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# A pilot study examining experiential learning vs didactic education of abdominal compartment syndrome

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**KEYWORDS:**
Simulation;
Intra-abdominal hypertension;
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Residency education;
Randomized study;
Observational performance

**Abstract**

**BACKGROUND:** Current surgical education relies on simulated educational experiences or didactic sessions to teach low-frequency clinical events such as abdominal compartment syndrome (ACS). The purpose of this pilot study was to evaluate if simulation would improve performance and knowledge retention of ACS better than a didactic lecture.

**METHODS:** Nineteen general surgery residents were block randomized by postgraduate year level to a didactic or a simulation session. After 3 months, all residents completed a knowledge assessment before participating in an additional simulation. Two independent reviewers assessed resident performance via audio-video recordings.

**RESULTS:** No baseline differences in ACS experience were noted between groups. The observational evaluation demonstrated a significant difference in performance between the didactic and simulation groups: 9.9 vs 12.5, $P = .037$ (effect size = 1.15). Knowledge retention was equivalent between groups.

**CONCLUSIONS:** This pilot study suggests that simulation-based education may be more effective for teaching the basic concepts of ACS.



Systematic reviews have established high-fidelity medical simulation as an effective and complementary educational method in medical education settings.[1–3] Currently, resident curriculums in the United States are bound by duty hour restrictions and supervision milestone requirements. This has prompted surgical residency programs to create integrated educational programs to address these constraints.[4–6] Thus, it is valuable to identify which educational methods provide the best return; didactic lectures (a mainstay of medical education) or experiential learning using simulation.

Previous randomized studies evaluating resident and nursing management of obstetrical emergencies[7,8] and radiology resident contrast reaction management training[9] found didactic and simulation-based training resulted in

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equivalent written test scores but better observational performance for those in the simulation group. At present, comparisons of didactic and simulation programs have not been conducted in the surgical education curriculum. Both methods may be a useful supplement for low frequency events that may not be otherwise experienced during limited clinical rotations. One example of a low frequency event is recognition of abdominal compartment syndrome (ACS). This clinical entity may lead to end organ system damage and is a significant contributor to morbidity and mortality in the critically ill.[10]

The risk factors for developing intra-abdominal hypertension and recommendations for patient assessment have been defined by the World Society of Abdominal Compartment Syndrome.[11] In particular, trans-bladder pressure measurement is considered the gold standard for assessing intra-abdominal hypertension in patients.[12] This technique is easily reproducible[13,14] but relies on the patient's position,[15,16] body mass index, timing of the respiratory cycle, and familiarity of the team with the measuring devices.[15]

Previous research suggests significant variation in the management of ACS across medical specialties (anesthesia, medicine, pediatrics, and surgery) prompting the need for research and education based on clear diagnostic criteria and standards for treatment.[14] Thus, a simulated experience was designed to address these factors. The goal of this prospective, single-blinded, randomized pilot study was to determine if an experiential-based educational program would improve performance and knowledge retention of ACS principles in general surgery residents better than a standard didactic lecture program.

## Methods

### Setting

After institutional review board approval, written informed consent was gathered from all residents. To mask the specifics of the didactic and simulation curriculum content, the study description was kept generic in the informed consent: "The purpose of this study is to evaluate the effectiveness of simulated training of surgical residents in a clinical setting." The study was conducted at the Center for Medical Education and Innovation at Riverside Methodist Hospital in Columbus, Ohio.

### Study design

Nineteen residents were block randomized by post-graduate year (PGY) level into 1 of 2 study arms: didactic training (group 1) or a simulation-based training with debriefing (group 2), see Fig. 1. Subjects in this study consisted of both preliminary and categorical residents in the general surgery residency program at our institution. All PGY levels (1 to 5) were included.

**Group 1: didactic curriculum.** The didactic curriculum consisted of a 30-minute interactive group lecture lead by a surgical intensivist. The curriculum was based on World Society of Abdominal Compartment Syndrome consensus definitions.[11] The session included indications for intra-abdominal pressure (IAP) monitoring, standardized method of trans-bladder pressure measurement, and common troubleshooting issues when dealing with the measurement device. After the lecture, it was expected that the residents

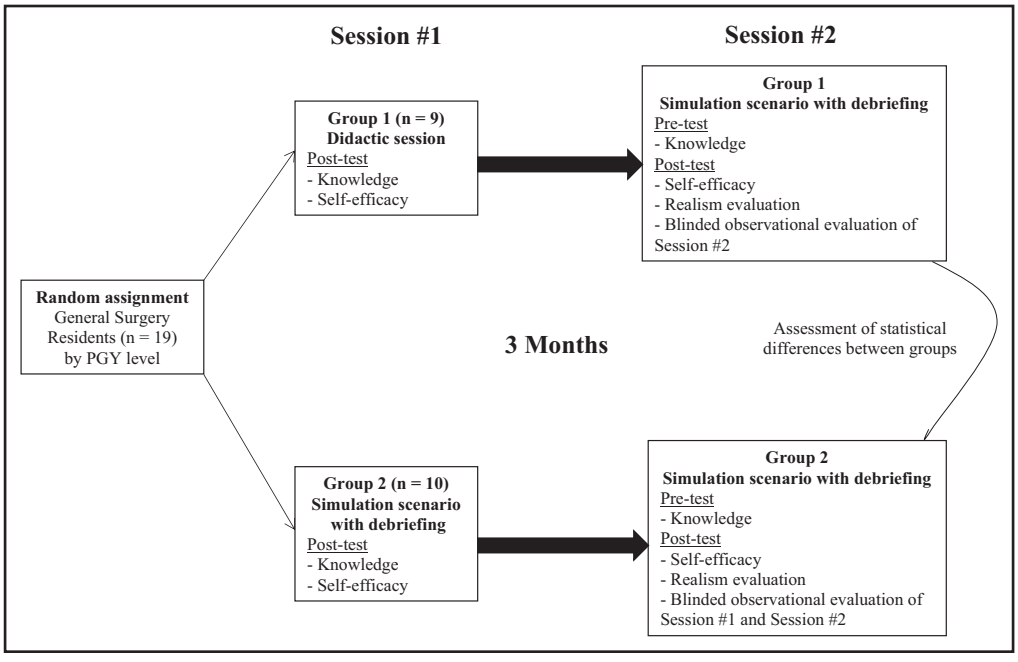


**Figure 1** Flowchart of study randomization and evaluation.