

Assessing the effectiveness of a cadaveric workshop in improving resident physicians' confidence in performing ultrasound-guided joint injections

Évaluation de l'efficacité d'ateliers de simulation sur cadavre pour renforcer la confiance en soi des médecins résidents pour réaliser des injections articulaires échoguidées

Jane Thornton,¹ Ahmed Mahdi,¹ Lydia Schultz,¹ Graham Briscoe¹

¹Schulich School of Medicine & Dentistry Department of Family Medicine, Western University, Fowler Kennedy Sport Medicine Clinic, Ontario, Canada

Correspondence to: Jane Thornton; Schulich School of Medicine & Dentistry Department of Family Medicine, Western University, Fowler Kennedy Sport Medicine Clinic, 3M Centre Western University London, ON, Canada N6A 3K7; phone: (519) 661-3011; fax: (519) 661-3379; email: jsthornt@uwo.ca

Edited by: Marcel D'Eon (editor-in-chief)

Published ahead of issue: Aug 2, 2023; published: Dec 30, 2023. CMEJ 2023, 14(6) Available at <https://doi.org/10.36834/cmej.77293>

© 2023 Thornton, Mahdi, Schultz, Briscoe; licensee Synergies Partners. This is an Open Journal Systems article distributed under the terms of the Creative Commons Attribution License. (<https://creativecommons.org/licenses/by-nc-nd/4.0>) which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is cited.

Implication Statement

Our study showed that an educational workshop using a cadaveric specimen is effective in improving resident physicians' confidence in performing ultrasound-guided, as well as landmark-based, joint injections. Participants also reported a strong interest in future cadaveric workshops on ultrasound-guided joint injections and believe such workshops would be a valuable educational resource for other physicians. Implementing cadaver-based ultrasound-guided joint injection workshops similar to the one discussed in this manuscript could be used to supplement training for these procedures in medical education and provide residents with the early experience they need to be able to perform these injections independently in clinic settings.

Énoncé des implications de la recherche

Notre étude montre que les ateliers de simulation sur cadavre aident les médecins résidents à acquérir de l'assurance pour pratiquer des injections articulaires guidées par échographie et repères anatomiques. Les participants ont également fait part de leur vif intérêt pour refaire des ateliers de simulation sur cadavre portant sur les injections articulaires échoguidées et estiment que de tels ateliers constitueraient une ressource éducative précieuse pour d'autres médecins. De tels ateliers sur les injections articulaires échoguidées sur cadavres peuvent être organisés en complément à la formation sur ces interventions et permettre aux résidents d'acquérir de l'expérience pratique tôt dans leur formation pour être en mesure de réaliser ces injections de manière indépendante en contexte clinique.

Introduction

The use of ultrasound-guided joint injections has greatly increased with the advent of point of care ultrasound (POCUS). Traditionally, these injections have been performed using a landmark-based approach, which can have considerably lower accuracy, or in a hospital-based setting under fluoroscopy, which is expensive and resource-intensive.¹ With the advent of POCUS, any joint injections can now be performed under ultrasound-

guidance in an outpatient clinic setting, which improves both accuracy and healthcare cost.² There is limited time to learn technical procedures during medical training, and there is some concern patient safety is jeopardized when students perform their first procedures on patients,³ yet physicians are still expected to become proficient in numerous interventions. Simulations can provide a controlled environment for learning critical procedures that can result in reduced complications⁴ and cadaver-based simulations confer advantages such as more realistic

anatomy and tissue consistency.⁵ Our aim was to assess the effectiveness of an educational workshop using a cadaveric specimen in improving resident physicians' confidence in performing ultrasound-guided injections.

Description of the innovation

A two-hour educational workshop led by the study team consisted of a presentation, followed by a demonstration of joint assessment using ultrasound and four ultrasound-guided joint injections on two cadaveric specimens: acromioclavicular, glenohumeral, suprapatellar recess, and ankle. Thirteen family medicine residents participated. The primary outcome was resident physicians' confidence in performing ultrasound-guided joint injections pre- and post-workshop. Secondary outcomes included resident physicians' beliefs regarding the effectiveness of a cadaveric workshop to learn ultrasound-guided joint injections, interest in educational cadaveric workshops to learn these injections, and confidence in performing landmark-based injections in their future practice pre- and post-workshop. We administered a 17-item survey with 5-point Likert-type scale pre- and post-workshop and analyzed using descriptive statistics. We compared pre- and post-workshop scores for paired questions using the Wilcoxon signed rank test. We obtained ethics approval from the Western University Health Science Research Ethics Board (ID:118747) and received written informed consent from all participants.

Outcomes

Participant confidence significantly increased for all ultrasound-guided and landmark-based joint injections (see Table 1). All participants indicated the cadaveric workshop was a realistic and effective method to learn. Participants also reported a strong interest in future cadaveric workshops on ultrasound-guided joint injections and believed such workshops would be a valuable educational resource for other physicians.

Suggestions for next steps

The present study showed that an educational workshop using a cadaveric specimen is effective in improving resident physicians' confidence in performing ultrasound-guided, as well as landmark-based, joint injections. Implementing cadaver-based ultrasound-guided joint injection workshops similar to the one discussed in this

manuscript could be used to supplement training for these procedures in medical education and provide residents with the early experience they need to be able to perform these injections independently in clinic settings. Our study assessed increase in participant confidence, but not competency performing injections. It also did not assess the durability of confidence and skill retention post-workshop or in a clinical setting. Future studies are needed to determine translation into improved clinical skills and patient outcomes.

Table 1. Statistically significant gains in participant confidence in all areas studied

Injection Type	Pre-workshop Mean	Post-workshop Mean	Wilcoxon Signed Rank Test
US-guided	1.85 ± 0.77	4.00 ± 0.55	z=-3.12 p=0.001
Landmark	2.15 ± 0.77	3.92 ± 0.27	z=-3.06 p=0.002

US-guided	Pre-workshop Mean	Post-workshop Mean	Wilcoxon Signed Rank Test
AC	1.46 ± 0.75	4.15 ± 0.53	z=-3.12 p=0.001
GH	1.54 ± 0.63	3.54 ± 0.75	z=-3.06 p=0.002
Knee	1.42 ± 0.49	4.31 ± 0.61	z=-3.12 p=0.001
Ankle	1.54 ± 0.50	4.15 ± 0.36	z=-3.12 p=0.001

US-guided: Ultrasound guided; AC: acromioclavicular; GH: glenohumeral.

Conflicts of Interest: The authors have no conflicts of interest to declare.

Funding: This study was supported by the Chair's Research Support Fund, Department of Family Medicine, Western University.

Acknowledgements: Western University Schulich School of Medicine and Dentistry Department of Family Medicine, Western University Body Bequeathal Program.

References

1. Bee WW, Thing J. Ultrasound-guided injections in primary care: Evidence, costs, and suggestions for change. *Br J Gen Pract.* 2017;67:378-379. <https://doi.org/10.3399/bjgp17X692117>
2. Daniels EW, Cole D, Jacobs B, Phillips SF. Existing Evidence on Ultrasound-Guided Injections in Sports Medicine. *Orthop J Sports Med.* 2018;6(2). <https://doi.org/10.1177/2325967118756576>
3. Walker A. Teaching junior doctors practical procedures. *BMJ.* 1991;302:306. <https://doi.org/10.1136/bmi.302.6772.306>
4. Ma IWY, Brindle ME, Ronksley PE, Lorenzetti DL, Suave RS, Ghali WA. Use of stimulation-based education to improve outcomes of central venous catheterization: a systematic review and meta-analysis. *Acad Med.* 2011;86(9):1137-47. <https://doi.org/10.1097/ACM.0b013e318226a204>
5. Hoyer R, Means R, Robertson J, et al. Ultrasound-guided procedures in medical education: a fresh look at cadavers. *Intern Emerg Med.* 2016;11:431-436. <https://doi.org/10.1007/s11739-015-1292-7>