Systematic Review on the Use of Fresh Frozen Cadavers in Procedural Skill Training of Medical Students

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INTRODUCTION

Cadaver dissection has been a cornerstone of anatomy education for centuries, offering students invaluable hands-on learning experiences. Limited exposure to procedural skills during medical studies hampers students' ability to appreciate the application of anatomy in modern medicine and contributes to their inadequate preparedness for residency. This review endeavors to fill this void, empowering educators to better prepare the next generation of physicians for the rigors of modern medical practice and facilitating their seamless transition into internship and subsequent professional stages.

- Programs have been piloted in research studies to allow not only the use of cadavers for teaching, but also for surgical skills training in medical schools.
- The use of fresh frozen cadavers has been proven effective in many studies at the residency level for specialty surgical training [1].

MODEL PROGRAMS

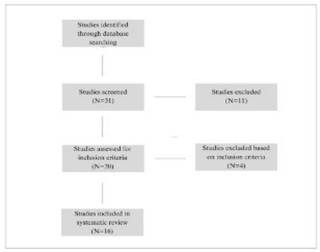
Lightly embalmed cadavers have also been used to further student's basic science knowledge by allowing students the opportunity to re-learn material in a hands-on approach.

- There have been a handful of studies done on the implications that such integration would have on student skill level and confidence.
- The reviewed articles provide data to address a hypothesized solution to a larger concern; the surgical/procedural skill level needed for a seamless transition to intern year of residency.

METHODS

The PubMed, JAMA, and Google Scholar databases were searched using pre-identified search terms for studies on the use of lightly embalmed/fresh frozen cadavers in medical student education, specifically in hands-on, procedural skills.

Inclusion and Exclusion Criteria



This table depicts the inclusion and exclusion criteria used. 31 studies were screened and 11 studies were excluded. 4 more studies were omitted due to being conducted at residency programs.

In each study the following measures were defined:

- Number of participants
- Pre-survey completion
- Post-survey completion
- Prior surgical/procedural experience
- P-value of confidence increase
- P-value of performance increase
- P-value of student knowledge
- Specialty training focused on
- Number of skills taught

RESULTS

The original search identified 31 reviews. This included the use of fresh frozen cadaver in residency programs and medical schools. 16 studies were used as the review solely focused on medical student education. Overall, the literature indicates that the use of fresh frozen cadaver in teaching or preparing for any procedure increases confidence, skill, and student knowledge.

Examples of Types of Skills Taught

- Suturing
- Cricothyroidotomy
- Thoracentesis
- Intubation
- Chest Tube Placement
- Arthrocentesis
- CVA placement
- Lumbar Puncture
- Harvesting Skin Grafts
- Cholecystectomy
- Appendectomy
- Small Bowel Anastomosis
- Hernia Repairs
- G-Tube Placement
- Colostomy Formation
- Amputation

Study	P-value:Student Confidence Increase	P-Value: Performance Increase	P-value: Student Knowledge
Brausch et al. 2022	0.002	N/A	<.001
Cervantes et al. 2017	<.001	<.001	<.001
DiMaggio et al. 2010	N/A	N/A	N/A
Ehrhardt et al. 2020	N/A	N/A	N/A
Kay et al. 2016	<.0001	<.0001	N/A
Manning et al. 2018	0.013	<.001	N/A
Miller et al. 2016	N/A	<.001	<.0001
Morgan et al. 2014	N/A	<.01-.06	<.01-.02
Nelson et al. 1993	N/A	N/A	N/A
Nematollahi et al. 2015	N/A	<.001	<.001
Ocel et al. 2006	N/A	N/A	N/A
Rothenberger et al. 2015	<.001	<.001	<.001
Schoeb et al. 2016	<.001	<.001	<.001
Thompson et al. 2016	<.001	N/A	<.001
Tocco et al. 2013	<.0001	N/A	<.0001
van der Vlugt et al. 2002	N/A	0.02	0.006

P-Values tabulated on measurable variables by pre and post survey completion of students. If N/A, the study did not utilize a pre and post survey. However, the feedback given from students followed the trend of showing perceived student benefit from the trial program of cadavers in procedural skill training.

CONCLUSION

This review of the literature serves to provide an overview of the data published on the use of lightly embalmed/fresh frozen cadavers for surgical skills training in medical school.

- It is necessary for further research to be conducted in obtaining lightly embalmed/fresh frozen cadavers at medical institutions. Further research should also be conducted based on individual medical school programs to identify the greatest need for training in procedural skill amongst the students there.
- The conclusions drawn from this systematic review show that the use of lightly embalmed/fresh frozen cadavers for surgical/procedural skills training in medical school increases confidence, skill, and knowledge.
- While the premise of body donation is based on the choice the donor made pre-mortem to serve as an educational tool to advance the field of medicine; it would be in the best interest of that principle and in the best interest of the student's learning experience to incorporate this model into the curriculum of our medical schools.

ACKNOWLEDGEMENTS

1. Levine RL, Kives S, Cathey G, Blinchevsky A, Acland R, Thompson C, Pasic R. The use of lightly embalmed (fresh tissue) cadavers for resident laparoscopic training. J Minim Invasive Gynecol. 2006 Sep-Oct;13(5):451-6. doi: 10.1016/j.jmig.2006.06.011. PMID: 16962531.

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