

A Subjective Assessment of Medical Student Perceptions on Animal Models in Medical Education

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BACKGROUND: There remains increasing societal pressure to limit the use of animals in medical education. The purpose of this study was to explore the subjective perceptions that medical students exposed to an animal model curriculum feel about the laboratory and its continued use.

METHODS: A 6-month prospective study was performed during the medical college core surgical clerkship. Medical students participated in both a trainer-based simulation workshop (dry laboratory) and a live-tissue animal laboratory (wet laboratory) in addition to their operative experience. Students completed a 23-question Likert survey at the end of the surgical clerkship. Data were compared using the chi-square test.

RESULTS: More students reported increased subjective stress levels in the wet laboratory (32.4%) compared with the dry laboratory (5.4%, $p < 0.001$). In addition, more students felt the wet laboratory (vs dry laboratory) prepared them for the anxiety (55.4% vs 24.3%, $p < 0.001$) and technical demands (67.6% vs 44.6%, $p = 0.005$) of the operating room. The majority of medical students (>90%) felt the wet laboratory was an important experience and should be continued.

CONCLUSIONS: The results of this study show a subjective benefit perceived by medical students when it comes to participation in an animal laboratory during their surgical clerkship. As such, over 90% of participating medical students feel the animal laboratory is important in medical education and should be continued in their surgical curriculum. (J Surg 71:61-64. © 2014 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEY WORDS: undergraduate medical education, simulation, surgical education

COMPETENCIES: Medical Knowledge

INTRODUCTION

The use of live animals in medical education has long been controversial.¹ Objections to the use of animal models include the ethical concerns of using healthy animals for educational purposes when surgical skills can be learned through high-fidelity simulation.² Ethical concerns, time constraints, absence of laboratory space, and lack of faculty to teach the animal laboratories are reasons given to describe a 1994 survey demonstrating steep declines in the use of animal models in medical education, from 38% to 17% over the previous 12 years.³

Teaching technical skills is a core component of surgical education.⁴ Recently, advancements in surgical education have placed an emphasis on simulation as the preferred means of surgical training and skill assessment outside of the operating room (OR).⁵ Simulation can offer a safe environment for medical students to practice a range of surgical skills without endangering patients.⁶ Despite its growing use, the argument that simulation is an inferior means to simulate the anxiety, stress, and technical demands of the OR remains. Presently, about 1 in 5 programs still utilize animal models.

There remains increasing societal pressure to limit the use of animals in medical education. Although the debate continues, the argument regarding the perceived benefit medical students place on these animal models is largely underrepresented. The hypothesis of this study is that medical students who are exposed to animal laboratories perceive these exercises to be beneficial to their medical education and, therefore although sensitive to ethical concerns, they would prefer animal models to remain part of their curriculum. The purpose of this study was to explore

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the subjective perceptions that medical students, who are exposed to an animal model curriculum, feel about the laboratory and its continued use.

METHODS

The study was approved by the Rush University Medical Center Institutional Review Board. A 6-month prospective cohort study was performed as part of the 2012 surgical core clerkship. During the surgical clerkship, medical students participated in both a “dry” simulation laboratory (DL) and a “wet” animal laboratory (WL) in addition to their OR experience. Students were able to recuse themselves from participation in the WL with completion of an essay on a designated surgical topic. All demographic data were collected.

Dry Laboratory

The DL was designed to introduce the medical students to surgical instruments, suture material, knot-tying techniques, and the principles of wound closure. In addition, placement of Foley catheters, intravenous catheters, and nasogastric tubes were taught. Knot-tying techniques were demonstrated using a knot-tying simulation trainer (Ethicon, Somerville, NJ), with an instructional emphasis placed on the clinical applications of surgical knots. Principles of wound closure were taught using a skin pad simulation trainer (Limbs & Things Ltd., Savannah, GA) with emphasis on recognition of static and dynamic wound forces.

Wet Laboratory

All WL teaching exercises were approved by the Rush University Institutional Animal Care and Use Committee and conformed to the National Institutes of Health guidelines for animal care. The WL was designed to introduce the medical students to the principles of laparotomy, the recognition of tissue planes, the principles of suturing an intestinal anastomosis, importance of mesenteric clamping techniques, and the control of blood vessels. Each student was provided with a single anesthetized adult Sprague Dawley rat. Students performed a midline fascial incision, splenectomy, left nephrectomy, and Lembert sutures of the bowel. Fascia and skin were then closed using suturing techniques initially taught in the dry laboratory.

Likert Questionnaire

An anonymous Likert questionnaire consisting of 23 questions was administered to all students participating in the study. The questionnaire was organized into 4 categories: demographic and general issue questions, questions regarding the DL, questions regarding the WL, and summary questions. Students were asked to rank their answers on a

graded 5-point scale. Scores were categorized as favorable (point score of 4 or 5), neutral (score of 3), or unfavorable (score of 1 or 2). Differences were evaluated using a chi-square test (3×3 contingency table) and significance was defined as a $p \leq 0.05$.

RESULTS

Responses were received from 74 medical students for a 100% response rate. Demographic data demonstrated a slight majority of female medical students (51.0%) in the study. When surveyed, internal medicine (13.5%) was the most common residency choice medical students anticipated applying for followed by emergency medicine (10.8%) and general surgery (9.5%). Complete anticipated matriculation data is shown in Fig. 1. Nine students (12.2%) admitted significant ethical concerns associated with their participation in the WL; however, only 3 students (4.1%) chose to recuse themselves from participation.

Favorable responses for students feeling a subjective increase in stress levels were 43.2% for the OR, 32.4% for the WL, and 5.4% for the DL. A significantly higher number of students felt the WL decreased their subjective anxiety level for the OR compared with the DL, 55.4% (mean score: 3.16) vs 24.3% (mean score: 2.61), respectively ($p < 0.001$; Fig. 2). In addition, a significant number of students felt the WL subjectively increased their technical skills in the OR compared with the DL, 67.6% (mean score: 3.57) vs 44.6% (mean score: 3.09), respectively ($p = 0.005$, Fig. 2). Furthermore, a significant number of students felt the WL was more valuable to their medical education compared with the DL, 90.5% (mean score: 4.57) vs 79.7% (mean score: 4.12), respectively ($p = 0.038$, Fig. 2).

Despite a significant subjective benefit placed on the WL by medical students, a majority (74.3%) still preferred to be taught initially in a DL environment, compared with 10.8% who preferred only the WL. A majority of students (91.9%) felt the WL was an important part of their medical education and 90.5% of students felt the WL should remain part of their surgical clerkship curriculum.

DISCUSSION

Obtaining technical skills outside of the OR is an important aspect of surgical training.⁶ Simulation techniques are being increasingly incorporated into medical education curriculums, while at the same time the number of animal models are in decline. As of 2001, a majority of United States medical schools (68%) did not use live animals in any physiology, pharmacology, or surgery course.¹ However, 91.9% of the medical students in this study who had the opportunity to experience an animal laboratory view the experience as an important part of their medical education,

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