

Science Letter

Development of a direct observation of procedural skills tool for gastric ultrasound

Point-of-care gastric ultrasound is used to determine pulmonary aspiration risk by assessing gastric content and volume before induction of general anaesthesia, sedation or tracheal extubation. However, there is little information on the ideal methods to teach or provide feedback for learning gastric ultrasound. An analysis to determine gastric ultrasound learning curves predicted that 33 scans performed under supervision with feedback was required to achieve a 95% success rate in qualitative assessment [1].

In our institution, we developed the first gastric ultrasound workshop in Australasia, consisting of directed pre-reading; formative multiple-choice questions; didactic teaching; hands-on skills teaching; scanning multiple individuals in various gastric states; observation of scanning by peers; structured reporting of images and videos; and formative objectively structured clinical examination stations. Early on we discovered that generic direct observation of procedural skills (DOPS) tools failed to meet our requirements for delivering effective formative feedback. We therefore sought to develop a specific DOPS tool by reviewing descriptions of performing gastric ultrasound to determine items deemed necessary for the delivery of this procedural skill.

We performed a literature review to identify publications relevant to performing point-of-care gastric ultrasound. We used the indication, acquisition, interpretation and medical decision-making (I-AIM) model [2], to determine if a paper described the technique of performing gastric ultrasound. All four domains of the I-AIM model were required to be present for a paper to be classed as containing a complete description. Data synthesis focused on qualitative content analysis of descriptions of performing gastric ultrasound to identify items for inclusion in a DOPS checklist. These were then selected based on frequency, relevance and applicability, and iteratively reduced to remove redundant items.

We screened 404 abstracts and included 82. A further 27 were identified from bibliographic review and three based on the authors' collective knowledge. Full-text review of these 112 records identified 69 documents included for data analysis. Data synthesis coded according to the I-AIM model identified 20 items in four domains (Table 1) over a series of iterations. Using these items, a DOPS

tool with further annotations was developed for use in gastric ultrasound workshops (see online Supporting Information Appendix S1). As the intent of the DOPS tool was to aid learning, a checklist was incorporated to guide feedback conversations. The DOPS tool was piloted at local gastric ultrasound workshops with positive feedback from instructors on applicability, face validity and feasibility.

The DOPS form incorporates a 20-item checklist to guide feedback discussion and annotations to aid the assessor in making judgements on performance. The use of the I-AIM model expands the application of the DOPS tool beyond mere technique and manual skill, incorporating elements such as communication, professionalism, data interpretation and knowledge application. A recently developed generic point-of-care DOPS tool contains a 31-item checklist, with 16 items deemed critically important [3]. A checklist for gastric ultrasound education and training based on the I-AIM framework was published after the completion of our work [4]. However, checklist items focused on learner knowledge and data interpretation, omitting practical elements such as patient interaction, professionalism and scanning preparation.

Achieving an acceptable level of competence in performing a procedural skill requires experience through a variable number of attempts depending on complexity of the skill, quality of teaching and feedback and learner aptitude [5]. We developed this DOPS tool to facilitate assessment for learning and developmental feedback in gastric ultrasound. Checklists in DOPS tools break a procedure down into its component parts and typically assign dichotomous outcomes. They improve reliability, confer construct validity and improve feasibility [5].

This DOPS tool can also be used in the clinical setting, similar to other workplace-based assessments. Workplace-based assessments are an ideal instrument to facilitate learning in the clinical environment, with the critical element being provision of feedback to the learner [6]. At the initial competency acquisition stage, workplace-based assessments are superior to logbooks as the latter do not reflect the level of performance or ensure provision of feedback to aid learning. When learners are supervised and observed performing procedures in the clinical setting, they may not necessarily receive appropriate feedback to aid

Table 1 Items for inclusion in gastric ultrasound direct observation of procedural skills (DOPS) checklist

Domain	Item
Indication	Clinical
	1 Identifies appropriate indication to perform gastric point-of-care ultrasound
	Patient
	2 Introduces self to patient, describes procedure, explains rationale
Acquisition	3 Obtains verbal consent
	4 Maintains patient privacy, modesty and comfort at all times
	Set-up
	5 Ergonomic positioning of equipment and operator, in relation to patient
	6 Machine: appropriate settings, correct transducer, uses acoustic medium
	7 Positions patient appropriately and exposes upper abdomen
	Scanning technique
	8 Identifies surface anatomy through manual palpation
	9 Performs survey scan
	10 Identifies pertinent structures
	11 Optimises image by adjusting probe position, machine settings or patient factors
	12 Identifies antrum at level of aorta, using Doppler to confirm
	13 If clear fluid content, measures antral cross-sectional area in right lateral decubitus position
Interpretation	14 Describes image using pattern recognition
	15 If clear fluid present, estimates gastric volume
	16 Correctly determines grade of antrum
Medical decision-making	17 Determines clinical context
	18 Grades image analysis
	19 Determines aspiration risk based on findings
	20 Formulates plan based on findings

learning [7]. The use of a DOPS tool in the workplace allows for a structured feedback discussion based on items in the checklist.

As our tool was not designed with high-stakes assessments in mind, there is no weight of importance assigned to individual items or a formal grading system. To utilise the DOPS tool for high-stakes or summative assessment, further evaluation is required to determine its reliability, construct validity and predictive validity. A global assessment component may also be incorporated.

To our knowledge, this is the first DOPS tool developed specifically for point-of-care gastric ultrasound. Further evaluation is required to use this tool as a formal workplace-based assessment instrument in specialty training or in high-stakes assessments.

Acknowledgements

The authors acknowledge Dr M. Ku, Dr S. Wall and Dr F. McDonagh for their contribution in providing

feedback on the DOPS tool in gastric ultrasound workshops. NS convenes a gastric ultrasound workshop at his institution. NS and CW have taught on multiple gastric ultrasound workshops. No other competing interests declared.

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doi:10.1111/anae.15676

Supporting Information

Additional supporting information may be found online via the journal website.

Appendix S1. Point-of-care gastric ultrasound direct observation of procedural skills (DOPS) form.