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Procedural Confidence and Teaching Satisfaction Among Internal Medicine Trainees in Relation to Curriculum Requirements

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Abstract

Objectives: This study aimed to describe self-reported confidence in 12 clinical procedures specified in the Joint Royal Colleges of Physicians Training Board (JRCPTB) curriculum and satisfaction with procedural teaching among doctors undertaking Internal Medicine Training (IMT). Secondary objectives were to explore differences between training grades and interpret the findings in relation to curriculum requirements.

Methods: A voluntary, anonymised, cross-sectional survey was distributed to IMT1-IMT3 doctors at University Hospital Coventry, University Hospitals Coventry and Warwickshire NHS Trust (UHCW), between June and July 2024. The 28-item questionnaire assessed confidence and teaching satisfaction for 12 procedures. Confidence categories were anchored to self-assessed procedural capability and supervision requirements. Responses were summarised descriptively and compared with the 2023 IMT Annual Review of Competence Progression decision aid.

Results: Fifteen trainees completed the survey: 9 IMT1 (60%), 4 IMT2 (27%), and 2 IMT3 (13%). The recruitment denominator was unavailable, so the response rate could not be calculated. Very or extremely confident responses were most frequent for nasogastric tube insertion, 13 (87%); advanced cardiopulmonary resuscitation, 12 (80%); and lumbar puncture, 8 (53%). Ten trainees (67%) reported being not so or not at all confident in diagnostic pleural aspiration, including both IMT3 respondents, 2 (100% of IMT3 respondents). Six trainees (40%) reported these responses for direct current cardioversion. Confidence in vascular access and intercostal drain insertion was also low. Comparisons across grades were exploratory, and the confidence and teaching satisfaction distributions differed for some procedures.

Conclusions: Confidence varied substantially between procedures, with diagnostic pleural aspiration and cardioversion warranting further exploration. Protected procedural attachments, access to trained ultrasound practitioners, and supervised cardioversion lists are proposed for local evaluation. This small, single-centre survey cannot establish competence or explain differences in confidence; assessment of exposure and observed performance is needed.

Categories: Other, Medical Education, Internal Medicine
Keywords: clinical procedures, clinical skill teaching, doctors in training, internal medicine training, medical education and research, survey

Introduction

Internal Medicine Training (IMT) is a UK postgraduate programme preparing doctors for higher medical specialty training and the medical registrar role. Its curriculum combines 14 Capabilities in Practice with practical procedural requirements assessed at defined stages of training [1,2]. These requirements differ between procedures: some require progression to independent practice, whereas others require skills-laboratory training or satisfactory supervised practice.

The General Medical Council's 2024 national training survey summary reports broad findings on postgraduate training quality and training environments [3]. Procedure-specific surveys provide more focused evidence: a UK study of general internal medicine registrars identified variation in procedural confidence and barriers to training [4]. Scottish IMT studies examined confidence after simulation-based mastery learning and factors affecting the transfer of training to clinical practice [5,6]. These studies provide relevant context for evaluating individual procedural skills.

The primary objective was to describe internal medicine trainees' self-reported confidence in 12 clinical procedures specified in the Joint Royal Colleges of Physicians Training Board (JRCPTB) IMT Stage 1 curriculum [1] and their satisfaction with procedural teaching at one tertiary teaching hospital. Secondary objectives were to explore differences between training grades and interpret the findings in relation to curriculum requirements. These exploratory comparisons aimed to identify areas for further educational evaluation. The survey did not assess individual trainees' procedural competence.

Materials And Methods

Study design and participants

A descriptive cross-sectional survey was conducted between June 4 and July 27, 2024, using an anonymised questionnaire hosted on Microsoft Forms (Microsoft Corporation, Redmond, Washington). Recruitment was by email and in person, with all IMT doctors in years 1-3 at University Hospital Coventry, University Hospitals Coventry and Warwickshire NHS Trust (UHCW), eligible to participate. A participant information leaflet explained that participation was voluntary and would not affect training. Training grades are referred to as IMT1, IMT2, and IMT3; these correspond to IMY1, IMY2, and IMY3 in the curriculum documents.

UHCW was the sole recruitment site. The questionnaire asked about placements at UHCW, George Eliot Hospital (GEH), and South Warwickshire NHS Foundation Trust (SWFT) in each training year; these options described trainees' placement history rather than additional recruitment sites. Placement responses were not available in the tabulated dataset used for this analysis.

Ethics and governance

The research and development team at University Hospitals Coventry and Warwickshire NHS Trust confirmed that NHS Research Ethics Committee approval was not required and authorised the study (reference: GF0916). Participation was voluntary and anonymous, and a participant information leaflet explained that participation would not affect training.

Questionnaire

The questionnaire was developed entirely by the authors and was not formally validated. The questionnaire contained 28 items: four on training grade and hospital placements, 12 on procedural confidence, and 12 on satisfaction with teaching for the same procedures. Written response descriptors preceded each section (Appendix A). Confidence was recorded using five categories, from "not at all confident" to "extremely confident". The descriptors referred to perceived ability, skills-laboratory training, and the level of supervision required. They measured confidence anchored to self-assessed capability rather than confidence alone. No objective assessment of competence was undertaken.

Teaching satisfaction was assessed using five categories ranging from "very dissatisfied" to "very satisfied", with a separate option for trainees who had not received the training. The full questionnaire, including all response options and descriptors, is reproduced in Appendix A. The 12 clinical procedures followed JRCPTB curriculum terminology [1].

Analysis and curriculum comparison

Participant-level responses were available to the authors through the raw Excel spreadsheets generated by Microsoft Forms. These responses were used to calculate descriptive response frequencies by training grade. During manuscript revision, the grade-specific frequencies were checked for completeness and reconciled with the aggregate figure distributions. Each of the 24 confidence and teaching satisfaction items contained responses from 9 IMT1, 4 IMT2, and 2 IMT3 doctors. Responses were anonymous, so repeat submissions by the same individual could not be identified. Counts and percentages were calculated overall and within each grade, with percentages rounded to the nearest whole number using the relevant denominator. The "no training received" category was retained separately from satisfaction responses. Given the small sample, particularly the IMT2 and IMT3 groups, no inferential tests were performed. Comparisons between grades and between confidence and satisfaction were descriptive. These cross-sectional comparisons do not measure change within individual trainees.

All descriptive statistical analyses were conducted using Microsoft Excel for Microsoft 365, version 2609 (build 16.0.20430.20032, 64-bit; Microsoft Corporation, Redmond, Washington). Figures were created using Matplotlib version 3.10.8 (Matplotlib Development Team, NumFOCUS, Austin, Texas).

The curriculum comparison used the procedural requirements in the 2023 IMT Stage 1 Annual Review of Competence Progression (ARCP) decision aid, preceding the survey period [2]. The August 2026 update was also checked during manuscript revision [7]. The comparison was contextual: survey responses were not treated as equivalent to workplace assessments or ARCP outcomes. In particular, "very confident" indicated a perceived need for limited supervision, not independent practice.

Results

Participants and recruitment

A total of 15 trainees completed the survey: 9 IMT1 (60%), 4 IMT2 (27%), and 2 IMT3 (13%). Each of the 24 tabulated items contained 15 responses (100%), with the same grade-specific totals. The total eligible population and the number approached were unavailable, so a survey response rate could not be calculated. Participant recruitment and inclusion are summarised in Figure *1*.

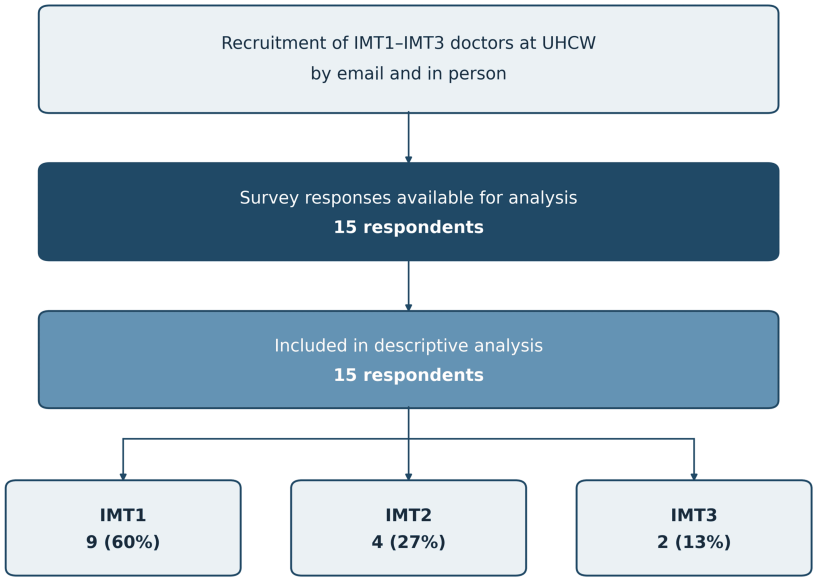


FIGURE 1: Participant recruitment and inclusion flowchart

The total eligible population and the number of doctors approached were not recorded; a response rate therefore cannot be calculated. The flowchart shows the 15 respondents represented in the available dataset and included in the descriptive analysis. Grade percentages use these 15 respondents as the denominator and are rounded to the nearest whole number.

IMT: Internal Medicine Training; UHCW: University Hospitals Coventry and Warwickshire NHS Trust.

Figure created using Matplotlib software (version 3.10.8, Matplotlib Development Team, NumFOCUS, Austin, Texas).

Procedural confidence

Figure *2* shows the confidence distributions, grouped by curricular requirement. Very or extremely confident responses were most frequent for nasogastric tube insertion, 13 (87%); advanced cardiopulmonary resuscitation (CPR), 12 (80%); and lumbar puncture, 8 (53%). For ascitic tap, 6 trainees (40%) were extremely confident, 1 (7%) was very confident, and 5 (33%) were somewhat confident.

Ten trainees (67%) were not so or not at all confident in diagnostic pleural aspiration, compared with 11 (73%) for central venous cannulation, 15 (100%) for intercostal drain insertion for pneumothorax, and 13 (87%) for drain insertion for effusion. No trainees (0%) were very or extremely confident in femoral/intraosseous access or either intercostal drain procedure. For temporary pacing, 1 trainee (7%) was very confident, 12 (80%) were somewhat or not so confident, and 2 (13%) were not at all confident.

For direct current (DC) cardioversion, 3 trainees (20%) were very or extremely confident, 6 (40%) were somewhat confident, and 6 (40%) were not so or not at all confident. Abdominal paracentesis responses spanned all five categories, with 4 trainees (27%) at each extreme of the scale. Figure *2* summarises these findings.

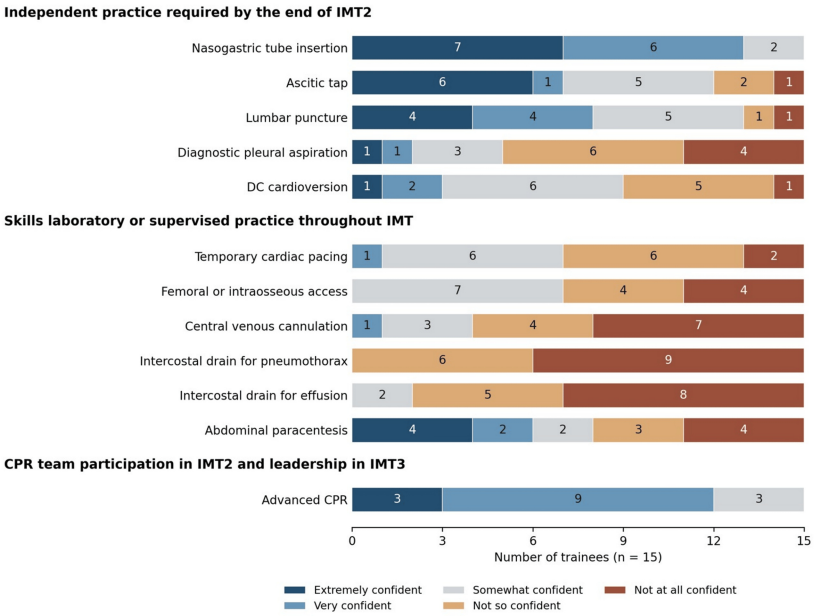


FIGURE 2: Procedural confidence grouped by curriculum requirement

Counts are shown within each segment; each procedure has 15 responses (100%). Groups reflect the 2023 ARCP decision aid [2]. Independent-practice requirements apply by the end of IMT2 and are maintained in IMT3. CPR is shown separately because its requirements concern team participation and leadership. These mixed-grade distributions are descriptive and do not indicate whether individuals met the standard for their training year. Response descriptors are given in Appendix A.

IMT: Internal Medicine Training; ARCP: Annual Review of Competence Progression; CPR: cardiopulmonary resuscitation; DC: direct current.

Figure created using Matplotlib software (version 3.10.8, Matplotlib Development Team, NumFOCUS, Austin, Texas).

Comparisons between training grades were exploratory. Full grade-specific confidence distributions are presented in Appendix B.

Teaching satisfaction and training grade

Satisfaction distributions are shown in Figure *3*. Thirteen trainees (87%) were satisfied or very satisfied with CPR teaching, 12 (80%) with lumbar puncture teaching, and 10 (67%) with ascitic tap teaching. The overall satisfaction and confidence distributions differed for some procedures. For DC cardioversion, 9 trainees (60%) were satisfied or very satisfied, whereas only 3 (20%) were very or extremely confident. For central venous cannulation, 9 (60%) selected neither satisfied nor dissatisfied despite low reported confidence. Five trainees (33%) were dissatisfied or very dissatisfied with teaching for each intercostal drain procedure. One trainee (7%) reported no training for each of nasogastric tube insertion, ascitic tap, and diagnostic pleural aspiration. The grade-specific satisfaction distributions are presented in Appendix C.

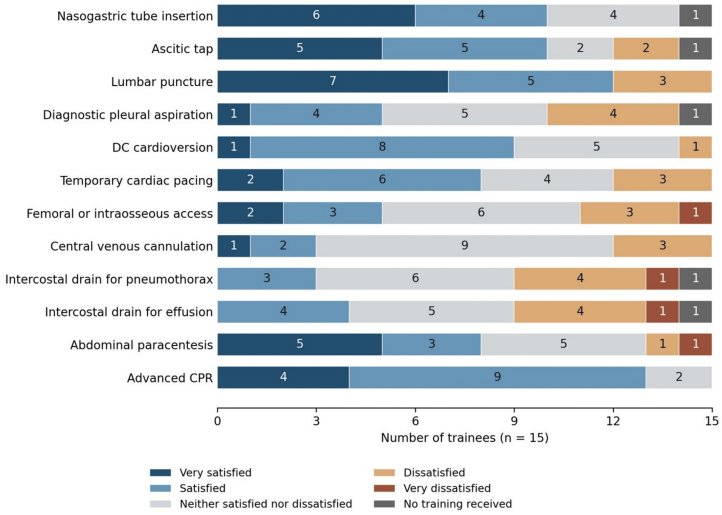


FIGURE 3: Satisfaction with procedural teaching

Counts are shown within each segment; each procedure has 15 responses (100%). Procedures follow the order used in Figure 2. "No training received" is a separate response and is not classified as dissatisfaction. The category "Satisfied" follows the questionnaire wording in Appendix A.

CPR: cardiopulmonary resuscitation; DC: direct current.

Figure created using Matplotlib software (version 3.10.8, Matplotlib Development Team, NumFOCUS, Austin, Texas).

There was no consistent descriptive increase in confidence across training grades. Both IMT3 respondents (2; 100%) were not so confident in diagnostic pleural aspiration and central venous cannulation. For pneumothorax drain insertion, 1 (50%) was not so confident and the other, 1 (50%), was not at all confident. Both were very or extremely confident in ascitic tap, 2 (100%), and neither reported low confidence in lumbar puncture, 0 (0%). With only 2 IMT3 respondents (13% of the overall sample), these observations cannot establish a grade-related pattern.

Discussion

Confidence in relation to curriculum requirements

Confidence was generally higher for nasogastric tube insertion, ascitic tap, and lumbar puncture than for vascular access and intercostal drain insertion. This pattern was broadly compatible with the different curricular expectations, but it cannot establish whether trainees achieved the required competence. Local opportunities and previous procedural experience may also account for the pattern.

The 2023 decision aid requires independent practice by the end of IMT2 for ascitic tap, lumbar puncture, nasogastric tube insertion, diagnostic pleural aspiration, and DC cardioversion, with maintenance thereafter. Temporary pacing, femoral/intraosseous access, central venous cannulation, both drain procedures, and abdominal paracentesis retain a skills-laboratory or supervised-practice requirement. CPR has separate team participation and leadership requirements [2]. These distinctions are retained in the August 2026 update [7]. Figure *2* groups the findings accordingly.

Diagnostic pleural aspiration merits particular attention: 10 respondents (67%), including both IMT3 trainees, 2 (100% of IMT3 respondents), selected "not so confident", 6 (40%), or "not at all confident", 4 (27%). For DC cardioversion, 6 (40%) selected "somewhat confident", linked to skills-laboratory training, 5 (33%) selected "not so confident", linked to direct supervision or assistance, and 1 (7%) selected "not at all confident". These distributions warrant review in the context of its independent-practice requirement. Thus, pleural aspiration was not the only potential area of concern. Conversely, some respondents reported high confidence in abdominal paracentesis despite its lower minimum curricular requirement. The results support procedure-specific evaluation rather than a simple division between procedures that trainees do and do not feel able to perform.

Most respondents were IMT1 doctors, for whom the end-of-IMT2 requirements were not yet due. Even within the more favourable distributions, "very confident" signified a perceived need for limited supervision. Low confidence in procedures requiring skills-laboratory training or supervised practice does not establish a curriculum deficit. For pleural aspiration, the August 2026 decision aid accepts a passed summative direct observation of procedural skills (DOPS) assessment marked as requiring limited supervision or assistance for independent sign-off if the assessor explicitly states that assistance relates only to ultrasound [7]. The

survey did not distinguish ultrasound capability from aspiration technique.

British Thoracic Society (BTS) guidance requires thoracic ultrasound before pleural fluid procedures, except in emergencies, with scanning in the procedural position and the procedure performed immediately after site marking without moving the patient [8]. Ultrasound assistance by immediate site marking is distinct from continuous real-time ultrasound guidance [9]. The BTS ultrasound standards set out training and assessment pathways [9]. Access to trained practitioners, equipment, and supervised ultrasound practice may influence confidence. The 2025 BTS pleural training standards describe a shift of training opportunities towards specialist services and argue that the level of independent pleural practice they define is not feasible for all IMT doctors [10]. Their proposals for curriculum review do not replace the progression requirements in the August 2026 ARCP decision aid [7].

Relationship to previous studies

A UK study of general internal medicine registrars identified barriers including limited supervision and delegation of procedures to other specialties [4]. This provides relevant context, although differences in participants and instruments preclude direct numerical comparison.

In a Scottish IMT cohort, self-reported confidence in intercostal drain insertion increased after simulation-based mastery learning, declined before a booster session, and increased again after that session. Successful clinical insertions between sessions were associated with a smaller decline in confidence [5]. Qualitative work on an internal medicine boot camp identified trainee-reported workplace factors affecting transfer of learning [6]. Exposure is therefore a plausible explanation for differences in confidence, but this survey did not measure procedure numbers, recency of practice, or simulation attendance. It cannot determine whether exposure, teaching provision, or other factors explain the findings.

Recommendations for local training

The findings justify reviewing access to procedural training, particularly diagnostic pleural aspiration and DC cardioversion. The following interventions are proposed for local evaluation, informed by procedural training studies and BTS standards [4-6,9,10]. Their effectiveness was not assessed in this survey.

First, the IMT programme lead and specialty teams should map who normally performs each procedure and identify where trainees can participate. We suggest that, at induction and each placement review, educational supervisors should record prior experience, completed specialty placements, and outstanding learning needs, then arrange protected time with a named procedural supervisor.

For pleural procedures, we propose dedicated pleural clinic or procedure-list attachments during IMT1-2, with release from ward duties and access to a trained thoracic ultrasound practitioner. Introductory ultrasound teaching should be followed by supervised practice and assessment appropriate to the trainee's intended scope of practice; course attendance alone does not establish independent ultrasound capability [9]. Aspiration technique and ultrasound capability should be assessed separately, with any ultrasound-only assistance explicitly documented on the relevant summative DOPS assessment [7].

For cardioversion, we propose scheduled access to supervised elective cardioversion lists with cardiology and anaesthetic teams during IMT rotations. Trainees should participate in patient selection, consent, preparation, synchronised shock delivery, and post-procedure care within local governance arrangements, with direct observation and feedback. External temporary pacing could be taught through dedicated cardiology or resuscitation simulation sessions, with clinical participation where appropriate. These proposals should be tailored to the curriculum's requirements for cardioversion and external pacing [2,7].

A systematic review of critical procedural skills after simulation found evidence of declining performance over time, although the studies were few and methodologically heterogeneous [11]. For vascular access and less frequently encountered procedures, we therefore propose planned intensive care unit (ICU) or acute medicine sessions and refresher simulation to supplement opportunistic practice. Procedure logs could record whether the trainee observed, assisted, or performed the procedure, the supervision required, and the date of practice, so that teaching can target gaps in exposure and retention.

A six-month review is proposed as a pragmatic local evaluation interval. Measures could include attendance, protected sessions delivered, supervised procedures and scans, and documented procedural assessments. Confidence and teaching satisfaction should be collected separately before and after implementation, alongside observed performance. Uptake should be examined by grade, specialty placement, and previous experience to identify trainees who remain unable to access training.

Teaching satisfaction should remain a separate outcome: favourable views of cardioversion teaching coexisted with limited confidence. Comparing overall distributions does not establish an individual-level relationship between these measures, and satisfaction alone does not determine teaching effectiveness.

Limitations

This was a small, voluntary survey at one tertiary centre, with no eligible-population denominator and therefore no calculable response rate. Trainees with strong positive or negative views, or a particular interest in procedures, may have been more likely to respond. The direction and size of this self-selection and non-response bias are unknown. The IMT2 and IMT3 groups contained only 4 (27%) and 2 (13%) respondents, respectively, making grade comparisons exploratory and particularly uncertain. The cross-sectional design

cannot describe progression within individuals.

The confidence descriptors combine subjective confidence with perceived competence and supervision requirements. Their ordering is imperfect: skills-laboratory competence, assigned to "somewhat confident", is not necessarily a higher level of clinical capability than performance under direct supervision, assigned to "not so confident". Responses should therefore be interpreted as descriptive categories. Their ordering has not been validated as a hierarchy of clinical competence, and grouped counts do not establish a particular level of competence. A systematic review found that physicians' self-assessments often showed limited agreement with external assessments, although the included studies varied in quality [12]. The original Dunning-Kruger experiments described overestimation among lower-performing participants in nonclinical tasks involving humour, grammar, and logic [13]. This provides a possible conceptual explanation for inaccurate self-assessment, but does not establish that the effect occurred in this cohort. Without objective performance measures, the extent and direction of self-assessment error cannot be determined. The questionnaire was not piloted before distribution, which may have affected the clarity and interpretation of its response descriptors.

Several potential confounders were unavailable. Recent respiratory, ICU, or cardiology placements may provide different opportunities from general medical rotations. Training grade also does not capture experience before IMT: direct foundation entrants may differ from doctors with previous core medical training (CMT), acute care common stem (ACCS) training, other specialty experience, or substantial overseas practice. These backgrounds were not recorded.

Local allocation of procedures to respiratory, radiology, ICU, cardiology, or anaesthetics may reduce opportunities for IMT doctors. The survey did not establish which teams normally performed each procedure or whether trainees could join their lists. Low confidence may therefore reflect limited access rather than poor teaching, weakening the curriculum comparison. Case mix, staffing, and service organisation also limit generalisability. The terms "ascitic tap" and "abdominal paracentesis" may have been interpreted inconsistently, as these terms are occasionally used interchangeably in clinical practice. Differences between these items may therefore reflect variation in interpretation, limiting comparisons of perceived procedural ability.

Future studies should measure specialty placements, experience before IMT, local procedural access, and observed performance alongside confidence, with a defined recruitment denominator. Multicentre research is needed to establish whether similar patterns occur across IMT programmes and whether they have implications for procedural training nationally.

Conclusions

This single-centre survey identified variation in procedural confidence and teaching satisfaction among internal medicine trainees at UHCW. Diagnostic pleural aspiration and DC cardioversion emerged as priorities for reviewing local training provision. The key message is that procedural training should address individual learning needs and provide supervised opportunities appropriate to the curriculum requirements for each procedure. Protected pleural attachments, access to thoracic ultrasound training, and supervised cardioversion lists are practical options for local evaluation. Confidence and teaching satisfaction can help identify areas requiring attention, but they should complement direct observation and workplace assessment rather than serve as evidence of competence. The small sample and predominance of IMT1 respondents limit wider interpretation, and the findings do not establish a competence deficit or explain the differences observed. These findings provide a basis for reviewing procedural training at UHCW and highlight questions of potential relevance to national IMT training provision, although wider applicability requires confirmation through multicentre research.

Appendices

Appendix A: Survey questionnaire

Survey questionnaire

Section 1: "How confident are you when performing clinical procedures?"

Response descriptors for questions 5-16

Extremely confident = competent to perform the procedure unsupervised and able to recognise complications and respond appropriately.

Very confident = able to perform the procedure with limited supervision or assistance.

Somewhat confident = trained and competent in a skills lab.

Not so confident = able to perform the procedure under direct supervision or assistance.

Not at all confident = unable to perform the procedure.

Question	Multiple choice answer options
1. What stage of training are you in currently?	• IMT1 • IMT2 • IMT3
2. Which hospital were you placed in for IMT year 1?	• University Hospital Coventry & Warwickshire (UHCW) • George Eliot Hospital (GEH) • South Warwickshire Foundation Trust (SWFT) • Other
3. Which hospital were you placed in for IMT year 2?	• UHCW • GEH • SWFT • Other • Not applicable
4. Which hospital were you placed in for IMT year 3?	• UHCW • GEH • SWFT • Other • Not applicable
5. How confident are you at performing advanced cardiopulmonary resuscitation (CPR)?	• Extremely confident • Very confident • Somewhat confident • Not so confident • Not at all confident
6. How confident are you at performing temporary cardiac pacing using an external device?	• Extremely confident • Very confident • Somewhat confident • Not so confident • Not at all confident
7. How confident are you at performing an ascitic tap?	• Extremely confident • Very confident • Somewhat confident • Not so confident • Not at all confident
8. How confident are you at performing a lumbar puncture?	• Extremely confident • Very confident • Somewhat confident • Not so confident • Not at all confident

FIGURE 4: Survey questionnaire (Part 1)

Question	Multiple choice answer options
9. How confident are you at inserting a nasogastric (NG) tube?	• Extremely confident • Very confident • Somewhat confident • Not so confident • Not at all confident
10. How confident are you at performing a pleural aspiration for fluid (diagnostic)?	• Extremely confident • Very confident • Somewhat confident • Not so confident • Not at all confident
11. How confident are you at gaining access to circulation for resuscitation (femoral vein or intraosseous)?	• Extremely confident • Very confident • Somewhat confident • Not so confident • Not at all confident
12. How confident are you at performing central venous cannulation (internal jugular or subclavian)?	• Extremely confident • Very confident • Somewhat confident • Not so confident • Not at all confident
13. How confident are you at inserting an intercostal drain for a pneumothorax?	• Extremely confident • Very confident • Somewhat confident • Not so confident • Not at all confident
14. How confident are you at inserting an intercostal drain for an effusion?	• Extremely confident • Very confident • Somewhat confident • Not so confident • Not at all confident
15. How confident are you at performing a direct current (DC) cardioversion?	• Extremely confident • Very confident • Somewhat confident • Not so confident • Not at all confident
16. How confident are you at performing abdominal paracentesis?	• Extremely confident • Very confident • Somewhat confident • Not so confident • Not at all confident

Section 2: “How satisfied are you with your teaching?”

Response descriptors for questions 17-28

Very satisfied = teaching was of the highest quality with no changes needed.

Satisfied = a good standard of teaching; minor changes could be made.

Neither satisfied nor dissatisfied = teaching was average; minor changes would be helpful.

Dissatisfied = teaching was poor; minor changes in multiple domains would help improve the service.

Very dissatisfied = teaching was very poor; major changes in multiple domains needed.

FIGURE 5: Survey questionnaire (Part 2)

Additional response option: I have not received this training.

Question	Multiple choice answer options
17. How satisfied were you with your teaching to perform advanced cardiopulmonary resuscitation (CPR)?	• Very satisfied • Satisfied • Neither satisfied nor dissatisfied • Dissatisfied • Very dissatisfied • I have not received this training
18. How satisfied were you with your teaching to perform temporary cardiac pacing using an external device?	• Very satisfied • Satisfied • Neither satisfied nor dissatisfied • Dissatisfied • Very dissatisfied • I have not received this training
19. How satisfied were you with your teaching to perform ascitic taps?	• Very satisfied • Satisfied • Neither satisfied nor dissatisfied • Dissatisfied • Very dissatisfied • I have not received this training
20. How satisfied were you with your teaching to perform lumbar punctures?	• Very satisfied • Satisfied • Neither satisfied nor dissatisfied • Dissatisfied • Very dissatisfied • I have not received this training
21. How satisfied were you with your teaching to insert nasogastric (NG) tubes?	• Very satisfied • Satisfied • Neither satisfied nor dissatisfied • Dissatisfied • Very dissatisfied • I have not received this training
22. How satisfied were you with your teaching to perform pleural aspiration for fluid (diagnostic)?	• Very satisfied • Satisfied • Neither satisfied nor dissatisfied • Dissatisfied • Very dissatisfied • I have not received this training
23. How satisfied were you with your teaching to gain access to circulation for resuscitation (femoral vein or intraosseous)?	• Very satisfied • Satisfied • Neither satisfied nor dissatisfied • Dissatisfied • Very dissatisfied • I have not received this training
24. How satisfied were you with your teaching to perform central venous cannulation (internal jugular or subclavian)?	• Very satisfied • Satisfied • Neither satisfied nor dissatisfied • Dissatisfied • Very dissatisfied • I have not received this training

FIGURE 6: Survey questionnaire (Part 3)

Question	Multiple choice answer options
25. How satisfied were you with your teaching to insert an intercostal drain for a pneumothorax?	• Very satisfied • Satisfied • Neither satisfied nor dissatisfied • Dissatisfied • Very dissatisfied • I have not received this training
26. How satisfied were you with your teaching to insert an intercostal drain for an effusion?	• Very satisfied • Satisfied • Neither satisfied nor dissatisfied • Dissatisfied • Very dissatisfied • I have not received this training
27. How satisfied were you with your teaching to perform direct current (DC) cardioversion?	• Very satisfied • Satisfied • Neither satisfied nor dissatisfied • Dissatisfied • Very dissatisfied • I have not received this training
28. How satisfied were you with your teaching to perform abdominal paracentesis?	• Very satisfied • Satisfied • Neither satisfied nor dissatisfied • Dissatisfied • Very dissatisfied • I have not received this training

FIGURE 7: Survey questionnaire (Part 4)

Appendix B: Procedural confidence by training grade

Procedure	Grade	Very satisfied	Satisfied	Neither satisfied nor dissatisfied	Dissatisfied	Very dissatisfied	No training received
Advanced CPR	IMT1	2	6	1	0	0	0
	IMT2	2	1	1	0	0	0
	IMT3	0	2	0	0	0	0
Temporary cardiac pacing	IMT1	1	5	2	1	0	0
	IMT2	0	1	1	2	0	0
	IMT3	1	0	1	0	0	0
Ascitic tap	IMT1	2	4	1	1	0	1
	IMT2	2	0	1	1	0	0
	IMT3	1	1	0	0	0	0

Lumbar puncture	IMT1	4	2	0	3	0	0
	IMT2	2	2	0	0	0	0
	IMT3	1	1	0	0	0	0
Nasogastric tube insertion	IMT1	4	2	2	0	0	1
	IMT2	1	2	1	0	0	0
	IMT3	1	0	1	0	0	0
Diagnostic pleural aspiration	IMT1	1	3	2	3	0	0
	IMT2	0	1	1	1	0	1
	IMT3	0	0	2	0	0	0
Femoral or intraosseous access	IMT1	1	1	5	2	0	0
	IMT2	1	0	1	1	1	0
	IMT3	0	2	0	0	0	0
Central venous cannulation (internal jugular or subclavian)	IMT1	1	1	5	2	0	0
	IMT2	0	1	2	1	0	0
	IMT3	0	0	2	0	0	0
Intercostal drain for pneumothorax	IMT1	0	3	3	2	1	0
	IMT2	0	0	1	2	0	1
	IMT3	0	0	2	0	0	0
Intercostal drain for effusion	IMT1	0	4	2	2	1	0
	IMT2	0	0	1	2	0	1
	IMT3	0	0	2	0	0	0
DC cardioversion	IMT1	1	5	3	0	0	0
	IMT2	0	2	1	1	0	0
	IMT3	0	1	1	0	0	0
Abdominal paracentesis	IMT1	2	3	3	0	1	0
	IMT2	2	0	1	1	0	0
	IMT3	1	0	1	0	0	0

TABLE 1: Procedural confidence by training grade

Values are the number of respondents. Each procedure has 9 IMT1, 4 IMT2, and 2 IMT3 responses. Comparisons between grades are exploratory, particularly because only two IMT3 doctors responded. The cross-sectional distributions cannot establish progression within individual trainees. The response descriptors are reproduced in Appendix A. Counts describe self-reported confidence and supervision categories.

IMT: Internal Medicine Training; CPR: cardiopulmonary resuscitation; DC: direct current.

Appendix C: Satisfaction with procedural teaching by training grade

Procedure	Grade	Very satisfied	Satisfied	Neither satisfied nor dissatisfied	Dissatisfied	Very dissatisfied	No training received
Advanced CPR	IMT1	2	6	1	0	0	0
	IMT2	2	1	1	0	0	0
	IMT3	0	2	0	0	0	0
Temporary cardiac pacing	IMT1	1	5	2	1	0	0
	IMT2	0	1	1	2	0	0
	IMT3	1	0	1	0	0	0
	IMT1	2	4	1	1	0	1

Ascitic tap	IMT2	2	0	1	1	0	0
	IMT3	1	1	0	0	0	0
Lumbar puncture	IMT1	4	2	0	3	0	0
	IMT2	2	2	0	0	0	0
	IMT3	1	1	0	0	0	0
Nasogastric tube insertion	IMT1	4	2	2	0	0	1
	IMT2	1	2	1	0	0	0
	IMT3	1	0	1	0	0	0
Diagnostic pleural aspiration	IMT1	1	3	2	3	0	0
	IMT2	0	1	1	1	0	1
	IMT3	0	0	2	0	0	0
Femoral or intraosseous access	IMT1	1	1	5	2	0	0
	IMT2	1	0	1	1	1	0
	IMT3	0	2	0	0	0	0
Central venous cannulation (internal jugular or subclavian)	IMT1	1	1	5	2	0	0
	IMT2	0	1	2	1	0	0
	IMT3	0	0	2	0	0	0
Intercostal drain for pneumothorax	IMT1	0	3	3	2	1	0
	IMT2	0	0	1	2	0	1
	IMT3	0	0	2	0	0	0
Intercostal drain for effusion	IMT1	0	4	2	2	1	0
	IMT2	0	0	1	2	0	1
	IMT3	0	0	2	0	0	0
DC cardioversion	IMT1	1	5	3	0	0	0
	IMT2	0	2	1	1	0	0
	IMT3	0	1	1	0	0	0
Abdominal paracentesis	IMT1	2	3	3	0	1	0
	IMT2	2	0	1	1	0	0
	IMT3	1	0	1	0	0	0

TABLE 2: Satisfaction with procedural teaching by training grade

Values are the number of respondents. Each procedure has 9 IMT1, 4 IMT2, and 2 IMT3 responses. Comparisons between grades are exploratory, particularly because only two IMT3 doctors responded. The cross-sectional distributions cannot establish progression within individual trainees. Category labels follow the administered questionnaire in Appendix A. “No training received” is reported separately from dissatisfaction.

IMT: Internal Medicine Training, CPR: cardiopulmonary resuscitation, DC: direct current.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

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Disclosures

Human subjects: Informed consent for treatment and open access publication was obtained or waived by all participants in this study. University Hospitals Coventry and Warwickshire NHS Trust Research and Development Team issued approval GF0916. **Animal subjects:** All authors have confirmed that this study did not involve animal subjects or tissue. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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