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, Ahmed Mahdi, Lydia Schultz and Graham Briscoe

Article abstract

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.
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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. 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>
<thead>
<tr>
<th>Injection Type</th>
<th>Pre-workshop Mean</th>
<th>Post-workshop Mean</th>
<th>Wilcoxon Signed Rank Test</th>
</tr>
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<tbody>
<tr>
<td>US-guided</td>
<td>1.54 ± 0.55</td>
<td>4.00 ± 0.55</td>
<td>z=3.12 p=0.001</td>
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<tr>
<td>Landmark</td>
<td>2.15 ± 0.57</td>
<td>3.62 ± 0.57</td>
<td>z=3.06 p=0.002</td>
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</tbody>
</table>


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

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References