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The Journal of mHealth

The Global Voice of Digital Health

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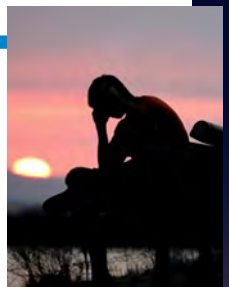

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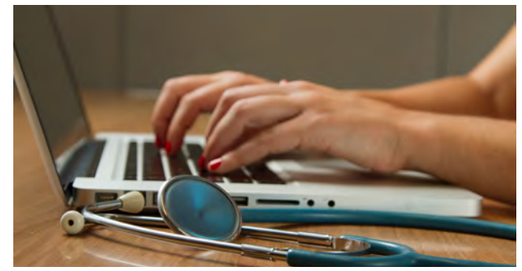

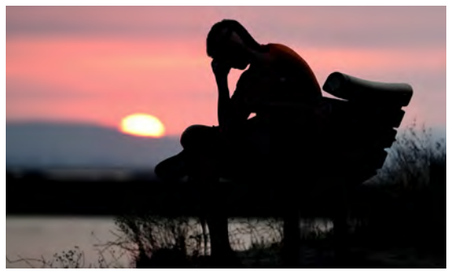

Welcome

On behalf of all the team at The Journal of mHealth I would like to begin by saying a huge thank you to all of our readers across the healthcare industry for your continued hard work throughout this difficult year!

Your unwavering commitment to help people during this pandemic has been heroic, and the sense of community that has resulted from having this universal challenge has at many times been extremely inspiring!

We would also like to take a moment to share our thoughts with all of those who have lost loved ones or suffered hardship during this period.

While 2020 has undoubtable been a year that we would all rather forget there have been some positives that have come as a result of the difficulties and challenges faced by us all.

In healthcare the essential uptake of technology that has been necessary to adapt organisations for social distancing has been a huge step forward for digital transformation across the industry. What would previously have taken years to debate and deploy has taken, in many cases, a matter of just weeks, or months.

In this edition we take a look at some of the lessons learnt throughout the course of this difficult time. Lessons which will hopefully provide a blueprint for the delivery of efficient healthcare in the future - Where practitioners are supported rather than led by technology.

So much has been gained through technology designed to deal with COVID that it is imperative that we maintain that momentum and drive forward the many benefits that have been derived.

As we look forward to what will hopefully be a much improved New Year, we do so in the hope that the positive strides taken during COVID will provide the necessary foundation for health technology to thrive in 2021.

Let me take this opportunity to wish you all a very happy Christmas, and a New Year that brings hope, happiness and safety for all!

Matthew Driver
Editor

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From Manual to Automatic, RPA Helps Healthcare Change Gear

Healthcare providers continue to face unprecedented challenges. Even before COVID-19 added a new level of complexity, shortages of healthcare professionals, rising costs, outdated management systems and an ageing population were already straining the NHS and its international peers.

Given the new normality, if we are to ensure our medical care is fit for the future, we need to make best possible use of all available resources to increase the speed and efficiency of clinical processes. With the backlog of primary care and outpatient referrals growing week by week, it's self-evident that this is imperative.

There is only one practical solution, and that is to leverage the power of technology to tackle productivity drains within the healthcare system. Top of the list should be the countless, repetitive, manual, non-clinical back office and management tasks.

Given that over a third of these could be easily automated, according to McKinsey Quarterly, removing these from the equation presents an obvious and considerable productivity opportunity.

One of the most effective technology for addressing this is Robotic Process Automation (RPA). An amalgam of artificial intelligence, robotics and business process automation, RPA is platform-independent, so it has the capacity to automate both new and existing legacy IT infrastructures.

This means RPA can overcome interoperability issues by bridging the gaps between different systems, so information can be extracted as needed from any one of them.

Healthcare RPA also helps ensure that what could be critical information isn't channelled into silos where it's hidden from the view of clinicians. As electronic medical records (EMR) are not yet universally available, this is of real practical significance as it moves us on from simply thinking about managing data, to how it is used to create knowledge.

And because healthcare RPA software pulls together data from different systems into a single point of reference, clinicians don't have to move between multiple interfaces to get the information they require.

There are many potential applications for RPA in healthcare. For instance, the auto-indexing and filing of scanned documents into patient folders; reconciling DICOM images against a Master Patient Index before archiving; the automatic collection of data from patients; and the scheduling of appointments based on a clinician's availability. The list goes on.

And from the patient's perspective, RPA can make their interaction with the health service and the clinicians looking after them a faster, less fragmented experience. Whether that's making and changing appointments, obtaining faster test results, or better management of medication and ongoing treatment plans, linking and integrating the service provision results in more personalised and effective healthcare.

And since software bots perform to precise, pre-set workflows, RPA reduces the potential for error and the costs that go with it, and they can do this around the clock, without a drop-off in efficiency or quality. In other words, RPA has the potential not only to cut operating costs by streamlining workflows but also to ensure greater compliance, which in turn feeds through into higher levels of patient satisfaction.

Introducing RPA offers many benefits under normal circumstances, but during periods of severe stress, it has game-changing potential. Imagine if much of the administrative burden was immediately and simply removed from high volume COVID-19 testing with RPA bots entering test results. How many resources might that free up?

Introducing RPA into a healthcare organisation is surprisingly straightforward. So, while healthcare entities might presume that introducing new technology is going to be disruptive, difficult and costly, in reality implementing an RPA programme is, in most cases, a simple process, since it requires no heavy investment in additional IT systems.

Hyland, for instance, through its recent acquisition of the leading German software firm, Another Monday, has been able to add robotic process automation to its OnBase platform, giving our healthcare customers an end-to-end solution with zero integration costs.

In the future, this is a technology that can be enriched further using facial recognition and biometric technology to give, for instance, an even more automated patient check-in and EPR retrieval process that leads to shorter waiting times. It can also be combined with other digital technologies, such as artificial intelligence, blockchain and big data analytics as part of a broader digital transformation that's now so necessary in healthcare.

Because as long as our healthcare system remains too heavily dependent on paper and manual tasks, it will become increasingly unable to meet the needs of the demographically-drive rise in patient numbers, let alone at a time when the entire world is struggling to deal with COVID-19.

However, the full benefits from 'front of house' services such as video visits, telemedicine and remote monitoring can only be enjoyed when behind the scenes technologies, such as RPA, are used to ensure greater interoperability of systems and improve access and speed of transfer and exchange of patient data between those who need it.

Peter Corscadden is Install Base Manager EMEA with Hyland Healthcare. *www.hyland.com* ■

How to Build Trust with Trusts on Artificial Intelligence

By Dr Venkat Reddy, Consultant Neurodevelopmental Paediatrician, Senior Clinical Adviser and AI Lead at Future Perfect

In general, and as a clinician myself, I believe there is a lack of trust between clinicians and the use of AI.

Aside from the few clinicians with an interest in clinical informatics and digital health, views are still largely shaped by newspaper headlines about killer robots. Unfortunately, there has been concern over the use of algorithms due to recent events. Not to mention the negative press about the use, or misuse, of AI by social media giants to gather information and 'snoop on people'.

There is also still a prevailing belief that AI is going to take away peoples' jobs. This is especially in relation to admin staff and in the introduction of robotic process automation (RPA) which can automatically scan documents, book appointments, and such like. The clinical staff are concerned too, particularly in radiology and pathology where AI is already doing a chunk of work.

The final aspect to this mistrust is a concern over safety and the fairness of AI as a tool.

With that rocky foundation, how do you convince clinicians that they can benefit from AI-based tools?

Starting with the basics of AI

The first thing that must be developed is a defined way to explain the fundamentals of AI as a tool. It may also help to start using different terms - for example 'augmented intelligence' – to drive forward the fact that it really is simply a tool. We use laptops with tools like Microsoft Teams and digital dictation. In the same way, AI is a tool, there to be used for a specific purpose. Clinicians are still in control, and it's vital to make that clear.

Also important is demystifying how algorithms are used in AI, and for what purpose. NHSX is currently doing work towards this by addressing concerns about bias. These initiatives are really useful. It will also help to clear up that many clinicians are using AI outside of work already, in the form of Alexa or even through recommended products on sites like Amazon. There is nothing to fear from moving it forward in a clinical setting, with the right tools to make sure the solution doesn't exacerbate inequalities.

From assistive AI to the fully autonomous

An idea was put forward in the Lancet recently, of start- ➪

ing slow, implementing assistive AI and moving through to fully autonomous AI on a gradual basis. I would agree with this approach. The consequences of getting things wrong with AI on something like social media, for example, are not as life-threatening, but it is very different in healthcare and caution is the right attitude to adopt.

The prevailing attitude in places like Silicon Valley is one of speed. The 'move fast and break things' attitude doesn't work in healthcare. Clinicians rightly want to build slowly, safely, and build things that will last.

It can be no different from a drug trial. You choose a drug that may help the patient, and then you monitor it for side effects. In the same way, you can trial AI in a gradual way. People are rightly concerned about everything happening all at once, so starting with something more controllable (assistive technology for example) and moving through to something fully autonomous may be the key.

Narrow and specific task-focused Assistive AI is already in use in healthcare, and is very different from the more complex general AI solutions of the future.

The NHS and its relationship with digitisation

Historically, efforts to digitise NHS processes have been slow, haphazard and piecemeal. There has long been a general understanding that we're nowhere near the level of digitisation as in other industries like fintech or travel. Part of that is due to a lack of overarching strategy and introducing new solutions that don't integrate with the system as a whole – with that, you end up just as disjointed as when you started. Another huge part is that clinicians are still too often battling legacy systems. Forget automation – they would simply settle for a system that works, and AI isn't on their radar.

There is, however, already motivation for change with initiatives like Global Digital Exemplar Trusts which encourage digital readiness.

We often talk about digitisation and AI in terms of computers and keyboards, but it's just as much about people being ready.

Since Covid, this precarious state of 'digital readiness' has begun to blossom into a real movement. Everything has changed. Before Covid, only a small amount of GP surgeries offered remote consultation. That is now the majority. Multidisciplinary teams are meeting over Teams. We're even delivering autism assessments and speech and language assessments remotely. We've proven that things can and will move forward, and AI is part of the equation. We must trust that we have come this far, and that we can go further with new and innovative tech that will make clinicians' lives easier.

Healthcare AI in the long term: where to start

Even if the desire is there, where should a Trust start? My advice for NHS Trusts is this: start by implementing a tool that will make clinicians' lives easier. Something that makes the workflow more seamless, that won't interrupt work or add any more time to an already busy day. Lots of services are inundated with patients asking similar questions on a routine basis. A great starting point for an AI-enabled solution would be to implement a simple bot which can answer these queries and is available 24/7. From an admin perspective, you can deploy solutions which prioritise appointments, scan documents, and organise referrals. Even better if you can implement a solution with natural language processing (NLP) that interacts with the electronic health records and retrieves information for staff, limiting the time they spend tethered to a keyboard. These things don't take away human interaction - they free up staff for more of it.

That is the goal - not a hostile takeover of jobs or a risky, biased algorithm, but a gradual move towards AI-enabled care, powered with clinicians' trust. ■

De-hospitalization of Healthcare

Revolutionising Models of Care Delivery for the Future

Elsevier's "Future of Healthcare Series" took place earlier in the year. Throughout the event speakers showcased how hospital systems have pivoted digitally to transform their operation, care, and service models in response to the current pandemic to improve healthcare delivery for a more sustainable future.

This report summarises the key learnings and explores the challenges countries are facing as they navigate their way through a second wave of infections . Additionally, it focuses on opportunities arising from the COVID-19 pandemic that will impact the future of our healthcare systems.

The pandemic has fast-tracked care out of hospitals and into the community

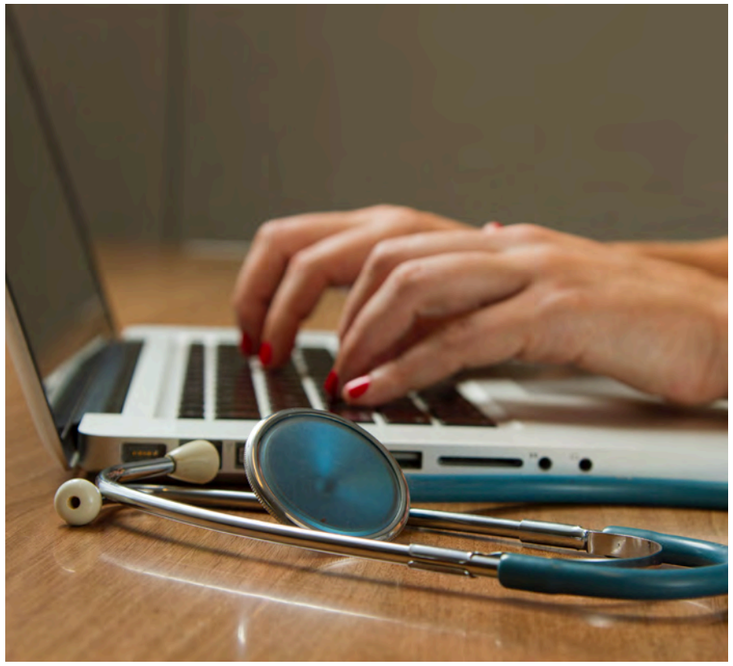
Prior to the global pandemic, there was a growing understanding that reactive hospital-based models of healthcare were unsustainable and would soon be unfit to meet the growing demands associated with increased life expectancies. However, in response to COVID-19, driven by the need to reduce viral transmission for patients and providers alike, in many parts of the world, health care delivery has accelerated in its shift from a 'sickness service' to a more preventive health or 'health and well-being service'.

This, however, has not been an easy transition. Around the world, healthcare systems are facing a common set of challenges with a particular concern at present being how efficiently and effectively they can redesign their services away from a model of reactive acute care towards a more proactive model. The NHS, like other healthcare systems, is facing challenges arising from shifting patient needs, novel technologies and the ever increasing need to manage costs. To address these challenges, hospitals will need to innovate and transform their models of service delivery.

Some healthcare organisations have already been able to show that the recent drive to digital can deliver benefits for patient care, defining better future care models. James Bird, CNIO at Imperial College, recently stated that Imperial facilitated a decade of transformation in weeks, with "60% of outpatients transitioning to virtual care a week after the outbreak."

Many healthcare providers are also realising the importance, and associated benefits, of involving patients as care partners as they find ways to transfer more ownership of care outcomes to patients themselves. De-hospitalizing technology to bring care closer to patients. Digital health and medical technologies, including healthcare personalisation delivery via smartphones and online consultation are shifting the perception from disease management to healthy lifestyle management.

Consumer expectations are rising and digital transformation in healthcare is being fed by consumers in other industries. Health Records on iPhones have recently been made available in the UK bringing together hospitals, clinics, and the existing Health app to provide a fuller snapshot of health. This allows users to see a central view of their allergies, conditions, immunisations, lab results, medications, procedures, and vitals across multiple institutions. It also allows users to be notified when their data is updated allowing the general public to prioritise and keep informed on their health.



Providing quality care and ensuring safety

As we look towards using new technology solutions during a healthcare crisis, we must not lose sight of the requirement to provide quality care and patient safety. These two factors are of utmost importance, especially in a pandemic when the situation is evolving by the minute. Innovation should not be done at the expense of the patients' safety and well-being. We need to collect and analyse the right data to find the best balance between innovation and patient safety.

A post event survey highlighted that 85 percent of the attendees of the Future of Healthcare webinar series indicated that a safety and health management systems need to be established to ensure clinical safety in hospitals, post COVID-19.

Sustaining the growth of new models of care

The current health emergency has encouraged us to adopt innovation and digitisation in healthcare at a rapid pace. The lasting result will hopefully be in an improvement in healthcare delivery, with a shift towards community-based care.

To sustain such system alterations healthcare providers need to continue to invest in sustainable business models, patient safety and outcome measurements, data integration with existing workflows as well as training for staff and patients. As digital solutions within healthcare are becoming more common and necessary in this future state of digital health, we need to take into consideration patient safety and quality care. We do not need more digital technology; we need innovation that is defined to meet the challenges of our new collective reality.

COVID-19 has provided a platform for change allowing healthcare systems to revolutionise their model of care delivery for the future. It will take time and collective effort to re-design and deliver approaches that can sustainably promote health and resilience. Sustaining such models will require new ways of working and more sophisticated funding mechanisms to incentivise and reward high-quality, productive care. This will result in the development of solutions that will impact patient care and are trusted by the people that will benefit from them the most. ■

INDUSTRY NEWS

News and Information for Digital Health Professionals

Acurable Launches Technology to Remotely Diagnose Sleep Apnoea

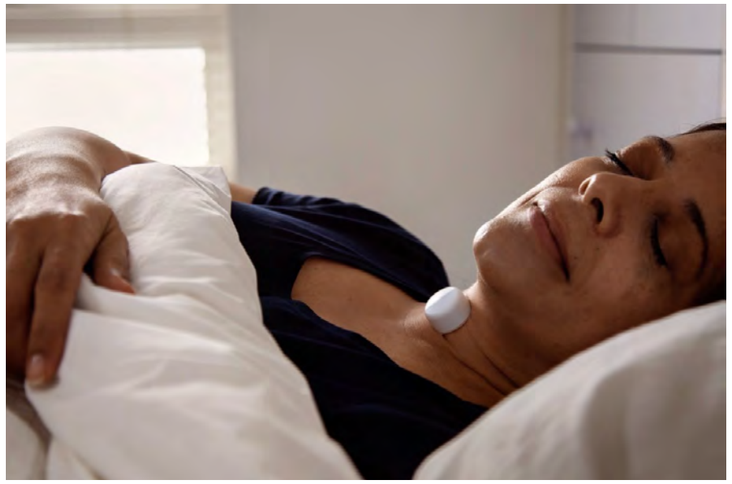
Acurable, has launched the AcuPebble SA100, a small wearable device, which for the first time enables a fully automated and remote diagnosis of obstructive sleep apnoea (OSA).

Traditionally, the diagnosis of OSA has required multiple hospital visits for patients, and doctors have had to manually review and analyse data from a patient's sleep study. AcuPebble SA100 automates this process, instantly providing a clinically validated diagnosis equivalent to the current ambulatory gold standard. This is particularly important in light of COVID-19 and the NHS move to digital first and remote consultations.

AcuPebble SA100 gained CE Mark approval in September 2020 and is the product of more than ten years of research led by Professor Esther Rodriguez-Villegas at Imperial College London.

Obstructive sleep apnoea is a serious respiratory condition that affects approximately 175 million people in Europe and almost 1 billion people worldwide (up to 24% of the adult population and up to 5% of children are affected) . OSA causes sufferers to repeatedly stop breathing while they are asleep, and can lead to serious health implications including high blood pressure, type 2 diabetes and dementia. It is also the second most common cause of road accidents due to tiredness.

However, until now, the diagnosis of OSA has relied on complex, expensive and resource-intensive tests which require patients to wear an uncomfortable set of devices. Furthermore, the patient must come to hospital to learn how to use the device, then come back the day after using it, or alternatively spend the night at a sleep clinic. All of this combines to create major bottlenecks in hospitals,long waiting lists, and an increased risk of infection both for hospital staff and patients.



Prof. Rodriguez-Villegas, inventor of the technology and founder of Acurable, commented: "Currently, only around 20% of people affected with sleep apnoea are diagnosed, and there are long waiting lists due to the scarcity of sleep clinics and the high costs of offering current sleep diagnostic tests. Furthermore, during the current coronavirus pandemic, this challenge has been further exacerbated. There is a backlog of patients who weren't seen during the height of the crisis and a reluctance from patients to travel to hospital. What's more, doctors are looking for ways to treat patients remotely to reduce the risk of infection.. Acurable's effective at-home testing enables earlier, more accurate and more cost-effective diagnosis of sleep apnoea, which will improve patient care, reduce co-morbidities and the risk of contagion, and which could save millions in hospital resources."

With AcuPebble SA100, patients undertake their sleep test remotely. The device is small enough to be sent to patients in the post, and continuously and accurately monitors the patient's breathing and cardiac biosignals in a non-invasive way while they sleep, and then automatically interprets the results. The next day, doctors can instantly see the diagnosis without having to manually review the data themselves, while patients do not need to attend outpatient appointments or stay overnight at a sleep clinic, freeing up valuable time and resources for hospitals and medical staff, and providing a better experience for patients. AcuPebble is easy to use, and clinically proven to have the diagnostic equivalence of multi-channel polygraphy - the current gold standard for ambulatory sleep apnoea diagnosis - with 94 percent PPV and 98 percent NPV in a recent trial at NHS Royal Free Hospital London.

Dr Swapna Mandal, a respiratory consultant at the Royal Free London NHS Foundation Trust, commented: "It's thought that 1.5 million individuals in the UK have Obstructive Sleep Apnoea, and at the moment, 80 percent of those remain undiagnosed. That equates to one in 25 men and one in 50 women. A few years ago, we were maybe getting 500 or 600 referrals a year, we're now getting about 2,000. This was already a lot to deal with, especially given the long and often complex diagnostic pathway for sleep apnoea, but with the ongoing coronavirus pandemic, we now have an even bigger backlog of patients to see. What's more, we're moving to a digital first approach, so we're trying to reduce the number of appointments taking place in the hospital.

"Last year, we ran a clinical trial with Acurable which demonstrated that the AcuPebble SA100 has diagnostic equivalence to the current ambulatory gold standard for obstructive sleep apnoea diagnosis. This is great news, especially now, as it means we can diagnose more patients, reduce the number of times these patients need to visit a hospital, and ultimately improve quality of life for those patients."

"I noticed that I was getting tired during the day, and my children said to me that they could hear my snoring from my bedroom when their door was closed and when my door was closed. I was referred to a lung specialist who gave me this equipment to wear overnight. There was a belt that went across my stomach, and another one that went across my chest; there was also a device you put on your finger, and plastic tubing that went into your nose. It was quite a bit of equipment, and it wasn't very comfortable to wear," said Timothy St Jean, a 48 year old patient at the NHS Royal Free Hospital. "In contrast, the AcuPebble was very easy, it's got an adhesive on the back and you just stick it below your Adam's apple. There's an app you use on your phone which gives you a step by step guide to setting it up. It was very easy to use and very intuitive. Nothing gets in the way when you're sleeping and you can turn over without disturbing the sensor. The AcuPebble was a lot easier to use than all the other paraphernalia."

AcuPebble operates on the principle of acoustic sensing, whereby the body respiratory and cardiac functions generate sounds that can be recorded with a non-invasive wearable sensor. The acoustic signals are then transferred wirelessly to a mobile device and to the cloud, where patented algorithms automatically extract the physiological parameters used by doctors for the diagnosis and management of important conditions such as sleep apnoea, COPD, epilepsy and asthma.

In 2014, AcuPebble won the prestigious XPRIZE and Acurable has since been operating in stealth mode, focusing on perfecting the technology, building the team and obtaining all the regulatory approvals required to launch as a medical device. During this time, Acurable secured £2.1 in seed funding from Kindred Capital and Alma Mundi Ventures, as well as two Innovate UK grants worth £1.4m. Acurable has also conducted a large clinical trial at the NHS Royal Free Hospital in London which demonstrated the safety and effectiveness of AcuPebble SA100 against multi-channel polygraphy. Most recently, Rodriguez-Villegas was awarded the Silver Award by the Royal Academy of Engineering for her work creating the AcuPebble technology.

In addition to improving diagnosis of sleep apnoea, Acurable is also working on product solutions to help improve the diagnosis and management of several other serious conditions such as COPD, pneumonia, epilepsy and asthma. ■

App to Save NHS up to £20 million in GP Triage Call Costs

GPs and patients are to benefit from a new softphone app, from X-on, that will eliminate almost all the "hidden cost" of calls for remote consultations and is forecast to save the NHS as much as £20 million over three years.

The app will mean patient calls to their GP are free and in turn reduce the cost to GPs and practices for outgoing calls by around 75%. Its development is aimed at addressing the significant financial impact in primary care of practice-to-patient calls as telephone "triage" has developed as the new consultation model during the Covid-19 pandemic.

The app is being developed by UK cloud telephony and primary care communications specialist X-on, supported by a significant six figure grant from the Government's Innovation Funding Service, part of Innovate UK, the UK's innovation agency. It is due to be available to GPs and their practices across England, Wales and Scotland from February 2021.

Dr Dustyn Saint, a GP partner at the Long Stratton Medical Partnership, at Tharston in Norfolk, is one of thousands of doctors who have seen their practice bills spiral from the changing nature of doctor-patient consultation.

He said: "We have noticed a big increase in telephone costs between 2019 and 2020. We've needed to purchase many additional lines as the move to telephone as the first point of contact left us with nowhere near enough to manage demand.

This, and the volumes of calls we are now making, especially to mobile, have really pushed up costs."

The software, for use on iPhone or Android smartphones, will plug into existing patient apps to extend patient access and closely integrate with patient clinical record systems, whilst crucially ensuring data security and confidentiality. X-on has already established a number of partnerships with app providers for roll-out of the softphone app and more are under discussion.

The app is built on a unified digital communications platform that also incorporates traditional telephony as a supporting channel option, and enables a switch to video consultation if necessary.

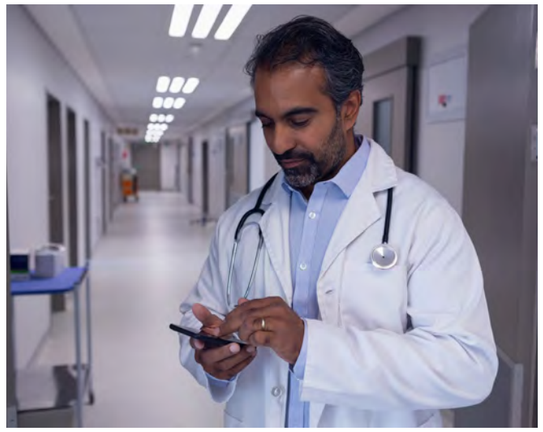
Under the initiative, patients' call costs are eliminated when using the app, and for practice or GP calls to patients they are significantly reduced through a funding formula principally based on growth forecasts.

The new softphone app will be immediately available to patients of the 700 GP practices that currently have X-on's key cloud telephony Surgery Connect practice network product or its GP@Home softphone homeworking product. Other practices will be able to benefit from cost savings by taking on Surgery Connect or a new embedded "omnichannel" communication platform that will also be launched early in 2021.

Development of digital telephony has been an essential channel for GPs and the NHS in creating a digital "front door" to enable more productive primary care, as outlined in the NHS Long Term Plan.

But during the Covid-19 crisis primary care has rapidly evolved, with an increase in remote consultation and GP homeworking resulting in GP practice calls made to patients more than doubling despite investment in video and online consultations. According to NHS Digital statistics for August 2020 this trend is continuing with telephone consultations exceeding video and online by more than 99:1.

The impact on the NHS from the cost of such calls is substantial, estimated at an annual £50 million, with more than 90% of GP calls going to a mobile. In addition many calls are being made from GP personal mobiles due to homeworking, causing a serious risk to information governance from patient data being



visible on private devices and bills. GPs often experience difficulty in contacting patients who are less likely to answer a call from a personal or withheld number.

Aside from use as a voice communications channel, the new softphone app will also have versatility to carry notification messages targeted at individual patients which would be normally delivered via SMS, such as flu jab, appointment and prescription information. This will also contribute to cost savings.

Paul Bensley, managing director of X-on, said: "In the last few months, primary care has undergone radical change in its delivery and the way in which GPs and patients make contact with each other, primarily through remote consultation.

"With the increase in telephone calls as a result, one seldom noted impact is the spiralling 'hidden cost' to GPs and practices in contacting patients, often when GPs are working from home. Our innovation offers a significant answer to the issue, almost completely removing the financial implications for practices as primary care continues to evolve, so that GPs can focus on providing high quality patient care.

"It offers a sustainable option that supports effective remote consultation and its development, and also ensures that traditional telephony channels remain available and that no patient group is disadvantaged." ■

AI-Powered Referral System Rego Slashes Hospital Waiting Lists

Vantage Health has announced the full-service launch of AI-powered referral platform, Rego. The first eRS compatible solution to be deployed in the NHS, Rego provides automated GP referrals in one efficient system, which reduces the complexity of outpatient pathway guidance and eliminates manual triage processes.

As a result, Rego has proven to flatten the waiting list curve in 10 months, improve the chances of early treatment and free up essential healthcare resource – potentially saving the NHS over £200 million each year, according to Vantage Health's work with GPs and GDPs.

The AI-powered referral platform has been developed over the past decade by Vantage Health. Since the onset of Covid-19, Rego has helped 25,000 users in medical and dental practices across the country successfully manage patient demand.

Rego enables GPs to refer patients to the right provider within 45 seconds – up to 20 times faster than current systems.

David Ezra, Co-Founder of Vantage Health, says: "Even before the pandemic, the NHS was struggling to deal with waiting lists, long delays to patients receiving treatment and an inability to prioritise care. There was also an inefficient use of resources, with a large administrative burden on clinicians and an inability to assess demand. The situation has of course become much worse with Covid-19, and the NHS now faces a target of reducing outpatient attendance by up to 50%.

"While the NHS is in a perilous position, it is not beyond saving. It's about getting to the root of the problem, rather than treating the symptom. That means we need to act now with proven solutions like Rego that use NHS resources in a smarter way, for the long-term benefit. We truly believe that using a triage system like ours is the only really effective way of solving the waiting list problem, and for the NHS to be equipped to deal with spikes in demand for medical care in the months to come."

How Rego transforms outpatient care

Historically, GPs' referral guidance has been provided via paper or individual PDFs – usually from 100+ pathway guidance manuals. This is disjointed and time-consuming, lacking in visibility and quality. Enter Rego, the AI-powered referral platform from Vantage Health that acts as a single source to speed up Advice & Guidance. By enabling GPs to better utilise NHS services and direct patients to the right local treatment first time, as well as reduce clerical and clinical workloads, Rego is a solution to relieve much-needed pressure on the NHS.

The only platform of its kind in the UK, Rego is fully integrated with eRS and uses AI to automate pathways which have been developed by clinicians using local and national guidelines. It acts as a decision support tool for referrers, taking into account referral details, past medical history, national and local service directories, the competencies of each provider service, and local and national care pathways. The result is a system that works with all referrals, eRS or outside of eRS. Rego will route the referrals to community services such as physiotherapy or to locally commissioned specialist outreach clinics. This enables the GP to correctly refer to the preferred option each time, without having to keep up-to-date email lists and minus the need to collect individual referral forms for each service.

Rego has been proven to stabilise waiting lists, reducing them by 30%, and enable recurring cost savings where patients are directed to appropriate care. Based on successful case studies, Vantage Health has also estimated a total saving for NHS England of 20 million kg of carbon, 135 million miles of travel and 5.5 million hours of travel time (or 628 years).

"Rego represents a paradigm shift in the way referrals are generated and processed. Validating and directing referrals to the appropriate service within seconds is a game-changer, as is smoothing the clunky interfaces and delays between primary and secondary care – saving GP practices much angst and health economies potentially huge savings. Giving GPs helpful advice and options at the point of referring must be the way forward if we're to manage the growing referral mountain, particularly during the difficult months ahead." Comments Alan Selwyn, GP IT Lead Brent CCG. ■

Wirano Provides New Global Digital Platform for Organizing Clinical Trials

A Dublin-based tech start-up has launched Wirano – a digital platform for the rapid and effective organization of clinical trials. The platform aims to revolutionize the activities involved in clinical trials by accelerating start-up of trials, optimizing patient recruitment, and improving site and investigator selection processes.

"The enormous cost of clinical trials in terms of time, money and effort is well known. The average clinical trial process lasts between 7.5 and 12 years with costs ranging from $161M - $2.6B per drug. Yet in spite of this investment, the success rate of clinical trials is just 14% (1)," said Noel Quinn, Commercial Director. "Wirano aims to improve this rate of success by optimizing the patient recruitment process, improving site selection procedures and creating reliable channels for effective communications between all participants."

One of the major challenges is searching for and selecting patients for trials – which is why 50% of all planned trials do not achieve recruitment targets on time. In fact, up to 11% of all trials do not recruit a single patient. In addition, the organizers of clinical trials often find it difficult to select a research center with reliable data on previous experience and patient enrollment. The lack of a single database of centers from different countries and the absence of effective and reliable communication channels with research teams further aggravate the situation. Wirano is designed to allow all participants of clinical trials, including

pharmaceutical companies, medical researchers, and patients to effectively communicate throughout the process.

Wirano will significantly optimize the process as pharmaceutical companies (sponsors) will be able to quickly select research teams in different countries, doctors will be able to quickly post information about clinical trials for patients and start recruiting, and patients will have the possibility of finding a suitable clinical trial in a matter of minutes and apply for participation in it.

Wirano is the brainchild of a team of international experts in the area of clinical research and is based in Dublin. ■

New Study Demonstrates the Efficacy of Wearable Device for Remote Hemodynamic Monitoring

Wearable patient monitoring developer Biobeat has revealed details of a new peer-reviewed study that substantiates the use of a wearable photoplethysmography-based (PPG) device to help accurately monitor patient vitals, even during significant hemodynamic changes.

The research which used a swine model study compared the hemodynamic parameters during controlled hemorrhagic shock to invasive arterial line (AL) and Swan-Ganz (SG) catheter monitoring methods.

The study, "Wireless, Non-Invasive, Wearable Device for Continuous Remote Monitoring of Hemodynamic Parameters in a Swine Model of Controlled Hemorrhagic Shock," published in Scientific Reports, measured the heart rate, systolic and diastolic blood pressure and cardiac output of 11 pigs using Biobeat's wearable non-invasive remote monitoring device and traditional AL and SG catheter invasive methods. Hemorrhagic shock was induced in the pigs by bleeding 35% of their blood volume, followed by a post-bleeding follow-up phase. The animals were monitored continuously by all three methods for a median period of 447 minutes.

"Accurate and continuous monitoring of critically ill patients is frequently achieved using invasive catheters, which are technically complex and can potentially lead to local injury and infection," said Prof. Arik Eisenkraft, the study's principal investigator and CMO of Biobeat. "During periods of induced hemodynamic instability - in which traditional non-invasive devices often struggle to monitor vitals - Biobeat's PPG-based device succeeded in continuously providing accurate measurements. This provides substantial evidence demonstrating that novel PPG-based devices can also be used for patient monitoring, even when patients experience drastic vital sign variation including significant hemodynamic changes."

Study findings showed unprecedented monitoring capabilities for heart rate, blood pressure, and cardiac output measurements, including hemodynamic deterioration in drastic situations. The overall mean values for the invasive measurement were highly comparable. There also were significant ($p<0.001$) and strong correlations between methods of measurement of BP during all phases of the study. Correlations between the wearable monitor and the invasive methods were significant ($p<0.001$) during all periods, and correlations for changes in cardiac output, systolic and diastolic blood pressure were significant ($p<0.001$) and strong ($r>0.88$). Notably, the comparison between AL and SG catheters with Biobeat's non-invasive PPG device showed first-of-its-kind accordance in relation to blood pressure and cardiac output.

Overall, these findings indicate that a PPG-based device like Biobeat's can be helpful in accurately and continuously tracking

changes in patient conditions, even in clinical settings where patients experience notable hemodynamic changes.

"There is a clear need for reliable non-invasive technology capable of advanced hemodynamic monitoring within the medical space," said Arik Ben Ishay, CEO of Biobeat. "Measurements obtained from the study indicated that Biobeat's PPG-based device can offer a high level of reliability compared to existing standard invasive techniques, even in circumstances of moderate to severe and unstable hemorrhagic shock. This further proves that Biobeat's PPG-based monitoring device can provide continuous non-invasive monitoring to support timely care, which may help health teams minimize morbidity and mortality without compromising measurement accuracy." ■

Smart Device to Support the Elderly and Vulnerable gets UK Funding

British start-up, Sentai, which is developing technology focused on helping the elderly live more independently in their own home has received financial backing from the UK Government.

Accelerated by the coronavirus crisis and rising loneliness amongst the elderly, Sentai, a portable smart device using Artificial Intelligence (AI) and Augmented Voice Technology to monitor and support older people, has received a grant from Innovate UK, the UK's innovation agency.

As part of UK Research and Innovation, the Sustainable Innovation Fund will help in bringing the device to market at a time when it's estimated 1.4 million people aged 50 and over in England alone suffer from loneliness. And with the number of people in Europe aged 80 and over expected to more than double by 2070, from 29 million to over 60 million, the need to support and monitor the elderly will be crucial in a post-pandemic world.

Thanks to advancements in machine-learning capabilities, Sentai can provide a contextual experience with the user, meaning conversations feel natural rather than robotic or one way. For example, it can detect the mood of a person from their voice and centre responses around that, whilst providing timely prompts around important things such as medication.

The idea is to offer a small, discrete, personal task force to deal with the day-to-day care needs of the elderly, whilst keeping them connected to their loved ones and community.

The caregiver can stay connected via a smart app, with daily performance logs and push notifications enabling them to get peace of mind.

Phil Marshman, Sentai's CEO and founder, said: "We're delighted to see the Government backing us under the Sustainable Innovation Fund, as it serves to underline how much our product is needed. With winter fast approaching and another national lockdown underway, loneliness is only set to rise further, and we want to be able to ensure our loved ones are monitored and supported when we can't physically be with them."

He continued: "We're now one step closer to making Sentai ➪

accessible to all who need it and incredibly excited at the prospect of being able to offer a viable solution to combatting loneliness, thereby improving quality of life and ensuring peace of mind."

Also, equipped with sensors, Sentai monitors movements and can call for help if someone falls, and can remind them to take medication throughout the day as needed.

Dr Ian Campbell, Executive Chair of Innovate UK, said: "In these difficult times we have seen the best of British business innovation. The pandemic is not just a health emergency but one that impacts society and the economy.

"Sentai, along with every initiative Innovate UK has supported through this fund, is an important step forward in driving sustainable economic development. Each one is also helping to realise the ambitions of hard-working people."

Innovate UK is investing up to £191million to fund research and development projects as part of its Sustainable Innovation Fund over the next two years.

With the aim of helping all sectors of the UK rebuild after the effects of COVID-19, the Sustainable Innovation Fund is supporting 1,103 projects and 1,189 UK businesses, totalling over £130million in aid.

To further help get the device into the homes of people who need it, Sentai is preparing to launch a Kickstarter campaign to raise funds for the next stage of its development – the success of which will see its pioneering technology brought to mass market. Details of the Kickstarter are due to be announced imminently. ■

WeWALK joins Microsoft's AI for Accessibility Programme

WeWALK, the smart cane designed for people who are blind or with low vision which is now in use across 37 markets, has joined Microsoft's AI for Accessibility programme to accelerate WeWALK's capability by developing and validating a human behaviour model for visually impaired users and creating a Voice Assistant designed for the visually impaired, providing the right mobility information when needed and allowing for even greater control of the WeWALK mobility experience.

Microsoft's AI for Accessibility $25 million 5-year programme is aimed at harnessing the power of AI to amplify human capability for the more than one billion people around the world with disabilities. Through grants, technology, and AI expertise, the program aims to accelerate the development of accessible and intelligent AI solutions and build on recent advancements in Microsoft Cognitive Services to help developers create intelligent apps that can see, hear, speak, understand and interpret people's needs.

WeWALK's new Voice Assistant will be released later in 2020 and will have immediate usability benefits, improving the user's confidence as they mobilise. The assistant will be built on clearly derived requirements and natural usage patterns and the challenge that WeWALK is seeking to overcome is to make the assistant truly 'smart' and dynamic, where it will effectively categorize and deliver on the user's commands in a host of different environments.

WeWALK's human behaviour model is due for release in 2021 and is of significant importance as currently there are no accurate models for how a person who is blind moves and how their mobility holistically evolves, especially after receiving orientation and mobility training. As a result, healthcare, government, and mobility trainers cannot effectively track how a person who is blind mobilizes and whether or not intervention has had benefit. By using WeWALK's built-in IMU (inertial measurement unit) sensors, including the gyroscope, accelerometer, and compass, as well as data collected from a connected smartphone, the model can be implemented and expanded organically through daily usage. The first stage will be rigorous data collection and user testing, followed by data manipulation and classification to ensure that optimum reliability and system usability can be achieved.

Commenting upon WeWALK's entry into the program Jean Marc Feghali, R&D Lead at WeWALK. "By working on these two objectives, WeWALK can set the standard for visually impaired mobility for both the individual user and the organisations that support them. We are now rigorously collecting mobility data with novel experimentation, validating our work by continuously engaging our users to ensure an exceptional product powered by Microsoft's best. Being a part of the Microsoft family truly excites us, bringing us closer to mobility trainers, researchers, and the global visually impaired community."

Mary Bellard, principal innovation architect lead at Microsoft adds "At Microsoft, we believe AI solutions built thoughtfully by and with the disability community have incredible potential to offer meaningful independence in people's daily lives. That's why we're thrilled to support WeWALK on this important assistive tool that stands to empower the millions of people around the world who use a white cane."

With the power of Microsoft AI, WeWALK's impact will be wide-reaching explains Kürşat Ceylan, WeWALK's co-founder & CPO "As a blind person from birth, I know that it is very important to get the right habits of using a cane from a young age. It is amazing to see how WeWALK can enhance this aspect of our lives with high tech, making training and orientation more effective. I believe that the smart cane will be a symbol for the fully independent journey people who are blind or with low vision."

Selected as one of the best inventions of 2019 by TIME Magazine, WeWALK is a member of YGA Ventures, which is an ecosystem of impact entrepreneurs. The team envisions WeWALK as a platform for continuous and collaborative development, putting it at the forefront of cutting-edge assistive technologies. This is exemplified through WeWALK's collaboration with Microsoft, where WeWALK participated in Microsoft's 2019 AI for Good in the UK. ■

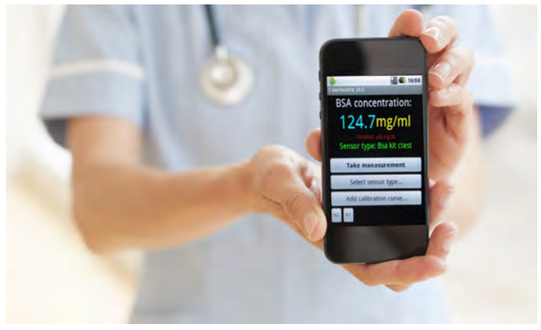
Germany Allows First Healthcare Apps for Prescription

Eleven months after the German federal government passed the Digital Healthcare Act (DVG) two health apps are now officially available for prescription.

While this creates many opportunities for the (digital) healthcare industry, it also introduces risk. Digital health experts Jan Bordon and Gabor Kiss from the global strategy and marketing consultancy Simon-Kucher & Partners explain what app providers should pay attention to, particularly with the upcoming price negotiations.

The first hurdle has been overcome: On October 5, the Digital Healthcare Act (DVG) officially granted doctors in Germany permission to prescribe apps to their patients. Currently, two apps have been approved. While only six percent of patients have used paid medical apps in the past, almost 60 percent would use these digital tools if their physician prescribed them and the costs were covered by the payer.

For healthcare companies whose offerings also include digital solutions and apps, this development offers completely new opportunities.



This is particularly true for digital health startups, which have little experience and should therefore develop a well-structured approach to this topic.

When generating evidence, it's important to consider the digital healthcare application (DiGA) directory listing requirements set by the Federal Institute for Drugs and Medical Devices (BfArM).

Particular attention should be payed to the requirements ➪

for price negotiations with the National Association of Statutory Health Insurance Funds (GKV-SV), which will take place after the final inclusion of the app in the German DiGa directory. Healthcare companies should not underestimate these. Based on our experience with negotiations involving the Act on the Reform of the Market for Medicinal Products (AMNOG), we know how important it is to develop a clear pricing strategy.

Without a thorough preparation and a structured plan and strategy for negotiations, companies will not succeed. In addition, the health insurance association will leverage its knowledge and experience from AMNOG processes, so companies should be prepared for tough price negotiations.

If an app is already on the market and paid out of pocket, its selling price will impact its potential future reimbursement price. Furthermore the GKV-SV may reference reimbursement prices in other countries that integrate models similar to the German approach in their healthcare systems, and this may affect price negotiations. The initial assessment and price negotiations with the GKV-SV will be a learning process for all parties involved and will inevitably require further adjustments. This makes it all the more crucial for providers to have a comprehensive pricing strategy ready at an early stage. ■

FundamentalVR Launches Full Commercial Ophthalmology Capability

FundamentalVR has announced the expansion of its surgical specialty capabilities with the addition of ophthalmology. Powered by the company's patented HapticVR technology architecture that mimics the physical cues of surgical actions, medical tools, and tissue variations, FundamentalVR can now create immersive, data-driven medical educational simulations for ophthalmology as well as orthopedic device and pharmaceutical brands.

Traditional ophthalmology teaching methods and the way Life Science brands, medical institutions, and students interact, typically include; classroom lectures, instructional videos, medical meetings, operating room (OR) observations, and tissue-based wet lab training, which is considered the gold standard for medical training. Low-cost immersive simulations now offer solutions to continue remote, socially distant learning, while accelerating skills transfers, thanks to the ability to collect and objectively measure performance data previously unattainable.

An established player in surgical education, FundamentalVR simulations are delivered through its Fundamental Surgery platform that allows users to experience the same sights, sounds, and feelings they would in a real OR. Combining HapticVR technology with high fidelity graphics, proven accredited educational strategies, and analytics of previously unmeasurable data points, Fundamental Surgery allows users to acquire both the technical knowledge and the muscle memory essential in developing surgical skills.

Every user interaction from the surgical gaze, respect for tissue, and movement efficiency is measured and recorded to provide a level of analysis and measurement. In addition to increasing knowledge transfer, this detailed, unique data insight enables life science businesses to drive consistency and compliance for their medical devices and procedures.

The expert knowledge has been used to create tailored solutions for Life Sciences companies and a cataract surgical simulator for the global eye care NGO Orbis International. The highly regarded organization works to end avoidable blindness by training eye care teams in low and middle-income countries so they can save and restore vision in their communities. Orbis is deploying FundamentalVR's educational simulation for cataract surgery in select residency training programs and prospective digital training hubs to evaluate the impact on residents' surgical skills and obtain user feedback to inform further software developments.

Simulations, featuring the interactions with human tissue essential for learning, can be created to cover various ophthalmology procedures. These interactions include incisions, trocar placement, scleral tissue manipulation, lens manipulation, lens implant insertion, posterior chamber manipulations, bimanual manipulation of the eyeball, and subretinal injections.

"Industry analysts now estimate adoption curves for immersive technologies have accelerated by around three years as COVID-19 permanently changes traditional teaching methods," said Richard Vincent, co-founder and CEO of FundamentalVR. "With the addition of ophthalmology capacities, we are meeting this increased demand with proven technology that allows medical device companies and medical educators to more effectively train the next generation of surgeons and bringing innovative new procedures and equipment to market permanently."

The Fundamental Surgery platform offers a more scalable, affordable, and flexible training solution to existing VR solutions that require dedicated labs, specialized equipment and large investment. Already in use by medical device manufacturers and teaching centers of excellence across the globe, it is equipment agnostic able to work with a range of off-the-shelf equipment, such as Oculus Quest and HTC Focus Plus headsets, and can be used remotely by an unlimited number of simultaneous users. ■

Men's Health Startup Numan Raises £10M Series A funding

Numan, the online health clinic for men, has completed a £10M Series A funding round, to continue building its digital health platform in collaboration with its patients.

Launched in February 2019, Numan helps men take action when it comes to their health and wellbeing, with quick and convenient access to clinical advice online. Recent findings show that 3 out of 4 men don't go to the doctor when something is wrong. Men are also more likely to get cancer, heart disease and become overweight, and are more prone to smoking, drinking, and abusing drugs. The company provides regulated treatment options for the most common male health concerns, with a team of clinicians who can create personalised treatment plans online.

Sokratis Papafloratos, CEO and Founder, Numan, said: "We are building a new kind of healthcare company that gives men simple and accessible solutions for their health and wellbeing problems. We help men understand their health better through a series of diagnostics and clinician consultations, and offer medical solutions that cover anything from sexual health, to hair loss, smoking cessation and general wellbeing – all via a comprehensive digital health platform. The COVID crisis is motivating men to take better care of themselves, and with people less inclined to visit clinical setting to be seen by a medical professional in person we look forward to becoming a holistic health partner for them, backed by a world-class team of investors."

As part of the funding, Birgir Már Ragnarsson from Novator Partners joins Numan's Board of Directors. Ragnarsson said: "We were impressed with Numan's capital-efficient execution so far and are excited about the future direction of the company. Health is one of the largest economic transformation opportunities still addressable at a global scale, and we're delighted to be part of Numan's journey."

Numan intends to use the funds to develop new ways of providing men with access to clinical advice and treatment. The company plans to achieve this by investing in more technology, and by expanding its clinical team and operations, with Sam Shah, ex CEO of NHSX, recently joining as Chief Medical Strategy Officer. As part of its growth plan, the company is also developing its own IP around digital health but is also in a number of partnership conversations that can extend and expand the therapeutic model on offer.

Sam Shah, Chief Medical Strategy Officer said: "I decided to join Numan because of the company's strong and sincere commitment to developing citizen-centric health services. To tackle inequalities in healthcare, it is important to focus on the health needs of everyone and to design services based on individual needs. It's why we've placed so much emphasis on improving accessibility for men and offering them the choice in how to deal with their conditions, as they're less likely to seek medical help and, even when they do, they do not always report all of their symptoms or concerns.

"It's great to work with a team that is committed to developing health technology that will help people improve their wellbeing, and this funding will enable us to continue investing in new disease areas and technology to make healthcare even more accessible via digital channels." ■

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