Report

Forum on the Future of Surgery

Friday 6 February 2009, Royal College of Art, London

Time for innovation in surgical practice

Centuries-old designs are still being used in British operating theatres while surgical practice struggles to catch up with other areas of medical innovation, delegates were told at the first meeting of the Forum on the Future of Surgery, an independent think-tank convened by the Helen Hamlyn Centre at the Royal College of Art.

Consultant orthopaedic surgeon Professor David Barrett, one of two guest 'provocateurs' at the Forum, offered the example of a mallet he uses in knee surgery, the design of which had not changed since the early 19th century. 'I am covered in blood and fat and it has no grippy handle… it flies out of my hand every now and then. So it's appallingly bad design,' he said.

Professor Barrett, who is based at Southampton University Hospital and has developed computer navigation in knee surgery, also highlighted the heavy joint replacements still used for older patients. These were inappropriate for younger people who had perhaps played a lot of sport and required lighter, longer-lasting prosthetics. 'We need design engineers to sort things out,' he concluded.

The relative speed of change in demographics, technological innovation, healthcare policy and the underlying infrastructure concerned the Forum's other provocateur, James Barlow, Professor of Technology and Innovation Management at Imperial College London.

Robotics, advances in minimally invasive surgery, new drugs and stem cell research were all developments Professor Barlow encouraged the Forum to consider. But while all of these technologies change very rapidly, 'The built infrastructure changes very slowly – we are spending millions of pounds building new facilities. The question is how flexible are they, how adaptable are they, will they be able to cope with the likely demands placed on them in 20 or 30 years time?'

The Forum on the Future of Surgery was facilitated by Microsoft's Phillip Joe, who is currently working on a major digitisation programme for the National Health Service. 'Think the unthinkable, ask lateral questions and go where we want to go,' he advised delegates. The experts invited to the Forum from the worlds of medicine, science, design, engineering, management, marketing and research took him at his word and the discussion ranged widely.

Surgeons or technicians?

Ed Matthews, head of the Helen Hamlyn Centre's Design for Patient Safety Group, asked for a definition of surgery and Professor Barrett described it as 'any intervention'. Delegates suggested that

with new technology, certain interventions could be carried out by a technician rather than a surgeon. Decision-making was a surgeon's territory, however.

Hospital or home?

Delegates discussed whether the site for some types of surgery could move from the hard-pressed hospital into the community. Could it be possible to do more surgery in people's homes or in mobile field units, and would this be an opportunity to rethink the instruments used?

Disposable or reusable?

Consultant surgeon Jeffrey Hallett said ENT surgeons had experimented with disposable instruments, which dispensed with the need for the cumbersome and time-consuming six-step sterilizing process. But these had been of poor quality and bad design and practitioners had reverted to the multi-use ones. Professor Barrett commented: 'They could not cut bread, let alone a throat.' The use of disposable instruments also raised questions of sustainability.

Who pays for R&D?

Cost was a barrier to innovation, delegates from marketing and engineering backgrounds said. Intellectual property rights were awkward to negotiate in an industry that required rigorous testing before implementation. It was often unclear who would pay for R&D, which was very lengthy in medical fields with so many regulatory hoops to jump through.

Regulation versus innovation

'You are hampered at the first hurdle by ethics boards if you want to do a clinical trial. How do you actually get the evidence to show that your new design is going to work and be successful?' one participant asked. However, some regulation was not mere bureaucracy but essential for patient safety, Jeffrey Hallett said.

Resistance to change

Other participants asked whether some problems were caused by a culture that resisted change rather than the regulatory hurdles themselves. 'We are very conservative,' Professor Barrett said. 'The reason is if we try to use a new-fangled thing and it goes wrong. It ruins someone's life. Progress has been evolutionary rather than step change, but provided we present it in the right way in terms of design, people can see there is a reason for change.'

The need to share

Designers present expressed surprise at a lack of the sort of sharing that happens readily in other design areas. Designer Mark Sanders drew a parallel with cycling. When he was seeking a new bicycle design, he needed only to look at the internet to find out what cyclists wanted. 'I think this is where areas like internet forums and the blogosphere really work. They make my research so much easier,' he said. 'Apply that to patients. Imagine if there was a huge forum of users who talk about each other, about surgeons, about hospitals. That would help make changes.'

Delegates concluded that the Forum on the Future of Surgery could play a key role in helping to share knowledge on surgical practice and innovation. Delegates then divided into four working groups to explore four identified issues – barriers to change, location, patient experience, and technology and materials – in more detail.

Prof David Barrett, Southampton University Hospital

Prof James Barlow, Imperial College

Dr Alison McGregor, Imperial College

Breakout Groups

Barriers to change

Delegates identified over-regulation, lack of information, funding concerns and intellectual property as well as ethical issues as barriers to change in surgical design.

Professor David Barrett said that if surgeons wanted to try a new process or piece of equipment, they were hampered by bureaucracy and – understandably – by checks and balances on safety grounds. Hospital managers, budget officers and nursing staff would all need convincing, which slowed down decision-making.

Designers felt that approval processes were overcomplicated and needed to be made more transparent, rather than running solely through surgeons. Information on the internet was beginning to make a small difference but practitioners had much to gain from having a national resource where surgeons could share results and processes.

Patients, too, wanted to be able to discuss procedures. This was beginning to happen with hip resurfacing where patients were extolling its virtues over whole hip replacements in online chat rooms and news of the procedure was spreading.

Funding and IP went hand in hand. Inventors needed to know their intellectual property rights would be respected through the long process and also who to go to in the large, unwieldy system to protect such rights. Innovation also needed paying for, with testing and prototyping through the long-winded ethical process. It takes two years to pass an ethical committee. 'In many ways we are over-regulated,' Professor Barrett said.

Designers and inventors found such inhibition difficult to accept, 'Society needs to get a grip on risk acceptance,' design engineer Mark Sanders said.

Location

From field hospitals folded out of the back of an RCA-designed state-of-the-art ambulance to super-tech tertiary care hospitals where one consultant might remotely watch a clutch of intensive care units, the potential to change the location for surgery was growing.

Forum members discussing the issue of location first wanted to look at what constituted surgery. It could be a minor intervention carried out by a nurse or GP or a major heart or brain operation. Except in extraordinary situations such as the battlefield, the seriousness of any condition and surgical intervention would inform where it took place. If there was a threshold above which patients needed acute care, what was it?

Assessment of patient risk would define both where surgery happened and who would carry it out, but cost was also a factor. Political pressure was building for more interventions to move locally on cost grounds. Hospital ships operated in some parts of the world, participants noted, as well as mobile units for treating eye problems such as cataracts.

There was room, perhaps, for remote guidance where a surgeon could oversee many operations. This already happened in some places in North America, especially in remote areas – also in cities where one specialist remotely watched four or five ICU units, J Paul Neely from the Mayo Clinic told the group.

Geography and population density made a big difference. What was economically feasible for the southeast of England might not work in, say, North Dakota, where patients might live 200 miles from the nearest acute hospital and if things went wrong with community treatment then specialist support was not close at hand.

Breakout Groups

Patient experience

Buying insurance, purchasing a house, emergency car repairs and mobile phone contracts were all used as analogies for stages and requirements in a patient's journey through the medical and surgical system.

Participants recognised four stages of the process, from the point where the patient realised he or she might require surgery, through family and GP consultation, specialist visits and tests, the surgery itself and finally the post-operative period when care might take place as an outpatient or, in more serious cases, in hospital.

The group was interested in looking at the length of the journey, the patients' emotional condition, possible anxiety and their psychological as well as physical needs. Experiences of analogous sectors such as insurance or house-buying were discussed in terms of coping with anxiety and pressure, ensuring a consistent flow of information and dispensing advice.

Much more was required to be done to inform and reassure patients at all stages of the journey through surgery. For the last stage, after surgery and during recuperation, the group discussed the parallels with a good telecoms company which, having agreed a contract with you, would continue to look after you.

Technology and materials

A mock operating theatre that replicated the gore and slime of the real thing could prove an aid to surgeon training much as a virtual cockpit is used to coach airline pilots.

Delegates discussing diagnostics and materials suggested surgeons would be immersed in such a theatre in a very realistic way to decrease the variability involved in different surgical processes.

Group members divided the discussion into four areas of medical interest, covering disease prevention, diagnosis, surgery and recovery with post-operative surveillance.

They asked whether there were better ways of assessing a patient's risk of developing an illness and whether this could involve sophisticated testing such as an MRI scan at a centre, or whether there could be more scope for home testing with kits or remote access. Home diagnosis could be open to abuse, however, with some asking for or doing every test.

Would it be possible to use a medical history and interrogate a patient's notes to get a better idea of what he or she might suffer from the future? This did have its downside in that if a patient was shown to be more likely to suffer from a condition, there might be a move towards obliging that patient to pay more for treatment in future.

The discussion moved into the ethics of who gets treatment, healthcare rationing and whether any treatment should be based on lifestyle and more readily available to those who neither drink nor smoke.

ICT was a big area of interest with suggestions to improve imaging and data processing of imaging. This could lead to a reduction in invasive diagnostics. If the complexity of a process was reduced, the best outcome might be achieved regardless of a surgeon's experience. The surgeon might also be given more information to better plan operations, using robotics or other aids.

Delegates

- **Professor James Barlow**, Healthcare economist, Imperial College, London
- **Professor David Barrett,** Consultant orthopaedic surgeon, Southampton University Hospital
- **Dr Sumeet Bellara**, Materials Scientist, IOM3
- **Mario Bertazzoni,** Senior International Product Manager, DePuy International, Johnson &Johnson
- **John Bound**, Head of Innovation Development, InnovationRCA
- **Dr Mobasher Butt,** Clinical Adviser to the Chief Medical Officer
- **Dr Mike Caine,** Professor of Sports Technology and Innovation, Loughborough University, Director, Sports Technology Institute
- **Dr Nadia Danhash**, Biochemist, IP Manager, InnovationRCA, Royal College of Art
- **Rama Gheerawo,** Research Fellow, Royal College of Art Helen Hamlyn Centre
- **Mr Jeffrey Hallett**, Consultant orthopaedic surgeon
- **Phillip Joe**, User Experience Architect, Microsoft
- **Ian Johnston**, Product Designer, Quinine Design
- **Gareth Jones**, Design Engineer, The Product Works
- **Maja Kecman**, Senior Associate, Patient Safety Group, Royal College of Art
- Helen Hamlyn Centre
- **Ed Matthews**, Senior Fellow, Head of Patient Safety Group, Royal College of Art
- Helen Hamlyn Centre
- **Dr Alison H McGregor**, Reader in Biodynamics, Division of Surgery, Oncology, Reproductive Biology and Anaesthetics, Imperial College, London
- **Professor Jeremy Myerson**, Director of the Helen Hamlyn Centre and InnovationRCA, and Professor of Design at the Royal College of Art
- **J Paul Neeley**, Design Researcher, Mayo Clinic, USA
- **Denis O'Brien**, Innovation Strategist, Open University
- **Liam Rowley**, Section leader knee development, DePuy Johnson&Johnson
- **Mark Sanders**, Design Engineer, MAS Design
- **Professor Mehdi Tavakoli**, Programme Manager, Health Technologies KTN, Consultant and Technology Manager, The Welding Institute
- **Professor Mark Taylor**, Professor of Bioengineering Science, School of Engineering Sciences, Southampton University
- **Karina Torlei**, Research Associate, Patient Safety Group, Royal College of Art Helen Hamlyn Centre
- **Jonny West**, Senior Associate, Patient Safety Group, Helen Hamlyn Centre Royal College of Art
- **Anna Wheelock,** Health and Care Infrastructure Research and Innovation Centre

Date of next meeting: Friday 12 June 2009
Forum coordinator: Maja Kecman, maja.kecman@network.rca.ac.uk

Report: Claire Lovell
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