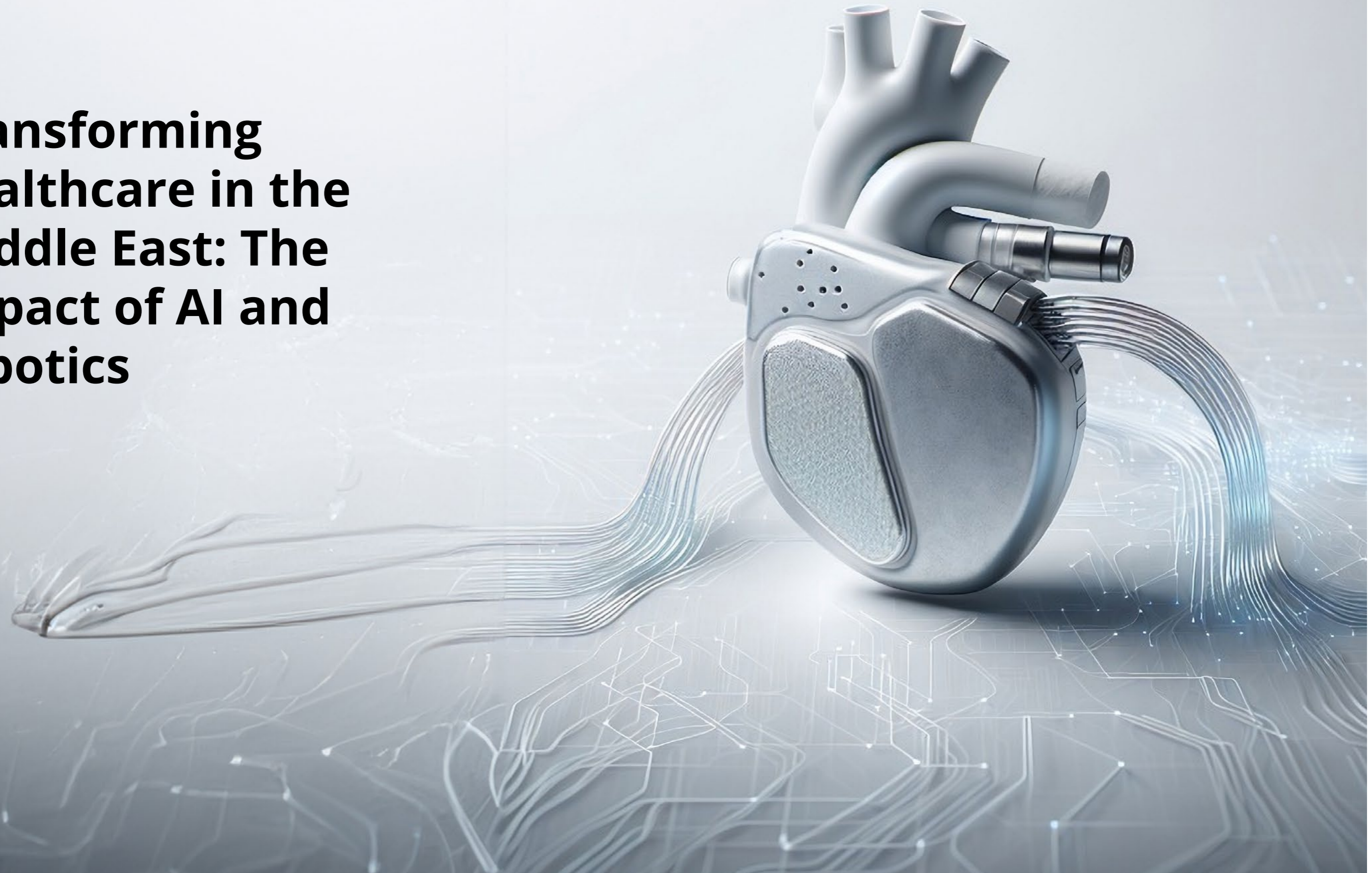# Transforming healthcare in the Middle East: The impact of AI and robotics

We are witnessing a paradigm shift in the healthcare sector within Middle East due to the emergence of digital innovations through advanced technologies like artificial intelligence (AI) and robotics, which are delivering greater efficiencies and enhancing patient care. Governments and healthcare institutions in the region are heavily investing in cutting-edge innovations and a range of initiatives, including digital health services, to improve efficiency, accessibility, and transparency in healthcare. Known for its rapid economic development and technological adoption, the Middle East is now poised to become a global leader in AI-driven healthcare solutions.

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The role of AI in healthcare: An overview

Artificial intelligence (AI) is rapidly transforming healthcare and medicine. This emerging technology has the potential to revolutionize the field by redefining the doctor-patient relationship and improving the efficiency of the healthcare industry through its ability to process and analyze vast amounts of medical data far beyond human capacity. This capability is instrumental in diagnosing diseases, predicting outcomes, and recommending treatments. AI's role in healthcare can be broadly categorized into the following areas:

Diagnostics

AI tools help reduce costs, improve accuracy, and save time compared to traditional diagnostic methods. They support medical decisions by providing clinicians with real-time assistance and insights, including the analysis of medical images, X-rays, CT scans, and MRIs with remarkable accuracy. AI also helps in identifying abnormalities, detecting fractures, tumors, and other conditions, while providing quantitative measurements for faster and more accurate diagnoses.

Drug information

AI enables quick and comprehensive retrieval of drug-related information by analyzing current medical literature, drug databases, and clinical guidelines. This enables healthcare providers to make accurate, evidence-based decisions.

Predictive analytics

Machine learning algorithms and other technologies are used to analyze data and develop predictive models to identify patients at risk of developing chronic diseases, such as endocrine or cardiac diseases. By analyzing data such as medical history, demographics, and lifestyle factors, predictive models can identify patients at higher risk, allowing for targeted interventions to prevent or treat these diseases.

Genomic medicine

The fusion of AI and genotype analysis has become a game-changer in disease surveillance, prediction, and personalized medicine. The advent of high-throughput genomic (HTG) sequencing technologies, combined with advancements in AI and machine learning (ML), has laid a strong foundation for accelerating personalized medicine and drug discovery.

The rise of robotics

The Middle East has been quick to adopt the below mentioned robotic technologies in healthcare, leveraging them to address both operational inefficiencies and clinical challenges.
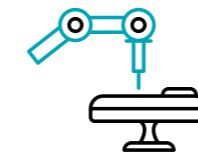
Surgical robots

Robotic-assisted surgery is a method that helps surgeons to perform complex surgical procedures with greater precision, flexibility, and command than traditional techniques. This approach enhances care and treatment of life-threatening medical conditions by improving the accuracy of operations and reducing patients' recovery times.

Robotics in rehabilitation

Exoskeletons have emerged as advantageous rehabilitation tools, revolutionizing rehabilitation for disabled individuals. These wearable devices assist patients in relearning how to walk by providing support and feedback during rehabilitation exercises.

Robotic pharmacy and medication management

Robotic systems are being used in pharmacies to automate the dispensing of medications, reducing human error and improving efficiency. These systems also facilitate the proper movement of supplies, maintain inventory of medicines and tools, and ensure timely placement of orders.

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AI and robotics adoption in the Middle East

AI for societal betterment is being integrated into the healthcare sector along with robotics. The market has grown from US$78 billion in 2021 to an expected US$320 billion by 2030. In the Middle East and UAE, the annual contribution of AI is expected to grow by 34%. The use of robots in the healthcare or medical field is helping to promote digital healthcare, with the sector anticipated to generate US$626.10 million in 2024, reaching US$811.30 million by 2028. The compound annual growth rate (CAGR) for this period is estimated at 6.69%.

United Arab Emirates (UAE): The UAE is one of the most economically advanced and diversified markets in the GCC. Launched in 2017, the UAE's Centennial 2071 Plan prioritizes healthcare, aiming to develop infrastructure, expertise, and services that match international standards, with a focus on lifestyle-related diseases. This has gained momentum in the last few years as they plan to enhance access to healthcare through digitization and position the UAE as a top destination for medical tourism. Further, the UAE launched the Artificial Intelligence Strategy 2031, aiming to make the nation a global leader in AI. For instance, Cleveland Clinic Abu Dhabi has invested in robotic-assisted surgery, particularly in the fields of urology and cardiology. Furthermore, the UAE, which was the first country in the world to appoint an AI minister, signed an agreement with the US software company Care AI in 2023 to advance its healthcare initiatives.

Saudi Arabia: Under its Vision 2030 plan, Saudi Arabia is focused on transforming its healthcare sector through technology. Launched in 2021, the newly established Health Sector Transformation Program aims to provide inclusive health services to 88% of the Kingdom's population and implement a unified digital medical records system for 100% of the population by 2025. The Saudi Arabian Ministry of Health has further partnered with several tech companies to introduce AI-based solutions in medical imaging and predictive analytics. King Faisal Specialist Hospital in Riyadh, for example, uses AI for cancer diagnosis and treatment planning. Additionally, the use of robotic systems in surgery is becoming increasingly common across the country. Artificial intelligence (AI) is already playing a growing role in healthcare in the Middle East. Saudi Arabia's National AI Strategy 2031 is bringing AI tools and technology to various sectors, including healthcare, benefiting local providers. Altib, the Middle East's largest AI-based digital health platform, raised US$44 million in 2022 to develop fully integrated primary care, supporting the goals of Saudi Vision 2030 (as per the World Economic Forum).

Qatar, Kuwait, Oman, and Bahrain: The governments of the GCC continue to upgrade the quality of healthcare through AI and robotics initiatives. In Kuwait's Jaber Hospital, AI is being utilized in surgeries, endoscopic procedures, cardiac monitoring tools, and to enhance robotics. In 2023, surgeons in the country began deploying 3D devices to create sophisticated visualizations of patients' internal organs for use during procedures. In Bahrain, the nation's commitment to healthcare innovation has been highlighted by the newly-opened King Hamad American Mission Hospital, which focuses on cutting-edge technologies in digital medicine and AI. This reflects the country's broader digital advancements across other sectors, including sports and technology (as per the World Economic Forum).

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Challenges to AI and robotics implementation in healthcare

While the adoption of AI and robotics in healthcare has been swift, there are several challenges that the Middle East must address to fully realize the potential of these technologies.

Regulatory frameworks: There is a lack of clear regulatory frameworks for AI and robotics in healthcare. Many countries in the Middle East are still developing policies to govern the use of these technologies, particularly in areas such as patient data privacy and the ethical use of AI in decision-making.

Data infrastructure: AI relies heavily on data, and the Middle East must continue to invest in robust data infrastructure to support its healthcare systems. Ensuring that healthcare providers have access to accurate, high-quality data is crucial for the success of AI initiatives.

Cost and accessibility: While larger, wealthier nations in the region have made significant investments in AI and robotics, smaller countries may face financial constraints. Making these technologies accessible to all populations, regardless of income level, is a challenge that will need to be addressed.

Skill shortages: The Middle East still faces a shortage of professionals trained in AI, robotics, and data science. While governments and educational institutions are working to close this skills gap, additional investment in training and education is needed to meet the growing demand for healthcare technology specialists.

Healthcare organizations, both globally and regionally, are adopting AI and robotic technologies to manage operations in a variety of fields, including surgery, pharmacy, rehabilitation, telemedicine, and others. As technology advances rapidly and costs continue to decline, more healthcare institutions are embracing these innovations in proven areas. Technology has the potential to automate repetitive tasks, improve accuracy and speed, reduce workloads, provide services remotely, and reduce costs.

It is worthwhile for healthcare leaders to recognize the immense potential and long-term benefits of leveraging innovative, yet maturing, AI and robotic technologies. Investing in these advancements can help manage their organizations more effectively. As Gijs van Wulfen, a keynote speaker and authority on innovation and design thinking, once said, "Operational excellence generates your profits today. Innovation excellence will generate your profits tomorrow."

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Endnotes
1. https://www.weforum.org/stories/2024/10/digital-innovation-reshaping-healthcare-middle-east/.
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3. https://duphat.ae/robotic-surgery-landscape-in-the-uae/.
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