# Are we failing our trainees in providing opportunities to attain procedural confidence?

***Practical procedures play a crucial role in clinical outcome. High proportions of Mersey trainees report a lack of procedural confidence despite the fact that the majority want to perform more procedures. Training has to be carefully analysed to address these shortcomings.***

## Background

Practical procedures play a crucial role in clinical outcome (Allery, 2009). The UK Joint Royal Colleges of Physicians Training Board (2009) outlines practical competency requirements for trainees. Procedures commonly performed in a hospital setting include central venous catheter insertion, lumbar puncture, pleural aspiration, ascitic aspiration and intercostal chest drain insertion (Connick et al, 2009). Some procedures require allied training in ultrasound to maximize safety (Joint Royal Colleges of Physicians Training Board, 2009).

The core medical training curriculum (Joint Royal Colleges of Physicians Training Board, 2009) specifies that by the end trainees should:

- Be clinically independent in lumbar puncture, nasogastric tube insertion, ascitic and pleural tap
- Have completed skills lab training or have had satisfactory supervised practice in central venous catheter insertion, direct current electrical cardioversion and intercostal chest drain insertion, with ultrasound guidance for pleural effusion.

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The general internal medicine curriculum (Joint Royal Colleges of Physicians Training Board, 2009) expects registrars to:

- Be clinically independent in direct current electrical cardioversion and ascitic aspiration
- Insert a central venous catheter and perform intercostal drainage of pneumothorax either independently or with supervision by the end of general internal medicine training
- Have completed skills lab training for ultrasound-guided intercostal drainage of pleural effusion by the end of general internal medicine training.

Procedural competence is acquired in stages: conceptualization, visualization, verbalization, ending with practice and feedback (Allery, 2009). This balanced feedback with a phased withdrawal of supervision allows for the transition into an independent practitioner (Allery, 2009). The link between confidence and procedural competence is complex and their correlation has been reported to be poor (Barnsley et al, 2004). Most medical education programmes nevertheless rely on trainees to self-identify and prioritize their educational needs in order to drive improvement (Hays et al, 2002). Trainees are expected to work within limits of their competence (General Medical Council, 2013) and their confidence affects willingness to perform procedures and ability to assess their skills and ask for support (Hays et al, 2002). Further, a lack of confidence can in itself adversely affect performance (Byrne et al, 2005).

The decline in the number and variety of practical procedures performed by general internists has led to shortfalls in training opportunities (Wigton and Alguire, 2007). A survey of core medical trainees confirmed that procedural exposure is lacking (Tasker et al, 2013). This can be attributed to changes in practice of general internal medicine, increases in regulatory oversight, technological advances, greater availability of procedure-oriented services (Wigton and Alguire, 2007), concerns for maximizing patient safety and altered working patterns (General Medical Council, 2013; Tasker et al, 2013).

A regional online survey was undertaken to:

1. Explore general attitudes towards procedural education and skills
2. Assess trainee procedural confidence
3. Explore the procedural training and procedural exposure
4. Demonstrate whether there is a correlation between procedural confidence and exposure.

## Methods

The authors performed a regional survey of core medical training trainees and specialty registrars at the end of their training year in the Mersey Deanery from June to August 2013 using an online questionnaire. Respondents were identified at regional teaching events and from existing contact lists. Approval for the survey was granted by the Countess of Chester Hospital Audit Department (#3504).

Respondents reported their level of specialty training and specialty interest. General attitudes towards practical procedures were sought by open and closed questions. Trainees self-identified their level of procedural confidence as either 'able unsupervised', 'limited supervision', 'direct supervision' or 'unable to perform' for pleural aspiration, Seldinger type chest drain insertion, ascitic tap and drain insertion, central venous catheter insertion, arterial line placement, direct current electrical cardioversion, lumbar puncture and ultrasound for pleural and vascular procedures. Procedural training methods were categorised as: 'none', 'watch and learn', 'manikin practice' or 'formal course'.

Practical experience was determined semi-quantitatively by retrospective recall.

Statistical analysis was performed using Stata 12.0 (StataCorp, US). Correlations were tested using Spearman's rank correlation. Šidák correction was applied for multiple tests to limit family-wise error rates to <5%.

## Results

Responses were received from 83 core medical training doctors and 73 specialty registrars (ascertainment rate 59.7% and 56.2% respectively). *Table 1* summarizes respondents' characteristics.

### General attitudes towards practical procedures

Out of all the respondents, 109 (69.9%) wanted to perform more procedures, six (3.8%) wanted fewer and 41 (26.3%) wanted about the same number. Of these, 100 (64.1%) enjoyed practical procedures, 46 (29.5%) perceived them as simply part of the job and 10 (6.4%) did not like doing them. A total of 125 (80.1%) respondents disagreed with the statement 'practical procedures should be reserved for the specialists with an interest in them' and 154 (98.7%) felt they should be procedurally competent in case of emergencies.

Common themes in general comments from respondents included lack of adequate supervision, lack of time to perform procedures and lack of ultrasound training, and in the core medical training group feeling unprepared for the registrar position.

### Procedural confidence

The ratio of respondents reporting confidence to perform procedures unsupervised is shown in *Table 2*. Among registrars, 15 (20.5%) were not independent in chest drain insertion and 19 (26%) in central venous catheter. In the core training year two group, i.e. 'registrars-to-be', the numbers were 26 (60.5%) and 37 (86%)

**Table 1. Number of trainees invited to respond and respondents' characteristics**

| | Core medical trainee | | Registrar | |
|---|---|---|---|---|
| Invited to participate | 139 | | 130 | |
| Opted out | 5 | | 4 | |
| No response | 49 | | 49 | |
| Incomplete questionnaire | 1 | | 4 | |
| Core anaesthesia before core medical training | 1 | | 0 | |
| Fully completed | 83 (59.7%) | | 73 (56.2%) | |
| Level of training | Year 1 | 40 (48.2%) | ST 3–4 | 27 (37%) |
| | Year 2 | 43 (51.8%) | ST 5–7 | 43 (58.9%) |
| | | | Unknown | 3 (4.1%) |
| Specialty interest | General/acute medicine | 15 (18.1%) | Respiratory | 15 (20.5%) |
| | Care for the elderly/ stroke medicine | 13 (15.7%) | Cardiology | 14 (19.2%) |
| | Respiratory medicine | 7 (8.45%) | Care for the elderly/ stroke medicine | 13 (17.8%) |
| | Cardiology | 7 (8.45%) | General/acute medicine | 7 (9.6%) |
| | Haematology | 6 (7.2%) | Gastroenterology | 7 (9.6%) |
| | Palliative medicine | 6 (7.2%) | Infectious diseases | 7 (9.6%) |
| | Other specialties | 27 (32.5%) | Other | 8 (11%) |
| | No preference | 2 (2.4%) | Unknown | 2 (2.7%) |

**Table 2. Respondents reporting no procedural training, no procedural exposure in 12 months and those confident to perform procedures independently**

| | No procedural training | | No procedural exposure in 12 months | | Confident to perform procedure independently | | |
|---|---|---|---|---|---|---|---|
| | | | | | Core medical trainee (*n*=83) | | |
| | Core medical trainee (*n*=83) | Registrar (*n*=73) | Core medical trainee (*n*=83) | Registrar (*n*=73) | Year 1 (*n*=40) | Year 2 (*n*=43) | Registrar (*n*=73) |
| Pleural aspiration | 3 (3.6%) | 1 (1.4%) | 12 (14.5%) | 20 (27.4%) | 15 (37.5%) | 32 (74.4%) | 65 (89%) |
| Chest drain insertion | 4 (4.8%) | 0 (0%) | 35 (42.2%) | 26 (35.6%) | 10 (25.0%) | 17 (39.5%) | 58 (79.5%) |
| Ascitic tap | 1 (1.2%) | 2 (2.7%) | 7 (8.4%) | 24 (32.9%) | 33 (82.5%) | 41 (95.3%) | 72 (98.6%) |
| Ascitic drain insertion | 12 (14.5%) | 4 (5.5%) | 61 (73.5%) | 33 (45.2%) | 21 (52.5%) | 34 (79.1%) | 67 (91.8%) |
| Central venous catheter | 9 (10.8%) | 0 (0%) | 61 (73.5%) | 28 (38.4%) | 4 (10.0%) | 6 (14.0%) | 54 (74.0%) |
| Arterial line placement | 44 (53%) | 17 (23.3%) | 65 (78.3%) | 46 (63.0%) | 9 (22.5%) | 14 (32.6%) | 47 (64.4%) |
| Lumbar puncture | 3 (3.6%) | 1 (1.4%) | 1 (1.2%) | 10 (13.7%) | 32 (80.0%) | 42 (97.7%) | 71 (97.3%) |
| Direct current cardioversion | 3 (3.6%) | 3 (4.1%) | 38 (45.8%) | 20 (27.4%) | 16 (40.0%) | 28 (65.1%) | 69 (94.5%) |
| Ultrasound for pleural procedures | 31 (37.3%) | 31 (42.5%) | --- | --- | 4 (10.0%) | 2 (4.7%) | 24 (32.9%) |
| Ultrasound for central venous catheter | 21 (25.3%) | 3 (4.1%) | --- | --- | 8 (20.0%) | 8 (18.6%) | 50 (68.5%) |

respectively. Of respondents, 126 (80.8%) were not independent in ultrasound chest for pleural procedures and 90 (57.7%) in vascular ultrasound for insertion of a central venous catheter.

### Procedural training and exposure

The ratio of respondents reporting no procedural training and no exposure in 12 months is shown in *Table 2*. The procedures with the highest number of respondents reporting no training included arterial line placement (61, 39.1%) and ascitic drain insertion (16, 10.3%). With regard to imaging, 62 (39.7%) received no training in ultrasound chest for pleural procedures and 24 (15.4%) received no training in vascular ultrasound for central venous catheter.

Procedures that respondents had the least exposure to were chest drain insertion (61, 39.1%), central venous catheter (89, 57.1%), ascitic drain placement (94, 60.3%) and arterial line placement (111, 71.2%).

### Correlation between procedural confidence and exposure

There was a significant positive correlation between procedural exposure and confidence for all eight procedures in the core medical training group ($P<0.003$, Šidák correction for multiple testing). Among registrars, this was true for pleural aspiration, chest drain insertion, central venous catheter and arterial line placement ($P<0.003$). There was a significant, positive correlation for ultrasound chest expertise and confidence in performing pleural procedures and for vascular ultrasound and central venous catheter insertion ($P<0.017$, Šidák correction for multiple testing).

## Discussion

This survey presents an interesting insight into the general attitude towards procedures, procedural confidence, training and exposure of trainees in the Mersey Deanery. The type of procedures and level of expertise required is stated in published curricula (Joint Royal Colleges of Physicians Training Board, 2009). However, trainees face challenges in acquiring procedural competencies (Wigton and Alguire, 2007; General Medical Council, 2013).

Among medical registrars, a significant proportion still reported a lack of confidence in central venous catheter and chest drain insertion. This was even more evident among year two core trainees, who might soon be expected to perform these procedures in less supported out-of-hours settings. Indeed, many core trainees do not feel prepared to become medical registrars (Tasker et al, 2013).

This survey shows that with a few exceptions only a minority of respondents reported no procedural training. This was most deficient in arterial line placement. However, this procedure is more common in higher dependency units and likely does not play a crucial part in procedural education in this group. The relatively high levels of training in the remaining procedures suggest that the reported lower levels of confidence were related to limited exposure or other factors as shown by general comments, e.g. insufficient supervision or lack of time.

There is a significant deficiency in practical exposure with high proportions of trainees not performing procedures regularly. Since confidence may affect performance (Byrne et al, 2005) and willingness to perform procedures (Hays et al, 2002), regular practice is crucial as confidence falls significantly after 1 year without exposure (Connick et al, 2009). Indeed for all surveyed procedures, there was a significant correlation between exposure and confidence for core medical training doctors. A lack of similar correlation in the registrar group for direct current electrical cardioversion, lumbar puncture, ascitic tap and drain insertion can be explained by their perceived simplicity and that once confidence is achieved, it is maintained despite limited exposure.

The significant correlation between ultrasound expertise and procedural confidence in central venous catheter and pleural procedures strongly suggests that a lack of ultrasound training is a limiting factor in developing procedural confidence. A more organized approach is required if all trainees are to become confident in using imaging. This could take the form of a yearly practical course incorporated into general medical teaching sessions.

This survey is limited by recall bias and self-reporting. There is a risk of selection bias as a result of the ascertainment rate and a high predominance of cardiology and respiratory specialty trainees who might be more procedure-focused. More senior trainees may not be required to perform certain procedures. Additionally, the questionnaire did not specify indications for pleural procedures. It is anticipated that confidence in performing pleural procedures would be higher if they were indicated for pneumothorax when ultrasound is not indicated. Lastly, as a survey of a single region, findings may not be representative of the whole of the UK.

## Conclusions

Postgraduate medical training should be carefully analysed to address the lack of confidence in performing practical procedures and inadequate exposure. Educational supervisors have a crucial role to play in ensuring that trainees' knowledge, skills and behaviours progress appropriately (Joint Royal Colleges of Physicians Training Board, 2009). Regular appraisal meetings and review of competences should be used to identify the areas where practical confidence and exposure is lacking. Trainee physicians enjoy and are keen to perform more practical procedures and are aware that they have to be procedurally competent in case of an emergency.

Supervisors have to ensure that trainees have adequate opportunities to gain and demonstrate practical skills. Training should focus on procedures where there is a strong correlation between exposure and confidence in both surveyed groups: pleural tap, chest drain insertion and central venous catheter insertion. Potential solutions include an 'on call procedural team', bringing together educators and trainees. Additionally, rostering trainee physicians for short periods to specialties such as interventional radiology and critical care could also enhance training opportunities. In all cases the authors recommend that medical departments and specialty teams should maintain records of the procedures performed, and whether there was a trainee in attendance. This would enhance awareness of the potential training opportunities and maximize trainee inclusion. **BJHM**

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## KEY POINTS

- Practical procedures play a crucial role in clinical outcome.
- A high proportion of core medical trainees and medical registrars report a lack of procedural confidence and insufficient exposure.
- Postgraduate medical training needs to be carefully analysed to assure that trainees have adequate opportunities to gain and demonstrate practical skills.
- It is especially crucial for central venous catheter, pleural aspiration and drainage where there is a significant correlation between procedural confidence and exposure.
- Lack of ultrasound training is a limiting factor in achieving procedural independence.