Revisiting patient safety for innovative urological surgery

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Technological advances in urology have led to many beneficial outcomes for patients. Unfortunately, increasing the complexity of a procedure may make surgical interventions even more unpredictable, increasing the possibility of error, with its detrimental effect on patient safety. In this article, the authors highlight the fundamental components of the patient safety process and recommend measures to maintain and enhance safer patient care.

Adverse events secondary to human error and system failure occur in all aspects of healthcare.1,2 ‘Patient safety’ is defined by the UK National Patient Safety Agency (NPSA) as ‘the process by which an organisation makes patient care safer’.3 It has emerged in response to the high prevalence of avoidable adverse events.4,5 Over the past decade, defining and improving patient safety has become an increasingly important discipline within the practice of modern medicine.6

Attention to patient safety is especially important within surgical specialties that incorporate technological advances early. Within urology, these changes have led to many beneficial outcomes for patients, including shortened hospital stay, reduced blood loss and improved functional recovery following surgery. As a result of the increased complexity of procedures, there is an increased potential for error and subsequent harm. The NPSA has highlighted these issues; the National Reporting and Learning Service quotes 335,245 patient safety incidents between April and June 2011, resulting in severe harm in 7,866 patients and 3,009 deaths.7

Various measures have been introduced in an attempt to reduce the incidence of errors and improve the safety of surgery. The Surgical Safety Checklist introduced by the World Health Organization (WHO) is one example and is now regarded as a standard of care, applicable to any operating environment.1,8 Dynamic changes in the use of technology and increasingly widespread use of innovative modalities such as robotics, complex laparoscopy and single port/natural orifice surgery are occurring within urology.
FUNDAMENTALS OF PATIENT SAFETY IN VIEW OF INNOVATIONS

Urological surgery is constantly evolving, adopting new technology and innovative approaches to the treatment of surgical pathology. This is demonstrated by the development of laparoscopic and robotic surgery and the trend towards increasingly minimally invasive techniques. Unfortunately, new technology does not necessarily equate to enhanced patient safety. In fact, because of the increasingly complex nature of surgical innovations, patient safety has to be closely monitored to ensure that this aspect of care is not compromised (Figure 1). Several models have been proposed to define the elements of patient safety and their application to urological surgery. These can be summarised into four distinct domains: healthcare professionals, recipients of care, healthcare delivery processes, and methods for feedback and continuous improvement (Box 1).  

Healthcare professionals

Clinicians and allied healthcare staff are exposed to innovation and new technologies at a pace that often outstrips that at which safety barriers can be developed. This includes various factors such as the training of teams undertaking robotic-assisted surgery. It also entails evaluating the effectiveness of that training, continual professional development and objective assessment. Furthermore, effective working practices also include development of non-technical skills (communication, decision making). Team co-ordination as well as member support and guidance for one another also have an important role to play. Non-technical skills have a significant impact on the delivery of patient safety. Communication is one of the key components required for success in carrying out robotic-assisted surgery. Communication breakdown between surgical team members has been identified as a significant contributor to patient safety incidents. Uncertainty of roles and responsibilities, incorrect or incomplete patient information transfer during handover and distraction in the operating room lead to adverse patient safety events. In robotic-assisted surgery, cognitive skills (situational awareness and decision-making abilities) and behavioural skills (teamwork and leadership qualities) are vital elements required to optimise patient safety. For instance, the console surgeon needs to be informed by other members of the urological team of problems at the operating table, as he or she may not have a direct view of the sterile field. Ensuring a focused but contented theatre atmosphere, good communication between team members and appropriate task delegation can substantially improve patient safety and reduce error occurrence (Box 2).  

Recipients of care

A sound understanding of an individual patient’s characteristics is vital to understand their thought process and expectations in order to provide quality of care. Furthermore, the patient’s perception and input into their own healthcare is essential to promote safety. As patients are the central components of healthcare delivery, it is proposed that they take a more active role in their own health. The extent to which patients are willing to participate in undertaking their own safety needs to be evaluated. The NPSA provides patients with leaflets such as ‘Quick tips – when planning for surgery’, which include the questions they should ask their surgeons. In spite of initiatives such as this, patients would rather ask general questions regarding their healthcare than challenge healthcare professionals. Thus, the onus appears to lie with the healthcare providers to ensure patients are in an environment where they feel comfortable asking questions regarding new management modalities. We must also address patients’ concerns with regards to the benefits and risks of surgery, the purpose of a procedure, anaesthesia modality as well as issues regarding site of surgery and recovery time. Providing patients with relevant verbal and written information will ensure they are well informed. Patients subsequently feel more at ease when reporting incidents, especially postoperative complications, so that immediate action can be taken. This approach will not only include patients in their own healthcare, but will create an environment in which patient safety incidents can be reported easily.  

Healthcare delivery processes

Healthcare systems comprise four main elements – the patient, the healthcare team, the institutions and the overall organisation – which together deliver care services to meet the needs of a target population. Patient safety is considered an essential component of healthcare; these elements must work in harmony to ensure that the quality of service delivered and patient safety measures employed are of the highest standards. To adopt a patient-centred safety approach, the urology team must engage the patient and communicate effectively with the individual with regards to their procedure, treatment and hospital stay. Moreover, patient perceptions are...
Increasingly being used as a measure of the quality of a healthcare system.

Collecting data on patients' perception of the effectiveness of surgical teams is important, enabling improvement via end-user review. The challenge lies in translating this data into meaningful change within the current healthcare system. Provision of a safe operating environment and the facilitation of individual tasks within the surgical team are cornerstones in achieving effective working practices. To ensure a surgical team is well equipped, both in a physical and cognitive sense, requires training and opportunities for research. This lies within the remit of organisations providing healthcare that have a responsibility to support and encourage development of surgical teams, especially in novel fields such as robotics. A culture that emphasises learning, teamwork and is patient-focused is paramount to ensuring any healthcare system is patient safety centred.

Methods for feedback and continuous improvement
To reduce the frequency of errors, all members of the urology team must be 'safety-minded'. Specifically they should be encouraged to report near-misses, these representing an opportunity to identify potential system failures. Unfortunately, under-reporting of near-misses is common. Focus should thus be placed on creating an environment that is open to the reporting of near-misses and errors to allow teams to share information and offer insight. Any mishaps should be regarded as learning opportunities and not means of apportioning blame to an individual. It is essential that the urological team members identify and report any patient safety incidents throughout the surgical procedure. Taking this proactive approach involves the acceptance of adverse events, applying knowledge from past errors, and continuous monitoring and feedback on the outcomes of reported incidences. Learning from these lessons will allow the implementation of solutions to minimise harm in the future.

It is important to note that these four domains are inter-related, with patient safety being a multistage process, each step giving rise to a potential source of error. A seemingly insignificant event in the operating environment may act as the catalyst for a chain of events that lead to a patient safety incident, spiralling beyond the control of the healthcare team. Each patient safety incident should provide an opportunity to learn from and implement changes in order to prevent a recurrence. Interactions between the components of patient safety should be utilised effectively to enhance patient safety.

**Box 2. Overview of recommendations to enhance patient safety**

**Technical skills**
- Equipment
- Operating environment
- Training (simulation and real settings)

**Non-technical skills**
- Communication
- Teamwork
- Situational awareness

**Checklist**
- Development and validation of a specific robotic-assisted surgical safety checklist

Technological-driven approaches to urological surgery provide scope to enhance patient safety through computer-regulated safety checks. However, the complex nature has introduced urology teams to new patient safety challenges. Team members have had not only to adapt to new techniques, but also to become more dependent on each other to ensure procedures run smoothly and efficiently. Alongside excellent anatomical and medical knowledge, it is extremely important to have good communication skills and team-working abilities to ensure patient safety throughout procedures (Figure 2). Essentially, the robot is a new member of the urological team, which requires modified roles and adaptation for each team member.

The machine has a significant footprint, which can lead to difficulties where space is limited. Access to the patient and even other team members may be restricted; co-ordination by team members and defined task allocation is required. Traditional roles of lead surgeon, assistant and scrub nurse may need to be adjusted. For example, the senior urologist may not be in the sterile field; as controlling consoles may be placed outside of the operating environment, verbal communication and situational awareness of the patient may be reduced. The operating surgeon is now dependent on the other team members for verbal information so that decisions can be made quickly in the case of an unexpected event. Access to technology aids such as touch-screen telestration by all operating theatre staff will improve awareness and
mutual understanding in order to prevent any incidents.

Changes in personnel with shift working is becoming more frequent in the operating theatre; transfer of information during handover is an area where patient safety is at risk.22 It is an important step, where all information regarding the procedure and patient issues must be communicated competently. Furthermore, members of the surgical team must feel comfortable with one another, so that any patient safety issues can be raised and addressed. Learning from shared experiences as a team, for example watching a video of the procedure they have just conducted, will provide scope for feedback, improvements and implementation of changes for procedures.

Training in robotic-assisted surgery by all members of the team is vital as new methods of technology and patient care are introduced. There is a significant extension to the roles of nursing staff. Their attention is divided between the needs of both the machine and the patient. There will be an increase in both the number and difficulty levels of nursing tasks. Urologists apply existing surgical expertise as well as learn new technical skills to ensure comfort and confidence with instrument use. Training outside of operating rooms is well suited to urology and simulators of robotic-assisted surgery allow trainees to practise procedures as well as encounter complications in the virtual environment without endangering the lives of patients.22,24 This training develops decision-making skills and has been shown to improve outcomes for those surgeons who regularly undertake particular procedures.24 By carrying out regular simulation training, the complication rates of urological surgery should be reduced, as well as allowing identification of new techniques and working practices.

CONCLUSIONS
Improvement of a team’s technical and non-technical skills (decision making, situation awareness and communication) requires the integration of knowledge and decision making. Key factors include co-ordination of effort, continuous feedback and a positive attitude. Neither efficient surgery nor patient safety can be achieved without these being in place. Robotic-assisted surgery introduces additional patient safety concerns, meaning focused efforts and teamwork collaboration are essential to address these. Simulation training as a team may help to enhance interdependence as well as ensure each member is familiar with the operative environment. The development and validation of a specific robotic-assisted surgical safety checklist, similar to that introduced by the WHO for surgery in general, may improve patient safety further.

Patient safety is a top priority in the operating environment. Robotic technology provides opportunities to deliver enhanced patient safety through computerised monitoring, although these alone will not suffice. Applying the components of patient safety described above to robotic-assisted surgery requires a robust and focused team effort together with a workflow system to enable task management and problem identification. The essential constituents of effective team working in this setting include integration of knowledge and technical abilities with excellent communication skills to achieve and maintain a high level of patient safety.

Declaration of interests
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