



The future unmasked
Predicting the future of
healthcare and life sciences
in 2025

Prediction One
From health(care) to healthy ageing

Deloitte Centre *for*
Health Solutions

Foreword

Welcome to our first prediction *From health(care) to healthy ageing* from our report, *The future unmasked: predicting the future of healthcare and life sciences in 2025*. This is the first of ten predictions, all of which have been informed by emerging evidence of the impact of the COVID-19 pandemic on society and the health ecosystem. They have also been shaped by our research insights including our global 2040 Future of Health campaign. This first prediction looks at what we expect the world in 2025 to feel like for people attempting to manage their own health risks and adopt a more proactive and preventative approach to their health.

The COVID-19 pandemic has raised people's awareness on the risks posed by having a chronic condition or a poor immune system. This has shifted attention to the impact of the social determinants of health on health inequalities. Consequently, in 2025 there has been a shift in focus to preventative measures, including vaccines, genetic testing and therapies that boost vitality, wellness and immune health, encouraged by payer incentives, role models and many consumers sense for a longer, healthier life.

This first prediction is brought to life through a series of portraits of the experience of individuals in 2025, with reference to the evidence today to predict what the future might look like tomorrow.

Stay tuned for the subsequent predictions in our series of ten.

Karen Taylor

Director
UK Centre for Health Solutions
+44 (0) 7825 793729
kartaylor@deloitte.co.uk

Hanno Ronte

Partner
Life Sciences and Healthcare
+44 (0) 20 7007 2540
hronte@deloitte.co.uk

From health(care) to healthy ageing

Individuals are incentivised to take responsibility for their own health and lifestyle choices

Prediction: In 2025, many more people are fully informed about their health risks and take a proactive rather than reactive approach to prevention and treatment. They are well informed about their personal risks of developing chronic disease and have embraced prevention, based on hyper-personalised insights. Many individuals are focused on ageing well by maintaining their physical and mental health, including tailored levels of exercise and nutrition. There has been a shift in focus to preventative measures, including vaccines, genetic testing and therapies that boost vitality, wellness and immune health, encouraged by payer incentives, role models and many consumers sense for a longer, healthier life. Consumers also monitor their healthcare data through validated apps, wearables and other connected monitoring devices. For some individuals, data alone may not be enough to influence behaviour change and they may require further motivation for example, via a virtual health coach or a digital twin.

The world in 2025

- Consumers understand that they are largely responsible for their own health and how ageing, nutrition and exercise affect their immune health, resulting for many in healthier lifestyle choices.
- The biological science sector of the longevity industry, comprising geriatric science, regenerative and precision medicine, provides new insights to help our understanding of ageing.
- Individuals understand their genetic profile (and associated risks), and how this can be modified to improve their immune health.
- Individuals use supplements, prophylactic treatments and vaccinations to prevent disease and ensure healthy ageing.
- AgeTech provides customised digital solutions to support older people to live independently for longer.
- Individuals no longer request intermittent healthcare checks when feeling unwell: instead they deploy continuous health monitoring.
- Mental health needs are identified through a number of channels such as facial recognition technology and via apps on sleep patterns, mood and environmental factors.
- When healthcare is needed, AI chat-bots provide digital-first access to help navigate the health system, matching individuals with virtual or face-to-face services.
- Individuals have easy access to their own, portable and secure personal health information on their smartphone and decide who to share it with.

Conquered constraints

- **Skills and talent:** A coordinated set of health improvement initiatives have helped develop people's digital skills and health literacy, giving them a better understanding of their health risks and how digital technologies and therapies can improve their immune health and mitigate the risks of poor health. Numerous online health coaches, gamification and chat-bots are available to support, encourage and motivate people to maintain healthy lifestyles.
- **Funding:** As the cost of sensors and genetic testing has decreased significantly, individuals are prepared to invest their own money in therapies that will help them age well. Insurance companies and other payers give financial discounts and incentives in response to evidence of healthy lifestyles. Governments and the healthy ageing and longevity industry have become a major investor in the AgeTech industry.
- **Regulation:** Regulators have developed specialist teams focused on preventative health and fast-tracking regulatory approvals for health technology and medical devices that enable consumers to take more control of their own wellbeing. Regulators have modernised the oversight of consumer health products by developing an internationally agreed framework which segments products by their risk profiles to ensure they are safe and effective.
- **Data:** Enhanced data security and privacy settings have improved consumer confidence in using medical technologies. Connectivity in peoples' homes has been strengthened with the roll out of 5G technologies.

Imagine the world in 2025

Next generation diabetic health management through a digital programme

Tom has obesity with insulin-dependent type 2 diabetes, and has been struggling to control his condition. He experiences frequent hyperglycaemia and difficulty in doing everyday tasks. Tom's doctor suggests switching his therapy to a new 800 calories-a-day diet and exercise programme, and that they should both monitor Tom's progress via a digital programme. Since the FDA provides a 20 per cent leeway for accuracy on food calorie labels, Tom's doctor also provides him with a food scanner so that he knows the exact amount of calories and sugar in his food, and the specific macronutrients he is eating. His scanned meals are logged in his app, and after meals Tom takes a breath test via a breath analyser connected to his app. Analysis of the volatile organic compounds in his exhaled breath helps him to understand exactly which foods spike his blood glucose, and which foods he can eat regularly and which to avoid. Changes to Tom's blood glucose are monitored through a continuous glucose monitor which Tom had fitted by his digital co-ordinator. Through the app, Tom joins a virtual patient group where he learns about the risk of diabetic foot disease (DFD). He has not noticed any of the symptoms of DFD but sees that he can book an annual check-in. At his check-in, he sends in a picture of his foot and learns how to reduce the risk of developing DFD.

Biomarkers and AgeTech reversing the risk of age-related chronic conditions

Mary, 45, is concerned about her risk of developing heart disease as she has a strong family history of the condition. Mary already uses a physician-recommended AgeTech device and has noticed a gradual rise in her heart rate and blood pressure over the past year. The device connects to her smartphone and feeds data into her electronic health record. She decides to have a genetic profile and longevity test, recommended by the patient support group that she joined six months ago. The longevity test assesses four metabolic biomarkers, including cholesterol, that are associated with cardiovascular disease. Her results indicate that she is at high risk of developing heart disease within the next five years. Mary therefore requests a virtual consultation with her doctor to discuss preventative measures. Her doctor prescribes a personalised smart pill that targets each of the biomarkers, and a diet and exercise regime. Mary continues to share her health data with her doctor through her AgeTech device linked to her electronic record. At six months, Mary has a scheduled bi-annual biomarker test which shows an improvement in her condition, which enables the doctor to readjust her medication. This encourages Mary to continue with her healthy lifestyle regime.

How the microbiome can improve the immune health of a new mother and her baby

Freyja is booked to have a caesarean section (C-section) due to complications she has experienced during pregnancy. Her doctor, Dr Ahmed, advises her how babies are born has a significant impact on their gut microbes, which influence many areas of the baby's development (including neurodevelopment, immune health and future health risks). Freyja consults a recommended chatbot which explains that babies born by C-section tend to lack strains of gut bacteria found in those born via the birth canal. Instead, their guts are more likely to harbour harmful microbes that are common in hospitals. To ensure her baby can develop a healthy gut microbiome, Freyja consults Dr Ahmed who takes a cervical and vaginal swab and sends it to the hospital's lab. At the lab, scientists use an AI-enabled in-vitro diagnostic test to identify the helpful strains of bacteria from Freyja's swab that her baby may lack to create a personalised formula for Freyja to give to her baby when she is born. Dr Ahmed also mentions to Freyja that women who undergo C-sections are thought to be at increased risk of postnatal depression. Freyja arranges to speak to the clinic's dietician, Andi, who explains how the gut-brain axis impacts mental health, and how a person's microbiota can help the synthesis of serotonin and other mood influencing neurotransmitters. Andi formulates a personalised daily solution of pre- and pro-biotics to help keep Freyja's gut microbiota in balance, protect her mental health and improve her overall immune system.

Evidence in 2020

Apple Watch® Series 6: How the smartwatch has become a health watch

Initially providing a fitness tracker and featuring a health monitor that provides alerts, Series 4 introduced the electrocardiogram (ECG) and Series 5 added the always-on display. The new Series 6 health app measures blood oxygen levels, a key indicator of an individual's overall wellness. It uses a SpO2 sensor to measure oxygen levels for fitness and wellness purposes via red and infrared light. Apple Inc. is partnering with academics to study how this new metric can be used to help treat medical conditions.¹⁸

Invitae direct-to-consumer DNA testing

Invitae provides at-home DNA testing to help people understand their risk of developing certain conditions such as specific cancers, heart disease and neurological conditions. It provides actionable, personalised advice to help people manage their health. Invitae also partners with biopharma companies to offer sponsored genetic testing programmes which are provided free of charge to individuals with specific conditions who have been referred by their healthcare providers. In return the pharma companies receive de-identified patient data for research purposes.¹⁹

Zio by iRhythm – ambulatory cardiac monitoring service

Heart data are captured through a heart monitor with an uninterrupted signal that has minimal disruption to patients' lifestyle. The Zio service offers the potential to change the diagnostic pathway for patients with suspected arrhythmia in primary care. It offers a streamlined solution for capturing paroxysmal arrhythmias and can avoid significant downstream costs as well as significantly reduce the time to diagnosis or reassurance.^{20,21}

Amazon Halo – newest wearable tracking fitness and stress levels

Halo tracks fitness through steps, walking, running and climbing, as well as the quality and quantity of sleep, providing improvement advice where needed. Using the app, body scans are taken using a smartphone camera to give a better idea of BMI than just weight alone, and a personalised 3D model allows consumers to track progress over time. Halo also analyses the tone of the consumer's voice throughout the day to monitor stress levels.²²

Digital therapeutics for sleep

Sleepio is a digital, sleep improvement programme that uses cognitive behavioural therapy (CBT) techniques to overcome poor sleep and improve mental health. The Sleepio programme (also available with a companion app) collects information about the user through a series of clinical questionnaires and daily sleep diary to personalise the programme to them. In March 2020, Sleepio was rolled out to 2.2 million workers in the US and UK in just one month in response to the COVID-19 crisis, including all 1.2 million NHS workers.^{23,24,25,26}

Mobile health digital behaviour change programme to facilitate weight loss

Noom is an evidence-based app, digital behaviour change programme and health coaching platform for obesity and diabetes. The app enables users to adopt strategies for healthier lifestyles including daily food logging and access to a virtual support group. Noom has over 47 million users worldwide that typically lose 7.5 per cent body weight over four months. In October 2019, Noom partnered with the US National Diabetes Prevention Programme and NovoNordisk to enable patients participating in weight loss drug trials with free app access for 12 months.²⁷ Noom has shown reduced chances of pre-diabetic individuals developing type 2 diabetes by 58 per cent, and saved payers around \$2,650 per patient over 15 months.²⁸

DnaNudge: DNA analysis + wearable + phone app to encourage healthier food choices guided by the user's genetics

DnaNudge provides on the spot DNA testing in under an hour. The user's DNA is extracted from saliva taken from a cheek swab and analysed for nutrition-related health conditions using a portable 'lab in a box' PCR machine. The user's results are uploaded to their DnaNudge app and a wearable which monitors inactivity. The user receives personalised 'nudges' based on their DNA to increase their activity, choose foods that are more suited to them, and make healthier lifestyle choices.²⁹

Deep Longevity's 'Biohorology' is helping address our understanding of age-related diseases and longevity

Some new tools are based on 'biohorology', the science of measuring the passage of time in living systems. These 'ageing clocks' use the biomarkers of ageing such as DNAm, gene expression and metabolomics. Today, DNAm clocks are the most popular, using deep learning to analyse data. Deep learning can also extend the functionality of ageing clocks beyond age prediction. Deep Longevity is developing user-friendly AI systems to track the rate of ageing at the molecular, cellular, tissue, organ, system, physiological and psychological levels, and developing systems for the emerging field of longevity medicine, enabling physicians to make better decisions on interventions that may slow down or reverse the ageing processes. Deep Longevity has integrated multiple deep biomarkers of ageing which provide a universal multifactorial measure of human biological age. During the past few years a number of Longevity therapies have entered human trials.³⁰

The COVID-19 impact

Deloitte view on the impact of COVID-19

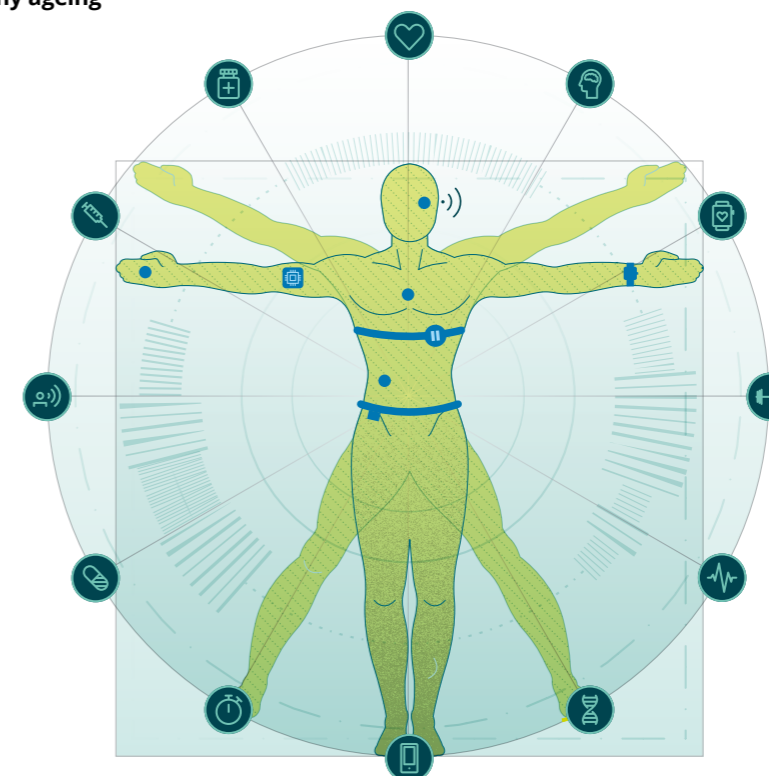
The COVID-19 pandemic has raised public awareness of the risks to their health of having a poor immune system and some of the actions they can take to improve their immune health and health outcomes. Evidence is also emerging on the increase in mental health risks. On a positive note COVID-19 has increased significantly the use of technology by individuals to monitor their own health and improve their activity levels and awareness of healthy lifestyles. It has also demonstrated the importance of improving digital literacy and establishing more local, meaningful public engagement that focuses on building trust and compassion with local communities. Importantly, COVID-19 has shone a spotlight on the role of vaccinations in protecting people's health. While many see a vaccine as a crucial step in return to a 'new normal', it will be 2021 before we know how quickly COVID-19 vaccines will be available for the general population or the extent to which people are willing to be vaccinated.

ChatBots

There has been a significant increase in the number of AI chatbots that answer patient's questions about symptoms and other related factors to determine the individual probability of a coronavirus infection, and provide the patient with a clear risk assessment and advice based on the latest policies, including recommendations on telemedicine options, advice on isolation and nearby test centres.

For example, German start-up, **DOCYET**, has created an intelligent chat-application helping patients navigate the healthcare system, delivering decision support based on individual symptoms, and matching them with medical services both on – and off-line.^{31,32}

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Source: Deloitte

Contacts

Karen Taylor

Director
UK Centre for Health Solutions
+44 (0) 7825 793729
kartaylor@deloitte.co.uk

Sara Siegel

Lead Partner
Public Sector Health
+44 (0) 20 7007 7098
sarasiegel@deloitte.co.uk

Neal Batra

Principal Deloitte Consulting LLP and
Global Future of Health Leader
Consulting in United States
+1 6463695496
nebatra@deloitte.com

Hanno Ronte

Partner
Life Sciences and Healthcare
+44 (0) 20 7007 2540
hronte@deloitte.co.uk

Contact information

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Deloitte UK Centre for Health Solutions, 1 New Street Square, London EC4A 3HQ

Endnotes

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