THEATRE TEAMS ASSEMBLED USING PERSONALITY PROFILES CAN IMPROVE PREDICTED TEAMWORKING SCORES

J Horwood General Surgical Registrar
A Maw Consultant Colorectal and General Surgeon
Glan Clwyd Hospital, Rhyl

Many organisations have realised the growing importance of teamworking and communication skills within their workforce.[1,2] **Teams that function well together tend to be more productive, dynamic and emotionally content.**[3] **High-stress professions, particularly those in the aviation industry, have recognised the importance of teamworking, not only for error reduction but also for successful outcomes in crisis situations.**[4,5] **This has led to a wealth of psychological research into many aspects of team interactions. Numerous independent organisations now utilise psychological profiling techniques to predict how their employees will perform in a team situation.**[6] **In addition, a wealth of companies offer various types of team training, specifically designed to improve the interactions between employees.**[7]

Theatre teams have traditionally been assembled in a random, haphazard fashion. Many theatre practitioners have experience of working within dysfunctional theatre teams, with potentially negative implications for both the patient and the individual team members themselves.

The aim of our study was to assess teamworking between the senior permanent members of our theatre teams, as predicted by their individual personality profiles, and subsequently to investigate potential interventions that may significantly improve communication and team functioning.

Methods

All general surgical theatre teams at Glan Clwyd Hospital were selected to participate in the study. The senior surgeon, senior regular anaesthetist and senior theatre nurse from each team were identified. Each participant was consented for their enrolment in the study.

Every team member undertook the 72-point Myers–Briggs Type Indicator questionnaire (http://www.humanmetrics. com/cgi-win/JTypes2.asp), based on the original personality characteristics first described by Carl Jung. This produced a four-point character assessment, based on Jung's dichotomies (Table 1), for each team member.

These scores were cross-matched with those of the other senior members of each theatre team, using a socionics chart (http://www.socionics.com/rel/ relcht.htm). Socionics is a relatively new science developed and popularised by

Aušra Augustinavičiūtė in the 1970s. Augustinavičiūtė and her colleagues worked with Carl Jung's personality typologies to develop personality-based relationship profiles. It was found that the nature and development of interpersonal relationships (both professional and personal) are far from random. Instead, they are based on how well suited each individual's psychological profiles are to one another, allowing Augustinavičiūtė to develop 16 'socionic types' (Table 2) predicting and describing the interpersonal relationships between any combination of Jung's personality types. Augustinavičiūtė's work was published in the Russian literature but translations of her work and a wealth of further information regarding the development and application of socionics can be found on a number of websites (such as http://www.socionics.com/ and http://www.socionics.us/) and in books.[8,9]

In addition to the description of the predicted interpersonal relationship between any two team members, a score out of three (homoverted, symmetrical, rhythmical), as described by socionics,[10] which assigns a score to the interpersonal relationship, was calculated. The higher the score, the higher the team cohesiveness. The relationship score for each of the three pairs of team members was added, giving final scores out of nine for the total predicted team cohesiveness.

The theatre scheduling roster was theoretically manipulated in an attempt to create teams with the best predicted team cohesiveness. This new roster was compared to the existing theatre situation, with an aim to improve overall

teamworking within our general surgical theatres.

Results

Sixteen healthcare professionals participated in the study (six consultant surgeons, five consultant anaesthetists and five senior theatre nurses). One anaesthetist and one theatre nurse worked regularly in more than one general surgical theatre team. All participants consented to take part in the study and there were no withdrawals during the study period.

Results from the initial personality profiles are presented in Table 3. No clear pattern of 'surgeon' emerged, suggesting a range of character traits in our consultant surgeons. The anaesthetists had a similar distribution of introverts and extroverts but tended to be more 'sensing' than surgeons and theatre nurses, who were more intuitive. In addition, anaesthetists tended to have more 'judging' characters than surgeons and theatre nurses, who had judging and perceiving characters evenly distributed. Theatre nurses also had a similar distribution of introverts and extroverts although they tended to show more 'thinking' personality traits than either surgeons or anaesthetists.

Theatre team cohesiveness scores are shown in Table 4. Team 1 showed a perfect cohesion score (100%). All three team members were extroverted and tended to be 'judgers' rather than 'perceivers'. The three interpersonal relationships were also predicted to function well in a team environment.

In contrast, Team 2 only scored 33% on predicted team cohesiveness. The surgeon is an introvert whereas the theatre nurse and anaesthetist are both extroverted. Despite having almost directly opposed characters, the surgeon and anaesthetist (INTJ and ESFJ) are predicted to have a 'duality' relationship, the most favourable and comfortable of the relationship profiles. Nevertheless, the relationships between both the surgeon and the nurse and the anaesthetist and the nurse (supervisor and beneficiary) were predicted to be poor, resulting in a low team score for Team 2.

Team 3 is a team of introverts but other characteristics were equally represented. This resulted in an overall team

TABLE 1	
CARL JUNG'S DICHOTOMIES	
Dichotomy	**Description**
Extraversion (E)	Directed towards objective world
	Open and talkative
	Take action and initiative
Introversion (I)	Directed towards subjective world
	Interested in own thoughts and feelings
	Appear reserved and quiet
Sensing (S)	Deal with information based on physical qualities
	Live in the here and now
	Adapt quickly to situation
Intuition (N)	Deal with information on basis of hidden potential
	Concerned for the future
	Interested in the new and unusual
Thinking (T)	Deal with information on basis of structure
	Interested in systems and patterns
	Cold and unemotional
Feeling (F)	Deal with information on basis of its energy and interactions
	Interested in people and feelings
	Give compliments and please people
Judgement (J)	Motivated into activity by their decisions and changes in situation
	Do not leave unanswered questions
	Plan work ahead
Perception (P)	Motivated by changes in situation
	Act impulsively
	Act without preparation

cohesiveness score of 67%. The surgeon and anaesthetist were found to have a satisfactory relationship of equals ('look-a-like') and the relationship between surgeon and nurse was one of 'activity', being easy to start and feeling comfortable between both partners. The relationship between the anaesthetist and nurse, however, was an asymmetrical relationship of 'benefit' with the anaesthetist acting as the benefactor and nurse as the beneficiary. Although likely to be free of conflict, the benefactor can undervalue the role of the beneficiary.

Team 4 is a team of opposite characteristics, with the exception of all being 'sensors'. The team is likely to respond well to changing situations. The surgeon and theatre nurse have a good 'ego' relationship, with feelings of

warmth and understanding towards each other. However, both relationships with the anaesthetist are of the 'benefit' type, predicted to result in poor communication and team interaction. The overall cohesiveness score for Team 4 was 56%.

Teams 5 and 6 both had low team cohesiveness scores (44% each). The surgeon and anaesthetist from Team 5 had a predicted solid relationship ('semi-duality') with both parties finding common ground and ease of understanding. The relationship between surgeon and nurse was 'quasi-identical'. According to the socionics chart (http://www.socionics.com/rel/relcht.htm), this is a relationship of misunderstanding. Nevertheless, it can be peaceful if, as was the case in our study, both parties are of the 'thinking' dichotomy.

2

Team 6 also demonstrated a range of characteristics. While both the surgeon and nurse were 'feelers', their characters otherwise differed. Their predicted relationship was one of 'semi-duality', with ease of understanding between both parties but a failure to cooperate. The surgeon and anaesthetist were diametrically opposite, resulting in potential conflict between these team members.

Interestingly, surgeons tended to have a more compatible character with the theatre nurses than with the anaesthetists (67% vs 39%), who tended to have a more benefactorial role, which can result in undervaluing of the beneficiary (theatre nurses). In general, the surgeons' characters were well matched to those of the anaesthetists (67%), with only one 'negative' relationship of the conflict subtype (Team 6).

Manipulation of the theatre roster
When manipulating the roster, we assumed that the surgeon could not be moved between operating theatres. Each anaesthetist described themselves as a 'general anaesthetist' and would therefore be able to work on any of the general surgical operating lists. In addition, we assumed that, owing to the nature of their training, the theatre nurses could similarly act as senior nurse in any of the general surgical operating theatres.

There are a large number of possible combinations. We have presented the combination that appears to result in the biggest improvement in team cohesiveness scores (Figure 3).

Team 1 could not be improved upon and therefore no changes were made.

In Team 2, the surgeon and anaesthetist had a good predicted relationship but both had a poor relationship with the theatre nurse. By moving the theatre nurse from Team 3 to Team 2, the overall team cohesiveness score for Team 2 would improve from 33% to 56%.

Once again, in Team 3 the relationship between the surgeon and anaesthetist was strong. If we moved the theatre nurse from Team 4 to Team 3, we could slightly improve the cohesiveness score for Team 3 from 67% to 78%.

TABLE 2		
RELATIONSHIP TYPES		
Category	**Description**	**Score (/3)**
Duality (Dlt)	These relations are the most favourable and comfortable of all intertype relations providing complete psychological compatibility. Dual partners are like two halves of a whole unit. They usually understand each other's intentions without needing to say a word.	2
Identical (Idn)	These are relations of complete understanding between partners but with an inability to help each other.	3
Activity (Act)	These relations are the easiest and quickest to start. Activity partners do not experience any visual difficulties when starting relations, which can be surprising to them at the beginning.	2
Mirror (Mrr)	These are relations of mutual correction. Mirror partners have similar interests and ideas but a slightly different understanding of the same problems.	1
Semi duality (Sdl)	These are relations of deficient duality. Semi duality partners usually have no problems in understanding each other or each other's objectives.	2
Comparative (Cmp)	These are relations of deceptive similarity. Comparative partners talk about similar things, have similar interests, obey the norms of politeness but they never really show an interest in each other's problems.	3
Conflicting (Cnf)	These are relations of constantly developing conflict. Conflicting relations have the worst compatibility between partners.	1
Super-ego (Ego)	These are relations of mutual respect. Super-ego team members may think of each other as distant and slightly mysterious. They often show an interest in each other's manners and behaviours.	3
Quasi-identical (Qid)	These are relations of major misunderstanding. Quasi-identical partners can interact with each other in a more or less peaceful manner if both partners are thinking types.	2
Contrary (Cnt)	These are relations of unstable psychological distance. Both sides experience difficulties in establishing and keeping a stable psychological distance between them. Partners usually compete over strong ideas.	2
Illusionary (Ill)	These are relations of growing laziness. Illusionary partners find it comfortable being relaxed together, discussing different subjects.	2
Look-a-like (Lkl)	These are relations between equal partners who can be called acquaintances rather than friends. There are no visual obstacles in the development of these relations; partners can talk easily about almost anything.	3
Benefit (Bn)	These relations are asymmetrical. One partner, called the benefactor, is always in a more favourable position in respect to the other partner, who is known as the beneficiary.	1
Supervision (Sp)	These relations are also asymmetrical. One partner, called the supervisor, is always in a more favourable position in respect to the other partner, who is known as the supervisee.	0

FIGURE 1

TEAM CHANGES AND COHESIVENESS SCORES
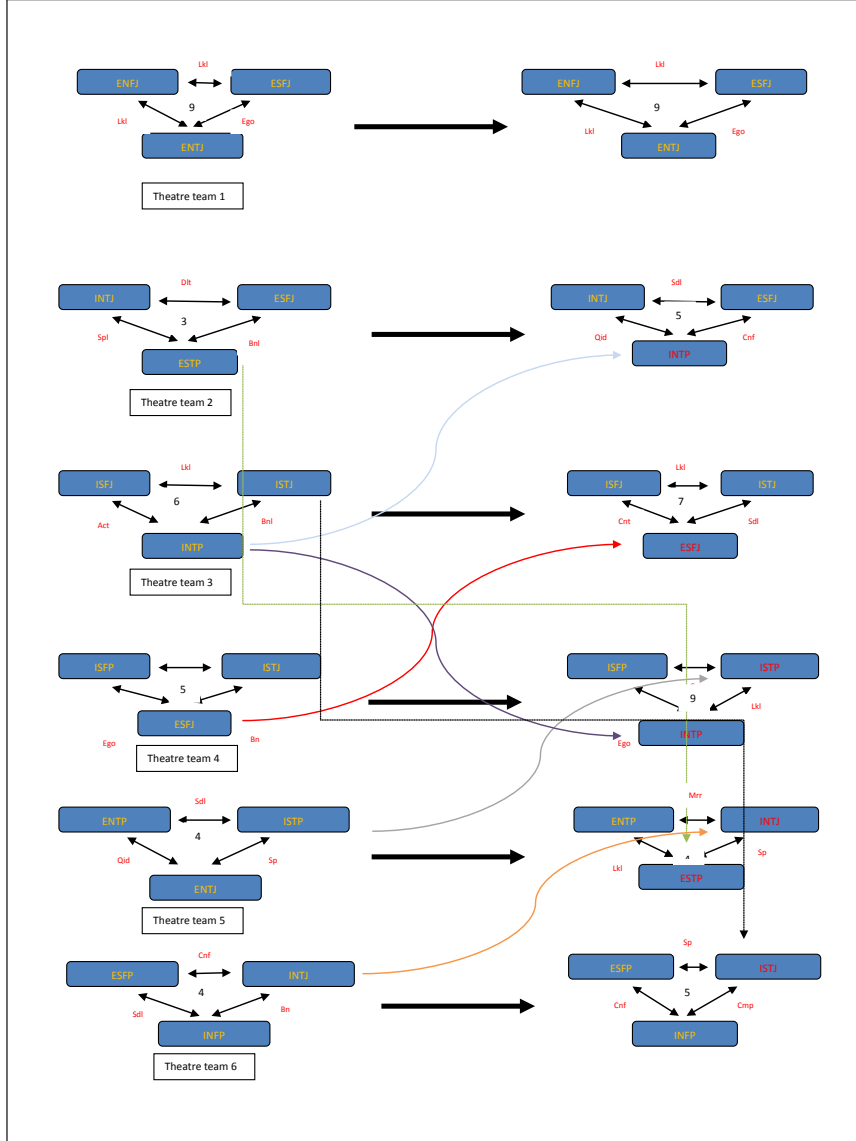
Team 4 had a low overall cohesiveness score (56%). By importing the anaesthetist from Team 5 and the theatre nurse from Team 3, we could create a second theatre team with perfect predicted characteristics for functioning well in a team (100%).

Team 5 also had a low cohesiveness score (44%). The predicted relationship between the anaesthetist and theatre nurse was lowest (supervisory = 0 points). By redeploying both nurse and anaesthetist elsewhere (nurse to other duties, anaesthetist to Team 4) and moving in the nurse from Team 2 and the anaesthetist from Team 6, we were able to keep the same overall cohesiveness score for Team 5 (44%) but significantly improve the scores in other teams.

The score for Team 6 was most affected by the predicted conflicting relationship between the surgeon and the anaesthetist. By moving the anaesthetist to Team 5 and importing the anaesthetist from Team 4, we were able to improve the predicted team cohesion score to 56%.

By making the above mentioned simple changes to the six theatre teams, the average overall team cohesiveness score for all six teams rose from 57% to 72%.

Discussion

Traditionally, surgical outcomes were thought to be closely related not only to the disease process and pre-morbid function of the patient but also to the technical skill of the operating surgeon. While it remains true that high-quality surgical skills can have a significant influence on the eventual outcome, we increasingly recognise that the operating surgeon is but a cog in a large medical team and that good collaboration with the team members is necessary to ensure a successful patient outcome.

A number of publications have attempted to categorise the infamous 'surgical stereotype', frequently reinforced by the media, as being dominant, cantankerous, hostile, impersonal and with poor communication skills.[11] Indeed, surveys of allied health professionals have supported the notion that poor communication in the operating theatre is a direct result of character traits observed in the surgical workforce.[12] Interestingly, however, the dynamic of the surgical workforce has undergone significant changes recently, with an increase in the proportion of female surgeons and more surgeons from more diverse backgrounds.[13] The surgeons included in our study did not demonstrate any particular character trends and in fact appeared to have characters more likely to work in harmony with the senior nursing staff than those demonstrated by the anaesthetists.

Our study was designed to investigate the current interpersonal relationships between the theatre team members in our district general hospital setting, which could be replicated easily by other trusts. Our results have given us an insight into the character traits of the senior members of the theatre team in our institution but, owing to sample size, they prevent us from making generalisations about the character traits of each individual profession (surgeon/anaesthetist/theatre nurse). Despite having been extensively validated in the psychological literature,[14] the socionics chart (http://www.socionics.com/rel/relcht.htm) used in our study has not been previously applied to studying interpersonal relationships in a 'high pressure' work environment. Work is required to validate this model further.

Other 'high reliability' professions have been quicker to recognise the role efficient teamworking has on error prevention. This has lead to interventions in the airline industry such as crew resource management,[15] focusing on the non-technical aspects of operational performance (eg leadership, teamworking

and decision making). This type of training has quickly been adopted by air traffic control and the offshore oil and nuclear power industries.

Such insights into error prevention have gradually been recognised by the surgical profession, leading to a stream of publications and professional recommendations.[16,17] A number of authors have shown a correlation between poor teamworking and communication skills, and surgical error and adverse events.[12]

In our study, we not only produced character profiles for each study participant but by comparing the character types of the team leaders we were able to predict the nature of the relationship between them. Even an awareness of one's character traits (as predicted by the Myers–Briggs score) and, in particular, an appreciation of the more negative aspects of one's character have a positive impact on future teamworking.[18] By simply feeding back the results of the personality and relationship profiling study to the involved participants, we would expect to see an increased understanding of each other's characters. This could have a positive effect on teamwork and communication.

Theatre teams have now developed to encompass a diversity of staff including operating department practitioners, extended role nurse practitioners, radiographers and, occasionally, perfusionists, forming a truly interdisciplinary team. With recent changes to junior doctor working hours and clinical training, resulting in a frequently changing team composition, there is an even greater need for the senior and permanent members of the theatre teams to practise exemplary leadership, communication and teamworking skills.

Surgeons are only too aware that patients are not as predictable or reliable as modern commercial airliners. Individual anatomical abnormalities and responses to surgical intervention, in addition to our increased reliance on technology, may cause frequent breakdowns in 'normal operating procedures'. Along with the other senior members of the operating theatre team, consultant surgeons need to be able to work quickly and efficiently together and adapt to the changing surgical environment to ensure optimal patient outcomes.

TABLE 3					
PARTICIPANTS' CHARACTER TYPES					
Surgeons		**Anaesthetists**		**Theatre sisters**	
Surgeon 1	ENFJ	Anaesthetist 1	ESFJ	Sister 1	ENTJ
Surgeon 2	INTJ	Anaesthetist 2	ESFJ	Sister 2	ESTP
Surgeon 3	ISFJ	Anaesthetist 3	ISTJ	Sister 3	INTP
Surgeon 4	ISFP	Anaesthetist 4	ISTP	Sister 4	ESFJ
Surgeon 5	ENTP	Anaesthetist 5	INTJ	Sister 5	INFP
Surgeon 6	ESFP				

TABLE 4				
THEATRE TEAM COHESIVENESS SCORES				
	Surgeon	**Anaesthetist**	**Theatre nurse**	**Team cohesiveness**
Team 1	ENFJ	ESFJ	ENTJ	100%
Team 2	INTJ	ESFJ	ESTP	33%
Team 3	ISFJ	ISTJ	INTP	67%
Team 4	ISFP	ISTJ	ESFJ	56%
Team 5	ENTP	ISTP	ENTJ	44%
Team 6	ESFP	INTJ	INFP	44%

Poor teamworking and communication skills will not only result in poor patient outcomes but have also been shown to be a significant factor in burnout rates and the general mental wellbeing of members of the medical teams themselves.[19] It has been widely reported that NHS staff are four times more likely to be absent from work with stress than people from other occupations.[20] Borrill et al demonstrated a significantly lower incidence of stress in members of NHS teams who were known to function well together.[21]

Our study demonstrated a wide range of predicted team cohesiveness scores across the six theatre teams. Further research into the stress levels experienced by each team member may reinforce the need for team building (or rostering changes) designed specifically to improve team scores. This may have a direct positive result on the stress levels experienced by the staff involved. As a result, this could reduce time lost to ill health.

The most effective teams are found frequently to be made up of team members with a variety of character traits. Thompson et al believe the best balance for a team involves people whose experience, skills, perspectives, interests

and contributions complement each other.[22] In many industries, and particularly in the Fortune 500 companies,[23] teams for specific projects are carefully selected from their employee pool, using personality profiling, to construct a team that is likely to work efficiently and effectively together. Traditionally, in the medical profession and particularly in the surgical specialties, little thought has been put into team composition, resulting in teams put together in a random and 'ad hoc' fashion.

As our study has demonstrated, when we know the personality profile of the senior members of the theatre teams, simple changes in personnel between teams can result in significantly improved teamworking scores. Further research would be required to assess the feasibility of team alteration and to provide clear evidence of an improvement in actual teamworking.

Personality testing has been used extensively in the private sector[24] over the last decade for both team-building and personnel selection purposes. Hosking et al described the evolution of the consultant selection process from a 45-minute interview to a 3-day assessment

that includes extensive personality profiling.[25] It is possible in the future that candidates' personality scores may be used as part of the selection process, especially if recruiting to a post within an already established team.

More specialised surgery (eg cardiothoracic, head and neck oncology) may require the services of specialised anaesthetists. In this situation, the surgeon and anaesthetist may be forced to work together. Profiling of their character traits can still be of benefit, even if it is shown that they have characters that are not very compatible. One can train the members of an 'incompatible' team to function better with a specific character trait of other team members, thereby improving teamworking performance while maintaining the highly skilled composition of the team itself.

Our study has demonstrated that by using personality profiling techniques to construct theatre teams we can significantly improve the overall predicted teamworking scores in general surgical theatres. Work is now required into the feasibility of swapping established theatre team members between teams, in practice. Resistance to change is a perpetual problem within the NHS. Nevertheless, when presented with the evidence from our study and others, one would hope that employees would be more tolerant to theatre roster changes. Studies of changes after roster manipulation could establish the impact of teamworking seminars and, indeed, whole-team training sessions within a simulated theatre environment on overall team performance.

Conclusions

Effective teamworking and communication between senior members of the theatre team maximises the chances of a successful outcome following major elective surgical procedures and particularly in times of surgical emergency. Our study has demonstrated that the characteristics of the surgical workforce are as diverse as those of other specialties, dismissing the popular 'surgical stereotype'. Theatre teams are currently assembled without consideration for the character traits of their senior members, resulting in incompatible teams, potentially impacting on patient outcome and creating medical professional stress.

Extensively employed in the private sector, personality testing can be used to construct theatre teams with more favourable teamworking and communication profiles, resulting in numerous potential benefits for patient and healthcare professional alike.

References

1. Personal Time Management Guide. Time-Management-Guide.com. http://www.time-management-guide.com/ (cited June 2011)
2. Vogt J, Leonhardt J, Koper B, Pennig S. Human factors in safety and business management. *Ergonomics* 2010; **53:** 149–63.
3. Ensley MD, Hmieleski KM. A comparative study of the new venture top management team composition, dynamics and performance between university-based and independant start-ups. *Res Policy* 2005; **34:** 1,091–1,105.
4. Surgenor SD, Blike GT, Corwin HL. Teamwork and collaboration in critical care: lessons from the cockpit. *Crit Care Med* 2003; **31:** 992–93.
5. Sexton JB, Thomas EJ, Helmreich RL. Error, stress and teamwork in medicine and aviation: cross sectional surveys. *BMJ* 2000; **320:** 745–49.
6. Cunningham PB. Improved communication and teamwork through use of Myers–Briggs type indicator. *Engineering Management in Technology-based Organizations* 2000; 31–36.
7. The Teambuilding Company. http://www.teambuilding.co.uk/ (cited June 2011).
8. Stern S. *Socionics Demystified*. Raleigh, NC: lulu.com; 2007.
9. Fischer K, Florian M, Malsch T. *Socionics: Scalability of Complex Social Systems*. Berlin, Germany: Springer; 2005.
10. Relations of Duality Between Psychological ('Personality') Types. Socionics.com. http://www.socionics.com/rel/dlt.htm (cited September 2011).
11. Cherrington L. I'm a surgeon – respect me! *Student BMJ* 2008; **16:** 62–63.
12. Lingard L, Espin S, Whyte S *et al.* Communication failures in the operating room: an observational classification of recurrent types and effects. *Qual Saf Health Care* 2004; **13:** 330–34.
13. Yutzie JD, Shellito JL, Helmer SD, Chang FC. Gender differences in general surgical careers: results of a post-residency survey. *Am J Surg* 2005; **190:** 955–59.
14. Socionics – A Science of Psychological Types of People and Their Relationships. Socionics Institute. http://en.socionics.ru/index.php?option=com_content&view=article&id=249&Itemid=109 (cited September 2011).
15. Flin R, O'Connor P, Mearns K. Crew resource management: improving team work in high reliability industries. *Team Performance Management* 2002; **8:** 68–78.
16. National Confidential Enquiry into Perioperative Deaths. *Functioning as a Team?* London: NCEPOD; 2002.
17. Vincent C, Moorth K, Sarker S *et al.* Systems approaches to surgical quality and safety: from concept to measurement. *Ann Surg* 2004; **239:** 475–82.
18. Personality Theories, Types and Tests. Businessballs. http://www.businessballs.com/personalitystylesmodels.htm (cited September 2011).
19. Shanafelt TD, Balch CM, Bechamps GJ *et al.* Burnout and career satisfaction among American surgeons. *Ann Surg* 2009; **250:** 463–71.
20. Clews G. NHS stress driving up nurse sick leave level.' *Nursing Times*; 14 April 2009.
21. Borrill C, West M, Dawson J *et al. Team Working and Effectiveness in Health Care*. Birmingham: Aston University; 2002.
22. Thompson N, Stradling S, Murphy M, O'Neill P. Stress and organizational culture. *Br J Soc Work* 1996; **26:** 647–65.
23. How to Create a Great Team. The Cool Perspective. http://rosssimmonds.com/2011/04/22/create-great-team/ (cited September 2011).
24. Know Your Type. http://www.knowyourtype.com/ (cited June 2011).
25. Hosking EJ, Salkeld A, King J. Consultant selection – a way forward. *BMJ Careers* 3 Dec 2008.