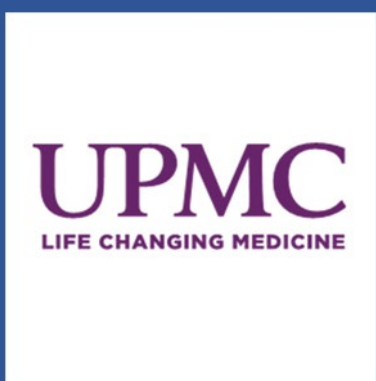




Results of an Interprofessional Simulation for ICA Injury Management in Endoscopic Endonasal Surgery



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Introduction

Internal carotid artery (ICA) injury is a rare, life-threatening complication of skull base surgery. We previously published an evidence-based ICA management algorithm based on expert consensus and literature.¹ Building on these materials, we executed a sequential curriculum: Phase 1 tested the algorithm with surgeons using a cadaveric simulation of ICA injury; Phase 2 implemented an interprofessional course to identify team knowledge gaps and foster structured cross-specialty dialogue.

Methods

Literature Review & Population Insights

Interviews with EES OR personnel identified:

- Role-specific responsibilities
- Communication needs
- Prior experiences with vascular injury management education

Phase 1: Cadaveric Simulation with Surgeons

- Skull base surgeons performed on a perfused cadaveric ICA injury model
- Edited operative footage to highlight key technical steps, decision points, and communication

Phase 2: Interprofessional Pilot Course

- Implemented pilot simulation with dynamic vital signs and situational cue cards
- Facilitated debriefing session

Algorithm Development

- Developed an interprofessional ICA injury management algorithm

Final Curriculum Design

- Pre-learning materials: expert consensus article, interprofessional algorithm review, video modules
- Pre-course quiz

Analysis & Reflections

- Coded pre-course quiz into core domains, analyzed responses, identified knowledge gaps

Conclusions

Baseline assessment revealed profession-specific differences in ICA injury knowledge, particularly in resource selection and intraoperative monitoring, despite high perceived preparedness. The interprofessional simulation and structured debriefing provided a safe, non-critical environment to clarify roles, align mental models, and rehearse coordinated responses outside of a real-life emergency. This scalable, simulation-based framework supports dissemination across institutions and surgical teams to advance ICA injury preparedness and patient safety. Future iterations of this curriculum will incorporate post-intervention assessment and longitudinal follow-up to evaluate performance changes and knowledge retention across professional roles.

Results

Phase 1: Perfused Cadaveric Model of ICA Injury

- Skull base surgeons [Table 1] were provided with the management algorithm prior to completing a high-fidelity model of ICA injury. Post-course surveys demonstrated median 5-point Likert-scale ratings exceeding neutrality ($p < 0.01$) across domains of satisfaction, relevance, comprehensiveness, instructor effectiveness, and model utility; each had median scores of 5. Surgeons also reported moderate-to-high confidence in managing ICA injury, median 4 ($p < 0.01$).
- Qualitative comments highlighted the value of the provided management algorithm (“algorithm for ICA injury”, “contents of the manual”, “learning materials”), alongside repeated calls for “more hands-on time”.

Table 1. Demographics of Phase 1 participating surgeons.

Characteristics of Surgeons (n=17)	n	%
Male	13	76.5%
Female	4	23.5%
Based in U.S.	11	64.7%
Based outside U.S.	3	17.6%
Skull base Otolaryngologist	4	23.5%
Skull base Neurosurgeon	6	35.3%
University Affiliation	7	41.2%

*Incomplete survey responses resulted in subcategory totals that do not sum to 17.

Phase 2: Pilot Interprofessional Simulation Course

- Participants [Table 2] completed a pre-course quiz and were provided with the management algorithm, expert consensus article, and video modules to review prior to the simulation exercise
- The pre-course quiz included 14 multiple-choice questions pre-divided into four domains: resource selection and preparedness, intraoperative monitoring, management steps, and role clarity. Overall baseline scores were lowest for resource selection and preparedness (51.5%), followed by intraoperative monitoring (66.7%), management steps (78.4%), and highest for role clarity (88.2%).

Table 2. Demographics of interprofessional course participants.

Participants (n=17)	n	%
Skull base surgeon	5	29.4%
Neurophysiology	3	17.6%
RN (Circulator)	7	41.2%
Surgical technician	2	11.8%
Anesthesiology**	0	0%
Prior ICA injury instruction	5	29.4%
– Reading	3	17.6%
– Video	1	5.9%
– Academic conference	3	17.6%
– Other (hands-on)	1	5.9%

** Anesthesiology team members participated in the course but did not complete survey and thus are not represented in the data presented.

- Scores separated by participant profession [Figure 1]:

Baseline Knowledge Accuracy by Domain and Professional Role

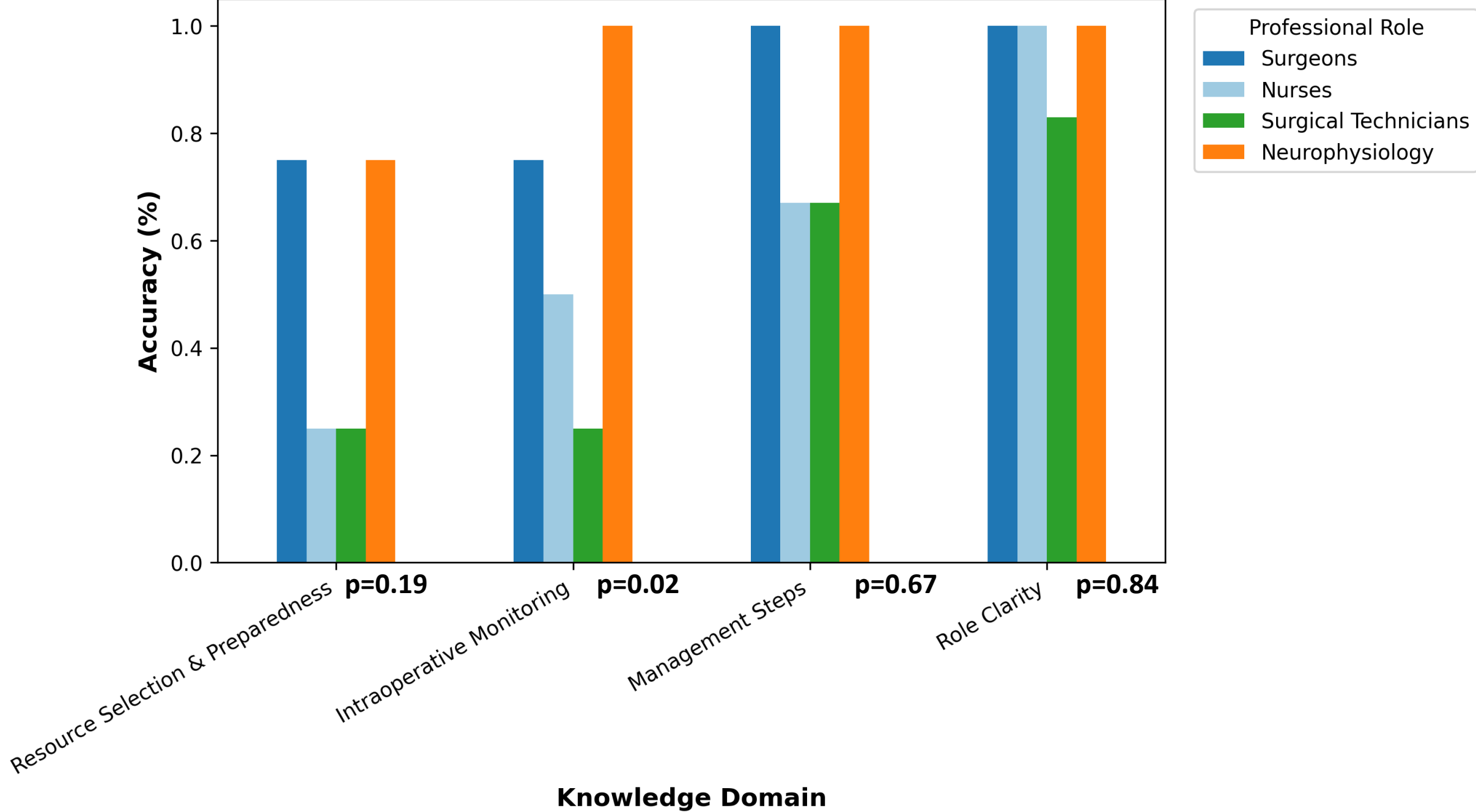


Figure 1. Pre-course quiz scores, by question domain and professional role.

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