Developing national selection processes for entry into postgraduate specialty training: the case of trauma and orthopedics in the United Kingdom

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Abstract A large body of international research has been done investigating best practice selection across many occupational groups, but there is relatively little research on developing selection methodology for entry to postgraduate training. Hitherto, various selection processes have been used, some of which relied heavily on patronage. Developments in Medical Education, including curriculum design, formal work-based place assessment, alongside the introduction of MMC (Modernizing Medical Careers) paved the way for significant *change*. Trauma and orthopedics in England is the last surgical specialty to adopt National Selection and did so first in 2013. This paper sets out that journey, the implementation of National selection in 2013, what has been learned, and our goals for the future.

Keywords Recruitment · National selection · Candidates · Trauma and orthopedics · Specialty training · Patronage · Fairness · Equitable · Assessment · Scoring matrices · Domains stations · Internal reliability · Validation

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Introduction

There exists a large body of international research investigating best practice selection across many occupational groups [1]. In medicine, there is a significant volume of research exploring medical school admissions procedures and the link to subsequent performance during medical school. However, there is relatively little research on developing selection methodology for entry to postgraduate training [2]. This paper presents the case of selection for training into UK Trauma and Orthopedics (T and O), which has now successfully completed the first year of national recruitment. In the paper we highlight what the authors have identified as important factors in the design of selection processes into postgraduate specialty training. This descriptive paper has 4 main objectives:

- (1) To provide an insight into the background and key levers for change in the recruitment and selection of trainees into UK trauma and orthopedics.
- (2) To identify the key elements of best practice selection design in this context.
- (3) To outline the development of a new national selection system for UK trauma and orthopedics with initial candidate feedback results.
- (4) To outline lessons learned for the future and plans for ongoing evaluation and validation.

Background to selection into surgery

The last 20 years has seen a dramatic, albeit slow, evolution in selection processes in surgery in the UK. To some extent it has mirrored the development and refinement of the surgical curricula and the demand by everyone for a more open, transparent, fair, equitable, and defensible process.

Progression in orthopedics in the UK in the 1980s

The 2 orthopedic authors (M.G. and D.L.) can recall when they were training over 20 years ago that it was commonplace to apply for multiple jobs after qualification before being appointed to a consultant post in the UK. At that time, trainees wishing to pursue a surgical career would, following a successful House Job (pre-registration year) and entry onto the medical register, usually spend time in Accident and Emergency (A&E), and many also did an Anatomy Demonstrator job at the same time. Other Senior House Officer (SHO) posts would follow, for 1 or 2 years, and then a move onto Junior, Middle, then Senior Registrar posts. The latter may have been up to 3 to 4 years in length. In those days it would be very unusual for anybody to be appointed a Consultant in less than 10 years from the time of qualification and usually much longer. Passing the FRCS examination was required before taking up HST (Higher Surgical Training) i.e. a Registrar post.

Frequency of advertised posts

In the 1980s posts would come up often and sporadically as and when individuals had got appointed to more senior posts. It was usual that a local candidate was aware of this and often at some considerable ‘advantage’ in the selection process. In general, it was difficult to break away from the *parochial* nature of these appointments but some movement across the country did take place.

Patronage

At this time, the process was heavily influenced by patronage and it also should be considered that it was at a time when the “Registrar” would be attached to a “Firm”, usually with a Consultant, Senior Registrar, Middle Grade Registrar, Junior Registrar, SHO, and sometimes a Houseman, looking after their cohort of patients. The individual Registrar would be with the trainer sometimes for a period of 12 months but very often longer, especially in the case of a Senior Registrar.

Assessment of performance

Whilst there were no structured, formal, workplace-based assessments at that time, performance of the individual Registrar was observed almost on a daily basis by the Consultants in charge, both during elective and trauma practice. How well those individual trainees performed in terms of looking after their patients, their operative ability, their ability to undertake audit, publish, and interact with Consultants, ward staff etc were all noted, albeit not formally. In essence, if the individuals did well, it is likely that they would be promoted locally, if not progression in the specialty was threatened.

Historical selection practices

Selection took place locally in regions, normally using a panel interview. In terms of the interview itself it was not uncommon for at least 8–10 orthopedic surgeons from around the region to be on such a panel with a lay Chair. It would also not be uncommon for the interviewers to turn up in the morning, about 10 min before the process started, to decide what questions would be asked with only a rudimentary scoring system if that. At the time, nothing was openly seen as wrong with this type of approach to selection because it was accepted and familiar to all. As time passed it became clear that certain individuals were being disadvantaged, that the process needed to be strengthened and become more structured, formal and transparent.

Key levers for change in recruitment and selection into T and O

The developments in medical education, including curriculum design, formal work based place assessment, introduction of an exit exam in 1991, learning agreements, the RITA process (Record of In-Training Assessment), and more recently the ARCP (Annual Review of Competence Progression) process since 2006, alongside the introduction of MMC (Modernising Medical Careers) paved the way for significant *change*. The MMC program replaced the traditional grades of medical career e.g. SHO before the level of Consultant. The aim of the MMC initiative was to improve patient care by delivering a modernized career structure with focused goals and objectives [3, 4].

Since approximately 2006, regional-based interviews for orthopedic Specialist Registrar (SpR), appointments were undertaken with an increasingly formalized structure over that time with the use of a properly constructed scoring matrix. However, individual Deaneries (the organizations overseeing the *quality management* of training) were able to select on any basis they deemed appropriate. This was changed in 2010, to remain a regionally based appointment but *nationally* coordinated, i.e. the format, types of questions, and marking schemes were decided nationally, but with the interviews delivered regionally. By 2012 all other surgical specialties moved to a 1-center national selection process, cardiothoracic surgery being the first to do so in 2006.

Disruptive innovation for T and O

In 2012 the driver for change in orthopedic came at the annual BOTA (British Orthopedic Trainees Association) conference in Carden Park, Cheshire when the overwhelming body of trainee opinion felt that the national administered, but locally delivered, recruitment process that year had been unfair. This

was due to differences in the scoring between each Deanery depending on the competition for that particular Region.

There was an overwhelming desire by trainees to move to a more objective, fair, equitable, and defensible process. The Specialist Advisory Committee (SAC) in Trauma and Orthopaedics (T&O) supported a move to National selection at its meeting in September, 2012. The processes seen in section 2 of this article was modeled on the General Surgical experience, having already been running for 4 years, at the time T and O set about organizing their inaugural National Selection for March 2013.

This process was met with considerable opposition from some quarters of the profession that wanted to keep the status quo. Multiple meetings took place and the SAC (T and O), supported unanimously by the British Orthopaedic Trainees Association (BOTA), were able to drive this change, through which was fully agreed by the Department of Health.

The ‘green light’ for the process was given on November 28, 2012 from the Medical Professional Board of Medical Education England. The SAC then set about establishing a Selection Design Group that designed and choreographed the process.

Best practice selection

There are a number of key concepts important to consider in designing selection systems [5•, 6]. The key elements

involved in designing and implementing any system are outlined in Fig. 1. The process starts by conducting a thorough analysis of the relevant knowledge, skills, abilities, and attitudes associated with performance in the target role. This information is used to construct a person specification (and job description where appropriate), which in turn informs which selection instruments and methods can be designed to evaluate the candidate’s capabilities against these attributes [7]. A validation process should then be used, to assess the extent to which the selection methods provide valid predictors of progress in training or job performance [8]. Research shows that candidates prefer selection methods that are job relevant and offer them the opportunity to demonstrate their ability, as well as treating them sympathetically [9], because of this, work sample and assessment centers are significantly less open to legal challenge [10].

Design and implementation of a new national selection system for T and O in the UK

Approval to go to a national selection process for orthopedic trainees in the UK was given in mid-November 2012. The process had to be run in the same timeframe as other specialty interviews, for which an interview window of between mid-March and mid-May 2013 had already been scheduled. This

Fig. 1 Key elements in designing best practice selection. With permission from Patterson F, Ferguson E. Selection for Medical Education and Training: ASME Publications. 2007. [6].

gave a very tight timescale in which to design and set up the new process. A decision was therefore taken that the broad structure of the 2013 national process should be unchanged from the process of previous years, in which selection, while designed nationally, was run locally. Therefore, the same 3 interview stations; portfolio review, clinical knowledge (split into a pure clinical knowledge and clinical anatomy), and communication skills (split into 2 components as well); were the starting point for the 2013 process, with 1 new station on technical skills being piloted to evaluate its suitability for use in future years.

Design group

A selection design group was established to develop and refine the new process. The members of the group were selected to represent the breadth of the orthopedic community. The group therefore included: academic representatives, SAC members, clinical directors, training program directors, senior trainees, BOA representatives, educationalists, as well as HR and Health Education England representatives. The group also covered the geographic breadth of the UK. The composition of the group was decided in late November/early December, and a date was set up for a 3-day meeting of the entire group in London in the latter half of January, 2013.

Blueprinting the selection criteria to the selection methods

The design group had to accomplish a number of important tasks relating to best practice selection. For example, the group had to identify key domains from the person specification that would then be mapped to the interview stations, with each domain being tested in more than 1 interview station. Three subgroups had worked prior to the main design meeting to start to develop content for questions for each of the interview stations.

A generic scoring matrix then had to be developed, and from that specific scoring matrices, with appropriate descriptors, for each of the key domains from the person specification needed to be developed. Having done that, a methodology for generating a total interview score from the individual scores of the interview stations and domains had to be decided. A cut-off score for appointability had to be calculated based on the scoring matrices, and a way of handling ties in the final scores agreed. The next task involved the entire group rating and agreeing a score for several videos of sample interviews. The aim of this was that real interviewers would watch these videos prior to the interviews, mark them, and have to score them within 1 mark of the agreed score prior to being allowed to interview on the day. Finally, the questions, and the scoring matrices, were tested on a number of trainees who had been successful at interview the previous year.

Scoring matrices

It was agreed that all components of the scoring should be marked out of 5, 1 being poor and 5 being the best. In addition it was agreed that a score of zero would be given if an interviewer felt that something came up in that component of the interview, which was such a serious cause for concern that it should automatically make the candidate unappointable. It was agreed that such a score would require generation of a specific report that would be independently reviewed prior to the score of zero being accepted. Specific descriptors on a scale of 1–5 were then agreed for each of the domains from the person specification, which were being tested (knowledge [both clinical and anatomic], academic skills, problem solving, judgment under pressure, and communication skills). For example, the specific descriptors matching a score of 2 in the domain of “Judgement under Pressure” were: “*limited evidence of retaining control*”; “*not seeking help*”; and “*in danger of not completing task correctly*”.

Overall score structure and ties

Each component of each interview station was scored in 2 of the domains, independently by each of 2 interviewers. That gave a possible score of 20 for each component of each interview station, and a total score of 40 per station. Given the importance of career progression and the strength of the portfolio, this station was given a weighting of 2, giving it a total score of 40. This gave a total score of 120 for the entire interview. With 500 applicants being anticipated and therefore 500 interviews, tied scores were going to be inevitable. Therefore, an individual weighting had to be given to each of the various components of the total score in order to break these ties.

Development of questions

Each of the questions developed had to test a candidate's knowledge and skills relevant to the outcome identified in the blueprint. Each question started off with a very broad stem, which was then followed-up by a series of probing questions designed either to test the depth of the candidates' knowledge, or to present them with a challenge that would test either their problem-solving or decision-making skills. For each stem and probe a series of positive and negative indicators were constructed in order to guide interviewers, and help with the generation of a score. Each question was refined in an iterative process involving all members of each subgroup and then finally the entire design group.

The design of the scenarios for the communication station proved to be one of the most challenging tasks because of the wide range of potential scenarios, and the need to make each scenario work in a seamless and easily organized and timely

Fig. 2 Candidate evaluation of the new national T and O selection center

manner at interviews. Eventually, a range of scenarios, each one testing communication with 2 different people, and testing both information giving and information receiving were developed.

The final stage in the development involved testing each question on trainees who had been successful in last year's interviews. Each of these trainees signed a confidentiality agreement prior to taking part in the testing. The testing process allowed the design group to get a feel for how each question worked, and also sought the views of the trainees on the fairness and relevance of the questions.

Initial results

The first national selection in T and O took place in Elland Road Stadium, Leeds in March, 2013. Four hundred ninety-eight candidates were interviewed in 5 days utilizing some 210 interviewers that were subjected to an online training process to benchmark scores. The process was evaluated including gathering candidate feedback, which was based on existing evidence of evaluating candidates' reactions to selection systems [11]. A summary of some of the findings from the candidate feedback can be seen in Fig. 2. Initial

psychometric analysis of the selection data is encouraging. Overall, based on the data available, the psychometric analysis of the selection exercise data available suggests it to be both *effective* (i.e. stations differentiate) and *reliable* (i.e. internal reliability). The results of the evaluation are being used to inform the 2014 selection process design.

Conclusions and recommendations for the future

The case of UK T and O national recruitment provides an opportunity to better understand the successful development of selection systems for entry into postgraduate training. Best practice recruitment processes are developed incrementally through piloting and methods must be validated; crucially they must also be perceived as appropriate and fair assessments by candidates and the assessor community. The next steps include plans for long term validation analysis, which while challenging, can be achieved [12•]. It is also recommended for a continual improvement of the design of the selection exercises with an extension of the criteria being assessed at interview. Finally, as with many selection processes, continued efforts at calibration of selectors, particularly

when new assessors join will significantly help to improve the reliability of the process.

Compliance with Ethics Guidelines

Conflict of Interest Mark Goodwin, David Large, Máire Kerrin, Julie Honsberger, Alison Carr, and David Wilkinson declare that they have no conflict of interest.

Human and Animal Rights and Informed Consent This article does not contain any studies with human or animal subjects performed by the authors.

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it provides a detailed overview of key concepts to consider in designing selection in medical education, training, and practice. In particular it considers best practice approaches to assessing some of the harder to measure 'non-academic' attributes in selection (e.g. empathy, teamwork, integrity), in a valid and reliable way. The research described in this current paper on selection into trauma and orthopedics in the UK was based upon many of the concepts outlined in this reference.

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