

## Evaluation of simulation-based ultrasound course for pediatricians: a starting point for future training curriculum

### To the editor

As a convenient and cost-effective tool with no ionizing radiation, the role of diagnostic ultrasound in pediatrics has expanded over the past decades.<sup>1)</sup> In addition to that, its real-time properties allow guidance in interventional procedures, leading to a higher success rate with decrease in complications.<sup>2)</sup> In some countries, point of care ultrasound has been incorporated into the pediatric training curriculum, highlighting its importance in patient care.<sup>3)</sup> Currently, there is no standardized ultrasound training program for pediatric trainees in our locality. With an aim to enhance ultrasound imaging proficiency in pediatric doctors, we had liaised with radiologists in our hospital to conduct short training sessions on ultrasound scans. Questionnaires were distributed to the participants to evaluate the course effectiveness.

Two identical 3-hour training sessions, which were provided by radiologists and radiographer, were held on 2 consecutive mornings in 2021. There were 2 components in each session. The first part was a 1-hour lecture hosted by a radiologist, focusing on the basics of ultrasonography and abdominal ultrasound interpretation. In the second part, the participants were divided into 4 groups (4–5 participants per group) and joined 4 hands-on stations, spending 30 minutes in each station. The stations included (1) abdominal simulation model without pathology, (2) abdominal simulation model with pathologies, (3) ultrasound of neck vessels on a human model, and ultrasound-

guided central venous catheter insertion on simulation model, and (4) case scenario discussion with image interpretation. In the last station, ultrasound videos of medical conditions such as deep vein thrombosis, pericardial effusion, intussusception, and hemoperitoneum were played after probe placement on the simulation model.

To evaluate the course effectiveness, particularly in junior doctors, a precourse self-rated assessment was completed by the pediatric trainees (year 1 to 6) before the training session. The trainees rated their confidence in ultrasound image interpretation, ultrasound-guided central venous catheter insertion, as well as their preference to perform bedside ultrasound assessment before radiology consultation in a scale from 1 to 10. Using paired t tests, the results were then compared to the postcourse evaluation results. In addition, a questionnaire was also distributed to all participants (pediatric trainees and specialists) to evaluate the course design and learners' satisfaction for future program improvement. A Likert scale from 1 to 5 (indicating strongly disagree, disagree, neutral, agree, or strongly agree) was applied to the questions.

Thirty-four pediatric doctors (18 specialists and 16 trainees) participated in the training sessions, the majority (64.7%) had less than 10-year experience in pediatrics. Thirty-two participants (94.1%) completed the course evaluation. All responders agreed that simulation was an effective mode of education (agree, 18.8%; strongly agree, 81.3%), and the vast majority

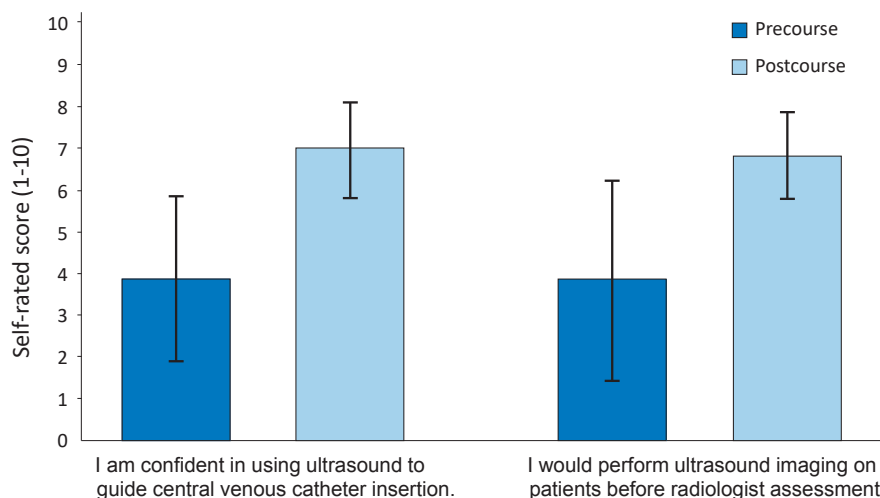


Fig. 1. Pre- and postcourse comparisons of pediatric residents.

reported that the course would enhance their clinical practice (neutral, 3.1%; agree, 12.5%; strongly agree, 84.4%).

Sixteen pediatric trainees (year 1 to 6) attended the sessions, and all completed the extra precourse and postcourse self-rated assessments. The self-rated confidence in abdominal ultrasound interpretation improved after the course (mean±standard deviation: pretest, 2.7±1.6; posttest, 6.6±1.4). Furthermore, they were more confident in ultrasound-guided central venous catheter insertion, and reported a higher preference in performing ultrasound scans before radiologist assessment (both  $P < 0.001$ ) (Fig. 1).

Our first experience of pediatrician-targeted ultrasound training received promising feedback. This type of interactive learning mode was also welcomed by participants in other simulation programs.<sup>4)</sup> Consistent with other reviews, our analysis demonstrated enhancement in self-confidence after simulation training.<sup>4,5)</sup> Besides, our evaluation revealed a new finding that pediatric residents were more willing to perform ultrasound imaging on patients before assessment by radiologist. Lack of confidence and concern of misdiagnosis are possible obstacles for pediatrician-performed imaging. Bedside ultrasound scans by pediatricians can supplement extra information, on top of presenting history and clinical findings, to aid making timely diagnosis. Ultrasound scans performed by the pediatric team are particularly useful in emergencies with high sonographic sensitivity and/or specificity, such as intussusception and deep vein thrombosis, to facilitate prompt interventions. This would hopefully extend the scope of ultrasound service that could be provided by the pediatric team, in addition to the existing echocardiogram and neonatal cranial ultrasound care. Further auditing can be useful to evaluate and maintain the quality and effectiveness of the ultrasound scans. However, despite its usefulness in clinical settings, pediatricians should also recognize the limitations of diagnostic ultrasound. Further discussion with radiologists and consideration of other imaging modalities may be warranted.

Simulation-based ultrasound training allows repeated demonstration from the instructors, as well as practice from the learners till the skills are mastered. More importantly, doctors are able to sharpen their skills in invasive procedures on the manikins first, without doing harm to patients. The combination of didactic and hands-on training on simulators has been successful in improving doctors' procedural performance.<sup>6)</sup> Furthermore, small-group learning (4–5 participants per group) is pivotal in these simulation-based programs, as it allows adequate time for hands-on practice and prompt guidance from the instructors.

There are limitations in the ultrasound training sessions. Simulation models cannot fully replace the learning experiences from real patients. This is particularly true in ill pediatric patients, who may require extra effort in establishing rapport and minimizing discomfort during imaging. Concerning the evaluation, we could only demonstrate the increment in self-confidence in a self-rated assessment; its translation to clinical practice improvement was uncertain. An objective skill

assessment can provide a better outcome indicator in evaluating the participants' competencies and the course effectiveness.

Nonetheless, our evaluation demonstrated that simulation-based training is widely accepted by our trainees, and showed remarkable improvement in self-assessment in different domains. It can be considered as part of the pediatric training curriculum in the future.

See the commentary “Is it time to add point-of-care ultrasound education to pediatric residency curriculum?” via <https://doi.org/10.3345/cep.2021.01060>.

### Key message

**Question:** Simulation-based ultrasound training is becoming more popular. Is there a role for pediatricians in such training programs?

**Finding:** Our program received promising feedback from its participants. Self-rated confidence in image interpretation and ultrasound-guided catheter insertion improved after the simulation. Participants reported a higher preference for performing ultrasound scans before radiologist assessment.

**Meaning:** Ultrasound training can be considered as part of the pediatric training curriculum in the future.

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### Footnotes

Conflicts of interest: No potential conflict of interest relevant to this article was reported.

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