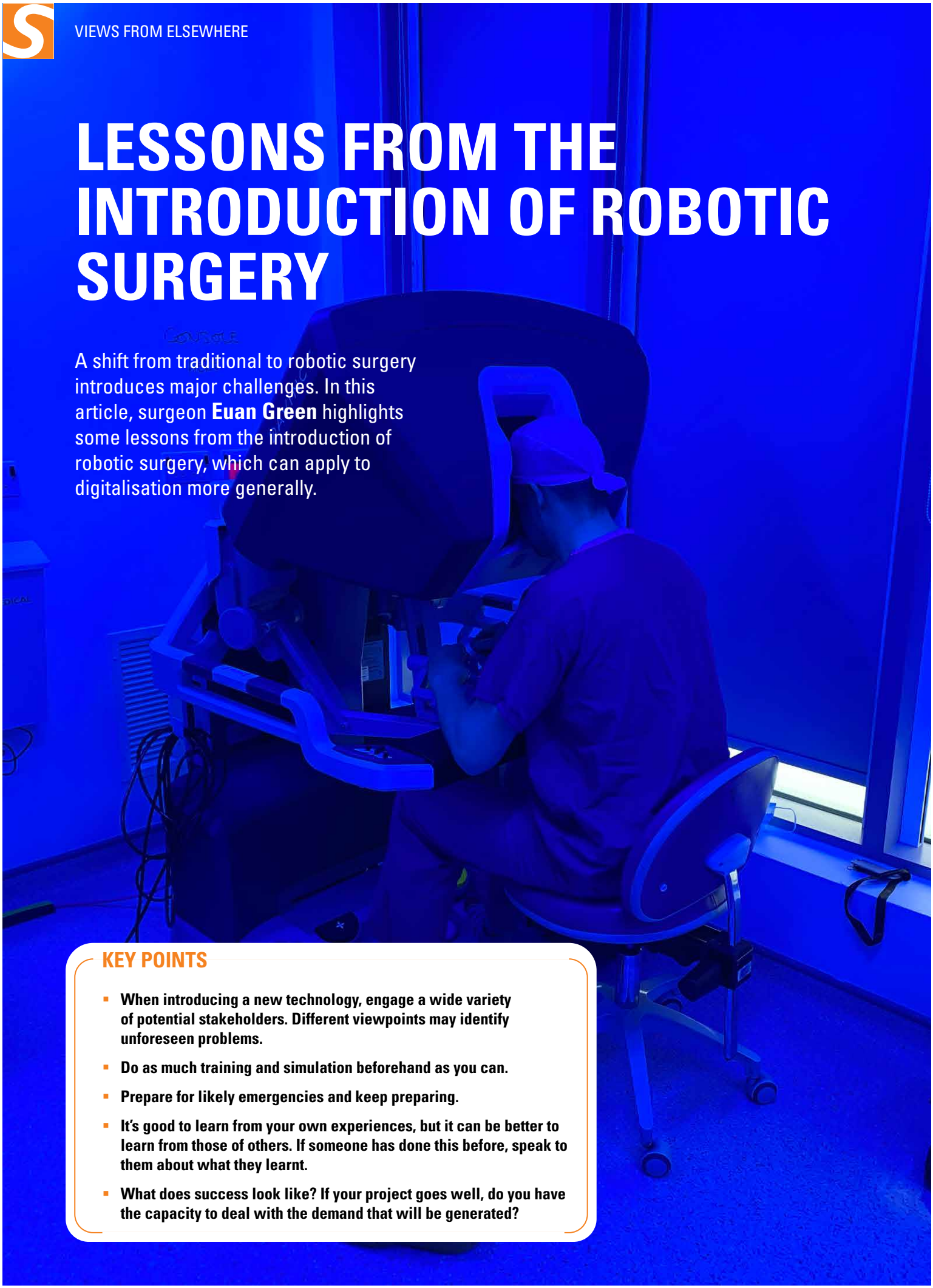
LESSONS FROM THE INTRODUCTION OF ROBOTIC SURGERY

A shift from traditional to robotic surgery introduces major challenges. In this article, surgeon **Euan Green** highlights some lessons from the introduction of robotic surgery, which can apply to digitalisation more generally.



KEY POINTS

- **When introducing a new technology, engage a wide variety of potential stakeholders. Different viewpoints may identify unforeseen problems.**
- **Do as much training and simulation beforehand as you can.**
- **Prepare for likely emergencies and keep preparing.**
- **It's good to learn from your own experiences, but it can be better to learn from those of others. If someone has done this before, speak to them about what they learnt.**
- **What does success look like? If your project goes well, do you have the capacity to deal with the demand that will be generated?**

Introducing a new technology is challenging in any field, but when the consequences of getting it wrong can have life-altering complications, it is especially important to get it right first time round. In surgery, changes in technology are often incremental – a slightly better instrument or cheaper version of an existing product – but sometimes the change is radical. My hospital's introduction of a robotic surgery programme over the last year or so is of the latter variety. With some experience behind us, I will reflect here on how we went about this, the challenges we anticipated and planned for, and the unanticipated challenges that we encountered.

Why robotic surgery?

The first question to be addressed is "why make a change towards robotic surgery?" We've been managing very well without a robot. Within the challenging financial environment in the UK's National Health Service, there has to be a clear justification for such large expenditure (exceeding one million pounds).

Keyhole surgery (laparoscopy) has, for the last 30 years, enabled operations to be undertaken with smaller incisions. This means less pain and quicker recovery for patients. From a technical point of view, robotic surgery offers better optics by providing 3D high-definition video with better magnification and the ability to visualise near infrared fluorescence. This makes it easier to see more of the fine detail of blood vessels we haven't been able to see before. Robotic technologies also offer instruments with a greater range of movement than that of the human hand and the limited movements of traditional laparoscopy, while enabling tasks like knot tying and dissection of patient tissues to be done almost as easily as with human hands.

But ease of use and keeping up with the new standard of care in many surgical procedures is not convincing enough for financial directors, at a time of tight budgets and other pressures on the NHS (e.g., COVID). The deciding factor was that there are potentially significant benefits to patients. Better technology allows us to undertake more complex and challenging operations in a minimally invasive fashion. Compared to traditional open surgery, robotic surgery can bring faster recovery to our patients. It can also allow us to operate on older, less healthy patients who might not be able to tolerate an open operation without serious risk of problems.

With a collaborative effort from a range of surgical specialities and the support of a charitable group, we were able to justify the expenditure to the executive board.

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Engaging stakeholders

The introduction of a significantly different method of operating poses potential challenges not just to surgeons, but to many people throughout the organisation. We set up a working group that engaged as many different stakeholders as we could identify. This was critical to our success. Rather than simply looking at the surgeons who will be operating with robots, it was important to think much more widely, involving:

- the company that makes and sells the robot (as they have experience of setting up similar programmes elsewhere),
- the nurses who will help set up and assist in the operating theatre,
- the support staff who order and check the stock of consumable items used during operations,
- the technical staff responsible for ensuring electrical and technical safety, and
- the staff groups who will be looking after patients before, during and after their operation (anaesthetics, recovery and ward staff). We used this group to identify the potential barriers to adoption and to look at how we might counter them.

By using expertise from a range of disciplines and those who had experience of setting up services elsewhere, we hoped to minimise the number of 'unknown unknowns'.

Major issues that were identified were as follows:

- staff training on the use of equipment and how to make sure the first operation on a patient went well,
- ensuring that there was a clear supply chain for obtaining disposable items and sterilising reusable items, and
- training staff in how to manage emergency situations during surgery.

Training and procedures

Adequate training was achieved by using the experience of others. This first involved visiting other units with established robotic surgery programmes and experience of how to carry out operations smoothly and safely. We trained using virtual simulation and software that could train basic techniques. We then used these as building blocks to lead into more complex virtual simulation. This led on to lab training using a real robot in a supervised environment on simulated tissue requiring certification, before progressing to operating on patients.

When it came to starting to operate on patients, this was done with the hands-on support of a 'proctor'. A proctor is another surgeon from another hospital, with extensive experience of robotic surgery, who has been trained in how to provide support to surgeons at the start of their robotic career. This was done while simultaneously choosing initial operations that were likely to be straightforward to start with, then slowly building in more complexity whilst support was still present. Nursing staff went along a similar journey of education.

A key element for me was to have a colleague training at the same time so that we support and advise each other once the support of the proctor was no longer there.

Issues around supply chains and sterilisation were resolved by making full use of the wider working group within the hospital who had experience of creating and implementing standard operating procedures. This ensured that new equipment was regularly checked, maintained, and cleaned in the way required and that responsibility for managing stock levels of items was clear.

Managing emergencies

For management of rare but serious emergencies, we set up a series of emergency drills simulating how we would manage a problem and undock the robot from a patient to allow rapid open surgical access. This identified problems that might occur. For example, the bulky robotic equipment got in the way of the trollies carrying emergency equipment into the operating theatre, which seems minor but is important. Given the rarity of true surgical emergencies like these, it is important to continue to run these drills at intervals; while surgeons stay in their roles for many years, nursing and support teams can change regularly. It is important that safety measures are kept high on the agenda and fresh in everyone's minds.

Success…with some unexpected issues

The robotic surgery programme has been a success. It has been of clear benefit to our patients, shortening in-hospital recovery for operations. Cancer operations to remove a kidney previously had a three-day stay for keyhole operations. This has been reduced to one day. The reduction has brought benefits to the hospital as we've tried to cope with higher numbers of emergency admissions during the pandemic. Patients have had noticeably less pain after their operation, and we have been able to take on more complex work as time has gone on. We have gone from two to six surgeons using the robot, with more being trained to broaden the scope of what can be done, bringing the benefits to more patients.

There were unexpected issues that have since been dealt with. For instance, the robot and associated items are larger than any traditional surgical equipment. The operating theatres – with a lot of thought and modelling – were required to fit and store the robot. The only operating theatres thought to be large enough to house the robot are suspended over a parking bay. Prior to its arrival, no-one had considered whether this structure would cope with the additional 1500 kg of weight, which required some structural engineering input.

As we have progressed and used the robot more frequently, we are getting to the point where there aren't enough days in the week for everyone to use it for everything we want it to be used for. After a long and complex setup process, we hadn't anticipated that we would need to be looking at a second machine within a year of getting the first.

The success of the introduction of this revolutionary technology has been through careful planning and engagement not just of those directly using the robot, but a broad array of people indirectly involved and in the identification of potential problems well in advance. Consultation with those who have seen programmes implemented before allowed us to learn from the experience of others rather than just our own.

Euan Green works as a consultant urological surgeon at Salford Royal Hospital in Greater Manchester, England, and has a specialist interest in robotic-assisted surgical treatment of kidney cancer. He is the trust cancer lead for urology and sits on the Greater Manchester Cancer Pathway Board. He is the training programme director for urology in Greater Manchester and Lancashire and a senior clinical lecturer for the University of Manchester.