Procedure-based assessments in trauma and orthopaedic training – The trainees’ perspective

ALISTAIR R. HUNTER, EMILY J. BAIRD & MIKE R. REED
University College London Hospitals NHS Foundation Trust, UK

Abstract

Introduction: The study aimed to gain an understanding of the attitudes of trauma and orthopaedic (T&O) trainees regarding procedure-based assessments (PBAs) and identify factors that influence any perceived educational benefit.

Methods and materials: A questionnaire was emailed to all T&O trainees in the UK via an established e-mail communication tool after an initial pilot exercise. The data were analysed using the online survey software.

Results: Of the 616 trainees included 53% found PBAs useful as a learning tool for delivery of feedback. Trainees agreed that there were barriers to the successful use of PBAs (61%). Completing the PBA at the time of the procedure ($p<0.001$) and the trainer delivering quality feedback with PBAs ($p<0.001$) significantly increased the number of trainees perceiving an improvement in their practice. Completing higher numbers of PBAs did not have this effect ($p=0.26$). There was wide geographical variation in the use of PBAs by trainees.

Conclusions: This is the first nationwide study offering a deeper insight into factors influencing T&O trainees’ perceptions of the educational benefit gained from using PBAs. This study informs the debate on how to improve the effective use of PBAs in T&O training, and generally, of workplace-based assessments in surgical training.

Introduction

Procedure-based assessments (PBAs) are one form of workplace-based assessment used in postgraduate medical training and are the principal method of assessing a trainee’s surgical skills in the operating theatre in the UK (Beard et al. 2011). The trainee is assessed against a six-domain competency checklist, consisting predominantly of generic competencies (e.g., pre-operative planning and preparation) with some specific procedure. A global summary score is divided into four levels, with the lowest rating being unable to perform the procedure and the highest rating the ability to perform the procedure unsupervised at the level expected of a specialist in practice (Intercollegiate Surgical Curriculum Programme 2014)

A PBA provides the trainee with formative assessment in the form of constructive feedback from their trainer on their performance in a particular operation (Pitts et al. 2005). Over time, PBAs are completed with a variety of trainers and for a range of operations. When collated, they form a summative assessment of competence and progression of a trainee in learning surgical procedures. In addition, PBAs are used in decisions regarding suitability of a trainee for progression or completion of training at their annual review of competence progression (ARCP) meeting. This review is led by the regional lead for each specialty Training Programme, known as the Training Programme Director (TPD).

PBAs are a recent development in surgical assessment. The introduction of competence-based curricula (PMETB 2005; Scheele et al. 2008; Modernising Medical Careers 2010) has led to the development of these formalised assessments of technical skills and professional behaviours as one method of workplace-based assessment in surgical training. PBAs were introduced to trauma and orthopaedic (T&O) surgical training in 2005 (Pitts et al. 2005) and into the surgical specialties curricula by the Intercollegiate Surgical Curriculum Project (ISCP) in 2007. These changes represented a major shift away from the previous lengthy apprenticeship model (Galasko & Mackay 1999; Thornton et al. 2003; Pitts & Rowley 2009), where technical and non-technical skills were not formally assessed in the workplace, towards shorter working hours (Department of Health 2003), increased objective assessment of doctors (Darzi et al. 1999) and emphasis on supervised training opportunities.

Practice points

- Trainees value the feedback from PBAs more than the summative assessment gained.
- Increased use of the free text feedback is encouraged in improving the quality of the feedback given by trainers.
- Lessons can be learned from regions using PBAs effectively in standardising good practice.
- Focusing on quality rather than the number of assessment events may improve the educational benefit gained by trainees.
The attitudes of surgical trainees to PBAs and the educational impact of PBAs on surgical trainees (Miller & Archer 2010) are not well understood. There is known to be some dissatisfaction among surgical trainees with the general use of the workplace-based assessment components of ISCP (Pereira & Dean 2013). Previous research by Marriott et al. (2011) concluded that PBAs had good acceptability among trainees across several surgical specialties. However, analysis of the relatively small sample of trainees was not broken down by specialty and the study was conducted in only one region, limiting generalisability of the results.

Trauma and orthopaedic (T&O) trainees make up 24% of all UK surgical trainees (JCST, personal communication) and have been using PBAs for the longest period of time (Pitts et al. 2005). Given the degree of trainee and trainer investment in PBAs and the weight given to them by the governing regional and national training bodies (Joint Committee on Surgical Training Quality Indicators for Surgical Training 2012), investigating the attitudes of T&O trainees towards PBAs and assessment of their perceived educational impact seems to be both important and worthwhile. The aim of the study was to gain an understanding of the attitudes of T&O trainees across the UK regarding their use of PBAs and identify factors influencing any perceived educational benefit. Educational benefit is defined for the purpose of this study as an improvement to a trainee's learning of surgical skills, or as being valuable in providing evidence of surgical competence.

Materials and methods

All T&O registrars holding a National Training Number (“trainees”) in the UK are required to use the eLogbook system to submit data relating to their operative experience (Sher et al. 2005). An Internet-based questionnaire was sent to all T&O trainees via the eLogbook e-mail system. The study was approved by the eLogbook Validation and Audit Committee.

In designing the questionnaire, an item pool of attitude statements was constructed according to established methods (Oppenheim 1992). In order to establish the intensity of attitude to a statement, a five-point Likert-type scale was used, ranging from “strongly disagree” to “strongly agree” and free text responses. A pilot questionnaire of 12 trainees attending their ARCP was conducted focussing on question phrasing and clarity. The questionnaire was then further refined and discussions with the then Educational Advisor to the British Orthopaedic Association. Further questions were included to provide more information on the changes in behaviour of trainees in response to using PBAs, and which aspects trainees found most useful, before conversion to an online format.

An e-mail with a link to the online questionnaire was sent to all T&O trainees via eLogbook. A reminder e-mail was sent 1 week later in order to maximise response rate (Solomon 2001). Responding trainees with an NTN who had previously used PBAs were included. Analysis of results was conducted using the online survey software and Microsoft Office Excel 2003 (Microsoft Corp, Redmond, Washington, DC). All tests of significance were made using the Chi-squared test with a p value of <0.05 considered significant.

Results

Of 668 responses 616 met inclusion criteria. This represents 54% of the total 1144 trainees in the UK at that time (JCST, personal communication). There was a broad, representative spread of seniority from ST3 to post-CCT trainees, and of geographical location (defined by Regional Training Programme) within the UK. The mean duration of use of PBAs was 3.75 years (range 1–5 years, n = 614). Per six-month post, trainees completed a median minimum number of four PBAs (interquartile range (IQR) 3–6), and a median maximum number of eight PBAs (IQR 6–10) (n = 601), with 35.9% of trainees completing a maximum of 10 or more.

Which aspects of PBAs do trainees find educationally beneficial?

More trainees found value in verbal feedback at the time of the procedure than in using PBAs as evidence of competence (Figure 1). The role of feedback was emphasised, with 53% perceiving verbal feedback to be a useful learning tool (Table 1). Overall 29.3% of trainees reported that they had

Figure 1. The attitudes of trainees to the most valuable aspects of PBAs (n = 592).
improved their practice as a result of using PBAs (Table 1). 41.3% of the respondents did not agree that they had improved their practice as a result of using PBAs, underlining the importance of improving PBAs as a learning tool for trainees. On analysing the 50.4% of trainees who agreed they had received good quality feedback when using PBAs 49.3% (143/290) of this group agreed they improved their practice as a result of using PBAs. Of the trainees who did not receive quality feedback (28.9%), only 9% (15/167) agreed their practice was improved a significant difference compared with the group reporting high-quality feedback (p<0.001).

Opinion was divided among trainees as to whether PBAs should be used at their ARCP as evidence of the surgical competence of the trainee (Table 1). About 42% thought that PBAs were a valid assessment, but 30.2% disagreed, some trainees giving examples in the free text of PBAs being routinely completed retrospectively just prior to their ARCP. Furthermore, trainees reported that the reliability of a PBA was sometimes undermined by the different interpretation of standards among trainers. These factors may explain the 51.4% who perceived completion of PBAs to be nothing but a ‘form-filling exercise’. However, trainees were more positive about the role of PBAs in measuring progression in their surgical competence over time (55.9%).

Effective implementation is a key to achieving educational benefit

About 60.7% of trainees perceived there are barriers to the successful use of PBAs (Table 1). Trainees highlighted several factors, which can be subdivided into individual and organisation factors.

Individual factors

The majority of trainees (77.8%) felt that the enthusiasm of their trainer for PBAs determined the extent of benefit to be gained from using them (Table 2). Trainer behaviours identified in the free text as beneficial include identifying cases on operating lists for PBAs and taking time to go through the PBA with the trainee immediately after the procedure. A similar high proportion of trainees (63.7%) felt that their own role was important in determining the benefit gained from PBAs (Table 2).

An analysis was performed to determine the behaviours which had the most significant effect on the satisfaction of trainees with PBAs. The completion of PBAs at the time of the procedure was found to be most important, with significant increases in their perception of PBAs as an effective learning tool (p<0.001), an effective tool in the annual progress review (p<0.001) and in improving their practice (p<0.001).

### Table 1. Trainee responses to attitude statements.

<table>
<thead>
<tr>
<th>Statement</th>
<th>N</th>
<th>Strongly disagree (%)</th>
<th>Disagree (%)</th>
<th>Uncertain (%)</th>
<th>Agree (%)</th>
<th>Strongly agree (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feedback from PBAs is a useful learning tool</td>
<td>588</td>
<td>5.1</td>
<td>19.0</td>
<td>22.8</td>
<td>49.3</td>
<td>3.7</td>
</tr>
<tr>
<td>In the past six months, your trainer has provided quality feedback when using PBAs</td>
<td>580</td>
<td>4.8</td>
<td>24.1</td>
<td>20.7</td>
<td>45.7</td>
<td>4.7</td>
</tr>
<tr>
<td>On most occasions you complete PBA assessments and gain feedback around the time of the procedure</td>
<td>581</td>
<td>6.2</td>
<td>27.9</td>
<td>11.7</td>
<td>51.6</td>
<td>2.6</td>
</tr>
<tr>
<td>Personally, using PBAs motivates you to talk about your surgical skills with your trainer</td>
<td>582</td>
<td>10.0</td>
<td>27.5</td>
<td>22.2</td>
<td>36.4</td>
<td>4.0</td>
</tr>
<tr>
<td>You have improved your practice as a result of the feedback from PBAs</td>
<td>588</td>
<td>9.5</td>
<td>31.8</td>
<td>29.4</td>
<td>27.4</td>
<td>1.9</td>
</tr>
<tr>
<td>There are barriers to the successful use of PBAs by trainees</td>
<td>584</td>
<td>1.6</td>
<td>12.8</td>
<td>24.9</td>
<td>48.4</td>
<td>12.3</td>
</tr>
<tr>
<td>Completing PBAs is nothing but a ‘form-filling exercise’</td>
<td>593</td>
<td>2.2</td>
<td>22.6</td>
<td>23.8</td>
<td>32.0</td>
<td>19.4</td>
</tr>
<tr>
<td>PBAs should be used as evidence of a trainee’s surgical competence in their ARCP/RITA</td>
<td>591</td>
<td>13.2</td>
<td>20.5</td>
<td>34.5</td>
<td>30.3</td>
<td>1.5</td>
</tr>
<tr>
<td>A PBA makes a valid assessment of a trainee’s surgical competence in a particular operation</td>
<td>593</td>
<td>9.3</td>
<td>20.9</td>
<td>27.8</td>
<td>40.3</td>
<td>1.7</td>
</tr>
<tr>
<td>Over time, a series of PBAs can reflect a change in the level of your surgical competence</td>
<td>592</td>
<td>6.3</td>
<td>16.7</td>
<td>21.1</td>
<td>52.4</td>
<td>3.5</td>
</tr>
</tbody>
</table>

### Table 2. The role of the trainer, trainee, and TPD.

<table>
<thead>
<tr>
<th>Statement</th>
<th>N</th>
<th>Strongly disagree (%)</th>
<th>Disagree (%)</th>
<th>Uncertain (%)</th>
<th>Agree (%)</th>
<th>Strongly agree (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The enthusiasm of your trainer towards PBAs dictates the benefit gained from them</td>
<td>586</td>
<td>2.4</td>
<td>7.5</td>
<td>12.3</td>
<td>52.2</td>
<td>25.6</td>
</tr>
<tr>
<td>The enthusiasm of the trainee towards PBAs dictates the benefit gained from them</td>
<td>584</td>
<td>2.7</td>
<td>14.6</td>
<td>19.0</td>
<td>52.2</td>
<td>11.5</td>
</tr>
<tr>
<td>Your Training Programme Director strongly encourages your trainers to use PBAs as an important aspect of your training</td>
<td>585</td>
<td>1.4</td>
<td>6.3</td>
<td>25.0</td>
<td>49.9</td>
<td>17.4</td>
</tr>
</tbody>
</table>
We analysed how the number of PBAs completed relates to trainee satisfaction. The subgroup that had completed a maximum of 10 or more PBAs in a six-month post (35.9% of trainees) were no more likely to complete PBAs at the time of the procedure \((p = 0.19)\), find the feedback as a useful learning tool \((p = 0.34)\) or improve their practice due to PBAs \((p = 0.26)\).

**Organisation factors**

There was wide regional variability between Training Programmes in the experience of trainees using PBAs. There was no obvious geographical pattern, but the example in Table 3 shows how important the influence of the Training Programme can be. TPDs were perceived as being broadly in favour of the role of PBAs in training (Table 2). Trainees who strongly agreed that they had supportive TPDs were significantly more likely to agree with the role of PBAs in their annual review of progress \((p = 0.012)\) and that feedback from PBAs had improved their practice \((p = 0.014)\).

**Discussion**

Understanding the attitudes of trainees regarding PBAs, the perceived educational benefit derived from their use and the factors influencing the trainees in these perceptions are important in identifying how to improve the use of PBAs in surgical training. Without a perceived educational benefit experienced by trainees, PBAs simply become a paper exercise. This is the first nationwide study investigating the attitudes of T&O trainees towards PBAs in the UK, and has relevance given the current shift towards increasing workplace-based assessment of trainees and revalidation of surgeons.

A major evaluation of ISCP (Joint Committee on Surgical Training 2012) highlighted that outside pressures, such as external administrative or structural training agendas, can mean PBAs (and WBAs in general) are not used effectively and lose their utility as drivers of experiential learning and development. Our results and recommendations in this study mirror these and other findings in the evaluation, such as the constructive use of WBAs by some trainers and the development, in some quarters, of a detrimental ‘tick-box’ culture.

A good response rate was achieved, indicating that this is an issue of importance for trainees. A range of opinions were expressed about the use of PBAs in training but trainees were broadly supportive. When used effectively, trainees found PBAs to be educationally beneficial. The formative role of PBAs as a learning tool was felt to be more valuable than their summative role as an assessment tool in their ARCP. This may reflect the unease of some trainees regarding the validity and reliability of the assessment event when PBAs are not used effectively. Recent GMC guidance (GMC 2011) has emphasised the need for trainees and trainers to differentiate between formative and summative WBAs, addressing one of the main concerns about the misuse of WBAs in general.

Trainees felt that barriers exist to the effective use of PBAs. We have identified factors that trainees thought influenced the effectiveness of PBAs and their perceived educational benefit. The most important individual factor was the enthusiasm of the trainer; without this, trainees felt the value of the process was limited. The importance of the trainer in maximising the benefit gained from using PBAs has been cited in other studies (Norcini & Burch 2007; Beard 2008). Assessor training for WBAs has been shown to reduce the variability among trainers when provide feedback and assessment (Holmboe et al. 2004). It may be worth considering inclusion of compulsory training for trainers in the use of PBAs and WBAs.

Another important factor was the quality of the feedback received. In our study, trainees receiving good quality feedback when using PBAs felt that they were significantly more likely to change their surgical practice as a result. This underlines that well-implemented feedback from WBAs can lead to a perceived positive effect on practice (Saedon et al. 2012). The reasons for failure of trainers to deliver quality feedback are known (Ali 2013) and include focusing on the assessment of performance at the expense of providing adequate feedback. Inclusion of compulsory written feedback in PBAs as a record of the verbal feedback conversation may focus the feedback and improve its quality.

The enthusiasm of the trainee was perceived to have an important role in gaining benefit from PBAs, which can be manifested in behaviours such as contemporaneous completion of PBAs. This was the most important behaviour in improving the perceived educational benefit to trainees. Encouraging this practice appears crucial in maximising trainee satisfaction and educational benefit, and could be achieved with a limit of 72 h within which to complete the PBA online.

This study showed that completing a high number of PBAs does not improve the perception of trainees regarding the educational benefit gained. Furthermore, there is an absence of any published evidence that a higher number of WBAs completed in a post signifies a higher quality of training in that

<table>
<thead>
<tr>
<th>Training Programme 1, N = 41 (%)</th>
<th>Training Programme 2, N = 52 (%)</th>
<th>Training Programme 3, N = 86 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completed a maximum of more than 10 in a six-month post</td>
<td>100</td>
<td>62.5</td>
</tr>
<tr>
<td>Feedback from PBAs is a useful learning tool</td>
<td>54.5</td>
<td>50.0</td>
</tr>
<tr>
<td>Your Training Programme Director strongly encourages your trainers to use PBAs as an important aspect of your training</td>
<td>100</td>
<td>40.6</td>
</tr>
</tbody>
</table>

\[ p = 0.26 \]
post. A fixed required number of WBAs at 40 per year (Joint Committee on Surgical Training 2012) could undermine the effective use of PBAs by encouraging the completion of the assessment as a form-filling exercise. Our study adds to concerns about how the current implementation of workplace-based assessment is at odds with the intended use (Ali 2013). Simply increasing the number of WBAs required per annum is not regarded by the authors as a way to improve the educational benefit to trainees. Instead, the emphasis should be on how the PBAs are used and the quality of the feedback and assessment.

As this study was conducted at a national level, we were able to identify a great deal of variability between Training Programmes, thus highlighting the importance of regional differences in the attitudes of trainees and in their use of PBAs. Our study shows that TPDs have an important influence in the implementation of PBAs in their training regions and on the educational benefit gained by trainees. Perhaps, then, it is the “culture” surrounding PBAs in that region which shapes the attitudes and behaviour of trainees. A culture in which PBAs are valued as an educational tool and are conducted in a way to ensure optimal benefit is likely to be important in ensuring trainee satisfaction and delivering educational benefit. Finding ways to implement good practice across Training Programmes would help to standardise their use across the UK.

As a questionnaire-based study, there are limitations in the interpretation of the data. How far respondents had a shared understanding of the meaning of terms used in the questionnaire is difficult to determine. In addition, separating out the attitudes relating to the PBA assessment event from those of WBAs in general is not easy. In piloting the study and using clear phrasing, we hope to have mitigated against these issues as far as possible. Likely responder bias is also acknowledged, with those trainees more enthusiastic or disgruntled with PBAs as far as possible. Despite these limitations, a questionnaire-based study was chosen in order to include the greatest possible number of T&O trainees.

In conclusion, this study has examined the attitudes and experiences of a sizeable cohort of T&O trainees across the UK. Based on an enhanced understanding of the individual and organisational level factors that influence both the attitudes of trainees and the perceived educational benefit derived from PBAs, possible improvements in their use and implementation have been identified. Further work should seek to identify whether the factors identified here apply to the use of PBAs in other surgical specialties. Our findings may also offer insights into the use of other, similar workplace-based assessments, used outside the UK. These findings should inform the debate on how to advance the effective use of PBAs in T&O training and the wider use of PBAs and workplace-based assessments in surgical training in general.

Notes on contributors

ALISTAIR R. HUNTER, MA, MSc, FRCS (Tr & Orth). FHEA, is a Trauma and Orthopaedics Registrar at Chelsea and Westminster Hospital, London. He has a strong interest in workplace-based assessment and curriculum design for surgical specialties. He co-authored the national trainee position statement on the use of PBAs in Orthopaedic Training.

EMILY J. BAIRD, FRCS (Tr & Orth) MFSTEd, is a Paediatric Orthopaedic Fellow at RHSC, Edinburgh, and Past President of the British Orthopaedic Trainees’ Association. She has a keen interest in education in orthopaedics, especially work-based assessments, the development of clinical scenarios for national selection interviews and OSCEs for paediatric orthopaedics.

MIKE R. REED, FRCS (T&O), MD, is a UK Training Programme Director and a co-author of the trauma and orthopaedic curriculum. He has previously been a member of the specialty advisory committee and the training standards committee. He now chairs the education committee of the British Orthopaedic Association.

Glossary

Performance-Based Assessment: Procedure-based assessment is one form of Performance-Based Assessment (Wojtczak 2003). This is an evaluation that demands trainees be engaged in specified clinical activities. This permits evaluation of an ability to perform clinical tasks and not merely the recitation of medical knowledge. Typical measurement tools for this form of testing are checklists, observation logs, and anecdotal reports.


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References


