

The Value of Simulation in Nurse Anesthesia Education

1. What is the value of simulation in the education of Student Registered Nurse Anesthetists?

Healthcare, like aviation and nuclear power plant operation, is a high-hazard/high-reliability profession. Many have argued simulation should become a part of healthcare education like it has in these other high-hazard/high-reliability professions. Healthcare educators also have a moral obligation to use all available instructions methods, including simulation, to minimize the problems arising from the tension between sharpening the skills of students and ensuring patient safety.

As Gaba and DeAnda pointed out, simulation has the following advantages over other types of training including classroom and traditional clinical training:

- No risk is posed to a patient.
- Exercises in routine procedures can be repeated intensively, whereas situations and events involving uncommon but serious problems can be presented at will.
- Participants can learn to use actual complex devices (with a hands-on simulator).
- The same situation can be presented independently to multiple subjects for evaluating individual or group performance.
- Errors can be allowed to occur that in a clinical setting would require immediate intervention by a supervisor.
- The simulation can be frozen to allow discussion of the situation and its management, and it can be restarted or begun anew to show alternative strategies or techniques.
- Recording, replay, and critique of performance are facilitated because patient safety or confidentiality is not an issue.

Simulation also enhances higher order skills such as application, analysis, synthesis, and evaluation. It facilitates experiential learning by allowing for concrete experience, observation and reflection, forming abstract concepts and testing in new situations. It is well suited for assessment of student performance in a clinical setting. It may increase the rate of student learning by allowing for students to gain experience prior to entering the operating room.

Oral examination of students allows the students to demonstrate they know how to handle a given scenario. In contrast, using simulation allows for the student to show how to manage a situation. Factors in performance such as delay in checking for circulation and proper airway management techniques can be assessed using simulation.

A growing body of research evidence suggests that in studies comparing no simulation versus simulation-education interventions, technology-enhanced simulation training in health professions education is consistently associated with large effects for outcomes of knowledge, skills, and behaviors. Where simulation-based education is incorporated with sound instructional design (curricular integration, distributing training over multiple sessions, provision of feedback and debriefing, mastery learning, and repetitive practice), learning outcomes are highest.

2. How does simulation relate to actual patient care?

There is limited but growing information suggesting simulation may improve patient care.

Examples include:

- Early data suggests that training in complex surgical procedures in the simulated setting leads to reduced intraoperative errors.
- Simulation improves learner's ability to perform cardiovascular examination skills and adherence to ACLS protocols.
- Pediatric residents trained to do lumbar punctures using a lumbar puncture simulator had a higher success rate with their first lumbar puncture.
- Advanced simulation training allows students to develop communication skills and strategies they can apply to a variety of scenarios.

The results of a large study published in 2014 examining the use of simulation for students in nursing programs suggested substituting up to half of traditional clinical hours in a simulation setting results in similar educational outcomes. Nurse Managers of graduates who had a substantial amount of experience in a simulation setting reported graduate competency and readiness was not different compared to those attaining clinical experiences in a traditional setting.

Anesthesia-specific examples of how simulation may improve patient care include:

- Using a simulator to learn anesthesia machine checkout procedures was found to be superior to didactic teaching and these skills were retained for at least two years.
- Anesthesiology residents trained with ultrasound simulation had a higher rate of performing successful regional anesthesia blocks and proficiency compared with residents didactically trained.
- Learners trained to place central venous lines using a central line trainer performed central line placement on patients in a shorter time and those trained to place arterial lines using a simulator were more likely to be successful placing these lines in patients.
- Patients who had central venous lines placed by personnel trained using a simulator had a lower incidence of central line blood stream infections.
- Anesthesiology residents who had simulation training on caring for patients on cardiopulmonary bypass performed better in the actual clinical environment.
- Trainees who received training with a transesophageal echocardiography simulator were more successful in acquiring suitable images.
- Despite heterogeneity of studies examining simulation training for advanced airway management, a review showed that overall simulation training was effective in teaching these techniques.

The use of simulation has been addressed by national groups including the Accreditation Council for Graduate Medical Education, the Institute of Medicine, and the Society for Simulation in Healthcare. All have called for the increased use of simulation for competency attainment, competency assessment, or competency maintenance. Standard E.11 of the *Standards for Accreditation of Nurse Anesthesia Programs – Practice Doctorate* requires that “simulated clinical experiences are incorporated into the curriculum.” Future SRNAs beginning their education and starting in the profession will increasingly see simulation-based education incorporated into their education as a bridge between the classroom and clinical education and as

an augmentation of each. As pointed out by the COA Standards Revision Task Force in their work developing the Practice Doctorate Standards:

“While the evidence is not nurse anesthesia specific in many studies, there is ample evidence that the transference of knowledge from a simulated environment into clinical practice can occur quite effectively. The research evidence to date provides support for allowing simulated learning for competency attainment in many situations. There exists no evidence to date that would support allowing simulation to substitute for actual administration of an anesthetic case. The literature supports the position that simulation is effective for teaching certain procedural skills, team training, crisis management, and improved performance in low frequency, high impact clinical situations.”

For students entering healthcare professions today, simulation-based education will be a growing and continued part of their education from entry to practice, to part their of on-going professional education, and potentially some component of their certification or recertification process or staff credentialing just as it has evolved in other high-hazard/high-reliability professions.

3. Selected Simulation References

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