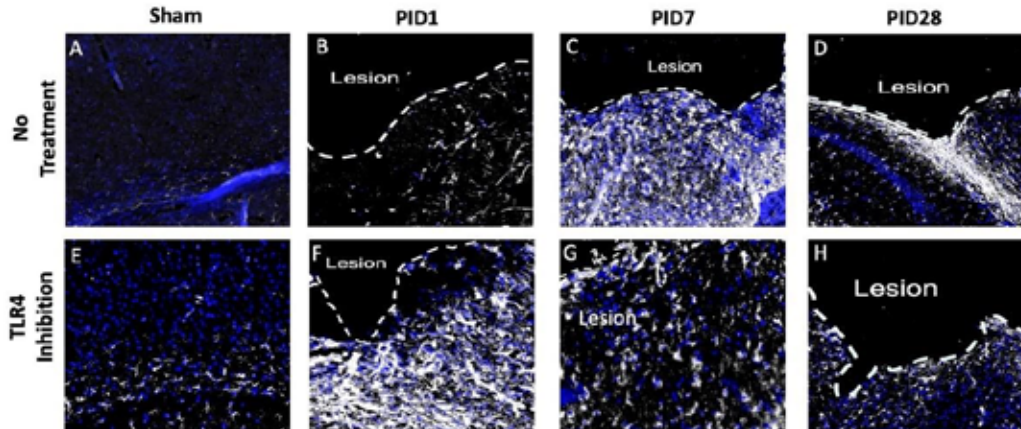


Figure: Representative photographs of brain sections stained with GFAP (white) around the lesion site following TBI. In the first row, compared to untreated Sham (A), increased GFAP staining is observed on PID1 (B) followed by a significant increase later, on PID7 (C). In the second row, TLR4 blockade groups show a significant increase in GFAP staining on PID1 (F), followed by attenuation in intensity on PID7 (G) and PID28 (H). Compared to untreated groups (B), TLR4 blockade (F) displays a significant increase in GFAP intensity acutely (PID1). In the subacute (PID7) and chronic phases (PID28) of injury, TLR4 blockade (G and H) downregulates the GFAP intensity compared to untreated groups (C & D).

QS 36

EFFECTS OF PRENATAL LIPOSOMAL SIHIF-2A ON CARDIO-METABOLIC GENE REMODELING IN CDH-ASSOCIATED CARDIAC DYSFUNCTION

Siqinzhaorigetu Saljuud, PhD¹, Vikas S. Gupta, MD², Di Jin, MS¹, Hannah V. Breitschopf³, Kylie W. Holden, MD³, Matthew T. Harting, MD, MS, FAAP, FACS¹, Cristian Rodriguez-Aguayo, Gabriel Lopez-Berestein

¹McGovern Medical School at UTHealth, Houston, TX, USA, ²McGovern Medical School, University of Texas, Houston, Dallas, TX, USA, ³McGovern Medical School, University of Texas, Houston, Houston, TX, USA

Introduction: Ventricular dysfunction is independently associated with mortality in congenital diaphragmatic hernia (CDH). Previous investigation suggests that alterations in myocardial energetics, including hypoxia, hypoxia-inducible factor (HIF) expression, inflammation, and both mitochondrial and fatty-acid biogenesis are drivers of this dysfunction. Whether these CDH-associated cardiac hypoxic and metabolic-related gene changes occur in utero remains unknown. Our objective was to investigate prenatal myocardial hypoxia and metabolism, including therapeutic HIF modulation.

Methods: We used the well-established nitrofen CDH rodent model. To investigate the effects of HIF-2 α silencing on the expression of cardio-metabolic associated proteins, we injected IV liposomal siHIF-2 α prenatally. Prior to delivery, 70mg/kg intraperitoneal hypoxyprobe (cellular hypoxia marker) was administered. Via cesarian section delivery and subsequent laparotomy, cardiopulmonary tissues from offspring were collected. Tissue hypoxia and HIF expression were assessed by immunofluorescence. Cardio-metabolic-associated proteins were measured by western blotting.

Results: Myocardial tissues from all groups demonstrated prenatal hypoxia. However, cardiac tissues from prenatal CDH-pups displayed significantly increased hypoxia compared to control tissues. The expression of cardiac HIF-2 α was significantly elevated in CDH pups, and siHIF-2 α treatment significantly reversed the alterations (Figure-A). Western blotting analysis showed that the expression of PPAR-gamma coactivator-1alpha (PGC-1 α), the master regulator of oxidative metabolism, and its corresponding nuclear receptor, PPAR α were significantly decreased in the CDH cardiac tissue (69%, p=0.001 and 30%, p=0.01, respectively) compared with controls. Notably, siHIF-2 α treatment significantly reversed the alterations of the cardiac metabolism-associated proteins in CDH. The treatment with siHIF-2 α restored the expression of PGC-1 α and PPAR α , increasing expression by 50% (p< 0.05) and 40% (p< 0.05), respectively, compared to CDH pups (Figure-B).

Conclusion: We identified that cardiac metabolic gene remodeling, related to CDH-associated hypoxia, is initiated in utero, and can be mitigated via prenatal HIF-2 α silencing. HIF-2 α may be a key molecular regulator of cardio-metabolic gene remodeling in CDH-associated cardiac dysfunction.

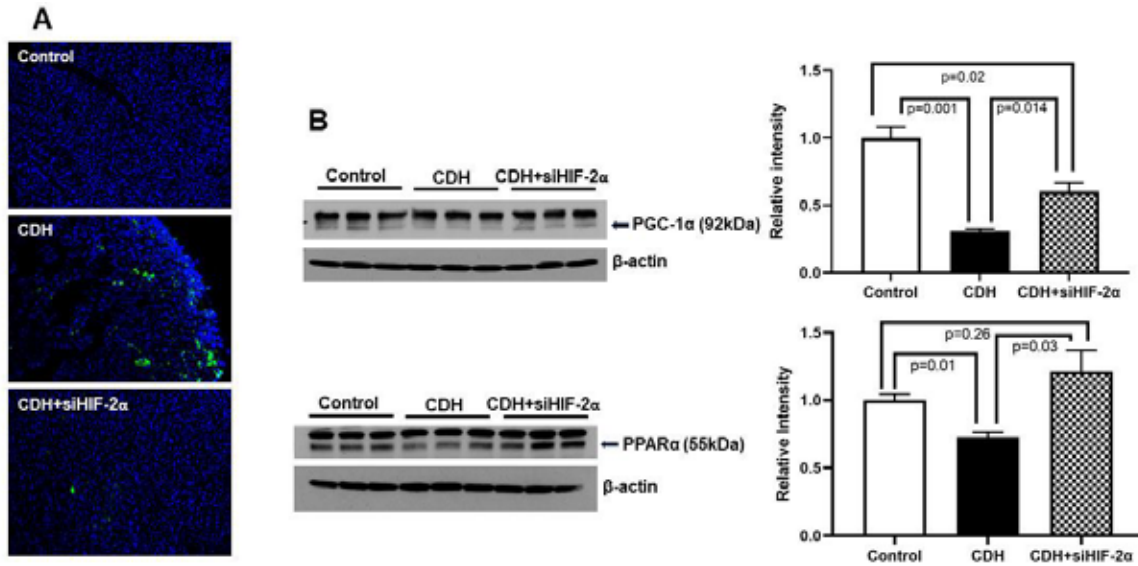


Figure: A) Representative confocal microscopy images (10 x magnification) showing immunofluorescence staining for local HIF-2α (green) in heart tissues. Tissue sections were counterstained with 4',6'-diamidino-2-phenylindole (DAPI) nucleic acid stain (blue).
Figure: B) Representative western blots of cardiac-metabolic-associated proteins are shown along with quantification. β-actin was used as loading control.

QS 37

SECRETORY IGA DELIVERED VIA TRANSAMNIOTIC FETAL IMMUNOTHERAPY (TRAFIT) FUNCTIONALLY BINDS INTESTINAL BACTERIA INTO THE POSTNATAL PERIOD: A POTENTIAL NOVEL STRATEGY TO PREVENT NECROTIZING ENTEROCOLITIS

Ashlyn E. Whitlock, MD¹, Kamila Moskowitsova, MD², Ina Kycia, PhD³, Jeffery Nelson, MS⁴, David Zurakowski, MS, PhD⁵, Dario O. Fauza, MD, PhD³

¹*Boston Children's Hospital, Harvard Medical School, Brookline, MA, USA*, ²*Boston Children's Hospital, Harvard Medical School, Boston, MA, USA*, ³*Boston Children's Hospital, Department of Surgery, Boston, MA, USA*, ⁴*Harvard Medical School, Boston, MA, USA*, ⁵*Boston Children's Hospital, Department of Anesthesia, Critical Care, and Pain Medicine Research, Boston, MA, USA*

Purpose: Secretory immunoglobulin-A (SIgA), a large conjugate of dimeric IgA not produced by the fetus or neonate, binds bacteria on mucosal surfaces enhancing mucosal immunity. Higher levels of intestinal bacteria bound by SIgA have been shown to be protective against necrotizing enterocolitis. Transamniotic fetal immunotherapy (TRAFIT) has been shown to be an alternative for delivery of SIgA to the fetal digestive tract, however with undetermined functional impact. We sought to determine whether SIgA administered via TRAFIT could bind intestinal bacteria through the postnatal period.

Methods: Fetuses (n=38) from four time dated Sprague-Dawley dams underwent volume-matched intra-amniotic-injections of 1mg/mL of ≥95% homogeneous SIgA pooled from human colostrum, with a half-life of 5-6 days, on gestational-day 19 (E19; term=E22-23). The rats were allowed to spontaneously deliver, and pups were survived for 1-2 days postnatally to allow for bacterial colonization, after which time intestinal contents were procured and submitted to flow cytometry. Specimens were stained for both bacteria (Syto-GFP) and human-specific SIgA (PE) to prevent cross reactivity with rat maternal SIgA they could have ingested. Statistical analyses were by Wilcoxon rank sum and Kruskal-Wallis tests (p< 0.05).

Results: Overall survival was 94.7% (36/38). SIgA-bacterial complexes were identified in all samples, with all time-points showing significantly higher positive PE events than unstained controls except for day 6 post-TRAFIT (p=0.03-0.05). The proportion of bacteria bound by IgA decreased daily, from 45.6% to 29.9% bound at 4 to 6 days post-TRAFIT, respectively (overall p=0.05) and 36.4% to 30.7% bound 1 to 2 days after birth (overall p=0.04). The highest percentage of bacteria bound to SIgA was 84%.

Conclusions: Transamniotic fetal immunotherapy with secretory-IgA leads to functionally IgA-bound bacteria into the postnatal period. This could become a novel strategy for enhancing early mucosal immunity in pregnancies at risk of preterm labor, potentially protecting the neonate against necrotizing enterocolitis.

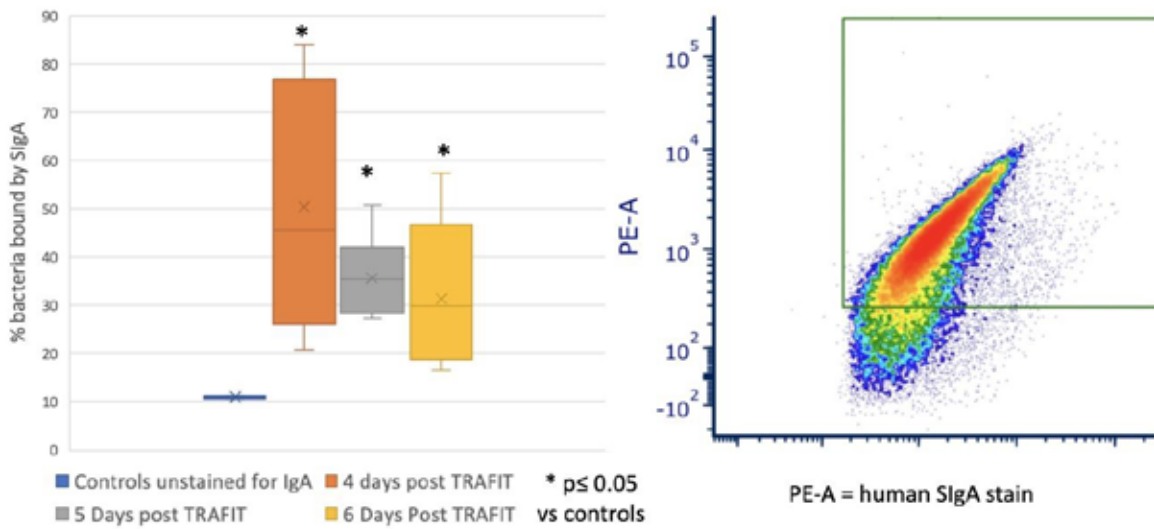


Figure: Left: proportions of bacteria bound to SIgA at different time points (days 4-6) post-TRAFIT and in unstained controls. Right: flow cytometry of SIgA-stained events after gating on a sample showing 84% of bacteria bound to SIgA. SIgA = secretory immunoglobulin-A; TRAFIT = transamniotic fetal immunotherapy

QS 38**WHOLE GENOME SEQUENCING IDENTIFIES NOVEL TARGETS IN GASTROSCHISIS**

John P. Marquart, MD¹, Qian Nie, PhD², Brandon Smith, MS², Kala Schilter, PhD², Angie Jelin, MD³, Honey Reddi, PhD, FACMG², Amy J. Wagner, MD⁴

¹Childrens of Wisconsin, Milwaukee, WI, USA, ²Precision Medicine Lab, Medical College of Wisconsin, Milwaukee, WI, USA, ³The Johns Hopkins Medical Institutions, Baltimore, MD, USA, Baltimore, MD, USA, ⁴Children's Wisconsin, Milwaukee, WI, USA

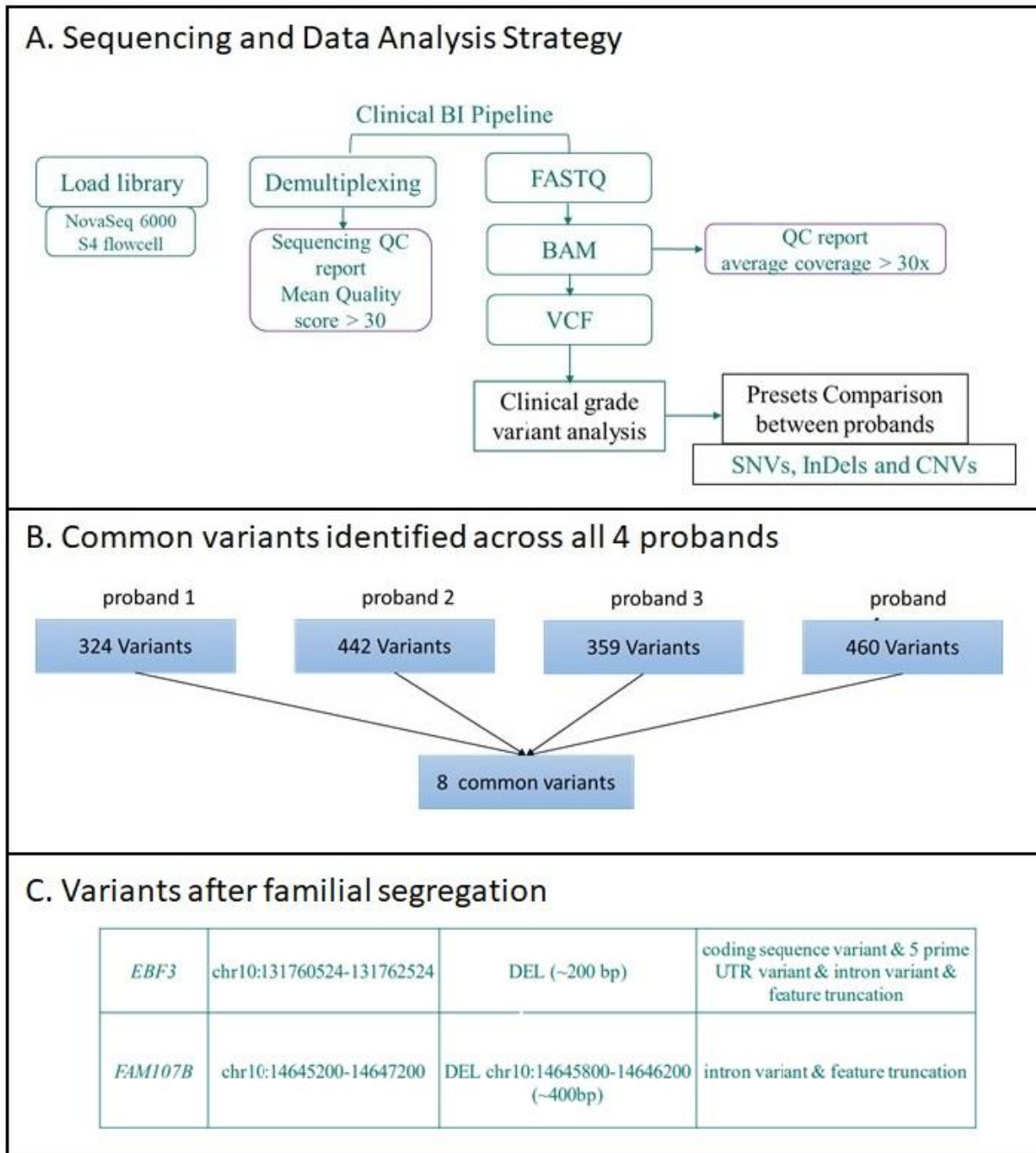
Purpose: Gastroschisis is the most common congenital abdominal wall defect with an increasing incidence over recent decades and an incomplete understanding of its etiology. There is limited knowledge of the genetic contribution to gastroschisis with prior studies evaluating single families on coding regions by whole exome sequencing. We hypothesize that using whole genome sequencing of multiple families with affected children, including two with monozygotic twins, will find novel genetic variants involved in gastroschisis.

Methods: Blood and saliva from four gastroschisis patients and their family members at our institution were obtained, with a minimum of four samples per family: affected patient, unaffected sibling, and both parents. Two of these families included monozygotic twins, each with one affected. Whole genome sequencing (WGS) was performed on all samples evaluating for Single Nucleotide Variants (SNV), Copy Number Variants (CNV), and Insertion/Deletions (InDels) using a clinically validated bioinformatics pipeline and tertiary tool. Variants unique to the probands in comparison to unaffected siblings were identified, confirmed by Sanger sequencing and segregation analysis performed with parents to determine inheritance patterns.

Results: Among the four probands sampled we found 324-460 variants that were unique to each proband and absent in the unaffected sibling of which eight intronic variants were common among all four probands. Segregation analysis further focused our targets on two remaining variants for which orthogonal confirmation is underway (Figure 1).

Conclusion: This is the first instance of using WGS to identify possible genomic contributions to gastroschisis. We found eight novel intronic targets that were common among four affected patients and not their unaffected family members. Further study of these variants with a larger cohort is needed to confirm these genetic targets as possible genetic causation for gastroschisis.

Figure 1



QS 39**WEIGHT-FOR-AGE Z-SCORE AT BIRTH AS A PREDICTOR OF 30-DAY SURGICAL WOUND COMPLICATION AND OUTCOMES IN TERM NEONATES**

Gabriel J. Ramos Gonzalez, MD¹, Maua Mosha, MPH², S. Alex Rottgers, MD³, Christopher W. Snyder, MD⁴, Nicole M. Chandler, MD⁴

¹*Division of Pediatric Surgery, Johns Hopkins All Children's Hospital, St. Petersburg, FL, USA,* ²*Department of Health Informatics, Johns Hopkins All Children's Hospital, St Petersburg, FL, USA,* ³*Pediatric Plastic Surgery, Johns Hopkins All Children's Hospital, St. Petersburg, FL, USA,* ⁴*Johns Hopkins All Children's Hospital, St. Petersburg, FL, USA*

Purpose: Assess weight-for-age z-score at birth as predictor of 30-day surgical wound complication and resource utilization metrics in term neonates undergoing surgery in the first four weeks of life.

Methods: NSQIP-Pediatric database was queried from 2018–2020 for patients born at ≥ 37 weeks gestation who had surgery ≤ 28 th day of life. Those missing birth weight and/or gender were excluded. Weight-for-age Z-score at birth was calculated using WHO formula. The primary outcome was the 30-day post-operative composite surgical site infection (SSI). Multivariate logistic regression analysis was performed using SAS v9.4; p-value < 0.05 was considered statistically significant.

Results: From the 9,136 term neonates included, 529 (5.8%) developed an SSI. Neonates who developed SSI were significantly younger at surgery (7.76 vs. 9.25 days), longer median operative time (93 vs 74 minutes), increased weight-for-age Z-score at birth (-0.46 vs. -0.63). They also had higher frequency of being inpatient (97.54% vs. 95.33%), having non-elective surgery (57.28 vs. 50.3%) and requiring pre-operative oxygen support (23.63% vs. 18.85%). On multivariate analysis, when compared to patients with Z-score between 0 and -1, significantly higher odds ratio (OR) of developing SSI was seen in those with Z-scores: > 2 OR=3.11 (95%CI 1.87-5.15, $p < 0.001$), 1 to 1.99 OR=1.8 (95%CI 1.29 - 2.52, $p < 0.001$), 0 to 0.99 OR=1.36 (95%CI 1.06-1.75, $p=0.016$), and < -2 OR=1.45 (95%CI 1.08-1.95, $p=0.012$). Systemic inflammatory response syndrome OR=2.20 (95%CI 1.33-3.62), $p=0.02$), operative time (OR=1.002 (95%CI 1.001-1.003, $p < 0.001$), and non-elective cases OR=1.33 (95%CI 1.1-1.6, $p=0.003$) were other independent predictors of increased odds of SSI. Table 1 summarizes the 30-day post-operative outcomes based on Z-score.

Conclusion: Positive or extremely low Z-scores were associated with higher frequency and odds of 30-day post-operative composite SSI. Patients with negative Z-scores at birth trended towards increased length of stay, frequency of need for nutritional and oxygen support at discharge, and mortality.

	< -2 N=1244	-1.99 to -1 N=2206	-0.99 to -0.01 N=2928	0 to 0.99 N=1973	1 to 1.99 N=630	>2 N=155
Composite SSI*	79 (6.35%)	112 (5.08%)	141 (4.82%)	125 (6.34%)	52 (8.25%)	20 (12.9%)
Median Length of stay [days]*	15 (IQR 3-26)	13 (IQR 3-22)	13 (IQR 5-21)	11 (IQR 6-19)	13 (IQR 7-20)	11 (IQR 7-20)
Nutrition supplement at discharge*	155 (12.46%)	196 (8.88%)	219 (7.48%)	122 (6.18%)	34 (5.4%)	14 (9.03%)
Oxygen supplement at discharge*	170 (13.67%)	218 (9.88%)	251 (8.57%)	148 (7.5%)	36 (5.71%)	9 (5.81%)
Readmission	55 (4.42%)	78 (3.54%)	105 (3.59%)	76 (3.85%)	29 (4.6%)	6 (3.87%)
Mortality*	35 (2.81%)	58 (2.63%)	42 (1.43%)	28 (1.42%)	5 (0.79%)	2 (1.29%)

Table 5: 30-Day Post-operative Outcome by Z-Score. (*=p<0.001)

QS 40**THE COST OF DIVERSITY: LANGUAGE BARRIERS IN PEDIATRIC APPENDICITIS**

Brittany Levy, MD¹, Jennifer T. Castle, MD², Wesley S. Wilt, MD¹, Daniel L. Davenport, PhD¹, Eric J. Rellinger, MD¹, David Worhunsky³

¹University of Kentucky, Lexington, KY, USA, ²Department of Surgery, Markey Cancer Center, University of Kentucky, Lexington, KY, USA, ³University of Kentucky, Kentucky Children's Hospital

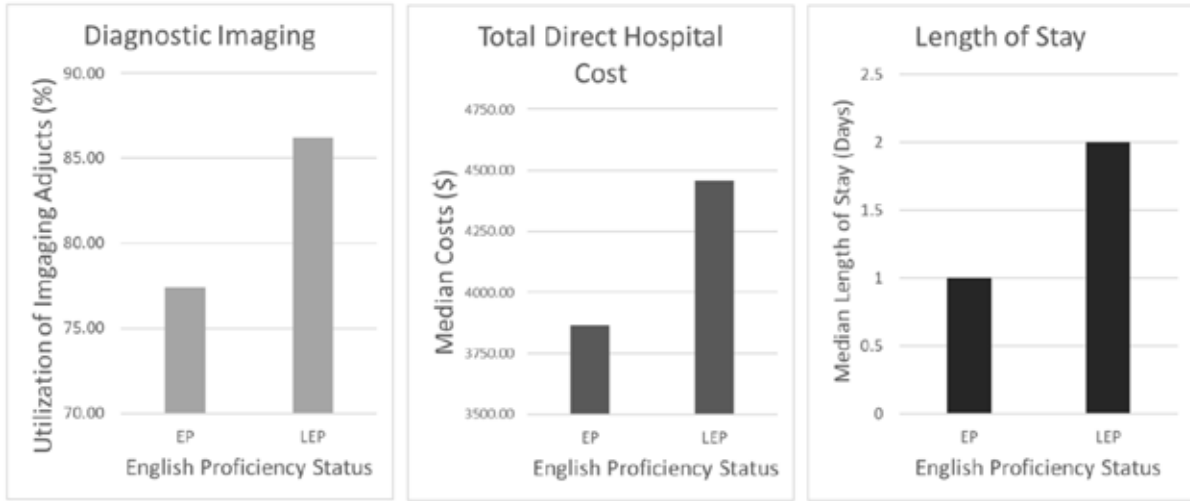
Purpose: Limited English proficiency (LEP) is a risk factor for poor outcomes, both due to medical errors and communication barriers related to healthcare literacy or access. Communication barriers may increase adverse outcomes and lead to higher costs and more imaging studies. This is particularly true in pediatric appendicitis, where patient history is critical in establishing the diagnosis. We hypothesize that LEP leads to higher rates of healthcare utilization in pediatric appendicitis.

Methods: We queried our institutional pediatric-National Surgical Quality Improvement Project database for pediatric patients < 18 years old, receiving an appendectomy from 2011-2021. Patient medical records and hospital billing were merged to obtain primary language, initial hospitalization cost, diagnostic work-up modalities, and operative findings. Patients identifying English as their primary language were termed English proficient (EP), whereby those selecting an alternative primary language made up the LEP cohort. Healthcare utilization outcomes including cost, length of stay (LOS), and imaging usage were compared across cohorts.

Results: 1556 patients were analyzed, whereby 92.4% were EP and 7.6% LEP. Primary languages included English, Spanish, Arabic, Chinese, Japanese, Korean, and Nepali. When compared with the EP cohort, patients with LEP had higher rates of diagnostic imaging (86.2% vs. 77.4%, p=0.039), longer median LOS (1d vs 2d, p< 0.001), and higher median hospital costs (\$3,865 vs \$4459, p=0.001). Imaging costs were also higher in patients with LEP (\$56 vs \$51, p=0.003). We observed higher rates of complicated appendicitis at time of operation in the LEP patients, compared to the EP cohort (38.8% vs 27%, p=0.028). (Figure)

Conclusion: In patients with LEP, language diversity creates a communication barrier resulting in higher rates of healthcare utilization. Significant variations in the cost of care, efficiency of care, and clinical outcomes related to language diversity should be reduced to ensure equitable healthcare delivery to all pediatric surgical patients.

Figure: Healthcare Utilization in Pediatric Appendicitis



QS 41**PRODUCTION OF A NEW AND IMPROVED GUT-ON-A-CHIP**

Adrian Rajab, BS¹, Belgacem Mihi, DVM², Samuel Volpe, BS², Gail E. Besner, MD³

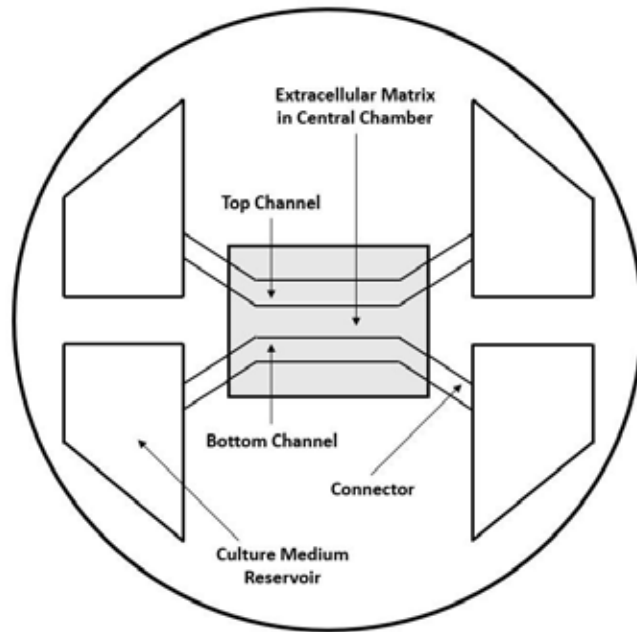
¹Nationwide Children's Hospital, Ohio State University College of Medicine, Columbus, OH, Columbus, OH, USA, ²Nationwide Children's Hospital, Columbus, OH, Columbus, OH, USA, ³Nationwide Children's Hospital, Columbus, OH, USA

Purpose: Translation of investigational drug discovery from bench-to-bedside typically fails due to deficient pre-clinical models, thus there is a need for novel technologies to model human disease. Human organ-on-chip platforms can be reliable alternatives to pre-clinical animal testing and can be used as predictive tools for personalized precision medicine. Our goal is to develop a novel, improved, cost-effective Gut-on-a-Chip that more closely recapitulates complex intestinal anatomy.

Methods: Our Gut-on-a-Chip consists of a central chamber containing 2 channels, connected to 4 peripheral culture medium-containing reservoirs (Fig. 1). The channels and reservoirs were printed using a 3D printer loaded with sacrificial ink. The two channels were covered with a layer of extracellular matrix (ECM) fibrin-PEG gel containing myofibroblasts, to mimic the lamina propria. After embedding the channels in the ECM gel, the chip is cooled to liquify the sacrificial ink, yielding perfusable channels that have connections to the culture medium-containing reservoirs. One channel was seeded with intestinal epithelial cells, and the other with endothelial cells. The reservoirs and channels were filled with culture medium, cultured x48h under static conditions, and then rocked x7d to achieve channel perfusion, which promotes cell expansion and maturation. Medium was replaced daily, and the cells monitored microscopically.

Results: The Gut-on-a-Chip successfully supported the growth of intestinal epithelial cells and endothelial cells in the channels, and myofibroblasts in the ECM. Epithelial and endothelial cells expanded in the channels to form intact cell monolayers, separated by the lamina propria containing viable myofibroblasts.

Conclusions: We have developed a cost-effective and customizable Gut-on-a-Chip that provides a higher degree of tissue complexity than currently available models and is adaptable to a variety of research needs. Future improvements will involve adding additional cell types (immune cells, enteric neurons) as well as the production of a Gut-Brain Chip to mimic the gut-brain axis.



QS 42**THE HYPERINFLAMMATORY STATE: INCREASING PROCLIVITY TO DEVELOP NECROTIZING ENTEROCOLITIS**

Katherine B. Snyder, MD¹, Heather L. Liebe, MD², Camille Schlegel¹, Alena Golubkova, MD², Tyler D. Leiva, MD³, Catherine J. Hunter, MD⁴

¹University of Oklahoma Health Sciences Center, Oklahoma City, OK, USA, ²Oklahoma Children's Hospital, Oklahoma City, OK, USA, ³University of Oklahoma Health Science Center, Oklahoma City, OK, USA, ⁴Oklahoma Children's Hospital, Oklahoma City, OK, OK, USA

Introduction: Necrotizing enterocolitis (NEC) is a devastating disease of premature neonates with significant morbidity and mortality. NEC is associated with prematurity, a hyperinflammatory response, and dysregulation of intestinal barrier function. We hypothesize that patients with NEC or a history of NEC will have a hyperinflammatory intestinal response at baseline compared to those without NEC.

Methods: Intestinal tissue was collected from premature neonates, with and without NEC, undergoing surgical resection. Enteroids were generated from these specimens. The enteroids were treated in triplicate with 100ug/mL lipopolysaccharide (LPS) and subjected to 24 hours of hypoxia to induce experimental NEC and compared with untreated controls. Gene and protein expression were evaluated via RT-qPCR and ELISA respectively. Tumor Necrosis Factor (TNF- α) and interleukin (IL-8) were used as markers to measure inflammatory response. ANOVA testing determined statistical significance ($p < 0.05$).

Results: Enteroids generated from patients with NEC that underwent treatment with LPS + hypoxia expressed significantly higher RNA and protein levels of IL-8 (RTqPCR ($p=0.003$) and ELISA ($p=0.0002$)) when compared to untreated NEC-derived enteroids. There was a significantly higher level of IL-8 demonstrated in NEC-derived enteroids compared to enteroids from normal control patients following LPS+ Hypoxia treatment RT-qPCR ($p=0.024$) with a positive increased trend demonstrated by ELISA. TNF- α levels were significantly elevated in enteroids derived from NEC tissue that underwent treatment compared to untreated NEC-derived enteroids (RTqPCR ($p=0.006$) and ELISA ($p=0.002$)) and compared to enteroids derived from tissue without NEC that underwent treatment seen on RTqPCR ($p=0.025$) and ELISA ($p < 0.0001$).

Conclusion: Enteroids generated from neonates with NEC have an elevated hyperinflammatory response in response to NEC-inducing stimuli compared with controls. This tendency towards a hyperinflammatory state at baseline may be correlated with an infant's proclivity to develop NEC. Further research could lead to strategies to identify at-risk infants and provide treatment.

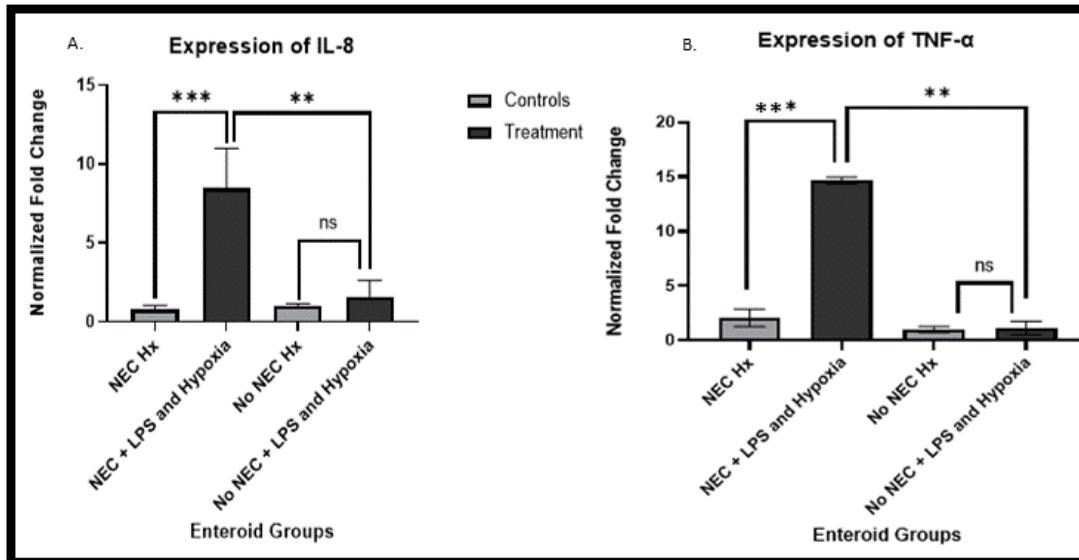


Figure 1: A. Enteroids derived from tissue with NEC that underwent treatment had a significantly increased level of IL-8 as compared to the untreated NEC derived enteroids (p= 0.003). Enteroids derived from tissue with NEC that underwent treatment had a significantly elevated level of IL-8 as compared to enteroids derived from control tissue that underwent treatment (p=0.024).

B. Enteroids derived from tissue with NEC that underwent treatment had a significantly increased level of TNF-α as compared to the untreated NEC derived enteroids (p= 0.006). Enteroids derived from tissue with NEC that underwent treatment had a significantly elevated level of TNF-α as compared to enteroids derived from control tissue that underwent treatment (p=0.025).

There was not a significant increase in the level of IL-8 or TNF-α seen when comparing control enteroids that underwent treatment to those that did not. This suggests that there is a hyperinflammatory response in the enteroids with history of NEC.

*denotes significance, ns=nonsignificant

QS 44**A SCOPING ANALYSIS OF SOCIAL MEDIA UTILIZATION AMONGST PEDIATRIC SURGERY FELLOWSHIP PROGRAMS**

Nikhil R. Shah, MD, Christine G. DeFilippo, BS, Jana DeJesus, MD, Keyan Mobli, MD, Bindi Naik-Mathuria, MD, MPH, Ravi S. Radhakrishnan, MD, MBA

University of Texas Medical Branch, Galveston, TX, USA

Introduction: Social media utilization is rapidly expanding within academic healthcare and graduate medical education. Interactive platforms provide opportunities for institutional outreach, trainee education and applicant recruitment. Its prevalence across many surgical training programs has been widely explored, however its usage in pediatric surgery has yet to be examined. This study aims to quantify the current use of social media by pediatric surgery departments with accredited pediatric surgery fellowship training programs.

Methods: A comprehensive list of US pediatric surgery fellowship programs was obtained from the American Pediatric Surgery Association (APSA) website and associated social media accounts on three platforms, Facebook, Instagram and Twitter, were identified. Authors reviewed every post from each account to quantify posted subject matter within publicly disseminated content. Comparative analysis was performed to explore social media platform utilization in relation to other major surgical training programs, including general surgery, plastic surgery, orthopedic surgery, and otolaryngology.

Results: Of 51 pediatric surgery fellowship programs, 1 (2.0%) had an active Instagram account, 2 (3.9%) had active Facebook accounts, and 23 (45%) had active Twitter accounts. A total of 311 Instagram posts, 581 Facebook posts and 8,479 Twitter posts were compiled for analysis. Across all platforms, most commonly posted content included: research/conference presentations (31.3%), faculty accolades (15.1%), department outreach (11.4%), and trainee wellness (8.7%). Applicant recruitment (5.2%), clinical/operative experience (3.6%), gender diversity (2.4%) and ethnic diversity (2.4%) were among the least commonly posted. Currently, pediatric surgery programs significantly underutilize Facebook and Instagram when compared to general surgery ($p=0.0005$, $p=0.024$ respectively), plastic surgery ($p<0.0001$, $p<0.0001$ respectively) orthopedic surgery ($p<0.0001$, $p<0.0001$ respectively) and otolaryngology, ($p<0.0001$, $p<0.0001$ respectively). There is no difference in Twitter utilization across all specialties.

Conclusion: There is a significant underutilization of social media amongst pediatric surgery fellowship programs, thus highlighting potential opportunities for innovative expansion and implementation.

QS 45**A NATIONAL SURVEY EXPLORING COMMUNICATION AND BIAS AMONG PEDIATRIC SURGEONS**

Ellen M. Reynolds, MD¹, Julia Metzger², Jason C. Fisher, MD³

¹St Lukes Children's Hospital, Boise, ID, USA, ²NYU Grossman School of Medicine,

³Hassenfeld Children's Hospital at NYU Langone, New York, NY, USA

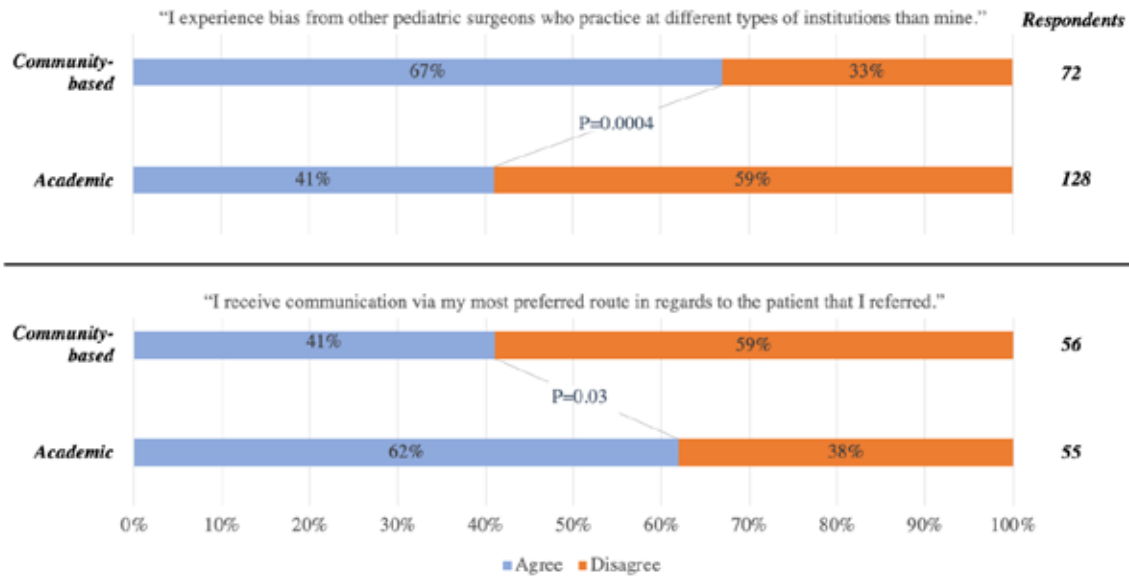
Purpose: Collaboration among pediatric surgeons represents a foundational strength of the specialty and manifests across multiple domains, from patient care to professional development. Unconscious biases among pediatric surgeons undermine this collaboration with wide-ranging consequences, including: (1) impaired communication during complex patient care coordination; and (2) discordance between the needs of diverse pediatric surgical practices and the strategic priorities of their national organizations. We designed a survey to explore the impact of bias on the practice of pediatric surgery.

Method: A REDCap survey was distributed via email to APSA members in July, 2022. Participants were queried regarding communication processes surrounding patient referrals. Bias was explored between surgeons and regarding APSA committee membership, leadership positions, educational opportunities, and major events. Statistical analyses included chi square tests of independence.

Results: We received responses from 239 of 1,443 survey recipients (17%), including 72 community-based pediatric surgeons. Discordance regarding care coordination was observed between the proportion of surgeons believing they initiate appropriate communication (86-95%), versus the proportion reporting they receive high-quality communication (52-60%). 21-30% report experiencing professional bias regarding APSA-related activities, with 57-78% identifying their practice environment as a driver of that bias. Community-based pediatric surgeons were more likely than academic surgeons to experience bias when interfacing with different practice environments (67% vs 41%, $P=0.0004$). Compared to academic-based pediatric surgeons, fewer community-based surgeons reported receiving communication via preferred routes when referring patients to higher levels of care (41% vs 62%, $P=0.03$).

Conclusion: Differences in pediatric surgical practice environments represent a significant driver of professional biases and appear to disproportionately impact community-based surgeons. The impact of bias on pediatric surgical collaboration may be obviated through (1) targeted efforts promoting equitable representation of all practice environments in the leadership composition of pediatric surgical organizations, and (2) systematic frameworks that promote reliable communication around pediatric surgical care coordination.

Practice environment influences how pediatric surgeons experience bias and receive communication



QS 46**DISCHARGE ANTIBIOTICS IN PEDIATRIC PERFORATED APPENDICITIS: AN UNNECESSARY BURDEN?**

Su Yeon Lee, MD¹, Kathleen E. Doyle, MD¹, Emily Byrd, MD, PhD¹, Monalisa Hassan, MD¹, Zoe M. Saenz, MD¹, Minna Minsing Chen Wieck, MD, FACS², Jonathan Kohler, MD³, Shinjiro Hirose, MD⁴, Payam Saadai, MD⁴, Erin G. Brown, MD⁴

¹UC Davis Medical Center, Sacramento, CA, USA, ²University of California Davis, USA, ³University of Wisconsin, Madison, WI, USA, ⁴University of California, Davis Medical Center, Sacramento, CA, USA

Introduction: There is growing evidence for limiting use of antibiotics in complicated appendicitis after surgical source control to decrease antibiotic resistance and antibiotic-related complications. Our institutional clinical practice guidelines (CPG) for appendicitis were modified such that patients meeting symptom-based discharge criteria were discharged without checking for leukocytosis and without antibiotics. We hypothesized that fewer patients would have antibiotic-related complications without an increase in surgical infection.

Methods: Patients under 18 years old with perforated appendicitis who underwent laparoscopic appendectomy between August 1, 2020 and August 31, 2022 at a tertiary children's hospital were included. Patients were excluded if they had >7-day length of stay (LOS), development of intraabdominal abscess prior to discharge, or received antibiotics upon discharge unrelated to appendicitis. Pre- and post-CPG modification outcomes were compared. Primary outcomes were adverse events including post-discharge surgical site infection (SSI), antibiotic-related complications and 30-day emergency department (ED) visit and readmissions. Fisher's exact and Mann Whitney U tests were used.

Results: 168 patients were included: 108 patients pre-modification and 60 patients post-modification. Compliance to the post-CPG modification was 97.4%, and only 1 patient was discharged with antibiotics. Hospital LOS was similar pre and post (3.7 vs. 3.9 days, p=0.46). There was no significant difference in post-discharge SSI rate (11.1% vs. 6.4%, p = 0.39), 30-day ED visits (16.5% vs 15.9%, p=1.00) or readmissions (9.2% vs. 12.7%, p=0.61). There was no significant difference in antibiotic-related complications with only 1 patient developing *Clostridium difficile* infection in the pre-CPG modification cohort (0.9% vs. 0%, p=1.0).

Conclusion: A modification to eliminate discharge antibiotics and white blood cell count for patients meeting discharge criteria was successfully implemented with high compliance and an expected decrease in antibiotics prescribed at discharge. SSI rates and other adverse events were not significantly increased.

	Pre-CPG (n=108)	Post-CPG (n=60)	p-value
Length of stay, days: median (IQR)	3.9 (3.0-5.0)	3.7 (2.7-5.0)	0.46
Inpatient antibiotic duration, days: median (IQR)	3.9 (3.0-5.0)	3.7 (2.6-5.0)	0.32
Discharged without antibiotics: n (%)	0 (0-0)	0 (0-0)	0.004
Discharge antibiotics duration, days: median (IQR)	4.1 (3.0-6.0)	3.7 (2.6-5.0)	0.005
Post-discharge SSI: n (%)	7 (6.5)	7 (11.7)	0.26
Post-discharge intervention: n (%)	4 (3.7)	6 (10)	0.17
Post-discharge <i>Clostridium difficile</i> infection: n (%)	1 (0.9)	0 (0)	1.00
30-day ED visit: n (%)	18 (16.5)	10 (15.9)	1.00
30-day readmission: n (%)	10 (9.2)	8 (12.7)	0.61

Outcomes of Pediatric Patients with Perforated Appendicitis Before and After Clinical Practice Guideline Modification

QS 47**USING QUALITY IMPROVEMENT METHODOLOGY TO IMPROVE STANDARDIZED REPORTING OF PEDIATRIC THYROID ULTRASOUNDS USING TI-RADS**

Ameer Al-Hadidi, MD¹, Lamy Atweh, MD², Jasmeet Singh³, Reham Alzahrani, MD³, Kelly Kersey³, Adam Bobbey, MD³, Robert Hoffman, MD³, Summit Shah, MD², Jennifer H. Aldrink, MD⁴

¹Nationwide Children's Hospital, Bloomfield Hills, MI, USA, ²Nationwide Children's Hospital, Columbus, OH, USA, ³Nationwide Children's Hospital, ⁴The Ohio State University College of Medicine, Nationwide Children's Hospital, Columbus, OH, USA

Purpose: The process of evaluating pediatric thyroid nodules at our institution was inconsistent with minimal multi-disciplinary coordination. A high rate of negative biopsies were identified, raising concern on patient selection for biopsy. Our aim was to institute a standardized risk stratification system for thyroid nodules to increase the utilization and accuracy of TI-RADS scoring and reporting at our institution from a baseline of 0% to 80% by January 2022 and to sustain for six months.

Methods: Data was extrapolated from January 2019 to July 2021. A standardized TI-RADS dictation template was created. Ultrasound technician training was performed to standardize acquisition of ultrasound images. Two training programs for radiologists and referring clinicians were held and a monthly thyroid multi-disciplinary conference was initiated. Process and outcomes measures were analyzed before and after the initiation of the interventions.

Results: From January 2019 to January 2021, 218 patients had a thyroid ultrasound performed at our institution. TI-RADS was utilized in 0% (0 of 57) of children in the four months prior to the standardized dictation template. Once the TI-RADS dictation template was created, utilization increased to 65% (39 of 60) over 5 months. Utilization further increased to 100% after the first TI-RADS training conference and remained consistent over 16 months (101 of 101). Ultrasound reports were accurately scored in 46.7% (28 of 60) of children initially. Accuracy of scoring improved to 71.4% (10 of 14) in the 3 months following the first training conference and improved to 78.4% (58 of 74) over 12 months after a second training conference. Reports scored accurately was maintained at 80% in the following 6 months.

Conclusions: We conclude the creation of a standardized dictation template improved utilization of TI-RADS reporting. Technician and provider training on the acquisition and interpretation of imaging significantly improved the accuracy of scored reports.

QS 48**A PROCESS IMPROVEMENT PROJECT TO INCREASE COMPLIANCE WITH CEPHALOSPORIN-BASED SURGICAL PROPHYLAXIS IN CHILDREN WITH NON-SEVERE PENICILLIN ALLERGIES**

Katherine He, MD, MS, Michele Dawson, CPHQ, Crystal Stroh, MSN, RN, CPN, Kristina M. Taylor, BS, BSN, RN, Susan Quigley, RN, BSN, Mari M. Nakamura, MD, MPH, Sarah Jones, PharmD, BCPS, Shawn J. Rangel, MD, MSCE

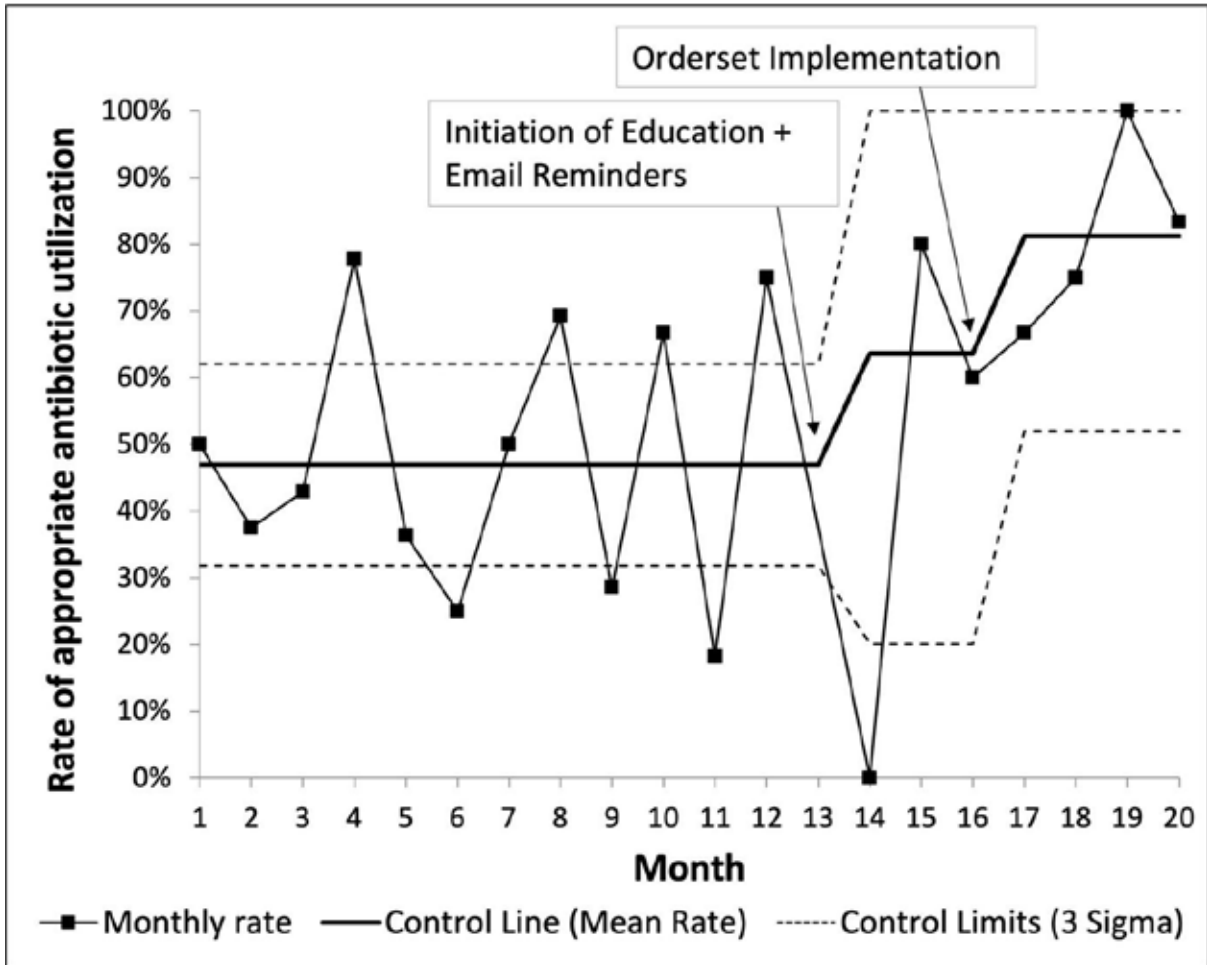
Boston Children's Hospital, Boston, MA, USA

Purpose: Cephalosporins are considered safe and first-line prophylaxis in children with non-severe penicillin allergies. Use of second-line agents is common, however, and primarily driven by poor allergy documentation and misunderstanding of cross-reactivity risk. The goal of this project was to improve compliance with cephalosporin prophylaxis in this cohort of children.

Methods: A multidisciplinary working group including representatives from surgery, infectious disease, and pharmacy was established to develop interventions to facilitate compliance with cephalosporin prophylaxis. These included: (1) Development of a decision-support algorithm for prophylaxis use in penicillin-allergic patients, (2) Standardized educational resources for algorithm use with cross-reactivity evidence (Powerpoint presentation for surgical faculty and emails sent to trainees with readback/feedback confirmation), (3) Caregiver outreach to clarify incomplete allergy documentation, and (4) Email reminders with prophylaxis recommendations sent out to attending surgeons prior to scheduled cases. EMR-based decision support during the antibiotic ordering process was implemented four months later. Rates of complete allergy documentation and cephalosporin utilization were compared for scheduled general surgery procedures between a 13-month pre-intervention and 7-month post-intervention period.

Results: 519 patients with penicillin allergies were included (318 pre-intervention and 201 post-intervention), 51.5% of which received prophylaxis. In the post-intervention period, complete documentation of allergic reactions increased from 56.9% to 68.7% ($p=0.01$). A 73% relative increase ($p=0.03$) in cephalosporin utilization was observed in the post-intervention period, with an initial increase in utilization rate from 46.9% to 63.6% following the first set of interventions and a further increase to 81.2% after implementation of EMR ordering support.

Conclusion: Compliance with cephalosporin prophylaxis significantly improved following a multidisciplinary effort targeting education, allergy documentation, and clinical support at the point of care. Ongoing efforts as part of the Plan-Do-Study-Act process include postoperative audits within 24 hours for noncompliant cases to identify and root cause persistent drivers of noncompliance.



QS 49**MESENCHYMAL DEVELOPMENT IS ENHANCED BY INNERVATION OF TRANSPLANTED HUMAN INTESTINAL ORGANOIDS**

Andie C. Dorn¹, Eoin P. McNeill, PhD¹, David J. Sequeira¹, Partha S. Chakraborty, MD¹, Justin E. Lewis¹, Hasen Xue, MD¹, Scott D. Olson, PhD², Allison L. Speer, MD¹

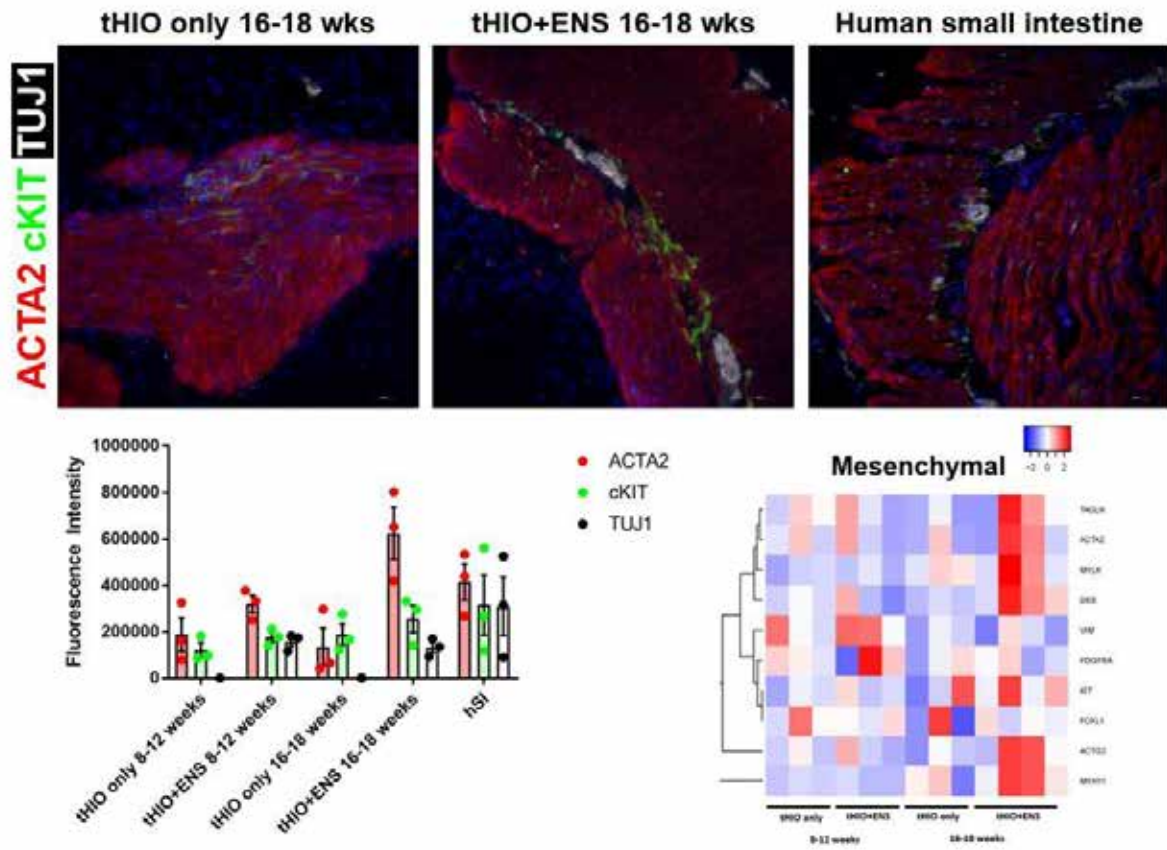
¹McGovern Medical School at UTHealth, Houston, TX, USA, ²McGovern Medical School at the University of Texas Health Science Center at Houston, Houston, TX, USA

Purpose: Tissue-engineered intestine derived from human intestinal organoids (HIOs) is a promising alternative therapy for short bowel syndrome. In this study, we sought to determine if innervation of transplanted HIOs (tHIOs) enhanced mesenchymal development, including components of the SIP syncytium, such as smooth muscle cells (SMCs) and interstitial cells of Cajal (ICCs), which are known to interact with the enteric nervous system (ENS).

Methods: HIOs and enteric neural crest cells (ENCCs) were generated in vitro from hESCs. HIOs±ENCCs were co-cultured for 28-40 days in vitro before transplantation under the kidney capsule of NSG mice for 8-12 weeks or 16-18 weeks. Human small intestine (hSI) was obtained from pediatric patients enrolled in our IRB approved biobank to serve as positive controls. Tissue underwent H&E and immunofluorescent (IF) staining. Muscular development was graded based on H&E. RNA was isolated and analyzed by RNAseq. Two-way hierarchical clustering of a curated list of mesenchymal genes was performed.

Results: IF staining confirmed the presence of two SIP syncytium components, ACTA2 positive SMCs and cKIT positive ICCs in all tHIOs (Figure 1A). 16-18 week tHIOs+ENS demonstrated significantly higher expression of ACTA2 vs tHIOs without ENS (Figure 1B). H&E revealed higher muscular grades in tHIOs+ENS vs tHIOs without ENS. Two-way hierarchical clustering demonstrated that tHIOs clustered based on the presence of the ENS as well as age for a curated list of mesenchymal genes (Figure 1C). The hierarchical distance between groups was calculated and showed that 16-18 week tHIO+ENS ($p=0.0029$), 16-18 week tHIO-ENS ($p=0.0106$), and 8-12 week tHIO+ENS ($p=0.0397$) were all significantly different from 8-12 week tHIO-ENS.

Conclusions: These results suggest that the presence of the ENS enhances mesenchymal development in HIOs. Future studies will investigate whether this improvement in mesenchymal development translates to enhanced function, such as ENS and SIP syncytium dependent intestinal motility.



QS 50**CILIARY-MEDIATED HEDGEHOG SIGNALING UNDERLYING MECHANICAL INTESTINAL LENGTHENING**

Siavash Shariatzadeh, MD, MPH¹, Katherine Portelli¹, Jun-Beom Park¹, Anne-Laure A. Thomas, MS², James C.Y. Dunn, MD, PhD²

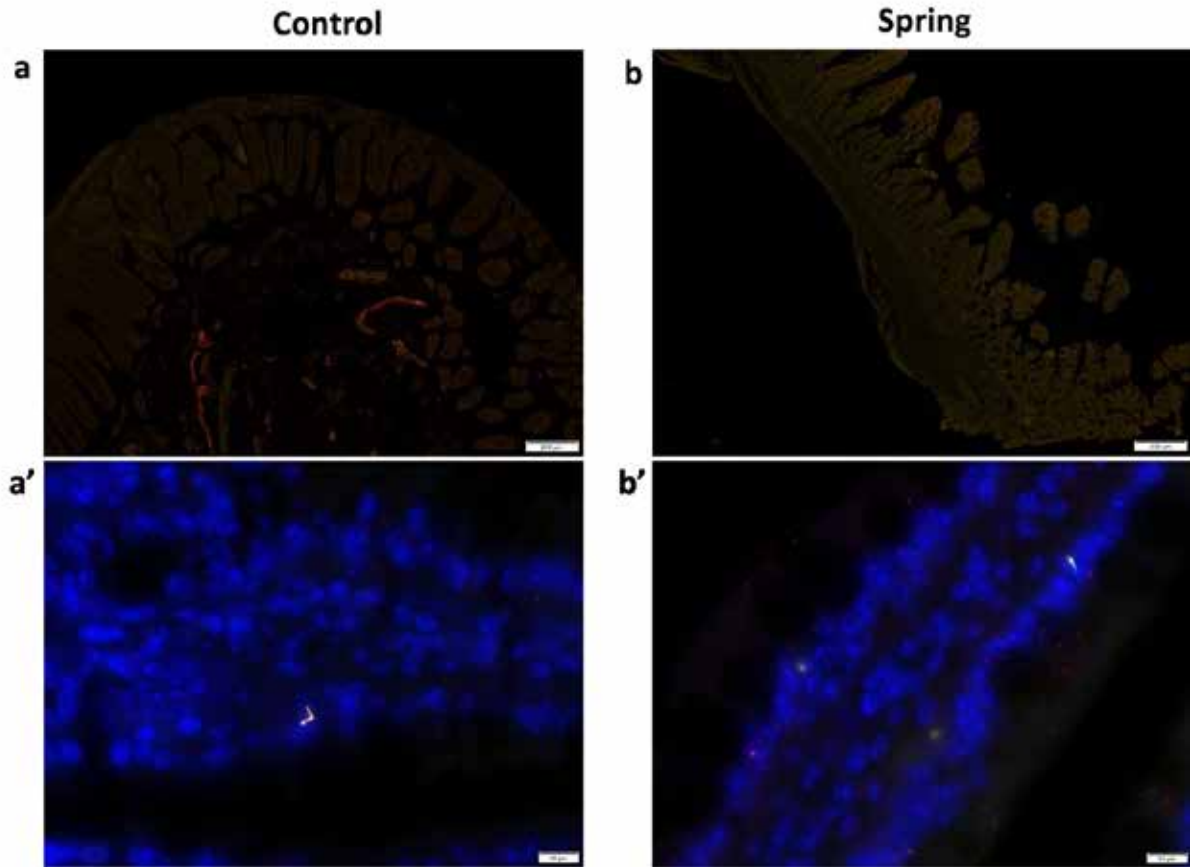
¹Stanford School of Medicine, Stanford, CA, USA, ²Stanford University School of Medicine, Stanford, CA, USA

Purpose: Mechanistic understanding of intestinal lengthening through distraction enterogenesis may be useful for patients with short bowel syndrome. Primary cilium is a mechanosensory organelle that serves as the central signaling hub for transduction of the Hedgehog pathway. The Hedgehog pathway directs cell proliferation to pattern the radial and longitudinal formation of the intestinal lumen. In this study, we aim to elucidate how primary cilia and Hedgehog pathway contribute to spring-induced intestinal lengthening.

Method: Nitinol springs were inserted into a segment of jejunum of C57BL/6 mice (N=7). Segment lengths were measured at initial spring placement and at sacrifice after 14 and 21 days. Institutional Animal Care and Use Committee (IACUC) approval has been obtained. Histology and gene expression of the spring-treated segments were compared to untreated control segments at scarification. Primary cilia were counted in 24-30 randomly selected fields of each sample using immunofluorescence. A t-test or one-way ANOVA was used to analyze the differences and the p-value ≤ 0.05 was considered statistically significant.

Results: The spring-treated segments lengthened by an average of 60% compared to the control segments. The number of primary cilia was significantly increased in the lengthened intestinal segments, as shown in the figure. The expression of the Sonic Hedgehog gene, as the initiator of the pathway, was increased 29.6 and 12.1 times in the lengthened intestine after 14 and 21 days respectively. The Gli1 gene's expression, as an endpoint transcriptional factor, was likewise increased 6.6 and 5.5 times following 14 and 21 days.

Conclusion: We demonstrated that spring distraction enterogenesis induces the composition of primary cilia and activates Hedgehog signaling pathway. This suggests a potential mechanism by which the spring-mediated mechanical force is transduced to cell proliferation and tissue formation. This knowledge of distraction enterogenesis may serve as a therapeutic target for patients with short bowel syndrome.



Quick Shots and Posters III: Fetal, Cancer, Colorectal

5:00 PM – 6:30 PM

QS 51**PRIMING OF NATURAL KILLER CELLS WITH NEUROBLASTOMA CELLS ENHANCES NATURAL KILLER CELL RELEASE OF GRANZYME B**

Colin H. Quinn, BS¹, Janet R. Julson, MD², John Laue³, Jerry E. Stewart, BS¹, Elizabeth A. Beierle, MD¹

¹*Division of Pediatric Surgery, Department of Surgery, University of Alabama at Birmingham, Birmingham, AL, USA,* ²*University of Alabama at Birmingham, Birmingham, AL, USA,*

³*University of Alabama at Birmingham Heersink School of Medicine, Birmingham, AL, USA*

Purpose: The use of natural killer (NK) cells for neuroblastoma therapies has proven challenging, due, in part, to the immunosuppressive tumor microenvironment associated with neuroblastoma. Human NK92 MI cells are NK cells that maybe expanded ex vivo and could serve as a cell-based immunotherapy for neuroblastoma. We demonstrated that NK92 MI primed with a previous environmental stimulus are more cytotoxic to neuroblastoma cells than non-primed (naïve) NK92 MI cells. Since NK cells kill tumor cells by releasing granzyme B from preformed vesicles, we hypothesized that the priming mechanism increases the release of granzyme B by NK92 MI cells thereby enhancing their cytotoxicity.

Methods: NK92 MI cells were primed for 24 hours with either SK-N-AS or SK-N-BE(2) human neuroblastoma cells, at effector to target (E:T, NK cell:neuroblastoma cell) ratios of 10:1 and 20:1, respectively. Primed or naïve NK cells were co-cultured with their respective priming neuroblastoma cell lines. Cell surface expression of CD107a, a marker for granzyme B degranulation, was analyzed via flow cytometry. Naïve NK92 cells not primed with neuroblastoma cells served as a baseline control.

Results: Primed NK92 MI cells had significantly higher levels of cell surface expression of CD107a compared to naïve NK92 MI cells. NK92 MI cells primed with SK-N-AS had nearly double the expression in comparison to naïve (Figure 1A). NK92 MI primed with SK-N-BE(2) had almost four times greater expression than the naïve NK cells (Figure 1B).

Conclusions: We demonstrated that NK92 MI cells primed with neuroblastoma cells release more granzyme B compared to the unprimed cells. These findings suggest that priming improves NK92 MI function by increasing their granzyme B degranulation capacity. This knowledge is critical to understanding the basic principles to NK cell priming and the potential, NK92 MI cells could have as immunotherapy for neuroblastoma.

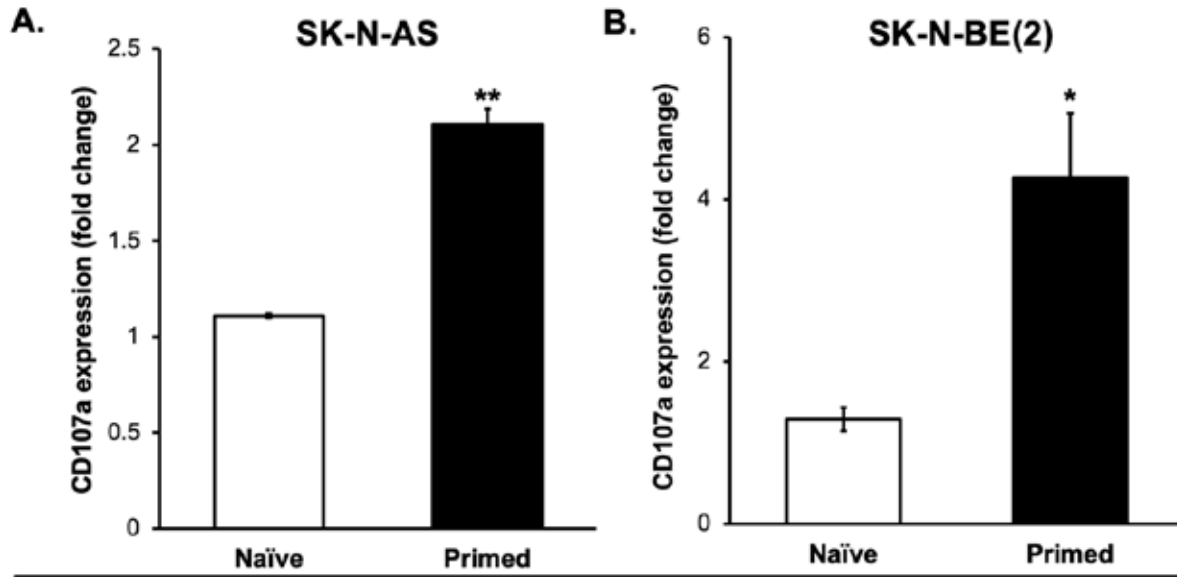


Figure 1: CD107a cell surface expression was measured on naïve and primed NK92 MI cells via flow cytometry. (A) Following co-culture with SK-N-AS cells, primed NK92MI had nearly double the expression of CD107a in comparison to the naïve cells. (B) Primed NK92 MI cells to SK-N-BE(2) also had significantly more CD107a expression with nearly four times the amount in comparison to the naïve. * $p < 0.05$, ** $p < 0.01$

QS 52**A NOVEL METHOD OF ULTRASOUND-GUIDED IN-UTERO INJECTION TO COLONIZE MOUSE EMBRYONIC INTESTINE WITH THE HUMAN GUT MICROBIOME**

Koichi Tsuboi, MD¹, David J. Hackam, MD, PhD², Chhinder P. Sodhi¹, William B. Fulton¹, Sanxia Wang¹, Peng Lu¹, Thomas Prindle¹, Steve Steinway, MD, PhD³, Hannah Moore¹, Hee-Seong Jang, PhD³, Johannes Duess, MD, Ph.D.¹, Menghan Wang⁴, Carla M. Lopez, MD¹, Maame Sampah, MD, PhD⁵, Daniel J. Scheese, MD, MBS³, Zachariah Raouf⁶, Asuka Ishiyama¹

¹Johns Hopkins University School of Medicine, Baltimore, MD, USA, ²Johns Hopkins Children's Center, Baltimore, MD, USA, ³Division of Pediatric Surgery, Department of Surgery, Johns Hopkins University School of Medicine, Baltimore, MD, USA, ⁴Johns Hopkins University, Baltimore, MD, USA, ⁵Johns Hopkins School of Medicine, Baltimore, MD, USA, ⁶The Johns Hopkins Hospital, Baltimore, MD, USA

Purpose: Inflammatory conditions in the premature infant, including necrotizing enterocolitis, may be mediated in part by bacterial signaling in the developing intestine in utero. Our ability to study in utero bacterial signaling in animal models is limited by an inability to precisely deliver human inflammatory bacteria to the developing intestine. We sought to develop a novel technique of human bacterial injection into the developing intestine in mice in utero and determined the effects on gut inflammation and development.

Methods: Inflammatory bacteria was derived from human infants with NEC, and injected in utero into the C57BL/6 mouse intestine at e15.5 by microinjection with the Nanoject II, (Drummond Scientific. Co., USA) under backscatter ultrasound guidance (Vevo 3100LT, Visualsonics) using a linear array transducer (MX550D, 25-55MHz). 48 hours later, intestinal samples from injected embryos were subjected to bacterial 16S analysis to determine the presence and types of bacteria. Inflammatory cytokine expression (of Tnf- α) and intestinal development were evaluated by qPCR. Ex vivo cell culture was then performed from intestine specimens to investigate the colonization of bacteria.

Results: All mice survived the in utero injection. 16s analysis by quantification of 16s PCRs relative expression values in the stomach (5230.2+2252), ileum (5485.263+5214) to colon (14421.66+1085) revealed the presence of bacteria in the whole fetal intestine. Furthermore, the ex vivo culture revealed the presence of bacteria. Strikingly, the expression of the inflammatory cytokine (Tnf- α) was significantly higher (35.4 vs. 4.3, p< 0.001) and goblet cell differentiation was significantly lower (Muc II, 38.3 vs 61.5, p< 0.05) in the injected intestine, revealing that bacterial signaling increases inflammation and impairs gut development.

Conclusion: We have developed a novel technique of ultrasound-guided injection of human NEC bacteria into the developing mouse intestine, leading to increased inflammation and reduced maturation, suggesting novel insights into the development of inflammation in the premature host.



QS 53**TRANSAMNIOTIC STEM CELL THERAPY (TRASCET) MODULATES UTERINE NATURAL KILLER CELL ACTIVITY IN A MODEL OF INTRAUTERINE GROWTH RESTRICTION (IUGR)**

Ashlyn E. Whitlock, MD¹, Kamila Moskowitsova, MD², Ina Kycia, PhD³, David Zurakowski, MS, PhD⁴, Dario O. Fauza, MD, PhD³

¹*Boston Children's Hospital, Harvard Medical School, Brookline, MA, USA*, ²*Boston Children's Hospital, Harvard Medical School, Boston, MA, USA*, ³*Boston Children's Hospital, Department of Surgery, Boston, MA, USA*, ⁴*Boston Children's Hospital, Department of Anesthesia, Critical Care, and Pain Medicine Research, Boston, MA, USA*

Purpose: Intrauterine Growth Restriction (IUGR) pathophysiology is driven by abnormal uterine natural killer cell (uNK) activity leading to placental dysfunction. Transamniotic stem cell therapy (TRASCET) with mesenchymal stem cells (MSCs) can reverse several effects of experimental IUGR by mechanisms not fully understood. We sought to examine TRASCET's effects in downstream products of uNKs in a model of IUGR.

Methods: Fifteen time-dated Sprague-Dawley dams were exposed to alternating hypoxia (10.5% O₂) from gestational-day 15 (E15) until term (E21). Fetuses (n=189) were divided into 4 groups. One group remained untreated (n=52), while three groups received volume-matched intra-amniotic injections of either saline (sham; n=44), or a suspension of amniotic fluid-derived MSCs, either in their native state (TRASCET; n=50) or "primed" by exposure to pro-inflammatory cytokines (TRASCET-Primed; n=43). Normal fetuses served as controls (n=33). At term, various analyses were performed, including ELISA of surrogates of local inflammation and uNK activity. Statistical comparisons included Bonferroni-adjusted criterion.

Results: Overall survival from hypoxia was 74% (140/189). Placental efficiency was lower in untreated and sham but normalized in both TRASCET groups (p< 0.001-0.469). IL-17, a stimulator of uNK cells, was elevated from normal in all groups (p< 0.001 for all). IFN- γ , released from activated uNK cells, was elevated in all groups except sham, but lower than the untreated in both TRASCET groups (p< 0.001-0.062). TNF- α , also produced by uNKs, was elevated in untreated and sham (p< 0.001 for both), but normalized by TRASCET (p=0.054) and even lowered from normal in TRASCET-Primed (p< 0.001). VEGF, also released by uNKs, was elevated in untreated and sham but lower than normal in both TRASCET groups (p< 0.001 for all).

Conclusions: TRASCET with MSCs modulates the activity of placental uNK cells in experimental IUGR, with distinct effects on their downstream products. This mechanistic insight may inform the development of novel strategies for the management of this disease.

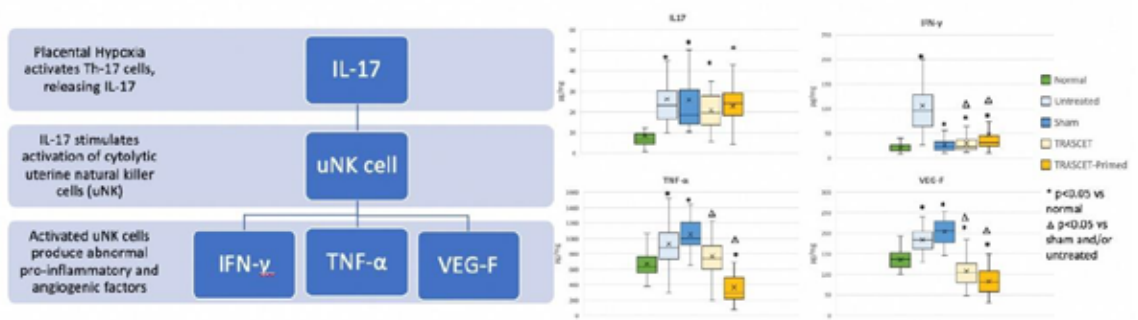


Figure: Left: pathophysiology of upstream signaling (IL-17) and downstream products (IFN- γ , TNF- α , and VEG-F) of uterine natural killer cells (uNK) associated with the placental dysfunction of IUGR. Right: placental levels of IL-17, IFN- γ , TNF- α , and VEG-F in the four experimental groups and in normal controls.

QS 54**PROSPECTIVE VALIDATION OF HIRSCHSPRUNG-ASSOCIATED ENTEROCOLITIS SCORING SYSTEMS**

Ruth Lewit, MD, MPH¹, Lauren Camp², Lawrence Willis, MD³, Joseph Tobias, MD⁴, Rebecca Peil, FNP⁴, Andrew Mason, MA⁵, Elisa Ornelas⁶, Madelyn Hill, MPH⁷, Arturo Aranda, MD⁸, Ashish Chogle⁶, Yigit Guner, MD, MS⁹, Andrew Zigman, MD CM¹⁰, Ankush Gosain, MD, PhD¹¹

¹Le Bonheur Children's Hospital, Augusta, GA, USA, ²Le Bonheur Children's Hospital, ³University of Tennessee Health Science Center, Le Bonheur Children's Hospital, Memphis, TN, USA, ⁴Oregon Health and Science University, Portland, OR, USA, ⁵Oregon Health and Science University, Beaverton, OR, USA, ⁶Children's Hospital of Orange County, Memphis, TN, USA, ⁷Division of Pediatric Surgery, Dayton Children's Hospital, Wright State University, Dayton, OH, USA, ⁸Dayton Children's Hospital, Dayton, OH, USA, ⁹Children's Hospital of Orange County and University of California Irvine, Orange, CA, USA, ¹⁰NW Permanente, OHSU/ Doernbecher Children's Hospital, Portland, OR, USA, ¹¹Le Bonheur Children's Hospital, Memphis, TN, USA

Purpose: A novel scoring system was recently described by Lewit, Veras, et al. in 2021 to aid in the diagnosis of Hirschsprung-Associated Enterocolitis (HAEC). This study sought to re-validate the newly developed HAEC scoring system and compare it to existing Pastor and Frykman scoring systems.

Methods: Prospective, multi-institutional data collection was performed. For each patient, all encounters were analyzed. Data included demographics, symptomatology, physical examination, laboratory and radiographic findings, and treatments received. A "true" diagnosis of HAEC was defined as receipt of treatment with rectal irrigations, antibiotics, and bowel rest. Scoring systems were compared by calculating sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and area under the curve (AUC) for receiver operator curves.

Results: Four centers provided data on 95 patients with 294 encounters including 98 HAEC episodes. Patients were primarily male (88%), Caucasian (48%) and non-Hispanic (82%). Fifty-four patients (57%) had at least one episode of HAEC. Of the 98 episodes of HAEC based on treatments received, only 19 (19.4%) had a diagnosis of HAEC documented in the patient chart. The 2009 Pastor scoring system had sensitivity 38.8%, specificity 96.9%, PPV 86.4%, NPV 76.0%, AUC 0.679, and an odds ratio (OR) associated with HAEC of 20.06 (CI 8.66-54.89, $p < 0.0001$). The 2018 Frykman scoring system had sensitivity 42.9%, specificity 92.4%, PPV 73.7%, NPV 76.4%, AUC 0.676, and OR 9.05 (CI 4.77-18.02, $p < 0.0001$). The 2021 Lewit/Veras scoring system had sensitivity 42.9%, specificity 94.9%, PPV 80.8%, NPV 76.9%, AUC 0.689, and OR 13.95 (CI 6.82-31.09, $p < 0.0001$). The Pastor and Lewit/Veras scores each maximized 3/6 parameters (sensitivity, specificity, PPV, NPV, OR, AUC) [Table].

Conclusion: All scoring systems performed similarly in this prospectively collected data set. The Lewit/Veras scoring system, which requires fewer data elements than the Pastor system, may provide the highest utility in clinical practice.

System	Sensitivity	Specificity	PPV	NPV	OR	AUC
2009 Pastor	38.8	96.9	86.4	76.0	20.06	0.679
2018 Frykman	42.9	92.4	73.7	76.4	9.05	0.676
2021 Lewit/Veras	42.9	94.9	80.8	76.9	13.95	0.689

Table 1: Comparison of HAEC Scoring Systems

QS 55**NEURODIVERGENT PATIENTS WHO UNDERGO MALONE APPENDICOSTOMY ACHIEVE FECAL SOCIAL CONTINENCE IN THE SAME AMOUNT OF TIME AS NEUROTYPICAL PATIENTS**

Shimon E. Jacobs, MD, Laura Tiusaba, MD, Elizaveta Bokova, MD, Teresa Russell, MS, Athanasios Tyraskis, MD, Christina Feng, MD, Briony K. Varda, MD, MPH, Marc A. Levitt, MD, Andrea T. Badillo, MD

Children's National Hospital, Washington, DC, USA

Purpose: Antegrade continence enema (ACE) is an effective management option in patients with functional constipation and soiling who have failed medical management with laxatives or rectal enemas. We examined the difference in time to improvement of constipation and soiling between neurodivergent and neurotypical patients.

Method: We retrospectively reviewed all patients less than 21 years of age referred to a single institution between 1/2020 and 9/2022 for functional constipation after failed medical management who subsequently underwent an ACE procedure. Patients were considered clean if they had less than 1 stool accident per week.

Results: Of the 51 patients (median age 9.9 years at time of surgery) with medically refractory functional constipation who underwent ACE creation, 36 (71%) were neurodiverse, including 18 (50%) patients with an anxiety disorder, 13 (36%) with attention deficit hyperactivity disorder, 11 (31%) with autism spectrum disorder, and 2 (5.6%) with Trisomy 21. The remaining 15 (29%) patients were neurotypical.

There was no difference in the presenting symptoms of soiling and constipation between the neurodivergent (23/31 74%) and neurotypical (13/20 65%) cohorts. As for soiling treatment, the median time to become clean was statistically the same in the neurodivergent and neurotypical patients (1.7 months and 1.3 months, respectively (log-rank p=NS) (Figure 1). This success was maintained at 90% (28/31) for longer term follow-up (median 8.7 months). Likewise for constipation-only there was no difference in time to resolution of symptoms among 10/13 (77%) neurodivergent vs. 6/7 (86%) neurotypical patients (p=NS).

Conclusion: Pediatric patients with medically refractory constipation in this series had a high rate of neurodiversity. Antegrade flushes are an effective option for them with a high rate of quick resolution of constipation and soiling and good long-term maintenance. This was equally true in both neurodiverse and neurotypical patients.

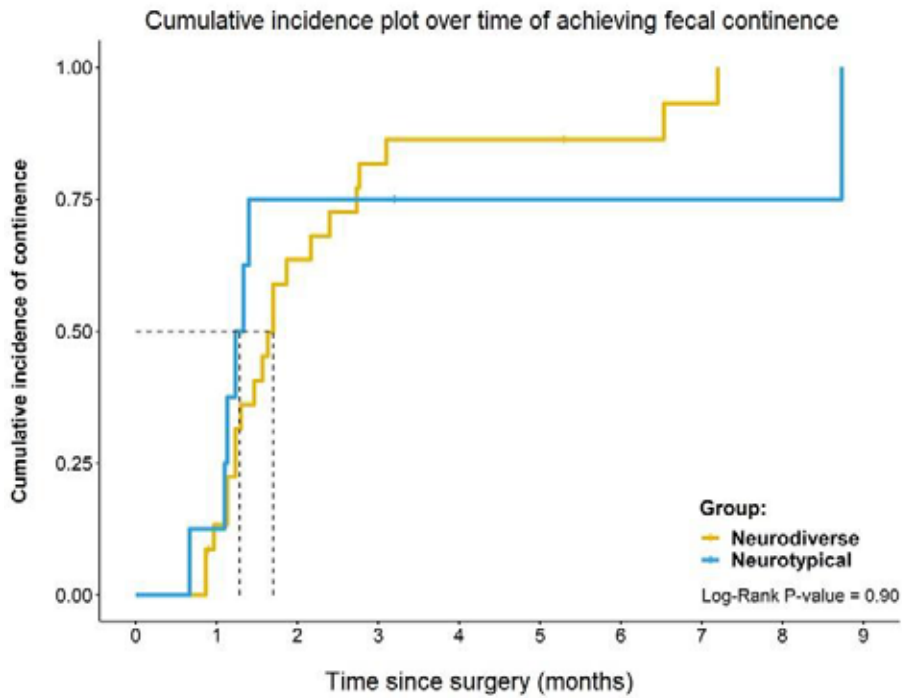


Figure 1. Cumulative incidence plot (1 minus Kaplan-Meier survival curve) of patients achieving fecal continence over time after Malone appendicostomy, by behavioral group

QS 56**CONTEMPORARY MANAGEMENT OF CONGENITAL DIAPHRAGMATIC HERNIA REPAIR:
A SURVEY OF PEDIATRIC SURGEONS**

Christina M. Theodorou, MD¹, Manisha Bhatia, MD MPH², Mary T. Austin, MD, MPH³, Brian W. Gray, MD⁴, Rebecca A. Saberi, MD⁵, Payam Saadai, MD⁶, Darrell Cass, MD⁷, Rony Marwan, MD⁸

¹UC Davis Medical Center, SACRAMENTO, CA, USA, ²Indiana University School of Medicine Department of Surgery, Indianapolis, IN, USA, ³McGovern Medical School at the University of Texas Health Science Center at Houston, Houston, TX, USA, ⁴Division of Pediatric Surgery, Department of Surgery, Indiana University School of Medicine, Indianapolis, IN, USA, ⁵DeWitt Daughtry Family Department of Surgery, Division of Pediatric Surgery, University of Miami Miller School of Medicine, Miami, FL, USA, ⁶University of California, Davis Medical Center, Sacramento, CA, USA, ⁷Cleveland Clinic, ⁸University of Missouri, Columbia, MO, Greenwood Village, CO, USA

Purpose: There are several surgical approaches to large CDH defects, and the current practice patterns are not well known. We aimed to characterize the contemporary management of CDH repair, focusing on the choice of patch or muscular flap for large defects.

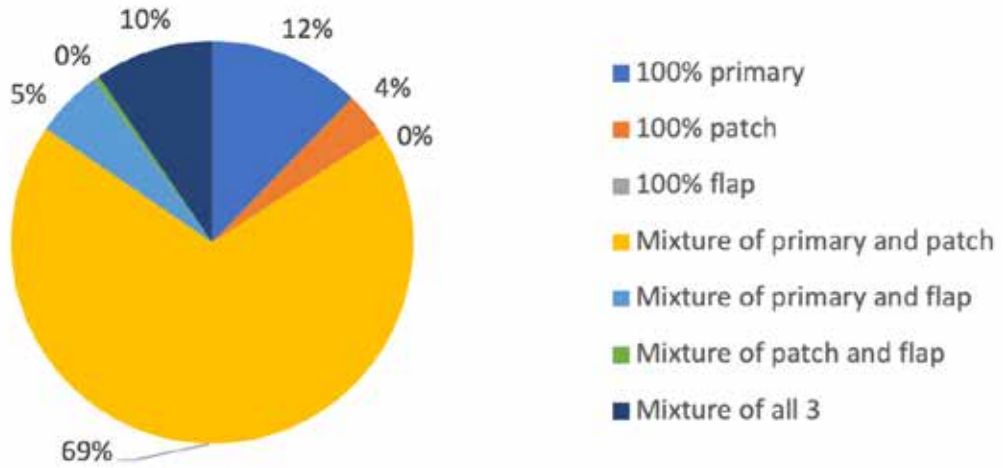
Methods: A survey was sent to members of the American Pediatric Surgical Association (APSA). Questions focused on repair of large defects, rationale for preferring patch or flap repair, and technical aspects of repair.

Results: 235 responses were received. Respondents have been in practice for a median of 14 [IQR 7-22] years, and work at centers performing a median of 8 [IQR 5-12.5] repairs per year. 85% reported that repair of CDH is not limited to a specialized group of surgeons, and only 29% reported that their institution has a multidisciplinary CDH clinic. Figure 1 shows CDH repair methods utilized in the past 5 years. Most use a patch or flap repair for Type C or D defects (87% and 100%, respectively). The main reason for choosing patch/flap rather than primary repair was defect size (47%), followed by tension on the repair (37%). Thoracoscopic rather than open repair (71%) and repairs done on extracorporeal life support (22%) were cited as least important factors.

Most prefer patch (82%) rather than flap repair (11%), most commonly due to prior training in patch repair (58%), and limited flap repair experience (19%). Respondents who prefer flap repair cited potentially lower rate of recurrence (58%), followed by the potential for growth of the flap with the child (25%).

Conclusion: Surgical management of CDH varies among pediatric surgeons. Collaborative multicenter studies are needed to determine the optimal approach to CDH repair. Standardized parameters should be developed to guide surgeons on optimal repair methods.

CDH Repair Approaches Used by Respondents in the Past 5 Years



QS 57**AIRWAY MANAGEMENT AND OUTCOMES FOLLOWING FETO: A SINGLE-CENTER DESCRIPTIVE ANALYSIS**

Oluyinka O. Olutoye, MD, MPH¹, Y. Deniz Sevilimis, BSA², Pamela Ketwaroo, MD², Timothy Lee³, Sundeep G. Keswani, MD¹, Alice King, MD³

¹Baylor College of Medicine/Texas Children's Hospital, Houston, TX, USA, ²Texas Children's Hospital & Baylor College of Medicine, Houston, TX, USA, ³Texas Children's Hospital, Houston, TX, USA

Purpose: Congenital Diaphragmatic Hernia (CDH) is a complex disease associated with pulmonary hypoplasia and hypertension. Fetoscopic endoluminal tracheal occlusion (FETO) has been shown to improve survival and pulmonary hypertension, but is associated with tracheomegaly. We seek to describe neonatal airway management and outcomes following FETO.

Methods: A single-center retrospective cohort review was performed for CDH patients who underwent FETO at our institution between 4/2012-6/2022. Patients with fetal demise, death at delivery, or awaiting delivery were excluded. Demographics and perinatal outcomes were collected. Tracheal measurements were collected from initial post-natal CXR by one radiologist. Data were analyzed with descriptive analysis.

Results: Of 34 patients who underwent FETO, median gestational age at diagnosis was 23 weeks [IQR 20-26] and at delivery was 36 weeks [IQR 34-37]. Median observed-to-expected fetal lung volume was 22% IQR [19-28%]. The median maximum tracheal diameter was 9.9mm [IQR 8.7-10.5]. Twenty-one (61%) patients exhibited a maximal tracheal diameter between T1-T3 vertebrae, while 11 (33%) exhibited a maximal diameter at the thoracic inlet. All patients were intubated. Three (9%) were initially intubated with cuffed ETT with 10 (29%) eventually intubated with a cuffed ETT. Re-intubation was performed in 18 (53%) patients, with 8 (24%) requiring an increase in ETT size. The maximum number of reintubations was 6. Of those who required ETT upsizing, length of intubation was 51 days [IQR 20-179] compared to 27 days [IQR 16-55] in the total FETO population. Three (38%) who required upsizing went on to undergo tracheostomy, and 4 (50%) survived to discharge. Nine (26%) patients underwent airway endoscopy with a maximum number of 5 endoscopies performed on one patient.

Conclusions: Persistent tracheomegaly in FETO patients represents a clinical challenge with need for multiple reintubations and use of airway endoscopy. Placement of large, cuffed ETT should be considered in initial resuscitation of FETO patients.

Outcomes	FETO Patients (n=34)
Max Tracheal Diameter (mm) median, IQR	9.9 (8.7-10.5)
T2-T3 Tracheal Diameter (mm) median, IQR	8.2 (7.1-9.3)
Re-intubation to Upsize ETT, n (%)	8/34 (24%)
Required additional ENT/Pulm Procedures	9/34 (26%)
Length of Intubation (days) median, IQR	27 (16-55)
Tracheostomy, n (%)	8/34 (24%)
ECMO Use, n (%)	14/34 (41%)
Supplemental O ₂ at Discharge*, n (%)	13/23 (57%)
Survival at Discharge*, n (%)	23/33 (70%)
*: Only patients who survived until discharge are included	

Airway Outcomes Following FETO

QS 58**SMALL BOWEL OBSTRUCTION FOLLOWING CONGENITAL DIAPHRAGMATIC HERNIA REPAIR: EVALUATION OF RISK FACTORS AND OPERATIVE APPROACH.**

Nicholas Schmoke, MD¹, Francesca Cali, BA², Terri Wilken, BA², Weijia Fan, MS³, Julie Khlevner³, Vincent P. Duron, MD⁴

¹Columbia University Irving Medical Center, New York City, NY, USA, ²Columbia University, New York, NY, USA, ³Columbia University Irving Medical Center, New York, NY, USA, ⁴CUMC, New York, NY, USA

Purpose: Small bowel obstruction (SBO) is a known complication following congenital diaphragmatic hernia (CDH) repair resulting in significant morbidity and mortality. The purpose of our study is to evaluate the incidence and risk factors for SBO following CDH repair.

Methods: A single-institution retrospective review was completed evaluating all CDH births between January 2010 and September 2022 (n=120). IRB approval was obtained. Risk factors for SBO were analyzed, including operative approach, type of repair, need for extracorporeal membrane oxygenation (ECMO), and additional abdominal surgeries (gastrostomy tube, fundoplication). Kruskal-Wallis test was conducted to compare the median of continuous factors between groups while Fishers exact test was used to compare categorical factors.

Results: 120 patients were included. Average length of follow-up was 54 months. 79% of all CDH births survived to 1 year. 16 (13%) patients developed a SBO with 94% requiring operative intervention. Median time to SBO was 7.5 months. Need for ECMO (p = 0.006), prior gastrostomy tube (p=0.004), and prior fundoplication (p=0.003) were associated with an increased risk of SBO, as were longer time to initial CDH repair (6 days vs. 3 days; p=0.004) and longer length of initial hospitalization (63 days vs. 29 days; p=0.012). Patch repairs had increased risk of SBO compared to primary repairs (16.4% vs 9.4%; p=0.294), although no significant difference was seen. A secondary analysis comparing open to minimally invasive CDH repair demonstrated no significant differences other than the risk of post-operative GERD (44.0% vs. 9.1%; p=0.027).

Conclusion: Neonates with increased acuity of illness (i.e., those requiring ECMO, additional abdominal operations, longer time to repair, and longer initial hospitalizations) appear to have an increased risk of developing SBO. More than 90% of patients with SBO required surgery. Additional multicenter studies are required to adequately power a comparison between open and minimally invasive CDH repair.

QS 59**LIDOCAINE INFUSIONS REDUCE POSTOPERATIVE ANTI-EMETIC USE AFTER SLEEVE GASTRECTOMY**

Devon J. Pace, MD¹, Julia Brothers, DO¹, Aditi Kale, n/a², Nadine Abi-Younes, MD¹, Manish Purohit, MD¹, Robert S. Lang, MD¹, Connie Lin, MD¹, Kirk Reichard, MD, MBA³

¹Nemours Children's Health, Wilmington, DE, USA, ²Sidney Kimmel Medical College, Philadelphia, PA, USA, ³Nemours Children's Health, Wilmington, DE, USA

Purpose: The obesity epidemic has led to an increased number of adolescents requiring bariatric surgery for weight loss and the management of obesity-related comorbidities. Enhanced Recovery After Surgery (ERAS) protocols are increasingly becoming standardized and include a variety of anti-emetics and analgesics. Low-dose intravenous (IV) lidocaine infusions have demonstrated anti-emetic, anti-inflammatory, and analgesic properties. This study evaluates the utility of IV lidocaine in our laparoscopic sleeve gastrectomy (LSG) ERAS protocol.

Methods: We retrospectively evaluated adolescents undergoing LSG at our institution (n=43, 9/2020-8/2022). Postoperative narcotic and rescue anti-emetic use, pain scores, time to oral intake, post-anesthesia care unit length of stay (LOS), and hospital LOS were compared based on lidocaine infusion status. Mann-Whitney U and Pearson's Chi-square were utilized with a two-sided significance of $p < 0.05$.

Results: 43 patients (26 female, 17 male) underwent LSG with a mean age of 16.4 years (standard error of mean [SEM] 1.6) and a body mass index of 46.1 kg/m² (SEM 0.9). 25 patients (58.1%) received a lidocaine infusion and there were no differences based on infusion status. The lidocaine infusion group used less rescue anti-emetic postoperatively (median 4.0 vs. 16.0 mg, $p < 0.001$). However, there was no difference in time to oral intake between groups (median 4.5 vs. 4.3 hours, $p = 0.82$) or HLOS (median 33.0 vs. 34.0 hours, $p = 0.46$). The remainder of postoperative outcomes were analogous between groups. There were no infusion-related complications encountered among the entire lidocaine group.

Conclusions: IV lidocaine infusions are safe and appear to be effective at reducing the incidence of postoperative nausea after bariatric surgery. Lidocaine infusions should be considered as an adjunct in bariatric ERAS protocols, as nausea is frequently encountered and limits intake postoperatively. Further studies with larger cohorts are needed to assess the true efficacy of these infusions at improving oral intake and decreasing LOS.

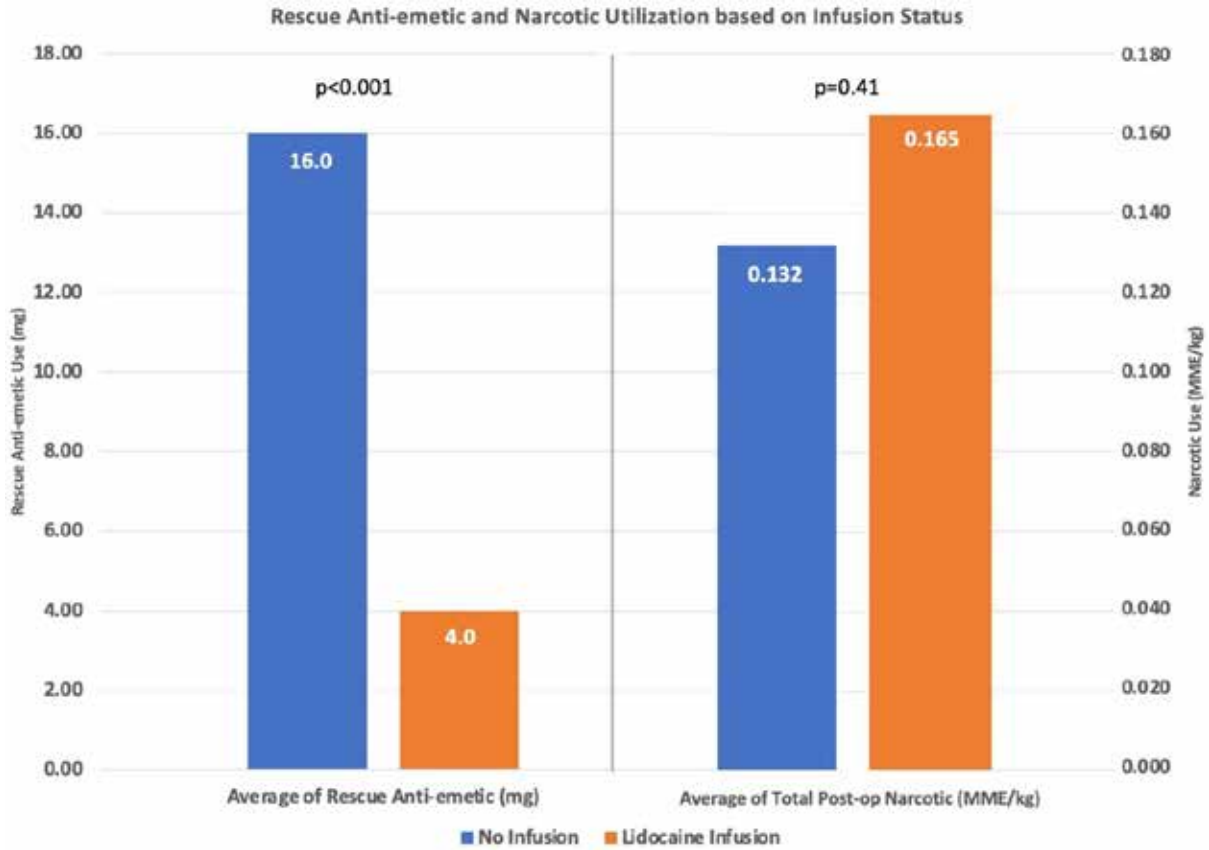


Figure. Postoperative rescue anti-emetic and narcotic utilization based on lidocaine infusion status.

QS 60**POSTNATAL FATE OF DONOR HEMATOPOIETIC STEM CELLS AFTER TRANSAMNIOTIC STEM CELL THERAPY (TRASCET) IN A HEALTHY SYNGENEIC MODEL**

Kamila Moskowitsova, MD¹, Ashlyn E. Whitlock, MD², Ina Kycia, PhD³, David Zurakowski, MS, PhD⁴, Dario O. Fauza, MD, PhD³

¹*Boston Children's Hospital, Harvard Medical School, Boston, MA, USA*, ²*Boston Children's Hospital, Harvard Medical School, Brookline, MA, USA*, ³*Boston Children's Hospital, Department of Surgery, Boston, MA, USA*, ⁴*Boston Children's Hospital, Department of Anesthesia, Critical Care, and Pain Medicine Research, Boston, MA, USA*

Purpose: Transamniotic Stem Cell Therapy (TRASCET) can be a minimally invasive alternative for fetal administration of syngeneic/autologous hematopoietic stem cells (HSCs). Regulatory feasibility of clinical trials of TRASCET is contingent on the postnatal fate of donor HSCs, as potential malignization of donor cells is a concern. We sought to examine donor HSC fate after birth following HSC-based TRASCET in a healthy syngeneic model.

Methods: Time dated pregnant Lewis dams (n=16) underwent volume-matched intra-amniotic injections in all fetuses (n=124) of either donor HSCs labelled with a firefly luciferase reporter gene (HSC; n=81), or of acellular luciferase (control; n=43) on gestational day 17 (E17, term=E21-22). Infused HSCs consisted of syngeneic cells isolated from Lewis rat amniotic fluid that were at least 80% positive for CD34, CD117, SSEA3, SSEA4, Sox2, Oct4, and alkaline phosphatase on flow cytometry. On days 7 (P7) and 21 (P21) after birth, samples from 10 neonatal anatomical sites were screened for luciferase activity via microplate luminometry. Maternal samples of serum and bone marrow were screened at either P7 or P21. Statistical analysis was by Mann-Whitney U-test, including Bonferroni-adjustment.

Results: Overall survival to term was 44% (54/124). Combined survival to P7 and P21 from term was 72% (39/54), with no significant difference between groups (p=0.22-1.00). When controlled by the acellular luciferase injections, donor HSCs were identified in the spleen, intestine, liver, and brain on P7 (p=0.032 to 0.002; Figure1A) and in none of the sites in any neonate on P21 (Figure1B). No luciferase activity was detected in any maternal sample.

Conclusions: Although present one week after birth at select neonatal sites, donor hematopoietic stem cells are not detectable at three weeks of postnatal life after intra-amniotic injection in a healthy syngeneic rodent model. Transamniotic hematopoietic stem cell therapy may be safe and amenable to eventual regulatory approval for clinical trials.

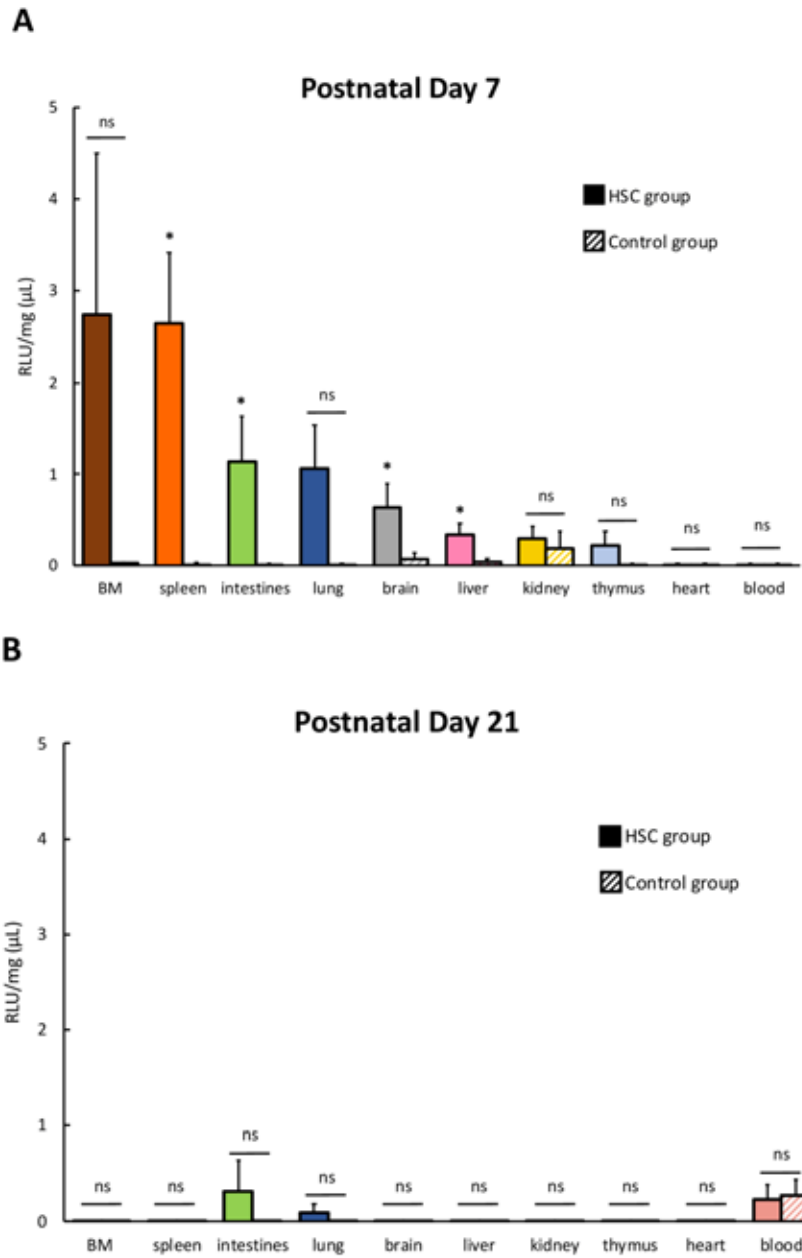


Figure. Luciferase activity levels at 10 neonatal anatomical sites: **(A)** on postnatal day 7 (P7) and **(B)** on postnatal day 21 (P21). BM = bone marrow; HSC = hematopoietic stem cell; RLU = relative light units. Data presented as mean \pm SEM, * $p < 0.05$ vs. acellular luciferase controls.

QS 61

MIRNAS CONTAINED INSIDE HUMAN AMNIOTIC FLUID-DERIVED EXTRACELLULAR VESICLES CAN BE USED AS BIOMARKERS OF NEUROINFLAMMATION SEVERITY IN SPINA BIFIDA APERTA

Lina Antounians, MSc¹, Marc Oria², Foong-Yen Lim, MD³, Jose L. Peiro⁴, Augusto Zani, MD, PhD, FACS, FAAP⁵

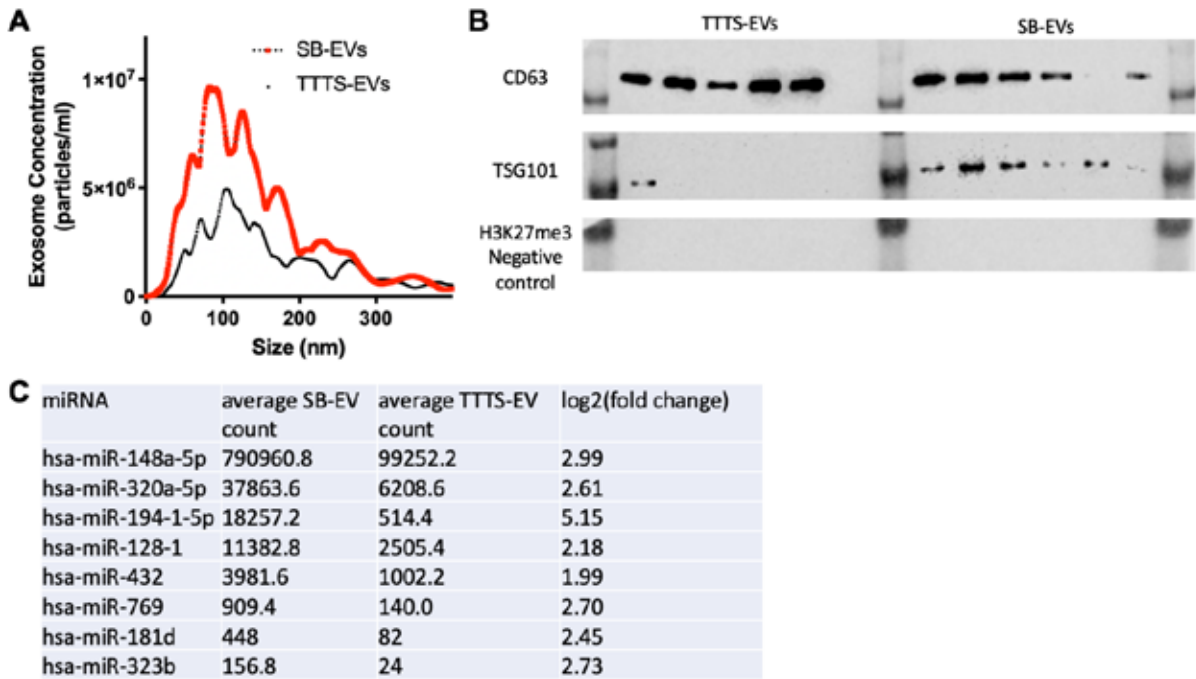
¹The Hospital for Sick Children, Toronto, ON, Canada, ²Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA, ³Cincinnati Children's Hospital, Cincinnati, OH, USA, ⁴Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA, ⁵The Hospital for Sick Children / University of Toronto, Toronto, ON, Canada

Purpose: Our current knowledge on neuroinflammation in spina bifida (SB) is limited to experimental studies, given the challenge to obtain neural tissue from human fetuses. Extracellular vesicles (EVs) are secreted nanoparticles that carry messages reflecting the status of parent cells, including the miRNA cargo. EVs are considered as the paradigm for liquid biopsies of inaccessible organs, like the central nervous system. Herein, we explored the potential of amniotic fluid-derived EVs as biomarkers of neuroinflammation in SB.

Methods: Following ethical approval (IRB #2017-2414CFC), amniotic fluid was collected from SB aperta fetuses (n= 6) at the time of surgical repair (24-25 gestational weeks) and from age- and sex-matched fetuses with twin-twin transfusion syndrome (TTTS, n= 6) that served as controls. EVs were isolated using differential ultracentrifugation and characterized according to the International Society for Extracellular Vesicles guidelines by size (nanoparticle tracking analysis) and expression of canonical protein markers (CD63 and TSG101, Western blot). Presence of cellular debris was ruled out by H3K27me3 expression (Western blot). Small RNA was isolated and sequenced using NovaSeq S2. Bioinformatics analysis was conducted using featureCounts/R. Data are presented as mean±SEM.

Results: Compared to TTTS, the amniotic fluid of SB fetuses had higher EV density (SB-EVs= $1.07 \times 10^{11} \pm 3 \times 10^7$, TTTS-EVs= $5.24 \times 10^{10} \pm 4 \times 10^7$; p= 0.017) but similar EV size (SB-EVs= 125.9 ± 1.3 nm; TTTS-EVs= 145.5 ± 0.9 nm; Fig.A). Expression of CD63 was uniformly present, whereas TSG101 was mainly found in SB-EVs (Fig.B). RNA-sequencing experiments identified a list of 108 miRNAs candidate SB biomarkers (log₂-fold change >2), including 8 miRNAs that have previously been reported as up-regulated in the cerebrospinal fluid of patients with spinal cord injury (Fig.C).

Conclusions: Amniotic fluid-derived EVs are a feasible source of miRNAs in fetuses with SB. Our study has identified a candidate list of potential biomarkers to preoperatively assess the severity of neuroinflammation. Further studies are needed to validate these candidates.



QS 62**FACTORS ASSOCIATED WITH HOSPITALIZATION COST IN THE INITIAL MANAGEMENT OF ESOPHAGEAL ATRESIA: A NATIONAL COHORT STUDY**

Annalise B. Penikis, MD¹, Pooja S. Salvi, MD², Shelby R. Sferra, MD, MPH¹, Abigail Engwall-Gill³, Daniel G. Solomon, MD⁴, Shaun Kunisaki, MD³

¹Johns Hopkins University, Baltimore, MD, USA, ²New York Presbyterian- Weill Cornell, New York, NY, USA, ³Johns Hopkins University School of Medicine, Baltimore, MD, USA, ⁴Yale School of Medicine, Department of Pediatric Surgery, New Haven, CT, USA

Purpose: Esophageal atresia (EA) has been associated with some of highest procedure-related costs among conditions managed by pediatric surgeons. However, the full extent of the cost burden and its associated variability are unknown. We sought to determine the leading sources of expenditures associated with the initial management of EA.

Methods: The Pediatric Health Information System database was queried for infants who underwent repair of esophageal atresia at one of 46 major children's hospitals (2014-2021). Patients who had undergone cardiac surgery or were missing significant data were excluded. Adjusted cost figures were obtained. Univariable and multivariable regressions were performed ($p \leq 0.05$).

Results: Of the 1346 EA infants identified, 979 (72%) fit criteria for analysis. Median age at repair was 2 days (interquartile range [IQR], 1-4 days) and median length of stay (LOS) was 34 days (IQR, 19.0-78.0 days). Median total adjusted cost was \$545,000 (IQR, \$302,000-\$1,130,000). Cost by category (i.e., pharmacy, imaging, lab, supply, room, and clinical) demonstrated that room charges (median \$391,000 [IQR, \$219,000-\$841,000]) accounted for nearly three quarters of the total cost and captured a substantial portion of the observed variation in cost. Markers of disease severity, postoperative complications, and resource utilization significantly increased total cost on univariable analysis (including decreased birthweight [$p < 0.001$], cardiac anomalies [$p < 0.001$], postoperative pneumonia [$p < 0.001$], and increased ventilator days [$p < 0.001$]). Multivariable analysis showed a significant association between total cost and cardiac anomaly ($p = 0.021$), ventilator day ($p < 0.001$), and LOS ($p < 0.001$, Table).

Conclusion: This national cohort of EA patients demonstrates that the median cost of initial EA management is over half a million dollars, with much of the burden attributed to prolonged LOS. Postoperative care initiatives aimed at decreasing LOS without compromising outcomes would be most impactful in addressing the considerable cost burden and resource utilization associated with the care of these children.

		Coefficient	Standard Error	p-value
<i>Disease severity</i>	Birthweight	0.006	0.016	0.688
	Cardiac anomaly	51.195	22.159	0.021*
	Presumed long-gap ^a	-49.693	42.572	0.243
<i>Postoperative complications</i>	Postoperative pneumonia	24.806	33.559	0.460
	Presumed postoperative leak ^b	-18.082	24.744	0.460
<i>Resource utilization</i>	Total parenteral nutrition	-16.995	23.303	0.466
	Ventilator days	4.970	0.473	< 0.001*
	Intensive care days	0.949	0.491	0.054
	Hospital length of stay	12.786	0.505	< 0.001*

Multivariable Regression of Total Adjusted Cost (In Thousands of Dollars)

^aDefined as a patient who received surgical feeding access prior to repair and were repaired at >28 days of life

^bDefined as a patient who had more than 1 postoperative esophagram and was on anti-infectives at >48 hours postoperatively

* p ≤ 0.05

QS 63

C-ARM CONE BEAM CT LOCALIZATION OF PULMONARY NODULES FOR THORACOSCOPIC RESECTION: A COLLABORATIVE IR/SURGERY APPROACH IN A HYBRID OR

John M. Racadio, MD¹, Roshni Dasgupta, MD, MPH², Nicole A. Hilvert, RT¹, Manish Patel, DO¹, Neil Johnson, MD³, Daniel von Allmen, MD¹

¹Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA, ²Cincinnati Children's Medical Center, Cincinnati, OH, USA, ³Cincinnati Children's Hospital, Cincinnati, OH, USA

Purpose: Traditionally pulmonary nodules have been localized by interventional radiologists under conventional CT. The patient would then have to be transferred to the OR for thoracoscopic resection by surgery. In a hybrid OR setting both the localization and resection could potentially be performed in the same setting. The purpose of this study was to evaluate the feasibility, success rate, and complication rate of C-arm Cone Beam CT localization of pulmonary nodules for thoracoscopic resection in a hybrid OR.

Materials and Methods: IRB approved retrospective analysis from 4/2018 - 7/2022 of all pulmonary nodules localized for thoracoscopic resection using fluoroscopy overlay onto C-arm Cone Beam CT in a hybrid OR. Nodules were localized using Kopans needle/wire +/- methylene blue blood patch +/- microcoil. Localizations were performed by 3 different pediatric interventional radiologists and thoracoscopic resections performed by 6 different surgeons.

Results: 67 pulmonary nodules were localized in 56 patients with mean age of 16 years (range 2-38). Nine patients had 2 or more nodules localized under the same anesthesia. Mean nodule size 4.4mm. All nodules were successfully localized for thoracoscopic resection: 34 metastatic disease (including sarcoma, Wilms, hepatoblastoma), 16 infection/inflammation, 14 lymph node, 3 other. Two complications: 1 pneumothorax requiring aspiration in order to be able to localize a second nodule and 1 retained Kopan's needle fragment. Mean number of cone beam CT scans (full or collimated) was 3.8.

Conclusion: C-arm Cone Beam CT localization of pulmonary nodules for thoracoscopic resection in a hybrid OR is a safe and effective method allowing imaging and resection to be performed in a single operative setting.



QS 64**LEVERAGING CONSUMER WEARABLE DEVICES TO EXAMINE DISPARITIES IN POSTOPERATIVE RECOVERY TRAJECTORIES AFTER PEDIATRIC APPENDECTOMY**

Suhail Zeineddin, MD, MS¹, J. Benjamin Pitt, MD², Michela Carter, MD³, Gwyneth A. Sullivan, MD, MS⁴, Muhammad Faateh, MBBS⁵, Angie Figueroa, MS⁵, Erica Park, n/a⁵, Soyang Kwon, PhD⁶, Hassan Ghomrawi⁷, Fizan Abdullah, MD, PhD³

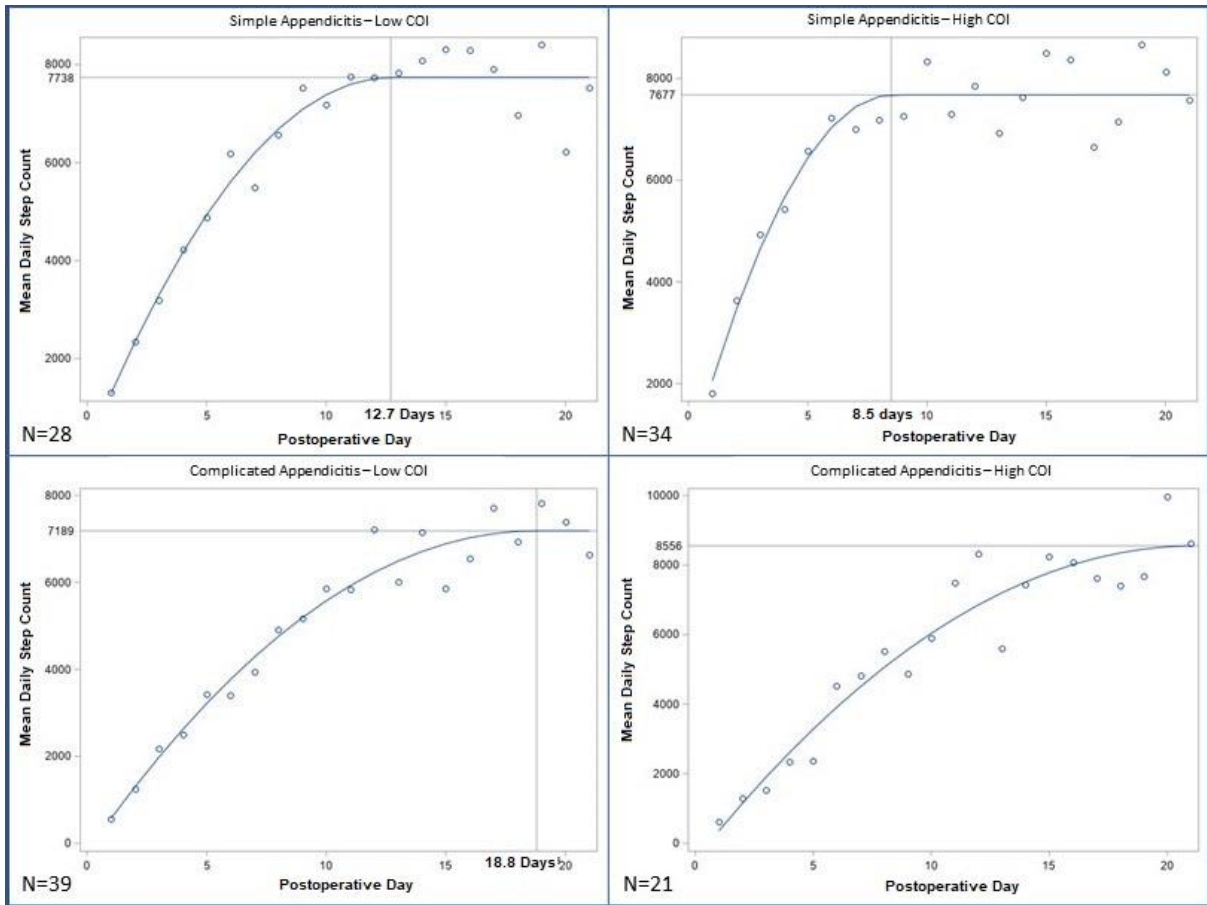
¹*Division of Pediatric Surgery, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA,* ²*Division of Pediatric Surgery, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA,* ³*Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA,* ⁴*Division of Pediatric Surgery, Northwestern University Feinberg School of Medicine, Ann & Robert H. Lurie Children's Hospital; Division of Pediatric Surgery, Rush University Medical Center, Chicago, IL, USA,* ⁵*Ann and Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA,* ⁶*Anne and Robert H. Lurie Children's Hospital, Chicago, IL, USA,* ⁷*Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA*

Purpose: Postoperative recovery is a continuous process with a predictable trajectory toward equilibrium, involving physical, cognitive, psychological, and emotional dimensions. While neighborhood-level social determinants of health have been shown to affect clinical presentation and surgical outcomes, their effect on recovery of physical activity is not well described. We examined the association between neighborhood level characteristics and physical activity recovery trajectories of appendectomy patients measured using consumer-grade wearable devices.

Methods: Children ages 3-18 years undergoing laparoscopic appendectomy for acute appendicitis were recruited. Patients wore the Fitbit Inspire HR or Fitbit Inspire 2 for 21 days post-operatively. Patients with postoperative infectious complications were excluded to examine differences in normal recovery trajectories. Census tract child opportunity index (COI), a composite measure of neighborhood resources and conditions related to children's health, was used as a proxy for social determinants of health. Patients were divided into 2 groups based on census tract-associated COI score: Low (lowest 2 quintiles) and High (quintiles 3-5). Segmented regression models were used to estimate daily step count trajectories separately for patients with simple and complicated appendicitis.

Results: Among 122 eligible patients, 60 (49.2%) had complicated appendicitis. Low COI group included 67 (54.9%) patients compared to 55 (45.1%) in the high COI group. Among patients with simple appendicitis, the high COI group demonstrated a faster increase in step counts and reached a plateau on postoperative day (POD) 9 (95%CI 6.5-10.6), while the low COI group reached a plateau POD 13 (95%CI 10.4-15.1). However, among patients with complicated appendicitis, no significant difference was captured during the 21-day follow-up period.

Conclusions: We show that patients from low COI neighborhoods had slower recovery compared to patients from high COI areas after appendectomy for simple appendicitis. Disparities exist in pediatric postoperative recovery that may not be captured or addressed using traditional outcome measures.



QS 65**SURGICAL APPROACHES FOR RESECTION OF PRIMARY ADRENAL AND PARAVERTEBRAL NEUROGENIC TUMORS IN PEDIATRIC PATIENTS**

Ana L. Melero-Pardo¹, Tarek M. Zaghloula, MD², Andrew J. Murphy², Lindsay J. Talbot, MD², Suraj Sarvode Mothi², Andrew M. Davidoff, MD², Hafeez Abdelhafeez, MD²

¹St. Jude Children's Hospital, San Juan, Puerto Rico, USA, ²St. Jude Children's Research Hospital, Memphis, TN, USA

Introduction: Neuroblastoma is the most common solid tumor in children, and surgical resection of retroperitoneal tumors is challenging due to involvement of retroperitoneal vessels. Therefore, most are resected via open transabdominal (OT) approach. Laparoscopic surgery (LS) is often used for tumors without image-defined risk factors (IDRFs). Although retroperitoneoscopic surgery (RS) is increasingly used in pediatric patients, literature on experience in pediatric adrenal tumors is limited. This study aims to compare the outcomes of open and minimally invasive surgical approaches for the resection of primary neurogenic tumors.

Methods: A retrospective review of pediatric patients that underwent OT, LS, or RS from 2018 to 2022 was performed to compare postoperative outcomes. We ascertained that the distribution for continuous variables was not normal and used the non-parametric Kruskal-Wallis test for overall differences between the groups. Posthoc analysis was performed using the Dunn's test for all continuous measures to determine pairwise differences between surgical groups.

Results: Forty-four patients, fifteen patients, and fourteen patients underwent OTS, LS, and RS, respectively. Operative time, length of hospital stay, estimated blood loss, and total postoperative opioid use were significantly less in the minimally invasive approaches. In the case of time to postoperative chemotherapy, significant differences were only observed between OTS vs. RS surgery groups only. Post-neoadjuvant chemotherapy the OTS group had 24 (75%) and the RS group had 2 (50%) patients with preoperative IDRF ($p < 0.422$).

Conclusion: Minimally invasive resections of primary retroperitoneal neurogenic tumors have more favorable perioperative outcomes than OTS. Within the minimally invasive approaches, RS allows for faster recovery, less postoperative opioid use, and quicker initiation of chemotherapy. Patients with large tumors or with complex IDRFs should be resected via an open approach. However, isolated renal artery encasement or neural foramina extension are not absolute contraindication for minimally invasive approach based on surgeon's experience.

	OT (N=44)	LS (N=15)	RS (N=14)	P- value	Dunn multiple comparison test
Operative time (min) , Median [Min, Max]	335 [104, 845]	130 [95.0, 313]	165 [87.0, 309]	< 0.001	OTS >LS, OTS >RS
Estimated blood loss (mL) , Median [Min, Max]	238 [30.0, 3500]	12.0 [1.00, 100]	22.5 [2.00, 100]	< 0.001	OTS >LS, OTS >RS
Length of stay (days) , Median [Min, Max]	4.00 [2.00, 22.0]	1.00 [1.00, 11.0]	1.00 [0, 2.00]	< 0.001	OTS >LS, OTS >RS
Post-operative chemotherapy					
No	16 (36.4%)	9 (60%)	6 (42.9%)	0.287	
Yes	28 (63.6%)	6 (40%)	8 (57.1%)		
Time to post-operative chemotherapy (days) , Median [Min, Max]	13.5 [6.00, 173]	8.00 [6.00, 16.0]	7.50 [4.00, 8.00]	< 0.001	OTS >RS
Post-operative opioid use (OME/kg) , Median [Min, Max]	29.5 [1.38, 703]	3.39 [0.600, 37.6]	3.50 [0, 26.7]	< 0.001	OTS > LS, OTS >RS

Perioperative Outcomes Between Open Transabdominal, Laparoscopic, and Retroperitoneoscopic Groups

QS 66**RISK OF NEURODEVELOPMENTAL DISABILITY AND HEALTHCARE NEEDS IN EXTREMELY LOW BIRTH WEIGHT INFANTS WITH NECROTIZING ENTEROCOLITIS OR SPONTANEOUS INTESTINAL PERFORATION.**

Priyanka V. Chugh, MD¹, Emily Nes, MD¹, Katherine D. Culbreath, MD¹, Gregory Keefe, MD¹, Erika M. Edwards, PhD, MPH², Kate A. Morrow, MS², Danielle Ehret, MD, MPH³, Roger F. Soll, MD², Biren P. Modi, MD, MPH⁴, Jeffrey D. Horbar, MD², Tom Jaksic, MD, PhD¹

¹*Boston Children's Hospital, Boston, MA, USA*, ²*Vermont Oxford Network, Burlington, VT, USA*, ³*Vermont Oxford Network, Burlington, VT, US, Boston, MA, USA*, ⁴*Boston Children's Hospital and Harvard Medical School, Boston, MA, USA*

Purpose: To compare neurodevelopmental outcomes, growth, and healthcare needs among extremely low birth weight (ELBW) survivors of necrotizing enterocolitis (NEC) and spontaneous intestinal perforation (SIP) to those without NEC or SIP.

Methods: This study analyzed prospectively collected data from 59 North American neonatal units, regarding ELBW infants (birth weight of 401-1000g or 22-27 weeks gestational age) born between 2011-2018 and evaluated at 16-26 months corrected age. Outcomes were collected from three exposure groups: infants with laparotomy-confirmed NEC, laparotomy-confirmed SIP, and those without NEC or SIP. The primary outcome was severe neurodevelopmental disability, defined as: bilateral blindness, hearing impairment requiring amplification, inability to walk 10 steps without support, cerebral palsy, or a Bayley Scales of Infant Development score < 70 (2 standard deviations below the mean) in cognitive, language, or motor categories. Secondary outcomes were weight < 10th percentile, medical readmission rates, and medical support at home. A generalized estimating equation model with a Poisson distribution and a log link was used to estimate risk ratios.

Results: Of 13,673 ELBW infants, 6,391 were followed including 93 of 232 with NEC and 100 of 235 with SIP. When adjusted for sex, gestational age, small for gestational age, and morbidities during the initial hospitalization there were no statistically significant differences in outcomes comparing NEC to SIP. Infants with NEC had greater risk of severe neurodevelopmental disability (ARR 1.43; 95%CI 1.09-1.86), rehospitalization (ARR 1.46; 1.17-1.82), and post-discharge surgery (ARR 1.82; 1.48-2.23) compared to infants without NEC or SIP. Infants with SIP had greater risk of post-discharge surgery (ARR 1.64; 1.34-2.00) compared to infants without NEC or SIP.

Conclusions: Extremely low birth weight infants with necrotizing enterocolitis or spontaneous intestinal perforation had significantly increased risk of post-discharge healthcare needs, but only those with necrotizing enterocolitis had significantly increased risk of severe neurodevelopmental disability when compared to those without either diagnosis.

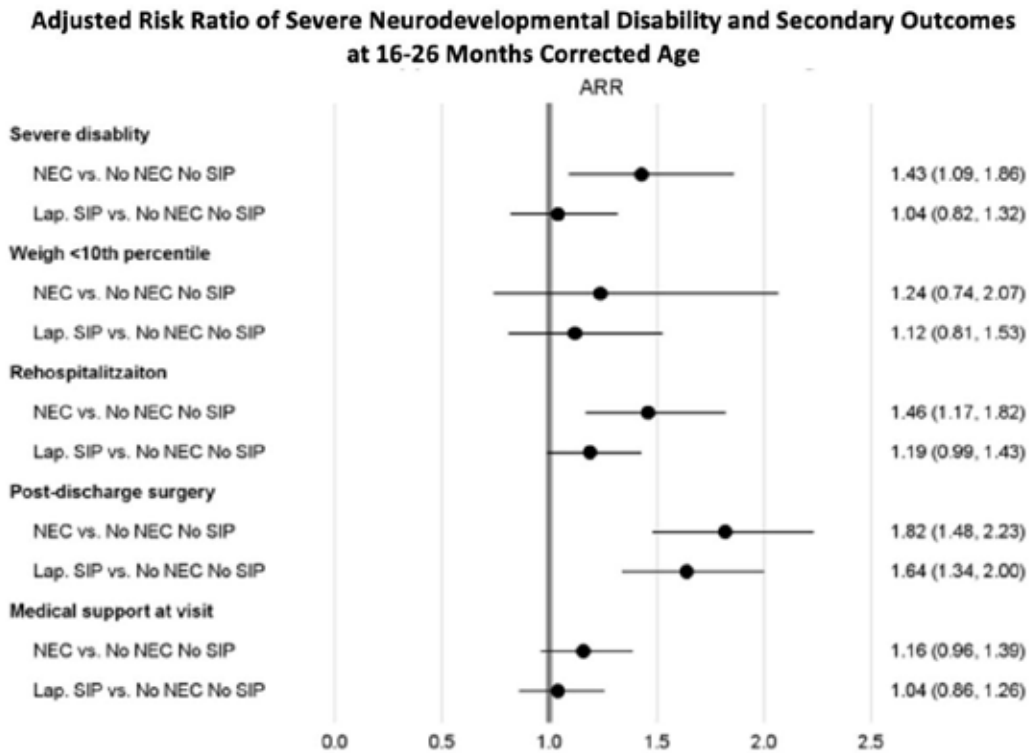


Figure 1. Forest plot of adjusted risk ratios (ARR). “NEC” refers to laparotomy-confirmed necrotizing enterocolitis. “Lap. SIP” refers to laparotomy-confirmed spontaneous intestinal perforation. “No NEC No SIP” refers to neonates without either diagnosis. “Severe disability” refers to severe neurodevelopmental disability.

QS 67**METABOLIC BONE DISEASE AND THE EFFECT OF PUBERTAL ONSET IN PEDIATRIC INTESTINAL FAILURE**

Emily Nes, MD¹, Katherine D. Culbreath, MD¹, Gregory Keefe, MD¹, Steven J. Staffa¹, Sam M. Han, MD², E. Reese, MPH, RDN, LDN³, Julia Arsenault⁴, Biren P. Modi, MD, MPH⁵, Tom Jaksic, MD, PhD¹, Christopher Duggan⁶, Christina M. Jacobsen, MD, PhD⁷, Alexandra N. Carey⁶

¹*Boston Children's Hospital, Boston, MA, USA*, ²*Department of Surgery, Boston Children's Hospital, Boston, MA, USA*, ³*Boston Children's Hospital, Division of Gastroenterology, Hepatology, and Nutrition and Center for Advanced Intestinal Rehabilitation, Boston, MA, USA*, ⁴*Bowdoin College, Boston, MA, USA*, ⁵*Boston Children's Hospital and Harvard Medical School, Boston, MA, USA*, ⁶*Center for Advanced Intestinal Rehabilitation and Department of Gastroenterology, Hepatology and Nutrition, Boston Children's Hospital and Harvard Medical School, Boston, MA, USA*, ⁷*Boston Children's Hospital, Division of Endocrinology, Boston, MA, USA*

Purpose: Bone mineral density (BMD) increases post-puberty in idiopathic juvenile osteoporosis (IJO); however, the effect in pediatric intestinal failure (IF) is unknown. This study aimed to identify the impact of puberty on BMD in pediatric IF.

Methods: This was a retrospective review of children (age < 18 years) in an interdisciplinary intestinal rehabilitation program from 2008 to 2021. Inclusion criteria included a diagnosis of pediatric IF (current use or history of parenteral nutrition (PN) \geq 60 days), pubertal onset (Tanner stage 2 or higher), and at least two Dual-Energy X-Ray Absorptiometry (DEXA) scans during the study period. Adjusted BMD Z-scores \leq -2 were diagnostic for metabolic bone disease (MBD). Univariate and multivariable analyses were performed using generalized estimating equations to identify predictors of MBD in pediatric IF.

Results: Forty-six patients were evaluated. Median follow-up was 13.5 years (IQR 10.8, 15.6). Thirty-three patients (72%) had MBD. Mean age at pubertal onset was 12.1 years (Figure 1). On univariate analysis, predictors of lower adjusted BMD Z-scores included PN dependence ($p=0.001$) and diagnosis of chronic intestinal pseudo-obstruction ($p=0.002$). Predictors of higher adjusted BMD Z-scores included higher weight-for-age Z-score (WAZ, $p<0.001$), height-for-age Z-score ($p<0.001$), and bone age Z-score ($p=0.001$), and diagnosis of midgut or segmental volvulus ($p=0.05$). Pubertal onset did not significantly impact adjusted BMD Z-scores ($p=0.193$), nor did presence of fracture ($p=0.677$), or vitamin D deficiency (vitamin D 25-OH < 20 ng/mL, $p=0.145$). Multivariable analysis identified WAZ as the only significant independent factor, with higher WAZ associated with higher adjusted BMD Z-scores ($p<0.001$).

Conclusion: Contrary to IJO, puberty did not significantly impact adjusted BMD Z-scores in pediatric IF; however, higher WAZ was associated with higher adjusted BMD Z-scores in this population. This finding emphasizes the importance of nutritional optimization to promote weight gain and mitigate MBD risk in pediatric IF.

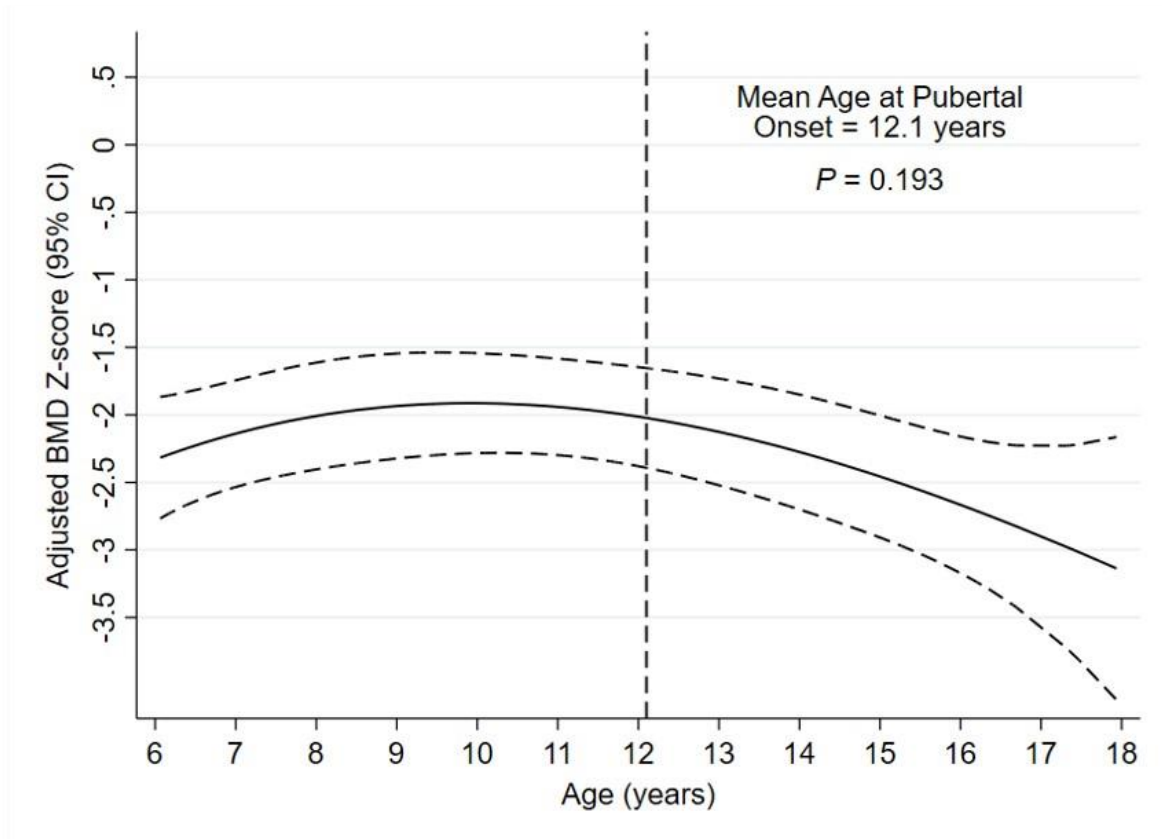


Figure 1. Trend of Adjusted Bone Mineral Density Z-scores over time, with dashed lines representing the 95% confidence interval. The vertical dashed line indicates mean age at pubertal onset in children with intestinal failure.

QS 68**FACTORS ASSOCIATED WITH NON-COMPLETION OF A PEDIATRIC BARIATRIC SURGERY PROGRAM**

Hannah M. Phelps, MD¹, Megan Shelton, PhD², Ginger Nicol, MD¹, Melissa Sicard, MSN, RN, CPNP¹, Marilyn Tanner-Blasiar, MHS, RDN, LD², Shaina R. Eckhouse, MD¹, Jennifer E. Sprague, MD, PhD¹, Baddr A. Shakhsheer, MD¹

¹Washington University in St. Louis, Saint Louis, MO, USA, ²St. Louis Children's Hospital, Saint Louis, MO, USA

Purpose: Childhood obesity is a devastating disease process disproportionately affecting minority and low-income populations. Though bariatric surgery leads to durable weight loss and reversal of multiple obesity-related comorbidities, only a small fraction of US adolescents undergo the procedure and successfully complete the pre-operative process. We sought to identify factors associated with failure to complete a pediatric bariatric surgery program.

Methods: Consecutive patients \leq 18-years-old referred to an academic adolescent bariatric surgery program between 2017 and 2022 (n=20 completers, 40 non-completers) were included. Demographics and medical and psychosocial histories were summarized. Wilcoxon and Pearson chi-squared tests were performed. Statistical significance was considered if p-values $<$ 0.05. The Institutional Review Board approved this study (#202208060).

Results: Of the 33% (20/60; 85% female, 30% non-white) who successfully completed the program, the median age was 16 years [IQR 16, 17]. The median age of the non-completers was 16 years [IQR 15, 17] (55% female, 56% non-white). Completion of polysomnography as part of the bariatric pathway significantly correlated with successful completion of the program (p $<$ 0.001). Non-completion was associated with male gender (p=0.022), household income $<$ 150% poverty level (p=0.047), and presence of environmental or family stressors (p=0.008) (Table). Though not statistically significant, non-completers tended to be non-white race (p=0.054) and younger age (p=0.084) (Table). Reason for non-completion was most often loss to follow-up (70.3%) followed by insurance denial (10.8%) or patient preference (10.8%).

Conclusions: Non-completion of the bariatric surgery pathway was more prevalent among male patients from lower income households with significant environmental or family stressors. These patients also tended to be non-white. Additional prospective investigations are required to pinpoint reasons why these patients tend to drop out of the program. The findings underscore the need for further work to ensure more equitable provision of adolescent bariatric surgery services.

	<i>n</i>	Completer <i>n</i> = 20	Non-completer <i>n</i> = 40	<i>p</i>-value
Age at referral (years)	57	16 [16, 17]	16 [15, 17]	0.084
Gender				
Male	60	15.0% (3)	45.0% (18)	0.022
Female		85.0% (17)	55.0% (22)	
Race				
White	59	70.0% (14)	43.6% (17)	0.054
Non-white		30.0% (6)	56.4% (22)	
Household income*				
< 150% poverty level	60	0	17.5% (7)	0.047
> 150% poverty level		100% (20)	82.5% (33)	
Distance from home address to facility (miles)	60	24.5 [15.8, 49.9]	21.6 [13.3, 98.4]	0.826
BMI at first visit	57	49.6 [43.1, 60.6]	51.3 [45.7, 57.3]	0.570
Medical co-morbidities (any)	58	95.0% (19)	86.8% (33)	0.332
Psychiatric co-morbidities	57	70.0% (14)	59.5% (22)	0.431
Environmental or family stressors	38	22.2% (4)	65.0% (13)	0.008

Factors Associated with Non-Completion of a Pediatric Bariatric Surgery Program

Values are median [Q1, Q3] or % (No.). BMI = body mass index.

*Household income based on median income for patient's zip code according to US Census Bureau's 5-year Estimates published in 2020. Poverty level based on household of 4 individuals and 150% selected based on current cutoff for the State Children's Healthcare Insurance Program.

QS 69**PEDIATRIC, ADOLESCENT AND YOUNG ADULT (AYA) PERITONEAL AND PLEURAL MESOTHELIOMA: A NATIONAL CANCER DATABASE REVIEW**

Colleen P. Nofi, DO, MBA, MSc¹, Bailey Roberts, MD², Barrie S. Rich, MD³, Richard D. Glick, MD³

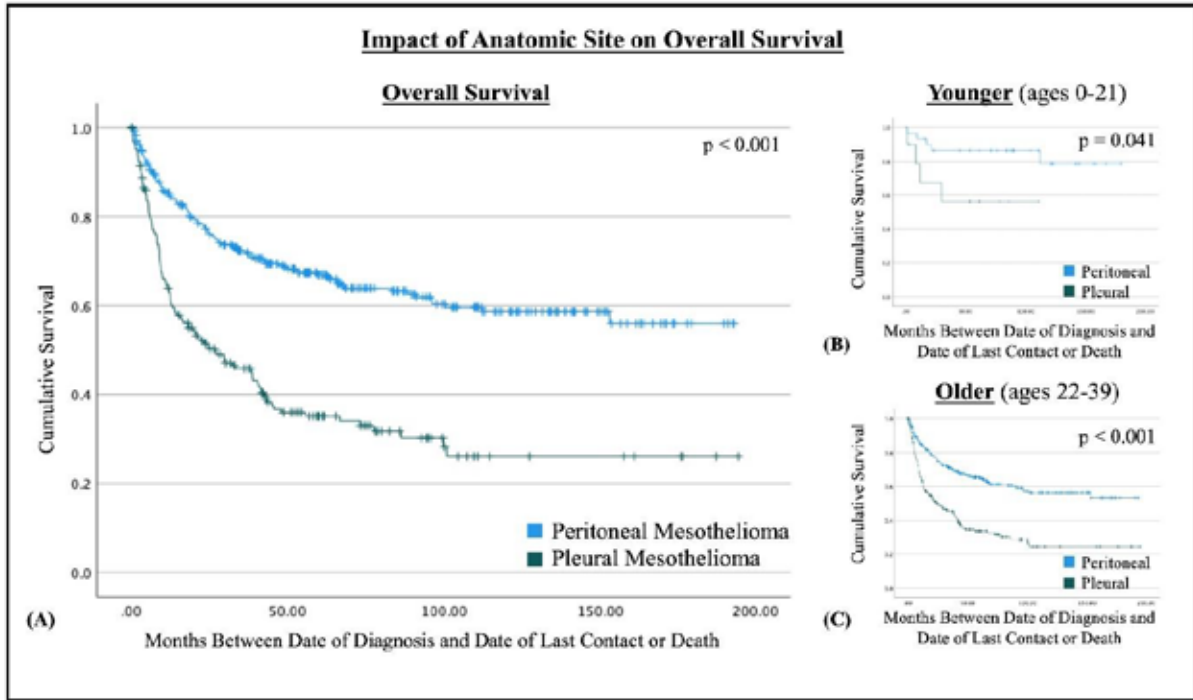
¹Cohen Children's Medical Center at Northwell Health, Manhasset, NY, USA, ²Cohen Children's Medical Center at Hofstra/Northwell, Long Island City, NY, USA, ³Cohen Children's Medical Center, New Hyde Park, NY, USA

Purpose: Malignant peritoneal (MPeM) and pleural mesothelioma (MPIM) is rare in young patients, with a paucity of data regarding clinical characteristics and outcomes. We therefore aim to describe the clinical characteristics, treatment strategies, and survival outcomes for pediatric and adolescent/young adult (AYA) patients.

Methods: The National Cancer Database (NCDB) was queried for MPeM and MPIM in pediatric/AYA patients (ages 0-39) from 2004 to 2019. Stratification was performed for younger (age 0-21) and older (age 22-39) patients. Chi squared, multivariable cox regression, and Kaplan-Meier analyses were performed.

Results: We identified 570 pediatric and AYA patients with malignant mesothelioma, of which 363 patients had MPeM and 207 patients had MPIM. There were significant differences in sex distribution: 63.1% of MPeM were female and 57.0% of MPIM were male ($p < 0.001$). Patients with MPeM were more likely to have radical surgery compared to MPIM (56.7% v. 24.6%, respectively, $p < 0.001$). Majority of patients with MPeM and MPIM received chemotherapy (71.3% and 68.1%, respectively). For MPeM, surgical management was associated with improved OS (HR 0.192, $p < 0.001$), whereas male sex (HR 2.838, $p < 0.001$), radiation (HR 4.958, $p = 0.031$), epithelioid (HR 1.931, $p = 0.007$) and biphasic histology (HR 2.770, $p = 0.021$) were associated with worse OS. For MPIM, intraoperative chemotherapy was associated with improved OS (HR 0.176, $p = 0.009$), whereas Black race (HR 4.198, $p < 0.001$) and epithelioid (HR 2.008, $p = 0.007$), fibrous (HR 3.451, $p = 0.005$), and biphasic (HR 4.482, $p = 0.003$) histology were associated with worse OS. OS was better for all patients with MPeM (mean survival of 125.06 months) compared to MPIM (mean survival of 68.79 months), which remained significant after stratification of younger and older patients (Figure).

Conclusion: By analyzing the largest group of pediatric and AYA patients with MPeM and MPIM, our study highlights significant differences in prognostic factors and survival between ages and disease sites.



QS 70

IMPLEMENTATION AND VALIDATION OF A NOVEL SEVERITY GRADING SYSTEM FOR UNEXPECTED EVENTS IN PEDIATRIC SURGERY: THE CLAVIEN-MADADI CLASSIFICATION

Omid Madadi-Sanjani¹, Joachim Kuebler¹, Julia Brendel², Soeren Wiesner¹, Annika Mutanen³, Simon Eaton⁴, Anja Domenghino⁵, Pierre-Alain Clavien⁵, Benno Ure¹

¹Hannover Medical School, Hannover, Niedersachsen, Germany, ²Hannover Me, Hannover, Niedersachsen, Germany, ³Helsinki University Hospital and University of Helsinki,, Finland, Uusimaa, Finland, ⁴Great Ormond Street Institute of Child Health, London, England, United Kingdom, ⁵Department of Surgery and Transplantation, University Hospital Zurich, Zurich, Zurich, Switzerland

Background: Severity grading systems for complications in adult surgical patients have limitations when used for children. Therefore, we aimed to introduce a novel instrument for daily pediatric surgical practice.

Methods: The novel instrument was established by a multidisciplinary group of experts based on modifications of the Clavien-Dindo classification. The new Clavien-Madadi classification focuses on procedural invasiveness rather than anesthesiological management and is the first classification to include organizational and management errors in the management of surgical patients. The new instrument was tested and validated in a cohort of more than 17,000 children treated between 2017 - 2022 and the reproducibility is currently evaluated through an international survey in the ERNICA network.

Results: The novel Clavien–Madadi classification significantly increased the number of events compared to the traditional Clavien–Dindo classification, including the organizational and management errors. Despite the high correlation of the Clavien-Madadi and Clavien-Dindo classification, the novel instrument led to a downgrading of 22% of events. Furthermore, results of the Clavien-Madadi classification correlated significantly higher with the complexity of procedures in children ($p = 0.8$ vs $p = 0.2$), especially for unexpected events > Grade III ($p = 0.7$ vs $p = 0.2$).

Conclusion: The Clavien–Madadi classification is a valuable instrument for the assessment of surgical and non-medical errors in the pediatric population. Here, we present the first classification and validation of its use in pediatric surgery. The logic and reproducibility of the Clavien-Madadi classification is currently tested within the ERNICA (European Reference Network for rare Inherited and Congenital Anomalies) network.

QS 71

BETTER LATE THAN NEVER: A CONTEMPORARY ANALYSIS OF AGE AT ORCHIOPEXY IN US HOSPITALS

Sarah Gans¹, Katerina Dukleska, MD², Matt Hall, PhD³, Brendan T. Campbell, MD MPH⁴

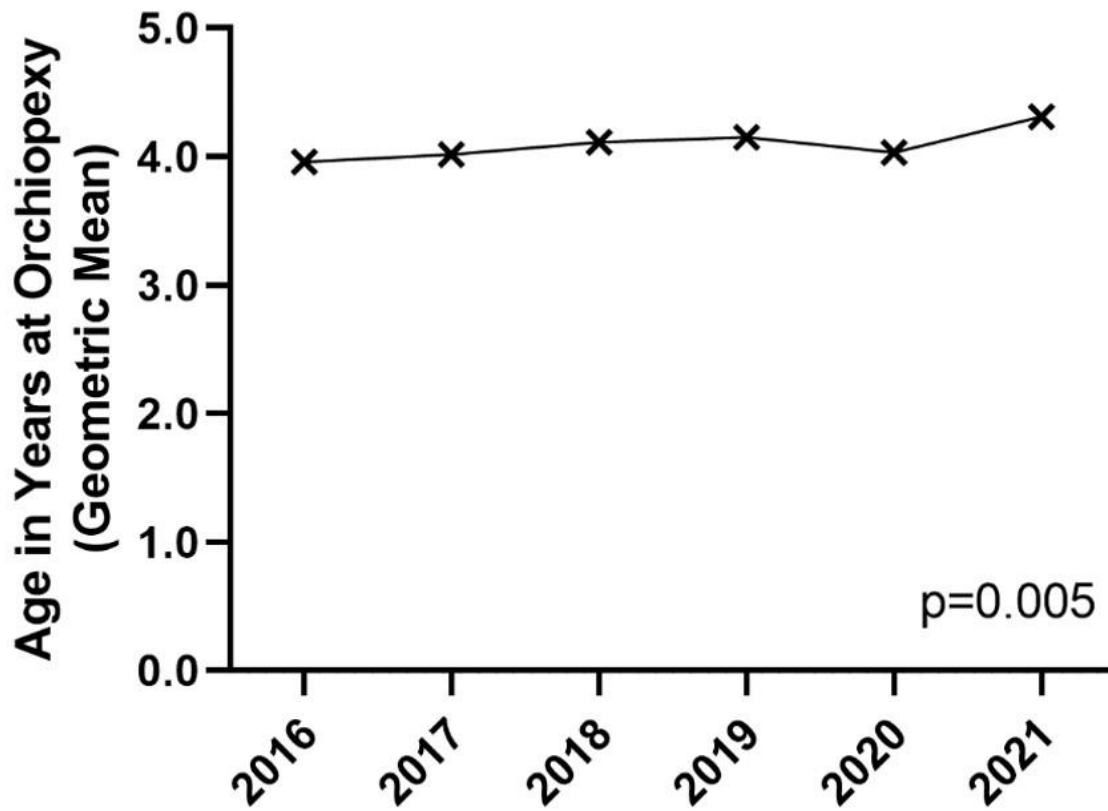
¹University of Connecticut School of Medicine, Hartford, CT, USA, ²Connecticut Children's Medical Center, University of Connecticut, Hartford, CT, USA, ³Children's Hospital Association, Lenexa, KS, USA, ⁴American College of Surgeons, Committee on Trauma, Hartford, CT, USA

Purpose: Unilateral undescended testis (UDT) is the most common genitourinary problem identified in boys. Current guidelines recommend surgical correction before 18 months of age, citing future risk of infertility and testicular cancer when surgery is delayed. The purpose of this study was to describe current trends related to unilateral inguinal orchiopexy in the US.

Methods: The Pediatric Health Information System® (PHIS) database was queried to identify all patients aged 0-17 years undergoing outpatient unilateral inguinal orchiopexy from January 2016 through December 2021. Hospitals were excluded if they did not consistently participate in PHIS. Patients were excluded if they had an intra-abdominal or bilateral UDT, or if they had other procedures performed concurrently. Geometric means were used to reduce the influence of outliers, and generalized estimating equations were used to evaluate trends over time.

Results: 43,403 cases from 41 hospitals met criteria for inclusion in the study. The geometric mean age at orchiopexy was 4.8 years and nearly one-quarter (23%) underwent orchiopexy between ages 10-17. The mean age of intervention increased slightly over the 5-year study period from 4.0 years in 2016 to 4.3 years in 2021 ($p=0.005$). Most orchiopexies (88%) were performed by pediatric urologists, and antibiotics were given in 39% of cases. Age at orchiopexy was not associated with insurance status, surgeon type, or geographic location of the hospital.

Conclusion: Age at orchiopexy for children in the US is highly variable, and has not changed over time. Opportunity exists for pediatric surgeons and urologists to identify ways to increase the number of children who get orchiopexy surgery at an earlier age.



Mean Age at Orchiopexy Over Time

QS 72

TRENDS IN THE OPERATIVE MANAGEMENT AND TIMING OF RESECTION IN PEDIATRIC CONGENITAL PULMONARY AIRWAY MALFORMATIONS: AN ACS NSQIP-PEDIATRIC STUDY

Marc M. Mankarious, MD¹, Alicia C. Greene, DO², Meloria A. Hoskins, MS³, Michael Stack, MD¹, Anthony Tsai, MD⁴, Afif N. Kulaylat, MD, MSc⁵

¹*Penn State Hershey Medical Center, Hershey, PA, USA*, ²*Penn State Hershey Medical Center, Harrisburg, PA, USA*, ³*The Pennsylvania State University College of Medicine, Hershey, PA, USA*, ⁴*Division of Pediatric Surgery, Penn State Children's Hospital, Hershey, PA, USA*, ⁵*Division of Pediatric Surgery, Penn State Children's Hospital, Hershey, PA, USA*

Introduction: Controversy remains regarding approach and timing of surgery in pediatric congenital pulmonary airway malformations (CPAM). Our aim was to evaluate national trends in CPAM management with the hypothesis that increased thoracoscopic adoption over time would be accompanied by shifting trends in age at the time of resection.

Methods: Retrospective review of pediatric patients undergoing elective pulmonary resection for CPAM in the NSQIP-P registry (2012-2020). Patients were stratified by age at operation (< 3, 3-6, 6-12, ≥12 months). Patient characteristics and clinical outcomes were abstracted and compared using univariate and multivariable regression analyses. P-value < 0.05 was considered significant.

Results: 1598 patients were identified of whom 208, 353, 591, and 446 belonged to the < 3, 3-6, 6-12, and ≥12 months age groups, respectively. Overall, thoracoscopy was used in 62% of patients, with lower utilization in the < 3-month group (30.8% vs. 65.4% vs 68.2% vs 66.6% for < 3, 3-6, 6-12, and ≥12 months, respectively). There was an increased adoption of thoracoscopy over time (42.5% in 2012 to 70.1% in 2020) (Fig 1A). Across this time interval, there was an overall 11% decrease in thoracoscopic resections in patients < 3 months of age (R²=0.57) (Fig 1B). Length of stay was decreased with thoracoscopy (-1.5 days) and in the older cohorts (-4.8 [3-6m], -4.9 [6-12m], -4.5 [>12m] days) when compared to patients < 3 months of age. Conversely, operative time was longer in the older cohorts compared to patients < 3 months of age (+26 [3-6m], +46 [6-12m], +46 [>12m] minutes) (p< 0.05 for all). Postoperative complications and re-operative rates were similar.

Conclusion: There has been a steady increase in the adoption of thoracoscopic resection for CPAM over time. While resections have decreased in those less than 3 months of age, there does not appear to be a convergence toward a preferred target age for resection.

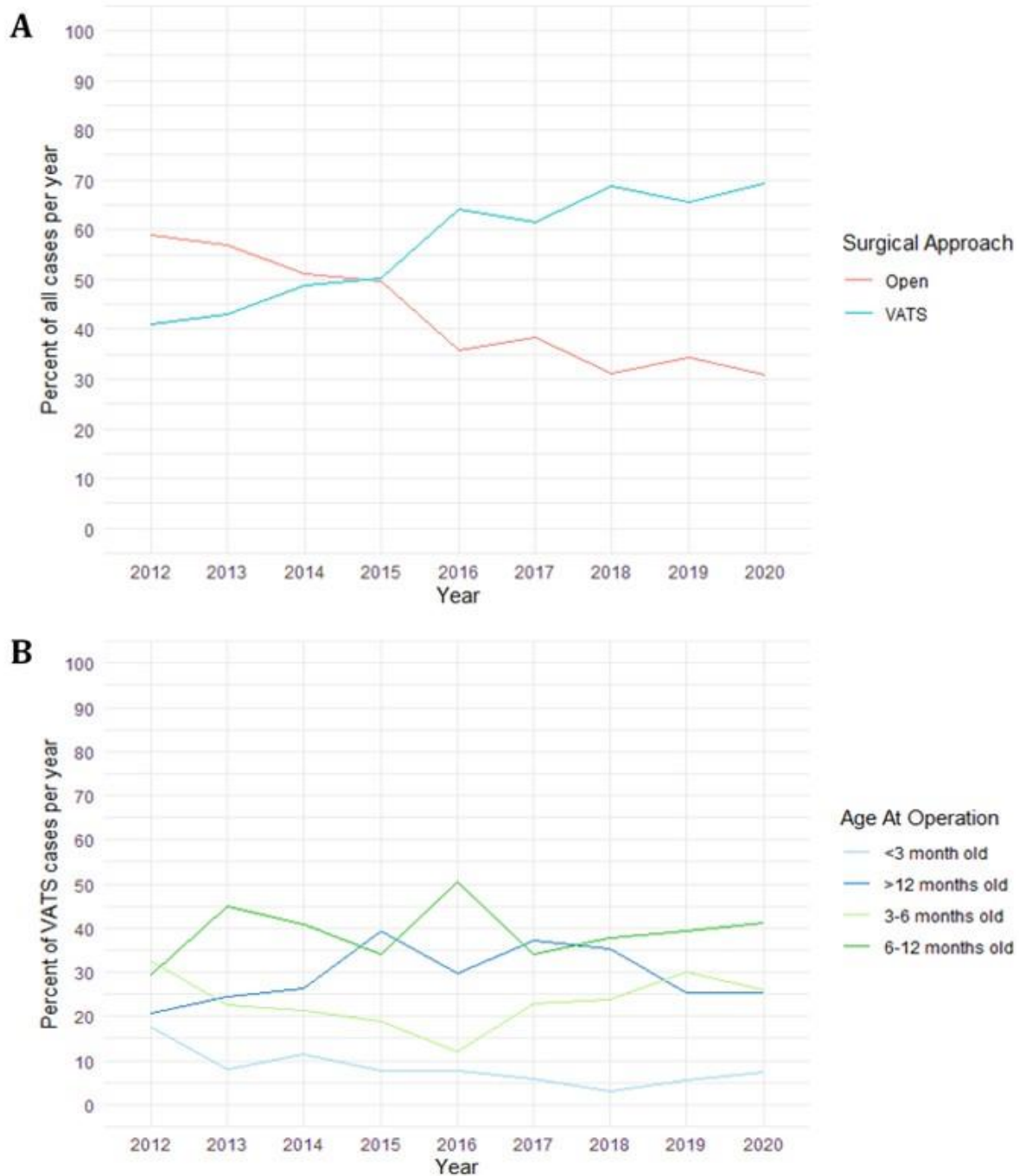


Figure 1. Trends in the operative management of pediatric congenital pulmonary airway malformations. **A:** Comparison of open versus VATS surgical approach. **B:** Trend in the percentage of VATS cases per year for different age groups.

QS 73

OPTIMIZED TIMING FOR SURGICAL CORRECTION OF PECTUS EXCAVATUM BASED ON MEDIAL CLAVICLE EPIPHYSEAL OSSIFICATION

Michela Carter, MD¹, Francis Prendergast, MD¹, Jillian Krauss, MD¹, Suhail Zeineddin, MD, MS², J. Benjamin Pitt, MD³, Gwyneth A. Sullivan, MD, MS⁴, Fizan Abdullah, MD, PhD¹, Brian C. Gulack, MD, MHS⁵, Seth D. Goldstein, MD, MPhil³

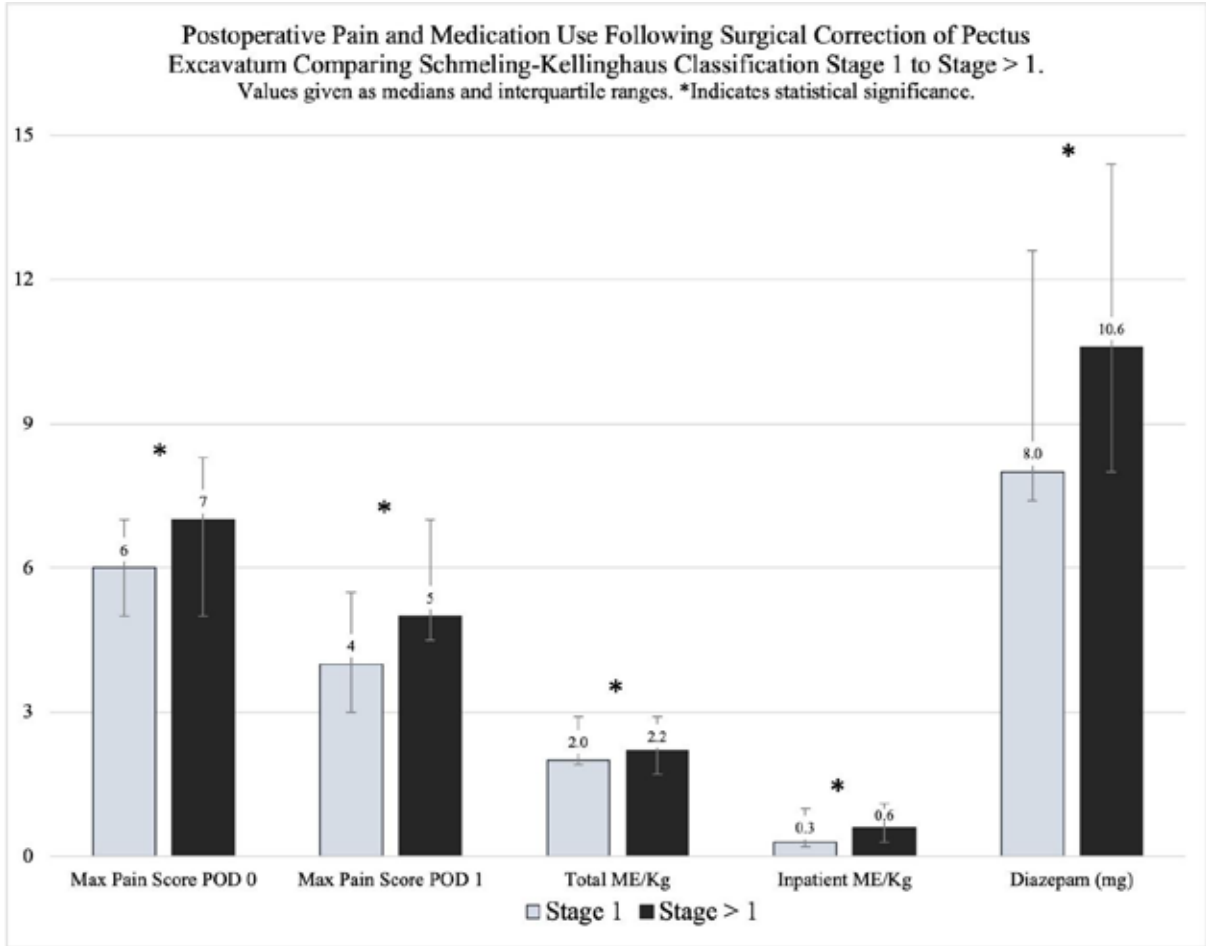
¹Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, ²Division of Pediatric Surgery, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, ³Division of Pediatric Surgery, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, ⁴Division of Pediatric Surgery, Northwestern University Feinberg School of Medicine, Ann & Robert H. Lurie Children's Hospital; Division of Pediatric Surgery, Rush University Medical Center, Chicago, IL, USA, ⁵Rush University Medical Center, Chicago, IL, USA

Purpose: Surgical correction of pectus excavatum is dependent upon chest wall pliability, and optimal timing is prior to complete skeletal maturation. Measures of skeletal maturity are not included in operative planning; therefore, age guides timing for intervention. As skeletal maturation occurs at different rates, a patient-specific approach is warranted. We aimed to determine whether a preoperative computed tomography (CT) imaging evaluation of skeletal maturity is associated with a surrogate for chest wall pliability—postoperative pain.

Methods: Children ≤18 years who underwent surgical correction of pectus excavatum at a high-volume children's hospital from 2020-2022 were identified. Preoperative CT scans within three months of procedure were reviewed by two radiologists and one surgery resident. Skeletal maturity was determined by Schmeling-Kellinghaus classification—a validated staging system based on extent of epiphyseal ossification of the medial clavicle. Inter-rater reliability was evaluated by Kappa statistic. Schmeling-Kellinghaus stage and postoperative pain were compared by Kruskal-Wallis. Wilcoxon-Rank Sum was then used to compare postoperative pain for stage 1 to stage > 1.

Results: Of twenty-eight records reviewed, 57% were Schmeling-Kellinghaus stage 1, 18% 2a, 7% 2b, 7% 3a, 11% 3b. High inter-rater reliability was identified (all raters: Kappa=0.781, p< 0.001, inter-radiologist: Kappa=0.947, p< 0.001). Median age at operation was 15.5 years (interquartile range: 14.8-16.0) and increased with skeletal maturity (p< 0.001). There were significant differences in maximum pain scores, total morphine equivalent use and benzodiazepine use (p≤0.01). When stage 1 (n=16) was compared to stage >1 (n=12), stage 1 had lower maximum pain scores, total morphine equivalent and benzodiazepine use after surgery (p< 0.001).

Conclusions: The Schmeling-Kellinghaus classification system is a valid proxy of skeletal maturity which both surgeons and radiologists can utilize with high inter-rater reliability. Surgical correction of pectus excavatum during stage 1 was found to have less postoperative pain and narcotic use than more mature stages.



QS 74**EARLY EXPERIENCE IN DEVELOPING 3D PRINTING-BASED THORACOSCOPIC SURGERY SIMULATOR FOR ESOPHAGEAL ATRESIA**

Joong Kee Youn, MD¹, Hyun-Young Kim², Sang Joon Park³, Dayoung Ko⁴

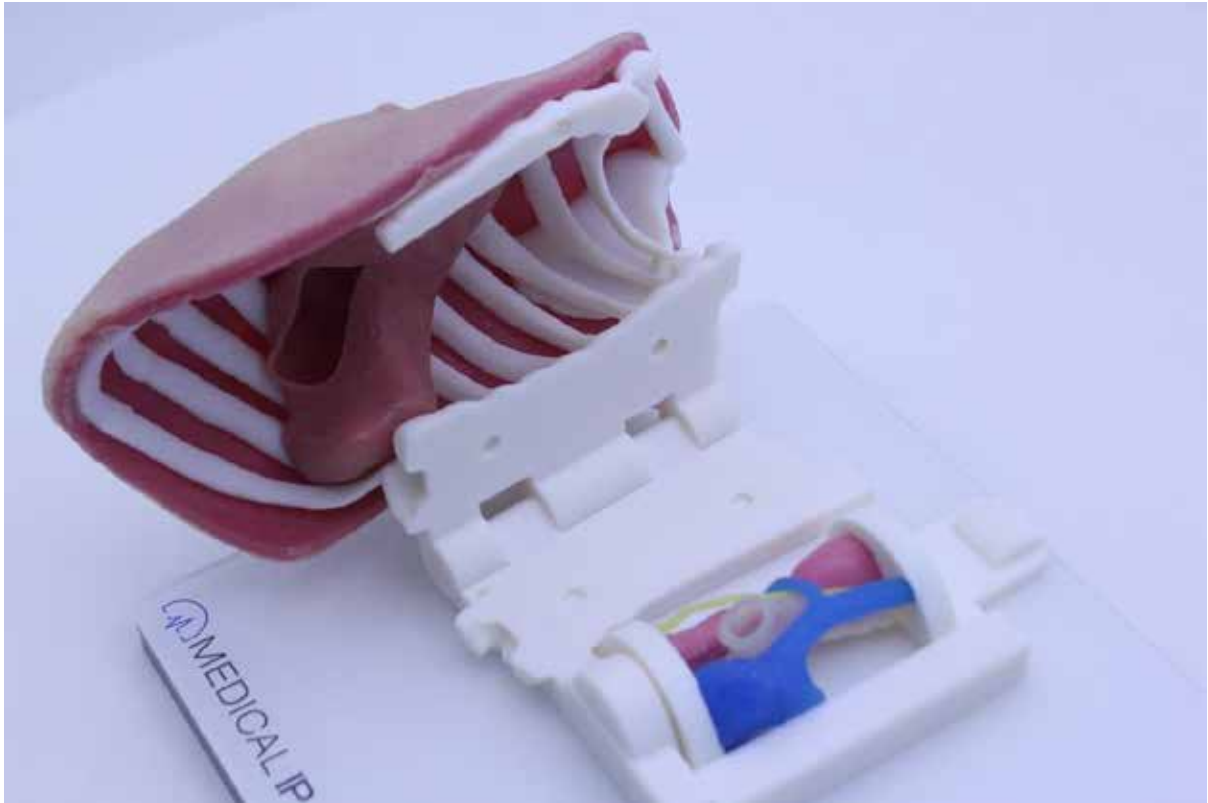
¹Seoul National University Hospital, Seongbuk, Seoul-t'ukpyolsi, Republic of Korea, ²Seoul National University, Jongro, Seoul-t'ukpyolsi, Republic of Korea, ³Seoul National University Hospital, Jongro, Seoul-t'ukpyolsi, Republic of Korea, ⁴Seoul National University Hospital, Jongro-gu, Seoul-t'ukpyolsi, Republic of Korea

Purpose: Surgery education, which has been mainly conducted in the form of an apprenticeship, has had issues in inefficiency and ethical issues, as well as difficulties in implementing complex disease or pediatric congenital disease models. Thus, we developed a 3D-printed thoracoscopic surgery simulator of Esophageal Atresia and checked its effectiveness in the education of pediatric surgeons.

Methods: This research can be divided into two steps: the development of the 3D printing simulator and its validation with pediatric surgeons. For the first step, the structures for the simulator were determined as skin, ribs, clavicle, scapula, esophagus, trachea, lung, azygos vein, and vagus nerve, and the printing materials were discussed. DICOM files of the computed tomography from an actual patient were used as the printing data. Prototype production and modification were repeated to produce the final version of the simulator. For the second step, 6 evaluation factors were determined: physical attributes, realism of materials, realism of experience, ability to perform tasks on the simulator, value of simulator, and overall score with 13 certified pediatric surgeons.

Results: Reusable parts of thoracic cage with skin, bones, and lung were printed combined with replaceable parts such as esophagus, trachea, azygos vein, and vagus nerve. Silicon, Agilus 30 and 95 were used for replication of organs and structures. After going through a total of six prototyping processes, the shape and material of the structure were decided. In the initial evaluation of 13 surgeons on this simulator, the value as a training tool of the simulator is very high, and after a few simple modifications, it is expected that it can be used for training of medical staff.

Conclusion: The 3D-printed thoracoscopic surgery simulator of Esophageal Atresia was developed, and it could be applied for training of pediatric surgeons with small modifications.



Thursday, May 11, 2023

Plenary Session II

7:30 AM – 8:45 AM

10

MODELING THE RELATIONSHIPS BETWEEN POLITICAL PARTISANSHIP, MEDICAID EXPANSION AND FIREARM LAWS WITH YEARS OF POTENTIAL LIVES LOST FROM GUNS AMONG US CHILDREN

Megan E. Paul, BA¹, Brian Arrinza Coakley, MD, FACS, FAAP, Dipl ABOM²

¹*Icahn School of Medicine at Mount Sinai, Los Angeles, CA, USA*, ²*The Mount Sinai Health System, New York, NY, USA*

Purpose: Firearms are now the leading cause of death for US children. Thus, we set out to assess if political partisanship, 7 measures of gun regulations and Medicaid expansion were related to years of potential life lost (YPLL) from firearms among US children.

Methods: The state-level pediatric firearm-related YPLL were extracted from the CDC's WISQARS database between 2015-2020. Additionally, the Cook Partisan Voting Index (PVI), which calculates how Democratic or Republican each state votes in presidential elections compared to the nation, was recorded. Bivariate analyses compared PVI, assault weapons bans, child access prevention (CAP) laws, firearm registration requirements, permit-to-purchase requirements, safe storage laws, Giffords Center ranking (a relative measure of each state's overall gun law environment), the number of firearm provisions and Medicaid expansion to YPLL. Further, a multivariate analysis, controlling for poverty, educational attainment, poor mental health, and race, was conducted to compare all 9 previously listed measures to YPLL.

Results: Alaska and Rhode Island had the highest and lowest YPLL, respectively. Bivariate analyses revealed that Republican-leaning states had higher firearm-related YPLL in children than Democratic-leaning states. This relationship held true in the multivariate analysis ($p=0.001$) controlling for poverty, educational attainment, poor mental health, and race. Further, in the bivariate analysis, lower Giffords Center rankings (indicating more restrictive gun law environments), Medicaid expansion and all firearm laws, except CAP laws, were associated with lower YPLL. Finally, multivariate analysis revealed lower Giffords Center rankings ($p < 0.001$), assault weapons bans ($p=0.02$), the number of firearm provisions ($p < 0.001$), firearms registration requirements ($p=0.007$) and permit-to-purchase requirement ($p=0.002$) were all associated with fewer YPLL.

Conclusion: Democratic-leaning states and states with more restrictive gun laws both experience lower YPLL due to firearms among their pediatric populations. Further research can help pinpoint which specific policies are the most impactful.

Years of Potential Lives Lost due to Firearms in Children, 2015-2020



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A NOVEL MFG-E8-DERIVED OLIGOPEPTIDE PROTECTS AGAINST INFLAMMATION AND ORGAN INJURY IN NEONATAL SEPSIS**Colleen P. Nofi, DO, MBA, MSc¹**, Monowar Aziz, PhD², Jose M. Prince, MD³, Ping Wang, MD²

¹*Cohen Children's Medical Center at Northwell Health, Manhasset, NY, USA*, ²*Center for Immunology and Inflammation, The Feinstein Institutes for Medical Research, Manhasset, NY, USA*, ³*Cohen Children's Medical Center, Zucker School of Medicine at Hofstra/Northwell, Queens, NY, USA*

Purpose: Sepsis is characterized by a dysregulated immune response to infection. It can lead to life-threatening organ injury and is associated with a 10% mortality in infants. Milk fat globule-EGF factor VIII (MFG-E8) attenuates hyperinflammation. On the other hand, the damage-associated molecular pattern, extracellular cold-inducible RNA binding protein (eCIRP), worsens inflammation and is elevated in neonatal sepsis. Given that there is no effective drug to treat sepsis, the aim of this study was to determine the therapeutic potential of a novel, MFG-E8-derived oligopeptide 3 (MOP3) designed to clear eCIRP and protect against inflammation and organ injury in neonatal sepsis.

Methods: MOP3 was designed by screening for effective sequences from the native MFG-E8 protein, with 15 amino acids selected from MFG-E8's interaction site with eCIRP. These amino acids were then tagged with three additional amino acids, arginine-glycine-aspartic acid ("RGD"), known to interact with the integrin receptor and promote phagocytosis. Sepsis was induced in neonatal mouse pups (6 days-old) through intraperitoneal injection of cecal slurry (CS). Pups were treated with either MOP3 (10 µg/g, intraperitoneal injection) or vehicle. After 10 hours, serum and organs were collected and analyzed for inflammatory parameters and organ injury by ELISA, calorimetric assays, and qPCR.

Results: MOP3 treatment protected septic neonatal mice from systemic inflammation by significantly reducing serum eCIRP by 69.9% and IL-6 by 44.1%, and reduced markers of tissue injury including LDH (reduced by 41.6%). MOP3 also protected against lung and intestinal inflammation assessed by significantly reduced mRNA expression of IL-6, IL-1β, KC, and MIP-2 in the lungs, and IL-6 and IL-1β in the intestines. (Table)

Conclusion: By clearing eCIRP from circulation, MOP3 protects against systemic inflammation and organ injury. Given the advantages of synthetic peptides as therapeutics, MOP3 provides a promising new treatment to improve outcomes in neonatal sepsis.

	Sham	Cecal Slurry Vehicle	Cecal Slurry MOP3 Treatment
Serum eCIRP (pg/mL)	303.2 ± 101.1	2681 ± 701.7*	806.8 ± 153.8*#
Serum IL-6 (ng/mL)	1.921 ± 1.399	57.40 ± 8.453*	32.09 ± 5.507*#
Serum LDH (IU/L)	48.57 ± 18.02	586.9 ± 62.79*	342.7 ± 63.91*#
Lung IL-6 (fold-change)	1.000 ± 0.2314	55.13 ± 24.11*	4.689 ± 1.667*#
Lung IL-1β (fold-change)	1.000 ± 0.6835	28.15 ± 10.05*	3.303 ± 0.8184*#
Lung MIP-2 (fold-change)	1.000 ± 0.4350	24.69 ± 5.481*	11.57 ± 3.199*#
Lung KC (fold-change)	1.000 ± 0.5449	46.90 ± 11.66*	9.410 ± 3.649*#
Intestinal IL-6 (fold-change)	1.000 ± 0.4187	378.8 ± 111.0*	164.0 ± 53.17*#
Intestinal IL-1β (fold-change)	1.000 ± 0.2222	128.0 ± 50.61*	22.64 ± 7.008*#

*p < 0.05 vs. sham, #p < 0.05 vs. cecal slurry vehicle by one-way ANOVA and SNK method, N=4-10 per group.

MOP3 Treatment Improves Inflammatory Markers in Neonatal Sepsis

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EXTRACORPOREAL LIFE SUPPORT IN CONGENITAL DIAPHRAGMATIC HERNIA: IS CENTER VOLUME ASSOCIATED WITH MORTALITY?

Alice M. Martino, MD¹, Danh Nguyen², Patrick T. Delaplain, MD³, Tim Jancelewicz, MD, MA, MS⁴, Matthew T. Harting, MD, MS, FAAP, FACS⁵, Peter T. Yu, MD, MPH⁶, Matteo Di Nardo, MD⁷, Sharada H. Gowda, MD⁸, Laura F. Goodman, MD, MPH⁶, Yigit Guner, MD, MS⁹

¹Department of Surgery, University of California Irvine Medical Center, Orange, CA, USA,

²University of California Irvine, ³Department of Surgery, Boston Children's Hospital, Boston,

MA, USA, ⁴Le Bonheur Children's Hospital, University of Tennessee Health Science Center,

Memphis, TN, USA, ⁵McGovern Medical School at UTHealth, Houston, TX, USA, ⁶Children's

Hospital of Orange County and University of California - Irvine, Orange, CA, USA, ⁷Pediatric

Intensive Care Unit, Bambino Gesù Children's Hospital, Rome, Lazio, Italy, ⁸Division of

Neonatology, Texas Children's Hospital, Houston, TX, USA, ⁹Children's Hospital of Orange

County and University of California Irvine, Orange, CA, USA

Purpose: Literature regarding center volume as an independent variable contributing to surgical outcome is emerging, and a center volume-mortality relationship has been previously shown for CDH. This association has not been specifically examined for neonates with congenital diaphragmatic hernia (CDH) receiving extracorporeal life support (ECLS) using the Extracorporeal Life Support Organization (ELSO) data. Our study aims to examine the risk-adjusted association between ELSO center volume and outcomes in CDH-ECLS neonates, hypothesizing that higher center volume confers a survival advantage.

Methods: ELSO data from 2000-2019 were used (IRB #150969). The primary outcome was inpatient mortality and secondary outcomes were on-ECLS complications. Hierarchical logistic regressions with random effects to account for center clustering were used to examine differences in outcomes.

Results: The cohort included 4,985 neonates at 120 centers with a mortality rate of 50.6%. Mean center volume was 42.4 \pm 34.6 cases (2.1 cases/year). In an adjusted model, higher volume was associated with lower odds of mortality: odds ratio (OR) 0.995 (95% CI 0.992-0.999, p=0.014). For an increase in 1 standard deviation in volume (1.5 cases/year), the OR for mortality was lower by 16.7%. Center volume was also examined as a categorical variable where low-volume centers (< 2 cases/year) were associated with 54% higher odds of mortality (OR 1.54, 95% CI 1.03-2.29) compared to high-volume centers (>5 cases/year). On-ECLS complications (mechanical, neurological, cardiac, hematologic metabolic, and renal) were not associated with center volume. Odds of infectious complications were significantly greater for low- (OR 1.90, 95% CI 1.06-3.40) and medium-volume (OR 1.87, 95% CI 1.03-3.39) compared to high-volume centers.

Conclusion: A survival advantage directly proportional to center volume (at least 2 cases/year) was observed for CDH patients treated with ECLS. Lower volume was also associated with infectious complications. Future studies should be directed to identifying opportunities for improvement for centers with lower volume.

Center Volume n = number of centers	Odds Ratio for Mortality	95% Confidence Interval	p-value * denotes statistical significance
Low (< 2 cases annually) n = 74	1.54	1.03 - 2.919	0.034 *
Medium (2 - 4.9 cases annually) n = 35	1.30	0.865 - 1.96	0.21
High (> 5 cases annually) n = 11	-reference-	--	--

Logistic Regression of Center Volume and Mortality

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HOW MANY OPERATIVE RATINGS DOES A PEDIATRIC SURGERY FELLOW NEED TO BE DEEMED PRACTICE-READY?

Andrew Krumm, PhD¹, **Brianna L. Spencer, MD¹**, Shawn Izadi, MD², Ronald B. Hirschl, MD¹, Biren P. Modi, MD, MPH³, Peter F. Ehrlich, MD⁴, Erika A. Newman, MD⁵, Benjamin Zendejas, MD, MSc²

¹University of Michigan, Ann Arbor, MI, USA, ²Boston Children's Hospital, Boston, MA, USA,

³Boston Children's Hospital and Harvard Medical School, Boston, MA, USA, ⁴University of Michigan, C.S. Mott Children's Hospital, Department of Pediatric Surgery, Ann Arbor, MI, USA,

⁵C. S Mott Children's Hospital, University of Michigan, Ann Arbor, MI, USA

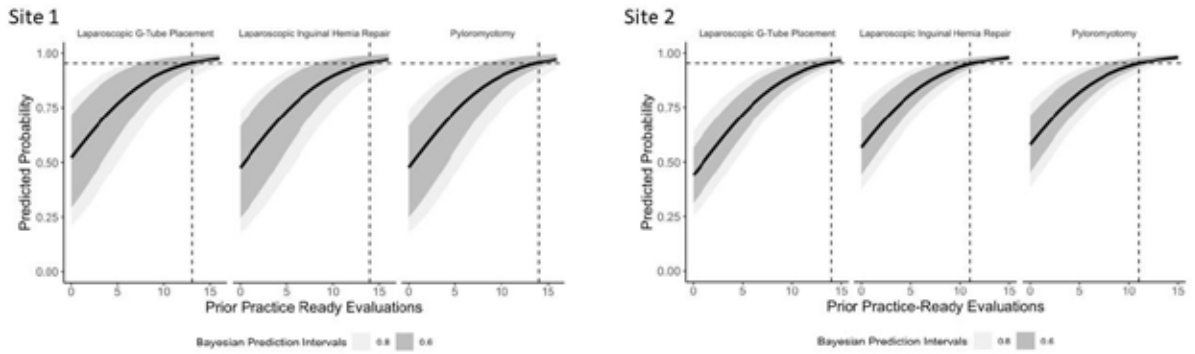
Purpose: Identifying the number of cases required for a fellow to achieve competence has eluded educators in Pediatric Surgery. Workplace-based assessment (WBA) systems have made collecting performance data practical and created the opportunity to translate WBA ratings into probabilistic statements about a fellow's likelihood of performing to a given standard on a subsequent operative assessment opportunity.

Methods: We compared data from two pediatric surgery training programs, using a Bayesian mixed-effects modeling approach to quantify the likelihood of a fellow earning a practice-ready rating the next time he/she attempted a specific procedure using the performance rating scale from the Society for Improving Medical Professional Learning's (SIMPL) smartphone app. The primary driver of a performance expectation is the accumulation of prior practice-ready ratings, conditional on key sources of variation like the rater and ratee. Therefore, the more that a fellow is assessed and earns practice-ready ratings, the higher his/her predicted probability.

Results: For site 1, 33 faculty rated 6 fellows on 4 unique procedures yielding 364 ratings of which 268 (68%) were deemed practice ready. For site 2, 26 faculty assessed 9 fellows on 16 procedures yielding 1,094 ratings, of which 777 (71%) earned practice ready ratings. Across these two independent sites using the same operative performance scale, we identified similar model-based performance expectations across multiple commonly assessed procedures. Figure 1 shows our results for 3 overlapping procedures. For example, for laparoscopic gastrostomy, modeling predicted between 13 to 14 procedures needed to achieve a 95% probability of earning a practice ready performance rating that next time a fellow is evaluated.

Conclusion: Our approach to modeling SIMPL operative performance data appears to be effective at determining practice readiness of pediatric surgery fellows across multiple faculty and fellow groups. This method could be used to establish minimum case number requirements.

Figure 1. Predicted Performance Expectations (Practice Ready Thresholds) for Sites 1 and 2



14

IMMEDIATE VERSUS DELAYED SURGICAL MANAGEMENT OF INFANT CRYPTORCHIDISM WITH INGUINAL HERNIA

Walter A. Ramsey, MD¹, Carlos T. Huerta, MD², Christopher F. O'Neil, MD³, Rebecca A. Saberi, MD⁴, Gareth P. Gilna, MD⁵, Nicole B. Lyons, MD³, Brianna L. Cohen, MD³, Joshua P. Parreco, MD⁶, Chad M. Thorson, MD, MSPH⁴, Juan E. Sola, MD⁷, Eduardo A. Perez, MD⁷

¹Jackson Memorial Hospital / University of Miami, Miami, FL, USA, ²University of Miami Department of Surgery, Miami, FL, USA, ³DeWitt Daughtry Family Department of Surgery, University of Miami, MIAMI, FL, USA, ⁴DeWitt Daughtry Family Department of Surgery, Division of Pediatric Surgery, University of Miami Miller School of Medicine, Miami, FL, USA, ⁵DeWitt Daughtry Family Department of Surgery, Division of Pediatric Surgery, University of Miami Miller School of Medicine, ⁶Memorial Healthcare System, Miami, FL, USA, ⁷DeWitt Daughtry Family Department of Surgery, Division of Pediatric Surgery, University of Miami Miller School of Medicine, USA

Purpose: Cryptorchidism is a common condition among male infants, particularly those born prematurely. Orchiopexy is usually delayed until six to twelve months of age, often allowing the undescended testicle(s) (UT) to descend spontaneously. However, when an inguinal hernia (IH) is also present, some surgeons elect to perform orchiopexy and inguinal hernia repair (IHR) at the age of presentation rather than delaying surgery. We hypothesize that there is no benefit to early surgical intervention in newborns with both IH and UT.

Methods: The Nationwide Readmissions Database was used to identify newborns with diagnoses of IH and UT from 2010-2014. Patients were stratified by management: IHR performed on initial admission (Repair) or not (Deferral). Demographics, outcomes, and complications were compared. Results were weighted for national estimates.

Results: We analyzed 1,306 newborns (64% premature) diagnosed with both IH and UT. IHR was performed at index admission 30% of the time. Repair was more common in premature babies (43% vs. 8% full-term, $p < 0.001$) and patients with congenital anomalies (33% vs. 27% without congenital anomaly, $p=0.012$).

There was no difference in readmission rates, perforation, or bowel resection in the Repair versus Deferral groups. Repair patients had higher rates of orchiectomy at index or return visit. Among Deferral patients, none were readmitted for bowel resection, and $< 1\%$ were readmitted for orchiectomy or hernia incarceration. None of the Deferral patients with incarceration at index hospitalization were readmitted within 365 days.

Conclusion: In newborns with UT and IH, immediate repair is not associated with improved outcomes. Even with incarceration on initial presentation, rates of readmission with incarceration or bowel compromise for patients who undergo Deferral of surgery are minimal. Moreover, Repair newborns have higher rates of orchiectomy. We found no benefit to early operative intervention; thus, we recommend waiting until 6-12 months of age to reassess for surgery.

	Deferral n=913 (70%)	Repair n=393 (30%)	p-value
Premature	475 (52)	357 (91)	< 0.001
Congenital Anomaly	485 (53)	238 (61)	0.012
Readmitted Within 365 Days	186 (20)	64 (16)	0.092
Intestinal Perforation	-	* (< 1)	0.090
Bowel Resection	11 (1)	* (< 2)	0.604
Orchiectomy	* (< 1)	* (< 2)	0.029

Table 1: Clinical Characteristics and Outcomes

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POST-OPERATION OPIOID REDUCTION PROTOCOL REDUCES RACIAL DISPARITY OF CLINICAL OUTCOMES IN CHILDREN

David F. Grabski, MD PhD¹, Rick Vavolizza², Heron D. Baumgarten, MD, MPH³, Mark A. Fleming, MD⁴, Chioma Moneme, MD¹, Eugene McGahren, MD¹, Sandra Kabagambe, MD⁵, Michael Williams, MD¹, Jeffrey W. Gander, MD⁶

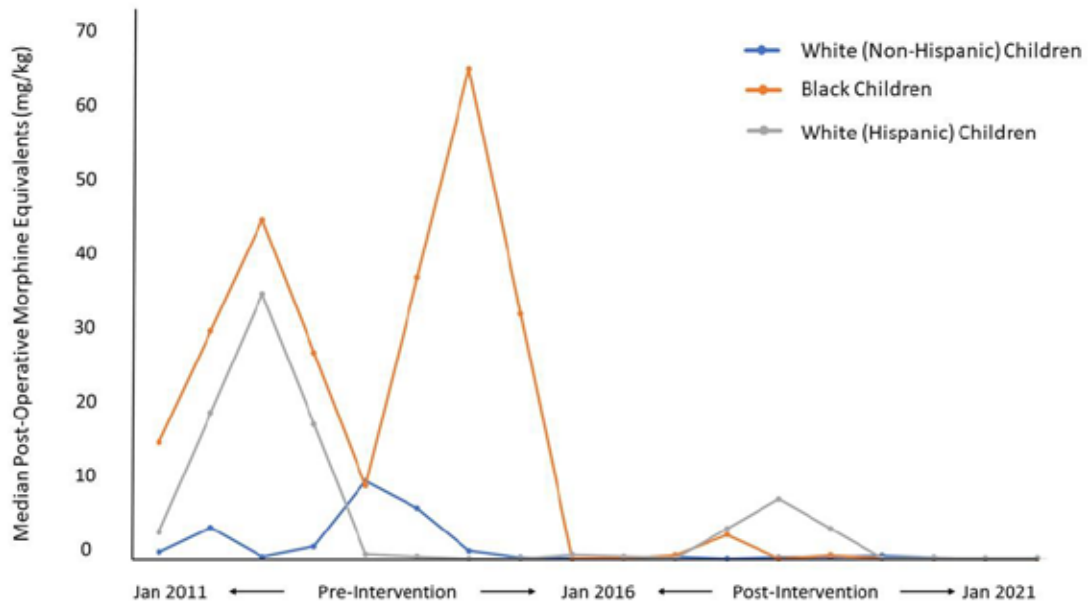
¹University of Virginia, Charlottesville, VA, USA, ²University of Virginia, ³University of Virginia, Children's Hospital of Philadelphia, Charlottesville, VA, USA, ⁴University of Virginia Health, VA, USA, ⁵University of Virginia, New York, NY, USA, ⁶University of Virginia Children's Hospital, Charlottesville, VA, USA

Introduction: Racial disparities in access and health outcomes exist for children requiring surgery in the United States. The purpose of this investigation was to determine if a pediatric post-operative opioid reduction protocol reduced racial bias in opioid prescribing patterns and associated clinical outcomes.

Methods: A post-operative opioid reduction protocol based on IV acetaminophen and standardized post-operative sign-out was implemented in children under 1 year old at an academic hospital. A before and after analysis was conducted using a retrospective pre-intervention cohort (Jan 2011- Dec 2015) and a prospective post-intervention cohort (Jan 2016- Jan 2021). Primary outcomes included post-operative opioid use and related clinical outcomes stratified by race.

Results: A total of 249 children were included in the investigation, 117 in the pre-intervention group and 132 in the post-intervention group. The majority of patients were White (non-Hispanic) or Black (non-Hispanic). Both cohorts were similarly matched including type of surgery (most common pathology- intestinal atresia, anorectal malformations, Hirschsprung's Disease). A time series analysis was used to demonstrate a temporal trend in the primary outcome (Figure 1). On univariate analysis in the pre-intervention cohort, the median post-operative morphine equivalents in White children was 2.1 mg/kg while in Black children it was 13.1 mg/kg ($p=0.0352$). In the post-intervention cohort, the median value for White children and Black children were statistically identical (0.05 mg/kg and 0.0 mg/kg, $p=0.237$). Additionally, a racial bias was noted in the preintervention cohort in total length of stay (White children- 16 days, Black children- 45 days, $p=0.007$), which was eliminated in the postintervention cohort (White and Black children- 8 days, $p=0.748$).

Conclusion: The use of a clinical post-operative opioid reduction protocol implemented at a tertiary medical center reduced racial bias in opioid prescribing patterns in children. The protocol also reduced a significant racial bias in associated clinical outcomes.



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ASSOCIATION BETWEEN PROPHYLACTIC ANTIBIOTICS AND RISK OF EARLY INFECTIOUS COMPLICATIONS AFTER PEDIATRIC CENTRAL VENOUS ACCESS

Steven T. Papastefan, MD¹, Suhail Zeineddin, MD, MS², Martin Blakely, MD, MS³, Harold N. Lovvorn, MD⁴, Mehul V. Raval, MD, MS⁵, Timothy B. Lautz, MD⁶

¹ Department of Surgery, Northwestern University Feinberg School of Medicine Division of Pediatric Surgery, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, ²Division of Pediatric Surgery, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, ³Department of Pediatric Surgery, Vanderbilt University Medical Center, ⁴Vanderbilt University Medical Center, Nashville, TN, USA, ⁵Division of Pediatric Surgery, Department of Surgery, Northwestern University Feinberg School of Medicine, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, ⁶Division of Pediatric Surgery, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA

Purpose: Despite the frequency of central venous access procedures in pediatric oncology patients, the utilization and effectiveness of prophylactic antibiotics for reducing infectious complications is unknown. Our purpose was to inform the design of a prospective randomized controlled trial (RCT) by identifying current antibiotic utilization and evaluating the correlation with infectious complications.

Methods: After excluding patients on antibiotics prior to the day of the procedure (n=2,811), patients < 18 years old with malignancies who underwent port (n=6,058) or tunneled vascular access device (VAD) (n=3,158) placement from 2017-2021 were queried using the Pediatric Health Information System database. Antibiotic utilization and complications including central line-associated blood stream infection, bacteremia, and surgical site infection were assessed. Multivariate logistic regression was used to evaluate factors associated with early infection.

Results: Prophylactic antibiotics were utilized in 67.7% and 64.4% of port and tunneled VAD placements, respectively. Compared to ports, tunneled VADs had higher rates of early infectious complications (4.65% vs. 0.20%, p< 0.001). Antibiotics were associated with reduced infectious complications after tunneled VADs (3.74% vs. 6.32%, p=0.001) but not ports (0.24% vs. 0.10%, p=0.08). Patients with acute myelogenous leukemia (AML) accounted for the highest fraction of tunneled VADs (9.43%) and the highest rate of infectious complications (9.60%). Factors associated with infectious complications in multivariate analysis included tunneled VAD (HR 20.78, p< 0.001) and AML (HR 2.37, p< 0.001), while prophylactic antibiotics (HR 0.67, p=0.02) and solid tumors (HR 0.38, p< 0.001) were associated with reduced risk.

Conclusions: Infectious complications are highest after tunneled VAD placement and in patients with AML, while lower in those with solid tumors. Despite recommendations by Centers for Disease Control against prophylactic antibiotics, these findings suggest a benefit in children undergoing central venous access and support the need for a multicenter RCT taking into account the effect modifiers identified herein.

		Infectious Complications	No Infectious Complications	Odds Ratio of Infectious Complications	95% CI (OR)	p-value
Surgery Type	Port	12 (0.2%)	6,046 (99.8%)	Ref.		
	Tunneled VAD	147 (4.6%)	3,011 (95.4%)	20.78	11.46-37.68	
Diagnosis	ALL	54 (1.9%)	2,765 (98.1%)	Ref.		
	AML	39 (9.6%)	366(90.4%)	2.37	1.52-3.69	< 0.001
	Solid Tumor	25 (0.7%)	3,419 (99.3%)	0.38	0.23-0.61	< 0.001
Antibiotics	None	73 (2.4%)	3,011 (97.6%)	Ref.		
	Prophylactic (< 24 hours)	69 (1.3%)	5,192 (98.7%)	0.67	0.47-0.94	0.02
	Extended	17 (2.0%)	854 (98.0%)	0.79	0.45-1.38	0.405

*Lymphoma and CNS tumor excluded from table but did not reach statistical significance
Multivariate Analysis of Factors Associated with Early Infectious Complications

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REDUCTION IN UNPLANNED INTUBATIONS AFTER CHILDREN'S SURGERY: A QUALITY IMPROVEMENT PROJECT

Peter Juviler, MD¹, Jeffrey Meyers, MD², Elizabeth Levatino, BSN, RN¹, Jessica Axford, MS, RN², Erin Barker, MD², Lynn Correll, MD, PhD³, Marjorie Gloff, MD², Margo McKenna Benoit, MD², Jan Schriefer, DrPH, MSN, MBA⁴, Sarah Verna, RDCS², Sarah Wegman, BA⁵, Derek Wakeman, MD¹

¹University of Rochester, Rochester, NY, USA, ²University of Rochester | Golisano Children's Hospital, Rochester, NY, USA, ³BC Children's Hospital, Rochester, NY, USA, ⁴University of Rochester Medical Center, Rochester, NY, USA, ⁵University of Rochester

Purpose: Unplanned intubation following children's surgery is associated with increased 30-day mortality. Our children's hospital was a high outlier for postoperative unplanned intubation according to NSQIP-Pediatric. In response, a multidisciplinary team of stakeholders aimed to reduce postoperative unplanned intubation rate by 25% in one year.

Methods: A multidisciplinary quality improvement team assembled in mid-2018. Based on apparent causes of unplanned intubations identified on case reviews, an extubation readiness checklist and a postoperative pain management guideline, which emphasized non-opioid analgesics, were implemented for neonates in August 2019. Records for children ages 0-17 years who underwent a surgical procedure were gathered from NSQIP-Pediatric. There were no cases of unplanned intubation after outpatient procedures, so only inpatient procedures are reported. Patients from January 2016 through August 2019 (pre-implementation group, n = 2810) were compared to patients from September 2019 through June 2022 (post-implementation group, n = 1652). Chi squared and Mann-Whitney U tests were employed for data analysis as appropriate ($p < 0.05$ considered significant).

Results: The number of unplanned intubation events and the percentage of children with a postoperative unplanned intubation decreased in the post-implementation period (32 intubations/1000 patients vs 12 intubations/1000 patients, $p < 0.001$; 2.5% vs 0.7%, $p < 0.001$, Figure). The 30-day mortality rate significantly declined over the study period (0.8% vs 0.3%, $p < 0.001$). There was no difference in balancing measures including postoperative pneumonia rate (0.6% vs 0.2%, $p = 0.870$) and median hospital length of stay [3 (IQR 4) days vs 3 (IQR 4), $p = 0.502$].

Conclusions: A quality improvement effort involving implementation of an extubation readiness checklist and postoperative pain management guideline for neonates decreased postoperative unplanned intubations. Unplanned intubation is associated with post-operative mortality, particularly in neonates, and, therefore, is likely an important children's surgical quality measure.

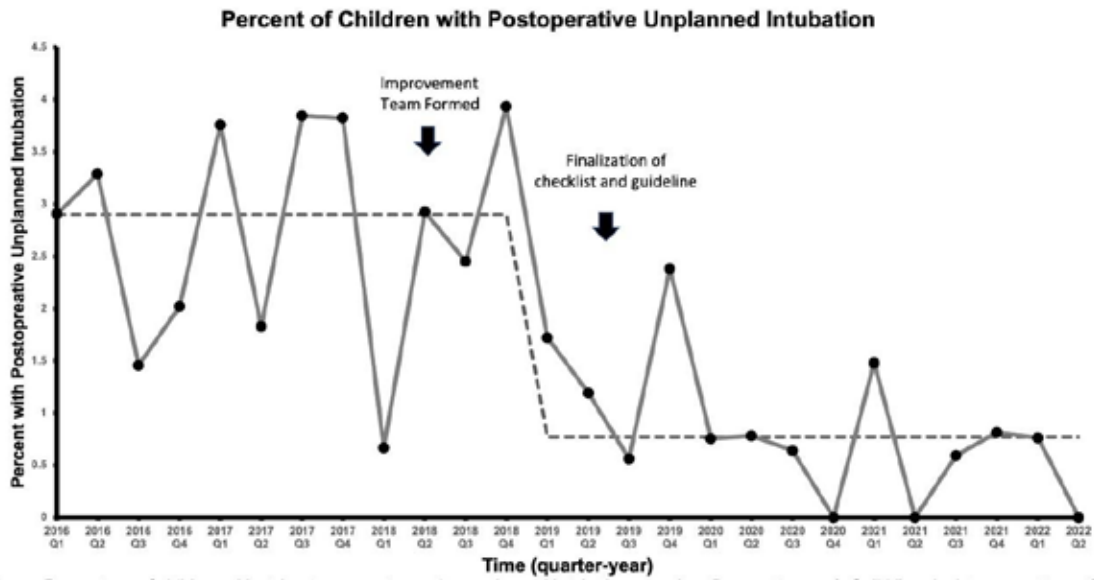


Figure. Percentage of children with at least one postoperative unplanned intubation over time (by quarter-year). Solid line depicts percentage of unplanned intubation. Dashed line depicts median percentage of unplanned intubation before and after median shift as determined by run chart rules. Arrows depict timing of improvement team formation as well as finalization and implementation of extubation readiness checklist and postoperative pain management guideline (as labeled). Q = quarter

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BALANCED RESUSCITATION WITH WHOLE BLOOD VERSUS COMPONENT THERAPY IN SEVERELY INJURED PRE-ADOLESCENT CHILDREN

Robert J. McLoughlin, MD, MSCI¹, Cassandra D. Josephson, MD¹, Lucas Neff², Nicole M. Chandler, MD³, Raquel Gonzalez, MD, MHCM³, Robert T. Russell, MD, MPH⁴, Christopher W. Snyder, MD³

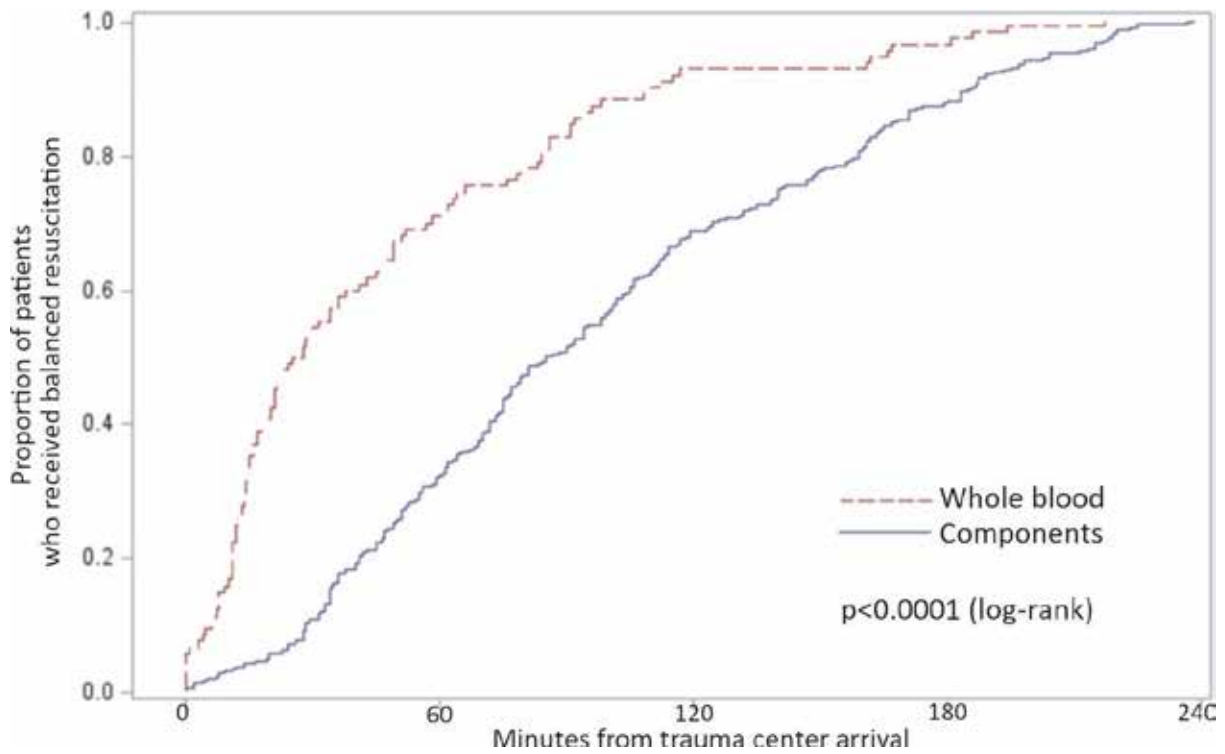
¹John Hopkins All Children's Hospital, Saint Petersburg, FL, USA, ²Wake Forest School of Medicine, Winston-Salem, NC, USA, ³Johns Hopkins All Children's Hospital, St. Petersburg, FL, USA, ⁴University of Alabama at Birmingham and Children's of Alabama, Birmingham, AL, USA

Purpose: Balanced resuscitation with blood products containing red blood cells, plasma, and platelets, can be achieved using whole blood (WB) or individual blood component therapy (CT). However, balanced resuscitation in younger children with severe traumatic hemorrhage is complicated by limited intravenous access, a greater impact of over-transfusion, and multiple product exposures. We hypothesized that using WB achieves a balanced resuscitation faster than CT, with fewer product exposures and improved clinical outcomes.

Methods: Children < 12 years old achieving balanced resuscitation within four hours of arrival were identified from the 2017-2019 Trauma Quality Improvement Program database. Time to balanced resuscitation was defined as the moment a child received either WB or all three blood components. Patient characteristics, resuscitation details, and outcomes were compared between WB and CT groups. Time to balanced resuscitation was compared using Kaplan-Meier analysis and the log-rank test. Multivariable regression models compared intensive care unit (ICU) length of stay and mortality, with adjustment for covariates.

Results: There were 390 patients (109 WB, 281 CT) with a median age of 7 years, 12% penetrating mechanism, 42% severe TBI, and 49% in-hospital mortality. Time to balanced resuscitation was shorter in the WB vs. CT group (median 28 vs. 87 minutes, $p < 0.0001$). WB patients received fewer transfusion exposures (mean 3.21 vs. 3.89, $p = 0.01$) and less total blood products (50 vs. 85 cc/kg, $p = 0.007$). On multivariable regression, ICU stays were shorter for the WB vs. CT group (median 10 vs. 12 days; hazard ratio 0.65, 95%CI: 0.46-0.92, $p = 0.01$), while in-hospital mortality was similar (50% vs. 45%, odds ratio 1.14, 95%CI: 0.66-1.95, $p = 0.64$).

Conclusions: In pre-adolescent trauma patients receiving balanced blood product resuscitation, WB was associated with faster time to balanced resuscitation, fewer transfusion exposures, lower overall transfusion volumes, and shorter ICU stays. Risk-adjusted in-hospital mortality was similar for WB and CT.



Scientific Session III: Colorectal and General

12:30 PM – 1:45 PM

36**LONG-TERM MANAGEMENT OF PROBLEMS IN CLOACAL EXSTROPHY; A SINGLE-INSTITUTION REVIEW**

Nora M. Haney, MD/MBA¹, Ahmad Haffar, MD², **Christian Morrill³**, Chad Crigger¹, John P. Gearhart⁴

¹James Buchanan Brady Urological Institutions, Johns Hopkins Hospital, Johns Hopkins Medical Institutions, Charlotte Bloomberg Children's Hospital, Baltimore, MD, USA, Baltimore, MD, USA, ²James Buchanan Brady Urological Institute, The Johns Hopkins Medical Institutions, Baltimore, MD, USA, Baltimore, MD, USA, ³Johns Hopkins Hospital, Baltimore, MD, USA, ⁴Johns Hopkins School of Medicine, Baltimore, MD, USA

Purpose: Cloacal exstrophy (CE) is the most severe malformation of the exstrophy-epispadias complex. This study aims to discuss long-term problems in a single major institution with a high volume of CE patients.

Methods: A prospectively maintained IRB approved database was reviewed for CE patients with >10 years of follow-up. Urinary, renal, gastrointestinal, orthopedic, psychosocial, and independence attributes were evaluated. Descriptive statistics were calculated (JMP).

Results: Out of 149 CE patients followed, there were 63 patients who met inclusion. Median age was 20.9 years [10.2-59.3]. Thirty-seven (58.7%) were 18 years and older. Twenty-one (33.3%) were born female and 39 (61.9%) born male, 14 of whom were gender converted at birth. Gender identity was self-reported 26 males, 36 females, and 1 non-binary. There were two deaths, one for cancer unrelated to CE (5th decade) and another associated with ESRD (2nd decade). Two females conceived naturally and delivered via cesarean section and two patients adopted. No male CE patients had biological children.

Average diastases was 6.2 cm [3.2-14]. Catheterizable channels were the most common method of voiding (45/63, 71.4%). Of those, 88.9% (40/45) were continent. Forty-six patients (73.0%) had no CKD while 4 (6.3%) went on to renal replacement therapy (RRT). Gastrointestinal diversion was managed by colostomy (37/63, 58.7%) and ileostomy (17/63, 27.0%). Only 1/5 (20.0%) was continent of stool after PSARP. Most patients underwent osteotomy (47/63, 74.6%). Thirty-eight percent (24/63) required a wheelchair. Psychosocial diagnoses included 19/63 (30.2%) patients with anxiety and/or depression and 17/63 (27.0%) patients with chronic pain. Out of the 52 patients who were evaluated by physical therapy, 46 (88.5%) were independent. Two patients (3.2%) had cognitive delay.

Conclusion: Improvements in intensive care management, gastrointestinal management, orthopedic management, and pediatric urology have resulted in survival rates approaching 100%. Yet these children face long-term problems across multi-disciplinary fields.

Urinary	45/63 (71.4%) Catheterizable stoma	6/63 (9.5%) Ileal Conduit	3/63 (4.8%) CIC per Urethra	9/63 (14.2%) Leaking per urethra	
Urinary continence	40/45 (88.9%) Catheterizable stoma	0 (0%) Ileal Conduit	1/3 (33.3%) CIC per Urethra	0 (0%) Leakage per urethra	
Renal	4/63 (6.3%) Stage 1 CKD	2/63 (3.2%) Stage 2 CKD	3/63 (4.8%) Stage 3 CKD	1/63 (1.6%) Stage 4 CKD	4/63 (6.3%) RRT
Gastrointestinal	37/63 (58.7%) Colostomy	17/63 (27.0%) Ileostomy	5/63 (7.9%) PSARP		
Gastrointestinal continence	0 (0%) Colostomy	0 (0%) Ileostomy	1/5 (20.0%) PSARP		
Orthopedic	22/63 (34.9%) No assistance	8/63 (12.7%) Abnormal gait	8/63 (12.7%) Braces/walker	24/63 (38.1%) Wheelchair	
Psychosocial	19/63 (30.1%) Anxiety/depression	17/63 (27.0%) Chronic pain			

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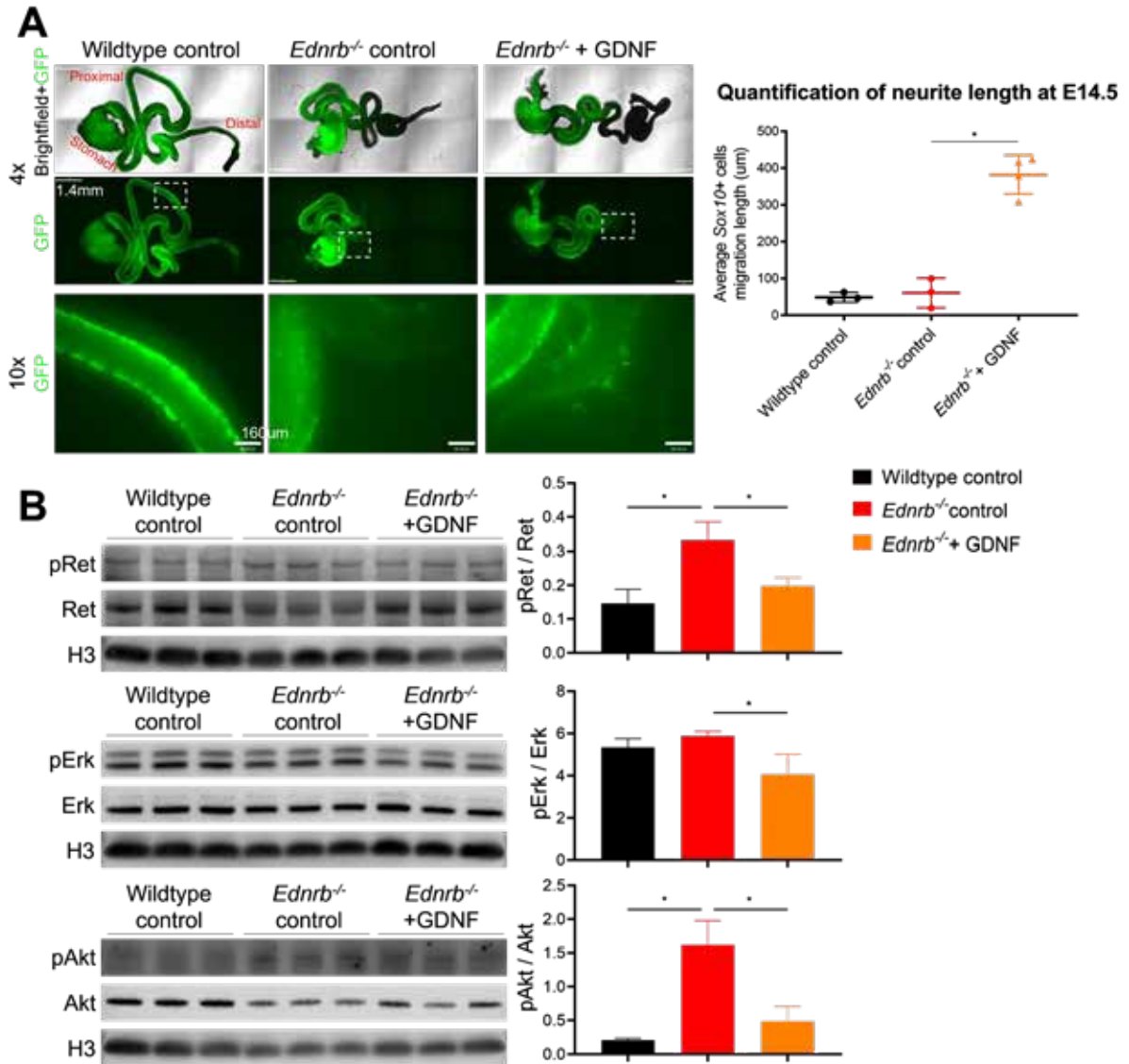
GDNF PROMOTES ENTERIC NEURAL PROGENITOR MIGRATION BY RESTORING THE MISREGULATED Ret PATHWAY IN A KNOCKOUT MODEL OF HIRSCHSPRUNG'S DISEASE**Dorothy Lee, Bachelor's¹, Bo Li, PhD², Atsuyuki Yamataka, MD PhD³, Agostino Pierro, MD²***¹Hospital for Sick Children, Toronto, ON, Canada, ²The Hospital for Sick Children, Toronto, ON, Canada, ³Department of Pediatric General and Urogenital Surgery, Juntendo University School of Medicine, Tokyo, Japan*

Purpose: The pathophysiology of Hirschsprung's disease (HD) is associated with migratory defects of enteric neural progenitors. It has been shown that glia cell-derived neurotrophic factor (GDNF) induced neural migration through the Ret pathway. We hypothesize that GDNF can induce post-migratory enteric neural migration through modulation of the Ret receptor and its downstream kinases.

Methods: Ednrb knockout mice (Ednrb^{-/-}) were studied as an animal model of Hirschsprung's disease, with transgenic expression of Sox10-Venus to allow tracing of enteric progenitors. Following ethical approval (#47780), embryonic guts of wildtype and Ednrb^{-/-} embryos at E14.5 with Sox10-Venus expression were isolated and embedded into Matrigel domes. Explants were cultured in control media (wildtype n=3, Ednrb^{-/-} n=3), or media supplemented with GDNF (100ng/mL) (Ednrb^{-/-} n=3). Explants were maintained for 48 hours, followed by live imaging to track cell migration. The protein expression of phosphorylated and total Ret, Erk and Akt was analyzed through Western blot using whole explant tissues.

Results: Outward migration of Sox10+ cells was observed in GDNF treated Ednrb^{-/-} embryonic gut explants (Fig. A), with quantification of neurite extension length confirming significant increased migration compared to explants cultured in control media. Phosphorylation of Ret and Akt were both significantly increased in Ednrb^{-/-} control explants (Fig. B), while after GDNF administration, phosphorylation of Ret, Akt and Erk were all significantly downregulated.

Conclusion: Administration of GDNF significantly enhanced Sox10+ enteric progenitor migration in Ednrb^{-/-} embryonic gut explants at post-migratory stage E14.5. We found a misregulated Ret pathway in Ednrb^{-/-} explants which may reflect an over compensatory response due to the loss of Ednrb signaling. Exogenous GDNF administration counteracts this imbalance and restored the signaling pathway similar to wildtype levels, thus restoring the migration ability of Ednrb^{-/-} enteric neurons. This study supports a potential future treatment of Hirschsprung's disease which is based on stimulation of neural migration.



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SOCIAL DETERMINANTS OF HEALTH ARE ASSOCIATED WITH FAILED BOWEL MANAGEMENT FOR CHILDREN WITH ANORECTAL MALFORMATIONS

Shruthi Srinivas, MD¹, Maria Knaus, MD¹, Drayson Campbell, BS¹, Alberta Negri Jimenez, BA¹, Gabriella Pendola, Richard J. Wood, MD², Ihab Halaweish, MD¹, Alessandra Gasior, DO³

¹Nationwide Children's Hospital, Columbus, OH, USA, ²Center for Colorectal and Pelvic Reconstruction, Columbus, OH, USA, ³Center for Colorectal and Pelvic Reconstruction, Nationwide Children's Hospital, Columbus, OH, USA

Purpose: Many patients with anorectal malformations (ARMs) benefit from intensive bowel management programs (BMPs) to manage severe constipation or fecal incontinence. We aimed to understand the role of social determinants of health (SDOH) in failure to achieve success following BMPs in the ARM population.

Methods: A single-institution, IRB-approved retrospective review was performed in children with ARM (n= who underwent bowel management program from 2014-2021 (n=239). Clinical, surgical, and SDOH data were collected. Children were stratified as clean or not clean per Rome IV criteria at the completion of their BMP. Categorical variables were analyzed via Fisher's exact tests and continuous variables with Mood's median tests. A significance level of 0.05 was utilized.

Results: There were 239 total patients identified who underwent initial or redo BMP, with median age of 6.62 years (IQR: 4.78, 9.83). 81 (34%) were not clean after completing BMP. Follow up occurred at a median of 14 months (IQR: 5.25, 36). Children who held public insurance, had unmarried parents, had family outside of immediate family in the home, and did not have formal support systems were found to have a higher association with BMP failure ($p < 0.05$ for all). Tethered cord status, type of ARM, age at repair, type of repair, age at BMP, and type of initial BMP regimen were not significantly associated with success.

Conclusion: In our series of 239 patients with anorectal malformations undergoing bowel management programs, there was a significant correlation of failure of bowel management programs with several social determinants of health elements. Attention to social determinants of health and identifying high-risk patients in whom specialized care may be needed may serve to help these children develop higher rates of being clean.

	Clean n=158 (66%)	Not Clean n=81 (34%)	p-value
Age at ARM repair, days	194 (102 - 443)	173 (107 - 397)	0.47
Age at BMP, months	88.1 (63.3 - 139.3)	73.3 (55.6 - 107.5)	0.13
Repair via PSARP	110 (70.1%)	63 (77.8%)	0.58
Initial BMP regimen			
ACE	52 (33.1)	18 (22.2)	0.1
Laxatives			
Rectal enemas	50 (31.9)	26 (32.1)	>0.99
	43 (27.4)	20 (24.7)	0.76
Public insurance	21 (14.6)	19 (28.4)	0.02
Immediate family at home	108 (87.8)	54 (76.1)	0.04
Unmarried parents	15 (11.9)	19 (26.4)	0.01
Formal support system	71 (73.2)	34 (60.7)	0.01

Social Determinants of Health Associated with Failure of Bowel Management Program in Anorectal Malformation Patients

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FUNCTIONAL OUTCOMES OF PATIENTS WHO UNDERWENT ANORECTAL MALFORMATION REPAIR USING REAL-TIME MAGNETIC RESONANCE IMAGING GUIDANCE

Danielle Dougherty, MD¹, Matthew W. Ralls, MD², Laurie Wild, NP², Maria Ladino Torres, MD, Connor Plagens, BS, Marcus D. Jarboe, MD²

¹University of Michigan, ANN ARBOR, MI, USA, ²University of Michigan, Ann Arbor, MI, USA

Purpose: Despite the initiation of minimally-invasive laparoscopic techniques, 60-70% of patients who undergo anorectal malformation repair still experience functional bowel issues in childhood, including constipation and fecal incontinence. In this study, we evaluate the outcomes of a procedure in which real-time magnetic resonance imaging guidance is used during initial repair to better allocate the epicenter of the sphincter muscle complex in the hopes of decreasing injury and improving functional outcomes.

Methods: A retrospective chart review was completed of the patients who underwent this procedure at one institution. Functional outcomes were measured by their most recent bowel management programs. Lesions were categorized as mild (perineal, recto-vestibular), moderate (no fistula, bulbar, prostatic, rectal atresia), and complex (bladder neck fistula, cloaca).

Results: Thirty patients underwent this procedure from 2014-2021. The average age at the time of operation was 9 months (range 3-22, median 8). Half of the patients were followed to ages 1-3 years old. The majority of these had moderate lesions (n=9) followed by complex (n=4) and mild (n=2). Five patients in this group (33%) do not take any bowel regimen at all, and only 3 (20%) take scheduled daily enemas. For the patients aged 4-8, the majority again had moderate lesions (n=8) followed by complex (n=6) and mild (n=1). Two patients in this age category (13%) have no bowel regimen, 3 (20%) are on daily enemas, and the rest (n=10, 66%) are on oral regimens only.

Conclusion: Recent literature has reported that over 80% of anorectal malformation patients above age 4 are on a bowel regimen, over half of which require enemas. Our study demonstrates that this novel procedure, which allows precise delineation of the complicated sphincter muscle complex, shows promise in improving the functional outcomes of these patients, especially in reducing the number of older children who need enemas.

Age (in years)	Fistula Type	Laxatives	Fiber and Laxatives	Enema Only	Enema and Oral Medication (fiber or laxatives)	No Bowel Regimen
1-3 (n=15, 50%)	Mild (n=2)	0	0	0	0	2
	Moderate (n=9)	5	2	0	1	1
	Complex (n=4)	0	0	2	0	2
Total in age group		5 (33%)	2 (13%)	2 (13%)	1 (7%)	5 (33%)
4-8 (n=15, 50%)	Mild (n=1)	0	0	0	1	0
	Moderate (n=8)	2	3	1	1	1
	Complex (n=6)	4	1	0	0	1
Total in age group		6 (40%)	4 (27%)	1 (7%)	2 (13%)	2 (13%)
Total all ages		11 (37%)	6 (20%)	3 (10%)	3 (10%)	7 (23%)

Bowel Management Programs by Age and Lesion Type

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GASTROINTESTINAL QUALITY OF LIFE AND BOWEL FUNCTION IN ADULTS BORN WITH ANORECTAL MALFORMATION OR HIRSCHSPRUNG DISEASE

Lea A. Wehrli, MD¹, Marina L. Reppucci, MD², Luis de La Torre, MD³, Alberto Pena, MD, Jill Ketzner, BS⁴, Laura Judd-Glossy⁵, Jared Rieck⁶, Emily Cooper⁷, Andrea Bischoff, MD³

¹Children's Hospital Colorado, Denver, CO, USA, ²Children's Hospital Colorado, Denver, CO, USA, ³International Center for Colorectal and Urogenital Care, Children's Hospital Colorado, Aurora, CO, USA, ⁴Children's Hospital Colorado, ⁵Children's Hospital Colorado, Aurora, CO, USA, ⁶Child Health Biostatistics Core / University of Colorado Anschutz Medical Campus, Aurora, CO, USA, ⁷University of Colorado, Aurora, CO, USA

Purpose: The purpose of this study was to assess the quality of life and disease-specific functioning of adults born with anorectal malformations (ARM) or Hirschsprung disease (HD), in comparison to healthy reference scores.

Methods: Within our Adult Colorectal Research Registry, patients with a colorectal condition (ARM, HD) were invited to complete three measures: the Short Form 36 Health Survey (SF-36), the Gastrointestinal Quality of Life Index (GIQOLI), and the Bowel Function Score (BFS). This was an IRB-approved, cross-sectional study in which surveys were administered through REDCap between October 2019 and August 2022, after patient consent was obtained. One-sample Wilcoxon tests were performed to compare the subscales of the three questionnaires to reported healthy references with a significance level of < 0.05.

Results: One hundred and thirty-three adults completed all three surveys: 63 females (47%), 68 males (51%), and two nonbinary (2%). Age ranged from 22-80 years (median 31 years). 88% were born with an ARM (29% had a cloaca) and 12% were born with HD. In comparison to the healthy population, all subgroups showed a statistically significant lower median composite score for bowel function and fecal control. Similar differences were found in the subscale of social functioning of SF-36. Interestingly, patients with cloaca had statistically significant lower composite scores in all three questionnaires (SF36, GIQoLI, BFS) compared to healthy populations, indicating impairment in all areas (physical, emotional, and social functioning; as well as bowel function).

Conclusion: Patients with cloaca reported significantly lower scores in all assessed areas in comparison to other types of ARM as well as the healthy population. Further studies are warranted to assess gender differences in patients with anorectal malformation.

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CONTEMPORARY TRENDS IN CHOLEDOCHAL CYST EXCISION: AN ANALYSIS OF THE PEDIATRIC NATIONAL SURGICAL QUALITY IMPROVEMENT PROGRAM (NSQIP)

Thomas Clark Howell, MD, MSHS¹, Henry E. Rice, MD¹, Tamara N. Fitzgerald, MD¹, Ryan M. Antiel, MD, MS¹, Alisha Mavis, MD¹, Kadiyala Ravindra, MBBS¹, Elisabeth (Lisa) Tracy, MD¹, Catherine Beckhorn²

¹Duke University Medical Center, Durham, NC, USA, ²Duke University School of Medicine, Durham, NC, USA

Background: Choledochal cysts are rare congenital anomalies of the biliary tree which may lead to infection, obstruction, and malignancy. Currently, there is wide variation in the age at which children undergo resection and the techniques of reconstruction. Although prior studies have examined outcomes of hepaticoduodenostomy (HD) versus Roux-en-Y Hepaticojejunostomy (HJ) reconstruction and use of minimally invasive surgery (MIS), they have been limited by sample size and spanned a long time period. Our goal was to define contemporary trends and complication rates for choledochal cyst excision using a large national database.

Methods: We queried the Pediatric National Surgical Quality Improvement Program (NSQIP) to identify patients who underwent excision of a choledochal cyst from 2015-2020. Multivariate regression was used to compare outcomes including length of stay, reoperation, complication, and readmission between patients of different age groups, open versus minimally invasive approach, and HD versus HJ reconstruction.

Results: Four hundred and seven patients met inclusion criteria. Of these, 150 (39%) underwent HJ reconstruction, 77 (18.9%) were less than six months old, and 100 (24.6%) were performed entirely with minimally invasive techniques. Using multivariate regression, we found that HD patients had higher rates of readmission than children with HJ reconstruction (10.5% vs. 4.0%, $p=0.03$). Factors associated with reoperation within 30 days included age older than six months (5.8% vs. 1.3%, $p=0.05$). Length of stay and complication rate, such as embolism, surgical infection, and hospital acquired infection were similar across age ranges, type of reconstruction (HD vs HJ), and surgical approach (MIS vs open).

Conclusion: Patients who underwent Roux-en-Y HJ reconstruction had a lower readmission rate and similar length of stay to HD reconstruction. Choledochal cyst excision is safe in young infants (< 6 months) and associated with similar complication and readmission rates compared to older children, as well as lower reoperation rates.

	Hepaticoduodenostomy	Roux-en-Y Hepaticojejunostomy	Adjusted Odds Ratio
Sample Size (N)	257	150	
Average Age (Years)	5.05	5.16	
Minimally Invasive Only	31.5%	12.7%	
Average Bilirubin (mg/dL)	1.38	1.37	
Average Operative Time (Minutes)	275.02	293.11	
Average LOS (Days)	7.99	9.20	1.02, p > 0.05
Reoperation within 30 Days	5.1%	4.7%	0.99, p > 0.05
Readmission within 30 Days	10.5%	4.0%	0.32, p = 0.03
Any Complication	5.4%	8.0%	1.01, p > 0.05

Patient Preoperative Characteristics and Outcomes for Choledochal Cyst Excision and Reconstruction with Hepaticoduodenostomy vs. Roux-en-Y Hepaticojejunostomy

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OUTCOMES OF SPLENECTOMY VERSUS SPLENECTOMY WITH CHOLECYSTECTOMY IN PATIENTS WITH HEMOLYTIC ANEMIA: A PEDIATRIC NSQIP ANALYSIS

Shale Mack¹, Devon J. Pace, MD², Sanath Patil¹, Matthew Boelig, MD², Loren Berman, MD³

¹Sidney Kimmel Medical College at Thomas Jefferson University, Philadelphia, PA, USA,

²Nemours Children's Health, Wilmington, DE, USA, ³Nemours | Alfred I. duPont Hospital for Children, Wilmington, DE, USA

Purpose: Children undergoing splenectomy for hemolytic anemia often have cholelithiasis, which may or may not be symptomatic. It is unclear whether concurrent cholecystectomy increases length of stay (LOS) or morbidity after splenectomy. The purpose of this study was to compare morbidity among children undergoing laparoscopic splenectomy alone (LS) versus splenectomy with concurrent cholecystectomy (LSC) in patients with hemolytic anemia.

Methods: We retrospectively evaluated children with hemolytic anemia undergoing non-traumatic LS in the National Surgical Quality Improvement Program-Pediatric (NSQIP-P) database (2012-2020). Outcomes were compared for patients undergoing LS (n=1010) versus LSC (n=371). Pearson's Chi-square and Student's t-tests were utilized with a two-sided significance of $p < 0.05$. Propensity score-matching was completed, controlling for 8 demographic and clinical variables.

Results: 1381 patients were identified, 73.1% undergoing LS and 26.9% LSC. LSC patients were older (10.9 years vs. 8.4 years, $p < 0.01$), more likely to have hereditary spherocytosis (56.1% vs. 40.8%, $p < 0.01$), less likely to have sickle cell disease (12.1% vs. 33.5%, $p < 0.01$), more likely ASA 1 or 2 (49.3% vs. 42.1%, $p < 0.01$), and had similar preoperative hematocrit levels (29.6 vs. 29.3, $p=0.33$). The LSC group was less likely to receive preoperative blood transfusions (13.5% vs. 25.4%, $p < 0.01$). There were 360 pairs selected on propensity score-matching, and LSC was associated with increased operative time (182 minutes vs. 145 minutes, $p < 0.01$) and decreased postoperative bleeding and transfusions (4.2% vs. 8.9%, $p=0.01$). LOS after surgery (2.5 days vs. 2.3 days, $p=0.13$), composite morbidity (3.9% vs. 3.4%, $p=0.69$), and 30-day readmission rates (3.3% vs. 7.4%, $p=0.08$) were all similar.

Conclusions: LSC is associated with similar postoperative morbidity and readmission rates as those undergoing LS alone. These data support the safety of concurrent cholecystectomy with splenectomy for children with cholelithiasis in the setting of hemolytic anemia and should be considered in discussion with families as an alternative to delayed cholecystectomy.

Factor	LS (n=360)	LSC (n=360)	P-value
Age (years), mean (SD)	11.0 (4.2)	10.8 (3.9)	0.51
Hereditary spherocytosis	60.3%	56.1%	0.26
ASA class 1 or 2	55.0%	50.5%	0.49
Preoperative transfusion	12.5%	13.9%	0.58
Operative time (minutes), mean (SD)	144.7 (65.6)	182.2 (73.4)	< 0.01
LOS after surgery (days), mean (SD)	2.3 (1.9)	2.5 (1.7)	0.13
Composite morbidity	3.3%	3.9%	0.69
Postoperative bleeding and transfusions	8.9%	4.2%	0.01
30-day readmission rate	7.4%	3.3%	0.08

Propensity Score-Matched Cohort for Patients with Hemolytic Anemia Undergoing LS versus LSC

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EARLY RESULTS OF SKIN SENSORY CHANGES AND DEVELOPMENT OF NEUROPATHIC PAIN IN PEDIATRIC PATIENTS AFTER NUSS PROCEDURE WITH CRYOABLATION

R Scott Eldredge, MD¹, Brielle Ochoa, MD², Krista Lai, MD³, Emily Khory¹, Kristin Mihalcin¹, Daniel J. Ostlie, MD¹, Lisa E. McMahon, MD¹, Justin Lee, MD⁴, David M. Notrica, MD¹, Benjamin Padilla, MD⁵

¹Phoenix Children's Hospital, Phoenix, AZ, USA, ²Phoenix Children's, Phoenix, AZ, USA, ³Phoenix Children's Hospital/Dalhousie University, Halifax, NS, Canada, ⁴Phoenix Children's Hospital, Phoenix, AZ, USA, ⁵Phoenix Children's Hospital, San Francisco, CA, USA

Background: Cryoablation during Nuss procedure for pectus excavatum (PE) results in reduced opioid use and hospital length of stay. Skin hypoesthesia of the chest wall also occurs. The purpose of the study is to describe the frequency, duration, and location of sensory changes and neuropathic pain after cryoablation.

Methods: We performed a single-institution prospective study of patients aged ≤ 21 years undergoing Nuss procedure with cryoablation for PE between 3/2021 and 10/2022. Patients underwent sensory testing of the chest wall preoperatively and postoperatively in 2-month increments for 6 months. Each patient completed neuropathic pain surveys (S-LANSS) with each sensory test. Incidence and duration of hypoesthesia and neuropathic pain were evaluated.

Results: Of 54 patients enrolled in the study, 21 have completed evaluation at six months postoperatively. All patients had some degree of skin hypoesthesia on postoperative day (POD)0 and POD1. The mean percentage of the treated anterior chest wall surface area (ACWSA) hypoesthesia was 46.4% (± 0.2) on POD 0 and 55.3% (± 0.2) on POD 1. Sensation returned over time, with hypoesthesia decreased to 15.3% (± 0.1) ACWSA at 6 months. At 6 months, 43% of patients (9/21) had complete return of sensation, while 43% (9/21) had residual sensory deficit at T5 and T6, and 14% at a single dermatome. Neuropathic pain (S-LANSS > 12) was documented in 17% (8/46) of patients at hospital discharge; this was most commonly pins and needles with rub (8/8 patients) or numbness/tenderness (6/8 of patients), which resolved in all but one patient (4%) at 6 months.

Conclusion: Skin hypoesthesia after cryoablation occurs over 55% of the anterior chest wall surface area by POD1. Sensation has returned to normal by 6 months in 43%. The etiology of persistent hypoesthesia is unknown but may be related to nerve compression by the bar and/or fixation. Chronic neuropathic pain is uncommon.

Anterior Chest Wall Sensory Deficit Following Cryoablation

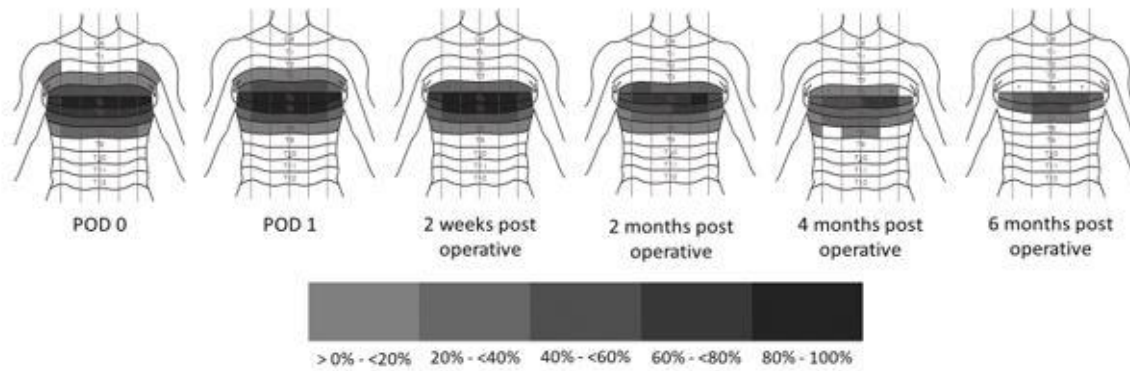


Figure 1. Percentage of anterior chest wall hypoesthesia by dermatome following cryoanalgesia at the time of Nuss procedure. Hypoesthesia was densest at T5 and T6 with 91% and 89% of patients reporting sensory deficits at POD1, respectively. At 6 months post operatively 42% of patients had varying degrees of sensory deficits at either T5 or T6.

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WHAT DOES SCHOLARLY ACTIVITY LOOK LIKE IN APSA MEMBERS?

Brett D. Haeffner, B.S.¹, James Cooper, MD², Austin Kerr, B.S.¹, Miranda Solly, B.S.¹, Russell B. Hawkins, MD, MS¹, Saleem Islam, MBBS, MPH³

¹University of Florida College of Medicine, Gainesville, FL, USA, ²UPMC Children's Hospital of Pittsburgh, Pittsburgh, PA, USA, ³The Aga Khan University, Karachi, Sindh, Pakistan

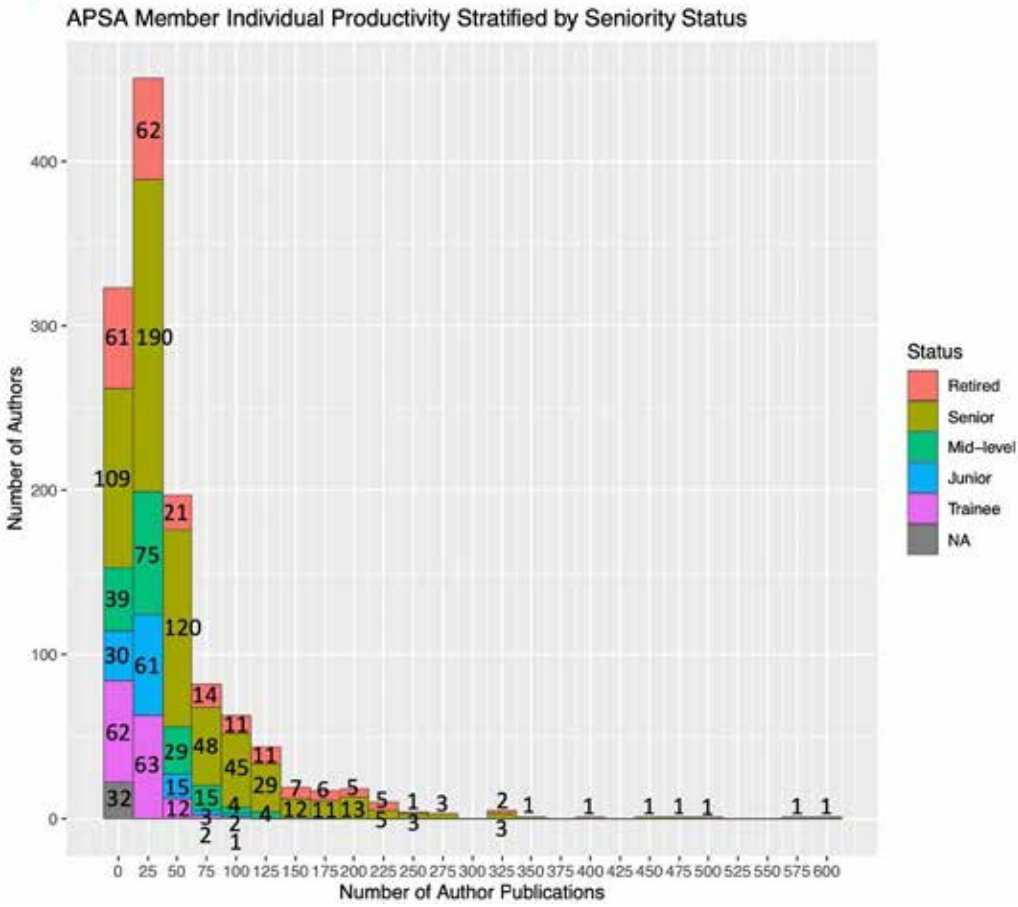
Purpose: Scholarly publication is often used as an index of productivity among physicians. The purpose of this study was to analyze and characterize a representative sample of scholarship among pediatric surgeons in North America.

Methods: The American Pediatric Surgical Association (APSA) directory of members was queried to generate a reference list of pediatric surgeons. This list was cross-matched with author research profiles identified on Scopus. Published works for each author were compiled and analyzed in Excel. The authors were divided by seniority for subset analysis according to the following status parameters: Training (residency or fellowship), Junior (0-5 years post-training), Mid-level (6-15 years post-training), Senior (15+ years post-training), and Retired.

Results: The APSA directory resulted in the identification of 1220 surgeons and an associated publication count of 57,828. Using a representative sample of 1000 publications from this data set, 22.3% articles were classified as Basic Science research and 77.7% classified as Clinical research. The average number of publications among APSA members is 47, with a median of 26 publications. When stratified by seniority status (Figure 1), the average number of publications among authors in training was as follows: Training 17, Junior 25, Mid-level 32, Senior 58, Retired 61. 50% of the total number of publications were accounted for by the 178 most productive authors. After removal of these 178 most productive authors, the average number of publications was 28. When this modified data set was stratified by seniority status, average number of publications was: Training 17, Junior 25, Mid-level 29, Senior 32, Retired 24.

Conclusions: APSA members cumulatively have generated a substantial number of publications. As shown by how 14.6% of the most productive members constitute 50% of the association's academic output, it is evident that a hyperproductive minority of the APSA membership dominates the research landscape. Further analysis is planned.

Figure 1.



Scientific Session IV: Oncology

2:45 PM – 4:00 PM

45

WHERE ARE THE CHILDREN? A THEMATIC ANALYSIS OF STATE, TERRITORY, AND TRIBAL ORGANIZATION COMPREHENSIVE CANCER CONTROL PLANS

Harold J. Leraas, MD, MSPHS, MHS, MA¹, Catherine Beckhorn², Claire Washabaugh², Julie Thamby², Rachel Greenup, MD MPH³, Krista Haines, DO, MA⁴, Laura Allen⁵, Elisabeth (Lisa) Tracy, MD¹

¹Duke University Medical Center, Durham, NC, USA, ²Duke University School of Medicine, Durham, NC, USA, ³Yale University Department of Surgery, New Haven, CT, USA, ⁴Duke University Department of Surgery, Durham, NC, USA, ⁵Children's Cancer Partners of the Carolinas, Spartanburg, SC, USA

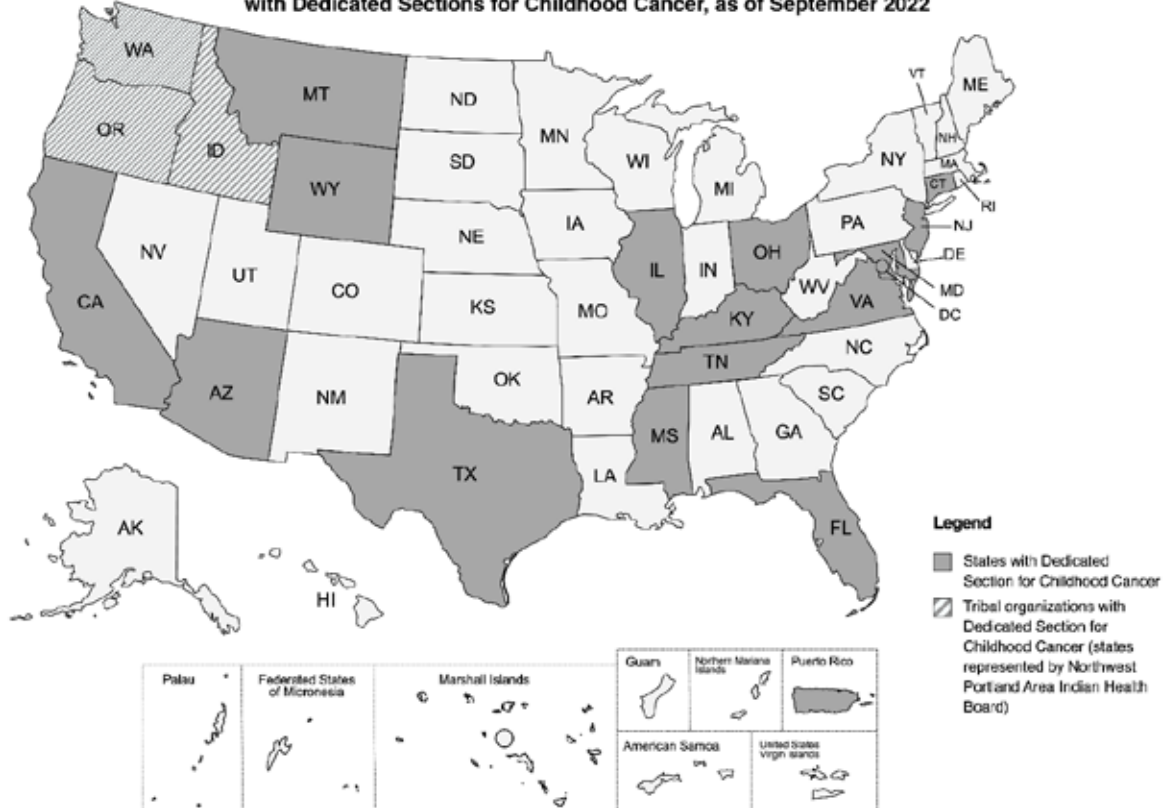
Background: The Center for Disease Control's Comprehensive Cancer Control Program (CCCP) funds initiatives in fifty states, the District of Columbia, seven U.S. territories, and seven tribal organizations to prevent and control cancer. These initiatives influence policy, care, research, and advocacy for cancer treatment. We performed an analysis of CCCP plans for states, US territories, and tribal organizations to understand the extent of inclusion of pediatric cancer care.

Methods: We conducted a thematic and quantitative analysis of CCCP plans for states, US territories, and tribal organizations. Plans were assessed by two reviewers and scored for discussion of cancer prevention, risk factors, early detection and screening, treatment and innovation, access, barriers to care, and survivorship in childhood cancer.

Results: Plans from fifty states, the District of Columbia, seven territories, seven tribal organizations, and one Pacific Regional (USAPI) plan were reviewed, for a total of sixty-six plans. Active CCCP plans were available through the CDC or state websites for 74% of states, 57% of territories, and 71% of tribal organizations; older plans were available for all groups without active CCCP plans. While all plans referenced children, most did so in the context of childhood exposures influencing adult cancer risks (e.g. sun, tobacco, HPV). Few plans contained a section dedicated to childhood cancer (30% states, 14.3% territories, 14.3% tribes). A minority of plans specifically discussed early detection and screening (14% states, 0% territories, 14.3% tribes), treatment and innovation (32% states, 0% territories, 28.6% tribes), access to cancer care (38% states, 28.6% territories, 28.6% tribes), reducing barriers to cancer care (28% states, 42.9% territories, 28.6% tribes), and pediatric cancer survivorship (42% states, 0% territories, 28.6% tribes).

Conclusions: Inclusion of pediatric cancer in CCCP plans will help to standardize pediatric cancer care, eliminate treatment disparities across state lines, and allow for comprehensive understanding of pediatric oncology.

CDC National Comprehensive Cancer Control Program (CCCP) Plans with Dedicated Sections for Childhood Cancer, as of September 2022



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SONOPERMEATION WITH SIMB4-5 SYNERGISTICALLY ENHANCES L-DOX UPTAKE AND TUMOR APOPTOSIS BY DECREASING ZONA OCCLUDENS 1

Rachel Sundland, MD¹, Donia Ballan², Aditi Bellary³, Isabella Iwanicki², Lydia Wu², Fernando Flores Guzman², Jameel Feshitan⁴, Jessica Kandel, MD⁵, Shashank Sirsi⁶, Sonia Hernandez⁵

¹*Department of Surgery, University of Chicago Medical School, Chicago, IL, USA., Brooklyn, NY, USA,* ²*Department of Surgery, University of Chicago Medical School, Chicago, IL, USA., Chicago, IL, USA,* ³*Department of Biomedical Engineering, University of Texas at Dallas, Richardson, TX, USA., Chicago, IL, USA,* ⁴*Advanced Microbubbles Inc, Newark, CA, USA,* ⁵*University of Chicago, Chicago, IL, USA,* ⁶*University of Texas at Dallas, Richardson, TX, USA*

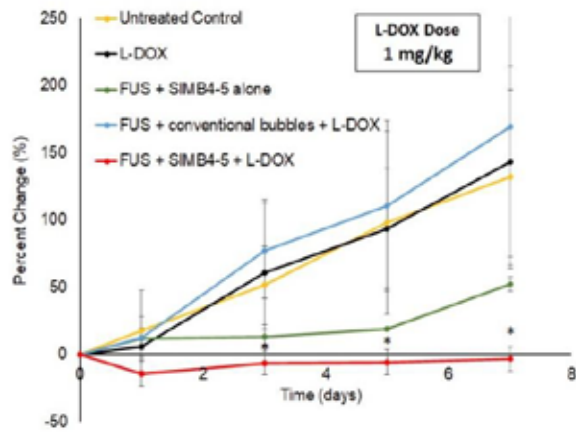
Purpose: Neuroblastoma (NB) is the most common extracranial solid tumor of childhood. Despite aggressive therapy, about 50% of patients fail to respond, and survivors face a lifetime of off-target therapy effects. To limit such systemic morbidity, sonopermeation, which utilizes focused ultrasound and microbubbles (gas-filled, sound sensitive, lipid spheres) to disrupt cell bilayers, has been investigated. Microbubble response to a given ultrasound pulse (cavitation) varies according to size. We hypothesize that large, size-isolated microbubbles (SIMB4-5 μm), compared to polydisperse microbubbles (PMB, 2-10 μm) will result in a consistent and predictable response, allowing targeted drug uptake of low-dose liposomal doxorubicin (L-DOX).

Methods: Tumor cells were implanted into the left kidney of nude mice and grown for 5-6 weeks. Mice were divided into groups: sonopermeation alone with either PMB or SIMB4-5 (via tail vein injection), sonopermeation with 1mg/kg L-DOX, L-DOX alone and untreated controls. Tissues were examined using: terminal deoxynucleotidyl transferase dUTP nick end labeling (TUNEL) for apoptosis, endomucin for vascular lumen size, and anti-zona-occludens (ZO-1) for cell-cell tight junctions with Isolectin-B4 for endothelium.

Results: Sonopermeation of SIMB4-5 decreased tumor growth (Fig.1, green line) and increased tumor cell apoptosis (TUNEL positivity) in synergy with L-DOX (Fig.1, red line). SIMB4-5 sonopermeation independently increased apoptosis ($p < 0.05$), not seen with PMB's ($p = \text{NS}$). The vascular lumen was significantly dilated after SIMB4-5 sonopermeation compared to PMB ($p < 0.05$) and controls. Tight-junction staining for ZO-1 was positive in controls and tumors with PMB sonopermeation. However, sonopermeation with SIMB4-5 led to a clear reduction in ZO-1 in tumor endothelium.

Conclusion: Sonopermeation with SIMB4-5 enhances L-DOX delivery through increased vascular permeability and decreased ZO-1 tight junction proteins. Furthermore, sonopermeation with SIMB4-5 increases tumor cell apoptosis, both independently of and synergistically with L-DOX. Our data suggests SIMB4-5 sonopermeation could enhance medication delivery and targeted tumor cell death in NB patients.

Fig.1 Average Tumor Growth Over 7 Days



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THE SURVIVAL ADVANTAGE OF ZIKA VIRAL THERAPY IN HUMAN NEUROBLASTOMA IN VIVO MODELS IS DEPENDENT UPON CD24

Joseph Mazar, PhD¹, Emma Sutton, BS², Rosa Rosario², Jeanne Brooks, MS¹, Matthew Peloquin, MS², Matthew Longo, BS², Tamarah Westmoreland, MD/PhD²

¹Nemours Children's Hospital, Orlando, FL, USA, ²Nemour's Children's Health, Orlando, FL, USA

Introduction: Neuroblastoma is one of the most common childhood tumors and accounts for 15% of all childhood cancer deaths. We recently demonstrated that Zika Virus is cytotoxic in neuroblastoma cells, dependent upon the expression of CD24. In order to assess the viability of this therapy, we utilized in vivo tumor models to verify a possible survival advantage after the introduction of Zika virus.

Methods: Employing both the MYCN-amplified pre-treatment cell line IMR-32 and the non-MYCN amplified post-treatment cell line SK-N-AS, the cells were injected subcutaneously into NCr nude mice and treated with Zika virus by direct injection of the tumor mass (compared to vehicle controls). Fold Change and tumor size were measured for both tumor surveys and survival studies. In addition, CD24-expressing stable SK-N-AS cells were compared to control cells and examined for changes after treatment.

Results: Following the treatment with Zika virus, dramatic reduction in tumor masses were detected in both tumor models. IMR-32 models lost virtually all tumor mass inside of 7 days, and SK-N-AS lost half of its mass in only 10 days. No tumors showed recurrence of tumor mass within 4 weeks post-treatment. In both survival studies a >90% survival advantage was found after a single application of Zika virus for >10 weeks post-treatment. The exogenous expression of CD24 increased both tumor growth rate and tumor sensitivity to Zika treatment.

Conclusion: The in vivo effectiveness of Zika viral therapy on human neuroblastoma tumors is both rapid and thorough. Tumor mass is lost quickly, showing no indication of recurrence, and offering a significant survival advantage in both MYCN-amplified and non-amplified models, as well as in CD24-stably expressing SKNAS tumors compared to controls. Collectively, these findings suggest that Zika virus can extend a possible survival advantage as a novel primary or rescue treatment for patients.

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LOSS OF IRF5 IS ASSOCIATED WITH INCREASED METASTASES AND WORSE PROGNOSIS IN OSTEOSARCOMA**Bailey Roberts, MD¹**, Betsy J. Barnes, PhD², Samuel Z. Soffer, MD³

¹*Cohen Children's Medical Center at Hofstra/Northwell, Long Island City, NY, USA*, ²*Feinstein Institutes for Medical Research, Northwell Health, New Hyde Park, NY, USA*, ³*Cohen Children's Medical Center at Hofstra/Northwell, New Hyde Park, NY, USA*

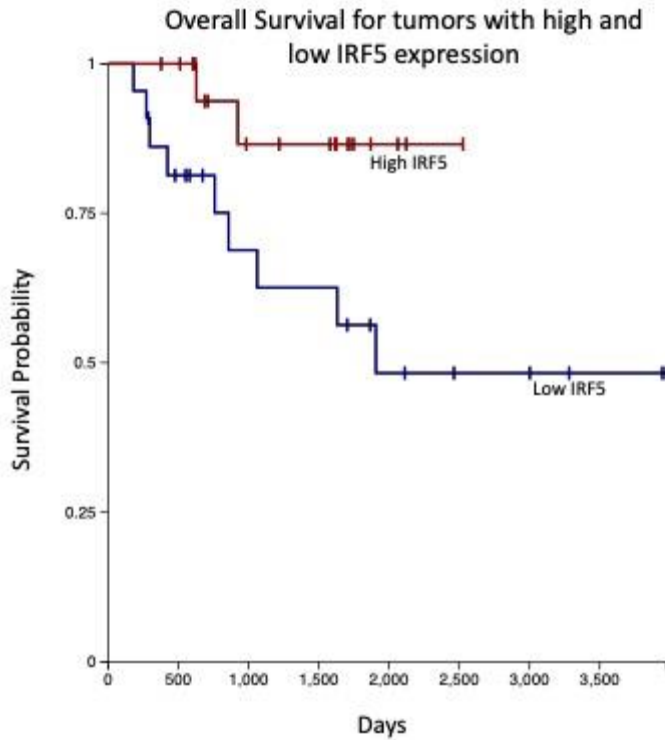
Purpose: Osteosarcoma (OS) is a highly metastatic cancer affecting adolescents. Metastasis at diagnosis carries high mortality. However, even for patients without metastasis at diagnosis, recurrence is common and often occurs at distant sites. Interferon regulatory factor 5 (IRF5) is a transcription factor known to activate the immune system and has been shown to act as a tumor suppressor in other cancers including breast, lung, and colon. Immunogenic markers of tumors are important to understand prognosis and provide targets for treatment. We aim to identify the mechanism(s) by which IRF5 contributes to OS metastasis.

Methods: Two experimental murine OS cell lines with varying metastatic potential, K7M2 and K12, were examined for IRF5 protein expression via Western Blot analysis. Clinical and RNA-sequencing data from OS patients from the TARGET data matrix were stratified by IRF5 expression levels, metastases, and overall survival. Kaplan Meier curves were created for the bottom and top quartile of IRF5 expression via the Xena platform.

Results: IRF5 protein expression is low in the highly metastatic K7M2 cell line and 18 times higher in the less metastatic K12 line. These data correlated with findings from TARGET analysis. 88 patients had tumor RNA-sequencing data with matched clinical information. Loss of IRF5 expression was associated with worse overall survival in pediatric OS patients. The top quartile of IRF5 expression had better survival than the lowest quartile, $p=0.0045$ (Figure 1). Presence of metastases at diagnosis or recurrence at distant sites was higher in patients with the lowest IRF5 expression levels ($p=0.0334$).

Conclusion: Low IRF5 expression in OS is associated with lower survival rates and higher levels of metastases or relapse. IRF5 may serve as a potential biomarker of metastatic risk, prognosis, and overall survival. IRF5 may be a driver of metastasis and could be useful to stratify patients for novel treatment options.

Figure 1: Kaplan Meier curve for IRF5 expression



IRF5 expression measured via HT-seq and normalized by fragments per kilobase of transcript per million mapped reads, published by the GDC. IRF5 expression levels separated into quartiles, highest quartile of IRF5 expression (n= 20) depicted in red and lowest quartile (n=22) depicted in blue. p= 0.004471

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PRECLINICAL TESTING PIPELINE REVEALS NOVEL TREATMENT STRATEGIES FOR CHEMOTHERAPY RESISTANT HEPATOBLASTOMA

Andy F. Espinoza, MD¹, Richard S. Whitlock, MD², Roma Patel³, Sai Govindu³, Sarah Woodfield, PhD³, Sanjeev Vasudevan, MD³

¹Michael E. DeBakey Department of Surgery - Baylor College of Medicine, Sugar Land, TX, USA, ²Baylor College of Medicine, Pearland, TX, USA, ³Texas Children's Hospital, Houston, TX, USA

Background: Relapsed and treatment refractory hepatoblastoma (HB) has a survival rate of less than 50% due to limited treatment options. To better understand this aggressive disease, our lab has developed orthotopically implanted patient derived xenograft (PDX) models. Given that we have previously found that treatment refractory HB has upregulation of histone deacetylase (HDAC) genes, we tested a pan-HDAC inhibitor, panobinostat.

Methods: HB cells were evaluated with cytotoxic assays and immunoblotting. Tumor derived 3D organoids were used to screen standard chemotherapy regimen with panobinostat. HB PDX mice were treated with therapy that had greater than or equal to 50% tumor reduction in the organoids. Mice were started on study when tumor volume reached 0.1-0.3 cm³ and were sacked when tumors reached diameter of 1.5 cm or at the end of the study. Alpha fetoprotein (AFP) was drawn after 3-weeks of treatment.

Results: Panobinostat (IC₅₀ of 0.013-0.059 μ M) showed strong in vitro effects for viability and PARP cleavage on immunoblotting. HB organoids demonstrated the highest level of cell death with panobinostat, cisplatin/panobinostat, vincristine/irinotecan (VI), and VI/panobinostat (Table 1). After 1 week of treatment, all placebo mice (4) had reached sack size with an average volume of 0.74 cm³. All mice treated with combination therapy of VI/panobinostat (3) had reduction of tumor burden to an average volume of 0.027 cm³ (p = 0.03) which was maintained over the entire study. At 3 weeks, the average AFP of the placebo group was 3500 while the VI/panobinostat group was 1300 (p=0.03). All other therapies did not cause a statistically significant decrease in tumor size (Table 1).

Conclusions: Panobinostat, in combination with VI, causes apoptotic death of treatment refractory HB in vitro and in vivo. To our knowledge, this is the first HB PDX study that demonstrates a therapy scheme that induces statistically significant tumor reduction.

Drug Regimen	Spheroid HB Drug Screen		PDX HB Drug Study	
	Relative Cell Viability	P	Relative Tumor Volume	P
Placebo	1.0 (Ref)	-	1.0 (Ref)	-
Cisplatin	0.8	0.07	-	-
Vincristine	0.7	0.0023	-	-
Irinotecan	0.6	0.0008	-	-
Panobinostat	0.2	< 0.0001	0.4	0.3
Cisplatin/Panobinostat	0.2	< 0.0001	0.3	0.2
Vincristine/Irinotecan	0.5	0.03	0.5	0.2
Vincristine/Irinotecan/Panobinostat	0.09	< 0.0001	0.2	0.009

Table 1. Chemotherapy Resistant HB Spheroid Drug Screen and PDX Drug Study

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HOW MANY LYMPH NODES ARE ENOUGH FOR STAGING IN PARATESTICULAR RHABDOMYOSARCOMA?

Brittany Levy, MD¹, Will Cranford, MS¹, Adam Dugan, PhD¹, Christopher McLouth, PhD¹, Jonathan Routh, MD², David Rodeberg, MD¹, Amanda Saltzman, MD¹

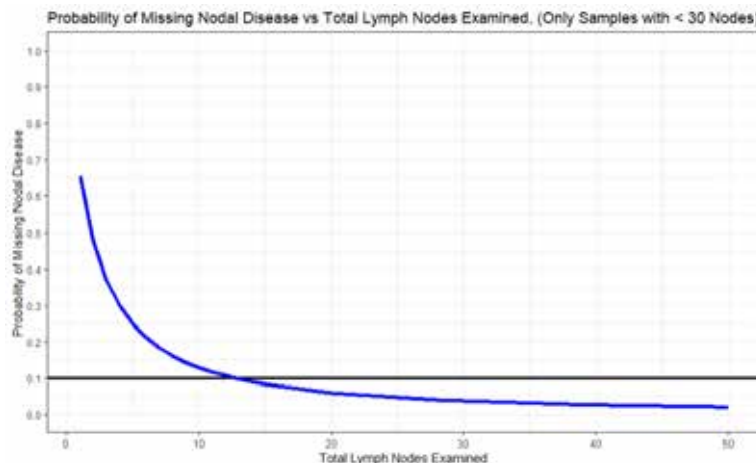
¹University of Kentucky, Lexington, KY, USA, ²Duke University, Raleigh, NC, USA

Purpose: Treatment strategies for paratesticular rhabdomyosarcoma (PT-RMS) are based on stage, which requires accurate lymph node (LN) evaluation. Previous methodology for determining quantity of LN for negative nodal status is based on LN positivity rates, without accounting for the relationship between LNs. This study aims to quantify the false negative rates of LN sampling based on LN yield using a previously established methodology in comparison to current recommendations.

Methods: Using the National Cancer Database, patients with a diagnosis of PT-RMS were queried from 2004-2018. Patients >10y and those < 10y with clinical N1 disease were included, based on COG guidelines. LN density was calculated using LN yield and the number of involved LNs. Based on established methodology, the beta-binomial model was used to calculate the rate of false neg LN sampling and identified the LN yield threshold to reduce the risk of a missing an involved LN node to < 10%.

Results: 67 patients were included for analysis over the study period. The median number of LNs sampled was 16 (IQR 8-25), and the median number of involved LN was 2 (IQR 1-4). The median lymph node density was 0.3 (IQR 0.1-0.3). For patients in the 1st-3rd quartiles of lymph node yield, < 30 LN are sampled. Application of the beta-binomial model for those with < 30 LN sampled, 13 LNs are needed to reduce the chance of missing an occult involved LN to < 10%. (Figure)

Conclusion: Previous statistical models estimate sampling of 7-12 LN is adequate for accurate staging. However, to account the negative correlation of LN sampled to proportion of involved LN, an alternative statistical analysis is beneficial. As such, the beta binomial model supports sampling at least 13 LNs to reduce the chance of missing occult metastatic disease to < 10% in the majority of patients.



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APOBEC2: ITS ROLE IN THE PANNEXIN 1-MEDIATED INHIBITION OF RHABDOMYOSARCOMA PROGRESSION AND POTENTIAL AS A NOVEL THERAPEUTIC TARGETAlexandra Welten, MSc¹, **Stephanie Langlois, PhD¹**, Xiao Xiang², Kyle N. Cowan, MD, PhD²¹Children's Hospital of Eastern Ontario Research Institute, Ottawa, ON, Canada, ²CHEO Research Institute, Ottawa, ON, Canada

Purpose: Rhabdomyosarcoma (RMS) is an aggressive soft tissue sarcoma of childhood for which novel therapeutic strategies are needed. RMS are thought to arise from muscle precursors that have lost the ability to terminally differentiate thus proliferating indefinitely. Improved therapies for RMS may thus come from targeting molecular pathways that are deregulated during myogenesis and consequently contribute to tumor formation. Our laboratory identified pannexin 1 (PANX1) as a novel regulator of myogenesis. We also showed that PANX1 expression is low in RMS and that increasing its levels inhibits RMS progression in vitro and in vivo. Using RNA-sequencing, we found that APOBEC2, a negative regulator of differentiation, is down-regulated in PANX1-expressing RMS cells. Here our goal is to determine the role of APOBEC2 in the PANX1-mediated regulation of RMS malignant properties.

Methods: Six RMS patient-derived cell lines, in which PANX1 and/or APOBEC2 levels were modulated, were used. Cell differentiation was assessed using various markers and the multinucleation status was determined. Proliferation and spheroid growth were measured using 5-bromo-2'-deoxy-uridine incorporation assays and the Incucyte live imaging system, respectively. Statistical significance was analyzed using two-tailed Student's t-test or one-way ANOVA (n≥3; *p< 0.05).

Results: APOBEC2 is expressed in RMS cells and its levels increase during their proliferation. PANX1 overexpression prevented the APOBEC2 up-regulation in three out of the six cell lines. Interestingly, the RMS cell lines in which PANX1 regulates APOBEC2 levels were those in which PANX1 overexpression triggers cell multinucleation, a marker of differentiation. Notably, APOBEC2 overexpression reversed the PANX1-mediated induction of RMS cell multinucleation and accelerated 3D tumor spheroid growth.

Conclusions: These results are the first to identify a role for APOBEC2 in RMS and to implicate it as a potential therapeutic target for this cancer. These findings also provide additional insight into the mechanism by which PANX1 alleviates RMS malignant properties.

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LEVERAGING A NOVEL EX-VIVO HUMAN TUMOR SYSTEM TO INTERROGATE PERITONEAL SURFACE MALIGNANCIES IN CHILDREN

Martha E. Teke, MD, Emily A. Verbus, MD, Areeba Saif, MD, Kirsten Remmert, PhD, Amber Leila Sarvestani, MD, Stephanie N. Gregory, MD, Carrie E. Ryan, MD, Tracey Pu, MD, Andrew M. Blakely, MD, Jeremy L. Davis, MD, Jonathan M. Hernandez, MD

National Institute of Health, Bethesda, MD, USA

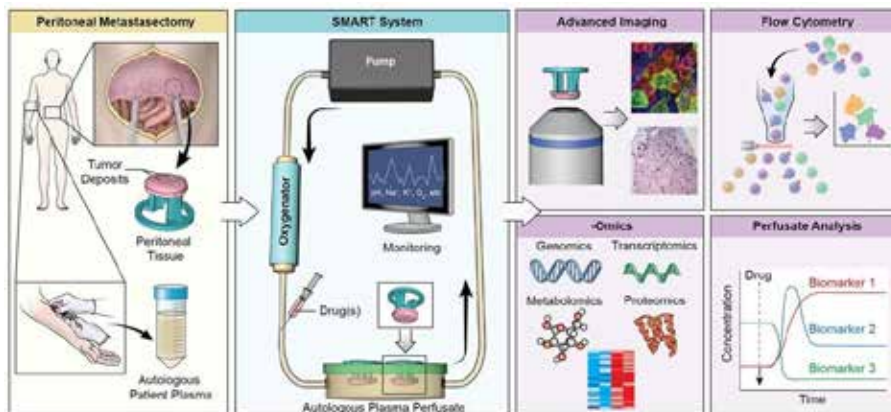
Purpose: The ability to accurately predict how a patient's tumor will respond to therapy will allow for the optimization of truly personalized cancer care. To this end, our lab produced a novel translational platform, the SMART System (Sustained Microenvironment for Analysis of Resected Tissue) that faithfully recapitulates tumor biology by preserving the innate structure, cell-cell interactions, and normal human physiology to mirror in vivo biology, albeit in an ex vivo environment amenable to detailed interrogation including advanced, dynamic imaging.

Methods: A clinically indicated diagnostic laparoscopy was performed on a 17-year-old female with chemotherapy-refractory metastatic gastric cancer under an institutionally IRB-approved protocol. Tumor bearing peritoneum was procured and the tissue was affixed to specialized 3D-printed platforms and placed into oxygenated perfusion circuit. Systems were kept in an incubator at 37 C and perfusate parameters were adjusted based on periodic point-of-care testing (pH, glucose, and electrolytes).

Results: The system maintained physiologic perfusate parameters (pH, glucose, Na⁺, Lactate, etc) during the 48- hour run. Tumor in the SMART system demonstrated good histopathologic preservation with only mild nuclear loss noted. Fluorescently labelled antibodies against cell surface markers were used to highlight various cell fractions within the intact tumor microenvironment (TME). Utilizing live cell imaging techniques, we elucidated the dynamic interactions between the tumor, its matrix and resident lymphocyte populations.

Conclusions: We developed a novel ex-vivo perfusion system that allows for the interrogation of peritoneal surface malignancies. We envision that this technology will be highly informative for rare diseases, as commonly occur in the pediatric population.

Abbreviations: SMART System (Sustained Microenvironment for Analysis of Resected Tissue) Tumor microenvironment (TME)



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JUVENILE GRANULOSA CELL TUMOR OF THE OVARY: A CLINICOPATHOLOGIC STUDY OF 10 PATIENTS

Heba M. Taher, MD pediatric surgery¹, Aya Abuelenean¹, Rahma Mohamadein², Ahmed Lymona³, Yasser Saadeldein⁴

¹Cairo university, Cairo, Al Qahirah, Egypt, ²Cairo University, Cairo, Al Qahirah, Egypt,

³National cancer institute, Cairo, Al Qahirah, Egypt, ⁴Alexandria University, Alexandria, Al Iskandariyah, Egypt

Purpose: Juvenile granulosa cell tumor (JGCT) is a rare ovarian sex-cord stromal tumor, with a variety of clinical, radiological and histopathologic features. Our study describes the clinical pathology, immunohistochemistry, diagnosis and treatment of JGCTs.

Methods: A retrospective analysis of 10 confirmed cases of juvenile granulosa cell tumor that were treated in a single institute was performed in a span of 15 years.

Results: all our cases aged from 4-6 years except for a single patient who was 7 months old at presentation. They presented with signs of precocious puberty. Eight patients showed breast enlargement and all of the cases had supra pubic hair, one patient showed clitoral hypertrophy and another had vaginal bleeding. Also, one patient came complaining of an intra-abdominal mass. All patients had elevated levels of urinary and serum estrogen, and normal levels of AFP and HCG.

Conclusion: JGCT is a tumor of a very rare occurrence where 95% of diagnosed GCT are of adult type. Owing to the young age of presentation of JGCT, most patients present with isosexual precocious puberty. Currently there are no standardized labs, imaging, nor pathology to confirm diagnosis of JGCT and thus diagnosis mainly depends on excluding other histologically similar ovarian tumors. There is a noticeable shift to use immunohistochemistry in attempting to diagnose JGCT. Fertility sparing surgery is now the main route of management for JGCT due to young age of presentation and low risk of tumor recurrence.

Figure 1 :Clitoral hypertrophy :(patients 3)



Figure 2 : Vaginal bleeding (patients 4)



Suprapubic hair (patient 1)



Case	Age	Breast enlargement	Suprapubic hair	Clitoris hypertrophy	Intra-abdominal mass	Bleeding per vagina
1	4 years	+	+	-	-	-
2	6 years	-	+	-	+	-
3	4 years	+	+	+	-	-
4	7 months	-	+	-	-	+
5	4 years	+	+	-	-	-
6	4.5 years	+	+	-	-	-
7	4.5 years	+	+	-	-	-
8	4.5 years	+	+	-	-	-
9	5 years	+	+	-	-	-
10	6 years	+	+	-	-	-

Summary of Clinical Picture and Investigation of Patients with JGCT

Friday, May 12, 2023

Scientific Session V: Trauma

1:30 PM – 2:45 PM

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POSTOPERATIVE WOUND INFECTION AFTER PRIMARY CLOSURE IN PEDIATRIC DOG BITE INJURIES: ANALYSIS OF A POSTOPERATIVE ANTIBIOTIC PROTOCOL

Brielle Ochoa, MD¹, R Scott Eldredge, MD², Megan Gilbert, CPNP-AC¹, Tiffany J. Zens, MD¹, Anthony Ferrantella, MD¹, Lisa E. McMahon, MD², Benjamin Padilla, MD³, David M. Notrica, MD², Justin Lee, MD⁴

¹Phoenix Children's, Phoenix, AZ, USA, ²Phoenix Children's Hospital, Phoenix, AZ, USA,

³Phoenix Children's Hospital, San Francisco, CA, USA, ⁴Phoenix Children's Hospital, Phoenix, AZ, USA

Purpose: Guidelines recommend three to five days of antibiotic prophylaxis after dog bite injury, but variation exists in clinical practice after surgical closure of these wounds. The purpose of this study was to analyze antibiotic duration, incidence of infection, and other clinical outcomes following institutional implementation of a protocol to limit post-repair antibiotics to a maximum of three days.

Methods: Dog bites in patients ≤ 18 years were identified from 2018-2022 at a level 1 pediatric trauma center. Demographic and clinical data, including antibiotic duration, were collected. Protocol compliance was defined as ≤ 3 days of antibiotics. Primary outcome was incidence of wound infection. Multivariate regression analysis for variables associated with wound infection was performed.

Results: 479 cases were analyzed across seven subspecialties: plastics (56.9%), emergency medicine (20.2%), ophthalmology (10.8%), pediatric trauma (7.6%), orthopedics (2.5%), and urology/neurosurgery (1%). Common injury locations were face (69.5%), extremities (12.7%), and eyes (10.6%). 73.9% of injuries were full thickness, 21.4% were repaired in the emergency department, and 98.5% were primarily closed. After protocol implementation, mean antibiotic duration decreased from 7.8 to 4.6 days ($p < 0.001$). 246 of these patients had post-initial visit follow-up (Table 1). There was no difference in postoperative wound infection rate between protocol-compliant and -noncompliant groups (8.3% vs 7.3%, $p = 0.809$). Multivariate regression analysis identified anatomic injury location to be the only significant variable associated with wound infection (extremity injury, OR 10.9, $p < 0.001$). Antibiotic duration and protocol implementation were not associated with increased risk of wound infection.

Conclusion: In the largest cohort of surgically repaired pediatric dog bite cases reported, standardization of postoperative antibiotic duration led to a significant decrease in antibiotic duration without an increase in wound infection. Our study highlights the feasibility of multidisciplinary standardization of pediatric trauma care across specialties and the safety of minimizing antibiotic duration after pediatric dog bite repairs.

	Total (n=246)	Protocol-compliant (n=96)	Protocol-noncompliant (n=150)	p-value
Wound infection	19/246 (7.7%)	8/96 (8.3%)	11/150 (7.3%)	0.809
Wound complication	43/246 (17.5%)	15/96 (15.6%)	28/150 (18.7%)	0.608
Unplanned return to ED	25/246 (10.2%)	8/96 (8.3%)	17/150 (11.3%)	0.521
Unplanned return to OR	8/246 (3.3%)	1/96 (1.0%)	7/150 (4.7%)	0.154

**Clinical Outcomes Based On Protocol-Compliance (Antibiotic Duration 3 Days or Less)
For Patients With Post-initial Visit Follow-up Data (n=246).**

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NEIGHBORHOOD CHILD OPPORTUNITY IS ASSOCIATED WITH HOSPITAL LENGTH OF STAY FOLLOWING PEDIATRIC BURN INJURY

Adesola Akinkuotu, MD¹, **Laura Burkbauer, MD²**, Michael R. Phillips, MD³, Jared Gallaher, MD, MPH², Felicia Williams, MD², Sean E. McLean, MD³, Anthony Charles, MD, MPH³

¹University of North Carolina-Chapel Hill, ²University of North Carolina-Chapel Hill, Chapel Hill, NC, USA, ³University of North Carolina at Chapel Hill, Chapel Hill, NC, USA

Introduction: Pediatric burns are associated with socioeconomic disadvantage and lead to significant morbidity. The Child Opportunity Index (COI) is a well-validated measure of neighborhood characteristics associated with healthy child development. This study aimed to evaluate the relationship between COI and outcomes of burn injuries in children.

Methods: We performed a single-institution retrospective review of pediatric (< 16 years) burn admissions between 2015 and 2019. Patients were stratified into national COI quintiles based on United States residential zip codes. Bivariate analysis was performed to evaluate differences among groups. We performed a multivariate Poisson regression analysis to determine the association between COI and increased length of stay.

Results: 2,234 pediatric burn admissions occurred over the study period. The majority of children admitted were from neighborhoods with very low (n=678,32.8%) and low (n=602,29.1%) COI. There was no difference in the proportion of female patients among the groups (Table). The proportion of non-Hispanic Black patients was significantly higher in neighborhoods with very low (43.6%) compared to others (low:29.3% vs. moderate:11.8% vs. high:11.0% vs. very high:4.3%) (p< 0.01). Patients from very low COI neighborhoods had significantly higher burn total body surface area than those in other neighborhood groups (Table). Hospital length of stay was significantly longer in patients from very low COI neighborhoods (3.6□4.1 vs. 3.2□4.9 vs. 3.3□4.8 vs. 2.8□3.5 vs. 3.2□8.1) (p=0.02). On multivariate regression analysis, living in neighborhoods with very high (IRR: 0.37; 95%CI: 0.34-0.42) and high COI (IRR:0.78; 95%CI: 0.73-0.85) were associated with decreased hospital length of stay

Conclusion: Children from neighborhoods with significant socioeconomic disadvantage, as measured by the Child Opportunity Index, had a significantly higher incidence and severity of burn injuries. Public health interventions focused on neighborhood-level drivers of childhood development are needed to decrease the incidence and reduce hospital costs in pediatric burns.

	Very Low (678)	Low (602)	Moderate (330)	High (278)	Very High (181)	p-value
Age (yrs), mean±SD	5.09±5.02	5.10±5.20	5.30±5.08	4.49±5.59	4.57±5.04	0.2
Female gender, n(%)	269 (31.6%)	268 (31.5%)	134 (15.7%)	107 (12.6%)	74 (8.7%)	0.37
Non- Hispanic Black, n(%)	313 (43.6%)	210 (29.3%)	85 (11.8%)	79 (11.0%)	31 (4.3%)	< 0.01
Burn total body surface area, median (IQR)	2 (1-5)	2 (1-3.5)	2 (1-4)	1.5 (1-3.5)	1 (1-3)	< 0.01
Hospital length of stay (days), mean±SD	3.6±4.1	3.2±4.9	3.3±4.8	2.8±3.5	3.2±8.1	0.02

Table: Patient Demographic and Outcomes of Pediatric (≤16 years) Burn Patients in North Carolina, from 2015-2019, Stratified by Child Opportunity Index Quintiles

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PEDIATRIC FIREARM INCIDENCE AND MORTALITY DIFFERS BY LEVEL OF CHILDHOOD OPPORTUNITY

Gwyneth A. Sullivan, MD, MS¹, Yao Tian, MS, MPH², Suhail Zeineddin, MD, MS³, Anne M. Stey, MD, MSc⁴, Mehul V. Raval, MD, MS⁵

¹*Division of Pediatric Surgery, Northwestern University Feinberg School of Medicine, Ann & Robert H. Lurie Children's Hospital; Division of Pediatric Surgery, Rush University Medical Center, Chicago, IL, USA,* ²*Surgical Outcomes Quality Improvement Center (SOQIC), Feinberg School of Medicine, Northwestern University, Chicago, IL, USA,* ³*Division of Pediatric Surgery, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA,* ⁴*Department of Surgery, Northwestern University Feinberg School of Medicine, Chicago, IL, USA,* ⁵*Division of Pediatric Surgery, Department of Surgery, Northwestern University Feinberg School of Medicine, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA*

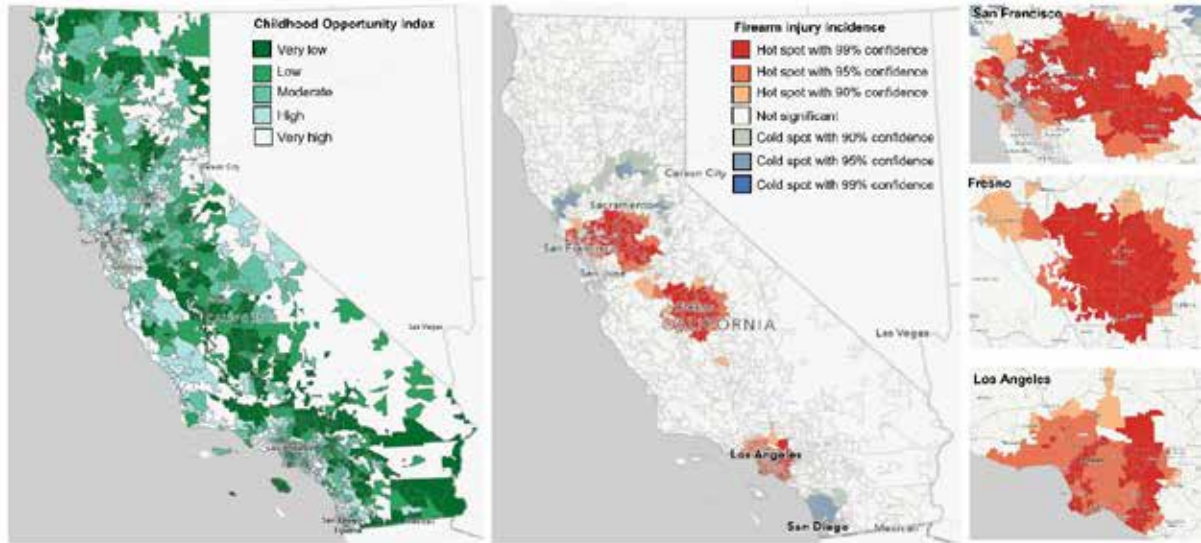
Purpose: While neighborhood deprivation is associated with increased rates of firearm injury, sociodemographic factors specific to a child's lived environment have not been assessed. Our objective was to evaluate the incidence, mechanism, and fatality of firearm injury using the childhood opportunity index (COI).

Methods: This cross-sectional study combined 2015-2018 California patient-level discharge data with Childhood Opportunity Index (COI) 2.0 zip code data. Derived from census indicators that capture neighborhood resources and conditions, COI scores are nationally normalized and categorized into quintiles from "very low" (worst) to "very high" (best). Children less than 18 years who presented to a trauma center following firearm injury were included. Incidence and case fatality by zip code COI were determined. Incidence was compared using exact rate ratios. Geospatial hot spot analysis of zip codes incidence was performed using the Getis-Ord G_i^* statistic.

Results: We found 2,636 firearm injury cases over four years. The incidence of pediatric firearm injury decreased from 15.1/100,000 person-years in "very low" COI zip codes to 1.3/100,000 person-years in "very high" COI zip codes. Incidence hot spots and COI were mapped by zip code (Figure). Compared to "very high" COI zip codes, the firearm incidence rate ratio incrementally decreased with each rising quintile of COI zip code ("very low": 11.2 (95% confidence interval [CI]:9.3-14.3; $p < .001$), "low": 8.1 (95% CI:6.5-10.1; $p < .001$), "moderate": 4.9 (95% CI:3.9-6.1; $p < .001$), and "high": 2.7 (95% CI:2.2-3.5; $p < .001$). Rate of assault decreased from 57.5% in "very low" COI to 34.0% in "very high" COI. Self-inflicted injury conversely increased from "very low" (0.5%) to "very high" (11.7%) COI. Case fatality rates also increased from "very low" (5.1%) to "very high" (14.9%) COI.

Conclusion: Zip codes with lower COI had higher incidence of firearm injury. Self-inflicted injury and case fatality was higher among zip codes with higher COI.

Figure. Zip code childhood opportunity index and hot spots of pediatric firearm injury in California from 2015-2018



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RETROSPECTIVE REVIEW OF ANGIOEMBOLIZATION IN HIGH GRADE BLUNT TRAUMATIC LIVER INJURIES IN ADOLESCENT AGE CHILDREN

Samara L. Lewis, MD¹, Kenneth L. Stewart, PhD², Zoon L. Sarwar, MS², Ryan Kennedy, MD², Jeremy Johnson²

¹Oklahoma University Health Science Center, Department of Surgery, Division of Pediatric Surgery, Oklahoma City, OK, USA, ²University of Oklahoma Health Science Center, Oklahoma City, OK, USA

Current adult guidelines for management of high-grade blunt traumatic liver injuries (BTLI) recommend consideration for early angioembolization (AE). Pediatric guidelines do not recommend angioembolization, as equivocal utility has not been demonstrated. Adolescent aged children have been underrepresented in adult and pediatric studies, and represent a unique challenge given their adult size and mechanisms of injury (MOI). The purpose of this study was to compare the outcomes of AE and non-operative management (NOM) for adolescent aged children with high grade BTLI

After IRB waiver, a retrospective review of the National Trauma Data Bank (2017-2019) of adolescent age children (age 12-17) was performed. Children with BTLI of OIS ≥ 4 were divided into those that underwent NOM management versus those who underwent AE. These patients were further divided by hemodynamically stability (Shock Index, Pediatric Age-Adjusted (SIPA) of 0.9). Primary outcomes were mortality, hospital length of stay (LOS), and ICU LOS. Analysis was performed 3:1 ratio, NOM to AE, matched on ISS, hemodynamic status, age, and trauma center type.

There were 701 patients age 12-17 with OIS of ≥ 4 of which 645 underwent NOM and 56 underwent AE. For matched analysis 46 AE patients were patched to 137 NOM patients. Those patients treated with AE had increased LOS with median 11 days vs 6 days in NOM ($p=0.0074$). Mortality and ICU LOS did not differ significantly between the two groups. Patients treated with AE were more likely to receive blood in the first 4hrs (58.7% vs 25.6% $p<.0001$), but no significant difference was identified in the amount of blood transfused when patients did receive blood (median 1050cc vs 725cc $p=0.4911$).

Adolescents with high-grade blunt liver injuries treated with initial angioembolization have similar mortality when treated with NOM, but have significant increased LOS, with median of 5 more days than those treated with NOM.

**Matched Analysis of High-Grade Blunt Liver Injuries Treated with Initial
Angioembolization vs Non-Operative Management**

Matched on ISS, Age, Trauma Center Type and Hemodynamic presentation; 3:1 Ratio

Variable	Angio-embolism 46(25.1)	NOM 137(74.9)	nmiss	p-value
Hemodynamic Condition on Arrival, n (%)				
Stable	25(56.8)	75(57.3)	8	0.9599 [§]
Unstable	19(43.2)	56 (42.8)		
ISS grp, n (%)				
<25	16(34.8)	47 (34.3)		0.9531 [§]
≥25	30(65.2)	90 (65.7)		
ISS, Median (IQR)	29.5(20.0)	29.0(15.0)		0.6899 [§]
Mortality, n (%)	3(6.5)	12(8.8)		0.6121 [‡]
Blood transfusion in the first 4hrs,n(%)	27(58.7)	35 (25.6)		<.0001 [‡]
Blood transfusion in the first 4hrs*, Median (IQR)	1050(1275)	725(2943)	125	0.4911 ^{***}
Hospital Length of Stay, (days) Median (IQR)	11(17)	6.0(7.0)	3	0.0074 ^{***}
ICU Days, Median (IQR)	5.0(5.5)	4.0(8.0)	21	0.0829 ^{***}
TBI, n (%)	16(34.8)	41(29.9)		0.5316 [‡]
Trauma Center Type, n (%)				
Adult	28(60.9)	84(61.3)		0.9937 [§]
Both	12(26.1)	36(26.3)		
Pead's	6(13.0)	17(13.0)		

*among those that had transfusion; ***p-value for Matched Analysis Wilcoxon rank sum Test; ‡p-value for Matched Analysis Cochran-Mantel-HaenszelTest; § Matched variables; IQR: interquartile range;

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PEDIATRIC BURN INJURIES AND MORTALITY: RISK FACTORS AT PLAY

Samantha M. Koenig, MD¹, Luqin Deng, PhD², Chinwendu Onwubiko, MD, PhD¹, Elizabeth A. Beierle, MD³, Robert T. Russell, MD, MPH⁴

¹Children's of Alabama, Birmingham, AL, USA, ²The University of Alabama at Birmingham, Birmingham, AL, USA, ³Division of Pediatric Surgery, Department of Surgery, University of Alabama at Birmingham, Birmingham, AL, USA, ⁴University of Alabama at Birmingham and Children's of Alabama, Birmingham, AL, USA

Purpose: Burn injuries are one of the leading causes of unintentional death in children and are frequently encountered by pediatric surgeons. There is a lack of literature evaluating mortality in pediatric burn injuries, especially in regard to non-accidental burns and potential disparities in care. Our study aimed to determine the risk factors associated with mortality in pediatric burn injuries and highlight specific populations that may be at increased risk.

Methods: We utilized the National Trauma Data Bank (NTDB) from 2017 to 2019 to identify primary burn injuries in children ≤ 14 years. A trilogy of physical abuse descriptors identified patients with non-accidental injuries. Age groupings were based on the National Institutes of Health's categories. Standard descriptive statistics were generated, and a multivariate logistic regression analysis was utilized to evaluate risk factors for mortality.

Results: 13,528 pediatric burn patients were identified. The overall mortality was $< 1\%$. Table 1 recaps results of the multivariate logistic regression model. All age groups had an independent risk of mortality compared to the youngest patients, but those from 5-9 years had the highest risk of mortality. Black children had a significantly higher mortality compared to white children. Non-accidental burns carried a mortality that was twice that of accidental burns. Children with burns to multiple body regions had the highest independent risk of mortality in comparison to patients with burns confined to a single body region.

Conclusion: Although overall burn injuries carry a low mortality, there are certain subpopulations, including black children and children from 5-9 years of age, who are at a significantly higher risk for death. Further studies evaluating these disparities with a burn specific database will be necessary to account for any disparities in clinical care leading to these mortality differences.

Variable	OR (95% CI)	p value
Age (years): ≤ 1	1 (ref)	-
$> 1 - 4$	7.98 (3.07, 20.71)	< 0.001
5 - 9	11.40 (4.41, 29.43)	< 0.001
10 - 14	7.20 (2.62, 19.79)	< 0.001
Race: White	1 (ref)	-
Black	2.57 (1.63, 4.06)	< 0.001
Other	1.42 (0.76, 2.65)	0.279
Physical Abuse	2.02 (1.11, 3.67)	0.022
Multiple Region Burn v Single Region Burn	37.00 (24.28, 56.38)	< 0.001

Multivariate Logistic Regression Model for Risk of Death in Pediatric Burn Injury

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APPLICATION OF A MACHINE LEARNING ALGORITHM IN PREDICTION OF ABUSIVE HEAD TRAUMA IN CHILDREN

Priyanka Jadhav, BS¹, Timothy Sears², Gretchen Floan, MD³, Katie Joskowitz, MS⁴, Shalon Nienow⁴, Sheena Cruz⁵, Maya David⁶, Victor de Cos⁷, Pamela Choi, MD³, Romeo C. Ignacio, MD, MSc, MPath⁸

¹University of California San Diego, San Diego, CA, USA, ²University of California, San Diego, La Jolla, CA, USA, ³Naval Medical Center San Diego, San Diego, CA, USA, ⁴Rady Children's Hospital San Diego, San Diego, CA, USA, ⁵University of California School of Medicine, La Jolla, CA, USA, ⁶Tulane University School of Medicine, New Orleans, LA, USA, ⁷University of California San Diego School of Medicine, San Diego, CA, USA, ⁸Rady Children's Hospital San Diego/University of California San Diego School of Medicine, San Diego, CA, USA

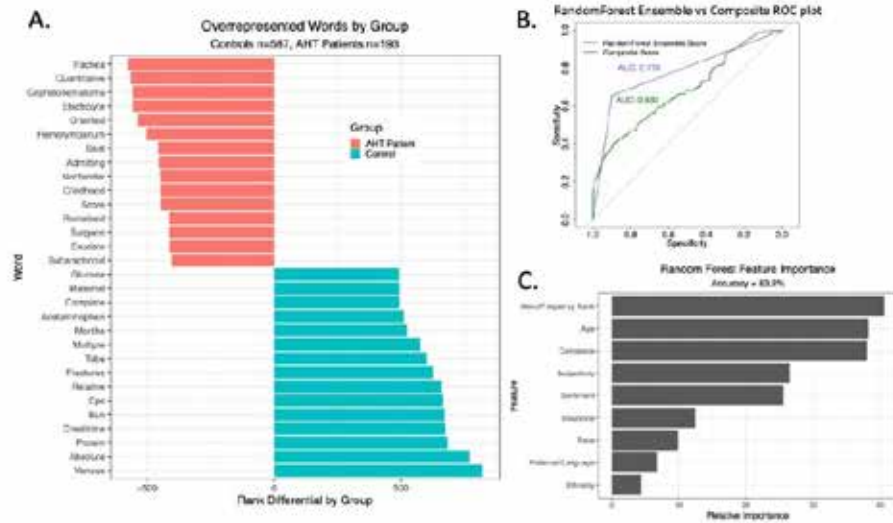
Purpose: Abusive Head Trauma (AHT) remains a leading cause of abuse-related deaths in children under five. Timely diagnosis is imperative for treatment initiation and injury reduction. We explored the application of a machine learning algorithm for timely detection of potential AHT using the first free-text note of an encounter and demographic information.

Methods: First free-text physician notes and demographic information were collected for children under 5 from 2010-2020 at a Level 1 Trauma Center. The control group (n=587) included patients with head/neck injury excluding those diagnosed with AHT. The AHT (n=193) group was diagnosed by the hospital's Child Protective Team. Differential scores accounted for words overrepresented in AHT patient vs. control notes. Sentiment score was reflective of note positivity/negativity and subjectivity score accounted for note subjectivity/objectivity. The composite score reflected the patient's differential score modified by subjectivity score. Composite, sentiment, and subjectivity scores combined with demographic information trained a Random Forest (RF) machine learning algorithm to predict AHT.

Results: Final composite scores with demographic information were highly associated with AHT in a test dataset. Words overrepresented in the control vs. AHT notes are shown in (Fig 1A). Combining composite scores with demographic information into the RF model improved AHT classification AUC from \sim .68 to .78 (Fig 1B), with an overall accuracy of 84% (Fig 1C). Feature importance analysis of our RF model revealed that composite score, sentiment, age, and subjectivity were the most impactful predictors of AHT. Sentiment was not significantly different between control and AHT notes ($p = 0.87$), while subjectivity trended higher for AHT notes ($p = 0.081$).

Conclusion: We conclude that a machine-learning algorithm can recognize patterns within free-text notes and demographic information that aid in AHT detection in children. Thus, comprehensive documentation is imperative to appropriately implement algorithms such as this as an aid in diagnosis.

Figure 1. A, Results of word frequency analysis displaying the top 15 overrepresented words in control vs. AHT cases. B, Composite sentiment score and total RandomForest Ensemble ROC plots with AUC values. C, Relative feature importance of word frequency rank, age, composite score, subjectivity score, sentiment score, insurance, race, language and ethnicity in the RandomForest model.



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IN SEARCH OF TRUTH: MODELING ACTIVATION LEVEL IN PEDIATRIC TRAUMA

Catherine W. Liu, BS¹, Miranda Chacon, MD², Hadassah Polydore, BS³, Tiffany Ting, BA¹, Marjorie J. Arca, MD⁴, David Darcy, MD⁵, Derek Wakeman, MD⁶, Nicole A. Wilson, PhD, MD⁴

¹University of Rochester School of Medicine & Dentistry, Rochester, NY, USA, ²University of Rochester Medical Center | Golisano Children's Hospital, Rochester, NY, USA, ³University of Rochester Medical Center, Rochester, NY, USA, ⁴University of Rochester | Golisano Children's Hospital, Rochester, NY, USA, ⁵Golisano Children's Hospital, University of Rochester Medical Center, Rochester, NY, USA, ⁶University of Rochester, Rochester, NY, USA

Purpose: Our purpose was to determine the ideal ground-truth for training machine learning models to predict trauma activation level in pediatric trauma patients. We hypothesized that combining the Cribari and Need for Trauma Intervention (NFTI) methods would perform better than either method alone.

Methods: We retrospectively reviewed all pediatric patients (age < 18 y) who triggered a trauma activation at our Pediatric Trauma Center (1/2014-12/2021). Two machine learning models (Logistic Regression and Random Forest) were tested 1000 times in separate trials using three ground-truths: Cribari (Injury Severity Score >15 =full activation), NFTI (positive for any of 6 criteria =full activation), and Cribari + NFTI (either criterion positive =full activation). Classification accuracy for trauma activation level was quantified using area under the curve (AUC).

Results: Of the 1366 patients, 230 (16.8%) triggered a full activation, and 46 (3.4%) died. All machine learning models were more accurate than emergency department staff (Table). Logistic regression using Cribari as ground-truth performed best. However, each ground-truth identified a different proportion of patients who met criteria for a full activation, with different subsets identified by Cribari [n = 246 (18.0%)] and NFTI [n = 364 (26.7%)]. Compared to either method alone, Cribari + NFTI captured more patients with a penetrating mechanism of injury and 97.8% (45/46 patients) of the children who died in the dataset (Table).

Conclusions: This work illustrates the difficulty in choosing a ground-truth for training machine learning algorithms when there are multiple correct answers. All machine learning models had increased accuracy and reduced variability compared to emergency department staff. However, while models performed best with the Cribari ground-truth, the combination of Cribari and NFTI better captured penetrating mechanisms of injury and mortality in the dataset. Despite reduced machine learning performance, Cribari + NFTI is a better ground-truth than either method alone.

	Cribari	NFTI	Cribari + NFTI
Emergency Department Staff (AUC ± 95% CI)	65.27 ± 0.04	67.36 ± 0.04	64.85 ± 0.03
Logistic Regression (AUC ± 95% CI)	85.52 ± 1.1e-16	80.02 ± 1.1e-16	78.46 ± 0.00
Random Forest (AUC ± 95% CI)	84.81 ± 2.0e-03	79.64 ± 0.00	80.44 ± 1.3e-03
Penetrating Mechanism; n (%)	27 (11.4%)	74 (31.2%)	79 (33.3%)
Mortality; n (%)	31 (67.4%)	45 (97.8%)	45 (97.8%)

Table. Ground-truth Comparisons

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PEDIATRIC TRAUMA TRANSFER PATIENTS HAVE LOW RATES OF ADDITIONAL TRAUMATIC INJURIES

Su Yeon Lee, MD¹, Jordan Jackson, MD², Sarah C. Stokes, MD³, Olivia Vukceвич, BSc⁴, Holly Leshikar, MD, MPH¹, Tanya Rinderknecht, MD¹, Jonathan Kohler, MD⁵, Shinjiro Hirose, MD³, Erin G. Brown, MD³

¹UC Davis Medical Center, Sacramento, CA, USA, ²UCSF-East Bay, Oakland, CA, USA, ³University of California, Davis Medical Center, Sacramento, CA, USA, ⁴UC Riverside School of Medicine, Riverside, CA, USA, ⁵University of Wisconsin, Madison, WI, USA

Objective: To characterize the frequency of additional traumatic injuries identified after transfer in pediatric patients.

Background: Pediatric trauma patients often require inter-facility transfer for subspecialty management of presumed isolated injuries. Understanding the frequency of additional injury identification in these low-acuity patients may enable improved resource utilization and benefits patients, families, and healthcare systems.

Methods: A retrospective review of pediatric trauma patients transferred to a Level 1 trauma center from January to December of 2019 was performed. Patients were compared by type of presenting injury. Primary outcome was identification of additional traumatic injuries. Secondary outcomes were need for operation, hospital length of stay (LOS), and mortality.

Results: 530 pediatric trauma patients were transferred for subspecialty evaluation, most commonly for an isolated orthopedic injury (56.5%). The overall rate of additional injuries identified was 2.6%, with the highest rate of additional injuries in patients transferred with neurosurgical injuries (6.7%). When compared to other transfer patients, patients with isolated orthopedic injuries were least likely to have any additional injuries (1.0% vs. 4.8%, $p=0.01$), more likely to require operative intervention (64.7% vs. 9.6%, $p<0.0001$), and had no significant difference in LOS or mortality.

Conclusions: Pediatric trauma patients transferred for subspecialty care of isolated injuries rarely had additional injuries identified after transfer. Rates of additional injuries were lowest in patients transferred with isolated orthopedic injuries. Improving efficient care for this population while maintaining vigilance for missed injuries is a target for future interventions.

Patient Characteristics	Isolated Orthopedic Injury Patients (n=300)	Non-Orthopedic Injury Patients (n=230)	p value
Median Age in years, IQR	6 (4-10)	5 (1.4-10)	< 0.0001
Male, n(%)	180 (60.0)	156 (67.8)	0.0692
Race			
Caucasian	104 (48.1)	80 (51.6)	0.1910
Black	13 (6.0)	16 (10.3)	
Asian	12 (5.6)	4 (2.6)	
Other	87 (40.3)	55 (35.5)	
Mechanism of Injury, n (%)			
Fall	210 (70.0)	134 (58.3)	0.0019
MVC	26 (8.7)	18 (7.8)	
Rec vehicle	14 (4.7)	16 (7.0)	
Sports injury	16 (5.3)	12 (5.2)	
Assault	4 (1.3)	18 (7.8)	
Other	30 (10.0)	32 (13.9)	
Median Injury Severity Score, IQR	4 (4-5)	9 (4-10)	< 0.0001
Glasgow Coma Scale			
< 15	3 (1.4)	15 (9.7)	0.0003
15	213 (98.6)	140 (90.3)	
Required operative intervention, n(%)	194 (64.7)	22 (9.6)	< 0.0001
Additional Injury Identified, n(%)	3 (1.0)	11 (4.8)	0.0113
Mortality, n(%)	0 (0)	0 (0)	>0.9999

Patient Demographics and Characteristics of Isolated Orthopedic Injury Patients Compared to All Non-Orthopedic Injury Transfer Patients.

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A NOVEL TECHNIQUE TO IDENTIFY CHILDREN AT HIGH RISK FOR PHYSICAL ABUSE IN A NATIONWIDE TRAUMA REGISTRY**Stephanie Papillon, MD¹**, Sahal Master, MPH¹, Matthew Klein², Allison Toth², Norrell Atkinson³, Harsh Grewal⁴

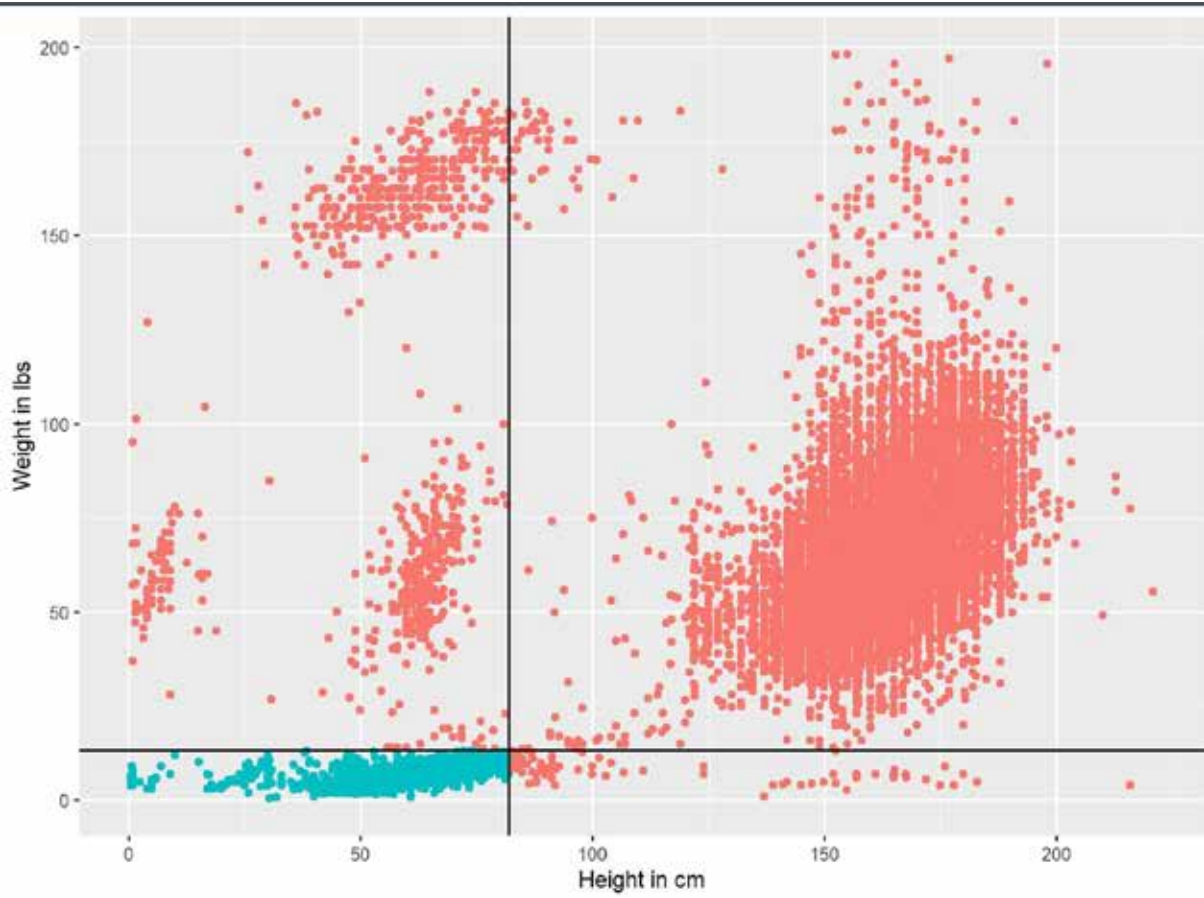
¹St. Christopher's Hospital for Children, Philadelphia, PA, USA, ²Drexel University College of Medicine, Philadelphia, PA, USA, ³St. Christopher's Hospital for Children, ⁴St. Christopher's Hospital for Children/Drexel University College of Medicine

Purpose: Physical abuse is a major public health concern and a leading cause of morbidity and mortality in infants. Rates of abuse are underreported as providers may not recognize abuse. Trauma registries can be used to develop clinical tools that can assist with early identification of abuse. The Trauma Quality Improvement Program (TQIP) database, the largest nationwide trauma registry, does not report age for children < 1 year who are the highest risk group. We report a method to capture these infants despite the missing age.

Methods: Pediatric patients 18 years or younger were identified from TQIP from 2017-2019. Exclusion criteria included sexual or emotional abuse, penetrating injuries, unintentional injury, and death at arrival. The primary outcomes included confirmed or suspected child abuse captured by Internal Classification of Diseases, Tenth Revision (ICD-10) diagnosis codes and report/investigation of physical abuse, and different caregiver at discharge available in TQIP. We decided to use the CDC growth standards for stature or length-for-age and weight-for-age to capture children younger than 1 year. We compared outcome and injury data with and without patients < 1 year.

Results: Using the CDC growth standard we identified children < 1 year (Fig 1). A total of 20,855 patients (age 0-18 years) had a report of physical abuse filed. The majority, 16,477, were ≤3 years. The number of patients with reports/investigations of abuse and a different caregiver at discharge nearly doubled when patients < 1 year were included. Increased age-adjusted odds ratios were seen for fractures of the lower limb, skull, vertebrae, ribs, spinal cord and head injuries.

Conclusion: In a nationwide trauma registry, CDC growth standards can be used to identify patients under one year. This can better capture age groups more adversely impacted by maltreatment, which can translate into improved accuracy of decision support tools derived from this data.



Scientific Session VI: Global

2:45 PM – 4:00 PM

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IMPACT OF INVESTMENT IN PEDIATRIC SURGICAL INFRASTRUCTURE ON INCOME EQUITY IN ETHIOPIA

Ava Yap, MD, MHS¹, Samuel Negash, MD², Caroline Stephens, MD MPH³, Emma Bryce, MPH⁴, Maija Cheung⁵, Maira Fedatto⁶, Ruth Laverde, Bs⁷, Doruk Ozgediz, M.D., MSc¹, Amezene Tadesse⁸, Milliard Derbew, MD⁹, Samuel Negash, MD², Beimnet Negussie, MD¹⁰

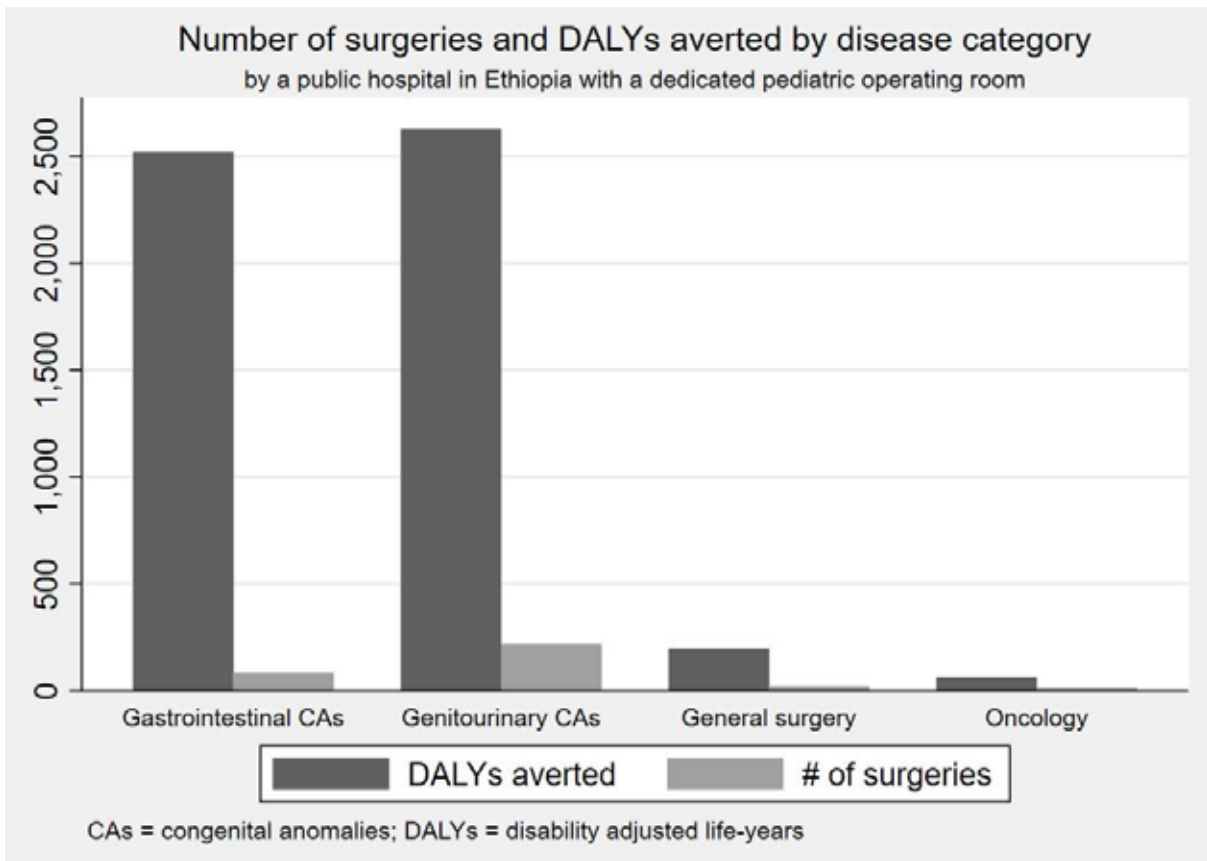
¹Department of Surgery, University of California San Francisco, San Francisco, CA, San Francisco, CA, USA, ²Menelik II Hospital, Addis Ababa, Adis Abeba, Ethiopia, ³UCSF Center of Health Equity in Surgery and Anesthesia, San Francisco, CA, USA, ⁴University of Edinburg Usher Institute of Population Health Sciences and Informatics, San Francisco, CA, USA, ⁵Yale School of Medicine, New Haven, CT, USA, New Haven, CT, USA, ⁶Kids Operating Room, Edinburgh, UK, Edinburgh, Scotland, United Kingdom, ⁷School of Medicine, University of California San Francisco, San Francisco, CA, San Francisco, CA, USA, ⁸Addis Ababa University, Addis Ababa, Adis Abeba, Ethiopia, ⁹Addis Ababa University, Addis Ababa, Ethiopia, ¹⁰St. Paul Hospital, Addis Ababa, Ethiopia

Purpose: To investigate the monetary health benefit in relation to the socioeconomic status of patients who underwent pediatric surgery in a public hospital after installation of a dedicated pediatric operating room (OR).

Methods: Children who underwent surgery in a pediatric OR at a public hospital were included. Clinical data were obtained via retrospective chart review. An inpatient economic survey collected household income, which was benchmarked to the gross national income (GNI) per capita and international poverty line. Disease-specific disability adjusted life-years (DALYs) averted quantified patients' health gained from surgery. The monetary health benefit was estimated using the value of statistical life year method and compared to household income to ascertain relative economic benefit. Currency is reported in 2022 United States dollars.

Results: A total of 335 patients and their caregivers were included from August 2019 to September 2021. The pediatric OR expanded capacity for elective cases, with hypospadias repair as the most common procedure (n=123, 36.7%). Mean annual household income was \$1,670. 100% of participants were below the GNI per capita (\$2,590) and 43% (n=145) fell below the international poverty line (\$913). Surgery averted a total of 5,408 DALYs, or 16 DALYs per patient. Total monetary health benefit was \$8.4 million, or \$24,940 per patient. The ratio of mean monetary health benefit to mean household annual income was 14.9.

Conclusion: Installation of a pediatric OR in a public hospital ensures access to surgery for those most impoverished. Such services not only avert approximately 16 life-years of disability per patient, but also result in families retaining almost 15 times their household income in monetary health benefit. Focusing pediatric OR installations in public hospitals in low-income countries can improve equitable access to care, providing substantial economic benefits to indigent children and families.



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IMPACT OF BOWEL COVERAGE ON GASTROSCHISIS MORTALITY IN LOW-INCOME COUNTRIES: EXPERIENCE AND LESSONS FROM UGANDA

Caroline Stephens, MD MPH¹, Stella Nimanya, MD², Ava Yap, MD, MHS³, Phyllis Kisa, MD², Nasser Kakembo, MD⁴, Anne Wesonga, MD², Innocent Okello, MD², Rovine Naluyimbazi, MD², Fiona Mbwali², Peter Kayima, MD², Yasin Ssewanyana, MD⁵, Bindi Naik-Mathuria, MD, MPH⁶, Doruk Ozgediz, M.D., MSc³, John Sekabira, MD²

¹UCSF Center of Health Equity in Surgery and Anesthesia, San Francisco, CA, USA, ²Mulago National Referral Hospital, Kampala, Kampala, Uganda, ³Department of Surgery, University of California San Francisco, San Francisco, CA, USA, ⁴Makerere University, Kampala, Uganda, ⁵Mulago National Referral Hospital, Kampala, Kampala, Uganda, ⁶University of Texas Medical Branch, Galveston, TX, USA

Purpose: To understand the impact of different methods of bowel coverage for delayed closure on gastroschisis outcomes for patients in a low-income country (LIC) setting.

Methods: A retrospective cohort study examined outcomes for gastroschisis patients served at a public tertiary referral center in Kampala, Uganda. Multiple approaches for bowel coverage and delayed closure were used: sutured urine bags (2017-2018), improvised silos using laparoscopic wound protectors (2020-2021) and Bentec silos (2022). Total parental nutrition (TPN) was not available; however, with the use of improvised silos, a protocol was implemented to include early enteral feeding, amino acids in intravenous fluids, and bedside closure. Patient outcomes were compared to a historic cohort (2014) when primary closure was the only option. Odds ratio (OR) for survival was calculated in comparison to historic controls.

Results: 289 patients were included: 42 historic controls, 85 sutured urine bags, 99 improvised silos and 63 Bentec silos. No differences were found in sex ($p=0.42$), days to presentation ($p=0.71$), and distance traveled to the tertiary hospital ($p=0.22$). Following the introduction of bowel coverage methods, the proportion of infants that survived to discharge increased from 2% to 17-25% (Table) and the average age at death increased to 8.1 days (sutured urine bags), 7.3 (improvised silos) and 7.8 (Bentec silos) from 4.8 (historic). Compared to historic controls, bowel coverage methods resulted in >eight-fold increase in odds of survival: OR 10.3 (95%CI: 1.5-438.6), 8.5 (95%CI: 1.2-363.7) and 14.0 (95%CI: 2.0-599.2), respectively.

Conclusion: Use of any bowel coverage method increases the length of life and percent survival for infants with gastroschisis, even in the absence of TPN. While Bentec silo bags have the best outcomes, improvised silos and sutured urine bags provide alternative solutions for delayed closure in LICs. Next steps for expanding access throughout LICs include manufacturing silos locally to ensure continuous supply.

	Historic Cohort (N=42)	Sutured Urine Bags (N=85)	Improvised Silo (N=99)	Bentec Silo (N=63)
Survived to discharge n, (%)	1 (2.4%)	17 (20.0%)	17 (17.2%)	16 (25.4%)
Died n, (%)	41 (97.6%)	62 (72.9%)	77 (77.8%)	42 (66.7%)
Left Against Medical Advice n, (%)	0 (0%)	6 (7.1%)	5 (5.1%)	5 (7.9%)

Gastroschisis Outcomes

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ADVANCING GASTROSCHISIS CARE IN LOW-INCOME SETTINGS - THE EXPERIENCE IN RWANDA

Edmond Ntaganda, MD¹, Thomas M. Diehl, MD², Michael Adam Lemma¹, Mohammed Javed¹, Elisée Rwagahirima, MD¹, Japhet Ntezamizero, MD¹, Axelle-Aimee Nduwimana, MD¹, Gisèle Juru Bunogerane, MD¹, Alain Jules Ndibanje, MD¹, Robin T. Petroze, MD, MPH³

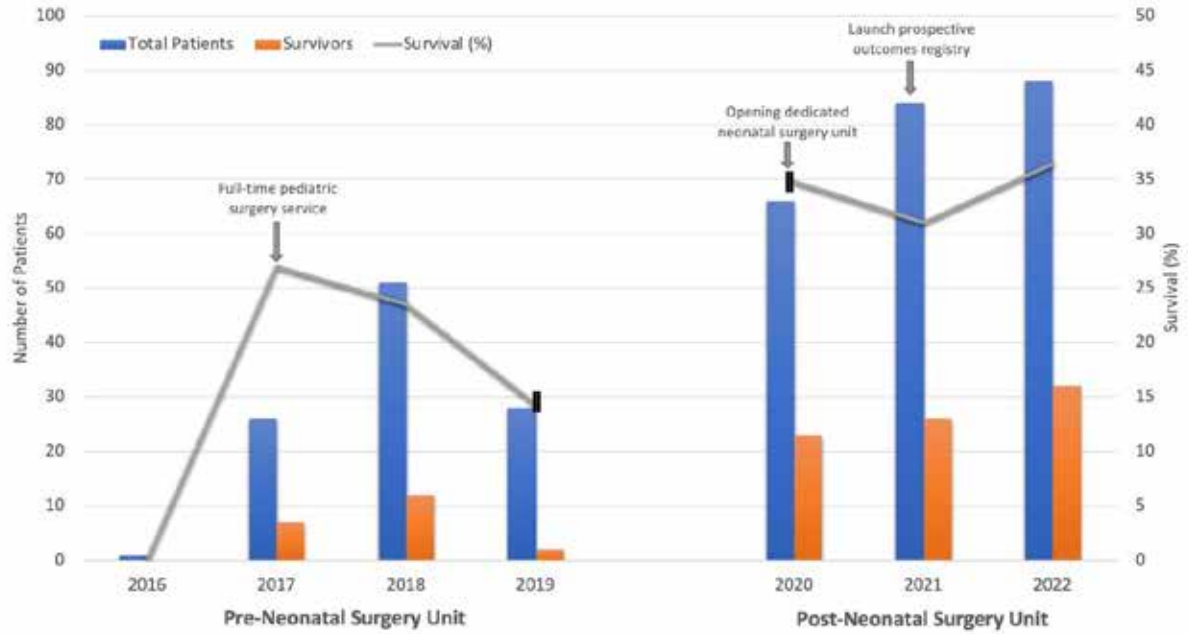
¹Centre Hospitalier Universitaire de Kigali, Kigali, Kigali, Rwanda, ²UW Hospitals and Clinics, Madison, WI, USA, ³University of Florida College of Medicine, Gainesville, FL, USA

Purpose: Gastroschisis outcomes are disparate in low-income settings where rare prenatal diagnosis, delays to surgical and neonatal care, and lack of parenteral nutrition challenge the ability to replicate western care paradigms. Here, we present gastroschisis outcomes before and after opening a dedicated neonatal surgical unit.

Methods: All gastroschisis patients admitted to the main referral hospital were included. A neonatal surgery unit opened in March 2020. Data was collected retrospectively from 1/2016-6/2019 and 3/2020-7/2021, and prospectively from 8/2021-8/2022. Included variables were demographics, time to abdominal closure, time to enteral feeds, and outcome. Descriptive and univariate analysis were completed using R.

Results: 342 gastroschisis patients were admitted with 31.9% survival (109/342). The volume of gastroschisis cases increased >3-fold (2.5 to 7.9 cases/month) and overall survival improved 40% after opening the unit (22.8% vs. 32.0%, p=0.063) (Figure 1). Mean maternal age was 23.5±4.8 years and 2.6% (9/342) were diagnosed prenatally. 47 patients (13.7%) had complicated gastroschisis, of which 4 (8.5%) survived. Mean length of stay was 27.8±11.8 days for survivors. Gestational age (37.5 vs. 36.8 weeks, p=0.04), time to abdominal closure (6.9 vs. 8.6 days, p=0.03), and last platelet count (333 vs. 113, p< 0.001) were associated with survival to discharge. There was no difference in birth weight (2.26kg vs. 2.32kg, p=0.13), time to arrival (0.50 vs. 0.42 days, p=0.23) or time to first enteral feeds (12.4 vs. 9.4 days, p=0.06). Incidence was 3.8 per 10,000 live births.

Conclusion: This is the largest cohort of gastroschisis patients from a single institution in a low-resource setting. Since opening a dedicated neonatal surgical ward, this institution has seen increasing patient volumes with meaningful improvements in survival. Prospective data will inform ongoing and future initiatives to further improve gastroschisis outcomes and support innovation for neonatal care in resource-limited settings.



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SOCIAL IMPACT OF A COLOSTOMY ON FAMILIES OF CHILDREN WITH COLORECTAL DISORDERS

Samuel Negash, MD¹, Melat Anania, MPH², Beimnet Negussie, MD³, Tihitena N Mammo, MD⁴, Fisseha Temesgen, MD⁵

¹Menelik II Hospital, Addis Ababa, Adis Abeba, Ethiopia, ²Plan International Ethiopia, ³St. Paul Hospital, Addis Ababa, Ethiopia, ⁴Addis Ababa University, Addis Ababa, Adis Abeba, Ethiopia, ⁵Addis Ababa University

Background: Colostomy is one of the most commonly performed pediatric surgical procedures. Even though most colostomies are reversible, our patients stay a long time with the stoma because of the long waitlist. Apart from medical complications, this treatment can cause social, financial and psychological problems in LMIC. The aim of this study was to assess this impact on children and their care givers.

Methods: Cross-sectional study with prospective data collection conducted from October–December 2020. Quantitative and qualitative data was collected in a convergent parallel design. Convenience sampling technique was utilized to select participants.

Results: Thirty caregivers were interviewed. Most were married (90%), young (mean age 30.6years) and living in urban areas (70%). The indications for colostomy were ARM (53%) and HD (47%). The procedure was mostly performed in infants (mean age 6.5months) and as an emergency (87%). Children stayed with a colostomy from 4months to 6years (mean 22.8months). Medical complications occurred in half of the children but only 20% required reoperation.

The first reaction towards the colostomy was anxiety. Most parents stated they did not get adequate counseling from doctors. Other patients were the most helpful source of information. None used a colostomy bag and they expressed significant issues with stoma care. Most had to stay home to take care of the child and many lost their jobs. They also faced difficulties in their social life because people were uncomfortable around a colostomy. Older children were not able to attend school. Around half of the participants experienced economic challenges because of the colostomy.

Conclusion: We found a high rate of psychosocial problems in families of children with colostomy. We recommend prioritizing these children on surgical waiting lists. Regional pediatric surgery associations should also work on educating the public and providing materials, training and support for families suffering with this condition.

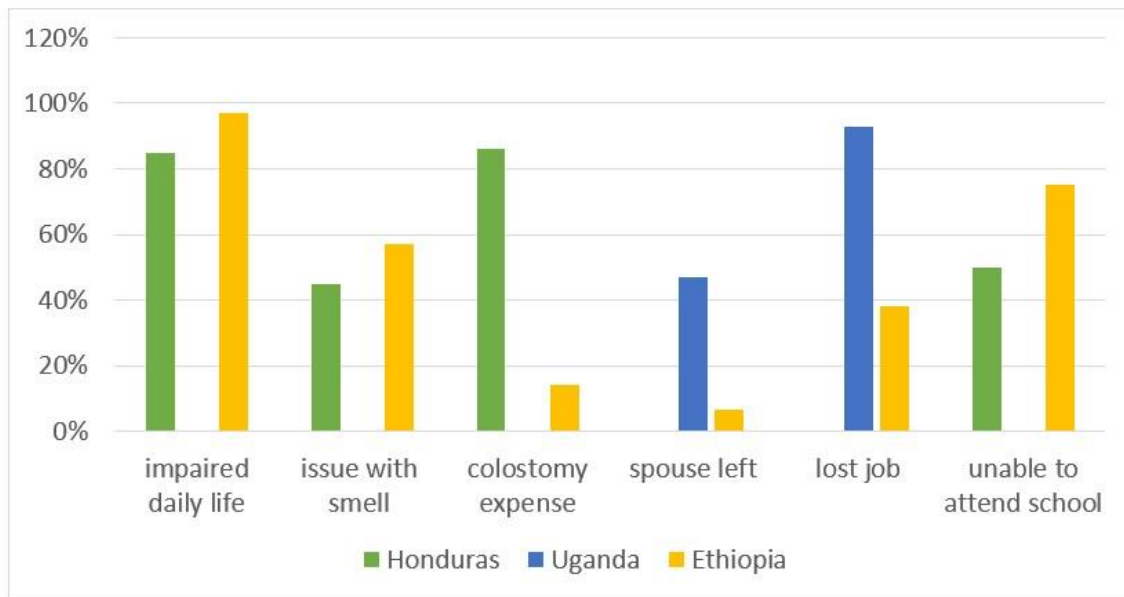


Figure : Comparison of the findings of 3 studies performed to assess the psychosocial and economic impact of a colostomy on families of children with colorectal disorders in LMIC

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PILOT BOWEL MANAGEMENT PROGRAM AT MBARARA HOSPITAL, UGANDA

Stephen Trinidad, MD, MPH¹, Felix Oyania², Crispus Bingana, NR³, Ivan Nuwagaba³, Maria Obermeyer, MSN APRN¹, Charles Odongo, MD MB ChB, MMED³, Meera Kotagal, MD, MPH¹, Martin Situma²

¹Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA, ²Mbarara Regional Referral Hospital, Mbarara, Mbarara, Uganda, ³Mbarara Hospital, Mbarara, Mbarara, Uganda

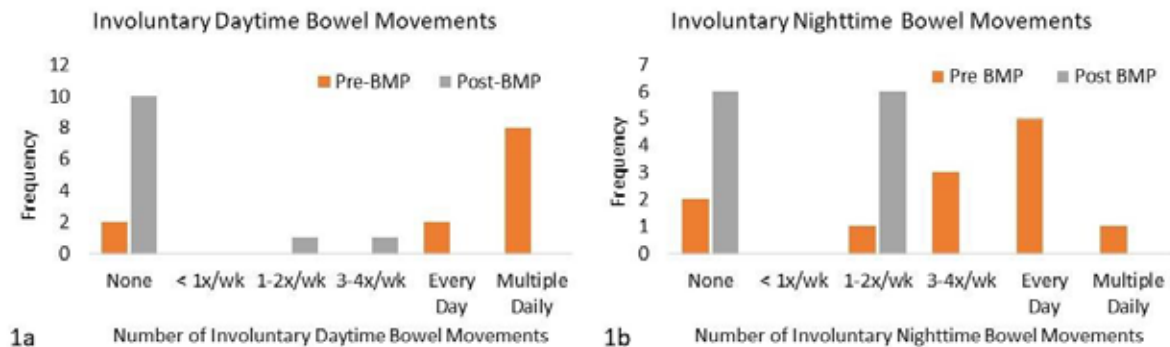
Purpose: Children treated for Hirschsprung's disease (HD) and anorectal malformations (ARM) may struggle with fecal incontinence and benefit from a bowel management program (BMP). However, there is no established BMP in Uganda. This study describes the introduction of a BMP.

Methods: Patients treated for HD or ARM were recruited for initial BMP which took place in June 2022. Local staff were trained in the fundamentals of bowel management and progressively took over decision making. Provider confidence was assessed pre- and post-BMP. The rates of patient involuntary bowel movements (IBMs) were evaluated pre- and post-BMP with a questionnaire. The results were compared with Fischer's exact test.

Results: Ten staff – 2 physicians, 6 nurses and 2 physiotherapists – and 12 patients participated in the BMP. Patient median age was 4.5 years (IQR 3-6.6) and ten were male (83%). Eight patients (67%) had ARM, 4 had HD (33%). Ten reported at least daily IBMs prior to the BMP, with multiple families consequentially reporting social isolation. After initial assessment, they all underwent a cleanout. The parents were then taught to perform daily enemas or irrigations. The specific regimens were titrated throughout the BMP. There were differences in the rates of both daytime and nighttime IBMs before and after the BMP ($p = 0.0001$ and 0.002 respectively, Figure 1). Specific challenges to implementing the BMP include fewer enema resources and difficulty with patient follow-up post BMP – primarily due to travel costs. All staff reported increased confidence managing fecal incontinence.

Conclusions: We report the first BMP and to our knowledge the first BMP in a low- and middle-income country (LMIC) described in the literature. BMPs can successfully treat fecal incontinence in LMICs, although there are challenges with regards to resources and follow-up. Further evaluation of long-term outcomes is needed.

Figure 1: Bowel Management Program Initial Results



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IMPROVISED LOW-COST SILO BAG USING WIDELY AVAILABLE MATERIALS AND SIMPLE ASSEMBLY TO MANAGE GASTROSCHISIS IN LOW RESOURCE SETTINGS

Vanshika P. Jhonsa, BA¹, Shreya Jindal², Shriya Shah², Meaghan Bond, PhD³, Timothy Jumbi, MBBS⁴, Bindi Naik-Mathuria, MD, MPH⁵

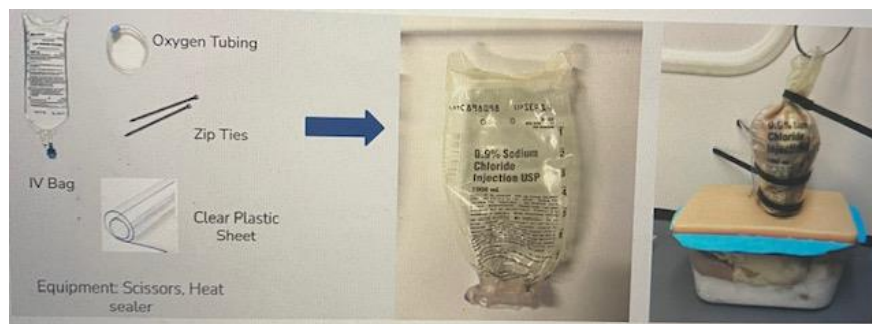
¹Rice University, Rice 360 Program, Pearland, TX, USA, ²Rice University, Rice 360 Program, Houston, TX, USA, ³Rice360 Institute for Global Health Technologies, Rice University, Houston, TX, USA, ⁴Kenyatta National Hospital, Nairobi, Nairobi Area, Kenya, ⁵University of Texas Medical Branch, Galveston, TX, USA

Purpose: Commercial silo bags are available to successfully treat gastroschisis in high-resource settings; however, high cost prevents access in low-resource settings and consequently, survival rates for infants born with this birth defect are extremely low. We aimed to create a low-cost silo bag using locally sourced materials and simple manufacturing to meet this need.

Methods: Our solution uses materials widely available in low-resource hospitals. A standard saline or urine bag contains the intestines. A flexible ring tailored to the size of the fascial defect is created by forming a loop of oxygen tubing. This tubing is folded into the bag and sealed using a heat sealer. The end result is very similar to a commercial silo bag. Stiff plastic bands are placed around the bag and held in place with zip ties to form the cylindrical shape required to successfully reduce intestines. Another band cinches the bag and can be replaced lower as the intestine is reduced daily. Material costs are under \$10.

Results: In the laboratory, leakage rate of fluid outside the bag was found to be less than 5%, comparable to the leakage rate of commercial silo bags. The bag can be disinfected in glutaraldehyde at least 5 times without significantly increasing leakage rate. The improvised silo was tested in a gastroschisis model consisting of pig intestines and produced 50% intestinal reduction in 3 days, similar to commercial bags. Pediatric surgeons in Kenya were able to recreate the bag and had very positive feedback. A clinical trial is planned to determine effectiveness.

Conclusion: Our improvised silo design shows the potential for significant cost reduction by using materials available in low-resource hospitals. Additionally, the simple design facilitates assembly by surgeons, which increases availability. This innovative idea could pave the way for increased survival for babies born with gastroschisis.



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THE PEDIATRIC EMERGENCY SURGERY COURSE: IMPACT ON PROVIDER PRACTICE IN RURAL UGANDA

Greg Klazura, MD, MPH¹, Martin Situma², Edwin Musinguzi³, Robert Mugarura⁴, James Nyonyintono⁵, Ava Yap, MD, MHS⁶, Sarah J. Ullrich, MD, MHS⁷, Doruk Ozgediz, M.D., MSc⁶, John Sekabira, MD⁸, Nasser Kakembo, MD⁹, Augustine Ssemeju³, Max Bwesigye⁵, Deborah Muzaki⁵, Thomas Sims¹⁰, Nalukenge Proscovia³, Jennifer Bandu³, Franklin Arinda⁴, Doreen Kundiye⁴, Phyllis Kisa, MD⁸, Caroline Stephens, MD MPH¹¹

¹Loyola University Medical Center, Chicago, IL, USA, ²Mbarara Regional Referral Hospital, Mbarara, Mbarara, Uganda, ³Fort Portal Regional Referral Hospital, Fort Portal, Kabarole, Uganda, ⁴Kabale Regional Referral Hospital, Kabale, Kabale, Uganda, ⁵Kiwoko Hospital, Kiwoko, Nakaseke, Uganda, ⁶Department of Surgery, University of California San Francisco, San Francisco, CA, San Francisco, CA, USA, ⁷Yale Department of Surgery, New Haven, CT, USA, ⁸Mulago National Referral Hospital, Kampala, Kampala, Uganda, ⁹Makerere University, Kampala, Uganda, ¹⁰UIC Department of Surgery, Chicago, IL, USA, ¹¹UCSF Center of Health Equity in Surgery and Anesthesia, San Francisco, CA, USA

Purpose: There are just eight of an estimated need of 170 pediatric surgeons. In response, stakeholders developed the Pediatric Emergency Surgery Course (PESC) for rural surgical providers. The course aimed to improve referral processes, raise provider confidence and increase the operative volume of select conditions. PESC was given three times between 2018 - 2019. To assess course impact, we conducted a mixed-methods evaluation at three regional hospitals.

Methods: Patient data were collected twelve months before and after PESC from admission books (n=1,534) and theater logbooks (n=2,148). We also assessed referrals from these institutions to Uganda's two pediatric surgery hubs: MRRH & MNRH, (n = 116). Kiwoko had a separate referral register, (n=539). Wilcoxon rank-sum tests and Pearson's chi-squared tests compared pre- and post-PESC measures (p<.05). Interrupted time-series-analysis (ITSA) assessed referral volume before and after PESC. Semi-structured interviews at each site were analyzed using HyperRESEARCH software.

Results: There was a statistically significant immediate increase in the number of referrals from FPRRH, from 0.5 patients/month pre-PESC to 0.8 post-PESC (95% CI 0.03-1.51). Although not statistically significant, moving averages of the combined number of pyloromyotomies, intussusceptions, and hernia repairs at the rural hospitals increased after PESC. Neonatal time to referral and referred patient age were significantly lower after PESC in both the MRRH & MNRH admission books and Kiwoko referral books. Thematic analysis of interviews suggested the course boosted provider confidence and communication but proposed lengthening the course and more hands-on training for course improvement.

Conclusion: Our data suggest that PESC positively affected provider practice: more referrals, shortened time to presentation, increased operative volume of selected cases, improved provider confidence, and communication between hospitals. The Pediatric Emergency Surgery Course is a locally-driven, validated, clinical education intervention that merits further support and dissemination.

Data Source	Measure	Pre- & Post-PESC	Pre-PESC	Post-PESC	P-value
MRRH & MNRH Admission Books	Neonatal Time to Referral (Days) (Median, SD)	8 (2-304)	30 (3-1460)	5 (2-91)	.024
MRRH & MNRH Admission Books	Age in Years (Median, SD)	.25 (.011-3)	1.7 (.049-5)	.044 (.0082-1.7)	0.004
Kiwoko Referral Book	Neonatal Time to Referral (Days) (Median, SD)	10 (5-30)	22 (7-91)	8.5 (4-23)	0.002
Kiwoko Referral Book	Age in Years (Median, SD)	.1 (.019-4)	1.3 (.057-7)	.066 (.016-2)	< 0.001

Age and Time to Referral

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12-MONTH PROSPECTIVE ANALYSIS OF NEONATAL SURGICAL OUTCOMES IN A LOW-INCOME SETTING: IDENTIFYING AND ADDRESSING MODIFIABLE RISK FACTORS FOR IN-HOSPITAL DEATHS

Thomas M. Diehl, MD¹, Elisée Rwagahirima, MD², Japhet Ntezamizero, MD², Axelle-Aimee Nduwimana, MD², Germaine Mukankuranga², Gisèle Juru Bunogerane, MD², Alain Jules Ndibanje, MD², **Robin T. Petroze, MD, MPH³**, Edmond Ntaganda, MD²

¹*UW Hospitals and Clinics, Madison, WI, USA*, ²*Centre Hospitalier Universitaire de Kigali, Kigali, Kigali, Rwanda*, ³*University of Florida College of Medicine, Gainesville, FL, USA*

Purpose: Vast disparities remain for neonatal surgical outcomes in low-income settings and sepsis is the leading cause of death for surgical neonates worldwide. We implemented a prospective neonatal surgical registry to study infectious outcomes and identify predictors for improved survival.

Methods: All surgical neonates admitted to the main referral hospital were included in a prospective perioperative registry from August 2021-August 2022. Variables included demographics, antimicrobial use, blood culture data, intravenous access, and survival outcomes. Descriptive and univariate analysis were completed using R.

Results: 223 surgical neonates (119 females, 104 males) were admitted. The most common diagnoses were gastroschisis (55.2%, 123/223), intestinal atresia (13.5%, 30/223) and esophageal atresia (10.3%, 23/223). Overall survival was 51.5% (115/223) and mean length of stay was 17.5±13.1 days. Table 1 depicts diagnosis-specific survival, admission antibiotics and antimicrobial resistance patterns. 95.5% of patients received antibiotics on arrival. The most common antibiotic regimens were ampicillin+gentamycin (58.7%, 131/223) and ampicillin+cefotaxime (20.2%, 45/223), which is in-line with national guidelines. Blood cultures were obtained in 135 patients, of which 52 (38.5%) resulted positive (excluding CoNS). Availability of routine blood culture data demonstrated a trend toward improved survival (58% vs. 46%, p=0.055), but did not reach statistical significance. Predictors of survival included birth weight (2.54kg vs. 2.21kg, p< 0.001), time to operation (5.6 vs. 8.2 days, p=0.013), and peripheral IVs (PIVs) inserted per week (5.5 vs. 6.1, p< 0.001). The total number of new PIVs was also associated with culture proven sepsis (11.8 vs. 19.8, p< 0.001).

Conclusion: Severe resistance to empiric antimicrobials, delays to the operating room, and lack of durable intravenous access contribute to perioperative mortality for surgical neonates at a Rwandan referral center. Future studies will elucidate the impact of newly developed protocols for sepsis prevention and low-cost midline catheter use on neonatal survival outcomes.

Diagnosis	Proportion	Survival (%)
Gastroschisis	55.2%, (123/223)	39%
Intestinal atresia	13.5% (30/223)	67%
Esophageal atresia	10.3% (23/223)	48%
Hirschsprung disease	6.3% (14/223)	79%
Anorectal malformation	4.5% (10/223)	90%
Malrotation	3.1 (7/223)	86%
Pyloric stenosis	1.8% (4/223)	100%
Inguinal hernia	0.9% (2/223)	100%
Intestinal obstruction NOS ^a	0.9% (2/223)	50%
Other ^b	3.6% (8/223)	88%
Antibiotics on Arrival	Proportion	Survival (%)
None	4.5% (10/223)	80%
Ampicillin + Gentamicin	58.7% (131/223)	47%
Ampicillin + Cefotaxime	20.2% (45/223)	44%
Cefotaxime + Metronidazole	5.8% (13/223)	77%
Ampicillin + Cefotaxime + Metronidazole	3.1% (7/223)	86%
Blood Culture Pathogens	Proportion	Resistance (%)
Klebsiella	14.1% (19/135)	Cefotaxime – 79.0% Gentamicin - 52.6% Zosyn – 52.6%
Staph Aureus	7.4% (10/135)	Penicillin/Ampicillin - 50% Clindamycin – 50%

		Oxacillin – 30%
E. Coli	3.7% (5/135)	Gentamicin – 100%
		Cefotaxime – 80%
Acinetobacter	3.7% (5/135)	Imipenem – 80%
		Gentamicin – 60%
		Cefotaxime – 40%
Candida ^c	5.2% (7/135)	NA
Coagulase-negative staphylococcus ^c	37% (50/135)	NA

^aNOS = *not otherwise specified*

^b*Other diagnoses included neck mass, necrotizing enterocolitis, peritonitis NOS, sacrococcygeal teratoma, choanal atresia, bladder exstrophy.*

^c*Antimicrobial sensitivity testing was not performed on fungal- or CoNS-positive blood cultures*

Table 1. Diagnosis-Specific Survival, Antibiotics on Arrival and Antimicrobial Resistance Patterns.

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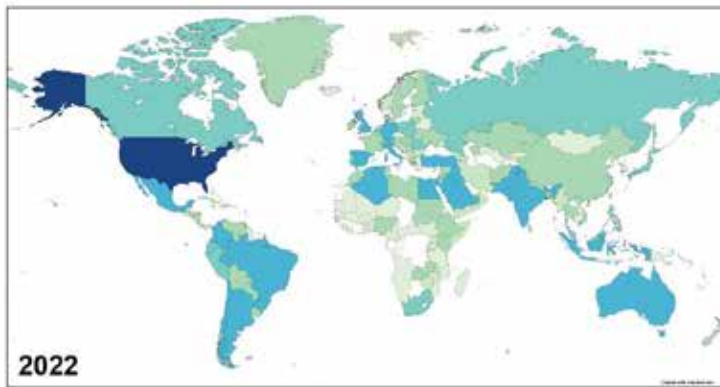
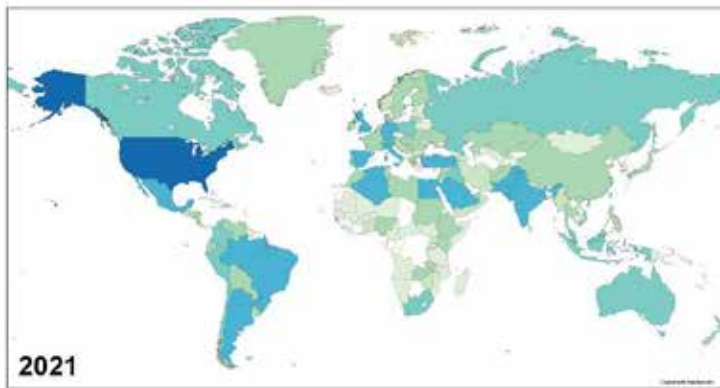
THE GLOBAL REACH OF A FREE PEDIATRIC SURGERY EDUCATION INITIATIVE**Ellen M. Encisco, MD¹**, Cecilia Gigena, MD², Kiersten P. Miller, BA³, Todd Ponsky, MD⁴¹*Cincinnati Children's Hospital Medical Center, Akron Children's Hospital, Wadsworth, OH, USA,*²*Cincinnati Children's Hospital Medical Center, Cincinnati, OH, Cincinnati, OH, USA,*³*Bambino Gesù' Children's Hospital, Roma, Lazio, Italy,* ⁴*Cincinnati Children's Hospital Medical Center, Pepper Pike, OH, USA*

Background: In healthcare, societies and journals are regional and so is exposure to new publications or guidelines. The prohibitive cost of journal subscriptions and society memberships has led to geographic disparities in access to newly published studies and guidelines. Information technology, including resource libraries and virtual conferences, has been seen as a way to bridge the gap in medical education. To broaden the availability of pediatric surgical knowledge, we summarize the key points from major publications in the form of video, audio, and text-based infographics and disseminate them to the world for free through our mobile application and online. Here, we sought to evaluate the global reach of the platform over the last three and a half years.

Methods: Geographic user data from the application, viewership data from YouTube, and listenership data from SoundCloud from January 2019 to June 2022 were obtained and analyzed.

Results: The application was introduced in 2018 and has grown from approximately 2,500 users across 119 countries in 2019 to nearly 8,000 users across 158 countries, representing over 220% growth over the 3.5 year period (figure 1). The platform's YouTube channel grew from 1,300 total views across 6 countries in 2019 to nearly 45,000 total views across over 58 countries in the first 6 months of 2022, representing a 34-fold increase in yearly viewership over the 3.5 years. Our podcast saw more modest growth in the same time period, from approximately 51,000 total listens in 2019 to 77,000 total listens in the first six months of 2022, representing 51% growth and representation from at least 73 countries.

Conclusion: Our platform, which incorporates educational content distribution across a mobile application, audio streaming platforms, and YouTube, has allowed for dissemination of educational pediatric surgical content across the globe.



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Saturday, May 13, 2023

Scientific Session VII: Fetal

7:30 AM – 8:45 AM

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PHYSIOLOGIC AND HISTOLOGIC OUTCOMES OF PROLONGED PARTIAL LIQUID VENTILATION IN PUMPLESS EXTRACORPOREAL MEMBRANE OXYGENATION-SUPPORTED CDH MODEL LAMBS

Alicia L. Eubanks, MD¹, Emily C. Hodgson, MDCM¹, Samantha A. Tilden¹, Jeffrey Dicker, MS¹, Mia E. Kwechin¹, Nicholas A. Wachowski¹, Travis Kotzur¹, Abby C. Larson, MD², Jonathan Chang, MD, MS³, Christopher G. Halline¹, Ash E. Spina¹, Gabriela Daszewska-Smith, MS⁴, William W. Fox, MD⁵, Emily A. Partridge, MD, PhD¹

¹Children's Hospital of Philadelphia, Philadelphia, PA, USA, ²Brigham and Women's Hospital, Boston, MA, USA, ³University of Connecticut Department of General Surgery, Farmington, CT, USA, ⁴Children's Hospital of Philadelphia, Philadelphia, PA, USA, ⁵Perelman School of Medicine at The University of Pennsylvania, Narberth, PA, USA

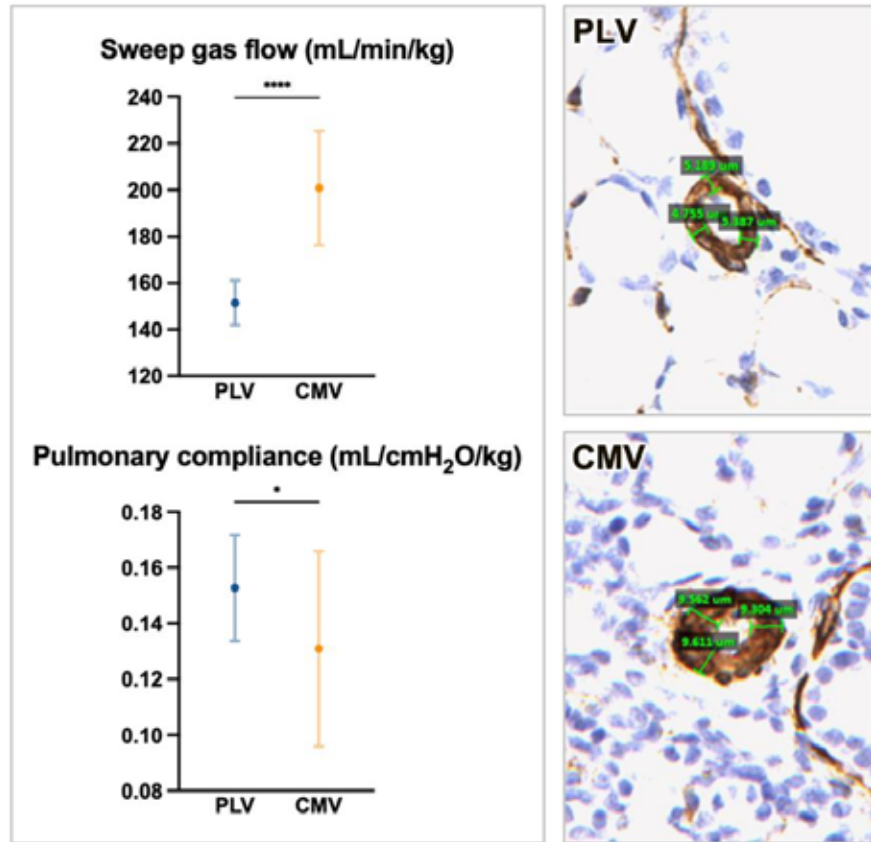
Purpose: Pumpless Extracorporeal Membrane Oxygenation (P-ECMO) efficiently supports congenital diaphragmatic hernia (CDH) model lambs for up to 21 days, but does not address underlying pulmonary pathology. This study aims to evaluate the impact of perfluorocarbon partial liquid ventilation (PLV) in CDH lambs maintained on P-ECMO, compared with conventional mechanical ventilation (CMV).

Methods: Fetal diaphragm defects were surgically created at 66-80 days gestation. Near term (130-145 days gestation), lambs were delivered, cannulated to P-ECMO, intubated and stabilized on CMV for 24 hours. PLV was then initiated with 10 mL/kg of perfluorocarbons instilled endotracheally, followed by 2 mL/kg every 4h. Hemodynamics and lung function were monitored continuously, with blood gases every 6-12 hours. After 21 days of treatment, lungs were collected, formalin fixed, and processed into H&E and aSMA-stained slides for alveolar and vascular morphometry. Physiologic and histologic outcomes were compared between groups using independent t-test with a significance threshold of $p < 0.05$.

Results: Five lambs were treated per cohort. No significant PLV-related adverse events occurred through 2,448 hours of treatment. PLV was associated with increased pulmonary compliance (+16.8% change, $p=0.015$), arterial oxygen saturation (90.7% vs 89.3%, $p=0.011$) and pH (7.400 vs 7.378, $p=0.024$). We observed a 24% reduction ($p < 0.001$) in sweep gas required to maintain target pCO₂. Histologically, PLV lambs showed significantly reduced severity of characteristic CDH features including reductions in pulmonary arteriolar medial wall thickness ($p=0.023$), alveolar septal wall thickness ($p=0.028$) and alveolar septal volume density ($p=0.038$).

Conclusion: Partial liquid ventilation in CDH lambs significantly improved pulmonary compliance

and histologic markers of disease, while reducing dependence on ECMO for gas exchange. This therapy may therefore shorten ECMO duration, treat pulmonary hypoplasia, and ultimately improve outcomes in CDH.



Left pane: Sweep gas flow and pulmonary compliance for Pumpless ECMO-supported CDH model lambs treated with partial liquid ventilation (PLV) versus conventional mechanical ventilation (CMV) for 21 days. Dot and whiskers represent mean and standard deviation, respectively. P-values determined by independent t-testing. **Right panes:** Representative measurements of pulmonary arteriolar medial wall thickness of formalin-fixed, paraffin-embedded peripheral lung tissue from CDH model lambs treated with PLV and CMV for 21 days. Immunohistochemical staining for α SMA highlights vessel medial layer (brown).

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A PUMPLESS PEDIATRIC ARTIFICIAL LUNG MAINTAINS FUNCTION FOR 72 HOURS WITHOUT SYSTEMIC ANTICOAGULATION USING THE NITRIC OXIDE SURFACE ANTICOAGULATION SYSTEM

Brianna L. Spencer, MD¹, Matthew Johnson², Spencer K. Wilhelm, MD¹, Orsolya Lautner-Csorba², Hannah Matich, BS¹, Gergely Lautner², Brian P. Fallon, MD³, Leah Gudex, BS¹, Tyler Dann, BS¹, Mark Meyerhoff, PhD¹, Joseph Potkay, PhD¹, Robert Bartlett², Alvaro Rojas-Pena², Ronald B. Hirschl, MD¹

¹University of Michigan, Ann Arbor, MI, USA, ²Extracorporeal Life Support Lab, Department of Surgery, Michigan Medicine, ³Extracorporeal Life Support Laboratory, Department of Surgery, Michigan Medicine

Purpose: Children with end stage lung disease are commonly managed with extracorporeal life support (ECLS) as a bridge to lung transplantation. A pumpless artificial lung (MLung) is a portable alternative to ECLS. It allows for ambulation, which aids in recovery and reduces morbidity. Unfortunately, both ECLS and pumpless artificial lungs require systemic anticoagulation which is associated with hemorrhagic complications. In the present work, we tested the MLung with a novel Nitric Oxide (NO) Surface Anticoagulation (NOSA) system, which mimics endothelial NO release, in providing local anticoagulation for 72 hours of support in a pediatric-size ovine model.

Methods: Four mini-sheep (14.5-19 kg) underwent thoracotomy and cannulation of the pulmonary artery (inflow) and left atrium (outflow), recovered, and monitored for 72hr. Heparin 100 U/kg was given only once just prior to cannulation. The circuit tubing and connectors were coated with the combination of an NO donor (diazoniumdiolated dibutylhexanediamine; DBHD-N2O2) and argatroban. The animals were connected to the MLung (surface area 0.37m², rated flow=2.75L/min) and 100 ppm of NO was added to the sweep gas. Systemic hemodynamics, blood chemistry, blood gases, and methemoglobin were collected.

Results: Mean device flow was 825±145 mL/min (32.9±1% of cardiac output). Device outlet saturation was 97.3±4.2%. Pressure drop across the lung was 3.7±2.0 mmHg and resistance was 4.6±4.1mmHg/L/min. Activated clotting time averaged 168±30s. Methemoglobin was 2.7±1.0%. Platelets declined from 590±87.6 at baseline to 107±49.9 at 72 hours. NO flux (x10⁻¹⁰ mol/min/cm²) of the NOSA circuit averaged 2.8±0.6 (before study) and 1.9±0.1(at 72 hours) which is consistent with human vascular endothelial release of 0.5-4 flux units, and across the MLung 18±3 NO flux was delivered.

Conclusion: The MLung is a more portable form of ECLS that demonstrates effective gas exchange for 72 hours without hemodynamic changes. Additionally, the NOSA system successfully maintained local anticoagulation without evidence of systemic effects.

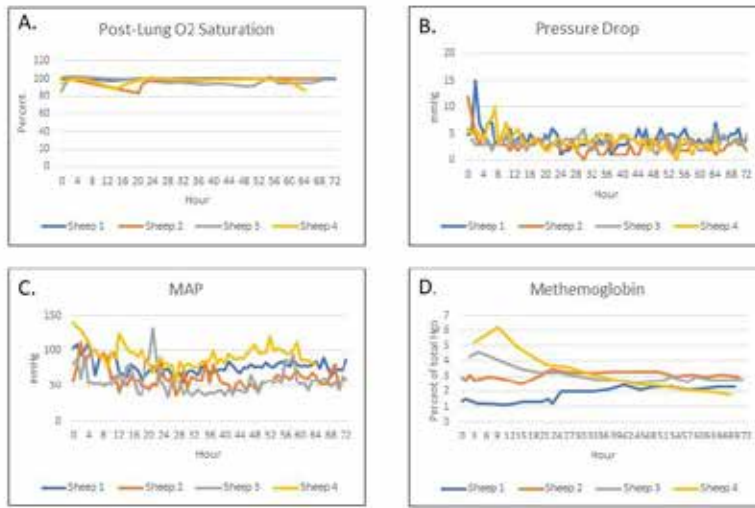


Figure 1. A. Post lung oxygen saturation, B. Pressure drop, C. Mean arterial pressure (MAP), D. Methemoglobin

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TRANSAMNIOTIC DELIVERY OF SURFACTANT PROTEIN B (SPB) MRNA: A POTENTIAL NOVEL STRATEGY FOR THE PERINATAL MANAGEMENT OF CONGENITAL SPB DEFICIENCIES AND SURFACTANT REPLACEMENT THERAPY

Kamila Moskowitsova, MD¹, Abbie E. Naus, MD¹, Tanya T. Dang², David Zurakowski, MS, PhD³, Dario O. Fauza, MD, PhD⁴

¹*Boston Children's Hospital, Harvard Medical School, Boston, MA, USA*, ²*Boston Children's Hospital, Boston, MA, USA*, ³*Boston Children's Hospital, Department of Anesthesia, Critical Care, and Pain Medicine Research, Boston, MA, USA*, ⁴*Boston Children's Hospital, Department of Surgery, Boston, MA, USA*

Purpose: Surfactant protein B (SPB) plays a central role in surfactant production, stability and function. Congenital diseases such as SPB deficiency and pulmonary alveolar proteinosis involve absence of SPB and are associated with very high mortality. In preterm infants, surfactant deficiency leads to respiratory distress and significant morbidity/mortality. It has been previously shown that the transamniotic route can be an effective method of delivering exogenous mRNA to the fetus. We sought to determine whether exogenous SPB mRNA could be incorporated and translated by the fetal lung after transamniotic administration.

Methods: Twelve time-dated pregnant Sprague Dawley dams underwent laparotomy followed by volume-matched intra-amniotic injections in all fetuses (n=149) of either human SPB (hSPB) mRNA encapsulated into lipopolyplex (mRNA, n=99), or of lipopolyplex without mRNA (control; n=50), on gestational day 17 (E17, term=E21-22). Fetal lung and amniotic fluid samples were procured daily thereafter until term. Lungs were screened for hSPB production by ELISA. Phosphatidylcholine (a surrogate for overall pulmonary surfactant production) levels were measured in the amniotic fluid by fluorometric assay. Statistical analysis was by nonparametric Wilcoxon rank sum test and generalized estimated equations regression.

Results: Significantly improved survival in the mRNA group compared to controls was observed at E18 (100% vs. 85.7%) and E20 (100% vs. 83.3%) (both p < 0.001). When controlled by mRNA-free injections, hSPB protein was detected in the mRNA group's lungs at E18, 19, and term (p=0.002 to < 0.001, Figure). Amniotic fluid phosphatidylcholine levels were increased compared to control at term [285.9 (251.1, 363.9) μM vs. 263.1 (222.8, 309.1) μM; Figure], however this did not reach significance in this series (p=0.33).

Conclusions: Encapsulated exogenous mRNA encoding for surfactant protein B can be incorporated and translated by fetal lung cells following simple intra-amniotic injection in a healthy rat model. Transamniotic mRNA delivery could become a novel strategy for perinatal surfactant protein replacement.

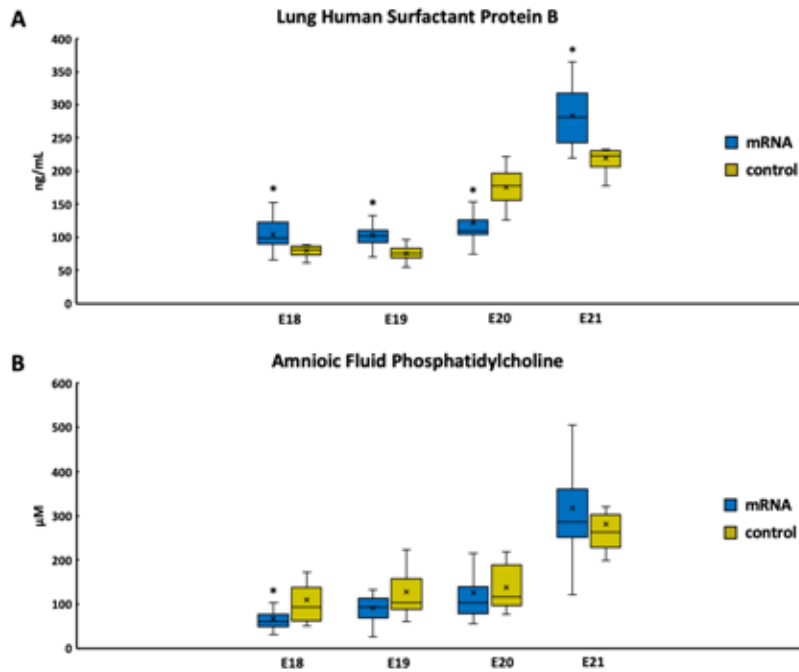


Figure. (A) Human surfactant protein B levels in rat fetal lungs at E18-E21 for the mRNA and control groups. **(B)** Phosphatidylcholine levels in rat amniotic fluid at E18-E21 for the mRNA and control groups. Data presented as median (interquartile range), * $p < 0.05$ vs. control, E = gestational day

SEVERITY MISCLASSIFICATION IN PRENATALLY DIAGNOSED CONGENITAL DIAPHRAGMATIC HERNIA: HOW OFTEN ARE WE WRONG?

Lawrence Willis, MD¹, Ashley Ebanks², Matthew T. Harting, MD, MS, FAAP, FACS³, Tim Jancelewicz, MD, MA, MS⁴

¹University of Tennessee Health Science Center, Le Bonheur Children's Hospital, Memphis, TN, USA, ²University of Texas Health Sciences Center at Houston, ³McGovern Medical School at UTHealth, Houston, TX, USA, ⁴Le Bonheur Children's Hospital, University of Tennessee Health Science Center, Memphis, TN, USA

Purpose: Prenatal risk stratification in CDH is used to counsel families and select patients for fetal intervention, but such prediction has been shown to have poor accuracy for certain subgroups. We hypothesized that use of O/E LHR to risk stratify patients results in an unacceptably high frequency of severity misclassification.

Methods: Using the CDHSG registry (2015-2021), first O/E LHR values were used to divide left CDH patients into mild, moderate, and severe prenatal groups using established thresholds. A previously derived prediction model incorporating early postnatal clinical variables that accurately estimates the probability of death or ECLS was used to stratify patients into postnatal severity groups. Correlation between prenatal and postnatal groups was then assessed to demonstrate the frequency of misclassification. Logistic regression was used to identify modifiers of accuracy.

Results: After appropriate exclusions, there were 495 patients with an O/E LHR. Correlation between prenatal and postnatal severity is shown in Figure 1. While there was some agreement between prenatal and postnatal risk classification, just 27.5% of patients in the prenatally severe and mild groups had the predicted/corresponding postnatal clinical course. Of 69 prenatally severe patients, 9(13%) had a mild postnatal phenotype (< 20% probability of death/ECLS) and 41(59%) had a moderate phenotype (20-80% probability of death/ECLS); 11(6%) of prenatally mild patients had a severe postnatal phenotype (>80% probability of death/ECLS) and 121(66.5%) had a moderate phenotype. Significant modifiers of O/E LHR predictive accuracy included presence of a hernia sac as well as center volume and ultrasound experience.

Conclusions: Prenatal risk stratification using O/E LHR misclassifies ~1 out of every 10 cases of prenatally severe CDH, with this subgroup having the opposite of the predicted clinical course. These data may inform prenatal counseling and selection for prenatal intervention or experimental therapies. Multiple data points improves accuracy of risk prediction in CDH.

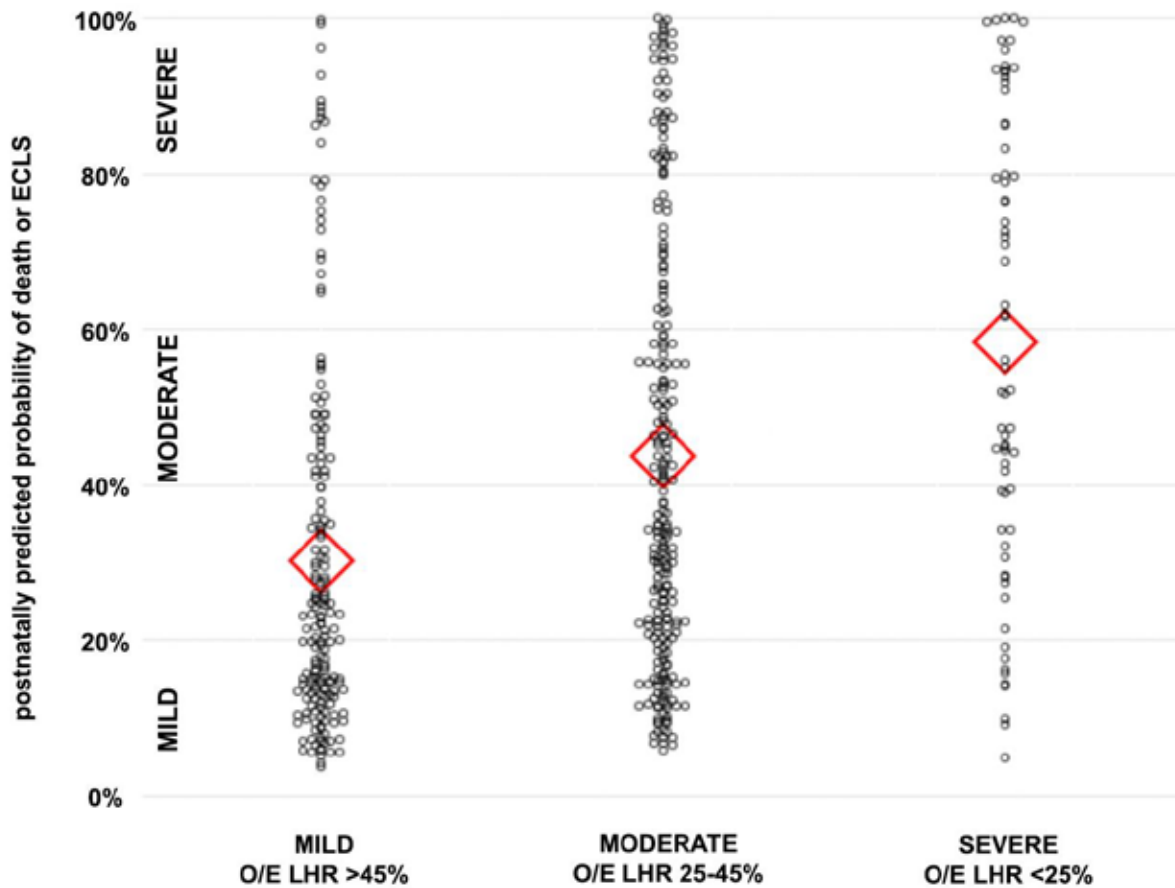


Figure 1. Mild, moderate, and severe left CDH patients subdivided using observed/expected lung-to-head ratios (O/E LHR), plotted against postnatally predicted probability of death or use of ECLS calculated using a prediction model consisting of early postnatal clinical variables. While there is concordance, some patients prenatally categorized as severe or mild have the opposite phenotype postnatally. Diamond shape is mean probability of death or ECLS for each group.

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FUNCTIONAL AND MOLECULAR SEXUAL DIMORPHISM IN CONGENITAL DIAPHRAGMATIC HERNIA

Oluyinka O. Olutoye, MD, MPH¹, JD Hammond, MD², Jamie Gilley³, Walker D. Short, MD¹, Hui Li, PhD¹, Sandra Grimm, PhD⁴, Christian Coarfa, PhD⁵, Jason Gleghorn, PhD⁶, Krithika Lingappan, MD, MS, PhD⁷, Sundeep G. Keswani, MD¹

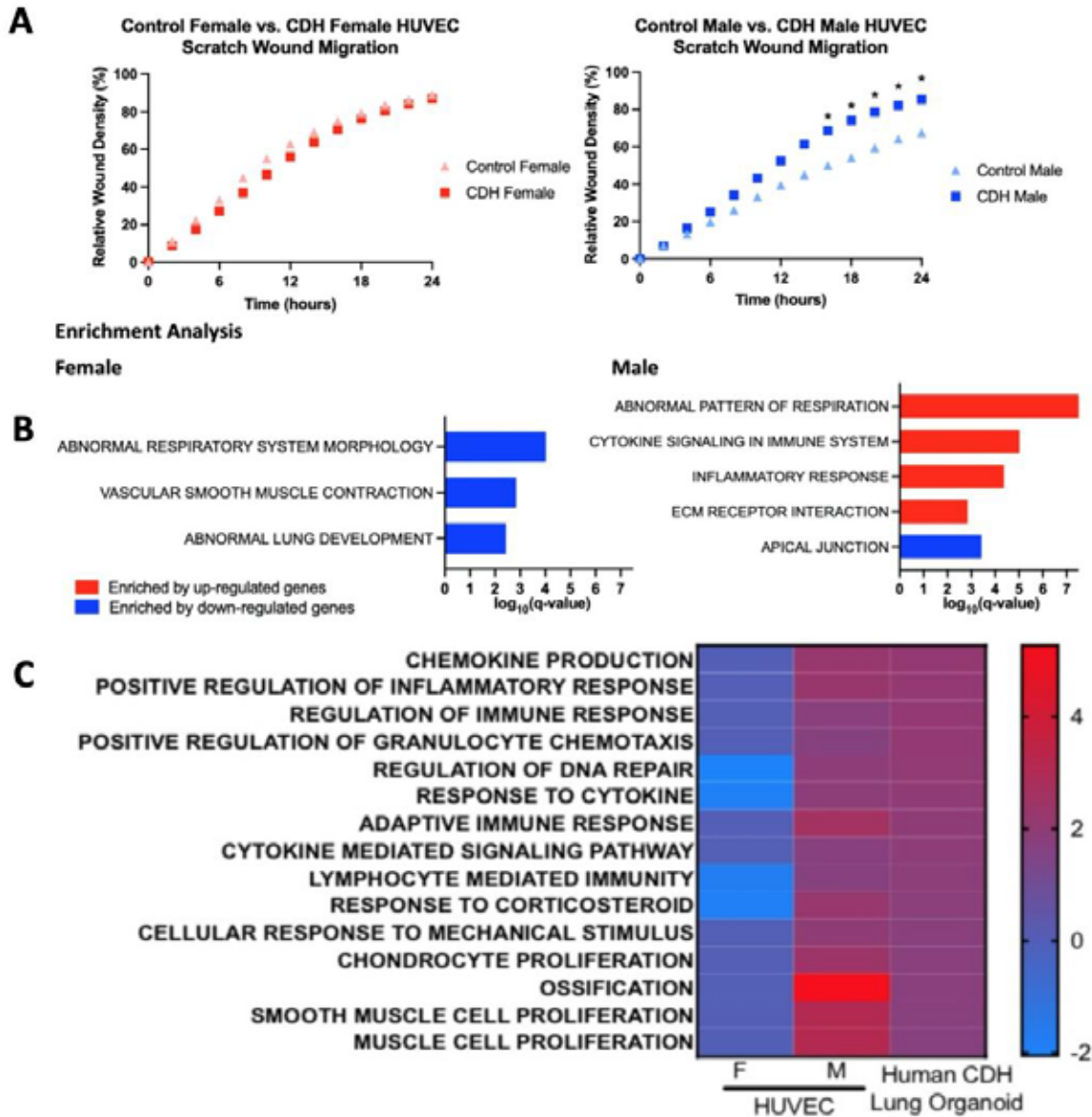
¹Baylor College of Medicine/Texas Children's Hospital, Houston, TX, USA, ²Texas Children's Hospital & Baylor College of Medicine, Houston, TX, USA, ³Baylor College of Medicine, ⁴Baylor College of Medicine, Houston, TX, USA, ⁵Baylor, Houston, TX, USA, ⁶University of Delaware, Newark, DE, USA, ⁷Children's Hospital of Philadelphia, Houston, TX, USA

Purpose: Pulmonary hypertension (PH) is a major source of morbidity in congenital diaphragmatic hernia (CDH). Sex-based differences have been described in other neonatal diseases, and we have discovered sex-based differences, clinically, in our CDH population. The goal of this study is to understand sex-based differences in CDH at a functional and molecular level using a novel human umbilical vein endothelial cell (HUVEC) model.

Methods: HUVECs were harvested from CDH and control patients. Proliferation, migration, and angiogenesis assays were performed in 18 CDH and 6 control HUVECs. RNA sequencing with gene expression and pathway analysis was performed and compared to a publicly available lung organoid database. Spatial transcriptomics of human CDH specimens is used to validate the HUVEC transcriptome.

Results: Male CDH HUVECs demonstrated increased proliferation ($p=0.02$), migration ($p<0.05$), and branching ($p=0.02$) compared to male controls. There was no significant difference in the functional phenotype of female CDH and female control HUVECs. RNA sequencing of CDH compared to control HUVECs demonstrated unique differentially regulated genes between sexes (259 in males and 303 in females, with only 7 overlapping). Twenty-one differentially expressed genes were linked to the X or Y chromosome. MiRNA changes and pathway enrichment were consistent with the inflammatory and fibrotic endothelial CDH-PH phenotype. Male CDH HUVECs demonstrated upregulation of key pathways associated with endothelial dysfunction, as also seen in CDH lung organoids.

Conclusion: HUVECs from CDH patients have an endothelial phenotype that is different from controls and similar to what would be found in the CDH pulmonary vasculature. CDH males exhibited more fibrotic, pro-PH characteristics compared to their controls, which was not observed in female HUVECs. HUVECS may serve as an ideal human representative model to study sex-based differences in CDH-PH. Further investigation of CDH-PH, using HUVECs, may lead to the development of precision medicine for CDH.



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FUNCTIONAL ACTIVITY OF SPINAL CORD ORGANOIDS GENERATED FROM HUMAN AMNIOTIC FLUID STEM CELLS: A NOVEL APPROACH FOR DISEASE MODELING AND AUTOLOGOUS THERAPY IN MYELOMENINGOCELE

Juan C. Biancotti, PhD¹, Shelby R. Sferra, MD, MPH¹, Annalise B. Penikis, MD¹, Jena L. Miller, MD¹, Shaun Kunisaki, MD²

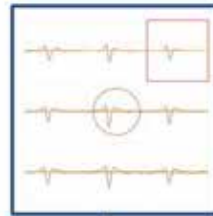
¹Johns Hopkins University, Baltimore, MD, USA, ²Johns Hopkins University School of Medicine, Baltimore, MD, USA

Purpose: Current neurological outcomes after fetal myelomeningocele (MMC) continue to be suboptimal. This study sought to generate functional human dorsal spinal cord organoids (SCOs) from amniotic fluid-derived induced pluripotent stem cells (iPSCs).

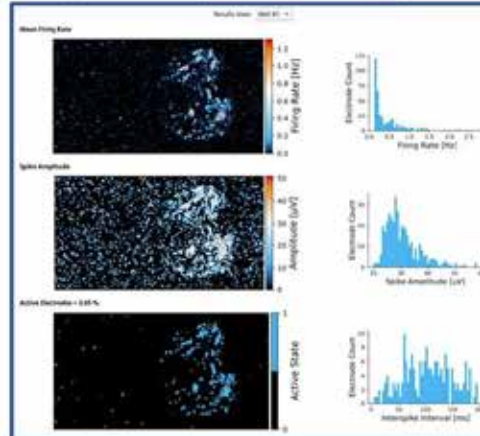
Methods: After IRB approval, second trimester human amniotic fluid samples (n=3) from normal (control) and MMC fetuses were reprogrammed by integrating methods into iPSCs. The stem cells were subsequently differentiated into 3D SCOs based on a modified Takahashi protocol with BMP4 and bFGF. SCOs were extensively characterized by quantitative gene expression and confocal microscopy at serial time points prior to functional testing at d45 using microelectrode arrays (Maxwell Biosystems).

Results: SCOs expressed multiple neural cell types, including neuroectoderm (SOX1, PAX6), roof plate (Lmx1a), dorsal (Olig3, PAX7), and ventral (Olig2) spinal cord progenitor phenotypes by d15. Dorsal morphogens induced the formation of dorsal interneurons (Brn3a, Lbx1), motoneurons (Lhx3/Islet2), oligodendrocyte progenitors (NG2), and astrocytes (GFAP). MMC cell lines had significantly fewer neuroectodermal cells than controls at d9 ($p < 0.05$), and progenitors/neurons were more restricted to the dorsal spinal cord at d24. In all cases, dorsal SCOs were generated by 12 wks after amniotic fluid procurement. Both MMC and control SCOs showed spontaneous electric activity as detected by microelectrode arrays (Figure). The specific firing rate reached maximum of 1.5 Hz, with amplitudes as high as 55 μ V, indicating neuronal activity. Network assay showed numerous burst peaks with a mean of 142.37 spikes per burst, suggesting connection between functional neurons.

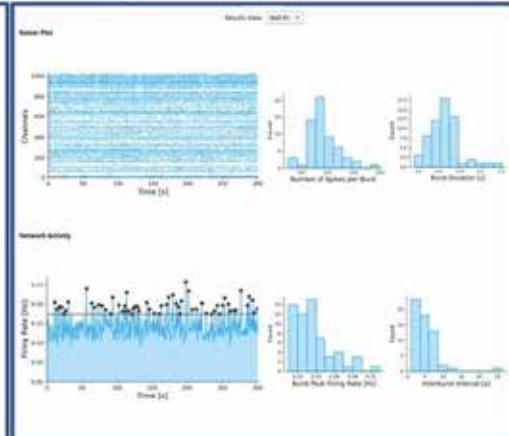
Conclusion: For the first time, this study demonstrates that human dorsal SCOs with functional electrical activity can be generated from MMC fetuses. Autologous SCOs may have potential use for enhancing spinal cord regeneration after fetal and neonatal MMC repair. This novel approach also provides a unique, patient-specific in vitro platform to study MMC spinal cord development and disease pathogenesis.



Activity Scan Assay



Network Assay



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TRANSCRIPTOMICS AND MOUSE MODELING OF SACROCOCCYGEAL TERATOMAS

Ernesto J. Rojas, B.S.¹, Maria Clarke, B.S.¹, Steven Cincotta, PhD¹, Lan Vu, MD², Soo-Jin Cho, MD, PhD¹, Stephan Sanders, BMBS, PhD¹, Diana Laird, PhD¹, Tippi Mackenzie¹

¹UCSF, San Francisco, CA, USA, ²University of California San Francisco, San Francisco, CA, USA

Purpose: Sacrococcygeal teratomas (SCTs) are the most common tumor in newborns but their cellular and molecular identities are poorly understood. SCTs may originate from gamete-precursors known as primordial germ cells (PGCs) that fail to migrate to the nascent gonad, leaving them in ectopic locations, including the sacrum. We seek to understand their molecular origins through next generation sequencing and in utero transplantation experiments.

Methods: We performed whole-genome sequencing and bulk RNA-sequencing of 7 banked SCT specimens and matched uninvolved skin from each patient. We performed single cell RNA sequencing (scRNA-seq) of fresh SCT tissues to better understand their heterogeneous cell type composition. We developed an in utero transplant model to inject PGCs into the sacrum of mouse embryos to model the growth of SCTs.

Results: SCT sequencing revealed few high confidence somatic mutations, no recurrent somatic mutations, and no evidence of chromosome amplifications unique to SCT tissue in any patient. ScRNA-seq demonstrated discrete populations of fibroblasts, macrophages, T-lymphocytes, and endothelial cells, with an overrepresentation of several ligand-receptor pairs, including those involved in EGF signaling (Fig 1 A-C), which has been implicated in PGC maintenance. Our in utero model revealed excellent survival of PGCs transplanted to the sacrum of E13.5 mouse embryos, with continued expression of pluripotency marker, OCT4 (Fig 1 D,E).

Conclusions: The surprising lack of somatic mutations in SCTs (compared to adult germ cell tumors) suggests epigenetic events as the main tumor initiator, a hypothesis we will explore further using ATAC-sequencing of fresh tumors and our fetal model. The specific ligand/receptor interactions we found in the scRNA-seq dataset can also be modulated to study the tumorigenic potential of in utero transplanted PGCs. Improved understanding of the molecular underpinnings of SCTs can lead to improved therapies in patients with rapidly growing fetal tumors and for predicting recurrences.

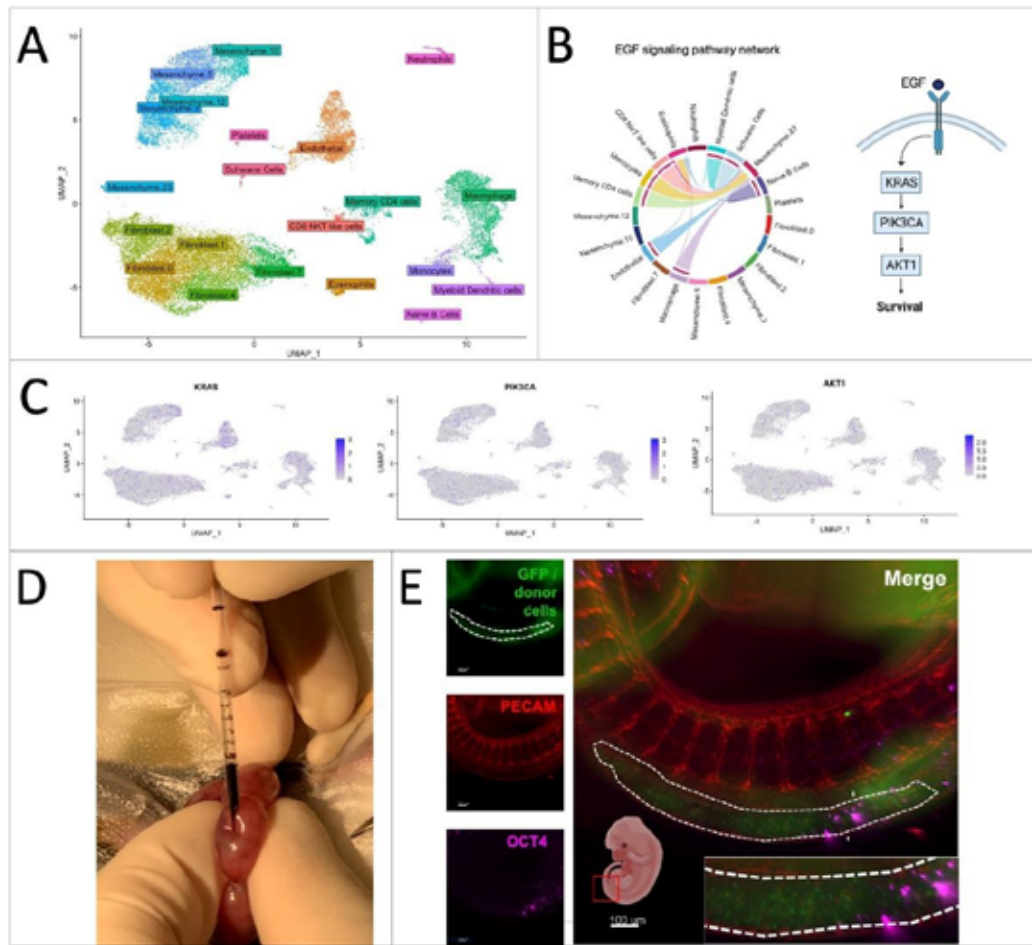


Figure 1. Transcriptomics and mouse injection model of SCTs. (A) UMAP projection of 22,000 cells from one SCT (analyzed by R package, scType). (B) CellChat chord diagram and signaling diagram of epidermal growth factor (EGF) across cell types in the SCT. (C) FeaturePlots of the key pathway genes from EGF signaling: KRAS, PI3K, & AKT, as represented in diagram on B. (D) Microsurgery technique used to inject embryos at embryonic day E13.5. (E) Wholemount imaging 24 hours after mouse GFP+ primordial germ cell (PGC) injection to sacrum [red box]. Antibodies used to image GFP+ cells [green], somatic vasculature [red], endogenous OCT4 expression [purple].

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**FETAL GENE EDITING EVADES MATERNAL T CELL IMMUNITY TO CAS9
ENDONUCLEASE**

John S. Riley, MD MS¹, Valerie L. Luks², Cara L. Berkowitz, MD³, Apeksha Dave, MD⁴, Philip Zoltick, MD⁴, William H. Peranteau, MD¹

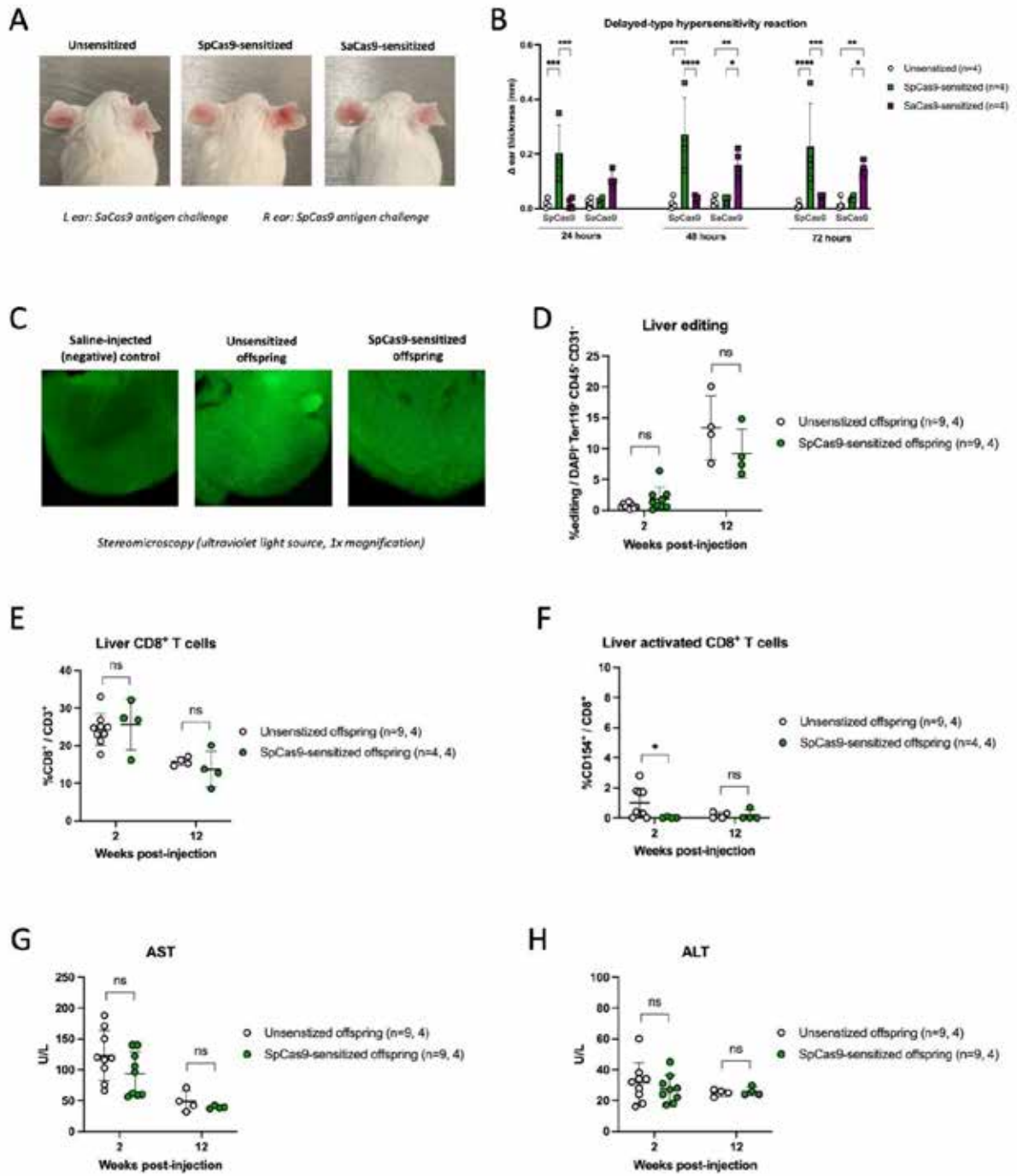
¹Children's Hospital of Philadelphia, Philadelphia, PA, USA, ²University of Pennsylvania Health System, Philadelphia, PA, USA, ³Children's Hospital of Philadelphia, ⁴Center for Fetal Research, Children's Hospital of Philadelphia, Philadelphia, PA, USA

Introduction: In utero gene editing is an experimental treatment for prenatally-diagnosed monogenic diseases including metabolic liver diseases. In mouse models of postnatal gene editing, pre-existing T cell immunity to Cas9 endonuclease causes cytotoxic T cell-mediated loss of edited hepatocytes. We tested what effect pre-existing maternal Cas9 T cell immunity has on fetuses administered CRISPR/Cas9 gene editing technology.

Methods: The ROSA26^{mTmG} mouse harbors a constitutively-expressed red fluorescent protein (mT) flanked by loxP sites. Successful cleavage at the loxP sites results in constitutive expression of green fluorescent protein (mG) quantifiable by flow cytometry. We designed an AAV9 to deliver *Streptococcus pyogenes* Cas9 (SpCas9) and a single guide RNA targeting the loxP sites (AAV9.SpCas9.sgloxP). Female mice were sensitized by intramuscular injection of SpCas9 with saponin adjuvant and assessed for T cell immunity by cutaneous delayed-type hypersensitivity reaction. Similar to a PPD skin test for tuberculosis, Cas9 antigen is injected intradermally into the ear, and subsequent swelling/erythema confirms antigen-specific T cell immunity. Fetuses carried by SpCas9-sensitized and unsensitized pregnant mice were injected with AAV9.SpCas9.sgloxP on gestational day 16. Liver editing, cytotoxic T cell infiltration, and serum transaminase levels were compared among the groups 2 and 12 weeks post-injection.

Results: Sensitization to SpCas9 resulted in Cas9 subtype-specific ear swelling/erythema consistent with T cell immunity (Figure 1A, B). Despite this, fetuses carried by SpCas9-sensitized dams demonstrated long-term hepatocyte gene editing (Figure 1C, D). The prevalence of cytotoxic T cells (Figure 1E) including activated cells (Figure 1F) in the liver was equal between the groups, with no maternal-derived (mT-H2kb-) T cells detected. Furthermore, no transaminitis indicative of hepatocyte injury was observed (Figure 1G, H).

Conclusion: Fetal gene editing sustains long-term hepatocyte editing despite maternal T cell immunity to Cas9. Maternal Cas9 T cell immunity does not exclude the fetus as a gene editing candidate in this model.



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FETOSCOPIC MYELOMENINGOCELE REPAIR IS ASSOCIATED WITH LESS FETAL BRADYCARDIA COMPARED TO OPEN REPAIR

Steven T. Papastefan, MD¹, Amir Alhajjat², Katherine Ott, MD³, Joy Ito, RN, CCRP⁴, Xavier F. Pombar, DO⁵, Erin E. Rowell, MD⁶, Robin M. Bowman, MD⁷, Aimen Shaaban²

¹ Department of Surgery, Northwestern University Feinberg School of Medicine Division of Pediatric Surgery, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, ²Center for Fetal Cellular and Molecular Therapy, Ann and Robert H. Lurie Children's Hospital, ³Center for Fetal Cellular and Molecular Therapy, Ann and Robert H. Lurie Children's Hospital, Chicago, IL, USA, ⁴Division of Pediatric Surgery, Ann and Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, ⁵Department of Obstetrics and Gynecology, Rush Medical College, Chicago, IL, USA, ⁶Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, ⁷Division of Pediatric Neurosurgery, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA

Purpose: Fetal bradycardia reflects hypoxia and acidosis and can be a harbinger of poor outcomes during fetal surgery. Fetoscopic myelomeningocele (MMC) repair avoids a large classical hysterotomy and decreases risk for the mother but has a significantly longer operative duration and a prolonged exposure to a deep inhaled anesthetic. As such, we hypothesized that fetal bradycardia would be more common in fetoscopic compared to open MMC repair.

Methods: This study is a single-institution retrospective review of patients undergoing open (n=25) or fetoscopic (n = 22) MMC repair between 2017-2022. Fetal heart rate (FHR) was recorded via continuous echocardiography every 15 minutes beginning just prior to transition to the deep inhaled anesthetic. Statistical analysis was performed using a Student t-test and Mann-Whitney U test.

Results: Operative time was shorter for open compared to fetoscopic repair (163 vs. 334 minutes, $p < 0.001$). Initial FHR and average FHR was similar between the groups (134.9 vs. 135.5, $p = 0.90$; and 131.2 vs. 131.4, $p = 0.95$). However, fetuses undergoing an open MMC repair more frequently developed transient bradycardia (FHR < 110 bpm ; 32% vs. 4.6%, $p = 0.013$) and decelerations defined as > 25 beats per minute decrease from baseline (16% vs. 4%, $p = 0.19$), though the latter did not reach significance. The FHR nadir occurred earlier after open vs. fetoscopic repairs (43.7 vs. 87.0 min, $p = 0.04$) with 51% overall occurring during the fetal repair. Severe bradycardia was rare, with only two bradycardic events (one in each group) necessitating intervention.

Conclusion: Contrary to our hypothesis, fetal bradycardia was less commonly associated with fetoscopic compared to open myelomeningocele repair and did not correlate with the duration of exposure to deep inhaled anesthetics. The lower rates of fetal bradycardia during fetoscopic surgery may reflect other physiologic benefits and future study is needed.

Scientific Session VIII: Neonatal and General

8:45 AM – 10:00 AM

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ACID SUPPRESSION AFTER ESOPHAGEAL ATRESIA REPAIR: SOME INFANTS DO BENEFIT

Suhail Zeineddin, MD, MS¹, Gwyneth A. Sullivan, MD, MS², J. Benjamin Pitt, MD³, Michela Carter, MD⁴, Seth D. Goldstein, MD, MPhil³, Brian C. Gulack, MD, MHS⁵

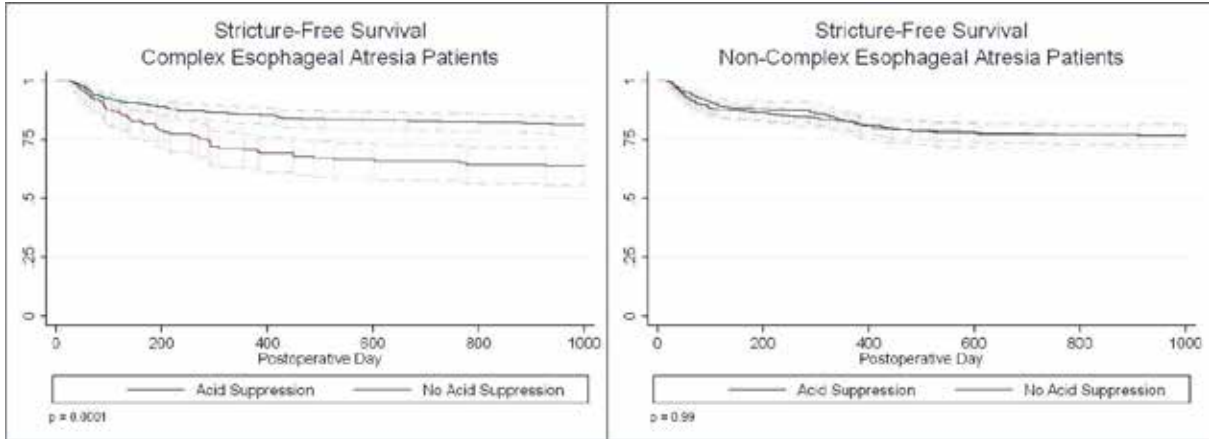
¹Division of Pediatric Surgery, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, ²Division of Pediatric Surgery, Northwestern University Feinberg School of Medicine, Ann & Robert H. Lurie Children's Hospital; Division of Pediatric Surgery, Rush University Medical Center, Chicago, IL, USA, ³Division of Pediatric Surgery, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, ⁴Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, ⁵Rush University Medical Center, Chicago, IL, USA

Purpose: Acid suppression has long been used for anastomotic stricture prophylaxis after esophageal atresia (EA) repair. However, recent studies have questioned the need for postoperative acid suppression. We aimed to compare rates of anastomotic stricture following EA repair among patients who received and did not receive acid suppression.

Methods: We queried the Pediatric health Information System (PHIS) for infants undergoing EA repair within the first 30 days of life between 2010 and 2021. Infants with stricture diagnosis in the index admission were excluded. Acid suppression was defined as receipt of an H2 blocker or proton pump inhibitor on day of discharge or longer than 30 inpatient-days. Complex EA repair was defined as delayed repair (>7 days), prolonged hospitalization (>60 days), or multiple esophageal fluoroscopies. Stricture dilation defined the outcome. Pearson's Chi-Squared and Rank-sum tests were used for analysis.

Results: Of 1,207 infants included from 45 hospitals, 535 (44.3%) met criteria for complex EA and 672 (55.7%) did not. At 1 year postoperatively, stricture dilation was performed in 214 (17.7%), including 98 (18.3%) with complex EA. Acid suppression was given in 813 (67.4%) infants. Median follow-up time was 687 days [IQR 232-1554]. In infants with complex EA, stricture rates were lower among those who received acid suppression compared to those who did not (1-year: 14.2% vs 29.3%, $p < 0.001$). Stricture rate variation was most pronounced among infants with prolonged hospitalization (1-year: 14.1% vs 45%, $p < 0.001$ for acid vs no acid suppression). Rate of stricture was similar in infants with simple EA, with or without acid suppression (1-year: 17.4% vs 17%, $p=0.89$).

Conclusion: In patients with complex EA, those who received postoperative acid suppression had lower stricture rate, particularly those with prolonged hospitalization. Continuing acid suppression in these subgroups is important, even as we reduce antacid treatment in infants with simple EA.



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OUTCOMES OF PRIMARY AND DELAYED SUTURELESS CLOSURE FOR GASTROSCHISIS**Ranjeet S. Kalsi, BS, DO, K. T. Anderson, Charles R. Hong, Stefan Scholz, MD***UPMC Children's Hospital of Pittsburgh, Pittsburgh, PA, USA*

Purpose: Sutureless closure has been adopted for patients with gastroschisis. We sought to evaluate outcomes for immediate (< 24 hours after birth) and delayed sutureless closure (≥ 24 hours after birth) patients using the preserved umbilical cord compared to traditional operative repair with or without patch.

Methods: We included neonates admitted with gastroschisis between 2008-2020 and excluded patients with complex gastroschisis (perforation, atresia, or necrosis at birth) or patients operated upon outside our institution. The primary outcome was days on mechanical ventilation. Secondary outcomes included time to closure, time to initiation of feeds and goal feeds, length of stay, wound infection, duration of central venous catheters (CVC) and total parenteral nutrition (TPN). We used descriptive statistics, t-test for continuous variables, and chi-square test for categorical variables.

Results: We identified 292 patients with gastroschisis, excluded 53 with complex disease, and 31 who were repaired elsewhere. Of the remaining 208 patients, 77 underwent immediate primary closure, 41 had immediate sutureless closure, 58 had delayed primary closure, and 28 had delayed sutureless closure. Between groups, there was no significant difference between gender, gestational age, birthweight, delivery method, or pre- vs. postnatal diagnosis ($p \geq 0.05$). Sutureless closure patients required significantly fewer ventilator days than primarily closed patients in the immediate closure group (1.3 vs. 3.0 days, $p < 0.01$) and in the delayed group (4.5 vs. 12.5, $p < 0.01$). In both immediate and delayed cohorts, sutureless closure patients had a shorter interval to reach goal feeds, fewer CVC and TPN days, shorter hospital stays, and fewer wound infections (Table 1).

Conclusion: Immediate and delayed sutureless closure patients had better outcomes compared to patients with primary surgical repairs. Sutureless closure appears to reduce complications and the use of invasive treatments in neonates with simple gastroschisis.

	Primary Closure (n=77)	Sutureless Closure (n=41)	p-value	Delayed Primary Closure (n=58)	Delayed Sutureless Closure (n=28)	p-value
Age (weeks)	36.33	36.54	0.6	35.87	36.57	0.07
Total Ventilator Days	3.03	1.28	0.01	12.53	4.48	< 0.01
Time to Goal Feeds (days)	24.07	17	0.04	36.38	25.35	0.04
Days on TPN	31.75	25.49	0.06	51.09	38.65	0.02
Duration of CVC (days)	41.65	28.21	0	58.47	44.58	0.02
Length of Hospital Stay (days)	41.61	38.63	0.49	66.93	50.65	0.01
Wound Infections, n (%)	7 (9.1)	1 (2.4)	0.13	25 (43.1)	2 (7.1)	< 0.01

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THE SHORT CHAIN FATTY ACID BUTYRATE AMELIORATES NECROTIZING ENTEROCOLITIS AND INHIBITS EXAGGERATED BACTERIAL SIGNALING IN THE PREMATURE INTESTINE OF MICE AND HUMANS

Andres J. Gonzalez Salazar, MD¹, Carla M. Lopez, MD², Maame Sampah, MD, PhD³, Asuka Ishiyama², Thomas Prindle², William B. Fulton², Sanxia Wang², Menghan Wang⁴, Peng Lu², Chhinder P. Sodhi², David J. Hackam, MD, PhD⁵

¹*Johns Hopkins Hospital, Division of General Pediatric Surgery, Baltimore, MD, USA*, ²*Johns Hopkins University School of Medicine, Baltimore, MD, USA*, ³*Johns Hopkins School of Medicine, Baltimore, MD, USA*, ⁴*Johns Hopkins University, Baltimore, MD, USA*, ⁵*Johns Hopkins Children's Center, Baltimore, MD, USA*

Purpose: The pathogenesis of necrotizing enterocolitis involves exuberant bacterial signaling in the premature intestine via the bacterial receptor toll-like receptor 4. Butyrate is a short chain fatty acid produced in the colon by bacterial fermentation of carbohydrates, and studies suggest that it may have anti-inflammatory effects. We now hypothesize that butyrate could reduce intestinal inflammation in NEC by inhibiting TLR4 signaling in the premature gut.

Methods: Intestinal organoids were developed from human-induced pluripotent stem cells that were treated with bacterial lipopolysaccharide and butyrate at doses of 50ug/ml and 20mM, and pro-inflammatory IL-6 or Tnf α expression were measured by qRT-PCR. NEC was induced in 7-day-old C57BL/6 mouse pups via four days of gavage-fed formula mixed with NEC bacteria, and periods of brief hypoxia. Butyrate was added to the formula at a concentration of 20mM and given to the mice with and without NEC. Terminal ileum samples were obtained on day five for RNA isolation and histology. PCR was performed for measurement of pro-inflammatory cytokines and H&E staining for histologic score.

Results: Butyrate significantly reduced LPS-induced IL-6 expression in intestinal organoids (Ctrl=0.57 \pm 0.15 vs LPS=12.1 \pm 1.2 vs LPS+butyrate=5.2 \pm 1.1, $p < 0.05$), confirming that this SCFA reduces bacterial signaling ex vivo. Mice subjected to NEC had elevated expression of Tnf α which was reduced by butyrate supplementation (Ctrl=1.2 \pm 0.23 vs NEC=8.9 \pm 2.3 vs butyrate+NEC=4.3 \pm 2.9, $p < 0.05$), while histologic injury scores showed decreased injury in mice with NEC after butyrate supplementation. Strikingly, butyrate also significantly reduced Tlr4 expression in the premature intestine of mice, suggesting a mechanism by which butyrate may ameliorate the intestinal injury seen in NEC (Ctrl=16.3 \pm 1.7 vs NEC=23.4 \pm 5.6 vs butyrate+NEC=17.2 \pm 4.1, $p < 0.05$).

Conclusions: Butyrate supplementation decreases exaggerated bacterial signaling in both intestinal organoids and animal models, and reduces Tlr4 expression, suggesting that this bacterial fermentation product may offer a novel therapeutic approach for patients with NEC.

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PERCUTANEOUS ULTRASOUND-GUIDED PERITONEAL ACCESS WITH A CENTRAL VENOUS CATHETER AS A TEMPORARY METHOD FOR PERITONEAL DIALYSIS.

Fernando Montes-Tapia, MD, Ph.D, Antonio Rodríguez-Taméz, M.D., **Daniela R. Padilla-Alanis, MD**, Arturo Garza-Alatorre, M.D. Ph.D., Manuel De la O-Cavazos, M.D. Ph.D.

Universidad Autónoma de Nuevo León / Hospital Universitario "Dr. José Eleuterio González", Monterrey, Nuevo Leon, Mexico

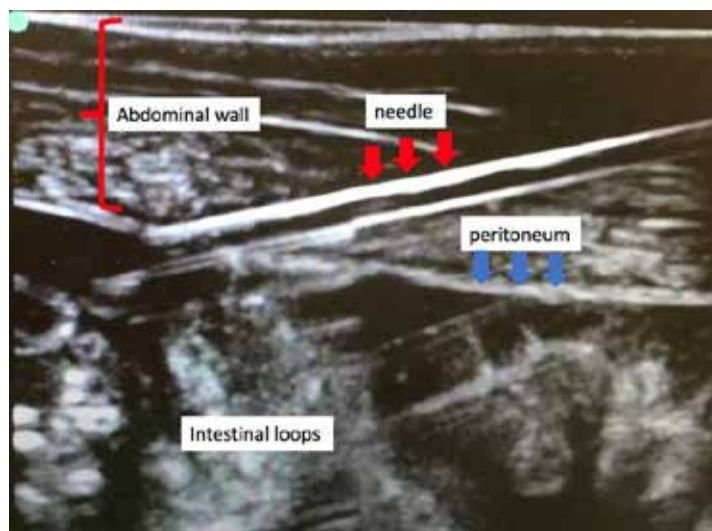
Purpose: To present a percutaneous ultrasound-guided technique that uses a central venous catheter (CVC) for acute peritoneal dialysis.

Methods: A retrospective study of the use of a CVC for peritoneal dialysis in patients with acute kidney injury (AKI). The study was approved by the IRB registration PE15-010.

Intervention: We used a portable ultrasound with a 13-6 MHz transducer. Local anesthesia with xylocaine was applied in the abdominal wall. A 7 Fr. two lumen catheter was used. A long-axis view approach was used to insert the needle obliquely to form a subcutaneous tunnel. Once the needle tip was identified within the peritoneal cavity, using the Seldinger technique, the catheter was guided by ultrasound to the pelvic cavity. In patients without ascites, saline solution was infused prior to insertion of the catheter.

Results: We included six infants with a mean age of 27.2 days; 5 (83%) were female. Three patients (50%) had congenital heart disease and three had (50%) an infectious disease. All six patients were critical ill children with hemodynamic instability, and high mortality risk to be transferred, the other reason for using a CVC is our lack of appropriate size Tenckhoff catheters. The mean time for the procedure was 15.7 minutes. Two patients (33%) did not have ascites therefore they required saline infusion before the procedure. Mean time of catheter use was 2.7 days (1-10 days). There wasn't any catheter dysfunction and appropriated renal replacement therapy was delivered in all six cases.

Conclusion: In our experience, percutaneous ultrasound-guided CVC placement in the peritoneal cavity for acute dialysis is a safe, quick, and simple bedside procedure.



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PEDIATRIC NECK VESSEL REPAIR FOLLOWING ECMO DECANNULATION - IS IT WORTH THE RISK?**Tania Gennell, MD¹**, Nicholas Schmoke, MD¹, Devin Midura, MD², Melody Gomez, BA¹*¹Columbia University Irving Medical Center, New York City, NY, USA, ²Montefiore Medical Center/Albert Einstein College of Medicine, Bronx, NY, USA*

Purpose: Following extracorporeal membrane oxygenation (ECMO) decannulation, pediatric patients may undergo either ligation or repair of common carotid artery (CCA) and internal jugular vein (IJV). Both options have the potential for future complications, and there remains a lack of consensus with significant variability in practice among institutions. The purpose of our study is to evaluate patency rates and ischemic cerebral vascular accident (CVA) risk following vessel repair in pediatric ECMO patients.

Methods: We performed a single-institution, IRB-approved retrospective review of pediatric ECMO patients cannulated via their neck from January 2019 to September 2022 (n=62). Vessel patency and vascular complications were determined by post-repair vascular ultrasound. CVA was detected by post-repair imaging in patients who demonstrated neurologic deficit on exam. Fishers exact test was used to compare categorical factors.

Results: 62 patients were included in the study. 49 (79%) patients survived to decannulation and 56% of patients survived to discharge. 30 (61%) patients underwent vessel repair; 20 (67%) underwent CCA and IJV repair and 10 (33%) underwent CCA repair only. Of repaired vessels, 18 (60%) had ultrasound surveillance. Median time to repair was 4.7 days. CCA and IJV patency were 89% and 71%, respectively, in patients who underwent repair. Ischemic CVA occurred in 3 (10%) patients who underwent carotid repair and 1 (5%) patient who was not repaired (p=1.0). 1 patient who underwent carotid repair developed a non-occlusive thrombus; no other vascular complications were observed.

Conclusion: Neck vessel repair is feasible in pediatric ECMO patients at decannulation. We demonstrated CCA and IJV short-term patency at 89% and 71%, respectively. There was no significant difference in ischemic CVA risk between repair and ligation groups. Given small sample size, additional prospective multicenter trials are warranted to further evaluate long term risks and patency in pediatric ECMO patients who undergo repair of neck vessels.

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SURGICAL MANAGEMENT OF NEONATAL SEVERE HYPERPARATHYROIDISM**saud alshanafey, MBBS, MSc, MBA, FRCSC¹, SABREEN MAQBOL¹, ALI ALAMEER²,
abdullah alashwal***¹king faisal specialist hospital and research center, Riyadh, Ar Riyad, Saudi Arabia, ²king faisal specialist hospital and resarch center, riayadh, Ar Riyad, Saudi Arabia*

Introduction: Neonatal severe hyperparathyroidism (NSHPT) is a rare disease that can be lethal. Most patients requires parathyroidectomy. We report our experience with management of this severe disease at a tertiary healthcare center.

Methods: A retrospective chart review was conducted for patients managed for NSHPT over the last 20 years. Demographic, clinical, and follow-up data were collected, and descriptive data were generated.

Results: A total of 17 patients were managed for NSHPT with parathyroidectomy, 12 males and 5 females, with a mean age of 46 days at referral. The mean preoperative parathyroid hormone and calcium levels were 1081 ng/L and 3.95 mmol/L, respectively. Ultrasound was done for 10 patients preoperatively; 6 had prominent glands, and no visualized glands in 4. Sestamibi scan done for 13 patients; 8 were negative, and 5 were positive: 3 in the neck and 2 at the sublingual area. Mean age at surgery was 5 months. In 15 patients, total parathyroidectomy (4 glands) was performed (12 of them underwent auto-transplantation simultaneously). One patient had 3 glands removed with auto-transplantation. One patient underwent single gland excision as a redo-procedure after previous surgery elsewhere. Mean post-op follow up was 6 years. The mean postoperative parathyroid hormone and calcium levels were 27 ng/L and 1.64 mmol/L, respectively. Ultimately on follow up, all of them required to be on Calcium and Vitamin D supplements except for one case who had an auto-transplantation.

Conclusions: Surgical treatment of neonatal severe hyperparathyroidism is effective. Preoperative radiological localization studies did not impact the management plan. Auto-transplantation failed to keep those patients off medical supplements.

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ASSOCIATION OF AGE AT DUODENAL ATRESIA REPAIR WITH OUTCOMES: A PEDIATRIC NSQIP ANALYSIS

Shale Mack¹, Devon J. Pace, MD², Loren Berman, MD³, Matthew Boelig, MD²

¹Sidney Kimmel Medical College at Thomas Jefferson University, Philadelphia, PA, USA,

²Nemours Children's Health, Wilmington, DE, USA, ³Nemours | Alfred I. duPont Hospital for Children, Wilmington, DE, USA

Purpose: Neonates with duodenal atresia (DA) are often born prematurely and undergo repair soon after birth, while others have delayed repair to allow for growth until closer to term corrected gestational age (cGA). It has been demonstrated that premature infants experience worse outcomes, but it is unclear whether delaying surgery mitigates the increased morbidity. This study evaluates the association of timing for DA repair with postoperative morbidity.

Methods: We retrospectively evaluated neonates undergoing DA repair from the National Surgical Quality Improvement Program-Pediatric (NSQIP-P) database (2015-2020). A multivariable regression analyzed factors associated with composite morbidity, including cGA and age in days of life (DOL). A propensity score-matched analysis was completed in premature neonates born ≤ 35 weeks gestation to compare outcomes at similar gestational ages at birth (bGA) and birth weight who underwent early (< 7 DOL) versus delayed (≥ 7 DOL) repair.

Results: 809 neonates were included with a median bGA of 36 weeks (IQR 34-38), birth weight of 2.46 kg (IQR 1.96-2.95), and DOL at surgery of 2 (IQR 1-5). Preterm infants represented 53.52% of the cohort with 35.23% born ≤ 35 weeks. On multivariable analysis, increasing cGA at surgery was associated with decreased morbidity (OR: 0.91, CI [0.84, 0.99]), and increasing DOL was associated with increased morbidity (OR: 1.02, CI [1.00, 1.04]). On propensity score-matched analysis, delayed repairs were associated with higher postoperative ventilation days (6 days vs. 2 days, $p < 0.05$). However, there were no differences in composite morbidity between early and delayed repairs.

Conclusions: Outcomes for DA repair are worse in younger cGA patients, but delaying surgery does not appear to mitigate the risks associated with prematurity. The morbidity of delaying surgery should be weighed against risks of performing DA repair in smaller, more premature infants. Optimal timing of repair for DA requires a delicate balance between these factors.

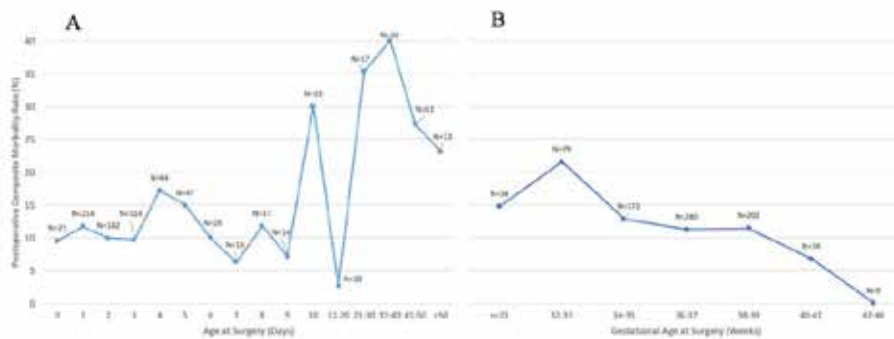


Figure. Association of (A) age (days of life) and (B) corrected gestational age at surgery (weeks) with postoperative composite morbidity

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PREDICTORS OF POOR GROWTH IN NEONATES WITH A SMALL BOWEL STOMA**Martina Mudri**¹, Rhonda Van Oerle², Alyssa Ramanzin¹, Jason Silverman³, Hannah Piper, MD⁴

¹BC Children's Hospital, Vancouver, BC, Canada, ²BC Women's Hospital, ³Stollery Children's Hospital, Edmonton, BC, Canada, ⁴Division of Pediatric Surgery, University of British Columbia/BC Children's Hospital, Vancouver, BC, Canada, Vancouver, BC, Canada

Purpose: A subset of infants struggle with growth after small bowel (SB) resection despite adequate nutrition. Although SB length is known to directly predict absorption, there are other factors that impact intestinal function. This study compares the intestinal microbiota, energy losses and levels of short chain fatty acids (SCFAs) in neonates with SB stomas to determine predictors of poor growth.

Methods: After REB approval (H16-03374), 18 infants with SB stoma after resection were enrolled (2018-2020). 48-hour stool collection was performed just prior to stoma closure when SB absorption was stable. The intestinal microbiota was characterized using 16S rRNA sequencing and energy losses and SCFA concentration were calculated with bomb calorimetry. Energy losses, SCFAs, and the abundance of Proteobacteria and Firmicutes were correlated with growth. Descriptive statistics and Mann-Whitney analyses were used, with $p < 0.05$ considered significant.

Results: Infants had a median gestational age of 28 weeks, and median age at surgery of 8 days. Underlying diagnoses included necrotizing enterocolitis (44%), gastroschisis (13%), volvulus (13%), atresia (4%) and other (26%). At 48-hour stoma collection (median 70 days of age), 6 infants (33%) had failure to thrive (Z-score for weight/length < -2). When comparing those growing poorly to those growing adequately there was no significant difference in mean small bowel remaining (52% vs. 59%, $p=0.838$), energy losses in the stool (14.2 kcal/kg/d vs. 12.2 kcal/kg/d, $p>0.999$), stool SCFA levels (247uM/g vs. 264uM/g, $p=0.913$) or parenteral nutrition support (66% vs. 63%, $p=0.553$). The microbiota did differ significantly between groups with those growing poorly having higher median levels of Proteobacteria (90% vs. 13%, $p=0.004$) and lower levels of Firmicutes (10% vs. 78%, $p=0.001$).

Conclusions: A portion of infants with SB stomas will have poor growth despite providing adequate nutrition. An intestinal microbiota enriched in Proteobacteria and depleted of Firmicutes may impact metabolism and energy use.

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DIAGNOSTIC ACCURACY OF LARYNGEAL ULTRASOUND FOR EVALUATING VOCAL FOLD MOVEMENT IMPAIRMENT IN CHILDREN

Shawn Izadi, MD¹, Benjamin Zendejas, MD, MSc¹, Jay Meisner, MD², Ali Kamran, Somala Mohammed, MD¹, Farokh R. Demehri, MD³, Anne Hseu, MD¹, Steven J. Staffa¹, David Zurakowski, MS, PhD⁴, Carol E. Barnewolt, MD¹, Sukgi Choi, MD⁵

¹*Boston Children's Hospital, Boston, MA, USA*, ²*Boston Children's Hospital*, ³*Harvard Medical School, Department of Surgery, Boston Children's Hospital, Boston, MA, USA*, ⁴*Boston Children's Hospital, Department of Anesthesia, Critical Care, and Pain Medicine Research, Boston, MA, USA*, ⁵*Esophageal and Airway Treatment Center, Boston Children's Hospital*

Purpose: Vocal fold movement impairment (VFMI) secondary to recurrent laryngeal nerve (RLN) injury is a common source of morbidity after pediatric cervical, thoracic, and cardiac procedures. Flexible laryngoscopy (FL) is the gold standard to diagnose VFMI, yet it's invasive, poorly tolerated, risks possible clinical decompensation, and is an aerosol generating procedure. Laryngeal ultrasound (LUS) is a potential non-invasive alternative, but limited data exists in the pediatric surgical population regarding its efficacy. We aimed to investigate the diagnostic accuracy of LUS compared to FL in evaluating VFMI.

Methods: A prospective, single-center, single-blinded (rater) cohort study was undertaken on perioperative pediatric patients at risk for RLN injury. Patients underwent FL and LUS. Cohen's kappa was used to determine chance-corrected agreement.

Results: Between 2021 and 2023, 85 children were evaluated with a median (IQR) age of 10 (4, 42) months and weight of 7.5 (5.4, 13.4) kilograms. The prevalence of VFMI was 27.1%. Absolute agreement between evaluations was 98.8% (kappa 0.97, 95% CI:0.91–1.00, $p < 0.001$). The sensitivity and specificity of LUS in detecting VFMI was 95.7% and 100%, yielding a positive predictive value (PPV) of 100% and negative predictive value (NPV) of 98.4% (95% CI:90-100%). Diagnostic accuracy was 98.8% (95% CI:93-100%).

Conclusion: LUS is a highly accurate modality in evaluating VFMI in children. While FL remains the gold standard for diagnosis, LUS offers a low-risk screening modality for children at risk for VFMI such that only those with an abnormal LUS or presence of clinical symptoms discordant with LUS findings should undergo FL.

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