

Impact of an intensive ultrasound block on trainee competence



Introduction

Ultrasound training is complex and the learning curve can be steep. Within the current clinical climate there is ever increasing pressure on departments to optimise the efficiency of their ultrasound service. This can in turn put pressure on training. Lack of training opportunities, particularly early in training may create potential for poor engagement with ultrasound and possibly early skill fade¹. It is increasingly important therefore that we deliver ultrasound training that is effective for trainees, and helps them achieve competence as early in their training as possible, whilst minimising impact on service provision.

Training

In our institution ST1 ultrasound training is multifaceted, involving simulator training, small group tutorials and small group clinical cases in addition to clinical supervised scanning, which all run alongside other modality learning. Two years ago we introduced a dedicated intensive month long ultrasound block, which all trainees rotated through during the first year of training. This block consists of 5 US sessions a week, compared with 1 or 2 during the rest of the year.

Assessment

Trainees are assessed utilising a standardised assessment template (fig 1) after 10 months of training when most but not all trainees have rotated through the block.

The assessment template scores each item as below:

- 1- does not attempt skill
- 2- attempts with limitations
- 3- demonstrates basic competence
- 4- familiar with and competent at skill

Assessment tool

Ultrasound simulator clinical assessment tool

Trainee no: _____
Date assessment performed: _____

Please assess trainees according to the following criteria:
Level 1 - Trainee fails to attempt assessed skill
Level 2 - Trainee attempts the skill but with limitations
Level 3 - Trainee demonstrates basic competence at the assessed skill
Level 4 - Trainee demonstrates familiarity with and competence at skill with awareness of diagnostic limitations

General Skills			
Domain	Skill	Not Achieved	Achieved
Communication skills	Introduces self to patient		
	Users appropriate probe		
Use of equipment	Selects appropriate preset		
	Hand washing		
Hygiene	Cleans probe		
	Positions self in relation to the patient to reduce risk of operator strain		
Ergonomics			

Ultrasound Technique					
Organ	Skill	Level 1	Level 2	Level 3	Level 4
Pancreas	Attempt at visualising the entire pancreas				
	Appropriate use of depth, gain, focal zone				
Liver	Whole volume scanned				
	Images acquired in different planes to maximise visualisation				
	Adapts positioning/uses breathhold if appropriate				
	Portal vein identified with colour Doppler				
	Portal vein velocity measured				
	CBG identified and measured				
Gall bladder	Whole volume scanned				
	Images acquired in 2 planes				
	GB scanned with patient in 2 positions				
	Appropriate use of depth, gain, focal zone				

Overall Competence					
Domain	Skill	Level 1	Level 2	Level 3	Level 4
Communication Skills	Clear explanation and communication throughout examination				
	Efficient navigation of ultrasound machine, demonstrating familiarity with the controls and appropriate use, whilst scanning				
General competence	Demonstrates ability to adapt examination to situation, responding to cues from patient				
	Shows familiarity with options for patient positioning/scan techniques to maximise quality of examination				

Assessor initials & date: _____

Figure 1

Method

12 ST1 trainees were assessed after 10 months of ultrasound training. This consisted of simulator training, small group tutorials, a weekly case based meeting, and case based teaching sessions in addition to clinical scanning sessions. These sessions were the same for all trainees. 9 trainees had also completed an intensive ultrasound block of 5 clinical sessions a week for a month, in addition to 4 months of 1 or 2 sessions a week. 3 trainees had had 5 months of 1-2 sessions a week. Assessment scores were combined to generate a mean value for each organ. A mean score was also generated for the overall skills including:

- Good communications skills
- Efficient navigation of the ultrasound machine
- Techniques to optimise image

This is a skillset difficult to quantify but that demonstrates a degree of competence beyond the basic identification of structures.

A t test was used to assess the differences between those trainees who had undertaken an intensive training block in ultrasound compared with those who had conventional training only.

The null hypothesis was that an intensive ultrasound block would have no impact on subsequent assessed performance. This was considered disproved at a p value of 0.05 or less.

Results table

	Intensive ultrasound block	Mean Score	Std. Deviation	P value	Significant?
Renal tract	No	2.942	0.532	0.012	Yes
	Yes	3.404	0.328		
Liver and biliary	No	2.800	0.365	0.028	Yes
	Yes	3.315	0.373		
Spleen	No	2.667	0.816	0.704	No
	Yes	2.867	0.941		
Pancreas	No	2.125	0.250	0.0006	Yes
	Yes	3.167	0.615		
Retroperitoneum	No	2.389	0.490	0.23	No
	Yes	2.708	0.567		
Overall competence	No	2.667	0.376	0.016	Yes
	Yes	3.167	0.428		
Combined scores	No	2.768	0.370	0.004	Yes
	Yes	3.250	0.350		

Images

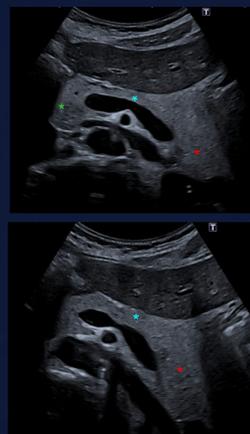
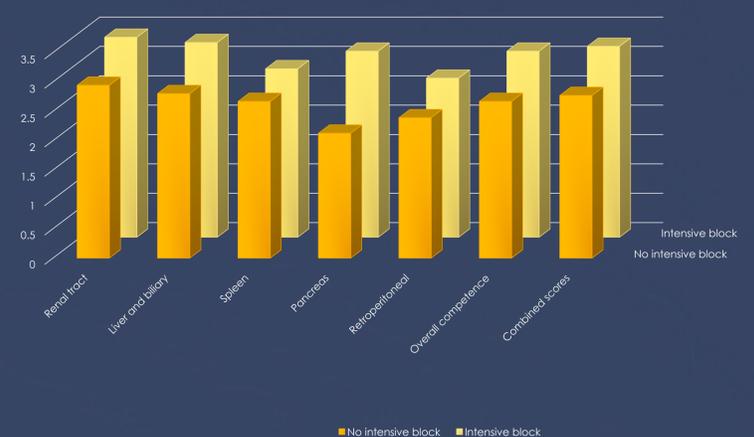


Figure 2

Pancreatic views that trainees were expected to obtain, demonstrating pancreatic head (*), body(*) and tail (-).

Trainees who had completed an intensive block performed this task with a greater skill than those who had not.

Mean assessment scores by organ



Results

The difference between the groups does not reach statistical significance in the retroperitoneal or the spleen domains. The other differences reach statistical significance and that significance is greatest within the pancreatic ($p=0.006$), renal tract ($p=0.012$), and overall competence ($p=0.016$) domains. The mean of the combined scores between groups is also statistically significant ($p=0.004$).

Discussion

The results show that the dedicated ultrasound training block increases trainees' assessment scores in multiple domains. This could be accounted for by the increased volume of clinical scanning experience in those who had completed the intensive block. Presuming a proportional relationship (not necessarily correct) between amount of training and score then we would expect trainees who had had more training to score higher. Nonetheless confirmation that the intensive ultrasound block does improve trainees' scanning abilities is useful and indicates the need continue to include this in our institution's training programme.

The biggest difference was seen in assessment of the pancreas. This is a more complex organ to scan, requiring skill, repositioning and an awareness of particular positions/techniques.

A significant difference was not demonstrated within the retroperitoneal domain, assessment of which included Isikoff's view of the aorta and renal arteries (fig 3). This was originally included as a discriminator, but both groups performed equally poorly on this skill with a mean score of 1.8 (raw data) indicating that many trainees did not even attempt to obtain this view. This globally poor score could be interpreted as implying that trainees are not adequately taught to do this, i.e a deficiency in the training programme.

The higher overall competence scores may reflect the increased familiarity that trainees with more experience have acquired with the mechanics of the ultrasound machines. However this domain particularly may be confounded by the different localities (and therefore different machines) that they were scanning in and with immediately prior to assessment. Whilst all trainees scanned during their intensive ultrasound block on the same machines that they were assessed on, some would have had their intensive ultrasound block longer ago than others. In this case, some trainees would have been scanning on a weekly basis using other machines prior to the assessment.

References

1. Dubbins P. Radiology academies. *Clinical Radiology*. 2011 Apr;66(4):385-8 Available at <http://dx.doi.org/plymouth.idm.oclc.org/10.1016/j.crad.2010.11.007> [Accessed 05 Nov 17].

Isikoff's view



Isikoff's view of the aorta and origins of the renal arteries- a longitudinal transhepatic view with the patient in a left lateral decubitus position. This was not well performed by either cohort.

Figure 3

Conclusion

Trainees who had undergone an intensive training block within the curriculum were assessed as having better overall competence, higher average scores and specifically higher scores in the more complex task of pancreatic assessment, when assessed using a standardised assessment tool. This suggests that there is therefore benefit to continuing this method of training for our ST1 trainees.