Poster Session II (cont.)

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CUMULATIVE SUM: AN INDIVIDUALIZED PROFICIENCY METRIC FOR LAPAROSCOPIC FUNDAMENTALS

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Background/Introduction:
Training paradigms are consistently pressured to produce competent pediatric surgeons in fewer hours with lower costs. Thus, effective proficiency metrics to guide self-directed learning are critical. The purpose of this study is to assess the utility of a novel longitudinal proficiency metric: Cumulative Sum (Cusum). We hypothesized that Cusum can augment self-directed learning within the Fundamentals of Laparoscopic Surgery (FLS) curriculum.

Methods:
Twenty medical students repetitiously practiced three FLS tasks: Peg-transfer, Circle-cut, and intracorporeal Knot-tie. Every attempt was scored using standard FLS criteria. Participants self-dictated practice volume for each task, up to a maximum of 7 combined hours, before an attending-supervised post-test. Task-specific Cusum curves based on repeated performances during practice were categorized into three types based on the terminal slope of fitted trendlines (Figure 1). An up-trending (Type 1) curve indicates inadequate proficiency by traditional Cusum standards. Univariate associations between post-test scores, Cusum curve type, and volume metrics (number of practice attempts, total practice time) were measured using the Wilcoxon rank-sum test.
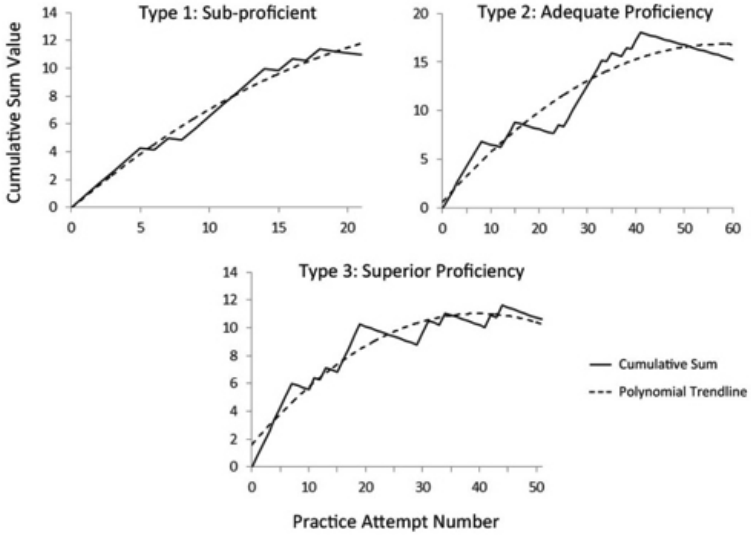
Results:
Eighteen participants completed the study (90%). Median adjusted post-test scores were 103.2, 85.3, and 81.6 for Peg-transfer, Circle-cut, and Knot-tie, respectively. All trainees achieved Type 3 Cusum curves for Peg-transfer, compared to 72% (13/18) for Circle-cut and only 56% (10/18) for Knot-tie. For Knot-tying, Type 1 curves in practice were associated with lower post-test performance (79.6 vs 83.3, p = 0.040), indicating that practice should continue until a Type 2 or Type 3 curve is attained. Conversely, volume metrics were not associated with post-test score on any task, signifying a discord between self-directed practice volume and proficiency.

Conclusions:
Novices are poorly capable of determining what constitutes adequate practice. By setting adaptive training recommendations tailored to the learning rate of each trainee, Cusum promotes efficient time allocation and individualized curricula

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