LETTER

The Auckland Surgical Theatre Educational Environment Measure: does attending surgery benefit house officers?

Tary Yin, Stephen Child

Surgical knowledge, procedural and interventional skills form an integral part of the learning objectives for New Zealand house officers (prevocational doctors) however the role of the operating theatre in house officer learning is unclear. This study aims to assess whether attending the operating theatre is perceived as beneficial by house officers utilising an easy to use and administer method.

The Surgical Theatre Educational Environment Measure (STEEM) was one of the first tools developed specifically for measuring the operating theatre learning environment. This was validated on surgical trainees in the United Kingdom who rated their environment a mean overall score of 74.4%. This research was subsequently reproduced with general surgical residents in Canada, medical students in the United Kingdom as well as Australian and New Zealand surgical trainees with similar scores.

Subsequently, a condensed Mini-STEEM, was created after discovering that 13 out of 50 of the survey questions covered 73.2% of the total variance. Each of these studies were validated by demonstrating a high internal consistency and using exploratory factor analysis these studies were then able to divide their inventories into various subscales reflecting distinct areas of the surgical theatre educational environment.

Our study utilised items from the mini-STEEM and full STEEM to construct a short 15-item, house officer-focused, Likert-type scale questionnaire called the Auckland Surgical Theatre Educational Environment Measure (ASTEEM; Appendix 1). For each Likert-type scale question, a score of 5 was given if the participant ‘strong agreed’, 4 if ‘agreed’, 3 if ‘uncertain’, 2 if ‘disagreed’ and 1 if ‘strongly disagreed’. For negative statements (questions 14, 15, 19, 20, 24, 25 and 26), the scoring was reversed. An overall total score and three subscale scores were calculated based on the mini-STEEM’s subscales.

In addition, 11 questions preceding the ASTEEM were included (Appendix 1 & 2) which asked about gender, level of training, district health board, current run, run experiences, New Zealand Curriculum Framework procedural learning outcomes achieved, opportunity to admit undifferentiated patients, belief in added educational value in going to theatre, theatre attendance, career intention and primary trainer.

This questionnaire was distributed to house officers using SurveyMonkey (SurveyMonkey Inc.), an online survey development website. House officers undergoing surgical runs at all Auckland hospitals were included (Waitemata District Health Board, WDHB; Auckland District Health Board, ADHB; and Counties Manukau District Health Board, CMDHB).

86 of 183 (46.99%) house officers working in surgical attachments responded, of which 84.88% had attended a case in theatre by the end of their attachment with 81.40% having completed ASTEEM as well. There were equal numbers of male and female respondents with postgraduate year one (PGY1) house officers making up the largest proportion (47.67%) followed by PGY2 house officers (39.53%).

84.88% of respondents attended the operating theatre during their run with 87.21% believing that there was added educational value in going to theatre. The mean overall score of the ASTEEM was 68.76% which compared similarly to previous surgical theatre educational environment measures. See Table 1.
Table 1. ASTEEM results

<table>
<thead>
<tr>
<th>Subscales</th>
<th>Score</th>
<th>Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good surgical operating experience</td>
<td>56.2%</td>
<td>Before the operation my trainer discusses the surgical technique planned 3.19/5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I get enough opportunity to assist 3.27/5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I am usually too busy doing other work to go to theatre 1.97/5</td>
</tr>
<tr>
<td>Friendly atmosphere in theatre</td>
<td>75.7%</td>
<td>My trainer is enthusiastic about teaching 4.17</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The theatre staff are friendly 3.85/5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>There are enough theatre sessions per week for me to gain the appropriate experience 3.25/5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The atmosphere in theatre is pleasant 3.81</td>
</tr>
<tr>
<td>Discrimination against me</td>
<td>81.3%</td>
<td>The anaesthetists put pressure on my trainer to operate himself to reduce anaesthetic time 3.47</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I feel discriminated against in theatre because of my gender 4.29/5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I feel discriminated against in theatre because of my ethnicity 4.44/5</td>
</tr>
<tr>
<td>Questions from the full STEEM</td>
<td></td>
<td>I get on well with my trainer 4.33/5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The nursing staff dislike it when I operate as the operation takes longer 2.91/5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>My trainer’s surgical skills are very good 4.53/5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I get bleeped during operations 1.89/5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When I am in theatre, there is nobody to cover the ward 2.14/5</td>
</tr>
</tbody>
</table>

A Mann-Whitney test was then performed to compare ASTEEM scores between house officers with surgical versus non-surgical career intentions. In total there were 31 house officers who had surgical career intentions and 39 house officers who had non-surgical career intentions. House officers interested in surgery rated their surgical educational environments significantly higher overall (72.43% versus 65.84%, p=0.006) as well as in the ‘friendly atmosphere in theatre’ subscale (80.95% versus 71.55%, p=0.002). See Table 2.

Table 2. ASTEEM scores comparing house officers with surgical career intentions versus non-surgical career intentions

<table>
<thead>
<tr>
<th>Variable</th>
<th>Surgical n=31</th>
<th>Non-surgical n=39</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total score</td>
<td>72.43%</td>
<td>65.84%</td>
<td>0.006</td>
</tr>
<tr>
<td>Good surgical operating experience</td>
<td>58.93%</td>
<td>54%</td>
<td>0.185</td>
</tr>
<tr>
<td>Friendly atmosphere in theatre</td>
<td>80.95%</td>
<td>71.55%</td>
<td>0.002</td>
</tr>
<tr>
<td>Discrimination against me</td>
<td>83%</td>
<td>80%</td>
<td>0.521</td>
</tr>
</tbody>
</table>

A high percentage of surgical house officers achieved the New Zealand Curriculum Framework procedural learning outcomes of: managing common complications (95.35%), monitoring and managing patients postoperatively (94.19%) and being able to explain indications and contraindications for common procedures (90.70%). However procedural skills including wound dressing, simple skin lesion excision and wound debridement were very poorly achieved at 37.21%, 25.58% and 20.93% respectively.1

Our study suggests that attending the operating theatre is perceived as beneficial by most house officers irrespective of career intention and that the operating surgical theatre environment is positive to their learning experience. It should be noted that our sample size precludes subgroup analysis and that we have no validation of our modified ASTEEM. Nevertheless, our results compare favourably to previous STEEM and mini-STEEM studies suggesting reliability.2–6
In addition, it was noteworthy that while 84.88% attended theatre, New Zealand Curriculum Framework procedural learning outcomes of managing common complications, monitoring and managing patients postoperatively and being able to explain indications and contraindications of common procedures were met by over 90% of respondents.

Educational environments should be monitored regularly and this survey provides a simple method to audit the effects of any interventions implemented. It is also the first house officer-focused tool for assessing the operating theatre educational environment to our knowledge.

(Ethics approval for this study was granted by the Auckland District Health Board Ethics Committee.)

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References
5. Nagraj S, Wall D, Jones E. Can STEEM be used to measure the educational environment within the operating theatre for undergraduate medical students? Medical Teacher. 2006;28(7):642–647.
Appendix 1. Survey (page 2); including 15 Likert-scale type questions (questions 12–26)

Please continue only if you have attended a theatre case during this run. If not, you may stop here, thank you for your participation.

11. When in theatre, who provided you with the most 'training'?
   Consultant □
   Fellow □
   Registrar □

Please indicate whether you strongly agree (SA), agree (A), unsure (U), disagree (D) or strongly disagree (SD) with each of the statements below by circling the appropriate response. Your answers should reflect the situation in the operating theatre at your current post. 'My trainer' in the statements below refers to the consultant, fellow or registrar who provided you with the most 'training'.

12. I get on well with my trainer

13. My trainer is enthusiastic about teaching

14. The anaesthetists put pressure on my trainer to operate himself to reduce anaesthetic time

15. The nursing staff dislike it when I operate as the operation takes longer

16. Before the operation my trainer discusses the surgical technique planned

17. My trainer's surgical skills are very good

18. I get enough opportunity to assist

19. I feel discriminated against in theatre because of my gender

20. I feel discriminated against in theatre because of my ethnicity

21. The atmosphere in theatre is pleasant

22. The theatre staff are friendly

23. There are enough theatre sessions per week for me to gain the appropriate experience

24. I get bleeped during operations

25. I am usually too busy doing other work to go to theatre

26. When I am in theatre, there is nobody to cover the ward

Thank you for completing this survey
Appendix 2. Survey (page 1)

The Auckland Surgical Theatre Educational Environment Measure

1. Are you?
   - Male
   - Female

2. Level of training
   - PGY1 HO
   - PGY2 HO
   - PGY3 or above HO - please specify year: ____________

3. District Health Board
   - Waitema DHB
   - Auckland DHB
   - Counties Manukau DHB

4. Current run
   - Cardiothoracic Surgery
   - General Surgery
   - Neurosurgery
   - Orthopaedic Surgery
   - Otolaryngology Head and Neck
   - Plastic and Reconstructive
   - Urology
   - Vascular Surgery
   - Obstetrics and gynaecology
   - Paediatric Surgery
     (specify subspeciality below)
   - Other - please specify: ____________________

5. Have you previously completed this run as a house officer?
   - Yes
   - No

6. Which of the following proposed NZCF (New Zealand Curriculum Framework for Prevocational Medical Training) procedural and interventional learning outcomes for PGY1 and PGY2 were you able to achieve during this run?
   - Explain indications and contraindications for common procedures
   - Monitor the patient and provide appropriate aftercare
   - Identify and manage common complications
   - Administration of local anaesthesia
   - Scrub, gown and glove
   - Simple skin lesion excision
   - Surgical knots and simple wound suturing
   - Suture removal
   - Wound debridement
   - Wound dressing
   - Administration of local anaesthesia
   - Scrub, gown and glove
   - Simple skin lesion excision
   - Surgical knots and simple wound suturing
   - Suture removal
   - Wound debridement
   - Wound dressing

7. On this run I had the opportunity to review an undifferentiated patient new to my service
   - Frequently
   - Occasionally
   - Never

8. Do you believe that there is added educational value in going to theatre over and above performing ward work, going to clinic etc?
   - Yes
   - No

   Please explain:

9. Did you attend a theatre case during this run?
   - Yes
   - No

10. Career intention - tick one only
    - Medicine/specialty medicine
    - Surgery/specialty surgery
    - General practice
    - Mental health
    - Emergency
    - Intensive care
    - Anaesthetics
    - Radiology
    - Paediatrics
    - Pathology
    - Don't know
    - Other - please specify: ____________________

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