

Cadaveric simulation for improving surgical training in dermatology

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Abstract

Simulation models are rapidly changing medical education, especially the training of dermatology residents. Various models are available, including cadaveric simulations. Our study evaluates the impact of a cadaveric simulation on the training of dermatology residents. Over a period of three years, cadaveric simulation was shown to increase the surgical knowledge of residents. Residents were more confident in their knowledge of surgical anatomy and also surgical skills. Cadaveric simulation may offer a positive impact on resident training in dermatology.

Keywords: educational activities, medical education, medical residency, dermatology, dermatologic surgery

Introduction

Simulation models are revolutionizing medical education. Within dermatology training programs, a recent survey of program directors reported that almost three quarters of programs utilize some form of surgical simulation in resident curricula [1]. We sought to evaluate the impact of a cadaver training session on resident education, including surgical knowledge, skills, safety, and confidence.

Methods: For three consecutive years, a cadaver training session for residents was directed by a dermatologic surgeon and supplemented with surgical readings. A 25-question quiz assessing surgical knowledge was administered pre- and post-intervention. Quiz scores were analyzed using

Student's t-test. In the 2017 cohort, confidence levels were collected for various dimensions via survey pre- and post-intervention. Data was analyzed using modified top-box scoring adjusting for increasing confidence per resident year and **McNemar's test.**

Results: For all three cohorts (n=40), there were significant increases in the quiz scores of second- and third-year residents following the intervention, whereas the quiz scores of first-year residents showed only a modest increase (Figure 1). Overall, there was a significant increase in quiz scores for all residents. Quiz scores were significantly greater both pre- (P=0.0071) and post- (P=0.0005) intervention for second-year compared to first-year residents.

For the 2017 cohort (n=13), there were significant increases in residents who were confident in their

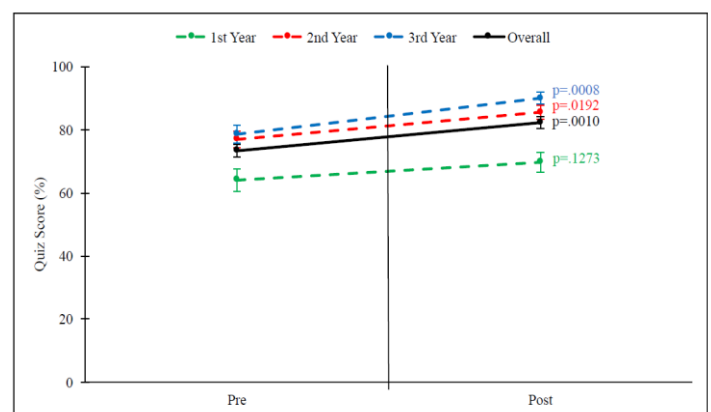


Figure 1. Quiz scores by year of dermatology resident, pre- and post-intervention (mean±SE).

knowledge of surgical anatomy and surgical skills, whereas knowledge of surgical dermatology trended towards an increase (Table 1). The majority

Table 1. Percentage of residents expressing confidence for various dimensions, pre- and post-intervention.

Dimensions	Pre (%)	Post (%)	p-value
Knowledge of Surgical Dermatology	54	85	0.0625
Knowledge of Surgical Anatomy	31	77	0.0156
Surgical Skills	46	85	0.0313
Safety of yourself and others	85	85	0.5000

of residents believed the cadaver session provided a low-stress learning environment (92%) and improved surgical skills (92%), understanding of flap/graft design and utility (85%), and surgical knowledge (77%).

Discussion

Simulation-based training has gained favor as a means to teach technical skills without jeopardizing patient safety. It has been shown to directly improve clinical knowledge, teamwork, communication, and procedural skills [2]. Advantages of simulation models include their ability to create specific and reproducible conditions (which may be used to objectively measure skill), permit repeated actions, and offer greater availability [3]. Skin simulation models in dermatologic surgery include cadavers, pig's feet, synthetic skin, and even virtual reality. A recent survey of program directors in dermatology revealed that 69% of programs utilize at least one simulation model, 34.5% of which use cadaveric models [1]. The applications of cadaveric simulations are vast. They can be used to teach and practice basic skills, including elliptical excisions and layered

closures, which are required competencies by the ACGME. They can also expose residents to less commonly performed procedures, such as nail surgery [4]. They may additionally prove useful for objectively measuring and tracking resident skills through the use of an assessment tool, such as the Objective Structured Assessment of Technical Skills, or OSATS. This validated tool has demonstrated utility in dermatologic surgery evaluation [5].

Our data, while limited by a small sample size and single center, supports previous findings that an interactive simulation model can make a positive impact in the education of dermatology residents. Residents not only gained knowledge and skills, but also confidence performing surgical procedures in a safe and supportive environment. Our data also indicates a significant knowledge gap between first- and second-year residents, which is indicative of the steep learning curve inherent to dermatology training. The cadaveric simulation provided an opportunity for new residents to begin closing that gap without compromising patient safety or satisfaction.

References

1. Dai J, Bordeaux JS, Miller CJ, Sobanko JF. Assessing surgical training and deliberate practice methods in dermatology residency: A survey of dermatology program directors. *Dermatol Surg.* 2016;42(8):977-84. [PMID: 27347633].
2. Okuda Y, Bryson EO, DeMaria S Jr, Jacobson L, Quinones J, Shen B, Levine AI. The utility of simulation in medical education: What is the evidence? *Mt Sinai J Med.* 2009;76(4):330-43. [PMID: 19642147].
3. Tavakol M, Mohagheghi MA, Dennick R. Tavakol M, Mohagheghi MA, Dennick R. Assessing the skills of surgical residents using simulation. *J Surg Educ.* 2008;65(2):77-83. [PMID: 18439524].
4. Clark MA, Yoo SS, Kundu RV. Nail surgery techniques: A single center survey study on the effect of a cadaveric hand practicum in dermatology resident education. *Dermatol Surg.* 2016;42(5):696-8. [PMID: 27054445].
5. Alam M, Nodzinski M, Yoo S, Poon E, Bolotin D. Objective structured assessment of technical skills in elliptical excision repair of senior dermatology residents: A multirater, blinded study of operating room video recordings. *JAMA Dermatol.* 2014;150(6):608-12. [PMID: 24622736].