

Robotics in Healthcare



Where is robotics used in healthcare?



Surgical robots – allows surgical operations to be carried out with greater precision than an unaided human surgeon, and/or allows remote surgery where a human surgeon is not physically present with the patient.



Telepresence robots – allow off-site medical professionals to move, look around, communicate and participate from remote locations.



Disinfection robot – has the capacity to disinfect a whole room in minutes, generally by using pulsed ultraviolet light. Beneficial for preventing hospital acquired infections (such as MRSA).



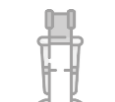
Companion robot – also known as ‘carebots’ have the capability to engage emotionally with patients, keeping them company and alerting if there is a problem with their health. Some have a combination of touch sensors, cameras and microphones. Embedded displays can remind users about medication adherence.



Pharmaceutical dispensing automation – robotic systems to dispense pharmaceuticals either in a retail or hospital pharmacy setting (eg sterile IV admixtures, dose packs).



Supply-chain robots – automated storage and retrieval for goods – from medical instruments to laundry, meals to blood samples.



Assistive robots – used as tools for rehabilitation, training, therapy or mobility – such as exoskeletons, assisting the lifting of patients, prosthetics and orthotics.



Patient simulation robots – clinical training with a realistic robotic patient that can simulate human physiological responses. Can be used in a multitude of different high-risk or rare medical procedures and patient cases within a team-based learning environment.



Robotic Process Automation (RPA) – software robots that are configured to carry out business processes previously done by people. The software acts as a virtual worker, programmed to carry out operational procedures eg financial transactions or health records. Main benefit being cost and time savings.

Opportunities

- Robotic services can be in places healthcare workforce can't – such as a rural setting controlled by a remote clinician
- Has the ability for tasks to be completed 24/7 – robots do not tire
- More services can be delivered for the same spend or less
- Allows automation of physical and repetitive tasks so that health workforce can focus more on a patient's care and wellbeing and other more rewarding tasks
- Can be easily tailored to the person – eg personalisation of care plan for companion robot
- Adoption of Robotics can improve overall productivity of the health system

Barriers

- Aversion to/distrust of the technology – not enough information out there for both public and workforce to feel comfortable with its adoption
- A perception of “robots stealing jobs”
- Adoption can mean the detailed understandings of business process/workflow can be lost. Invisibility of the new process can mask future risk and opportunity.
- Up front investment needed to cover cost of implementation, including planning for maintenance, upgrades, security patching
- Need for the review of regulations and procurement frameworks for the devices and services offered – including Medsafe/Pharmac

The health & disability system is the **biggest** employer in New Zealand. Somewhere **between 5% and 47%** of jobs will be affected by robots

Robots have been used in hospital pharmacies in the NHS for over **20 years**

Robots are now so fast that they can complete the welding of an entire SUV in just **86 seconds**

The NZ Forestry, Agriculture & Horticulture industries are using robots to help **reduce costs & resolve workforce shortages**

Some New Zealand Examples

Matilda@
Mercy Radiology

Auckland's Mercy Ascot is using Robotic Process Automation for processing all ACC invoicing and receipting for Mercy Radiology. The 'Matilda' software spends two hours a day doing a task that previously took two people around three to five hours a day. The software usage has led to a 10% reduction in error rates for these processes. As a virtual worker, the software does not need a desk or any space or equipment. There is also a cash flow benefit as the software submits daily to ACC, whereas previously it was done weekly. The use of RPA will allow the organisation to grow without having to increase headcount to manage these essential but repetitive processes.

TASKA
PROSTHETICS

New Zealand company TASKA Prosthetics had produced the world's first waterproof multi-articulating myoelectric prosthetic hand. Myoelectric prosthetic devices are designed to mimic human anatomy and function. The user controls the prosthesis using sensors placed on the muscles in the remaining part of their limb. The sensor technology in the device reads the movement, and once it is calibrated to the wearer it becomes a functioning replacement hand. Callaghan Innovation and the New Zealand Artificial Limb Centre supported TASKA on the commercialisation of their robotic hand.

CARTERTON PHARMACY
PHARMACY SOLUTIONS

For the past 10 years, Carterton Pharmacy have been using dispensing robots to help with managing medications in Age-Related Residential Care facilities and in the community for customers who benefit from this type of service. The system is run with 2.5 pharmacy technicians and one pharmacist equivalent over all five Pharmacy Solutions stores in the Wellington/Wairarapa region, servicing on average between 1200-1500 patients. Removing the need to manually pack these medications frees up staff to deliver other services, such as giving vaccinations. The robotic system is very accurate with packaging, thereby improving patient safety.

Southern Cross
GRACE
HOSPITAL
Surgical excellence, personalised care

The da Vinci robot is a specialised surgical device used for complex and delicate surgeries, predominantly urological and gynaecological procedures. Completely operated by a surgeon through a magnified 3D vision system, the robot technology translates the surgeon's hand movements into smaller and precise movements. That enables very precise and gradual movement in delicate areas involving high concentrations of nerves and blood vessels, minimising the risk of complications. There are three da Vinci robots currently operating private hospitals in New Zealand, Grace Hospital in Tauranga, and Southern Cross Hospitals in Auckland and Christchurch.