

Performance in Simulated Crises Correlates with Time Since Training and with Exposure to Challenging Clinical Situations

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Research Question

What factors predict anesthesiologists' performance in managing simulated perioperative crises?

Background

Developing and maintaining clinical competence is essential for ensuring safe patient care. Too little is known about the factors affecting decision making and clinical performance during crisis events. In a multicenter, federally funded study (IMPACTS), we sought to evaluate anesthesiologists' management of high-acuity, higher risk events in high-fidelity simulation scenarios.

Hypothesis

Based on prior simulation studies, we hypothesized that:

- 1) Level of training will be positively correlated with non-technical, technical, and global performance in simulated crises.
- 2) Prior real world acute care crisis management experience and prior simulation training will both be positively correlated with non-technical, technical, and global performance in simulated crises.

Methods

Scenario Design

With input from a multidisciplinary expert panel, we designed and pilot-tested four 15-minute high-fidelity simulation scenarios (Table 1) that:

- Require significant decision making
- Challenging but manageable by Board-Certified Anesthesiologists (BCAs)
- Pre- or post-operative (not intraoperative) setting (to be generalizable to other specialties)
- Have at least two possible diagnoses
- Require teamwork skills

Intervention

Each participant completed a baseline comprehensive eSurvey (>250 variables) on background and experience before rotating through all four simulated scenarios.

Participants then were studied at one of four US simulation centers (Vanderbilt U, U New Mexico, Penn State U, and UPMC). Each participant did all 4 scenarios in random order on a single day. Scenarios were performed individually, with help from standardized embedded participants (SEPs) portraying clinical team members according to strict behavioral scripts.

Assessments

Independent trained video raters, blinded to participant, assessed performance remotely via a custom app. For each encounter they rated performance using:

- Scenario-specific Clinical Performance Elements (CPE)
- 9-point Behavioral Anchored Rating Scale (BARS)
- 9-point overall technical, overall non-technical (behavioral or teamwork), and global performance scores

Multivariate regression models adjusted performance ratings for scenario, study site, participant demographics (age, gender, race/ethnicity), years of experience, and three domains from the eSurvey: (1) clinical practice attributes, (2) experience managing challenging clinical situations, and (3) simulation exposure.

Results

We enrolled 102 participants (55% male, average age 38±8 years) with 8±7 years of clinical experience across 4 study sites. Including 60 BCA and 42 anesthesia residents.

A substantial number of performances were rated as excellent. A small but significant proportion were rated poor, even among experienced BCAs (Figure 1).

Senior trainees achieved the highest scores, followed by BCAs, with junior residents scoring significantly lower.

Performance Trends:

Senior residents excelled, particularly in a Post-Operative Care Unit (PACU) scenario involving TRALI. BCAs displayed declining performance correlating with time since ABA certification (Figure 2). No differences were observed between academic and community practitioners.

Clinical Performance Elements (CPEs) associated with lower rated performances:

A notable proportion of participants failed to:

- Appropriately broaden their differential diagnosis
- Order additional diagnostic tests
- Call for help
- Escalate hemodynamic support
- Communicate effectively with a colleague

Key Predictors:

Time from the end of training (closer) and amount of prior exposure to crisis events (more) were the most significant predictors of higher rated performance. Neither prior experience with simulation nor other practice attributes were found to significantly affect performance ratings.

Table 1. Summary of Simulation Scenarios.

Presentation	Primary Diagnosis	Description
Shortness of breath (Manikin)	Transfusion-related acute lung injury (TRALI)	PACU: Effects of transfusion-related lung injury (TRALI) after emergent exploratory laparotomy
Altered mental status (SP)	Serotonin Syndrome	PACU: Signs of serotonin syndrome after carpal tunnel with Bier block
Hypotension (Manikin)	Urosepsis	PACU: Evolving urosepsis after an elective cystoureteroscopy with stent placement
Anxiety evolving into chest pain (SP)	Thyrotoxicosis and Acute Coronary Syndrome	Pre-op holding area before total thyroidectomy; anxiety progresses to acute coronary syndrome

Abbreviations: PACU = Post-Anesthesia Care Unit; SP = standardized patient

Figure 1. Overall rated technical and non-technical performance, by scenario and overall

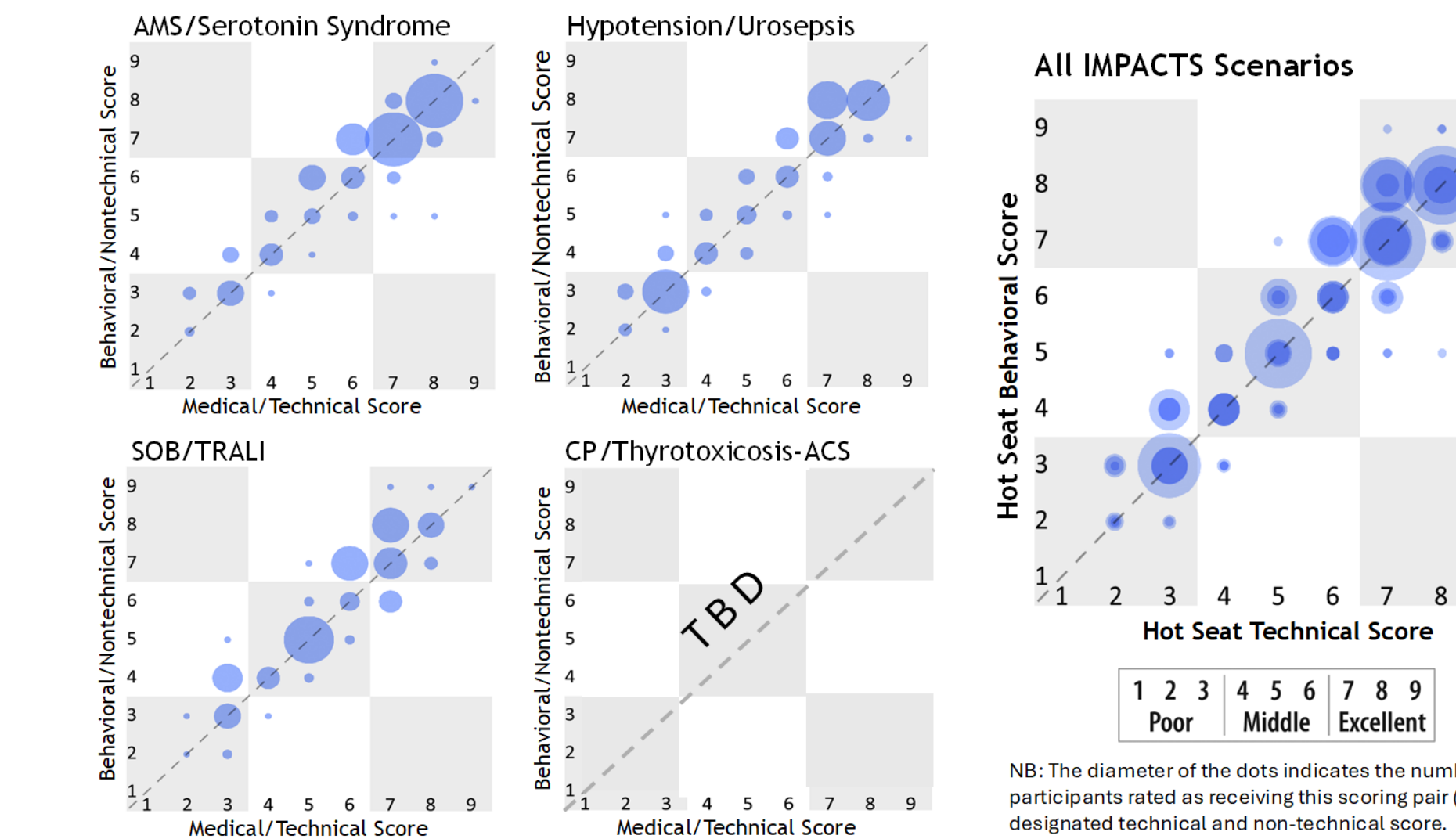
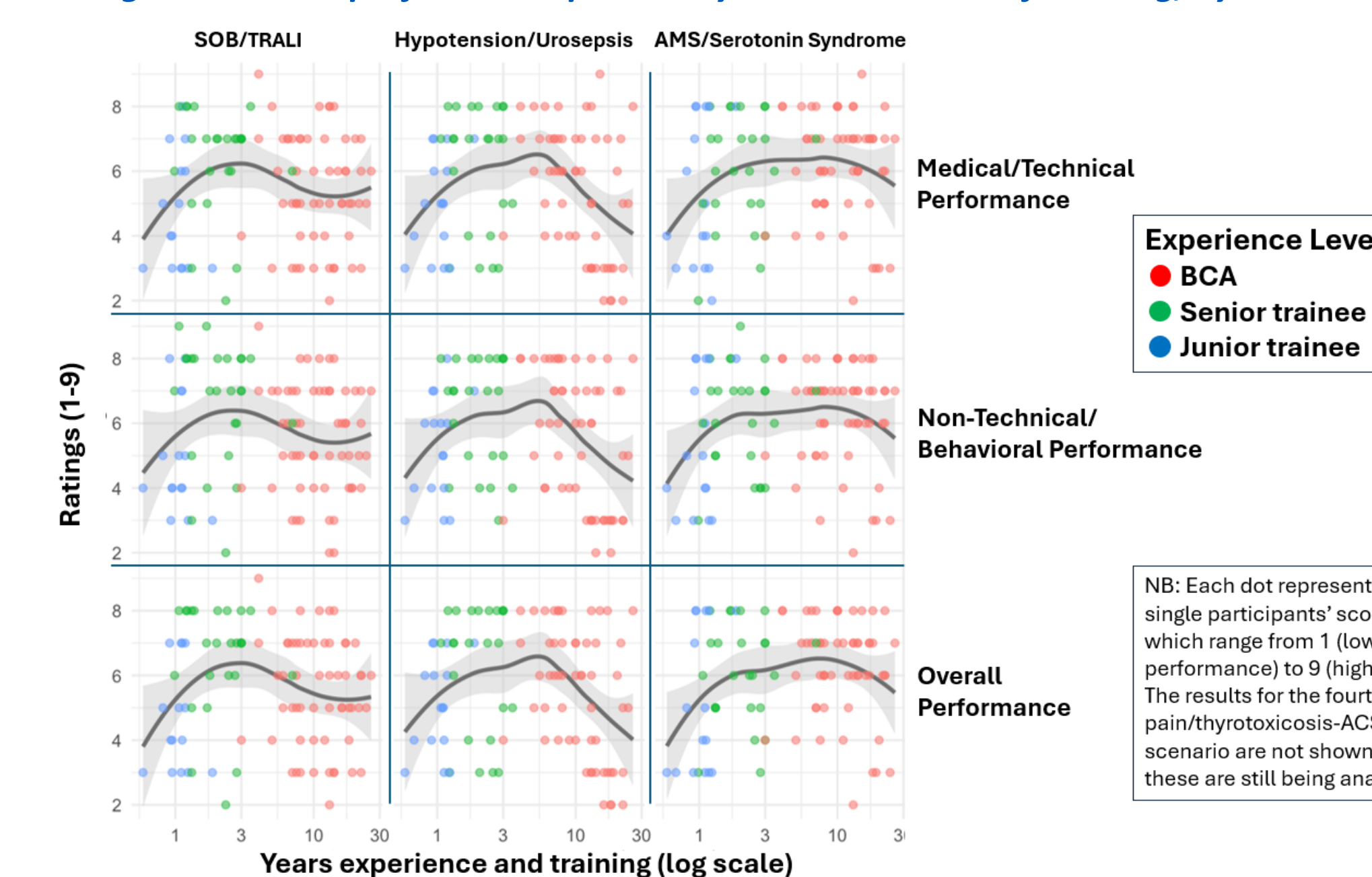


Figure 2. Rated performance plotted by time since start of training, by scenario



Conclusions

- Prior exposure to crisis events in clinical practice correlated with better performance.
- Prior experience with simulation and other clinical practice attributes did NOT correlate with performance.
- Performance improved between the beginning and end of training, and for several years following board certification. Deterioration in performance was seen starting ~5 years after training.
- These findings support aggressive strategies to improve and maintain proficiency throughout one's career.

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