ERGONOMICS

A matter of life and death

The Younger Fellows Committee investigates the problems of an unergonomic workplace, especially for women operating in a man's world

Andrew J Diver
Consultant Plastic Surgeon, Member of Younger Fellows Committee

Michael Moneypenny
Consultant Anaesthetist, Member of the Patient Safety Committee

When you hear the word 'ergonomics' you may think of a chair or workstation. The ergonomic chair supports your back and spine, the ergonomic workstation means you don't get repetitive strain injury when typing using a keyboard. In the UK ergonomics is now often looked at in combination with 'human factors' – for example, at the Chartered Institute of Ergonomics and Human Factors. The laudable twin aims of human factors and ergonomics (HFE) are to improve system performance and personal wellbeing through design.

GENDER BIAS

Although HFE may seem like a dry subject, it is actually a matter of life and death. In her book, *Invisible Women*, Caroline Criado Perez argues that cars are not designed for women[1]. Due to their shorter stature, women tend to sit further forward and more upright. Other differences in weight distribution and muscle strength mean that cars don't protect women as much as they do men.

This bias is also reflected in the regulatory environment. In the US it wasn't until 2011 that car safety regulations required the use of a female crash test dummy. In the EU a female dummy need only be tested in the passenger seat and this female dummy is actually just a scaled-down male dummy. This poor design means that women are 17% more likely to die in car crashes even when height, weight, seatbelt use and crash intensity are taken into account.

The problem is not limited to the car industry. When Leyk *et al* looked at the data for integrating female personnel into military workplaces, they found that "(with) regard to biometric and strength parameters, the present results clearly show only small overlaps between the sexes"[2]. This means that personal protective equipment and hardware are not designed for women, putting them at risk.

Over the past decades the number of women in surgery has greatly increased. It is unclear whether that demographic change has resulted in reciprocal changes in surgical equipment and the theatre environment. The problem is not just the lack of modifications for females, but rather the lack of ergonomic input into day-to-day theatre work for all surgeons.

The RCSEd's Younger Fellows Committee wanted an in-depth assessment of the extent to which ergonomic issues affect the ability of surgeons to perform their job. There is a plethora of literature looking at the issue. A key research leader is Susan Hallbeck of the Mayo Clinic in the US and she kindly shared some useful papers (discussed below).

MSK CONCERNS

A comprehensive review in 2018 (Catanzarite *et al*[4]) showed that work-related musculoskeletal (MSK) disorders are prevalent, with risk factors including loupes, headlamps and microscopes. The authors found that in laparoscopic surgery, table and monitor position, as well as long instrument handles, contribute to trunk, wrist and finger strain.

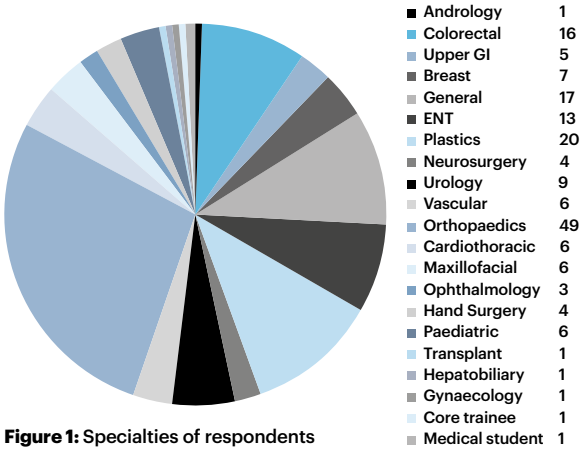

Figure 1: Specialties of respondents

What you told us

Selection of work-related injuries reported in our survey

"Back pain and needlesticks"

"Broke toe (I suspect) when hand table dropped on it"

"Cervical myelopathy"

"Deafness"

"Back pain and foot pain from standing on steps to be tall enough to see the operation"

"Chair taken away, fell on floor"

"Back pain, neck pain, bilateral tennis elbow, left shoulder pain"

"Acute prolapsed disc after assisting with TKR in theatre as a junior"

"Thrombophlebitis from an unpadded stool"

In a separate paper by Wells *et al*[5], a survey was conducted among members of the European Association of Endoscopic Surgery (EAES), which found that MSK pain is prevalent among EAES members. Nearly half had fears about career longevity from pain or discomfort, which correlated with greater feelings of burnout.

Lowndes *et al*[6] found that when procedural difficulty is greater than expected, there are negative mental and physical implications, which result in poorer perceived performance. Future efforts to re-engineer the surgical planning process and procedural environment to optimise workload and performance were advised. As an example of how this can work, Law and colleagues[7] showed that robotic procedures required significantly less mental and physical demand (and effort) than open or laparoscopic procedures.

METHODS AND RESULTS

The College wanted to establish the extent of the problem in the British Isles. To that end a survey was sent out to Members and Fellows, which was completed by 177 people. Respondents' specialties are outlined in Figure 1. Some of the supra-specialist categories with one or two respondents are omitted from the pie chart to enable interpretation. The list of questions with corresponding response charts are available online at bit.ly/RCSEdEG and some of respondents' suggestions are detailed overleaf.

Almost half of respondents reported an acute or chronic injury due to the theatre environment/operating conditions. In about one-third of those respondents, this affected their performance. Two-thirds would feel discouraged from reporting their discomfort.

Instruments are a major frustration, particularly broken, poorly functioning or absent ones. Table height, overstretching of the body, moving heavy equipment and dysfunctional equipment are also significant problems. Lighting is often too heavy and not bright enough. Lead aprons also cause difficulties, especially in hot theatres (separately an issue). Excess noise, telephones, interruptions and insufficient breaks cause problems.

Most respondents felt that more needs to be done to guide and educate surgical and other theatre staff on ergonomic issues.

The survey provides insight into a serious issue that has arguably been ignored until fairly recently. A few themes stand out, such as women feeling an expectation to modify their practice and positioning to an environment largely set up for males. Orthopaedic and laparoscopic surgeons appear most affected. Noise, instruments, lights, positioning and a 'macho' culture of surgeons not taking breaks all contribute to the chronic stress experienced by surgeons.

THE WAY AHEAD

Further research is needed to ensure the theatre environment and equipment are designed for the modern workforce. This will improve performance, wellbeing and patient safety. The Younger Fellows Committee plan to discuss ergonomics at the next Residential Forum. We also hope to continue collaboration with researchers on the topic towards improving our working lives.

"Almost half of respondents reported an acute or chronic injury due to the theatre environment"

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Some suggestions from our survey

"Operating theatres were built in the 1970s and there is no space to move around with equipment and staff packed in."

"Less macho approach to taking breaks!"

"More awareness of surgeons who are not 6ft men with big biceps!"

"General theatres too cold. People chat loudly in background during difficult surgery."

"Don't think this is a serious issue at all – after 30 years in the operating theatre there has never been a significant prolonged problem that can't be sorted out with common sense."

"Hospital-employed ergonomics expert required. Legal requirements instituted."

"Questions are too leading – introduces bias towards results you want."

"Our own bodies know best – when to break, when to move, adjust height, etc – we just ignore the messages, overrule them,

etc. So body awareness/ergonomics help if it is to empower the surgeon, not force them to comply with some external enforced measure, be that for breaks or height."

"I like you looking at this, but you have missed a huge point here. Please read Invisible Women by Caroline Criado Perez and redo your survey without the gender data gap – 30% of surgeons will be women and all of the setup is designed around the male body/hand size."

"I find the stress/anxiety created by the 'is this list going to finish (in time)?', held in my earshot one of the most distracting and counterproductive habits in most theatre environments that I have worked in. (I am NOT unduly slow.)"

"I think it is a problem that surgeons don't get a break. Nurses/ODP/anaesthetists are able to swap in and out for their breaks, but when it comes to our lunch or break, we are told we are working through so that we can get finished on time. This means full days without eating."

"I am soaked with sweat after being in IR theatre doing endovascular cases wearing lead."

References

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