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## A novel anatomy and ultrasound curriculum improves physiatry resident confidence with ultrasound-guided musculoskeletal and spasticity procedures

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### Implication Statement

Our novel anatomy and ultrasound curriculum, integrating cadaver lab sessions and ultrasound workshops, enhances resident knowledge, confidence, and competence with ultrasound-guided procedures. Physiatry educators can adopt this longitudinal approach, incorporating spaced repetition and peer learning, to improve ultrasound training. Implementing this curriculum may lead to increased proficiency in ultrasound-guided procedures among residents. For programs without access to a cadaver lab, the curriculum can be modified by using available anatomical models or online cadaveric dissection videos. The minimum resources for programs wishing to implement a similar curriculum include an ultrasound machine and a faculty member for instruction.

# Un nouveau programme d'enseignement en anatomie et échographie améliore la confiance des résidents en physiatry dans les procédures musculosquelettiques et de spasticité guidées par échographie

## Énoncé des implications de la recherche

Notre nouveau programme d'anatomie et d'échographie, intégrant des séances de laboratoire sur cadavres et des ateliers d'échographie, améliore les connaissances, la confiance et les compétences des résidents dans les procédures guidées par échographie. Les enseignants en physiatry peuvent adopter cette approche longitudinale, qui inclut la répétition espacée et l'apprentissage entre pairs, pour renforcer la formation en échographie. Sa mise en œuvre peut accroître la maîtrise des procédures guidées par échographie chez les résidents. Pour les programmes sans accès à un laboratoire de dissection, le programme peut être adapté en utilisant des modèles anatomiques ou des vidéos de dissection en ligne. Les ressources minimales nécessaires pour un programme similaire sont un appareil d'échographie et un membre du corps enseignant pour dispenser la formation.

## Introduction

In physiatry, ultrasound is used to guide musculoskeletal injections, chemodenervation, and perineural procedures.<sup>1-2</sup> Its primary benefit is improved needle placement accuracy, which theoretically enhances safety and efficacy.<sup>3</sup> Ninety-seven percent of Canadian physiatry residents want to use ultrasound; however, training access remains limited and it is not a core competency of residency training.<sup>4</sup> To address this gap, the University of Saskatchewan Physiatry Residency Program developed an innovative approach for teaching procedural anatomy and ultrasound. Our study evaluated the influence of this novel approach to anatomy and ultrasound training on resident knowledge, confidence, and competence.

## Description of innovation

The longitudinal curriculum consists of five sessions, integrating instruction from residents, physiatrists, and anatomists. The sessions are spread throughout the year and repeat annually for all residents. Sessions feature morning cadaver labs and afternoon ultrasound workshops (Figure 1). In the lab, anatomists

detail osteology, muscle insertions, and neurovascular structures using cadaver specimens and models. Resident-leads pose clinical questions, and physiatrists add clinical context. In the afternoon, physiatrists or senior residents demonstrate ultrasound views, followed by hands-on practice. Notably, the cadaver lab is not used for scanning or injection practice.

The program runs with a total time commitment of 15 hours per year from anatomists and up to 35 hours per year from interested physiatrists, none of whom are directly compensated through program funding. Three ultrasound machines (2 Sonosite PX machines and 1 Sonosite M-Turbo machine) were accessed, from a private practice, at no cost. The only tangible costs were for travel from neighboring cities and lunch, totaling \$2,032.52 per year.

We were granted ethics exemption by the University of Saskatchewan, Research Ethics Board and operational approval by the Research Department of the Saskatchewan Health Authority. We obtained informed written consent from all participants.

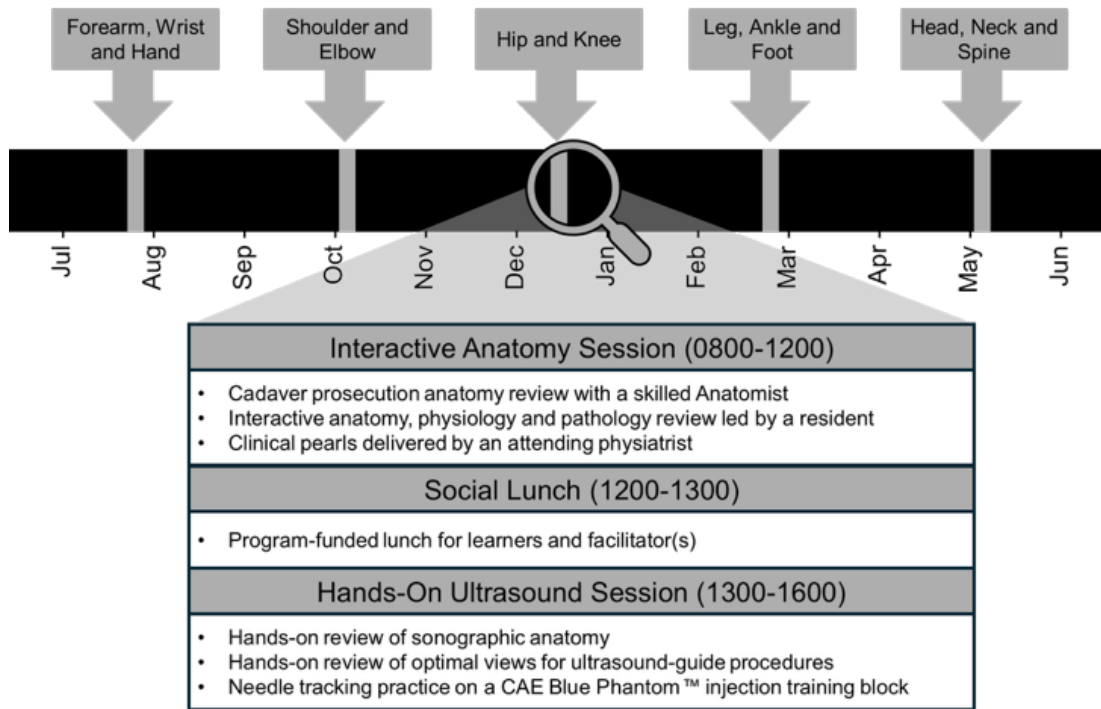


Figure 1 The distribution of topics across the annual

## Outcomes

We collected survey data at the end of the 2023-2024 academic year from physiatry residents ( $n = 9$ ) and physiatrists ( $n = 9$ ) using the Research Electronic Data Capture system. We utilized a mixed-methods approach, combining thematic analysis and quantitative reporting.<sup>5</sup> Quantitative responses were primarily gathered by rating agreement with provided statements, on a 5-point Likert scale.

The curriculum was perceived to enhance multiple learning domains, including knowledge and procedural skills. Residents reported increased knowledge and confidence in both anatomy and ultrasonography, and faculty agreed that resident competence improved. For their respective training levels, 78% of physiatrists found residents competent in ultrasound-guided musculoskeletal procedures, and 67% found them competent in spasticity procedures.

All resident participants planned to utilize ultrasound in their future practice (yes-no question). The results also highlighted areas for improvement: 78% of residents felt they needed additional ultrasound training (yes-no question), and 33% identified a lack of sufficient needle-tracking instruction. Appendices A-C provide key results and are available on request. Figure 2 shows the relationship between themes and elements of the quantitative analysis, visualized in a thematic map.

## Suggestions for next steps

Residents and physiatrists reported that incorporating high-fidelity phantoms and allotting time to practice needle tracking would further improve the curriculum. Our next steps include the dissemination of these findings to other Canadian physiatry programs and launching a quality improvement initiative to address needle-tracking instruction.

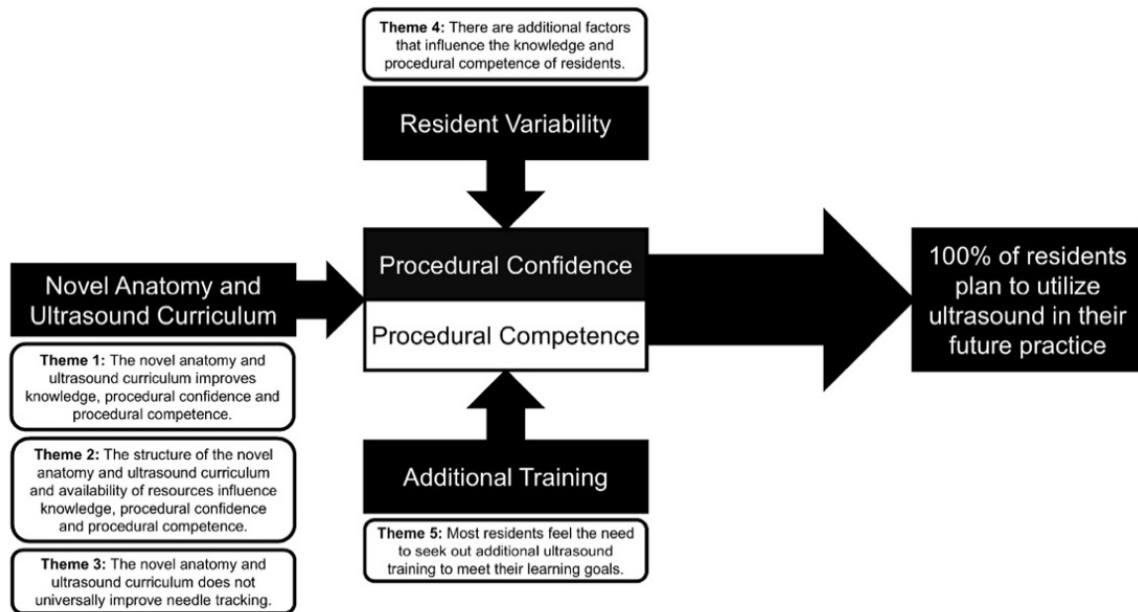


Figure 2. The relationship between themes and elements of the quantitative analysis

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The authors have no competing interests to declare.

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