

THE RISE OF THE ROBOT NURSE



As technology continues to advance and become cheaper and more accessible, its uses are increasingly benefiting human workers in the health care industry. Around the world, medical professionals are experimenting with how robots can fill growing gaps in the health care workforce. These experimentations are becoming more important in light of Census Bureau estimates that show nearly 25 percent of the population will be aged 65 or older by 2060, demanding more care.

WHY NURSES NEED ROBOTS



A large aging baby boomer population will soon place greater strain on our health care system—strain that can be alleviated with the help of robots.

LARGE AGING POPULATION

- By 2035, there will be **78.0 million** people 65 years and older compared to 76.4 million under the age of 18," according to Jonathan Vespa, a demographer with the US Census Bureau. **Census**
- The problem in Japan is even more extreme—nearly one out of three individuals are over the age of 65, and with only about **1.2 births** per woman, there are not enough people entering the workforce to make up for it.
- This means a significant shortage of nurses in health care to care for the elderly. **Stanford**

ROBOTS TO THE RESCUE

REPETITIVE TASKS



Robots can help check patients' vital signs and conditions, draw blood, and take care of hygiene needs.

SURGERY SUPPORT



Da Vinci has been used in various types of surgeries. The surgeon is controlling the robot's system and directing the procedure.

INTERACTING AS CARETAKERS



A remote-controlled robot can take on the responsibilities of a caretaker by interacting with patients and checking on their living conditions and need for appointments.

PHARMABOTICS



Robots could dispense prescriptions, similar to an ATM, allowing pharmacists to focus on educating individuals about preventive measures. **MedicalFuturist**

DISINFECTING



The Xenex robot uses high-intensity ultraviolet light to disinfect any space in a health care facility quickly and efficiently.

JAPAN'S ROBOT ROLLOUT

The nursing shortage is so severe in Japan that the government has taken on a significant role in promoting the development of robotics in health care by offering subsidies to developers and manufacturers.

THE JAPANESE ROBOTICS MARKET

An estimated **5,000** nursing-care institutions are testing robots. **Economist**

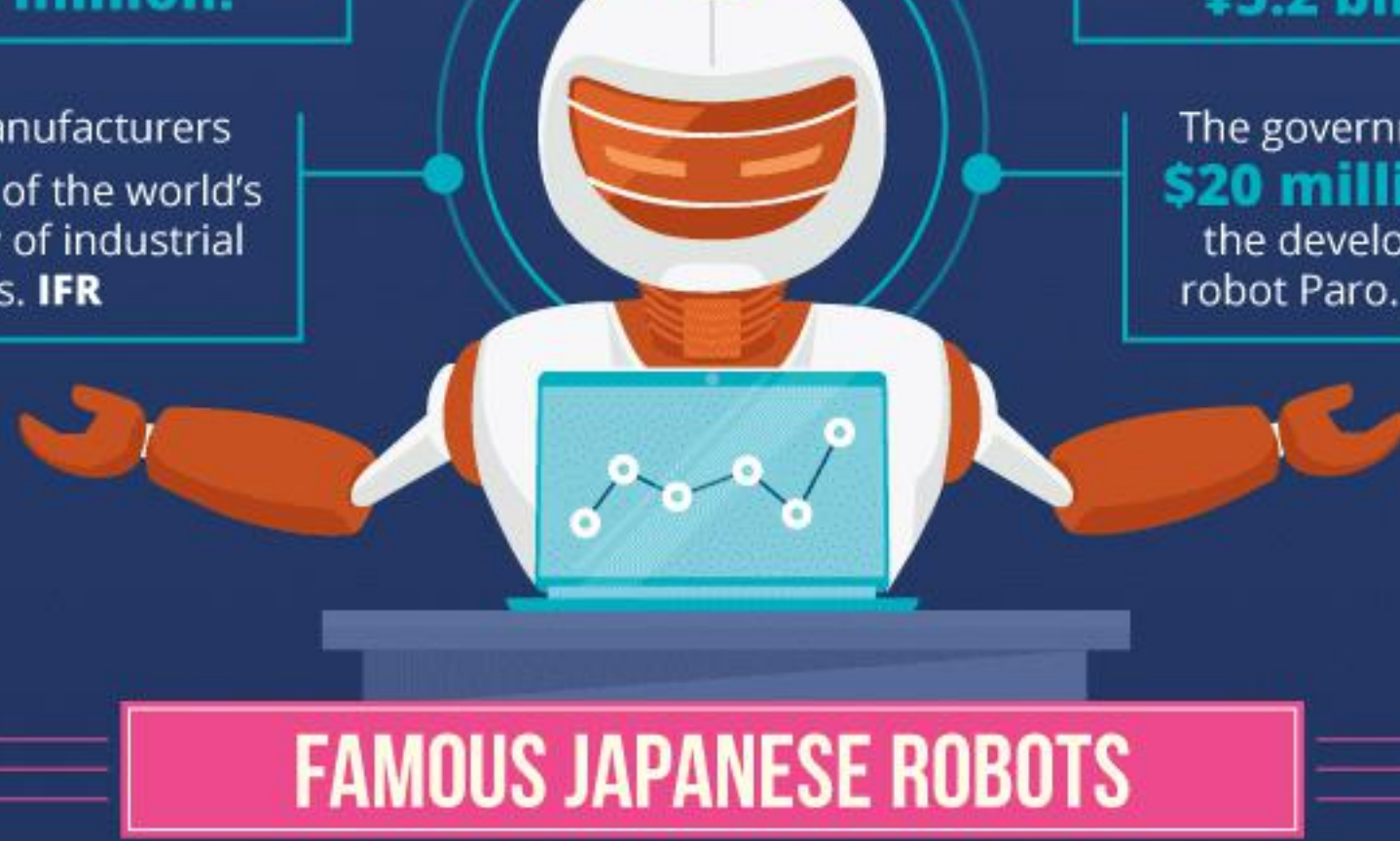
The Japanese Ministry of Economy, Trade and Industry (METI) has gotten involved, providing **¥4.7 billion** in subsidies since 2015.

The market is expected to more than triple between 2015 and 2020, to reach **\$480 million**.

The labor ministry is promoting the spread of robots into facilities, spending **¥5.2 billion**.

Japanese manufacturers deliver **52%** of the world's global supply of industrial robots. **IFR**

The government provided **\$20 million** to support the development of the robot Paro. **Japan Times**



FAMOUS JAPANESE ROBOTS



PARO
Nuzzles patients who stroke or talk to it.



AIBO
A friendly pet for the elderly.



PEPPER
Specializes in customer service but also monitors corridors at night and communicates with patients. **Economist**



CHAPIT
Capable of engaging in elementary conversations.



ROBEAR
Can transfer a person from a bed to a wheelchair.



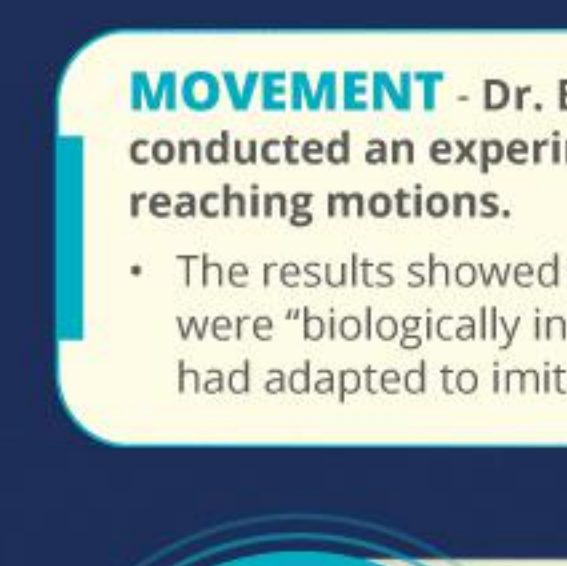
PALRO
Can lead a group of elderly people in an exercise routine **FT**

OPPORTUNITIES FOR IMPROVEMENT



COMMUNICATION - Perhaps one of the most valuable health care areas in which robots can contribute is surgery.

- A recent study showed that poor team communication during an operation is associated with worse surgical outcomes in robotic gynecologic surgery. **NCBI**
- Further research is necessary to test and refine robot behavior in high stress environments, such as operating rooms. **WeForum**



MOVEMENT - Dr. Elena De Momi and her colleagues conducted an experiment using robots to mimic human reaching motions.

- The results showed that **70%** of the time the robotic arms were "biologically inspired," meaning their neural networks had adapted to imitating human behavior. **WeForum**



HUMAN-ROBOT INTERACTION - Robots are capable of performing basic tasks that require no emotional decision-making or empathy, but to be truly useful in helping alleviate staffing shortages, robots need to be able to interact with human coworkers.

- Smooth interaction between a higher motor resonance, which is defined as "the internal activation of an observer's motor system, specifically attended to the perceived movement." **FrontiersIn FrontiersIn2**

WHAT'S NEXT?

Though robotics is becoming extremely useful in nursing, the development of new and advanced surgical systems will further improve health care, allowing health care professionals to spend more time interacting with patients.

Medrobotics — Flex Robotic System

- Enables surgeons to perform minimally invasive procedures with greater maneuverability
- Can operate through a single-access site and direct the scope to the surgical target
- Provides onboard HD visualization **Medrobotics**



Hansen Medical — Sensei X2 Robotic System

- A robotic system that holds a catheter stable, allowing the user to focus on maps, electrograms, and patient care
- Integrates information from multiple sources: 3D mapping system, ICE, fluoroscopy, and EKG recording system
- Provides two times more tip stability than a manual catheter
- Has been used in over 14,000 procedures and 26 studies that involved over 2,700 patients
- Reduces radiation time by 35 percent **Hansen Medical**



MEDTECH — ROSA Spine

- A surgical system for minimally invasive spine surgery
- The robot arm follows the patient's movements in real time
- Assisted navigation allows the user to visualize the screw placement operation in real time **Medtech**



Titan Medical — SPORT surgical system

- A single-incision advanced robotic surgical system that uses multi-articulated instruments with single-use replaceable tips
- Features 3D high-definition visualization on a flat-screen monitor, an ergonomic open workstation, and a single-arm mobile patient cart **Titan Medical**



Aethon — TUG

- An autonomous mobile delivery robot that transports racks, carts, or bins weighing up to 453 kilograms
- Can be requested using a touch-screen interface
- Used in over 140 hospitals, making over 50,000 deliveries each week **Medical Futurist 2**



Robotics is well on its way to impacting many roles and procedures in health care. As the technology becomes more advanced, nurses will need to learn how to adapt to robotic coworkers and develop skills to manage and direct them. With the help of robotics, healthcare professionals can be confident in their ability to meet the demands of a large aging population and provide quality, personalized care.



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