Visuospatial and technical ability in the selection and assessment of higher surgical trainees in the London deanery

P TANSLEY, S KAKAR, S WITHEY, P BUTLER

Department of Plastic and Reconstructive Surgery, Royal Free Hospital, London, UK

ABSTRACT

INTRODUCTION Despite awareness of the limitations of current selection and competency assessments, there is little consensus and alternatives have not been readily accepted. Essential surgical skills include visuospatial and technical ability. The aim of this study was to survey current methods of higher surgical trainee selection and assessment. We suggest ways to improve the process.

MATERIALS AND METHODS Nine surgical training programmes in the London deanery were surveyed through questionnaires to programme directors, existing trainees and examination of deanery publications.

RESULTS Testing of visuospatial and technical ability was piloted at selection only in a single general surgical department. Practical skills were assessed in 3/9 (33%) specialties (ENT, plastic and general surgery). Once selected, no specialty tested visuospatial and technical ability. Practical skills were tested in only 1/9 (11%) specialties (plastic surgery). The remaining 8/9 (89%) were 'assessed' by interview.

CONCLUSIONS Lack of visuospatial and technical ability assessment was identified at selection and during higher surgical training. Airlines have long recognised early identification of these qualities as critical for efficient training. There is a need for more objective methods in this area prior to selection as time to assess surgical trainees during long apprenticeships is no longer available. We advocate a suitably validated competency-based model during and at completion of training.

KEYWORDS

Visuospatial – Training – Assessment – Competence

CORRESPONDENCE TO

P Tansley, Department of Plastic and Reconstructive Surgery, Royal Free Hospital, Pond Street, London NW3 2QG, UK
E: patrick.tansley@btinternet.com

There are concerns that the present methods for selection and assessment of surgeons have not been carefully designed to identify necessary skills and qualities. Criticism has been directed at existing methods which traditionally have favoured academic achievements over surgical ability and competence.¹ Alternatives have not been readily accepted despite awareness of the limited reliability of the current approach and there is little consensus.

Surgical practice depends critically upon several factors that include visuospatial and technical ability. There is a need, therefore, to ensure that only candidates with appropriate levels of innate ability should be selected for training.² This was recognised long ago by other professions with similar dexterity requirements such as the aviation industry. Assessment of competency during surgical training following selection is also far less rigorous than in aviation.³ Competence should be the basis on which career progression is determined

rather than the current dependence upon having spent fixed time periods in a particular training grade in conjunction with previous academic success.^{4,5}

The aim of this study was to survey current methods of higher surgical trainee selection and assessment in the London deanery and suggest ways to improve the process and ensure competency.

Materials and Methods

Between February and August 2002, nine surgical training programmes were surveyed within the London Deanery comprising: cardiothoracic surgery; ear, nose and throat surgery; general surgery; neurosurgery; ophthalmology; orthopaedic surgery; paediatric surgery; plastic surgery; and urology.

Information relating to each training programme was obtained from nine Programme Directors by postal question-

Table 1 Competency criteria assessed at SpR selection

	CTS	ENT	GS	NS	OpS	OS	PS	PIS	U
Clinical knowledge	A/I/R	A/I/R	A/R	A/I/R	A/I/R	A/I/R	A/I/R	A/I	A/I/R
Communication	A/I/R	A/I/R	A/I/R	A/I/R	A/I/R	A/I/R	A/I/R	A/I/R	A/I/R
Decision-making ability	A/I	R	R/I	R	R	R	I/R	R	R
Practical skills and manual dexterity	R	Sk	Sk/R/VT ^a	R/A	I/R	A	A/I/R	Sk/R	A/R

^aIn 1 department only.

CTS, cardiothoracic surgery; ENT, ear, nose and throat surgery; GS, general surgery; NS: neurosurgery; OpS, ophthalmological surgery; OS, orthopaedic surgery; PS, paediatric surgery; PIS, plastic surgery; U, urology; A, application form; I, interview/RITA process; R, reference; L, log-book; E, Fellowship examination; Sk, practical skills and manual dexterity assessment; VT, visuospatial and technical ability assessment.

naire. In addition, 45 SpRs in post (5 per specialty) were contacted by telephone and deanery publications obtained from the internet were examined. Assessment for skills considered essential to each specialty took place at selection for higher training (Table 1), during training and upon training programme completion (Table 2).

Initial selection was based on assessment through application forms, interviews and personal references with objective skills station performances in some specialties. Assessment during and upon completion of training was based upon Record of In-Training Assessment (RITA) interviews, log-books, skills testing in some specialties and final fellowship examinations. At all stages, categories of assessment focused on clinical knowledge, communication, decision-making ability, and manual dexterity.

Results

HST selection (see Table 1)

1. *Clinical knowledge* was assessed using application forms, in conjunction with interviews and a personal reference in seven specialties, personal reference in one specialty and interview in another.
2. *Communication skills* were assessed in all specialties using a combination of the application form, interview and personal reference.
3. *Decision-making ability* was assessed by personal reference only in six specialties, interview and application form in one and interview and personal reference in one.
4. *Practical skills and manual dexterity* were only assessed in ENT, plastic surgery and general surgery; all others

Table 2 Competency criteria assessed during, and at completion of, SpR training programme

	CTS	ENT	GS	NS	OpS	OS	PS	PIS	U
Clinical knowledge	I/E/L	I/E/L	I/E/L	I/E/L	I/E/L	I/E/L	I/E/L	I/E/L	I/E/L
Communication	I/E	I/E	I/E	I/E	I/E	I/E	I/E	I/E	I/E
Decision-making ability	I/E	I/E	I/E	I/E	I/E	I/E	I/E	I/E	I/E
Practical skills and manual dexterity	I	I	I	I	I	I	I	I/Sk	I

CTS, cardiothoracic surgery; ENT, ear, nose and throat surgery; GS, general surgery; NS: neurosurgery; OpS, ophthalmological surgery; OS, orthopaedic surgery; PS, paediatric surgery; PIS, plastic surgery; U, urology; A, application form; I, interview/RITA process; R, reference; L, log-book; E, Fellowship examination; Sk, practical skills and manual dexterity assessment; VT, visuospatial and technical ability assessment.

made a surrogate assessment based on a combination of an application form, interview and reference. Assessment included a selection of tasks that might be expected of a newly appointed SpR, such as grommet placement (ENT), skin suture, tendon repair and skin graft harvest (plastic surgery) and knot tying (general surgery). Both plastic and general surgery validated their testing for specific operative skills using Objective Structured Assessment of Technical Skill methodology.⁶⁻⁹ A single general surgical department acted to pilot visuospatial skills and technical ability testing despite this not being a regional specialty policy.

Assessment during and at completion of HST training programmes (see Table 2)

Candidates were appraised throughout their training by annual RITA interviews that included assessment of operative activity by means of logbook examination. Final assessment was completed by fellowship examinations in each specialty.

1. *Clinical knowledge* was assessed in all specialties using a combination of interviews, fellowship examinations and log-book assessment.
2. *Communication skills* were assessed by all specialties using the interview and fellowship examination.
3. *Decision-making ability* was assessed in all specialties using the interview and fellowship examination.
4. *Practical skills and manual dexterity* were assessed using practical skills testing in plastic surgery only. In all other specialties, an interpretation of these attributes was made through the interview process. No specialties were found to have assessed visuospatial skills or technical ability. There were no true 'competence' assessments made, with only the RITA process acting as a surrogate in this regard.

Discussion

Deficiencies exist in the present system of surgical trainee selection and on-going assessments of competence. Both depend largely upon cognitive factors (intelligence and knowledge) and academic achievements, known to be poor indicators of clinical performance.^{2,10,11} Generally accepted attributes fundamental to surgery include innate dexterity and technical skills.^{2,12} Neuropsychological factors such as visuospatial organisation, stress tolerance and psychomotor abilities have also been shown to correlate with surgical skills.¹¹ However, none of these qualities are assessed objectively during the selection or assessment process.^{2,12,15}

Prolonged surgical apprenticeships in the past allowed senior surgeons to get to know trainees and observe many of these qualities informally. However, the Calman reforms and European Working Time Directive have reduced training

time, clinical exposure and experience of contemporary higher surgical trainees (HST) along with opportunities at which to change career direction once a training programme has commenced.^{5,14-20} This situation is likely to deteriorate further with the impending introduction of Modernising Medical Careers.

More objective methods of trainee selection and assessment are required.^{5,14,21,22} However, the availability of proven, reproducible techniques to assess individual surgical aptitude reliably remain limited. Assessing technical and visuospatial ability may offer a non-academic adjunct to assist in the selection process which might avoid individuals embarking upon higher training to which they are not suited, thus avoiding both personal disappointment and increasing the efficiency of training programmes.^{11,23-30}

Only a single general surgical department was identified in this study, as piloting an assessment of technical and visuospatial skills at trainee selection. No training programme used this approach during, or at completion of, training. The opportunity to assess these qualities in the London Deanery is currently being missed. This sits in marked contrast to the aviation industry, which requires similar innate skill profiles but accepted long ago the need for early investigation in these areas as part of selection for higher training.

Determining surgical competency during training has also proved difficult. Current surgical progression does not involve any requirements for training in particular technical procedures.³ In contrast, aviation training incorporates 'deliberate practice' comprising mission briefings, desired learning objectives, careful monitoring of individual proficiency and 'crew resource management'.^{3,28,31,32} It is easy to envisage the relatively straightforward development of parallel systems in surgery, making learning objectives clearer to both trainee and trainer and ensuring that a surgeon takes effective charge of the multidisciplinary team.^{3,32}

There is much evidence to suggest that simulators should also be incorporated into surgical training and assessment, as they have been shown to increase trainees' proficiency and reduce operative errors.^{2,3,15,28,33-38} Similarly, the potential applications of virtual reality systems have been recognised for objective assessments of dexterity and as adjuncts for teaching.^{21,39-41} In comparison with controls, virtual-reality trained surgeons have been shown to perform faster, with less error and greater economy of movement, demonstrating that skills obtained in this manner can be directly transferred to the operating theatre.^{21,42,45} They may offer particular benefit for training in areas such as microsurgery and complex dissections. It is hard to envisage how future surgical training and assessment methods might develop without incorporation of these high-technology systems as they are currently available and it is no longer acceptable to 'learn' operations on real patients.

Potential benefits from increased training and operative efficiency are likely to be significant, although initial set-up costs may be high.

At the end of aviation training, pilot competence is assured through 'probably the safest system of professional training ever devised for a job that depends critically on hand, eye and brain co-ordination'.^{28,44} It is based on a rating system that demonstrates competence in practical procedures both in the aircraft and simulator. Surgical training is in need of radical overhaul and a similar system could be developed. Surgeons could be rated in particular procedures through log-books and assessment by senior colleagues. Such a system might incorporate a patient's entire assessment, diagnosis, operative intervention and subsequent management and could be applied at all levels of seniority.^{28,32,45,46} Options for corrective training could be included where appropriate.^{44,47}

Conclusions

Future training programmes need to select trainees on a basis that includes assessment of innate visuospatial and technical abilities. Career progression should be based on competence rather than the amount of time served in particular posts. Assessment should include practices used in aviation training, including the use of high-technology systems. Use of a suitably validated model comprising elements of these methods should be piloted as a priority to ensure that trainees are selected appropriately, demonstrate proficiency in clinical skills and act as an early warning system to identify those not meeting the required standards. If surgeons do not grasp this nettle as we enter the 21st century, the result may be inappropriate trainee selection, inefficient training with wasted resources and loss of public confidence.

Acknowledgement

This paper was presented at the winter meeting of the British Association of Plastic Surgeons at The Royal College of Surgeons of England, December 2005.

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