Surgeons' experience of learning psychological skills: a preliminary evaluation of a psychological skills training course

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ABSTRACT

INTRODUCTION A range of human factors have been shown to impact on surgical performance although little is known about the impact of training on the views of surgeons towards these factors or how receptive surgeons are to such training.

SUBJECTS AND METHODS This was an observational pilot study using a short questionnaire designed to elicit views of surgeons towards a range of human factors prior to, and immediately following, a course designed to address human factors in surgical performance. Focus groups were also conducted before and immediately after the course to elicit views.

RESULTS Of all the human factors assessed, decision-making was rated on a visual analogue scale as having the biggest impact on performance both before and after the course. In general, views of human factors changed following the course, most notably an increase in the extent to which work stress, interpersonal difficulties and personality were believed to affect performance. Three themes emerged from the focus groups: (i) personal professional development; (ii) the relationship between trainer and trainee; and (iii) the changing perspective.

CONCLUSIONS Surgeons from a range of specialties are receptive to training on the impact of human factors on performance and this study has shown that views may change following a course designed to address this. Further training to address the theory–practice gap is warranted in addition to an evaluation of its effectiveness.

KEYWORDS

Human factors – Surgical performance – Training – Evaluation – Qualitative

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The influence of human factors on performance has been studied in various domains including the automotive industry and aviation.^{1,2} A range of human factors have been shown to impact on surgical performance and clinical outcome, including decision-making, visual-spatial thinking, situational awareness, technical performance, personality, burnout, performance anxiety^{3–7} and visual perception.³ Traditionally, surgical education has focused on developing technical skills, knowledge and clinical expertise. However, to achieve and maintain high levels of surgical performance, a combination of technical skills, knowledge, decision-making, communication, situational awareness and leadership skills need to be considered.^{8,9}

The degree to which the non-technical factors outlined above can affect surgical performance across specialties can differ. For example, where minor mistakes may be

without cost in conventional surgery, in laparoscopic surgery minor mistakes may lead to serious consequences and complications; indeed, the mental strain experienced by surgeons performing this type of complex surgery has also been shown to be higher.¹⁰ Given the range of human factors and the diverse ways in which they may impact on surgical performance, surgical outcomes and the health of surgeons, increasing awareness of, and ways of identifying and managing these issues is warranted particularly in a changing climate of increased litigation. Whilst the importance of being up-to-date in technical skills is essential, there is a lack of formal training on the impact of human factors on surgical performance both during and after training, despite evidence demonstrating that these factors impact on performance. Notable exceptions include the Non-Technical Skills for Surgeons course (NOTSS)¹¹ and Safety and

Table 1 Content of the psychological skills training course

The importance of human factors in improving surgical performance including the evidence and clinical relevance
What can we learn from pilots? Human factor management in aviation
<ul style="list-style-type: none"> • The role of human factor training in aviation and how these apply to non-technical skills in surgery
The art and science of decision-making in surgery
<ul style="list-style-type: none"> • Understanding the decision-making process and the role of intuition, cognitive errors and bias in clinical thinking
Visual-spatial skills in surgery
<ul style="list-style-type: none"> • Mental imagery and surgical skills, models of imagery used in psychomotor skills
Situation awareness
<ul style="list-style-type: none"> • The role of situation awareness in the operating theatre
Performance personality
<ul style="list-style-type: none"> • The impact of personality on surgical performance and methods to optimise it

Leadership for Interventional Procedures and Surgery (SLIPS) run by The Royal College of Surgeons of England. Furthermore, the World Health Organization has promoted an initiative based on surgical teams meeting prior to procedures for a team briefing which is based on a structured checklist designed to promote team work and communication.¹²

We are not aware of any studies investigating the views and receptiveness of surgeons to training in non-technical skills. Consequently, in order to address the important issue of training in this area, the aim of this pilot study was to conduct a preliminary evaluation of a course designed to address the role of human factors in improving the performance of surgeons in the UK, and to explore whether surgeons appreciate the importance of human factors in their practice.

Subjects and Methods

Sixteen surgeons participated in a 1-day course which consisted of didactic and interactive sessions about human factors. The faculty members of the training team consisted of a human factor trainer in aviation, a clinical psychologist, a psychiatrist and a consultant surgeon. The topics covered during the course and details of the course content are illustrated in Table 1. The participating surgeons (who volunteered to attend) were from various surgical subspecialties and the average number of years in speciality was 13 (SD 8.1 years; range, 4 months to 25 years).

A short, structured questionnaire was administered prior to, and immediately following, the course. In addition, four focus group discussions were conducted; two immediately before and two after the course using a semi-structured schedule to gather a more detailed account of the surgeons' views before and following the course.

Results

Questionnaire

Mean pre- and post-course scores for the factors assessed by the questionnaire are recorded in Table 2. There were three missing questionnaires; one surgeon completed the follow-up questionnaire only, and two surgeons did not complete the follow-up. Prior to the course, decision-making was considered to have the largest impact on surgical performance and interpersonal difficulties were considered to have the least impact. Similarly, immediately following the course, decision-making was rated as having the biggest impact and both personality and interpersonal difficulties were rated as having the least impact. All mean ratings increased from pre- to post-course including the extent to which these factors were believed to impact on clinical outcome. The largest increases occurred for work stress, interpersonal difficulties and personality.

Focus groups

Two groups were conducted prior to (8 and 8 participants in each group) and two immediately following the course (9 and 5 participants in each group). Recorded interviews were analysed thematically using the framework approach.¹³ This provides a way of organising and synthesising the data. The data were managed and made sense of by reading and re-reading the transcripts and then noting any key issues that emerged. Once these issues had been identified, they were organised into themes. This was further refined by subsuming any minor issues under the superordinate or broad themes that captured the views of the surgeons. The analysis was carried out independently by VM and SB and final themes agreed upon by the team. Three broad themes emerged from the focus groups and

Table 2 Mean pre- and post-course values for the factors affecting surgical performance including *P*-values

Factor	Pre-course Mean (range)	SD	Post-course Mean (range)	SD	<i>P</i> -value
Decision-making	8.5 (6.2–10.0)	1.1	8.8 (7.1–9.7)	0.8	0.48
Visual-spatial skills	7.7 (5.0–9.3)	1.4	8.1 (5.0–9.6)	1.4	0.64
Personality	7.5 (4.6–9.5)	1.6	8.0 (4.4–9.6)	1.5	0.03
Work stress	7.2 (4.6–9.3)	1.3	8.5 (7.3–9.9)	1.0	0.01
Interpersonal	7.1 (4.1–9.0)	1.4	8.0 (5.8–9.6)	1.1	0.01
Clinical outcome	8.2 (5.3–9.9)	1.3	8.7 (7.3–9.7)	0.8	0.20

these, along with supporting quotes, are reported in Table 3. Broadly, the themes relate to the views, attitudes and beliefs of surgeons around the role of human factors on surgical performance and to the changes that occurred following course attendance. Illustrative quotes were selected for inclusion if they captured the meaning of the theme in a succinct way. Where differences in view occurred, these are discussed within each theme. On the whole, views of the course were positive and this was supplemented by suggestions for improvements.

Personal professional development

Awareness of the range of human factors affecting performance had emerged throughout the duration of the surgeons' careers due to the absence of formal training regarding these factors. Attendance at the course reinforced the importance of these factors although surgeons reported a

gap between theory (knowing about these things) and practice (knowing how to address them in practice). Following the course, it was acknowledged that changes would need to be made in the context of limited resources.

The relationship between trainer and trainee

Whilst trainees reported concerns about raising issues with more senior colleagues, trainers saw it as their responsibility to imbue trainees with non-technical and technical skills in their role in developing them. Trainees appeared to value the recognition given to these factors within the course.

Changing perspective

There were some notable changes post-course which were distinct from views of the course itself. Greater openness was evident as was an enhanced awareness of the importance of human factors over the traditional emphasis on

Table 3 Main themes emerging from the group interviews

Personal professional development

I can see the benefit of understanding these factors but not sure how this understanding translates into being a better trainer or performing better (*post-course*)

The relationship between trainer and trainee

Things like juniors telling patients that they should be having surgery that they probably should not have, not communicating expectations about surgical outcome. Not disastrous technical errors, but the peripheral interpersonal skills – that is where they fall down and that is where hopefully I can teach them to be better (*pre-course*)

Hierarchical structure may make speaking up in theatre more difficult: have to be careful with what you say and how it is worded. Although it depends on the trainer and some trainers are accommodating and accept and want that but with others it is more difficult and it is hard to speak up (*post-course*)

Changing perspective

Changed focus from technical issues and knowledge-base to the importance of these non-technical and non-knowledge based factors (*post-course*)

[*The course*] provided a language to help formulate ideas and seek further information (*post-course*)

technical knowledge-based factors. The course provided a language with which to seek further information and showed receptiveness to training.

Discussion

These preliminary findings suggest that surgeons from a range of specialities rate human factors as having an impact on clinical outcome, most notably decision-making. Even before the course, all factors were considered to be important, suggesting that this self-selected group of surgeons were already aware of these issues but wished to enhance their knowledge and understanding of them. Following the course, all factors were considered to have a greater impact, and the relative impact of these changed following the course. For example, work stress was seen as having a greater impact relative to other factors at follow-up. Such a finding might be due to feeling more comfortable with expressing this view despite the guaranteed anonymity of responses. Decision-making and visual-spatial skills did not appear to change and this may be due to the fact that they are more closely aligned with technical skill and ability than the other psychological factors. Whether such changes can be attributed to the course itself cannot be concluded from this; however, it does suggest that views relating to these factors are modifiable.

Key themes emerging from the focus groups were personal professional development, the relationship between trainer and trainee, and changing perspectives. Many non-technical factors were acknowledged to impact on performance and clinical outcome and this was said to vary both across the career span and surgical specialty. Such factors were described as intrapersonal (*e.g.* personality, decision-making), interpersonal (*e.g.* team-work, relationship with colleagues, ability to relate to patients) and sociopolitical (*e.g.* policy, impact of European Working Time Directive, targets) and were seen as multifaceted. Intrapersonal factors focused almost exclusively on cognitive, rather than affective factors.

In consideration of the first theme, surgeons reported their awareness of the impact of human factors on performance emerging over time and a gap between theory and practice was identified. This confirms that coping strategies are not explicitly taught during surgical training and echoes previous research showing that, whilst juniors were unsure of their ability to cope, senior surgeons developed sophisticated strategies for dealing with situations.⁴ Given that some of the more experienced surgeons had devised their own strategies for dealing with situations through their own apprenticeship without the aid of formal training, attending and engaging with the current course suggests a perceived need for more formal training using a range of didactic and interactive methods to enable them to pass on these skills to their trainees.

In the second theme, surgeons offered different perspectives depending on whether they were a trainer or a trainee. Issues around effective communication emerged, particularly in terms of how comfortable trainees feel about voicing concerns to more senior staff. Indeed, problematic aspects of communication have been found by Moorthy and colleagues.¹⁴ Other studies also highlight the importance of communication, particularly given the potential for negative consequences should such communication be ineffective.¹² Steep hierarchies are a common feature of surgical teams, where senior members of staff are not open to input from juniors.¹⁵ Awareness and the implications of this emerged in the study as a potential barrier to voicing concerns. Another difference to emerge between the perspective of trainees or recent trainees and trainers was their reason or motivation for attending the course; for example, the more experienced attendees reported that their role in educating and training others was a key issue.

The third theme reflected a shift in perspective where changes were observed following course attendance. In particular, a greater degree of openness about the factors discussed during the course was observed. This concurs with the shift in thinking about the impact of human factors assessed by the questionnaire, which were considered to have a greater impact following course attendance. Importantly, this raised the issue of the current gap in training and a shift in thinking from the more traditional focus on technical aspects of surgery to a greater consideration of the role that psychosocial factors play in the work of surgical teams.

On the whole, views of the course were favourable and it was thought to be different, relevant and stimulated further interest. There was also broad agreement that the input about aviation was useful and interesting as were the sessions on the general scientific underpinning. Just a few issues to take account of when delivering subsequent sessions were suggested, and these included that there be more interactive, scenario-based sessions and a focus on the theory–practice gap. Few had sought information about human factors prior to attending the course, with the exception of looking at the information that general practitioners receive regarding consultation skills, thus providing further confirmation that there may be a gap in training opportunities for surgeons in this regard.

Study limitations

Although the sample size was modest and included a heterogeneous sample of surgeons, the aim of this small study was to investigate the views of surgeons towards the impact of human factors on performance and to conduct a preliminary evaluation of a course to address this. The results should be interpreted with caution given the small number of participants. Also, given their pre-existing interest, the

study population was self-selected which may be associated with particular surgeon characteristics. However, further research could investigate the receptiveness of those with a low interest using more detailed methods of evaluation. Notwithstanding these issues, this pilot study does provide a snapshot of the immediate impact and view of the course to enable further refinement and improvement. The study also provides valuable insight into the acceptability of courses designed to address non-technical skills and could provide a useful starting point for further research. For example, a randomised controlled trial of surgeons receiving training (or not) could enable a range of objective and subjective outcomes to be assessed in relation to its effectiveness in bringing about positive changes to practice. An important goal of future work would also be to investigate the long-term educational impact of the course. This could be achieved by following participants up in 6 months to determine whether they are still using any of the skills learned on the course. In addition to evaluating the potential value of these courses to surgical outcomes, a discussion of how and by whom such courses should be run and funded is warranted. Eliciting the views of surgeons provides useful feedback to enhance the delivery of courses to address these factors which have already been shown to be important in performance⁵ and outcomes.¹⁶ The aviation industry has long acknowledged and taken account of non-technical factors and it is timely that surgery does the same. Whilst undoubtedly beneficial, raising awareness of these issues may not be sufficient to bring about changes to practice without a more concentrated focus on strategies to address these issues. A further area of development is, therefore, to include a practical element to training to enable surgeons to implement these.

Conclusions

This pilot study has shown that surgeons are receptive to training on how surgical performance can be enhanced through human factors and that they appreciate the content and mode of presentation. Given that they are well received by the surgical community and that there is a dearth of coverage in surgical training, further training to address these issues should be initiated in addition to further research to evaluate its impact.

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