Previous work by Larsson and colleagues has outlined how young and inexperienced Swedish anaesthetists have feelings of deep inadequacy and loneliness in the face of difficult clinical situations, and often feel unsupported by their seniors. I am sure that this will ring true for colleagues in other countries too. This is unsatisfactory because they cannot learn well when stressed, and this also leads to concerns about recruiting doctors into the specialty if there is a perception that the working life of anaesthetists is more difficult than it needs to be. This theme is developed in this issue of *British Journal of Anaesthesia* as Larsson and colleagues report an interview-based investigation into the sources of stress in the work of established specialist anaesthetists and their strategies for coping with them. In this editorial, I would like to explore the specific issue of how stress and personality interact in anaesthesia, but then discuss more generally how anaesthesia education might be expanded to encompass, more mindfully, the less obvious aspects of the total professional knowledge in anaesthesia—of which strategies for coping with stress is but one example.

**Stress and anaesthetists**

Stress arises when an individual feels obligated to respond to a situation but feels unable to cope with the situation’s demands. Some stress appears to be necessary and beneficial, but if an individual is exposed to levels that he or she finds uncomfortably high, psychological difficulties can result. Stress is caused by an individual’s perception and handling of that stressor, so what may be stressful to one individual may not be to another. Also, the ability to cope with stress is not a trait in itself, but appears to be related to an individual’s set of traits or personality. Is there, then, a typical ‘anaesthetic personality’?

The literature reveals two anecdotal descriptions. In 1977, Howat suggested that the typical anaesthetist ‘wishes to be a member of a team. . . . is by nature gregarious, likes being with others and usually has good relations with his colleagues. He (by which I mean he or she) often has a keen sense of humour. . . . is of a meticulous, even obsessional turn of mind and yet is prepared to adapt himself to changing circumstances’. Further, he notes: ‘we have heard it said that anaesthetists must be a little paranoid’. Another view was offered by Gaba, an expert in human factors issues relating to anaesthesia. He suggested that anaesthesia and intensive care attract a particular type of person who seeks out excitement in the dynamic and fast-paced work required: ‘In all likelihood, the emphasis on direct action and the aura of ‘danger’ lurking just below the surface are key factors that attracted many anaesthetists to this line of medical work rather than others’.

More objective study began with the work of Reeve. He postulated that if an ideal anaesthetic personality could be identified, then selection procedures could be set up which would recruit individuals who were most suited to the work. If people are dissatisfied with their career, then they are not happy, do not derive much joy from professional work in the specialty and constitute a potential for accidents and errors of judgement. The empirical work that followed aimed at informing the selection procedure for trainee anaesthetists, to try to avoid this sort of mismatch. Reeve administered the Cattell 16 PFQ Form C personality questionnaire to 231 trainee anaesthetists. This questionnaire is based on 16 pairs of ‘opposites’—for instance, trusting–suspicious, confident–unsure, tolerant–critical—each linked by an axis similar to a visual analogue scale. Individuals can be assigned a position along that axis for each dimension. Clarke and colleagues and Kluger and colleagues reported similar studies using the same questionnaire. Clarke and colleagues aimed at seeing whether differences within the profile affected the job satisfaction of an anaesthetist, and administered the questionnaire to 330 staff anaesthetists. Kluger and colleagues aimed at finding out the personality profile of 167 Australian specialist anaesthetists and relating the findings...
to similar research undertaken in other countries. The comparison of such studies can be difficult, but all three found that anaesthetists were more likely to be bright than dim, serious than happy, independent than dependent, shy than bold, trusting than suspicious, and careful than casual. All appear to contradict the two descriptions at the start of this section.

Reeve\(^7\) developed his work by distinguishing two types of trainee, judged successful and unsuccessful on the basis of seniors’ assessments of their clinical prowess, and compared their personality findings. The successful trainees demonstrated greater detachment, mental quickness, drive and determination, stability, high standards, self-sufficiency, openness, and self-control.

Why might these findings be important? There is little evidence within anaesthesia, but in aviation Stokes and Kite\(^10\) suggested that a ‘pilot’s personality traits do not necessarily cause mishaps or failures, but they may enable them – that is, they may contribute to the establishment of conditions which, in combination with other factors, make failures more probable’. Stress can lead to error in that individuals have a limited ability for cognitive processing. Many commonly performed tasks are done on mental ‘autopilot’ but, during periods of stress, such behaviour may be bypassed by other mental processing. Thus, in anaesthesia, if well-practised skills apparently fail, it may be because of concurrent stress or personality deficiencies.\(^9\) ‘Premature closure’ (making a decision before all relevant information has been identified) can also occur and may also be considered hazardous. Defensive personality traits may become manifest, rendering pilots unable to work as part of the team. This failing has certainly been the case of many aviation accidents.\(^10\)

What, then, is stressful about anaesthesia? All the foregoing assumes that anaesthesia is stressful and some (mostly anaesthetists!) have suggested that it is. Jackson\(^11\) has identified some potential stressors: the noisy environment of surgical machinery, ventilators, monitors, and alarms; uncomfortable chairs and poorly designed work spaces. Anaesthetists can also experience difficult interpersonal relationships from working with other specialties with their range of personalities, competencies, motivation, and degrees of cooperation. However, Nyssen and colleagues\(^3\) study found that mean stress levels among anaesthetists were not higher than in the other working populations studied. This would be consistent with the premise that, although anaesthesia may well be stressful, anaesthetists are well placed to cope with it, whether through their underlying personality or through strategies they have developed. Kinzl and colleagues\(^12\) studied job satisfaction, physical health, emotional well-being, and working conditions (as assessed by the Instrument for Stress-related Job Analysis) in 125 Austrian and Swiss anaesthetists. Control over work had a strong effect on job satisfaction in anaesthetists, especially time control and participation, whereas task demands and task-related problems did not have any effect. The authors suggested that to improve job satisfaction, and by implication to reduce stress, more attention should be paid to improving working conditions, including control over decision-making, and allowing anaesthetists to have more influence on their own work pace and work schedule. There is now a well-developed understanding of how stress in general can be managed,\(^13\) but what Larsson and colleagues offer is an insight into the ways which anaesthetists themselves have evolved to manage it.

**Stress management as a professional skill**

These coping strategies do overlap with some of the generic stress management advice, but also go beyond it. They are in this sense specific and unique to our profession. If something here is part of the essence of expertise in anaesthesia, is it possible, first, to describe it and second, to use that knowledge to enhance the training of young anaesthetists? This is the line of argument behind Larsson and colleagues’ work, and the one which we ourselves have pursued.\(^14–16\) Expertise in anaesthesia, in common with other fields, rests on the successful relationship between different forms of knowledge. There is ‘explicit’ knowledge, which can be readily written down, codified, and communicated in textbooks and journals and set out in examination syllabuses. There is also ‘tacit’ knowledge, defined as ‘knowledge that has not been (and perhaps cannot be) formulated explicitly and therefore cannot be stored or transferred entirely by impersonal means’.\(^14\) It is typically acquired by demonstration followed by practice. However, the tacit/explicit division may be artificial: first, in that each relies on the other to make it work in practice and second, in that there are ways of transmitting tacit knowledge, for instance, by making and distributing a video recording of an expert performing a regional anaesthetic block. Thus, where syllabuses for anaesthesia education are set out in terms of knowledge, skills, and attitudes, within each aspect there are both tacit and explicit elements. The acquisition and testing of explicit knowledge are straightforward, but to return to the first question posed above, is it possible to describe the tacit elements of anaesthetic practice? We have shown\(^14–16\) that it is, but as many of these qualities cannot be measured or quantified, alternative research approaches must be used. The title of this editorial is taken from a piece by Pope, a leading healthcare qualitative researcher in the United Kingdom, and underlines the point that the typical research methods used in the biomedical sciences are not adequate for this task.\(^17\) Qualitative methodology may lead to feelings of unfamiliarity or even scepticism among those brought up in the biomedical tradition, but they lend themselves perfectly to a richer understanding of how anaesthetists act and think. Typically, they combine a range of methods—usually observation and interviews—though
documentary analysis and video may also be used. Analysis proceeds by induction, that is, the themes and findings emerge from the data. Researchers are encouraged to share their findings with others. Clear guidelines are given for sharing and dissemination.

In the context of stress management, Larsson and colleagues have documented anaesthetists’ strategy of mental readjustment in the face of difficult situations. They have also explored how anaesthetists handle uncertainty in their work. The relationship with the patient’s family is crucial. Teachers and learners spend together provide a ‘short-cut’, or perhaps accelerate in some way, the progression towards expertise. This is not straightforward in theory, as it suggests we must make visible and audible things that are often not seen or heard. We have highlighted a number of ways of doing this, but have not so far tested the effect of these suggestions. Experienced practitioners can help simply by talking about what they do. Verbalizing how they are thinking as they balance different sources of knowledge about the patient ‘unlocks’ their experience and makes it available for learning. Talking through practical techniques and exploring the wider scope of practice in discussion can also help, and both are uniquely suited to workplace teaching. Anecdotes from practice (‘cautionary tales’) can also provide vivid and memorable learning points. The morbidity and mortality sections of departmental meetings are also worthwhile starting-points for anaesthetists to share the knowledge born of experience. Larsson and colleagues have previously described how anaesthetists have different ‘ways of understanding’ their work, and such themes help specialists explain, and trainees appreciate, the essence of expert anaesthetic practice. In the rush to embrace ‘evidence-based’ practice, we should not forget what it is that makes us effective as expert anaesthetists and shapes our professional identity and consciousness. Developing and testing such approaches is the next step we should take towards expanding the scope of professional education in anaesthesia.

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In the last few years, several monitors have been developed to assess the depth of anaesthesia and to discriminate between its pharmacodynamic components. Most of those monitors have been initially designed to assess the hypnotic component of anaesthesia. Experience has progressively revealed that several factors other than external artifacts can alter the interpretation of what is said to be the depth of anaesthesia, that is, the value of the indices. Among those factors, the pharmacodynamic interaction between anaesthetic agents plays a key role, and neuromuscular blocking agents (NMBA) can, theoretically, be involved in that interaction. The calculation of depth of anaesthesia indices is frequently based on EEG recordings. The frequency band associated with EMG activity is close to that of the EEG. As NMBA modulates EMG activity, they may artificially modify the calculated frequencies. It has been demonstrated that sensory deprivation causes a decrease in EEG power and a shift towards slower frequencies. A reduction in the amount of proprioceptive inputs to the brain emerging from peripheral muscles and a direct central effect of NMBA metabolites.

The first mechanism refers to the de-afferentation theory. It has been demonstrated that sensory deprivation causes a decrease in EEG power and a shift towards slower frequencies. A reduction in the amount of proprioceptive inputs to the brain emerging from peripheral muscles and a direct central effect of NMBA metabolites.

Influence of muscle relaxation on depth of anaesthesia

In 1946, Gray and Halton first suggested that NMBA may affect the depth of the hypnotic or the antinociceptive components of anaesthesia. As NMBA cross the blood–brain barrier to a very small extent, a hypothetical effect on depth of anaesthesia can only be explained by indirect mechanisms. In the reduction in the amount of proprioceptive inputs to the brain emerging from peripheral muscles and a direct central effect of NMBA metabolites.

The first mechanism refers to the de-afferentation theory. It has been demonstrated that sensory deprivation causes a decrease in EEG power and a shift towards slower frequencies. A reduction in the amount of proprioceptive inputs to the reticulo-thalamic activating system would reduce the level of arousal and explain why NMBA administered in dogs during an isoflurane-induced burst suppression pattern significantly increased the periods of isoelectricity. However, muscle relaxation does not produce complete sensory deprivation. Should such an effect exist in humans, it would be poorly detectable, and