



EP09.21: Institutional experience with low-cost simulation for invasive procedures in Maternal–Fetal Medicine

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Objectives:

1.To describe the institutional experience in implementing a longitudinal low-cost simulation program for the acquisition and objective assessment of competencies in amniocentesis, transcervical chorionic villus sampling (CVS), and cordocentesis among Maternal–Fetal Medicine residents.

2.Evaluate individual learning curves by analyzing them using the cumulative sum (CUSUM) method.

Methods

Three structured educational interventions were implemented using low-cost, procedure-specific simulation models. Residents participated in sequential supervised deliberate-practice sessions and were assessed with standardized checklists. Each procedure was classified as a success or failure, and individual learning curves were analyzed using the cumulative sum (CUSUM) method, with explicit acceptable performance thresholds defined to determine the point of competence acquisition.

Results:

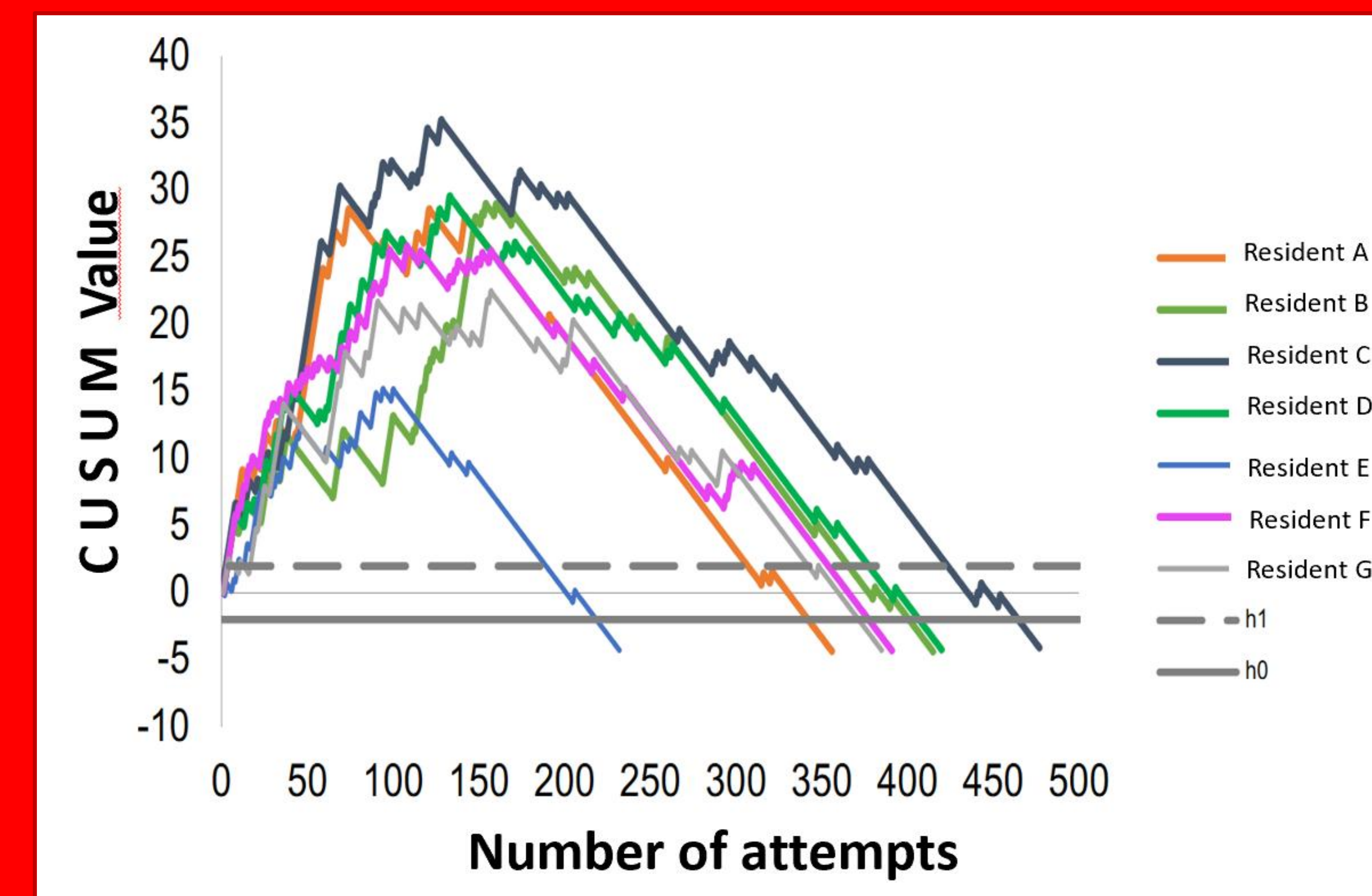
Learning curves showed a consistent progression in performance across the three procedures. The mean number of attempts required to reach competence was 63 ± 11 for CVS, 255 ± 53 for amniocentesis, and 369 ± 70 for cordocentesis, reflecting differences consistent with the technical complexity of each procedure. One hundred percent of residents met the objective competence criteria in the simulated environment before actual clinical practice. Participants' perceptions of the program's educational impact were very positive.

Conclusions:

This institutional experience, described in earlier publications, shows that longitudinal integration of low-cost simulation enables objective assessment of technical competency in invasive procedures. CUSUM analysis facilitates formative feedback and standardizes evaluation criteria, proving to be an effective, ethical, and reproducible pedagogical strategy for competency-based medical residency training.



Low-cost simulation program. Maternal-Fetal Medicine Department. Instituto Nacional de Perinatología Mexico.



Learning curves in cordocentesis CUSUM method