PSYCHOLOGY AND EDUCATION (2025) 62(04): 184-202
ISSN: 1553-6939

SOCIAL AND ETHICAL IMPACTS OF USING ROBOTS IN HEALTHCARE

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Received: 02/2025, Published: 04/2025

Abstract:

The world is currently witnessing many successive changes in various fields, particularly in technology and healthcare. This has compelled countries to develop health policies that keep pace with the requirements of the era by providing quality services and focusing on digital health transformation. Technology is rapidly evolving and influencing different domains, including healthcare, particularly in the use of robots. This aims to enhance the services provided to citizens, reduce the workload on medical staff, and ensure quality healthcare.

Keywords: Social Impacts, Ethical Impacts, Robots, Healthcare.

Introduction

Developed countries are experiencing rapid and astonishing progress, as well as intense competition in the field of robotics technology. Robots are increasingly becoming a part of nearly all aspects of daily life, including manufacturing, healthcare, defense, space exploration, service industries, and household tasks. Experts in robotics and artificial intelligence predict that robots will become an essential part of human society in the coming years. Robotics technology has now become a promising global industry, and the level of its development has become a benchmark for measuring a country's industrial strength.

The interest of developed countries in robotics is evident in their focus on robotics sciences and artificial intelligence, along with related fields such as nanotechnology and microelectronics. These countries have also established numerous advanced scientific and research centers dedicated to robotics research, with increased spending on the development of robotic technology. Additionally, we observe the growing encouragement of major global companies and factories to invest in robotics, the increasing number of international scientific conferences on robotics technology and its promising future, as well as the promotion of robotics culture through educational curricula and scientific awareness programs. Due to this significant attention, it is not surprising that most robotic inventions and developments reported in global news originate from developed countries.

The healthcare industry is one of the vital sectors experiencing significant transformation due to rapid technological advancements. These modern technologies, particularly artificial intelligence,

are fundamental in improving the quality of healthcare services and enhancing medical procedures. However, this industry faces major challenges in delivering effective and sustainable healthcare, necessitating the search for innovative solutions that meet patient needs and improve medical service performance.

Robotics is used in multiple healthcare applications, including disease diagnosis, where computers with human-like intelligence perform precise tasks in detecting life-threatening diseases. Various wearable devices and applications incorporating artificial intelligence monitor biological indicators and predict potential health crises before they occur.

Medical robots and smart devices are also among the innovations that significantly enhance healthcare through artificial intelligence. Robots assist in complex surgical procedures and provide routine care for hospital patients. Meanwhile, smart devices enable individuals to monitor their health and manage chronic diseases independently, reducing pressure on medical facilities and granting individuals greater control over their healthcare.

Based on the above, the following question arises:

- What are the social and ethical impacts of using robots in healthcare?

FIRST: ROBOTS

1. The Emergence of Robots

The Czech playwright Karel Čapek was the first to use the word "robot" to refer to an artificial human in his 1920 play **R.U.R. (Rossum's Universal Robots)**. He derived the word "robot" from the Czech term **robota**, meaning "forced labor." In the play, a brilliant engineer named Rossum creates robots to perform menial tasks that humans typically avoid. However, these robots eventually realize they are superior to humans, who engage in wars and commit atrocities against one another. Consequently, they rebel against their human masters, eradicate them entirely, and take over the world. **(Karel Čapek, 1963: 5)**

The credit for the first use of the term "robotics" goes to the Russian-American science fiction writer Isaac Asimov, who was a professor of biochemistry at Boston University. He introduced the term in his 1941 short story **Liar!**, published in the May issue of **Astounding Science Fiction**. Asimov is also credited with formulating the "Three Laws of Robotics," which still largely govern the field of robotics today. These laws were first introduced in his 1942 short story **Runaround**,

which appeared in the March issue of **Astounding Science Fiction**. Both stories were later included in his famous 1950 science fiction collection **I, Robot**, which was adapted into a movie of the same name in 2004. **(Isaac Asimov, 1956)**

THE THREE LAWS OF ROBOTICS

1. A robot may not harm a human being or, through inaction, allow a human being to come to harm.
2. A robot must obey the orders given to it by human beings, except where such orders would conflict with the First Law.
3. A robot must protect its own existence as long as such protection does not conflict with the First or Second Law.

2. DEFINITION OF A ROBOT

There are two definitions of a robot:

The first definition was established by the American Institute of Robotics, stating that:
"A robot is a manually operated manipulator that is reprogrammable, multifunctional, and designed to move materials, parts, tools, or specialized devices through various programmed motions to perform different tasks." (Tom Logsdon, 1984:19)

The second definition was provided by the Japanese Industrial Robot Association, which states that:
"A robot is a general-purpose machine equipped with limbs and a memory device to perform a predetermined sequence of movements. It can rotate and replace human labor by automatically executing motions." (Frederik Schodt, 1988:37)

Both definitions agree that a robot is a machine or a manually operated manipulator; that it is designed to perform multiple functions; and that it operates through automatic (self-directed) movements. However, the Japanese definition differs from the American one in that it does not require reprogrammability. This allows for the inclusion of manually operated manipulators controlled by human workers, as well as devices that function based on fixed memory sequences rather than programming.

The American science fiction writer Isaac Asimov provides a simplified definition of a robot as:
"An industrial machine that mimics humans and is equipped with a computer."

He summarizes this definition in the following equation:

Robot = Machine + Computer (Isaac Asimov, 1956:2)

Some scholars define a robot as:

"A programmable, multifunctional machine capable of controlling the movement of objects and tools. It has parts or limbs that can be moved and used to interact with objects based on a set of diverse programmed variables designed for specific tasks. In other words, it is a machine capable of performing pre-programmed tasks under human control or through computer programs." (Raouf Wasfi, undated: 17)

Others describe robots as:

"A self-operating and autonomous machine that imitates artificial intelligence to perform precise tasks in medicine, management, internal auditing in institutions, and other fields."

The 2005 United Nations report defines a robot as:

"A reprogrammable device that operates semi-autonomously or fully autonomously to carry out manufacturing processes or provide useful services for human well-being." (Ugo Pagallo, 2)

Another perspective considers a robot as:

"An electronically programmed machine, equipped with artificial intelligence technology, capable of making appropriate decisions based on surrounding conditions and the environment." (Saleh Ahmed & Abdullah Said, 2020:12)

Thus, robotics is considered one of the branches of artificial intelligence, which consists of electrical engineering, mechanical engineering, and computer science, to design a humanoid robot or robot that, through artificial intelligence, can perform all the actions carried out by humans, even surpassing them in terms of speed and accuracy in completing assigned tasks.

Accordingly, a robot can be defined as a self-programmed machine designed to perform specific tasks, and robotics is the science of using artificial intelligence, computer science, and mechanical engineering to design machines that can be programmed to perform specific tasks.

3. BASIC COMPONENTS OF ROBOTS

Despite the great diversity in the forms of robots, their basic components can be identified as follows: **(Daniel Hunt, 1985:6-15)**

3.1 The Trunk:

It is the robot's main structure, to which its limbs are attached via motion axes. The main control units, transition mechanisms, and power supply systems are usually mounted on it.

3.2 The Limbs:

These function similarly to human arms but have multiple joints depending on the required range of motion. The robot's work range depends on the arm length, the type of joints, and their number.

3.3 The Grippers:

Equivalent to human hands, they are used to grasp the tools that the robot utilizes to accomplish its assigned tasks.

3.4 Sensors:

These serve as the robot's senses, represented by smart devices that allow it to recognize its surroundings. Through sensors, the robot can detect obstacles that impede its movement, identify the boundaries of objects it interacts with, sense temperature and humidity, receive voice commands, engage in dialogue, and interact with users.

3.5 The Robotic Brain or Computer:

This component stores data and operating programs, processes input signals from sensors and external commands received through peripheral control units, and subsequently issues commands to the control unit.

3.6 The Peripheral Operating Unit:

This unit transfers commands and programs from the robot operator to the robotic brain or computer. It may be entirely separate from the robot and communicate with it remotely.

3.7 The Control Unit:

Functioning like the human nervous system, it receives signals from the robotic brain and sends them to the drive units to operate the robot's limbs and grippers.

3.8 The Drive Units:

These consist of various types of motors that drive the robot's joint movements and are operated by electrical signals from the control unit.

4. TYPES OF ROBOTS

In recent years, many types of robots have become increasingly widespread, including household robots, industrial robots, educational robots for children, and chess-playing robots. Robots vary in design, function, shape, and size. Some of the main types include:

4.1 Industrial Robots:

These are the most well-known type of robots and are used in the industrial sector. They are primarily employed for highly demanding tasks that require significant physical effort. Industrial robots operate in manufacturing environments, such as factories, and are often designed in the form of articulated arms and linkages to perform tasks such as welding, material handling, assembly, and painting.

4.2 Household Robots:

These robots are designed to assist individuals with household tasks and interact with users in an easy and engaging manner. Household robots can perform various tasks, including cleaning, delivering food, moving around the house, and providing assistance to individuals.

4.3 Medical Robots:

These are a rapidly expanding category of robots, often equipped with mechanical arms connected to a computer system capable of performing surgical procedures.

4.4 Sports Robots:

A new type of robot introduced in the world of tennis is called "Drone-vic," named after Serbian tennis star Novak Djokovic. This robot is designed to launch tennis balls at players during practice, directing them at specific angles and speeds to help athletes improve their shot power and accuracy. It is an effective tool for enhancing players' skills in returning balls.

4.5 MILITARY ROBOTS:

These are primarily used for surveillance at sea and in the air. They can take the form of drones or submarines.

4.6 EXPLORATORY ROBOTS:

This type is often used in exploration missions in environments that are difficult for humans to access, such as the probe sent to explore Mars in 1976.

4.7 EDUCATIONAL ROBOTS:

Educational robots serve as an excellent learning tool, encouraging students to learn programming and robot control. These smart robots can also help inspire students to innovate and be creative. **(Arab4Apps.com)**

5. THE IMPORTANCE OF ROBOTICS DEVELOPMENT

Robots play a significant role in shaping the future of humanity, as they are becoming increasingly integrated into all aspects of life and human activities.

To begin with, automated systems are already present in various fields, such as factories, water management, drones, and missile launches. Robots have been an integral part of the automobile industry for several decades. However, new fields of application are expected to expand significantly in the near future.

One of these emerging applications is in healthcare and rehabilitation. Robotic exoskeletons will assist disabled individuals in moving independently, reducing their reliance on others. Additionally, robots will be integrated into the human body, such as implanting smart computer chips in the brain to enhance cognitive abilities or deploying microscopic robots into the bloodstream to clean arteries.

Another major role for robots will be in security, surveillance, and defense. Antonio López Peláez, a sociology professor at the Spanish National University of Distance Education, predicts that by 2020, 40% of military forces will be automated, operated by robotic soldiers—similar to the widespread use of robots in car manufacturing today. This automation is expected to reduce human casualties in violent conflicts.

Furthermore, robots are becoming more intelligent and will be incorporated into both household and industrial settings. They will assist in cleaning homes, milking cows on farms, and working continuously in factories 24 hours a day without rest.

Apart from these advantages, replacing human workers with robots will protect employees from hazardous, difficult, and unhealthy work environments, thereby reducing job-related risks.

ROBOTICS AND ECONOMIC TRANSFORMATION

A 2013 report titled **The U.S. Robotics Roadmap: From Internet to Robotics** examined the contribution of robots to the American economy across various sectors. It highlighted that in 2011, the sale of robots in manufacturing saw significant growth. Companies such as **Apple, Lenovo, Samsung,** and **Foxconn** utilized robots to streamline and simplify production processes. The adoption of robotics also led to significant transformations in major corporations such as **General Motors**.

In recent years, robots have increasingly been used in space exploration, handling repetitive and long-duration tasks with high precision. For example, NASA collaborated with **General Motors** to design robotic systems deployed at the International Space Station. They also worked together to accelerate the development of next-generation robotics for the aerospace and automotive industries.

ROBOTS IN DEFENSE AND NATIONAL SECURITY

During peak military intervention in Iraq and Afghanistan, more than 25,000 robotic air and ground systems were deployed. Unmanned aerial systems have expanded mission capabilities while eliminating risks faced by human pilots. Today, more than 50% of U.S. Air Force pilots are trained to operate remotely piloted aircraft systems.

GLOBAL INVESTMENT IN ROBOTICS

Recognizing the growing importance of robotics in the present and future, numerous large-scale international robotics initiatives are receiving significant funding. For instance, in October 2013, the **U.S. National Science Foundation (NSF)**, through its **National Robotics Initiative** launched in 2011 in partnership with the **National Institutes of Health (NIH), the U.S. Department of Agriculture (USDA),** and **NASA,** announced grants worth approximately $38 million over three years.

The goal of these projects is to develop collaborative robots that work alongside humans to enhance individual capabilities, improve performance and safety, and contribute to fields such as **advanced industries, civil and environmental infrastructure, healthcare and rehabilitation, military and national security, space and underwater exploration, food production and distribution, personal independence, quality of life,** and **driver safety.**

These projects also aim to enhance 3D printing technology, improve robot training, develop surgical robot capabilities, and provide assistive robots for people with disabilities. Additionally, these projects will improve robots' ability to work closely with humans—whether on emotional, physical, or functional levels—such as lifting and transporting heavy objects or performing extremely dangerous and complex tasks that are difficult for humans, including search and rescue operations during disaster response.

For example, seven of these projects from Carnegie Mellon University in the United States received seven million dollars in funding. One of these projects involves equipping drones to monitor signs of deterioration in bridges, dams, and other infrastructure. This project will use small, unmanned aerial robots flying at low altitudes, equipped with 3D imaging technology and advanced capabilities in analysis, modeling, and planning, to provide a safe, efficient, and highly accurate assessment of critical infrastructure.

Among the other projects funded within the U.S. National Robotics Initiative is a cloud-based service platform that will allow anyone to teach household tasks to robots online. Other projects include an assistive robot capable of sensing individuals with Parkinson’s disease, a prosthetic hand controllable via brain waves, bipedal robots designed to walk more effectively on rough terrain, and robots for harvesting and detecting diseases in fruits and vegetables.

The global robotics market is expected to experience significant expansion and widespread adoption, with increasing global demand due to urban and industrial growth. This is particularly true given rising costs and the push toward automation and smart manufacturing systems, which are characterized by high efficiency, superior quality, and enhanced safety levels. **(Maryam Ahmed, 2018: 10-12).**

SECOND: HEALTHCARE

1. Definition of Healthcare:

Healthcare is an essential necessity and an urgent demand, serving as an indispensable element for survival, development, growth, productivity, and quality of life. In modern times, healthcare is regarded as a fundamental human right, drawing legitimacy from the fact that it fulfills a basic human need.

The concept of primary healthcare has changed significantly over the past thirty years. Healthcare is no longer solely focused on treating patients; it is not merely curative care that includes some

immunizations against diseases and basic health knowledge for the public. Instead, primary healthcare now emphasizes community participation—not only in implementing healthcare projects but also in their planning and preparation. **(Furt Abad & Rodmari McMahon, 1989: 11).**

It comprises a set of preventive measures provided by primary healthcare directorates and affiliated institutions to improve the overall health level of society. **(Qasir, 2016: 10).**

Definition of Al-Maktha:

It refers to a set of guiding values for health development, along with the necessary principles for organizing healthcare services and the approaches required to meet health needs and address the fundamental determinants of health. **(Nasibi, 2021: 12).**

2. The Importance of Healthcare:

Despite significant improvements in global health conditions, several critical gaps remain in achieving the highest possible health standards. A large portion of the world's population lacks the necessary resources to access essential social and healthcare services, creating a substantial impact across nations.

Healthcare holds a prominent position in the **2030 Sustainable Development Agenda**, as it is linked to multiple objectives, including ensuring healthy lifestyles and well-being for all age groups. Achieving universal health coverage requires a commitment to equity, ensuring that all individuals and communities receive the healthcare services they need—including health promotion, disease prevention, curative, and rehabilitative services—of sufficient quality without financial hardship.

The relationship between primary healthcare and improvements in health outcomes, equity, health security, and efficiency makes it the foundation for strengthening healthcare systems and ensuring universal health coverage.

Healthcare-oriented systems are crucial for positively addressing health priorities, including the **Thirteenth WHO Programme (2019-2023)**, which focuses on health development and global preservation. Additionally, healthcare consists of a range of services and preventive measures provided by health directorates and affiliated institutions to improve public health and prevent the spread of dangerous and rapidly transmissible diseases (such as infectious diseases) by ensuring environmental cleanliness, water safety, and food security.

Healthcare can also be enhanced by providing necessary vaccines and immunizations against severe illnesses, maternal and child health services, and early disease detection to ensure timely treatment and prevent complications.

These services are difficult to perform by an individual alone, regardless of their skills, expertise, and competencies. Instead, an integrated **medical team** must work in coordination and collaboration to maintain the health of individuals and society, enabling them to enjoy physical, mental, and social well-being. This team includes **general and specialist physicians, dentists, midwives, registered nurses, nursing assistants, health monitors, social workers, nutritionists, and others.**

The role of this team extends from treating minor health issues to referring severe cases to specialized medical institutions. **(Nasibi et al., 2021: 44-45).**

3. Foundations and Methods of Healthcare

To achieve its objectives, healthcare employs various methods and distributes its efforts across multiple social aspects of life:

- These methods help identify diseases and their symptoms, particularly treatment approaches, as well as familiarize individuals with hospitals and clinics that offer assistance and health education.
- The means employed by healthcare officials include:
    - Various forms of **public awareness campaigns**, including pamphlets and lectures conducted by social health and health education departments.
    - **Providing adequate medical institutions** and ensuring a sufficient number of healthcare personnel while also focusing on staff training and improving nursing professions.
    - **Strengthening good healthcare systems**, such as mandatory **pre-marital health screenings**, care facilities for individuals with special needs, and **health visitation programs**.
    - **Addressing psychological needs** and motivations by integrating healthcare programs into social development efforts.
    - **Linking healthcare with religious teachings**, as religious motivations strongly influence people's behavior. Many individuals are more receptive to health programs

when they include references to **Prophetic traditions and Quranic verses** encouraging good health practices. **(Qasir, 2016: 41).**

Every citizen has the **right to full and adequate healthcare provided by the state.** This does not merely mean offering healthcare services in an unstructured or advanced manner but rather ensuring these services are **sufficient and of a high standard**, covering both **quantitative and qualitative adequacy**.

Quantitative Adequacy:

This refers to the availability of healthcare services in proportion to the population size, including:

- **An adequate number of medical personnel** (doctors, nurses, and lab technicians) since a doctor alone cannot perform all medical and administrative tasks.
- **A sufficient number of doctors, healthcare centers, and institutions**, such as health units, hospitals, and pharmacies, ensuring **equitable distribution** across all regions. No area should be prioritized over another at the expense of healthcare access.
- **Round-the-clock healthcare availability** since illnesses are not time-bound.
- **Health education and awareness programs** to inform the public about available healthcare services and their importance, encouraging early medical consultation instead of waiting until conditions become severe.
- **Adequate financial and administrative policies** to ensure individuals can access healthcare services.

Qualitative Efficiency:

Providing healthcare is not just about increasing the number of medical teams, health units, and hospitals; it also requires **ensuring favorable working conditions** for medical practice, which includes:

- Establishing **standards and criteria** that define the required quality level for medical teams, equipment, diagnostic tools, and treatment facilities.
- Creating **expert committees** specialized in different healthcare fields to enforce these standards.
- **Regulating medical practice**, ensuring that no doctor, nurse, or medical institution can operate without meeting the established healthcare standards.

ENHANCING HEALTHCARE EFFICIENCY AND TRAINING

Improving the efficiency and training of medical teams—whether general practitioners, specialists, or nurses—is essential. To enhance their scientific expertise, structured **educational programs, exposure to the latest medical discoveries and treatments, and regular training workshops** should be implemented. These programs must be **mandatory** and directly linked to the continuation of professional practice. **(Shoushan et al., 2020: 212-213).**

4. KEY ELEMENTS OF HEALTHCARE DELIVERY

First Element: Specialized Human Resources

Healthcare requires professionals across various medical fields, including:

- **General practitioners, specialists, and medical investors** in fields such as **surgery, ophthalmology, obstetrics,** and more.
- **Pharmacists, laboratory technicians, radiologists, anesthetists, and health inspectors.**

Second Element: Patients and the Public

This category includes those who seek medical services, influenced by demographic factors such as:

- **Gender, age, social status, education level, cultural background, family size, nutrition, and housing conditions.**

Third Element: Medical Facilities and Infrastructure

This includes:

- **Hospitals, clinics, medical centers, pharmacies, and laboratories.**
- **Essential hospital spaces** such as **patient rooms, bathrooms, corridors, nursing stations,** and **sanitary and well-ventilated environments** equipped with proper **lighting, heating, and hygiene standards.**

Fourth Element: Medical Equipment and Technology

Medical technology plays a crucial role in:

- **Diagnosing and treating diseases.**
- **Improving the quality of healthcare services.**
- **Enhancing hospitals' competitiveness** by incorporating **state-of-the-art technology** to provide high-quality medical services.

Fifth Element: Information and Organization

Accurate and up-to-date **health information systems** improve:

- **The efficiency of healthcare institutions.**
- **The ability to provide timely and appropriate medical treatment.**
- **Patient involvement in decision-making, aligning with real-time demand for services. (Kenoui, 2021: 28-29).**

5. HEALTHCARE AND ROBOTICS: INTERNATIONAL MODELS

The integration of **robots in healthcare** is revolutionizing medical services through **artificial intelligence (AI) and automation.** The rising **global population, increasing life expectancy, infectious disease outbreaks, and high healthcare costs** have driven the adoption of robotics in medicine.

Robots can assist **healthcare providers by improving efficiency, reducing errors, and handling repetitive tasks,** such as:

- **Surgical procedures.**
- **Disinfection and sanitation.**
- **Medication and meal delivery to patients.**
- **Vital sign monitoring.**
- **Equipment arrangement and hospital maintenance.**

China: A Leading Example

China has rapidly expanded **robot-assisted medical services,** particularly after **technological advancements** in the field. Improvements in **3D vision systems and flexible electronic sutures** have made robotic surgeries more precise.

- The **Beijing Advanced Medical Institute** reported that **75 robots** were introduced in hospitals within **two months**, conducting approximately **30,000 surgeries.**
- Chinese medical robots can now perform **high-precision procedures** such as **tumor removal and internal organ surgeries,** with ongoing developments for **open-heart surgery.**

- The **China Robotics Industry Federation** estimated the **robotics sector's revenue at $7 billion. (Ali Abu Mreihil, Al Jazeera).**

Additionally, a **China-made laparoscopic surgery robot** is undergoing hospital trials, particularly in **gynecological procedures.** Developed by **Edge Medical Robotics Ltd., Shenzhen,** the system allows **greater precision and control** than traditional surgery, reducing **surgical trauma** and accelerating **patient recovery.**

China continues to lead in medical robotics, with ongoing trials at:

- **The General Hospital of the People's Liberation Army in Beijing.**
- **The First Hospital of Zhengzhou University in Henan Province.**

Locally developed **surgical robots** are more **cost-effective** than foreign alternatives and have **great potential for nationwide adoption** in medical institutions. **(Xinhua, 2021).**

Robots in the COVID-19 Response

During the pandemic, researchers at one of China's top universities developed a **robot** designed to assist frontline healthcare workers.

- This robot features a **mechanical arm on wheels** that can perform:
  - **Ultrasound scans.**
  - **Oral swabs.**
  - **Listening to internal organ sounds** (traditionally done using a stethoscope).
- Equipped with **cameras**, the robot allows doctors to **examine patients remotely**, even from another city.
- The lead designer, a **professor at Tsinghua University**, stated that robots can handle **high-risk medical tasks** while **self-sanitizing** after direct contact with patients. **(Al Mayadeen Network).**

JAPAN'S USE OF ROBOTICS IN HEALTHCARE

Japan has witnessed significant growth in **healthcare technology**, driven by:

- **An aging population.**
- **A declining number of doctors and caregivers.**
- **The need for cost-effective and adaptable robotic solutions.**

Market Growth

Japan's healthcare robotics market was valued at **$1.77 billion in 2018** and is expected to grow at a **CAGR of 8.1%** from **2019 to 2025. (Al Arabia).**

Types of Medical Robots in Japan

1. **Surgeon-Guided Robots** – Controlled by human surgeons.
2. **Autonomous Surgical Robots** – Perform tasks like **suturing soft tissues** without direct human intervention.

Public Perception

- A **survey in Tokyo** found that **80% of respondents supported medical robots**.
- **13.1%** were particularly enthusiastic, stating they would prefer **robotic nursing care**.

Robotics for Elderly Care

Japan addressed its elderly care crisis with **assistive robots**, due to a lack of human caregivers and **insufficient wages** in the sector.

- **Medical robot technology** has gained increasing attention from **developers and investors**.
- **Medtech Expo**, Asia's largest medical technology exhibition, **shifted focus** from humanoid robots to **AI-driven healthcare solutions. (Al-Ayyam).**

Examples of Healthcare Robotics in Japan

- **Wearable robotic devices** reduce strain on caregivers when lifting patients. **(Minami Tsukuba Care Home).**
- **Panasonic** developed a **robotic bed that transforms into a wheelchair** for elderly and disabled patients.

Japan's success in integrating robotics into **elderly care and medical treatment** stems from its **demographic challenges**, positioning it as a global leader in **healthcare automation. (Middle East Online).**

BRITAIN

Hospitals are soon expected to be filled with **robot doctors** that provide patient care, respond to inquiries, and deliver necessary treatments—especially as the global crisis of **doctor and medical staff shortages** intensifies.

According to **Daily Mail UK**, a successful **robotic trial** in Britain demonstrated **remarkable efficiency** in interacting with patients and answering their questions. This advancement could **significantly alleviate** the workload of doctors and nurses in hospitals. The newspaper reported:

"Artificial intelligence robots can ease the burden on exhausted nurses by handling patient inquiries and performing simple tasks."

A recent **successful hospital trial** revealed that robots could smoothly respond to **questions about wait times** before seeing a doctor.

Britain's National Robotarium Initiative

The **National Robotarium**, based at **Heriot-Watt University in Edinburgh**, played a **pivotal role** in the EU-funded project **"Socially Assistive Robots in Healthcare for Aging"**, which received **£7 million** in funding.

A **pilot study** conducted on elderly patients aimed to test whether **robots could reduce patient anxiety and relieve pressure on nursing staff**. Scientists concluded that these robots:

- **Enhance productivity** by handling simple hospital duties.
- **Reduce infection risks** by minimizing **physical contact** between doctors and patients.
- Are being **increasingly deployed** in **public spaces** using the same technology as **chatbots**.

According to **Professor Oliver Lemon**, an AI specialist and **co-leader of the National Robotarium program**:

"These results mark a significant milestone in bringing social robots into hospitals."

Initial trials showed **promising results**, as the robots **effectively communicated with patients and their caregivers** while seamlessly **collaborating with hospital staff**—bringing **AI-assisted patient care closer to reality**. **(Al Arabiya Net, 2024).**

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