



## The feminine touch

Women are reshaping healthcare

### Antibiotic breakthrough

New SynthMol AI generates 6 completely new antibiotics that kill *A. baumannii*

### Dead on your feet

Wearable tech used to assess surgeons' posture during surgery

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- Mubadala acquires KELIX bio, expands UAE's footprint in pharmaceutical sector
- WHO launches first ever Patient Safety Rights Charter
- Experts call for paradigm shift in healthcare to combat climate change
- Gene therapy for sickle cell disease trial shows remarkable results

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# Prognosis

## The rising influence of women in healthcare

One of our focuses in this issue is on women's health and how women are reshaping healthcare. Around the world, women are increasingly taking on influential roles in healthcare, marking a shift that is reshaping how medical care is delivered and advanced. Historically relegated to certain caring roles like nursing, women are now making up a growing portion of almost every healthcare profession.

In many developed nations, women account for around half or more of all medical school graduates. Countries like Estonia, Georgia, Croatia and Latvia have even reached gender parity among practicing physicians. Emerging economies like Brazil, Mexico and Thailand also have high percentages of female doctors entering the workforce.

This greater representation of women is extending up to leadership levels as well. More women are becoming hospital chief executives, health ministers, heads of global health organizations, and leaders of major pharmaceutical and biotech companies driving innovation.

The impacts have been significant. Numerous studies link the rise of female healthcare providers to improved patient outcomes and experiences, particularly when it comes to treating other women. Research indicates female doctors tend to have better communication styles, show more empathy, emphasize preventative care, and prioritize emotional and social factors impacting health.

Women are also making pioneering research contributions across many areas of medicine. Their perspectives and leadership have led to important medical device innovations, treatment breakthroughs, greater emphasis on women's health issues, and landmark drug developments such as the mRNA Covid-19 vaccine.

In many developing countries, increasing the number of female healthcare workers has been key to achieving public health goals. Women providers tend to have higher acceptance in rural, underserved areas and can help overcome cultural barriers inhibiting care for women. Several global public health initiatives now actively promote training more women as health workers.

While gender parity in healthcare is still a long way off globally, the influence of women in the field is becoming more widespread and profound. As their representation grows, women seem poised to fundamentally transform and elevate medical practice and innovation through their skills, perspectives and leadership in the years ahead.

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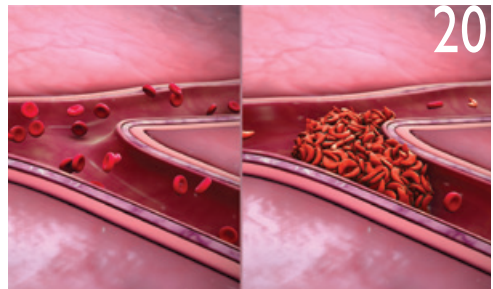
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# middle east monitor

Update from around the region



The state-of-the-art diabetes facility in Al Dhafra, set to open later this year.

## Imperial College London Diabetes Centre to open one-stop tech-enabled diabetes facility in Al Dhafra

In a regional first, the Imperial College London Diabetes Centre (ICLDC), part of the M42 group, will open a dedicated one-stop facility in Madinat Zayed to provide comprehensive care for diabetes and endocrine patients. With a proven track-record of nearly two decades, ICLDC's model for diabetes prevention and management has significantly reduced HbA1c values in patients across the UAE. The new tech-enabled, world-class centre in Al Dhafra will serve a critical part of Abu Dhabi's population, providing targeted prevention and intervention for more than 6,000 people with diabetes in the region.

Set to open in the second half of this year, the state-of-the-art facility will bring comprehensive care closer to those in need. Currently, the flagship ICLDC in Abu Dhabi city serves around 9% of the Al Dhafra population of diabetes patients. The new facility in Madinat Zayed will provide greater access to people with diabetes across the Al Dhafra region including residents in Liwa, Mirfa, Gayathi, Ruwais, and Tarif.

The new Al Dhafrah ICLDC centre will be equipped with the latest diagnostic and management facilities supported by a world-class multi-specialty team. The centre will operate state-of-the-art outpatient services, providing specialised care for diabetes and endocrine related complications.


In addition to providing clinical care, ICLDC will continue to promote preventive solutions for Type 2 diabetes, with an extensive community outreach programme including workshops, health screenings, and educational programmes for schools and organisations, as well as promoting an active lifestyle and healthy eating.

Hasan Jasem Al Nowais, Managing Director, and Group Chief Executive Officer, M42, said: "As a leader in diabetes and endocrine management and prevention, the Imperial College London Diabetes Centre is positively impacting lives across the UAE. Expanding our one-stop services to Al Dhafra presents an opportunity to serve a much greater number of UAE residents with an innovative model that provides premium, tech-enabled



Hasan Jasem Al Nowais, Managing Director, and Group Chief Executive Officer, M42

health solutions that result in tangible positive clinical outcomes."

Over the past 20 years, ICLDC's efforts have led to a notable decrease in HbA1c levels, dropping from an average of 9.5% to an impressive 7.2% among its patients. A remarkable 57% of ICLDC's patients now have HbA1c results below 7%, surpassing the international benchmark of 38%. These exceptional outcomes demonstrate the expertise and commitment of the team of over 65 consultants in diabetes and endocrine care across ICLDC's facilities. 



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## Meem Foundation donates AED3 million to Al Jalila Foundation to provide medical scholarships for women

The Meem Foundation, a Dubai-based philanthropic organization, has donated AED 3 million (US\$816,880) to the Al Jalila Foundation to provide medical scholarships for aspiring female students.

The donation is aligned with Meem Foundation's values of creating pathways for women and girls to achieve economic empowerment and access to healthcare.

Al Jalila Foundation is part of Dubai Health, which is the first integrated academic health system in Dubai. Dubai Health was established to elevate the standard of care and to advance health for humanity. Dubai Health comprises six hospitals, 27 ambulatory health centres, 20 medical fitness centres, Mohammed Bin Rashid University of Medicine and Health Sciences, and Al Jalila Foundation.

Commenting on the generous dona-

tion, Muna Easa Al Gurg, Emirati businesswoman, philanthropist, and founder of Meem Foundation, said: "We invest in strategic philanthropic initiatives in the MENA region to address issues impacting the lives of women and girls while helping to bridge the gender gap. Our partnership with Al Jalila Foundation is a testament to our commitment. Together, we aim to empower aspiring young women to pursue their educational goals and accelerate their medical careers. Our partnership will also support patient treatment programmes for women and girls, ensuring that health is never a barrier to achieving their dreams. At Meem Foundation, we envision a future where every woman and girl has the opportunity to thrive, irrespective of the challenges they face."

Dr Amer Al Zarooni, CEO of Al Jalila Foundation, said: "For over a decade, Al Jalila Foundation has made a significant impact on lives through its patient treatment programs, medical scholarships and research grants. Our collaboration with Meem Foundation exemplifies the collective effort needed to deliver life-transforming health programmes. The funds received will enable us to support women and girls, empowering them to step into a more promising tomorrow."

Meem Foundation is a Dubai-based organization committed to finding innovative entrepreneurial solutions to gender inequality, aligned with the UN Sustainable Development Goal (SDG) 5. It is committed to creating sustainable solutions that uplift women and girls, empowering them to thrive in all aspects of life. [MEEM](#)

## amplifAI Health and Healthspan Digital collaborate to advance understanding of vascular ageing

amplifAI Health, a health technology company headquartered in Saudi Arabia, and Healthspan Digital, a Toronto-based data-driven healthtech company, have established a strategic partnership that combines amplifAI Health's AI-powered, rapid, and cost-effective thermal hyperspectral technology with Healthspan Digital's advanced longevity clinical protocols. This first-of-its-kind partnership is set to improve the understanding and management of vascular ageing, a key factor in enhancing healthy ageing.

With the escalation of age-related diseases posing a significant challenge worldwide – particularly within populations of developed nations – it has become crucial to focus on mitigating these conditions in order to improve overall quality of life.

Vascular ageing, which contributes to the age-dependent rise in long-term disability and mortality among older adults, is intimately linked with the decline of organ function and the pathogenesis of various age-related diseases. Understanding the underlying mechanisms of vascular ageing holds the promise of new therapeutic

strategies and clinical diagnostic methods. The pioneering integration of AI with thermal hyperspectral imaging offers a promising avenue for unlocking groundbreaking therapeutic and diagnostic advancements in this domain.

Human medical thermography, a result of decades of research and development, offers a powerful tool for visualizing diseases that may not be readily detected or monitored by other methods. Its global application in disease screening, detection, and monitoring is heralded for its cost-effectiveness, mobility, non-invasive nature, minimal power requirements, and the absence of harmful radiation. This aligns with the global growing demand for safer and more accessible healthcare solutions.

Dr Meshari F. Alwashmi, CEO of amplifAI Health, commented: "We're tremendously excited to work with Healthspan, and our diverse team has what it takes to expand our sphere of knowledge regarding the application of thermography and AI on vascular ageing. We hope to extend healthy lifespan for the benefit of all humanity."

A major limitation of current medical hu-

man thermography is the limited capacity of human thermographers to observe, analyze, and interpret thermograms. This is where artificial intelligence algorithms, specifically computer vision, come into play. By leveraging AI algorithms, computer-aided thermography can objectify findings, minimize inter-observer variability, and improve thermographic accuracy and reliability. While computer-aided thermography requires high-level training and experience, it offers the potential for faster throughput and centralized processing, leading to enhanced diagnostic outcomes.

The detection of vascular ageing currently lacks universal and user-friendly markers. Peripheral arterial disease is one of the most common manifestations of vascular ageing, and thermography can aid in its early detection by analyzing asymmetries and local temperature changes over time. The development of handheld smartphone-based thermal infrared imagers presents a creative solution for detecting and monitoring vascular ageing. [MEEM](#)





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## MENADNA and Nebula Genomics collaborate to offer Whole Genome Sequencing in the Middle East

MENADNA, a startup in the field of bioinformatics and genetic testing focused on the Middle East and North Africa (MENA) region, is collaborating with Nebula Genomics, a specialist in personalized genome sequencing. This partnership designates MENADNA as the exclusive partner of Nebula Genomics in Jordan, Oman, and Iraq. MENADNA currently operates in the UAE and has plans to expand into the Saudi market in the future.

This partnership, spearheaded by MENADNA's CEO, Dr Bassam El Fahmawi, aims to bridge the significant gap in genomic testing within Jordan, Oman, and Iraq. Leveraging Nebula Genomics' advanced sequencing technologies alongside MENADNA's proprietary bioinformatics pipeline, the alliance is set to significantly enhance the quality and relevance of genomic data for the region, which has been historically underserved in global genome-wide association studies (GWAS).

Highlights of the partnership include:

- **Exclusive partnership:** MENADNA

is positioned as the exclusive partner for Nebula Genomics in Jordan, Oman, and Iraq; countries with a combined population of over 56 million people. This partnership will empower the region's healthcare system with advanced Whole Genome Sequencing services for individuals and families.

- **Bioinformatics excellence:** Utilizing MENADNA's advanced bioinformatics pipeline, together with Nebula's proprietary reports, the partnership will refine and enhance genomic data quality, addressing the unique genetic makeup and health needs of the region.

- **Addressing the GWAS gap:** The region represents a diverse genetic landscape that is currently underrepresented in global GWAS, which predominantly features European ancestries. This collaboration aims to contribute valuable genomic data from this population, thereby enriching global genetic databases and research.

Dr El Fahmawi, CEO of MENADNA, shared his vision for the impact of this partnership: "Our collaboration with

Nebula Genomics is a game-changer for genomic testing in Jordan, Oman, and Iraq. By combining Nebula's state-of-the-art sequencing technology with our specialized bioinformatics pipeline, we can provide more accurate, region-specific genomic insights. This is crucial, as less than 2% of genomic data available today comes from the region, despite its rich genetic diversity. Our joint efforts will not only enhance patient care but also significantly contribute to the global understanding of genetic variations and their impact on health."

Jason Karkus, President of Nebula Genomics, commented: "Nebula Genomics, a global pioneer in Whole Genome Sequencing is pleased to partner with MENADNA, bringing our cutting edge, low-cost technology, to Jordan, Oman, and Iraq. This is an exciting partnership, which we believe will lead to a substantial business relationship between our companies. Our combined expertise in Whole Genome Sequencing, proprietary reporting, bioinformatics, and large-scale distribution in the region, make us a perfect match for this strategic partnership." 

## PureHealth launches trainee programmes to empower Emirati healthcare workforce


PureHealth, the largest healthcare platform in the Middle East, is set to launch Emirati student and graduate trainee programmes with the aim of strengthening Emiratisation in the UAE's healthcare sector. The programmes are part of the Emirati Development Center, a unique initiative initiated by PureHealth in line with the Abu Dhabi Economic Vision 2030. The Emirati Development Center will offer trainee programmes in the clinical, pharmaceutical, nursing, and management fields.

To offer a diverse range of learning experiences and accommodate various academic schedules and career aspirations, the Graduate Trainee Programme lasts for 12 months while the Student Trainee Programme is for a short, flexible term. Both programmes will provide young,

local talent with opportunities to start and accelerate their career by enabling personal and professional development through on-the-job training and learning from experience.

Rashed Al Qubaisi, Chief Corporate Officer, PureHealth, commented: "At PureHealth, our core mission is to nurture the next generation of healthcare leaders. Our focus lies in equipping them with vital practical skills and knowledge gained through hands-on experience and real-world projects. We maintain a steadfast commitment to fostering a strong and highly skilled national healthcare workforce, with the ultimate goal of driving advancements within the healthcare sector in the UAE. Our efforts play a key role in supporting Abu Dhabi's Economic Vision 2030, as well as

national economic plans to achieve greater self-sufficiency, we are proud of our collaborations with esteemed academic institutions which play a key role in supporting our endeavours."

Pure Health has established partnerships with leading universities with the aim of building a sustainable pool of Emirati talent, nurturing the growth of young leaders who will shape the future of the healthcare industry and make a positive impact on communities throughout the UAE. To ensure the selection of the best candidates for these programmes, short-listed applicants will undergo various interviews and assessments. 

• Students and graduates can apply here: <https://bit.ly/4diHDAh>



## M42's Mubadala Health Dubai attains prestigious JCI accreditation

Mubadala Health Dubai, part of the M42 group, has been successfully accredited by the Joint Commission International (JCI) and now proudly displays the coveted Gold Seal of Approval. This significant achievement marks a milestone for Mubadala Health Dubai as it attains its inaugural JCI accreditation in an impressive timeframe of less than 18 months since the Jumeirah-based facility opened its doors in October 2022.

JCI accreditation, a top recognition for healthcare facilities, emphasizes Mubadala Health Dubai's commitment to delivering high-quality care and maintaining strict patient safety standards. The facility underwent a comprehensive five-day survey in January, covering all aspects of its operations. The accreditation underscores its unwavering commitment to prioritizing patient-centric care and sets a benchmark for swift achievement within the healthcare sector.

Mubadala Health Dubai provides state-

of-the-art surgical and non-surgical medical services to its patients.

Safeya Al Maqtari, Acting Chief Executive Officer at Mubadala Health Dubai, said: "This is a huge achievement serving as a testament to the entire team's dedication to consistently providing the highest international standards of care to every patient who walks through our doors. This exceptional outcome is truly one of a kind and our entire team is very proud of this accomplishment. This accreditation reaffirms Mubadala Health Dubai's unwavering commitment to the communities we serve, ensuring comprehensive care delivered by expert hands in state-of-the-art facilities."

The 14-chapter survey examines critical areas, including patient care assessment, patient and family rights, quality and patient safety, facility management and infection control, in addition to anesthesia and surgical care. The recognition received from the JCI surveyor high-



Safeya Al Maqtari, Acting Chief Executive Officer at Mubadala Health Dubai

lighted Mubadala Health Dubai's rigorous processes, particularly in surgical safety. Its multidisciplinary teams adhere to global standards for patient safety, implementing numerous practices and protocols to ensure optimal surgical outcomes and patient safety. MEH

## Mubadala's acquisition of KELIX bio expands UAE's footprint in the pharmaceutical sector

Mubadala Investment Company, an Abu Dhabi sovereign investor, acquires KELIX bio, a specialty pharmaceutical business focused on delivering complex generics across emerging markets, to further strengthen the development of the UAE's life sciences ecosystem.

KELIX bio was launched in November 2020, and has since, acquired manufacturing businesses in India, Egypt, Malta and Morocco successfully commercializing a broad range of both oral and injectable formulations covering diverse therapy areas including diabetes, oncology, cardiology, and the central nervous system.

Dr Bakheet Al Katheeri, Chief Executive Officer of Mubadala's UAE Investments Platform, said: "In line with our role as a responsible investor, today's ac-

quisition is testament to the role Mubadala continues to play in accelerating the nation's economic diversification through our portfolio of companies and national champions.

"This partnership marks a key milestone in further advancing Mubadala's position in the life sciences sector, to deliver important long-term socio-economic returns for our nation including improved healthcare, drug security, job creation and GDP impact."

Ismail Ali Abdulla, Head of UAE Clusters, at Mubadala's UAE Investments Platform said: "At Mubadala, we are deeply committed to enhancing the well-being of our communities through strategic investments that address critical health care needs. By amplifying our domestic capabilities in producing essential medications via Kelix bio, our goal is to significantly empower the UAE's



healthcare infrastructure, ensuring wider access to life-saving treatments for all citizens. This investment is a testament to our dedication as a responsible investor, emphasizing our commitment to investing in solutions that address the world's most pressing challenges." MEH

# worldwide monitor

Update from around the globe



## WHO initiates new operational strategy for Global Malaria Programme

Ahead of World Malaria Day on 25 April, the WHO Global Malaria Programme published a new operational strategy<sup>[1]</sup> outlining its priorities and key activities up to 2030 to help change the trajectory of malaria trends, with a view to achieving the global malaria targets. The strategy outlines four strategic objectives where WHO will focus its efforts, including developing norms and standards, introducing new tools and innovation, promoting strategic information for impact, and providing technical leadership of the global malaria response.

In recent years, progress towards critical targets of the WHO *Global technical strategy for malaria 2016-2030* has stalled, particularly in countries that carry a high burden of the disease. In 2022 there were an estimated 608,000 malaria-related deaths and 249 million new malaria cases globally, with young children in Africa bearing the brunt of the disease.

Millions of people continue to miss out on the services they need to prevent, detect, and treat malaria. Additionally, progress in global malaria control has been hampered by resource constraints, humanitarian crises, climate change and biological threats such as drug and insecticide resistance.

“A shift in the global malaria response is urgently needed across the entire malaria ecosystem to prevent avoidable deaths and achieve the targets of the WHO global malaria strategy,” said Dr Daniel Ngamije, Director of the Global Malaria Programme. “This shift should seek to address the root causes of the disease and be centred around accessibility, efficiency, sustainability, equity and integration.”

The WHO Global Malaria Programme has an important role to play in leading the response to control and eliminate the disease worldwide. Through its direct actions and networks, including a presence in 150 countries, the Programme is well placed to shape the malaria ecosystem and achieve impact at country level.

The new operational strategy includes four strategic objectives.

**1. Develop and disseminate norms and standards.** Evidence-based technical recommendations are a cornerstone of the fight against malaria. Normative guidance supports the translation of evidence into action by aligning countries and partners under one common technical vision and strategic direction. The Global Malaria Programme has a core responsibility to guide the research agenda and analyse

evidence that can inform global policy.

**2. Stimulate the development and timely introduction of new tools and innovation.** While more progress can be achieved with currently available tools, new interventions are needed to accelerate the gains and counter emerging threats. The Global Malaria Programme plays a critical key role in facilitating the evaluation and introduction of new malaria control tools and works closely with multiple partners to provide an evidence base to inform their effective scale-up.

**3. Promote the use of strategic information for impact.** The Global Malaria Programme’s work in monitoring, evaluating and reporting on trends in malaria burden, control and elimination drives priorities and decision-making at all levels – from in-country actors to international donors and other partners. WHO’s work also includes global and national equity monitoring as well as support for local barrier assessments to better understand who is missing out on malaria interventions.

**4. Provide technical leadership of the global malaria response.** WHO leads and coordinates the United Nations’ health agenda at both the country and global levels. The Organization has a core responsi-



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bility to convene key stakeholders, define and advocate for priority activities, and empower communities and individuals to access quality health services. The Global Malaria Programme embodies this core WHO function in the malaria ecosystem.

### Guiding principles

The new operational strategy is guided by three equity-oriented principles:

- **Country ownership and leadership, with a whole-of-government and whole-of-society approach.** Efforts to fight malaria must be fully owned and led by countries with adequate investment of domestic resources and a multisectoral response. A country-led response further promotes inclusive governance, accountability and specific interventions that are tailored to local contexts.

- **Resilient health systems to enable the success of national malaria responses.** Ensuring the provision of malaria services relies on a strong primary health care system that can respond to emerging needs and provide quality care for all people, including those infected with malaria.

- **Equity in access to quality health services.** All efforts to fight malaria should be rooted in the principles of equity, gender equity and human rights to ensure that the most vulnerable are protected and have access to quality health services, including malaria interventions and information.

Equity in access to malaria services is the focus of the year's World Malaria Day under the theme: "Accelerating the fight against malaria for a more equitable world." It is also a central tenet of the Yaoundé Declaration, signed in March 2024 by African Ministers of Health from some of the countries hardest hit by malaria.

In signing the declaration, Ministers committed, among other measures, to the aim of ensuring that all populations at risk of malaria consistently receive the appropriate tools – including those living in hard-to-reach areas and conflict humanitarian settings. MEH

### Reference:

1. <https://www.who.int/publications-detail-redirect/9789240090149>

## New law and policy portal launched to advance implementation of the Global health and care workers compact

The World Health Organization and the O'Neill Institute for National and Global Health Law at Georgetown University have released the Global health and care worker law and policy lab <[www.hcwpolicylab.org](http://www.hcwpolicylab.org)>, a digital platform and tool to advance implementation of the Global health and care worker compact <<https://bit.ly/3wrWU0Y>>.

The law and policy lab houses national and international legal instruments and resources to support countries and their partners in strengthening their national policies and operations, populated with an initial compilation of laws, regulations and policies from over 150 countries worldwide.

In 2021, Member States requested that the World Health Organization (WHO) develop a compilation of international human rights, labour and humanitarian instruments to protect health and care workers and ensure their rights. At the Seventy-fifth World Health Assembly in 2022, Member States took note of the resultant Global health and care worker compact that resulted from an extensive legal and policy review and consultation with health worker organizations and associations.

From deaths, illness, burnout and mental health issues experienced during COVID-19 to attacks and harassment in conflict zones, health and care workers around the world face occupational hazards and risks. The World Health Organization projects a global deficit of 10 million health workers by 2030, with two regions bearing an increasing proportion of the gaps. Urgent action is needed to protect, support and safeguard health and care workers as a vital component of strong and resilient health systems.

"Health and care workers are the backbone of health systems," said WHO Health Workforce Director Jim Campbell, "We need to protect and safeguard their health and well-being and invest in decent work. The new law and policy lab provides a foundation on which countries and their partners can assess and strengthen existing policies and strategies to protect health and care workers' rights."

The Global health and care worker compact identifies ten areas of focus within four domains – preventing harm, providing support, ensuring inclusivity and safeguarding rights – where governments and societies can improve the work environments and rights realization of the people doing health and care work. The new law and policy lab consolidates national laws across each of those domains along with a guide to the existing international legal obligations to safeguard the rights of health and care workers and ensure that they have decent and enabling work environments. It is housed at [www.hcwpolicylab.org](http://www.hcwpolicylab.org)

Well-designed and implemented laws and policies support health and care workers, improve retention, and support their engagement in health systems, efforts to end future pandemics, and improve global public health.

"Law is among the most powerful public health tools we have to support those doing lifesaving work in clinics and hospitals, homes and care facilities, war zones and climate disasters," said Dr Matthew Kavanagh, director of the Center for Global Health Policy and Politics at the O'Neill Institute. "And the first step in applying this tool is understanding how national laws may or may not support that goal." MEH





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## WHO sounds alarm on viral hepatitis

According to the World Health Organization (WHO) 2024 Global Hepatitis Report <<https://www.who.int/publications-detail-redirect/9789240091672>>, the number of lives lost due to viral hepatitis is increasing. The disease is the second leading infectious cause of death globally – with 1.3 million deaths per year, the same as tuberculosis.

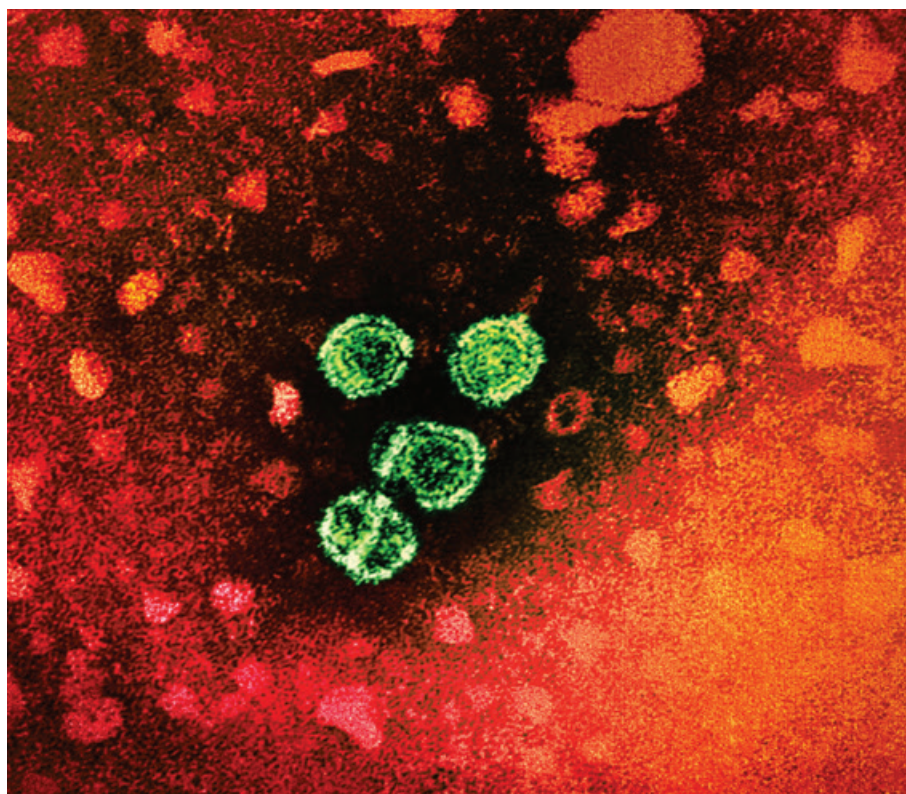
The report, released at the recent World Hepatitis Summit in Lisbon, Portugal, highlights that despite better tools for diagnosis and treatment, and decreasing product prices, testing and treatment coverage rates have stalled. But, reaching the WHO elimination goal by 2030 should still be achievable, if swift actions are taken now.

New data from 187 countries show that the estimated number of deaths from viral hepatitis increased from 1.1 million in 2019 to 1.3 million in 2022. Of these, 83% were caused by hepatitis B, and 17% by hepatitis C. Every day, there are 3500 people dying globally due to hepatitis B and C infections.

“This report paints a troubling picture: despite progress globally in preventing hepatitis infections, deaths are rising because far too few people with hepatitis are being diagnosed and treated,” said WHO Director-General Dr Tedros Adhanom Ghebreyesus. “WHO is committed to supporting countries to use all the tools at their disposal – at access prices – to save lives and turn this trend around.”

Updated WHO estimates indicate that 254 million people live with hepatitis B and 50 million with hepatitis C in 2022. Half the burden of chronic hepatitis B and C infections is among people 30-54 years old, with 12% among children under 18 years of age. Men account for 58% of all cases.

New incidence estimates indicate a slight decrease compared to 2019, but the overall incidence of viral hepatitis remains high. In 2022, there were 2.2 million new infections, down from 2.5 million in 2019.



Transmission electron micrograph of hepatitis B virus particles, shown in green.

These include 1.2 million new hepatitis B infections and nearly 1 million new hepatitis C infections. More than 6000 people are getting newly infected with viral hepatitis each day.

The revised estimates are derived from enhanced data from national prevalence surveys. They also indicate that prevention measures such as immunization and safe injections, along with the expansion of hepatitis C treatment, have contributed to reducing the incidence.

### Global progress and gaps in diagnosis and treatment

Across all regions, only 13% of people living with chronic hepatitis B infection had been diagnosed and approximately 3% (7 million) had received antiviral therapy at the end of 2022. Regarding hepatitis C, 36% had been diagnosed and 20% (12.5 million) had received curative treatment.

These results fall well below the global targets to treat 80% of people living with

chronic hepatitis B and hepatitis C by 2030. However, they do indicate slight but consistent improvement in diagnosis and treatment coverage since the last reported estimates in 2019. Specifically, hepatitis B diagnosis increased from 10% to 13% and treatment from 2% to 3%, and hepatitis C diagnosis from 21% to 36% and treatment from 13% to 20%.

The burden of viral hepatitis varies regionally. The WHO African Region bears 63% of new hepatitis B infections, yet despite this burden, only 18% of newborns in the region receive the hepatitis B birth-dose vaccination. In the Western Pacific Region, which accounts for 47% of hepatitis B deaths, treatment coverage stands at 23% among people diagnosed, which is far too low to reduce mortality.

Bangladesh, China, Ethiopia, India, Indonesia, Nigeria, Pakistan, the Philippines, the Russian Federation and Viet Nam, collectively shoulder nearly two-thirds of the global burden of hepatitis B and C. Achiev-





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ing universal access to prevention, diagnosis, and treatment in these ten countries by 2025, alongside intensified efforts in the African Region, is essential to get the global response back on track to meet the Sustainable Development Goals.

### Disparities in pricing and service delivery

Despite the availability of affordable generic viral hepatitis medicines, many countries fail to procure them at these lower prices.

Pricing disparities persist both across and within WHO regions, with many countries paying above global benchmarks, even for off-patent drugs or when included in voluntary licensing agreements. For example, although tenofovir for treatment of hepatitis B is off patent and available at a global benchmark price of US\$2.4 per month, only 7 of the 26 reporting countries paid prices at or below the benchmark.

Similarly, a 12-week course of pangenotypic sofosbuvir/daclatasvir to treat hepatitis C is available at a global benchmark

price of US\$60, yet only 4 of 24 reporting countries paid prices at or below the benchmark.

Service delivery remains centralized and vertical, and many affected populations still face out-of-pocket expenses for viral hepatitis services.

Only 60% of reporting countries offer viral hepatitis testing and treatment services free of charge, either entirely or partially, in the public sector. Financial protection is lower in the African Region, where only about one third of reporting countries provide these services free of charge.

### Recommendations for accelerating hepatitis elimination

The report outlines a series of actions to advance a public health approach to viral hepatitis, designed to accelerate progress towards ending the epidemic by 2030.

They include:

- expanding access to testing and diagnostics;
- shifting from policies to implementa-

tion for equitable treatment;

- strengthening primary care prevention efforts;
- simplifying service delivery, optimizing product regulation and supply;
- developing investment cases in priority countries;
- mobilizing innovative financing;
- using improved data for action; and
- engaging affected communities and civil society and advancing research for improved diagnostics and potential cures for hepatitis B.

### Funding remains a challenge

Funding for viral hepatitis both at a global level or within dedicated country health budgets, is not sufficient to meet the needs. This arises from a combination of factors, including limited awareness of cost-saving interventions and tools, as well as competing priorities in global health agendas. This report seeks to shed light on strategies for countries to address these inequities and access the tools at the most affordable prices available. [MEH](#)

## WHO launches first ever Patient Safety Rights Charter

The WHO has launched a Patient Safety Rights Charter at the recent Global Ministerial Summit on Patient Safety in Santiago, Chile. It is the first Charter to outline patients' rights in the context of safety, and will support stakeholders in formulating the legislation, policies and guidelines needed to ensure patient safety.

Patient safety refers to the processes, procedures and cultures established in health systems which promote safety and minimise the risk of harm to patients. Everyone has the right to safe health care, as established by international human rights standards, regardless of their age, gender, ethnicity or race, language, religion, disability, socioeconomic status or any other status.

The Charter covers 10 patient safety rights crucial to mitigate risks and prevent inadvertent harm, which includes the right to timely, effective, and appropriate care, the right to safe health care processes and practices, the right to qualified and competent staff and the right to patient and family engagement amongst others.

### The 10 fundamental patient safety rights

1. Timely, effective and appropriate care;

2. Safe health care processes and practices;
3. Qualified and competent health workers;
4. Safe medical products and their safe and rational use;
5. Safe and secure health care facilities;
6. Dignity, respect, non-discrimination, privacy and confidentiality;
7. Information, education and supported decision making;
8. Access medical records;
9. To be heard and fair resolution;
10. Patient and family engagement.

“Patient safety speaks to the first, fundamental principle of health care – ‘Do no harm’. Assuring patient safety is a global priority, and a critical component needed to achieve the Sustainable Development Goals. Patient safety can be seen as an indicator of countries’ broader commitment to respect, protect and fulfil health-related human rights,” said Dr Rudi Eggers, WHO Director of Integrated Health Services. [MEH](#)



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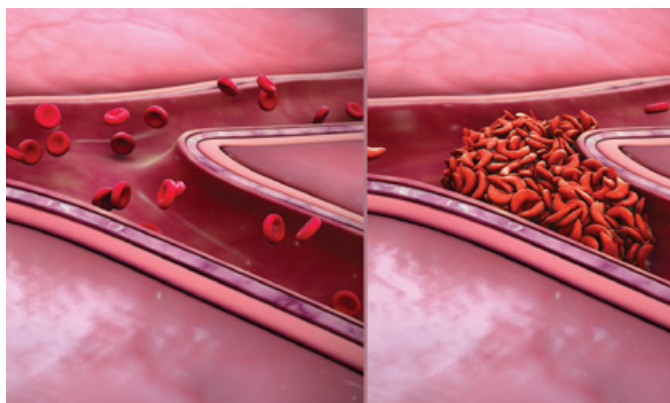
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## Researchers publish final results of key clinical trial for gene therapy for sickle cell disease

In a landmark study, an international consortium led by researchers at Children's Hospital of Philadelphia (CHOP) published the final results of a key clinical trial of the gene therapy CASGEVY (exagamglogene autotemcel) for the treatment of sickle cell disease in patients 12 years and older with recurrent vaso-occlusive crises (VOCs). The study found that 96.7% of patients in the study did not have any VOCs – a blockage that results in lack of oxygen and painful episodes – for at least one year, and 100% were able to remain hospitalization-free for the same length of time.

The findings, published 24 April 2024 in the *New England Journal of Medicine*<sup>[1]</sup>, provide the complete details of the critical clinical trial that led to the US FDA approval of CASGEVY for the treatment of sickle cell disease in December 2023. Additionally, the results of a clinical trial on the efficacy of exa-cel for the treatment of  $\beta$ -thalassemia were also published 24 April in the *New England Journal of Medicine*<sup>[2]</sup>. The preliminary results

of the trial led to the FDA approval of CASGEVY for transfusion-dependent  $\beta$ -thalassemia in January 2024.

Sickle cell disease (SCD) is a life-long condition that causes intense pain due to deformed blood cells that can cause blockages in blood vessels. This

can also lead to strokes, organ damage, and shortened lives.

The research findings and the new treatment – CASGEVY – are particularly pertinent for the Middle East region where the incidence and prevalence rates of SCD in some countries are amongst the highest in the world, and childhood mortality rates for patients with SCD are relatively high<sup>[3]</sup>. CASGEVY has recently been approved in several countries across the region, including the UAE and Saudi Arabia.

Researchers have been studying the use of gene therapy and CRISPR technology to edit portions of DNA in people with inherited or genetic disorders, like sickle cell disease. In the case of sickle cell disease, the CASGEVY process edits DNA within the patient's own cells and enables the patient to produce a different form of haemoglobin in their red blood cells. Clinical trials at CHOP and other sites have shown that successful gene editing can prevent cells from developing the distinctive crescent shape apparent in sickle cell disease and have eliminated pain episodes in almost all patients. CASGEVY was the first FDA-approved therapy developed with CRISPR technology.

"In this clinical trial, sickle cell patients who were having significant issues with their disease began to see their problems


resolve within months and improve their quality of life significantly," said senior study author Stephan A. Grupp, MD, PhD, Section Chief of the Cellular Therapy and Transplant Section, Inaugural Director of the Susan S. and Stephen P. Kelly Center for Cancer Immunotherapy, and Medical Director of the Cell and Gene Therapy Laboratory at CHOP. Grupp was also one of the principal investigators in the clinical trials that led to the approval of CASGEVY and the leader of the study's steering committee.

The researchers conducted the CLIMB SCD-121 trial, a phase 3, single-arm, open-label study of exa-cel in patients between 12 and 35 years old with sickle cell disease and at least two severe VOCs in each of the two years before screening. The key primary endpoint of the study was a proportion of patients without severe VOCs for at least 12 consecutive months, with a secondary endpoint of patients who were free from inpatient hospitalization for severe VOCs for at least 12 consecutive months.

A total of 44 patients received exa-cel with a median follow up of 19.3 months. In a total of 30 patients with sufficient follow-up data to be evaluated, 29 (96.7%) were free of VOCs for at least 12 consecutive months. This information is an update for the US Prescribing Information for CASGEVY, which includes an evaluation of 31 patients resulting in a response rate of 93.5%. The safety of treatment was comparable to treatment with hematopoietic and progenitor stem cells, and no malignancies were reported as a result of treatment.

The study was supported by Vertex Pharmaceuticals and CRISPR Therapeutics.

• For more information from the US FDA about CASGEVY's prescribing information, warning and precautions, and adverse reactions, visit:

[www.fda.gov/media/174615/download](http://www.fda.gov/media/174615/download) . 

### References:

1. Frangoul et al, "Exagamglogene Autotemcel for Severe Sickle Cell Disease." *N Engl J Med*. Online April 24, 2024. doi: <https://www.nejm.org/doi/10.1056/NEJMoa2309676>
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3. Bailey M., Gibbs M., Dani N. et. al. Burden of Illness of Sickle Cell Disease in Countries of the Middle East: A Systematic Literature Review. *Blood*. November 13, 2019. doi: <https://doi.org/10.1182/blood-2019-131699>



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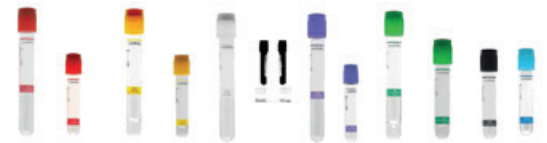
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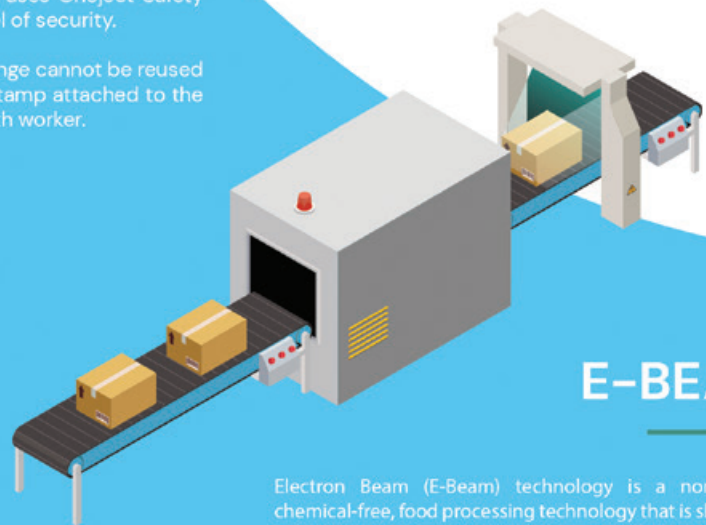
After injection, the automatic syringe cannot be reused and the needle is closed with a stamp attached to the needle, so it will not hurt the health worker.



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## Experts call for paradigm shift in healthcare to combat climate change

In a groundbreaking commentary published recently, a consortium of global experts highlights the urgent need for a paradigm shift in healthcare to combat climate change. Titled “Climate-Friendly Healthcare: Reducing the Impacts of the Healthcare Sector on the World’s Climate,” <<https://bit.ly/4bbQ4vE>> the paper underscores the profound environmental footprint of the healthcare industry and advocates for transformative measures to address it.

The healthcare sector, traditionally viewed as a champion of human health, paradoxically emerges as a significant contributor to environmental degradation. If the global healthcare sector were a country, it would rank as the fifth-largest emitter of carbon dioxide, a sobering statistic that underscores the sector’s immense carbon footprint. The commentary, authored by Walter Leal Filho and colleagues from prestigious academic institutions worldwide, sheds light on the intersection between healthcare and climate change.

At the core of the commentary lies a call for action to transition towards a more sustainable model of healthcare delivery. The

authors identify three key areas where emissions occur: Scope 1, Scope 2, and Scope 3. While Scopes 1 and 2 primarily involve direct and indirect emissions from healthcare facilities and operations, Scope 3 emissions, representing a staggering 71% of the sector’s overall footprint, stem from the broader healthcare ecosystem, including supply chains and patient care.

To effectively address these emissions, the authors propose a multifaceted approach focusing on high-impact decarbonization actions. These include investing in energy-efficient infrastructure, transitioning to renewable energy sources, promoting sustainable procurement practices, and optimizing waste management strategies. Moreover, the commentary emphasizes the importance of integrating climate considerations into clinical guidelines and fostering interdisciplinary collaboration to drive systemic change.

The commentary also underscores the disproportionate burden of climate change on developing countries’ healthcare systems. Limited financial resources, outdated infrastructure, and technological gaps pose significant challenges to implementing

climate-friendly practices in these regions. To address these barriers, the authors advocate for robust policy frameworks, capacity-building initiatives, and international collaboration to support climate-resilient healthcare systems globally.

Furthermore, the commentary highlights the critical role of healthcare professionals in driving change. By leveraging their expertise and advocating for sustainable practices within their institutions, healthcare workers can catalyze the transition towards climate-friendly healthcare. Additionally, the commentary underscores the need for comprehensive monitoring and reporting mechanisms to track progress towards decarbonization goals effectively.

“Climate-Friendly Healthcare” serves as a clarion call for the healthcare industry to embrace sustainability as a core principle. By prioritizing climate action and adopting transformative measures, healthcare systems worldwide can mitigate their environmental impact while safeguarding public health. The commentary underscores the imperative for collective action and collaboration across sectors to achieve a sustainable and resilient healthcare future. 

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## Esketamine injection just after childbirth reduces depression in new mothers

Findings from a recently published clinical trial show that a single low dose injection of esketamine given immediately after childbirth reduces major depressive episodes in individuals with depressive symptoms during pregnancy (prenatal depression).

The results, published 10 April in *The BMJ* <sup>[1]</sup>, suggest that low dose esketamine should be considered in new mothers with prenatal depressive symptoms.

Depression is common during pregnancy and shortly after giving birth and can have several adverse effects on new mothers and their infants.

Esketamine is made from a drug called ketamine. It’s used as an anaesthetic and to treat depression, yet the effect for moth-

ers with perinatal depression is unclear.

To examine this further, researchers based in China and the USA wanted to find out if a single low dose injection of esketamine given just after childbirth might reduce subsequent depression in mothers with pre-existing prenatal depression.

Their findings are based on 361 mothers (average age 32 years) enrolled from five Chinese hospitals from June 2020 to August 2022 with no medical history of depression and no diagnosis of depression in pregnancy, but who had scores on a scale consistent with mild prenatal depression and were preparing for childbirth.

None of the participants had severe pregnancy complications, or any condi-

tion that meant they couldn’t be given esketamine.

Information on factors including age, weight (BMI), education level, family income and existing health conditions was recorded at the start of the trial and participants were randomly assigned to either esketamine or placebo intravenously infused over 40 minutes after childbirth.

Participants were interviewed 18 to 30 hours after giving birth and again at 7 and 42 days.

Major depressive episode was diagnosed with the Mini-International Neuropsychiatric Interview at 42 days. Depression was also assessed using the Edinburgh depression score at 7 and 42 days, and the Hamilton Depression Rating Scale score ▶





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at 42 days. No participant took antidepressants or received psychotherapy during the follow-up period.

At 42 days after giving birth, 12 of 180 (6.7%) of mothers given esketamine experienced a major depressive episode compared with 46 of 181 (25.4%) of those given placebo (a relative risk reduction of about three-quarters).

As expected, mothers given esketamine had lower Edinburgh depression scores at 7 and 42 days, and a lower Hamilton depression score at 42 days.

Based on these figures, the researchers estimate that, for every five mothers given esketamine, one major depressive episode would be prevented.

More neuropsychiatric adverse events such as dizziness and diplopia (double vision) occurred with esketamine (45% v 22%). However, symptoms lasted less than a day and none needed drug treatment.

The researchers acknowledge that excluding mothers with pre-pregnancy mood disorders may have affected the validity of their results, and the short follow-up period may have led to under-reporting of neuropsychiatric symptoms and other adverse events.

What's more, most participants had only mild prenatal depressive symptoms, so it's unclear whether esketamine is equally effective in those with more severe depressive symptoms.

Nevertheless, they conclude that for mothers with prenatal depressive symp-

toms, a single low dose of esketamine given shortly after childbirth decreases major depressive episodes at 42 days postpartum by about three quarters.

These results are generally consistent with previous work investigating the effects of low dose ketamine or esketamine on postpartum depression, mainly in mothers after caesarean delivery, and, importantly, the researchers say their trial "extends existing understanding by targeting women with pre-existing prenatal depression, who were therefore at high risk of postnatal depression."

As such, they conclude that low dose esketamine should be considered in mothers with symptoms of prenatal depression. MEH

#### Reference:

1. Wang S., Deng CM., Zeng Y., et. al. Efficacy of a single low dose of esketamine after childbirth for mothers with symptoms of prenatal depression: randomised clinical trial. *BMJ* 2024;385:e078218. doi: <https://doi.org/10.1136/bmj-2023-078218>

## Plasma irradiation promotes faster bone healing

"Break a leg!" is a welcome blessing of good luck for actors, but who wants to hear that they have actually broken a bone? What's worse, fractures that are displaced or complex require surgery and possibly lengthy recovery times while the patient remains partly or wholly immobilized.

Aiming to shorten recovery times, an Osaka Metropolitan University-led research group is focusing on plasma irradiation as a treatment method to speed up bone healing. Non-thermal atmospheric-pressure plasma (NTAPP) is attracting widespread interest for use in medical applications. The tissue repair capacity of NTAPP has been reported in various fields; however, little is known about its effect on fracture healing.

The Department of Orthopedic Surgery's Kosuke Saito, a graduate student in the Graduate School of Medicine, Associate Professor Hiromitsu Toyoda, and Professor Hiroaki Nakamura, and Graduate School of Engineering Professor Jun-Seok Oh were among the researchers who used laboratory rats for their experiment. In the study, they aimed to investigate how NTAPP irradiation promotes fracture healing in a non-union fracture model and its underlying mechanism, *in vitro* and *in vivo*.

The researchers broke the legs of the rats in two ways. One group of 24 rats had normal fractures that are generally easy to heal. The other group of 20 rats had fractures known as non-union ones where healing is usually prolonged or does not happen. Some were then irradiated with NTAPP, which didn't offer the normal fracture group any significant advantages, but boosted the healing and recovery time of the rats with non-union fractures. The strength of the healed



An X-ray image of a control rat femur that has not properly healed (left) compared to a rat femur in its eighth week of plasma irradiation.

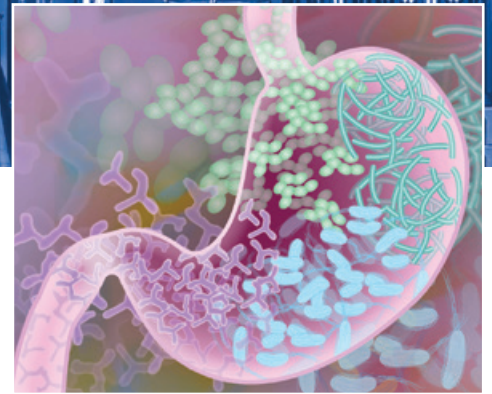
areas of the irradiated non-union rats was also about 3.5 times stronger than that of the nonirradiated ones.

Furthermore, an *in vitro* study of pre-osteoblastic cells irradiated with the plasma for 5 to 15 seconds showed that the activity of a protein that is an indicator of osteoblast differentiation increased, indicating that maturation of these bone-forming cells was progressing.

"Collaboration between the medical and engineering fields creates new medical technologies that have never before existed," Professor Toyoda said. "In the future, combining this treatment method with current fracture treatments is expected to contribute to more reliable bone fusion and shorter recovery times." MEH

Their findings are published in *PLOS ONE* <<https://doi.org/10.1371/journal.pone.0298086>>





## Scientists link certain gut bacteria to lower heart disease risk

Changes in the gut microbiome have been implicated in a range of diseases including type 2 diabetes, obesity, and inflammatory bowel disease. Now, a team of researchers at the Broad Institute of MIT and Harvard along with Massachusetts General Hospital has found that microbes in the gut may affect cardiovascular disease as well. In a study published in *Cell*<sup>[1]</sup>, the team has identified specific species of bacteria that consume cholesterol in the gut and may help lower cholesterol and heart disease risk in people.

Members of Ramnik Xavier's lab, Broad's Metabolomics Platform <[www.broadinstitute.org/metabolomics](http://www.broadinstitute.org/metabolomics)>, and collaborators analyzed metabolites and microbial genomes from more than 1,400 participants in the Framingham Heart Study, a decades-long project focused on risk factors for cardiovascular disease. The team discovered that bacteria called *Oscillibacter* take up and metabolize cholesterol from their surroundings, and that people carrying higher levels of the microbe in their gut had lower levels of cholesterol. They also identified the mechanism the bacteria likely use to break down cholesterol. The results suggest that interventions that manipulate the microbiome in specific ways could one day help decrease cholesterol in people. The findings also lay the groundwork for more targeted investigations of how changes to the microbiome affect health and disease.

"Our research integrates findings from human subjects with experimental validation to ensure we achieve actionable mechanistic insight that will serve as starting points to improve cardiovascular health," said Xavier, who is a core institute member, director of the Immunology Program, and co-director of the Infectious Disease and Microbiome Program at the Broad. He is also a professor at Harvard Medical School and Massachusetts General Hospital.

Postdoctoral researcher Chenhao Li and research scientist Martin Stražar,

both in Xavier's lab, were co-first authors on the study.

### Cholesterol cues

In the past decade, other researchers have uncovered links between composition of the gut microbiome and elements of cardiovascular disease, such as a person's triglycerides and blood sugar levels after a meal. But scientists haven't been able to target those connections with therapies in part because they lack a complete understanding of metabolic pathways in the gut.

In the new study, the Broad team gained a more complete and detailed picture of the impact of gut microbes on metabolism. They combined shotgun metagenomic sequencing, which profiles all of the microbial DNA in a sample, with metabolomics, which measures the levels of hundreds of known and thousands of unknown metabolites. They used these tools to study stool samples from the Framingham Heart Study <[www.framinghamheartstudy.org/jfhs-about](http://www.framinghamheartstudy.org/jfhs-about)>.

"The project outcomes underline the importance of high-quality, curated patient data," Stražar said. "That allowed us to note effects that are really subtle and hard to measure and directly follow up on them."

The approach uncovered more than 16,000 associations between microbes and metabolic traits, including one that was particularly strong: People with several species of bacteria from the *Oscillibacter* genus had lower cholesterol levels than those who lacked the bacteria. The researchers found that species in the *Oscillibacter* genus were surprisingly abundant in the gut, representing on average 1 in every 100 bacteria.

The researchers then wanted to figure out the biochemical pathway the microbes use to break down cholesterol. To do this, they first needed to grow the organism in the lab. Fortunately, the lab has spent years collecting bacteria from stool samples to create a unique library that also included *Oscillibacter*.


After successfully growing the bacteria, the team used mass spectrometry to identify

the most likely byproducts of cholesterol metabolism in the bacteria. This allowed them to determine the pathways the bacteria use to lower cholesterol levels. They found that the bacteria converted cholesterol into intermediate products that can then be broken down by other bacteria and excreted from the body. Next, the team used machine-learning models to identify the candidate enzymes responsible for this biochemical conversion, and then detected those enzymes and cholesterol breakdown products specifically in certain *Oscillibacter* in the lab.

The team found another gut bacterial species, *Eubacterium coprostanoligenes*, that also contributes to decreased cholesterol levels. This species carries a gene that the scientists had previously shown<sup>[2]</sup> is involved in cholesterol metabolism. In the new work, the team discovered that *Eubacterium* might have a synergistic effect with *Oscillibacter* on cholesterol levels, which suggests that new experiments that study combinations of bacterial species could help shed light on how different microbial communities interact to affect human health.

### Microbial messages

The vast majority of genes in the human gut microbiome remains uncharacterized, but the team is confident that their success in pinpointing cholesterol-metabolizing enzymes paves the way for the discovery of other similar metabolic pathways impacted by gut microbes, which could be targeted therapeutically.

"There are many clinical studies trying to do faecal microbiome transfer studies without much understanding of how the microbes interact with each other and the gut," Li said. "Hopefully stepping back by focusing on one particular bug or gene first, we'll get a systematic understanding of gut ecology and come up with better therapeutic strategies like targeting one or a few bugs." 

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# World-leading fertility care

The Assisted Conception Unit (ACU) at Guy's Hospital is known worldwide as a leading provider of fertility treatments and treats over 2,000 patients a year, including many from the Middle East. We are proud to offer evidence-based practice to our patients alongside innovative treatments and the highest standards of consultant-led, personalised care from one of the UK's largest and most prestigious teaching hospitals.

As part of Guy's and St Thomas' NHS Foundation Trust, our comprehensive range of treatments includes in vitro fertilization (IVF), intracytoplasmic sperm injection (ICSI), intrauterine insemination (IUI), fertility preservation, embryo implantation and pre-implantation genetic diagnosis. Patients can have consultations, tests and investigations, procedures, and gametes storage under one roof with state-of-the-art technology and facilities.

Our experts draw on evidence-based approaches to support patients with personalised care before, during and after treatment. We work as a multidisciplinary team which includes joint working with our embryologists, andrology specialists who advise on male infertility issues, and clinical genetics, enabling us to create a personalised treatment plan.

We understand the emotional challenges of fertility treatment. That's why our team are proud to offer free counselling for all fertility treatments, including psychosexual support, to provide the emotional support our patients need throughout their journey.

We always put patients' health and safety first. One aspect of the IVF process is our radio frequency identification tags, which minimise human error by locking a patient's identity to samples of eggs and sperm. Another example is only offering treatments where reliable evidence proves they can enhance the chance of pregnancy.

As pioneers in fertility treatment, we can access a wealth of advanced techniques for assisted conception, such as an embryoscope to video embryos during early development before implantation. It helps us select embryos with the greatest chance of success. Two fertility services are also at the forefront of innovation – our



ACU consultant team (L to R) – Mr Tarek El-Touky, Dr Julia Kopeika, Mrs Jan Grace, Professor Yacoub Khalaf.

centre for pre-implantation genetic testing (PGT) and our ovarian tissue cryopreservation (OTC) service.

## Pre-implantation genetic testing

PGT is a type of IVF offered to couples at an increased risk of having a child with a specific genetic disorder. Guy's and St Thomas' has offered PGT since 1997 and is the UK's largest and longest-established centre, performing over 60% of all PGT cycles in the country. We test for 300 genetic disorders, such as sickle cell disease, cystic fibrosis, Huntington's disease, alpha thalassemia and chromosomal re-arrangements.

Our PGT specialist, Professor Yacoub Khalaf, consultant obstetrician and gynaecologist, said: "We pride ourselves in providing effective care that adds value. We assess the best care for our patients. Our track record of success in treating patients from the Middle East is a testimony to the care we provide."

Embryologists perform the embryo biopsy step in PGT, removing a sample of cells from an embryo to test if they are affected by a genetic condition. Then, only the unaffected embryos are returned to the womb to avoid passing on the disorder to a child as pregnancy hopefully develops.

## Ovarian tissue cryopreservation

OTC allows female patients to preserve their fertility before undergoing treatment such as

chemo-radiotherapy or stem cell transplants that could make them infertile. Its other advantage is that it can help women restore their menstrual cycle and conceive naturally, although many will still need IVF.

A gynaecologist will collect the ovarian tissue through keyhole surgery before or during chemotherapy. Then, after a safe interval, and when the patient is ready to start a family, they re-implant the ovarian tissue in the pelvis.

Using ovarian tissue is faster than other fertility preservation methods, such as collecting oocytes or embryos, which can take up to three weeks and delay cancer treatment. In contrast, we can arrange ovarian tissue cryopreservation within 2 to 5 days.

We recently expanded our OTC service to give children with gonadotoxic treatment the opportunity to freeze their ovaries at the world-renowned Evelina London Children's Hospital.

Our consultants are at the forefront of international research, using world-first innovations and sharing their expertise and knowledge to improve fertility services across the globe. MEH

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# Women in healthcare: Reshaping the sector for improved health across society



■ By **Olfat Berro**  
Area Head Middle East,  
Roche Pharmaceuticals

It's time to prioritise women's health within healthcare systems. Not only is it crucial for improving overall health outcomes, but it will also contribute to the economic growth of societies. According to the latest World Economic Forum (WEF) report, <sup>[1]</sup> "addressing the women's health gap could add years to life and life to years – and potentially boost the global economy by \$1 trillion annually by 2040".

Women play a pivotal role in society and act as primary decision-makers for the health and well-being of their families. Additionally, research indicates that the health of a mother has a significant impact on the health of future generations, making women's health an indispensable aspect of overall community health.

Unfortunately, the health system design fails to provide women with adequate health services across the care continuum. Women live longer than men, but they also spend 25% more of their lives in debilitating health. The aforementioned WEF report states that a woman will spend an average of nine years in poor health, affecting her ability to be present and/or productive at home, at work, and in the community, and reducing her earning potential. Furthermore, research by the NCD Alliance highlights that two out of every three women die from a Non-Communicable Disease (NCD) <sup>[2]</sup>, due to gender norms, inequali-

ties, and other intersecting determinants that make women particularly vulnerable to NCDs, especially in low- and middle-income countries (LMICs).

## Overcoming hurdles: Key challenges to address

The gender gap in health persists due to systemic, knowledge, and cultural barriers. For example:

- In the Arab world, women face many challenges when it comes to their representation in the healthcare sector, both as professionals and as patients.

- Across the world, without exception, women perform 76% of unpaid care work<sup>[3]</sup>. When a woman takes care of her family when someone is sick, she often forgets to take care of herself.

- For too long, women have been overlooked by healthcare systems that see men as the default. Research into women's health has been chronically underfunded, leaving women facing inequities in diagnosis, treatment, and access to healthcare. Excluding women from clinical trials has resulted in delayed diagnostics for women <sup>[4]</sup> – on average by four years longer than for men in more than 700 diseases. For every one woman diagnosed with a women's health-related condition, roughly four go undiagnosed.

- Women have been found to be 50 per cent more likely than men to be misdiagnosed following a heart attack <sup>[5]</sup> and more likely than men to die from heart attacks.

- Only 1 per cent <sup>[6]</sup> of the global healthcare research and innovation funds are invested in female-specific conditions beyond oncology.

Addressing these barriers is necessary to ensure that women receive the care and attention they need to lead healthy lives.

## Changing the perspective

A healthier and more equitable society can only be achieved by empowering women to prioritise their own health, and health systems to prioritise it as well. In that sense, promoting the advancement of women's equal access and participation in science, technol-

ogy, engineering and mathematics (STEM) fields is the first step. Female scientists can add their gender perspective by developing biomedical inventions that address women's health conditions. A study analyzing over 440,000 medical patents filed between 1976 and 2010 found that biotech inventions created by women were up to 35% more likely to benefit women's health compared to those created by men. It is concerning to note that globally, only one-third of scientific researchers are women <sup>[7]</sup>.

The second step is equally important: Empowering women in the health sector and encouraging gender diversity. The WEF report suggests that leaders tend to initiate changes in the workplace based on their own experiences, knowledge, or vision. Hence, having more women in senior leadership roles could enable them to advocate for policies that support women's health and play a significant role in closing the gender gap in health.

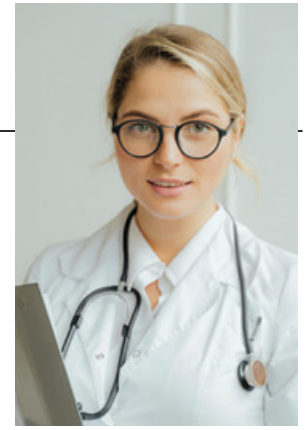
As a woman in STEM and as the first woman to lead a major pharmaceutical company's Middle Eastern region, I can attest to the need for progress in terms of inclusion. Working in healthcare, I witnessed firsthand the challenges and biases we face in all aspects of our health. Women in healthcare in the Arab world have come a long way and may have a long journey ahead of them. A woman's health outcomes can depend on a variety of factors, including her mental health, her family relationships, her place in society, and the prejudices she must overcome both inside and outside of the healthcare system.

## The impact of women leading healthcare changes

Fortunately, my role in a company like Roche, which is actively closing gender gaps, gives me the opportunity to work towards fostering change. For instance, in 2022, we signed the Middle East Inclusion & Diversity Council Charter, allowing us to join a network of like-minded organizations that are accelerating towards achieving gender balance.




Additionally, we are committed to creating opportunities for the next generation of healthcare leaders in the Middle East, and we are bringing more diverse voices to help truly represent the communities we serve. One example is our programme to promote gender equality and inclusive leadership in the Middle East. Developed in partnership with the internationally recognized teaching institution IE University, the Roche-IE Inclusive Leadership Program (RISE) has included 22 leaders in the initial cohort. We are proud to have a diverse and inclusive workplace in our region, where 40% of our collaborators are female.



As shown, prioritising women's health is not only an ethical imperative but also a strategic one. By amplifying women's voices and advancing gender-inclusive solutions in health, technology, and financing, we can provide better outcomes for the entire society.

The addition of a female perspective to healthcare has proven beneficial with

new alliances and projects underway. If this trend continues, significant progress can be expected in this field. (See: "What healthcare companies can do for equity") To accomplish this, all healthcare system stakeholders must work together to bridge the gaps that contribute to the gender disparity in health. Let's collaborate and make it a reality! 

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## What healthcare companies can do for equity

### The XProject, the Equity 2030 Alliance, and the Women-Centric Cancer Care approach


Female leadership in healthcare can accelerate changes towards equity. Here's an example: as a healthcare company, Roche has a long-standing history in women's health, pioneering diagnostics and treatments for conditions that primarily address women. However, that was not all. The company recognised the systemic blindness to the experiences and needs of women and decided to act. Teresa Graham, CEO of Roche Pharmaceuticals, was one of the driving forces for the XProject <[www.roche.com/xproject](http://www.roche.com/xproject)>, an ongoing initiative aiming to close the gaps in women's health through partnerships, funding, and action to create better health outcomes for everyone.

The 'X' in XProject represents the female chromosome that has histori-

cally been overlooked. The project has grown into several initiatives spanning health, technology, and financing. One of the actions is the #MyStoryForChange campaign. Since its launch in early 2023, over 650 women from around the world have shared stories about their healthcare experiences, revealing the stark knowledge gaps in women's health as well as the discrimination and stigma that women often face.

To address this critical issue, the United Nations Population Fund (UNFPA) has launched the Equity 2030 Alliance <[www.unfpa.org/equity-2030-alliance](http://www.unfpa.org/equity-2030-alliance)>, a pioneering global initiative aimed at achieving gender equity in science, technology and financing by 2030. Leaders from the private sector, academia and government are joining efforts to advance gender-inclusive solutions in health science and technology, as

well as ensuring adequate financing of women-centric solutions and research.

The living testimonials from women of the #MyStoryforChange campaign were also vital in understanding why women-centric approaches to cancer care are so important. According to the Lancet Commission on Women, Power and Cancer<sup>[8]</sup>, cancer leads to premature death of 2.3 million women every year. A diverse group of stakeholders convened at the FemTechnology Summit and published a discussion paper [9], advocating the immediate need for Women-Centric Cancer Care (WCCC), which includes better access to screening, early detection, and treatment, and is vital to hopefully avert all of those deaths. 

# Women's heart disease is underdiagnosed, but new machine learning models can help solve this problem

Using machine learning, scientists built more accurate models to predict heart disease risk and found that women are underdiagnosed compared to men, highlighting the need for sex-specific criteria. *Middle East Health* reports.

When it comes to matters of the heart, cardiovascular disease in women is underdiagnosed compared to men. A popular scoring system used to estimate how likely a person is to develop a cardiovascular disease within the next 10 years is the Framingham Risk Score. It is based on factors including age, sex, cholesterol levels, and blood pressure.

Researchers in the US and the Netherlands have now used a large dataset to build more accurate cardiovascular risk models than the Framingham Risk Score. They also quantified the underdiagnosis of women compared to men. The results were published in *Frontiers in Physiology* <<https://doi.org/10.3389/fphys.2024.1339866>>.

"We found that that sex-neutral criteria fail to diagnose women adequately. If sex-specific criteria were used, this underdiagnosis would be less severe," said Skyler St. Pierre, a researcher at Stanford University's Living Matter Lab. "We also found the best exam to improve detection of cardiovascular disease in both men and women is the electrocardiogram (EKG)."

## Underdiagnosis due to heart differences

Anatomically, female and male hearts are different. For example, female hearts are smaller and have thinner walls. Yet, the diagnostic criteria for certain heart diseases are the same for women and men, meaning that women's hearts

must increase disproportionately more than men's before the same risk criteria are met.

When the researchers quantified the underdiagnosis of women compared to men, they found that the use of sex-neutral criteria leads to severe underdiagnosis of female patients. "Women are underdiagnosed for first degree atrioventricular block (AV) block, a disorder affecting the heartbeat, and dilated cardiomyopathy, a heart muscle disease, twice and 1.4 times more than men, respectively," St. Pierre said. Underdiagnosis of women was also found for other heart disorders.

## Old vs new

To achieve more accurate predictions for both sexes, the scientists leveraged four additional metrics that are not considered in the Framingham Risk Score: cardiac magnetic resonance imaging, pulse wave analysis, EKGs, and carotid ultrasounds. They used data from more than 20,000 individuals in the UK Biobank – a biomedical database comprising information from approximately half a million UK individuals aged 40 and older – who had undergone these tests.

"While traditional clinical models are easy to use, we can now use machine learning to comb through thousands of other possible factors to find new, meaningful features that could significantly improve early detection of disease," explained St. Pierre. Just 10 years ago, these methods were not available, which is why assessment scales like the Framingham Risk Score have been used for half a century.

Using machine learning, the researchers

determined that of the tested metrics, EKGs were most effective at improving the detection of cardiovascular disease in both men and women. This, however, does not mean that traditional risk factors are not important tools for risk assessment, the researchers said. "We propose that clinicians first screen people using a simple survey with traditional risk factors, and then do a second stage screening using EKGs for higher risk patients."

## Paving the way for custom medicine

The present study provides a first step into rethinking risk factors for heart disease. Leveraging new technologies is a promising way to improve risk prediction. However, there are some limitations to the study which should be addressed in the future, the researchers said.

One such limitation is the fact that in the UK Biobank sex is treated as a binary variable. Sex, however, is inherently complex, relating to hormones, chromosomes, and physical characteristics, all of which may fall somewhere on a spectrum between 'typically' male and 'typically' female.

In addition, the study population was middle-aged and older people residing in the UK, so the results may not be transferable to people from other backgrounds and ages. "While sex-specific medicine is one step in the right direction, patient-specific medicine would provide the best outcomes for everyone," St. Pierre concluded. MEH



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# Heart health declines rapidly after menopause

A woman's cardiovascular risk can rise sharply after she goes through menopause, quickly catching up to men of a similar age and health profile, according to new findings presented at the American College of Cardiology's Annual Scientific Session. Researchers said the study underscores the importance of recognizing and addressing early warning signs of heart disease risk in women as they lose the protective effects of oestrogen after menopause.

"This is a unique study cohort of only post-menopausal statin users that signals that post-menopausal women may have risk of heart disease that is on par with males," said Ella Ishaaya, MD, an internal medicine physician at Harbor-UCLA Medical Center in Torrance, California, and the study's lead author. "Women are underscreened and undertreated, especially post-menopausal women, who have a barrage of new risk factors that many are not aware of. This study raises awareness of what those risk factors are and opens the door to indicating the importance of increased screening for coronary artery calcium (CAC)."

## CAC score

In the study<sup>[1]</sup>, post-menopausal women underwent heart scans to assess their CAC score, a measure of plaque buildup – fat, calcium and other substances – in the heart's arteries.

Researchers analyzed data from 579 post-menopausal women who were taking statins to control their cholesterol and had undergone two CAC scans at least one year apart. Participants did not have heart disease at the time of the first scan. To compare CAC changes in men and women, each female participant was matched with a male of a similar profile in terms of age, race, statin use, blood pressure and diabetes status.

Researchers divided the participants into three groups with CAC levels of 1–99, 100–399, and 400 or higher at baseline. Between their first and second heart scan, women with baseline CAC of 1–99 saw their CAC rise by

a median of eight points, double the median of four seen in their male counterparts. Similarly, women with baseline CAC of 100–399 saw their CAC rise by a median of 31 points, about double the median of 16 seen in males. There was no significant difference between sexes for those with baseline CAC of 400 or higher.

## Plaque buildup

The findings suggest plaque buildup is accelerated in post-menopausal women compared to men, indicating that many women experience a steep rise in the risk of heart problems. Dr Ishaaya said this is likely related to the drop in oestrogen that women experience during menopause. Oestrogen has long been known to have a protective effect on heart health, but researchers said many women and even many clinicians are not aware of what it means to lose that protection during menopause.

"After menopause, women have much less oestrogen and shift to a more testosterone-heavy profile," Dr Ishaaya said. "This affects the way your body stores fat, where it stores fat and the way it processes fat; it even affects the way your blood clots. And all of those [changes] increase your risk for developing heart disease."

Heart disease is the leading cause of death in both men and women, but women's cardiovascular risk has traditionally been undertreated because women tend to develop heart disease at an older age than men and may experience different and sometimes more subtle symptoms.

Based on these results, researchers suggested post-menopausal women should talk to their doctor about heart disease risk factors and follow up on any recommended tests or monitoring. More women may benefit from heart scans when compared to the number of women currently receiving them, Dr Ishaaya said.

## Statin ineffective

Since all the women in the study were taking statins but many still saw a substantial

Women are underscreened and undertreated, especially post-menopausal women, who have a barrage of new risk factors that many are not aware of. This study raises awareness of what those risk factors are and opens the door to indicating the importance of increased screening for coronary artery calcium.

– Ella Ishaaya, MD

rise in CAC, the results may also indicate that statins are not sufficient to keep plaque buildup in check for this population, Dr Ishaaya said. Future studies could investigate the effectiveness of statins or other therapies in reducing plaque burden in post-menopausal women, she said.

ACC/American Heart Association guidelines recommend considering a heart scan to assess CAC when a person's risk level is ambiguous or borderline based on standard risk factors. In the U.S. and many other countries, CAC scoring is most used to determine recommendations for statins for intermediate-risk and asymptomatic patients. [MESH](#)

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# Technogym celebrates 40 years of keeping people fit and healthy

## World's leading fitness equipment manufacturer is official supplier to Olympics

On the occasion of their 40th anniversary, *Middle East Health* speaks to Nerio Alessandri, the founder of Technogym, about the company's world-leading fitness equipment and their relationship with the Olympics. Technogym is world leader in the Fitness and Wellness solutions sector and has equipped 80,000 wellness centres and more than 500,000 homes around the world. It is estimated that approximately 50 million people use Technogym products every day.

**Middle East Health:** Technogym is world renowned for developing and manufacturing some of the world's most advanced fitness equipment and technology which is used by leading athletes around the world. Can you elaborate?

■ **Nerio Alessandri:** Technogym has been the brand of reference of the Olympic Games since 2000. The forthcoming Paris 2024 Olympics will be the 9th experience of Technogym as official supplier of the Games after Sydney 2000, Athens 2004, Turin 2006, Beijing 2008, London 2012, Rio 2016, PyeongChang 2018 and Tokyo 2020. That's why around the world, prestigious teams and sports champions train with Technogym. In the world of football, the company is the official fitness equipment supplier of Juventus, Inter Milan and Paris St. Germain, among others. Additionally, Technogym has been working alongside the Ferrari and McLaren Formula 1 teams for many years.

**MEH:** How does your equipment cater to the diverse range of sports disciplines practiced by elite athletes, from endurance sports to strength-based activities?

■ **NA:** Starting with science and our experience, and thanks to the most innovative digital technologies, we are able to build a tailor-made workout for each athlete based on his/her personal goals and needs. These workouts can be designed down to the smallest detail to ensure maximum

results. We call this Precision Training: a workout precisely tailored to each individual – athlete, amateur or beginner – and accessible, thanks to the Technogym Ecosystem, at any place and time: at home, in the gym or outdoors.

**MEH:** What feedback have you received from sports professionals regarding the effectiveness of your equipment in improving their strength, agility, and overall athletic performance?

■ **NA:** The Olympics for us is like Formula 1 for the car industry. We follow the most important champions and competitions, and the research and experience made in the professional field helps us improve our products for everybody. For example, starting from our experience with elite runners and triathletes we developed Technogym Run, our new treadmill to train athletic performance at home with a unique running surface that adapts to the runner's stride; the same applies to Biostrength, our new AI-based strength-training range fitted with specific advanced training protocols.

**MEH:** How does your company stay ahead of the evolving needs and trends in the sports community to continually innovate and improve what your equipment can do?

■ **NA:** "When it works, it's obsolete": this is our motto. This means that, in order to always stay ahead, when a product

or a technology is at its top, it's time to change...waiting until it starts declining would be too late to change. Innovation has always been the engine that drives Technogym's growth. I started up Technogym in my home garage as a mechanical company, then we introduced electronics, then software, then digital and cloud-based technology, and today, media content and AI, to fully personalize people's training experiences in fitness, sport and health.

**MEH:** Technogym celebrates its 40th anniversary this year. Congratulations! As we are a health-focused magazine – can you elaborate on how your fitness equipment promotes overall health and well-being beyond simply enhancing athletic performance?

■ **NA:** Today, health is more than ever the number one priority for people. There is an increased awareness of the benefit of physical exercise. People are more informed, but also at an institutional level, governments and local authorities are understanding that investing in health and disease prevention is a great tool to reduce public healthcare costs that are likely to become unsustainable in the future as the population ages. When it comes to health, being able to prescribe precise exercise protocols to treat specific conditions and diseases is fundamental. Technogym has a strategic advantage in the health field thanks to its unique digi-





Nerio Alessandri, founder of Technogym, observes the company's official fitness equipment supplier relationship with the Olympic Games.



Olympic athletes train on Technogym equipment

tal Ecosystem that allows professionals to prescribe precise exercises or training programmes based on the needs of each user and at the same time the user can keep track of their movement and improvement.

**MEH:** Technogym is the official and exclusive fitness equipment partner for the Paris 2024 Olympic and Paralympic Games – the ninth time it has been an Olympic Games partner. What specific role does your equipment play in supporting the diverse training needs of athletes from various countries and sports disciplines as they prepare for the Olympic Games?

■ **NA:** Technogym has been appointed Official Supplier to the Paris 2024 Olym-

pics for the ninth time for three reasons:

- Thanks to its global footprint the Technogym brand is known by athletes around the world. This enables Olympic athletes to train during the Olympics with equipment that they already know very well, ensuring them a high level of performance and results.

- Our products are the most innovative and safe in the market, which makes this the perfect solution for a such a huge and important sports event.

- With 40 years of history, Technogym has become the brand of reference in the sport and fitness fields. With such a strong legacy, it can be relied upon to deliver the best training experience to athletic champions and people around the world.

In fact, Technogym's commitment to the Olympic Games goes far beyond the supply of equipment and technology. Our association with the Olympics has become a powerful communication platform through which we can leverage sports to achieve our ultimate mission: to involve the global population in physical activity.

**MEH:** Are there any innovative initiatives in fitness equipment technology that have been introduced as part of your collaboration with the Olympic Games to enhance the training environments for athletes?

■ **NA:** There are many examples. Kinosis is one. This is our unique, patented solution to train strength, balance and flexibility thanks to a free cable system, which was born from the idea of allowing people to train with total freedom of movement. This enables a range of exercises from simple exercises to the simulation of specific athletic gestures. Another example is the Skill range – our athletic performance line for both professional and amateur athletes that has been designed for athletes based upon the needs and feedback of athletes.

**MEH:** How does your partnership with the Olympic Games align with your company's mission and values, particularly in promoting health, fitness, and athletic excellence on a global scale?

■ **NA:** Technogym is a Wellness company. Its mission is to help people to live better and longer lives through physical activity, healthy lifestyle, and positive mental attitude. At the same time, the Olympic Games are committed to creating a healthy sporting culture for everyone. Now more than ever this is something central in our lives. This close relationship, spanning almost two decades, is the result of closely matching values. In fact, Technogym's commitment to the Olympic Games goes far beyond the supply of equipment and technology. Our association with the Olympics has become a powerful communication platform through which we can leverage sports to achieve our ultimate mission: to involve the global population in physical activity. **MEH**

# AI flags patient deterioration, improves physician and nurse collaboration

With large language models that take notes during patient visits and algorithms that identify disease, artificial intelligence has begun to prove its worth as an assistant for physicians. A new study from Stanford Medicine shows the potential of AI as a facilitator – one that helps doctors and nurses connect to achieve more efficient, effective patient care.

The study, published in *JAMA Internal Medicine*<sup>1</sup>, describes an AI-based model in use at Stanford Hospital that predicts when a patient is declining and flags the patient’s physicians and nurses. Ron Li, MD, a clinical associate professor of medicine and medical informatics director for digital health who is the senior author on the study, said the alert system helps clinicians connect more efficiently and effectively as well as intervene to prevent patients from deteriorating and landing in the intensive care unit.

Dr Li, who worked with informatics postdoctoral scholar and lead author Robert Gallo, MD, on the evaluation, discussed their team’s approach to harnessing the algorithm and how it fosters clinician connection in a ceaselessly buzzing hospital environment. Lisa Shieh, MD, PhD, clinical professor of medicine; Margaret Smith, director of operations for primary care and population health; and Jerri Westphal, nursing informatics manager, also helped lead the study and the implementation of the AI system.

## What is a deterioration model and how does AI fit in?

The algorithm is a prediction model that pulls data – such as vital signs, information from electronic health records and lab results – in near-real time to predict whether a patient in the hospital is about to suffer a health decline. Physicians aren’t able to

monitor all of these data points for every patient all of the time, so the model runs in the background, looking at these values about every 15 minutes. It then uses artificial intelligence to calculate a risk score on the probability the patient is going to deteriorate, and if the patient seems like they might be declining, the model sends an alert to the care team.

## What’s the benefit of having such a model run in a hospital?

The big question I want to answer is: “How do we use AI to build a more resilient health system in high-stakes situations?” There are many ways to do that, but one core characteristic for a resilient system is strong communication channels. This model is powered by AI, but the action it triggers, the intervention, is basically a conversation that otherwise may not have happened.

Nurses and physicians have conversations and handoffs when they change shifts, but it’s difficult to standardize these communication channels due to busy schedules and other hospital dynamics. The algorithm can help standardize it and draw clinicians’ attention to a patient who may need additional care. Once the alert comes into the nurse and physician simultaneously, it initiates a conversation about what the patient needs to ensure they don’t decline to the point of requiring a transfer to the ICU.

## How did your team implement and evaluate the model?

We integrated this model – which we did not create – into our workflow, but with a few tweaks. Originally, it sent an alert when the patient was already deteriorating, which we didn’t find very helpful. We adjusted the model to focus on predict-

ing ICU transfers and other indicators of health decline.

We wanted to ensure the nursing team was heavily involved and felt empowered to initiate conversations with physicians about adjusting a patient’s care. When we evaluated the tool, which we had running for almost 10,000 patients, we saw a significant improvement in clinical outcomes – a 10.4% decrease in deterioration events, which we defined as transfers to the ICU, rapid response team events, or codes – among a subset of 963 patients with risk scores within a “regression discontinuity window,” which basically means they’re at the cusp of being high risk. These are patients whose clinical trajectory may not be as obvious to the medical team. For that group of patients, this model was especially helpful for encouraging physicians and nurses to collaborate to determine which patients need extra tending.

## How have nurses and physicians responded to the integration of this new model?

The model is far from perfect. The reactions have overall been positive, but there is concern about alert fatigue, since not all alerts are flagging a real decline. When the model was validated on data from patients prior to implementation, we calculated that about 20% of patients flagged by the model did end up experiencing a deterioration event within six to 18 hours. At this point, even though it’s not a completely accurate model, it’s accurate enough to warrant a conversation. It shows that the algorithm doesn’t have to be perfect for it to be effective.

With that said, we want to improve the accuracy; you need to do that to improve trust. That’s what we’re working on now. MEH

## Reference:

1. Gallo RJ, Shieh L, Smith M, et al. Effectiveness of an Artificial Intelligence–Enabled Intervention for Detecting Clinical Deterioration. *JAMA Intern Med*. Published online March 25, 2024. doi: <https://doi.org/10.1001/jamainternmed.2024.0084>



# SyntheMol AI generates 6 completely new antibiotics that kill *Acinetobacter baumannii*

With nearly five million deaths linked to antibiotic resistance globally every year, new ways to combat resistant bacterial strains are urgently needed.

Researchers at Stanford Medicine and McMaster University are tackling this problem with generative artificial intelligence. A new model, dubbed SyntheMol (for synthesizing molecules), created structures and chemical recipes for six novel drugs aimed at killing resistant strains of *Acinetobacter baumannii*, one of the leading pathogens responsible for antibacterial resistance-related deaths.

The researchers described their model and experimental validation of these new compounds in a study <sup>[1]</sup> published March 22 in the journal *Nature Machine Intelligence*.

“There’s a huge public health need to develop new antibiotics quickly,” said James Zou, PhD, an associate professor of biomedical data science and co-senior author on the study. “Our hypothesis was that there are a lot of potential molecules out there that could be effective drugs, but we haven’t made or tested them yet. That’s why we wanted to use AI to design entirely new molecules that have never been seen in nature.”

Before the advent of generative AI, the same type of artificial intelligence technology that underlies large language models like ChatGPT, researchers had taken different computational approaches to antibiotic development. They used algorithms to scroll through existing drug libraries, identifying those compounds most likely to act against a given pathogen. This technique, which sifted through 100 million known compounds <sup>[2]</sup>, yielded results but just scratched the surface in finding all the chemical compounds that could have antibacterial properties.

“Chemical space is gigantic,” said Kyle Swanson, a Stanford computational science doctoral student and co-lead author on the study. “People have estimated that there are close to 10<sup>60</sup> possible drug-like molecules. So, 100 million is nowhere close to covering that entire space.”

## Hallucinating for drug development

Generative AI’s tendency to “hallucinate”, or make up responses, could be a boon when it comes to drug discovery, but previous attempts to generate new drugs with this kind of AI resulted in compounds that would be impossible to make in the real world, Swanson said. The researchers needed to put guardrails around SyntheMol’s activity – namely, to ensure that any molecules the model dreamed up could be synthesized in a lab.

“We’ve approached this problem by trying to bridge that gap between computational work and wet lab validation,” Swanson said.

## Recipes to produce the drugs

The model was trained to construct potential drugs using a library of more than 130,000 molecular building blocks and a set of validated chemical reactions. It generated not only the final compound but also the steps it took with those building blocks, giving the researchers a set of recipes to produce the drugs.

The researchers also trained the model on existing data of different chemicals’ antibacterial activity against *A. baumannii*. With these guidelines and its building block starting set, SyntheMol generated around 25,000 possible antibiotics – and the recipes to make them – in less than nine hours. To prevent the bacteria from quickly developing resistance to the new compounds, researchers then filtered the generated compounds to only those that were dissimilar from existing compounds.

“Now we have not just entirely new molecules, but also explicit instructions for how to make those molecules,” Zou said.


## A new chemical space

The researchers chose the 70 compounds with the highest potential to kill the bacterium and worked with the Ukrainian chemical company Enamine <<https://enamine.net>> to synthesize them. The company was able to efficiently generate 58 of these compounds, six of which killed a resistant strain of *A. baumannii* when researchers tested them in the lab. These new compounds also showed antibacterial activity against other kinds of infectious bacteria prone to antibiotic resistance, including *E. coli*, *Klebsiella pneumoniae* and MRSA.

The scientists were able to further test two of the six compounds for toxicity in mice, as the other four didn’t dissolve in water. The two they tested seemed safe; the next step is to test the drugs in mice infected with *A. baumannii* to see if they work in a living body, Zou said.

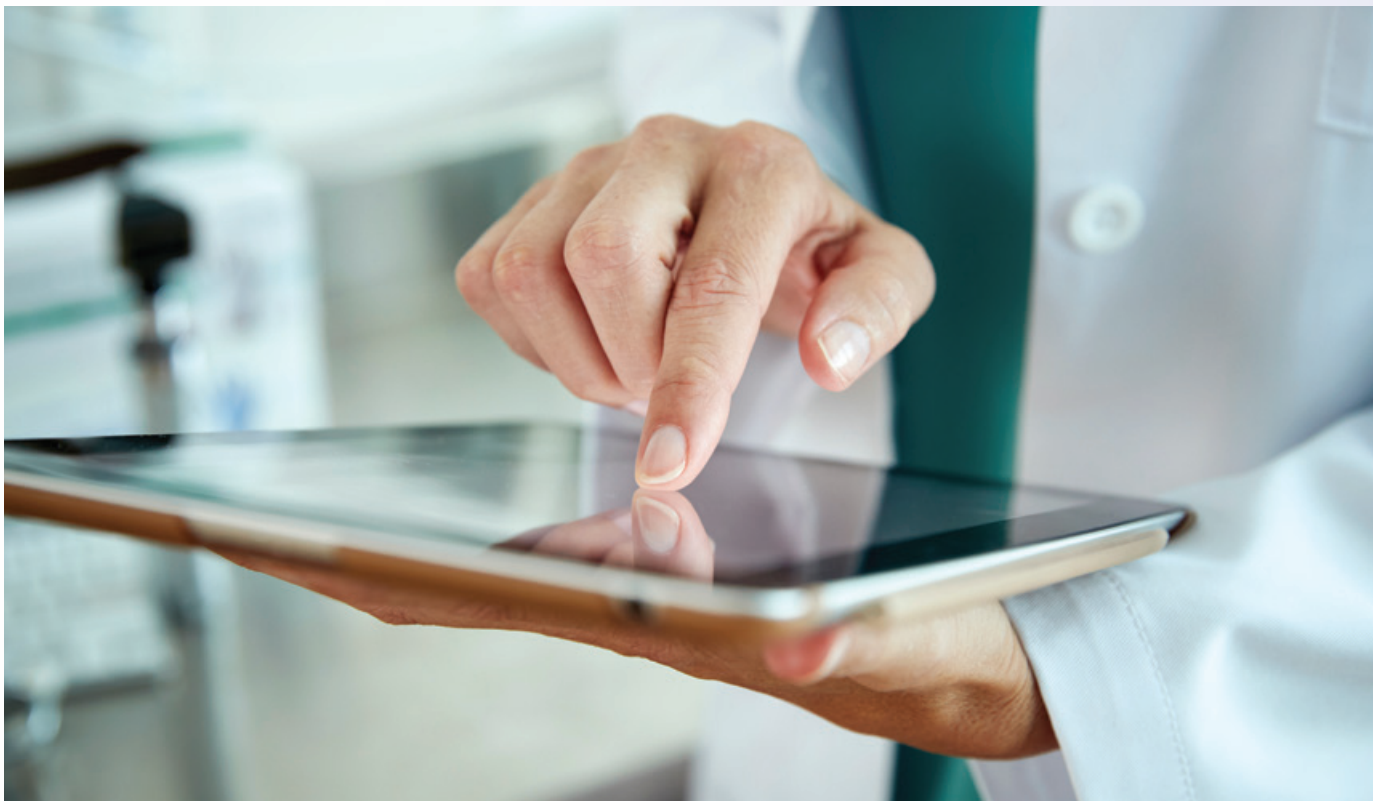
The six compounds are vastly different from each other and from existing antibiotics. The researchers don’t know how their antibacterial properties work at the molecular level, but exploring those details could yield general principles relevant to other antibiotic development.

“This AI is really designing and teaching us about this entirely new part of the chemical space that humans just haven’t explored before,” Zou said.

Zou and Swanson are also refining SyntheMol and broadening its reach. They’re collaborating with other research groups to use the model for drug discovery for heart disease and to create new fluorescent molecules for laboratory research. 

## References:

1. Swanson, K., Liu, G., Catacutan, D.B. et al. Generative AI for designing and validating easily synthesizable and structurally novel antibiotics. *Nat Mach Intell* 6, 338–353 (2024). <https://doi.org/10.1038/s42256-024-00809-7>
2. doi: <https://doi.org/10.1016/j.cell.2020.01.021>



# Clinical authors are the trusted foundation for generative AI adoption

A new survey shows physicians are optimistic about using generative AI in healthcare clinical decision-making and patient care, but having a trusted content source is key to adoption.

Generative artificial intelligence (GenAI) is poised to transform the healthcare industry and the way clinicians deliver care. An analysis by McKinsey suggests there is an unrealized \$1 trillion of improvement potential within the healthcare industry through efficiencies like better data interpretation, automating tedious work, and more quickly surfacing the latest research to clinicians' fingertips. However, unless the technology is helpful in clinical service and can improve the accuracy of outcomes, diagnoses, and treatments, it won't be adopted or leveraged to its fullest potential.

One key element of any technology adop-

tion is trust, and GenAI is no different. A new survey commissioned by Wolters Kluwer asked practicing U.S. physicians in large hospitals and health systems about their perceptions of the use of GenAI in healthcare – the result was generally optimism alongside a heavy dose of scepticism about the content sources. Understanding physician perceptions and concerns is key for any organization looking to implement GenAI across their care teams.

## The benefits of GenAI at the point of care

The benefits and new opportunities for GenAI to support physicians at the point

of care has been widely reported on, from Google partnering with the Mayo Clinic to interpret health data more quickly to improving clinical notes and documentation. The survey found physicians are generally optimistic towards the new technology, with 68% reporting they are more likely to see GenAI as beneficial compared to how they felt a year prior.

Physicians see how they can save time by using GenAI to quickly search medical literature (68%) and surface data to assist in clinical decision making (54%). There are also wider benefits for care teams. 81% of physicians surveyed said



they felt GenAI can help improve care team interactions with patients and almost half (46%) said it can help coordinate scheduling across teams to facilitate timely care.

### Sources matter: Clinician experts as the foundation of GenAI content


But where physicians are more selective about GenAI tools comes down to a key component: the source material the technology relies on.

Many reports have been released about “hallucinations” in GenAI – where the AI generates content that can seem realistic, but is actually fabricated information based on trained language patterns. The consequences to healthcare could be dire, and addressing this issue head-on is key: what is the source material the technology is surfacing and can it be trusted?

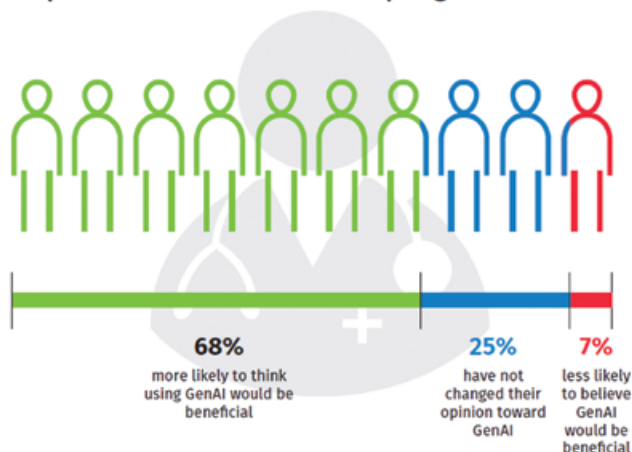
Before using GenAI in clinical decisions, 91% of physicians surveyed would have to know the source materials were created by doctors and medical experts. For the majority of physicians (58%), knowing the content was created by medical professionals was the number one factor in selecting a GenAI tool.

Source transparency also matters. 89% of physicians said they would be more likely to use GenAI in clinical decision-making if the technology vendor was transparent about where the information came from, who created it, and how it was sourced.

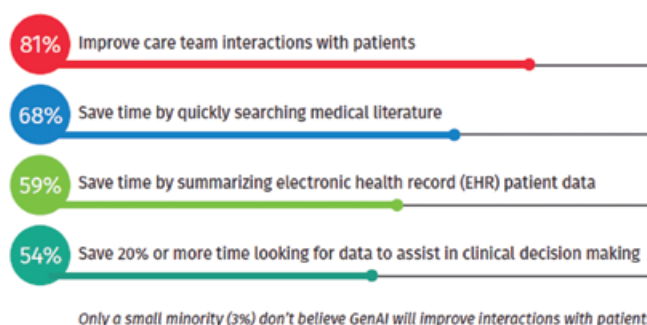
### For patient care, the right GenAI technology partner is key

To be successful, healthcare leadership would benefit from taking physician input into consideration when assessing GenAI solutions for their care teams. The foundation of any new technology and its successful implementation is being able to trust the information sources and the vendor. In this case, having a trusted solution that harnesses GenAI to more efficiently surface the latest clinical insights and care recommendations compiled by experts can become a trusted, efficient resource for care teams. 

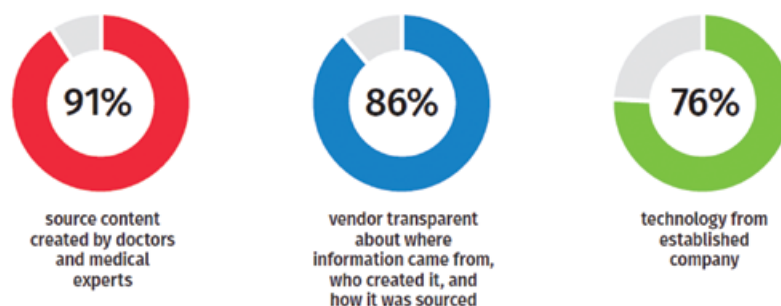
**Physician perceptions toward the use of GenAI are shifting rapidly. In just the last year, the majority of physicians have grown more receptive toward the idea of adopting GenAI in healthcare.**



**Physicians see strong potential for GenAI to save time, improve interactions at the point of care and support decision making.**



**Despite their enthusiasm, physicians are wary of which GenAI tools they would be comfortable using. What would make doctors more comfortable?**



- To learn more, download the full executive brief, get the free infographic, and learn how Wolters Kluwer is incorporating GenAI <<https://bit.ly/4a6ZcQP>> into its trusted decision support solution, UpToDate <<https://bit.ly/3WtBPxP>>.

# A small robot smart car can reduce children's stress before surgery



Undergoing medical treatment, having surgery or simply being admitted to hospital are situations that make children fearful and anxious, especially during early childhood. And in addition to having a short-term impact, their subsequent psychological, social and educational development may also be affected.

To overcome this problem, an international team of researchers working with Sant Joan de Déu Barcelona Children's Hospital have developed and tested a small robot vehicle which aims to reduce stress among children aged between 3 and 10 years old before they undergo minor surgical procedures.

According to the results of this first pilot test<sup>[1]</sup>, this type of robot could be a successful strategy for reducing anxiety and fear before surgery, and could be an effective alternative to the medication strategies commonly used to relax children.

This first prototype also provides information about the potential and challenges involved in integrating affective technologies in paediatric hospital environments.

"Children are admitted to hospital, which is already an unwelcoming environment for them, and they have to go with people they don't know, like medical staff, and undergo unpleasant procedures, such as an injection. This all creates situations of stress which can end up causing chronic pain in the long term," explained Jordi Albo, the scientific director of Lighthouse DIG and co-principal investigator of the project.

"We try to minimize the stress that children experience during this process by using a robot car that changes colour, makes music and creates smells, and talks to them and interacts with them," Albo, an expert in social robots, explained.

## Children's stress before surgery

According to a study conducted by Sant Joan de Déu Barcelona Children's Hospital, six out of ten young patients who have to undergo surgery suffer from stress before they receive anaesthesia. The hospital has explored various alternatives in order to improve the children's emotional state, ranging from doing activities and playing games with the children before surgery to therapies involving dogs and clowns, and even letting parents into the operating theatre.

However, the most widely used strategy is usually pharmacological, which can paradoxically make the children's experience even more stressful due to the bitter taste of the drugs used and their side effects.

Previous studies had already shown that using small motorized electric vehicles is effective in reducing children's unease. The researchers used those results as the basis for developing their prototype, as well as the research on assisted driving for adults that was being carried out at the Massachusetts Institute of Technology (MIT) Media Lab.

"We installed AI and sensors in our robotic car, as well as a surface for interaction. This enables the car to capture the child's

facial expressions, heart rate and breathing patterns, which are indicators of their emotions, and adapt to how the child is feeling by changing the music, or colours, or producing smells to help them relax," said Àgata Lapedriza, researcher at the Universitat Oberta de Catalunya (UOC), member of its Faculty of Computer Science, Multimedia and Telecommunications, and leader of the Artificial Intelligence for Human Wellbeing (AIWELL) research group at the UOC's eHealth Center.

The project is an example of affective computing "which focuses on developing AI systems that perceive emotions, understand emotions and can respond to emotions in an emotionally intelligent way", said Lapedriza, who led the project with Albo.

The participants involved in designing the vehicle included doctors, nurses and experts in affective computing, social robotics, data science, sensor design, machine learning and computer vision. The prototype was manufactured by the Hyundai car company in South Korea, and sent to Sant Joan de Déu Barcelona Children's Hospital, where it was tested with 86 children between 3 and 9 years old (mean age of 5.23 years) who had to undergo a procedure between December 2020 and May 2023.

## Positive effects on both the children and their parents

"Driving the car into the operating theatre had positive effects on both the children and their parents," said Carmen



# Bariatric surgery-induced upregulation of apoA-IV is beneficial for insulin secretion and energy expenditure

Bariatric surgery has emerged as an effective means of reducing weight in morbidly obese individuals, while also significantly improving diabetes. Currently, laparoscopic sleeve gastrectomy (LSG) and Roux-en-Y gastric bypass (RYGB) are two of the most commonly performed bariatric surgeries. Both LSG and RYGB can result in weight loss as well as improvements in glycaemic control and metabolic levels in individuals with obesity and type 2 diabetes, but the exact mechanism is unclear.

In a recent paper<sup>[1]</sup> published in *Life Metabolism*, the researchers found that apolipoprotein A-IV (apoA-IV) was significantly increased in diabetic obese patients after LSG, and similar changes were observed in patients after RYGB. Furthermore, apoA-IV and its derivative peptide, T55-121, improved energy expenditure and glucose tolerance in diabetic mice. It has been known that apoA-IV is synthesized primarily by enterocytes in the small intestine and dietary lipids stimulate its production. Several studies have shown that apoA-

IV regulates blood glucose levels. However, whether and how apoA-IV enhances insulin secretion in humans is still unknown. The study provides strong evidence of the relationship between apoA-IV and glycaemic control.

The researchers first performed proteomic analysis of sera from patients before and after LSG or RYGB surgery. The data consistently showed a significant increase in apoA-IV levels and long-term improvement in glycaemic control. Subsequently, the potential role of apoA-IV in improving glucose homeostasis was further explored through direct administration of exogenous apoA-IV and *in vivo* overexpression of apoA-IV using adeno-associated viruses (AAVs). All the results showed that apoA-IV could improve glucose tolerance in both wild-type and diabetic mice.

Next, the researchers investigated whether apoA-IV is involved in insulin secretion and the potential mechanism. The results showed that apoA-IV acted on pancreatic  $\beta$ -cells partly through the Gs-coupled GPCR/cAMP (G protein-coupled receptor-cyclic adenosine monophosphate) pathway,

thereby promoting insulin secretion.

Since glucose metabolism plays a crucial role in energy homeostasis, the study sought to determine whether apoA-IV affects energy homeostasis in the body. Through indirect calorimetry, a significant increase in oxygen consumption (VO<sub>2</sub>), carbon dioxide production (VCO<sub>2</sub>), and heat expenditure (HE), as well as a significant increase in metabolic rate, was found in apoA-IV-treated mice, suggesting that apoA-IV enhanced energy expenditure. Finally, the researchers used Gaussian network modelling (GNM) to predict apoA-IV functional peptides, indicating that the truncated peptide 55-121 (T55-121) could be a potential functional peptide of apoA-IV in mice. After a glucose tolerance test, T55-121 improved glucose tolerance, promoted insulin secretion from MIN6 cells, and increased oxygen consumption, which was consistent with full-length apoA-IV's enhanced energy expenditure. All these data provide new therapeutic ideas and strategies for improving glucose homeostasis. **MEH**

## Reference:

1. Zhen Cao et al. (2024) Apolipoprotein A-IV and its derived peptide, T55-121, improve glycemic control and increase energy expenditure. *Life Metabolism*. <https://doi.org/10.1093/lifemeta/loae010>.

Jerez, a paediatric nurse at Sant Joan de Déu Barcelona Children's Hospital. "It gave the children the feeling of control, of being in the driving seat, and having an active role in the process without realizing it, in a way that was fun. The parents were able to walk with them, talking about their driving, and they could see that their child was experiencing less anxiety and fear."

Despite the pitfalls the project had to address, such as a large proportion of the study taking place during the Covid pandemic and the masks worn by children preventing the sensors from capturing facial expressions, the scientists behind the project, whose results were presented at the Human-Robot Interaction conference in Colorado in mid-March, believe that the

smart car has proven that it could be an effective and scalable strategy for reducing children's stress before surgery.

"The pilot project has enabled us to evaluate the adoption response of this type of technology in a real hospital environment, and to fine-tune the design of the robot, see which sensors are useful and which ones aren't, and which actions are viable and which ones aren't," concluded Lapedriza,

who is also a principal research scientist at Northeastern University in Boston, US.

The next step is to manufacture a new prototype, applying all the conclusions drawn from the pilot test in order to conduct a clinical trial. However, the project is currently on hold due to a lack of funding.

This project contributes to United Nations Sustainable Development Goals (SDGs) 3, Good Health and Well-being **MEH**

## Reference:

1. Agata Lapedriza et al. Deploying a Robotic Ride-on Car in the Hospital to Reduce the Stress of Pediatric Patients before Surgery. HRI '24 Companion. <https://dl.acm.org/doi/abs/10.1145/3610978.3641081>

## YouTube

Watch a short video of the stress-relieving paediatric smart car: [https://youtu.be/xHy9Bx4wH5A?si=uVBMml8lmLLeg\\_fm](https://youtu.be/xHy9Bx4wH5A?si=uVBMml8lmLLeg_fm)



# Researchers develop wearable technology to assesses surgeons' posture during surgery

Researchers at Baylor College of Medicine in collaboration with the University of Arizona led a study that can help surgeons obtain biofeedback of their posture during long surgical procedures. Ultimately, the aim is to reduce the stress associated with maintaining static postures while operating.

Published in the *Journal of Neurosurgery: Spine*, <<https://doi.org/10.3171/2024.1.SPINE231001>> this pilot study evaluated the feasibility of using wearable technology to assess the posture of neurosurgeons during long spine and cranial procedures. The findings show that wearable technology is a feasible and reproducible approach to provide objective feedback necessary to raise postural awareness and implement protocols focused on correcting posture to

prevent musculoskeletal issues in surgeons.

“Wearable technology can identify those periods when neglected postures are more prevalent, enabling prompt correction,” said first author of the work, Dr Alejandro Zulbaran-Rojas, research associate in the Michael E DeBakey Department of Surgery.

Although neurosurgeons are aware that static postures cause significant harm, the methodology for assessing their posture is suboptimal. The present study used wearable technology to quantify neurosurgeon upper body spasticity, or muscle stiffness, either when leaning forward or backward.

Ten neurosurgeons, including five attendings and five trainees, were recruited and equipped with two wearable sensors attached to the back of their head and their upper back. The sensors collected

the average time spent in extended, neutral and flexed static postures during spine and cranial procedures.

## Static posture

The researchers successfully collected and analyzed 16 of 20 possible recordings from 11 procedures (eight spine, three cranial). “We found that surgeons remained in a static posture approximately 52.1% (38 minutes) and 53.2% (77.6 minutes) of active surgical time during spine and cranial procedures, respectively,” Zulbaran said. “This is a considerable amount of time given that the American College of Surgeons recommends avoiding prolonged static postures by taking mini-breaks at least every 30 minutes to incorporate range-of-motion stretches.”



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The present study also showed that taller neurosurgeons spent longer time in flexed and extended positions during cranial surgery.


Zulbaran explained: “Objective biofeedback can guide surgeons in adjusting their posture in relation to the table height to improve their ergonomics, the interactions with the equipment they use in surgical practice, especially in procedures in which there is constant position switching (standing to sitting and vice versa), as well as tailoring interventions based on specific procedures and level of expertise.”

#### Detecting incorrect motion patterns

“Maintaining an ideal, perfectly straight posture might seem intuitive, but the reality is that surgical procedures often require a range of body positions to access different anatomical structures effectively,” Zulbaran said. “Wearable technology can provide self-awareness of static positions that are not always captured or assumed by a simple view. Detecting incorrect motion patterns at early career stages may help emerging surgeons correct their posture and avoid long-term injuries.”

Corresponding author Dr Bijan Najafi, professor in the Michael E. DeBakey Department of Surgery, commented: “The potential impact and implications of our findings are significant for surgical practice and training. Using wearable technology to monitor and analyze surgeons’ posture offers a proactive approach to preventing the onset of musculoskeletal disorders such as back and neck pain. This could lead to improved surgeon health and well-being, enhanced performance and potentially extended career longevity. Additionally, personalized training programmes derived from wearable data could revolutionize surgical education, equipping novice surgeons with the tools to adopt optimal postural habits from the outset of their careers.”

Future studies are needed to evaluate the use of this wearable technology in other specialties.

Mohammad D. Rouzi, Mohsen Zahiri, Abderrahman Ouattas, Christina M. Walter, Hung Nguyen, Sanam Bidadi and G. Michael Lemole also contributed to this work. The authors are affiliated with Baylor College of Medicine or University of Arizona College of Medicine. 

## How to track and control nano robots and surgical instruments inside the body

In the medicine of the future, tiny robots will navigate independently through tissue and medical instruments will indicate their position inside the body during surgery. Both require doctors to be able to localize and control the devices precisely and in real time. Until now, there has been no suitable method for this. Scientists from the German Cancer Research Center (DKFZ) have now described a signalling method based on an oscillating magnet that can significantly improve such medical applications.

What until recently sounded like science fiction is now well advanced in development: Nanorobots that move independently through the body are expected to transport drugs, take measurements in tissue or perform surgical procedures. Magnetically driven nanorobots that navigate through the muscle, through the vitreous body of the eye or through the blood vessel system have already been developed.


However, there is a lack of sophisticated systems to track and control the activities of the robots deep inside the body in real time. Traditional imaging techniques are only suitable to a limited extent. Magnetic resonance imaging (MRI) is limited in temporal resolution, computer tomography (CT) is associated with radiation exposure and the strong scattering of sound waves limits the local resolution of ultrasound.

#### Small-Scale Magneto-Oscillatory Localization

A team led by Tian Qiu from the DKFZ, Dresden site, has now invented a new method to solve this problem. The tiny device they have developed is based on a magnetic oscillator, i.e. a mechanically oscillating magnet located in a millimetre-sized housing. An external magnetic field can excite the magnet to vibrate mechanically. When the oscillation subsides again, this signal can be recorded with magnetic sensors. The basic principle is comparable to nuclear magnetic resonance in MRI. The researchers refer to the method as “Small-Scale Magneto-Oscillatory Localization” (SMOL).

SMOL allows the position and orientation of the small device to be determined at a great distance (over 10 cm), very precisely (less than 1 mm) and in real time. In contrast to tracking methods based on static magnets, SMOL can detect movements in all six degrees of freedom and with significantly higher signal quality. As the device is based on weak magnetic fields, it is harmless to the body, wireless and compatible with many conventional devices and imaging techniques.

“There are many possible applications for the SMOL method,” said Felix Fischer, first author of the publication. “We have already integrated the system into miniature robots and instruments for minimally invasive surgery. A combination with capsule endoscopes or the marking of tumour tissue for very precise radiotherapy would be conceivable. Our method could also provide a decisive advantage for fully automated surgical robotics or augmented reality applications.”

“SMOL only requires comparatively simple technical equipment. Due to its dimensions in the millimetre range, the oscillator can be integrated into many existing instruments, and there is still potential for further miniaturization. Thanks to its precise spatial and temporal resolution, our technique has the potential to significantly advance many medical procedures of the future,” said Tian Qiu, senior author of the publication. 

#### Reference:

F. Fischer, C. Gletter, M. Jeong, T. Qiu. Magneto-oscillatory localization for small-scale robots. *npj Robotics* 2024, doi: <https://doi.org/10.1038/s44182-024-00008-x>





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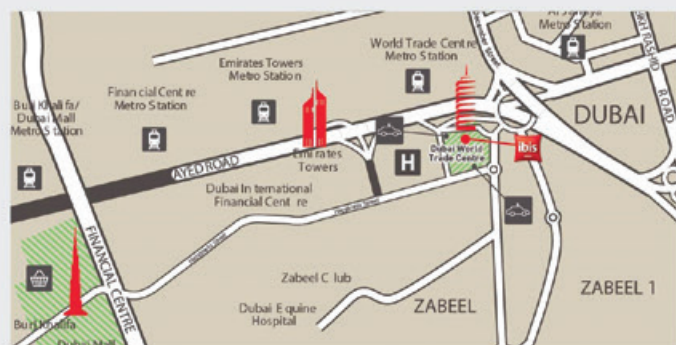
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# The clinical impact of OMRON COMPLETE 2 in 1 ECG + Blood Pressure Monitor on Atrial Fibrillation Management

## Integrating OMRON COMPLETE into cardiac care

OMRON COMPLETE is an innovative 2-in-1 device that combines a home blood pressure monitor with a 1-lead electrocardiogram (ECG). Designed to address the critical needs in the management of atrial fibrillation (AFib) – the most common type of serious arrhythmia – this tool is pivotal in early detection and continuous monitoring of patients, significantly enhancing cardiac care.

### Evidence-based impact

Clinical studies underscore the effectiveness of OMRON COMPLETE in identifying atrial fibrillation. One such study involved 1,607 elderly patients, where the device detected AFib with a remarkable 100% sensitivity and 86% specificity. This capability is crucial, especially considering that many AFib patients are initially asymptomatic and that AFib significantly increases the risk of stroke and heart failure.



- **Irregular Heartbeat Detection:** Automatically detects and alerts for irregular heart rhythms, enhancing diagnostic precision.
- **Clinical Validation:** Backed by clinical research that supports its accuracy and effectiveness in detecting and monitoring AFib.

### Supporting long-term patient management

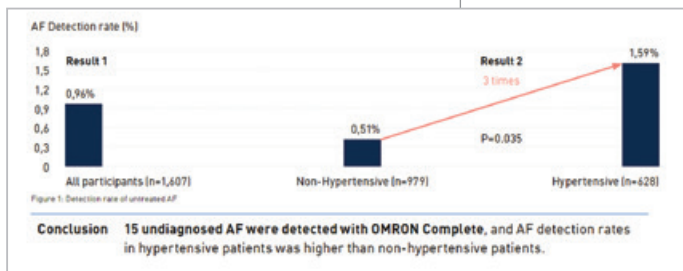
OMRON COMPLETE's ability to monitor and record blood pressure and cardiac electrical activity concurrently is particularly beneficial for patients with comorbid conditions such as hypertension, which is present in 60-80% of AFib cases. The device's comprehensive monitoring capabilities enable healthcare providers to develop personalized and effective treatment plans, reduce the risk of stroke by early detection, and manage the overall cardiovascular health of their patients.

lowering hospital visits and reducing healthcare costs through effective outpatient monitoring.

### Why OMRON COMPLETE is essential for modern healthcare

OMRON COMPLETE is not just a medical device; it is a comprehensive healthcare solution that aligns with the current needs of patient management and the technological advancements in medical practice. By integrating this device into regular patient care, healthcare providers can significantly enhance the quality of care, especially for patients at risk of or living with atrial fibrillation. It is a critical tool that supports the proactive management of cardiovascular health, empowering both patients and healthcare providers with accurate, reliable, and actionable health data.

OMRON COMPLETE offers a prime example of how integrated medical devices can facilitate better patient outcomes and transform the approach to healthcare delivery, making it a valuable addition to any medical practice focusing on cardiovascular health and chronic disease management. **MEH**



### Key features of OMRON COMPLETE:

- **Dual Functionality:** Integrates blood pressure and ECG monitoring in one device, facilitating simultaneous assessments.
- **High Clinical Accuracy:** Matches the diagnostic capability of traditional 12-lead ECGs as interpreted by cardiologists.
- **Mobile Connectivity:** Compatible with the Omron Connect app, allowing for seamless data sharing between the device and healthcare providers.
- **User-Friendly Interface:** Designed for easy use at home, encouraging patient engagement and compliance.
- **Memory Storage:** Capable of storing up to 90 readings, aiding in the tracking of patient health data over time.

### Facilitating improved healthcare delivery

The connectivity of OMRON COMPLETE with healthcare systems via the Omron Connect app is transformative. It enables real-time data transmission and access to historical health data, crucial for remote patient monitoring and telehealth applications. This technology supports healthcare professionals in making informed decisions quickly, potentially





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Neurocognitive Rehabilitation -  
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