

**ROBOTS IN MEDICINE**  
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Heart operations, kidney transplants, and brain surgery: When it comes to complex surgical procedures, doctors are looking to robotics. Robots are making operations less painful, invasive, and risky, while increasing accuracy.

**The advantages of robot-assisted surgery**

**For the Patient:**

- Less pain
- Smaller incisions
- Fewer, smaller scars
- Shortened recovery period - days instead of weeks
- Fewer infections, complications

**For the Surgeon:**

- Greater precision
- Steady instruments
- Less invasive procedures

**Brain surgery: The neuroArm.** Canadian scientists have designed a robot that operates on the brain. Doctors will use the neuroArm and MRI technology to perform risky surgical procedures with dexterity and precision. The MRI provides a clear, 3-D image of the entire process. Doctors control the entire operation from another room, using handles to control every movement of the robotic arms and gauge pressure and texture.

**Heart surgery.** The da Vinci robot and new software from the UK are making major heart surgery easier and better. With only a few tiny cuts, a tiny camera, and miniature tools, doctors can operate with less risk to the patient and more accuracy.

There is no longer any need for long incisions, making for less pain and faster recovery. Unlike human hands, robotic tools take up little room, and work with great precision. The new software makes stopping or slowing the heart during the procedure unnecessary because the robotic arm is able to work in synch with the movement of the heart. The AESOP and Zeus R. Surgical Systems are other robotic operating systems. They are voice-controlled.

**The robot leech.** Carnegie Mellon University's Heart Lander is another revolutionary robotic tool. Not only can it inject drugs, heal hearts, and connect pacemakers, but it is also engineered to destroy damaged tissue.

**Other surgeries.** Lung surgeries and difficult procedures such as kidney transplants have been performed successfully with robot assistance. With shorter recovery times and non-invasive keyhole procedures, physicians hope surgeries will grow in popularity.

**Long-distance surgeries.** With robot-assisted surgery, doctors can perform operations in rural communities or dangerous settings without having to be present. Whether the patient is located in a remote location or on a battlefield, surgeons can control the operation without traveling or endangering themselves. Not only will health care have a greater reach, but it can take place earlier.

Robots are the newest members of the hospital support and nursing staff. From dispensing medication, to making deliveries and visiting patients, robots are improving the way hospitals function. Robots are helping doctors reach patients across distance. They step in to handle nursing and support staff shortages and streamline many tedious administrative tasks.

**McKesson ROBOT-Rx** This automated system stores and dispenses single doses of drugs for entire hospitals. Pharmacists enter prescriptions into the computer, the robot collects

the dosage by scanning the barcodes on the medications, and bags them, all the while keeping track of all medication. This robotic system ensures that the right medicine reaches the right patient.

**The Numbers:**

- 1/3 of the medium and large pharmacies in U.S. hospitals own a ROBOT-Rx.
- It sorts half a billion medications error free per year.
- 25,000 - the number of doses a ROBOT-Rx can store.

**The Advantage of ROBOT-Rx:**

- Prevents medication errors
- Manages dispensation numbers
- Eliminates the tedious task of sorting medicine
- Works 24-hours a day
- Keeps track of stocking needs
- Saves money/time

**Mechanized Couriers.** Robots are efficient messengers. They transport materials like food, x-rays, and linens throughout the hospital. The RobotCart travels a set path and prevents collisions by using sonar. The HelpMate and Aethon TUG are other mechanized couriers work to create better hospital environments.

Virtual visits from your physician. Doctors are examining patients from continents away with interactive robots and hi-tech visuals. Mobile robots such as the In Touch Health Remote Presence (RP-6 and RP-7s) are facilitating faster service and doctor-patient face time. These robots are fully mobile, with computer screens for heads and real-time video cameras for eyes and ears. Doctors operate them using a joystick and wireless technology. Another advantage to these robots is saving staff from cross-infection.

**Robot Doctors.** Imagine receiving virtual visits from your physician. Doctors are examining patients from continents away with interactive robots and hi-tech visuals. Mobile robots such as the In Touch Health Remote Presence (RP-6 and RP-7s) are facilitating faster service and doctor-patient face time. These robots are fully mobile, with computer screens for heads and real-time video cameras for eyes and ears. Doctors operate them using a joystick and wireless technology. Another advantage to these robots is saving staff from cross-infection.

**Nanorobots** are at the brink of revolutionizing the medical world. Once they are created, scientists believe tiny nanorobots will be the answer to many serious conditions and diseases. Small enough to slip into the blood stream, nanorobots will treat and find disease, and restore lost tissue at the cellular level. Like any developing scientific field, there are objections about side effects and ethical concerns. But the eventual medical advantages are unmistakable.

**How Small?** The word, nano is Greek for dwarf. But that can't begin to describe the size of a nano. Each one ranges from 0.1 to 100 nanometers in size. A nanometer is one-billionth of a meter.

**Targeted Drug Delivery.** Nano-sized machines have a future in drug delivery. With nanorobotics, specific areas can be targeted with nano-bullets or treated with smart bombs. Other nanoparticles may be used to starve cancer, providing an alternative to chemotherapy.

**Diagnostics.** Tiny nanorobotic probes may be the future of diagnosis. Monitoring, diagnosing and fighting sickness will be the work of microscopic agents. Nanorobots will be able to monitor neuro-electric signals and stimulate bodily systems.

**Regenerative Medicine.** Complex procedures like growing new organs may also be possible with the help of tiny nanorobotics. Scientists are still investigating methods to create new tissue. Nanorobots will be used to orchestrate cell repair as well.