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Will robots make good perioperative nurses?

New technology is always being introduced into health care and nursing as a profession has had to adapt. Technological advances have changed the practice of nursing from the introduction of the stethoscope to the electronic health record, and now robots and artificial intelligence (AI). With technological advancements occurring at an ever-increasing rate, more and more perioperative tasks will be delegated to robots and AI. The main question for perioperative nurses is, how can we remain relevant in the high-tech operating room of the future?

Perioperative nursing has always been at the forefront of technological change in health care. It is now commonplace during surgery to use advanced technologies such as lasers, stereotactic guidance, advanced imaging and 3D printing, to name a few. These technologies have been tools to aid or augment the skills of the perioperative team but many of the technologies of the future will be autonomous with the potential to complete tasks independently. The introduction of this type of technology into the perioperative environment will require restructuring of roles and new models of care. It is important that perioperative nurses play an active role in deciding these new ways of working and how they are implemented.

A report by the McKinsey Global Institute[1] estimates that 800 million workers worldwide could be replaced by robots by the year 2030. There is already a robotic revolution happening in health care but currently these robots are limited to assistant roles making tasks and procedures more efficient and safer. A typical example is the transportation robots that are frequently seen delivering equipment and supplies around modern health facilities. There are even some well-publicised, albeit inappropriately named, 'robot nurses' but to date these machines are primarily limited to assisting with manual handling.

The use of robots to assist and augment practice is not new to perioperative nurses. Robotic-assisted surgery has been with us for almost two decades. Instruments such as the Da Vinci system allow surgeons to take control of multiple robotic arms through a hand-operated console which gives them much greater dexterity and vision when operating in hard-to-reach areas. These devices are operated by remote control with no automation or intelligence to make decisions. Because of this, some people have even argued that they are not, in fact, robots but are better classified as mere machines[2].

Autonomous surgical robots, like autonomous systems in many other industries, are currently being researched and are in various stages of development. At present, the functionality of surgical robots is limited to specific tasks such as suturing or biopsies. The purported advantage of these robots is they are not affected by human-related problems such as fatigue or momentary lapses of attention. Thus, they can perform repeated and tedious operations with a high degree of safety and efficiency.

Researchers hope that widespread adoption of surgical robots will make specialised surgical procedures safer and more readily available to people worldwide.

The Smart Tissue Autonomous Robot (STAR)[3] is one of the most advanced and most widely publicised systems. It uses 3D and infrared imaging along with pressure sensors to perform an intestinal anastomosis which is said to tolerate twice the pressure of one performed manually. It may seem counterintuitive but this awkward and intricate work is perfectly suited to robots who have unlimited patience and a potentially unlimited number of digits.

Another form of autonomous surgical robot currently in development are micro-robots that can operate intravascularly. Initial animal experiments are focused on cardiac valvular repair where the device is inserted into the vena cava and propels itself to the damaged valve guided by vision and touch sensors. It then wedges into position near the leaking valve where it launches an occluder to plug the leak. Advancement in micro-robotics is said to be the precursor to nano-robots that have the capability of operating at the cellular level.

The difference between current surgical robots like the Da Vinci system and the autonomous robots of the future is the addition of artificial intelligence (AI). The AI is produced by algorithms that give these machines the ability to reason and perform cognitive functions such as problem solving, object and word recognition and decision-making[4]. The influence of AI in surgery is not limited to surgical robots. AI is already being integrated into monitoring, diagnostic and therapeutic devices that can adjust alarm parameters, interpret data and titrate therapies. Currently, AI augments human decision-making but as machines demonstrate their superiority to humans, these actions will become autonomous.

The title of this paper is somewhat facetious. It is very unlikely that robots will replace nurses or surgeons any time soon, but they will become commonplace in perioperative settings. It is most likely that this technology will be introduced gradually, like cruise control and lane-keeping systems have made their way into cars ahead of full self-driving capabilities. Just like the motor vehicle industry, we need to be considering the practical, ethical, and legal implications of working with technology that is autonomous and makes its own decisions. Planning for this should be happening now as the technology is being developed and it must include nurses and other members of the perioperative team.

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