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The Journal of mHealth

The Global Voice of Digital Health

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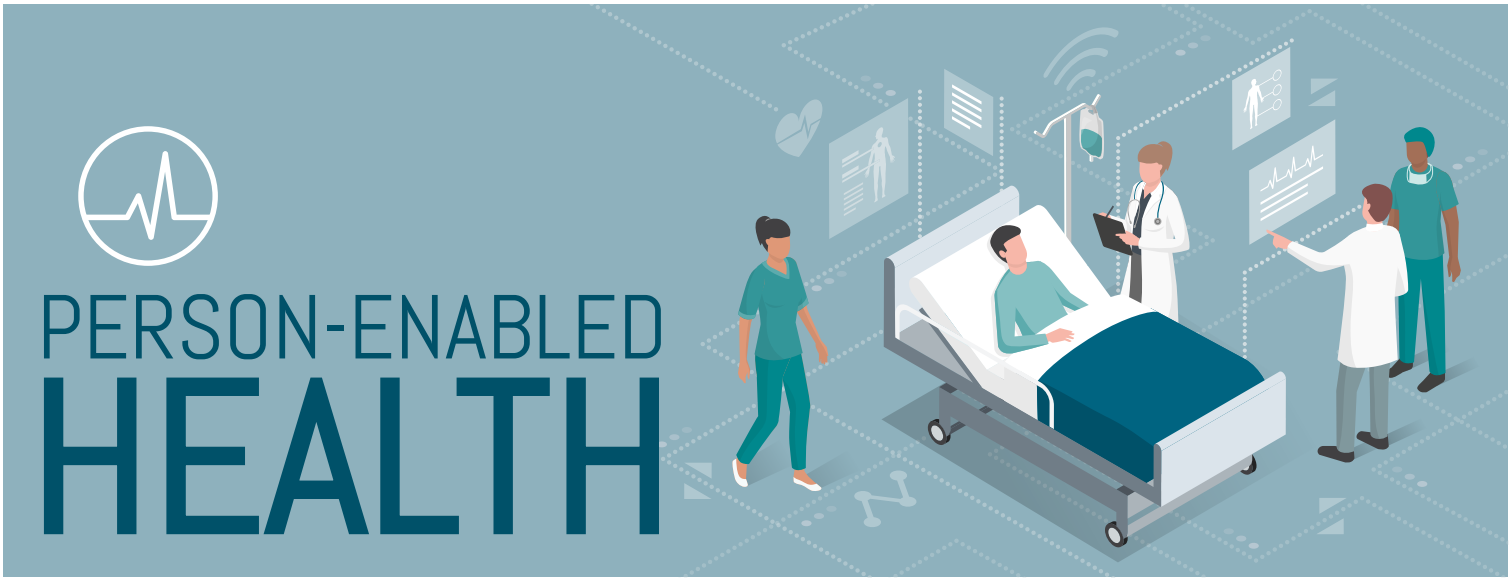

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Remotely Managing Blood Pressure in Pregnancy

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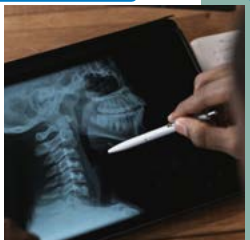
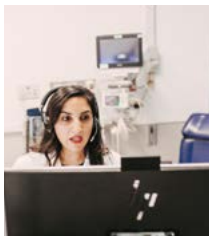


HEALTH-TECH

3 Crucial Considerations for Integrating RPM



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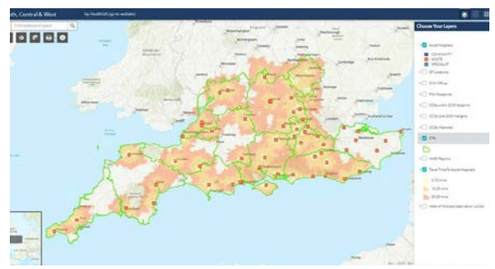

New geospatial mapping techniques have been used to create optimised routes for GPs and nurses in Somerset, so they can give Covid-19 vaccinations to housebound patients more efficiently. Trevor Foster, Associate Director, Geographic Intelligence and Mapping Services, NHS South, Central and West CSU, explains how it was achieved.

Welcome

The huge impact that COVID-19 has had on healthcare providers around the world means that the requirement to manage patients in an effective way is now, more than ever, of paramount concern for the industry.

As care providers attempt to balance the demands of COVID-19, alongside existing health conditions, resources are being stretched to unprecedented levels. The role of technology in placing patients at the centre of their health provision has proven extremely effective during the pandemic and this digital transformation will need to continue for healthcare systems to begin reintroducing routine care provision and to reduce the huge waiting lists that have built over the past year.

One benefit of the pandemic has been the greater use and acceptance of digital solutions by both patients and clinicians. The foundation has been set for the widespread adoption of digital-first, care services. With technology being utilised, and centred, around providing patients with the greatest possible choice, flexibility, and personalisation in their interactions with healthcare.

The results are 24/7 access to health services, increased patient involvement in self-care, personalised care plans, and data-driven clinical decisions. All of which ultimately result in the potential for much better outcomes.

Patients are demanding this type of care and clinicians understand that it allows them to manage their patient populations much more effectively.

In this issue we consider how these evolving patient needs are coupling with an increasingly challenging health provision landscape to drive digital transformation and allow organisations to adopt more efficient strategies.

Inside the issue, Nicky Murphy, Head of Healthcare Public Policy, at Amazon Web Services explores how health organisations are meeting these evolving patient and clinical needs, and how they can leverage the benefits of cloud solutions to deliver transformation at scale. Dr Lucy Mackillop, consultant obstetric physician at Oxford University Hospitals NHS Foundation Trust asks, 'How can Technology Help to Remotely Manage Blood Pressure in Pregnancy?'. And, Oliver Harrison, of Koa Health outlines, 'How Access to Mental Health Care has Changed with COVID-19 One Year In'.

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Editor

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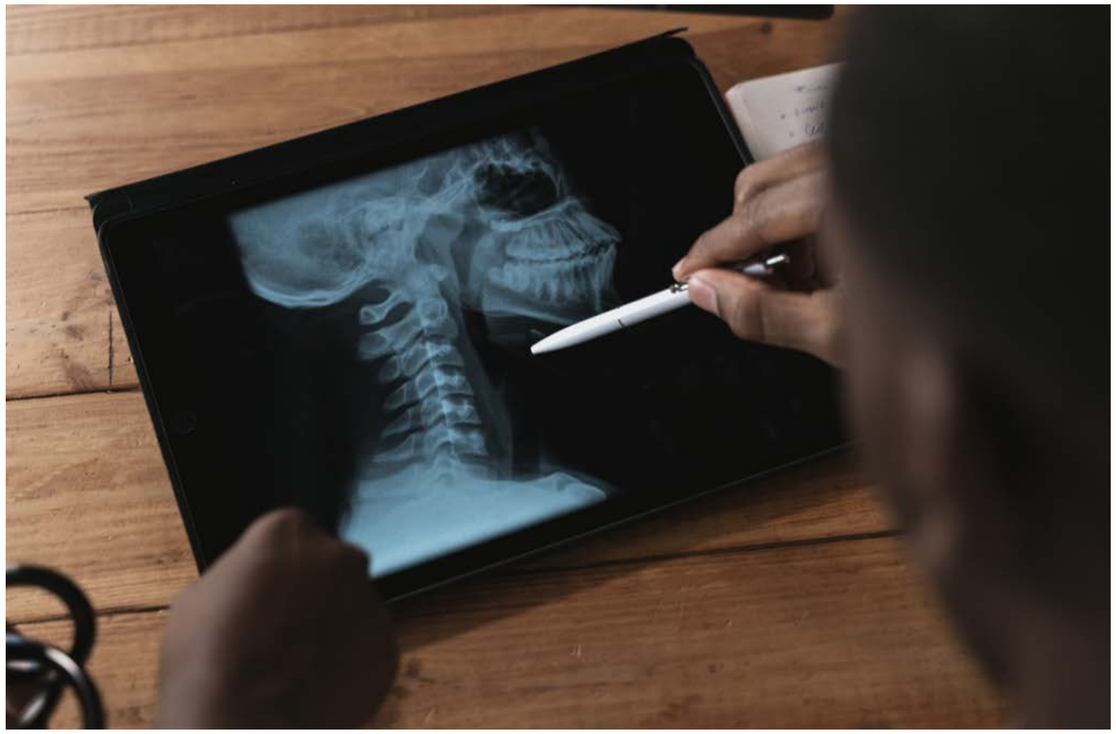

Meeting Evolving Patient and Clinical Needs During COVID-19 and *Beyond*

By: Nicky Murphy, Head of Healthcare Public Policy, EMEA at Amazon Web Services

The COVID-19 pandemic is challenging health systems around the world. They are responding to an increasing number of ill patients (both those with COVID-19 and patients whose care plans have been disrupted), managing a lack of resources such as personal protection equipment (PPE), administering vaccination programmes at scale, and all whilst maintaining workforce well-being.

With the worldwide deployment of vaccines still underway, health systems will need to continue transforming to adapt to managing COVID-19 alongside other health conditions.

Using cloud technology has already provided benefits to health systems during the pandemic—many of which will persist into the recovery phase. Amazon Web Services (AWS) is helping healthcare systems accelerate the pace of research, support data-driven decision making, and facilitate the delivery of services to citizens and patients, during this crucial time.

Accelerating the pace of research

Since the early stages of the pandemic, academic institutions and other healthcare and research companies have turned to cloud technology to accelerate scientific insights. The cloud supports research at scale and collaboratively between research groups through its reliable and scalable computing power.

For example, Genomics England and their technology platform LifeBit are using cloud technology to deliver Genomic England's COVID-19 research platform. They provide researchers with access to genomic data from within their highly secure environment, allowing them to collaborate and find new insights quickly.

Health IT company Cerner launched their Learning Health Network, using the analytics capabilities of the cloud, to perform analysis on aggregated and de-identified data from multiple organisations. Through the network, researchers have been able to quickly run algorithms to prove the efficacy of therapies to treat COVID-19.

The Jameel Institute at Imperial College London are using cloud technology to accelerate COVID-19 disease modelling work. They provide public health agencies and governments around the globe with real-time estimates to inform the COVID-19 outbreak response, using a combination of machine learning (ML) and data science methods. Thanks to the cloud, the Imperial College COVID-19 response team can now store more data, share more information and experiment with different methods in ways not previously possible.

And, to facilitate health systems sharing data for research, AWS launched CORD-19: a ML-enabled database of COVID-19 research.

"The trend to share data during the pandemic is leading to positive outcomes, and citizens will benefit from initiatives such as the creation of a European Data Space and further clarity from the European Commission on how the health sector can exchange and use different types of data for healthcare delivery and research whilst fully protecting citizen's data in compliance with GDPR."

Enabling data-driven decision making

Access to cloud technology has enabled organisations to innovate and make use of data during the pandemic. Health systems have had greater willingness to use data from multiple sources and have worked with partners to develop dashboards for government leaders.

Governments and public health officials also used more real-time data, from a wider set of sources, and applied artificial intelligence (AI) and ML to infer patterns in virus prevalence and predict where they would need resources in the future.

For example, The World Health Organization (WHO) used AWS to build large-scale data lakes and aggregate epidemiological country data to track the spread of the virus. In the United States, Kinsa, a developer of internet-connected thermometers and a health-tracking app, aggregated real-time fever and symptom information to create visualizations of the spread of the illness.

We have also seen Imperial College London and Pansurg use AWS for their Realtime Data Analysis and Synthesis (REDASA) platform to combat the infodemic of data about COVID-19. The platform uses AWS cloud technology to analyse vast amounts of COVID-19 information in real time. It extracts the most important insights—saving tens of thousands of hours of research and enabling clinicians and policymakers to find the best available evidence for better patient treatments at speed.

Health systems have also seen reductions in treatments for non-COVID-related conditions during 2020, meaning there is likely to be a backlog of patients requiring care in 2021. Prioritisation of this workload will rely on accurate, timely information.

Delivering electronic health and care services to patients and citizens

Healthcare organisations have also tapped into cloud technology to deliver innovative, direct care. The NHS and technology consultancy Slalom, for instance, worked with AWS to set up an automated messaging service to reach the 1.5 million UK citizens identified as most vulnerable to COVID-19. They helped them register to receive social and medical care and essential supplies. This service was set up in 48 hours, thanks to the cloud.

According to a study published by Journal of the American Medical Informatics Association (JAMIA), telehealth services including virtual urgent and non-urgent care visits grew by 683% and 4,345% respectively during the pandemic. Telehealth is the provision of care remotely, using digital technology and telecommunications. Regulatory reform in some countries facilitated this increase.

For example, Brazil and India legalised the use of telemedicine during the pandemic, and Australia made telehealth a permanent part of the way the government will provide the delivery of care going forward. In the US, the federal government enabled Medicare, the federal health insurance programme, to reimburse these services more comprehensively, whilst other states are developing legislation to extend the enhanced access and efficiency of telehealth to meet patient needs beyond the pandemic. In Japan, Canada, and many EU countries, frameworks for telehealth provision were already in place so government policies focused on encouraging more clinicians and patients to use them.

Telehealth providers, like Nye Health, have used the cloud to support this increased demand in telehealth services and scale quickly, in turn, helping patients continue to access clinical advice and care when they needed it. The Nye Health service is fully encrypted, compliant with NHS Digital's standards and is now servicing thousands of patient consultations a week.

These healthcare innovations have been made possible thanks to the scale and agility that cloud technology offers. Healthcare organisations have been able to continue delivering care thanks to their ability to use the cloud to: scale services to meet patient demand, introduce new services at speed and with flexibility, deliver real-time analytical insights, and accelerate the pace of research. By harnessing the power of the cloud, health systems can continue to support innovation at scale to the benefit of patients and health services. ■

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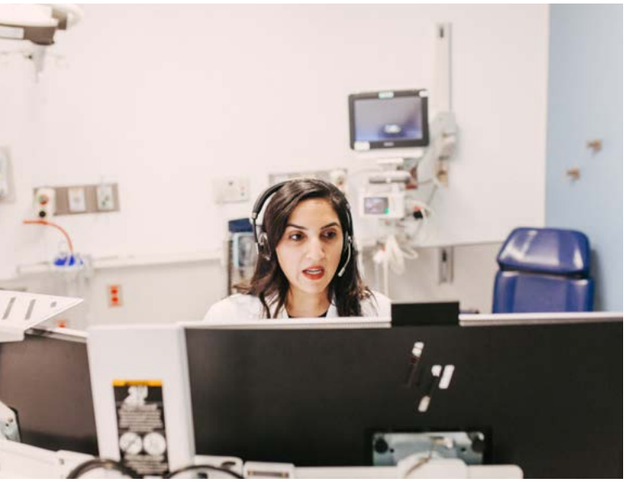
to find out what's on across the mHealth industry

3 Crucial Considerations for Integrating RPM with your Telemedicine Platform

In times of a public crisis where thousands of Americans are being asked to practice social distancing by staying at home, the opportunity to receive medical care through the use of telehealth and remote patient monitoring (RPM) technologies offer a promising solution.

With the recent passage of legislation allowing healthcare providers to bill Medicare fee-for-service for patient care via telehealth, it is a model that the majority of organizations are now either looking at implementing or expanding.

Using telemedicine in conjunction with RPM can streamline care delivery and benefit your healthcare organization in a number of ways - right from providing better care to patients suffering from chronic conditions such as diabetes, obesity and congestive heart failure; to mitigating costs of delivering care - it has you covered.



Problems reside in the fact that many providers get easily overwhelmed even at the thought of integrating RPM with their telemedicine platform because of how complex the entire process looks.

In this piece, we will be looking at a few crucial considerations every healthcare provider looking at integrating remote patient monitoring with their telemedicine platform must be aware of.

Maintaining Optimal Security at the Care Provider's End

The ultimate goal of any RPM or telehealth solution in general is for clinicians to have access to dependable and timely patient data which can be leveraged to make informed clinical decisions. For this very reason, there will always be an endpoint device at the care provider's end that collects and translates or assists in the interpretation of all the congregated patient data. This simply implies that issues of security surrounding this endpoint device will always arise.

Ensuring data security and compliance to regulatory requirements is one of the biggest challenges of telemedicine app development. Any healthcare software that collects, stores and/or transmits patient health information needs to be compliant to laws such as HIPAA (Health Insurance Portability and Accountability Act). This also holds true when you are developing a remote patient monitoring app or integrating remote patient monitoring devices into your existing telemedicine platform.

The use of private devices increases an organization's susceptibility to a cyber attack. The probability of such an attack being attempted increases further if the devices aren't managed by the information security teams and lack the required security controls.

Moreover, a telemedicine platform is almost always connected to the healthcare facility's network which includes various components such as switches, routers, firewalls, Wi-Fi, VPNs, and, depending on the size of the business, one or more data centers, with storage systems, virtual and physical servers, and a host of other devices as well as applications.

Since all of these components are interlinked, any vulnerability arising due to an inefficiency in security controls even in one particular area can have effects across the entire IT ecosystem.

Therefore, when looking at integrating RPM with your telemedicine practice, enough thought must be put into how optimal security can be maintained at the healthcare provider's end.

Leveraging Artificial Intelligence to Streamline Clinical Operations

Integrating RPM with your telemedicine platform is only going to be effective when you can derive maximum value out of the patient data these systems are gathering. This is where other state-of-the-art technological solutions come into the picture.

For one, artificial intelligence (AI) is bringing about never-seen-before transformations on the telemedicine front.

Some of the future possibilities of AI in telemedicine and remote patient monitoring include:

» AI-guided ultrasound technology is one of the latest advancements happening on the virtual care front right now and it has already received FDA approval in February, 2020. By integrating this solution with your telemedicine platform and connecting it to RPM devices, medical professionals who are not expert in ultrasonography can produce high-quality diagnostic images in real-time. Thus AI can reduce the demand on specialists while streamlining care remotely.

» Deep learning technology will soon be used to automate most manual routine tasks on the telemedicine front. It will also be used to improve diagnostics in specialties such as dermatology, radiology and pathology.

» Research on assistive robots that run on AI is already underway in Japan. With a growing aging population and increasing burden at senior living facilities, AI-enabled assistive robots can provide timely medications, help in movements around the house and alert healthcare providers in case of any accident or emergency.

» AI can also be used as a tool for triaging patients remotely and determining the urgency as well as severity of their medical condition. Based on this, emergency services can then be deployed to those patients alone who are in immediate need of attention. This considerably reduces the burden on healthcare systems and ensures everybody gets the care they need.

» Applying machine learning (ML) - a subset of AI - on large image data banks can help compare individual cases to large global data banks to furnish insights on disease trajectory, diagnosis, and treatment options. It can provide additional information by combining multiple data sources as well as individual electronic health records. In this way, AI can help address the ongoing crisis in medical imaging.

Apart from AI, there are many other technological solutions that can boost the overall efficiency of your telemedicine platform when used in conjunction with RPM. You just need to keep yourself well informed about the latest developments and what your counterparts are doing to stay ahead of the curve.

Considering the Patient's Home Environment before Designing the Solution

Even though securing the patient's home information technology environment isn't as compound a function as securing the telehealth and RPM systems', vendors', or care providers' environments, it is becoming more diverse as we speak.

Some of the most vital components of the patient's home technology environment include cable modems, personal firewalls, PCs, laptops, tablets, smartphones, wireless routers and access points, and other smart home devices (like home security systems or appliances).

In addition to these, for certain telemedicine applications, there may also be monitoring equipment deployed in the patient's home to either carry out diagnostic tasks (e.g., calculating glucose levels, blood pressure, BMI/weight measurement, etc.), or provide important data to patient monitoring systems that track vitals around the clock and are designed to transmit information and alerts about both the health of the patient as well as the health of the device.

While these devices may more or less be sound in and by themselves, complications may exist in the patient's home environment, like the lack of adequate password security, lack of cybersecurity awareness, inefficient use of multi-factor authentication and lack of data encryption.

These problems often act as a pathway for an enterprising and skilful cybercriminal to gain access to critical backend systems of a supplier or possibly even a healthcare provider.

Therefore, creating a stereotype of an ideal patient's home environment and designing the solution in a way that no ends are left unsealed can take any healthcare provider a long way in gaining maximum benefit out of RPM and Telemedicine integration.

Apart from the ones mentioned above, there are many other considerations a healthcare provider should consider when looking at integrating these two solutions.

Try educating yourself as much as you can about industry trends, the latest tech stack available in the market, what your counterparts are doing and what you can do to furnish an exceptional patient experience moving forward. ■

How can Technology Help to Remotely Manage Blood Pressure in Pregnancy?

By Dr Lucy Mackillop, consultant obstetric physician at Oxford University Hospitals NHS Foundation Trust, and CMO at Sensyne Health

Hypertensive disorders of pregnancy affect 10% of pregnancies worldwide, of which almost half develop pre-eclampsia – a syndrome characterised by abnormal placentation leading to pregnancy complications. These include low birth weight babies, premature births, and even life-threatening complications for the mother, such as stroke or organ failure. Worldwide, hypertensive disorders of pregnancy account for 10- 15% of maternal mortality, and pre-eclampsia causes 15% of preterm births and 25% of all neonatal costs. Early detection and prevention is, therefore, important.

Regular blood pressure checks are a key part of the care pathway for pregnant women to enable the identification of high blood pressure to minimise some of the consequences of uncontrolled hypertension and severe pre-eclampsia. However, the COVID-19 pandemic has led to a modification in some antenatal and postnatal services with fewer face-to-face appointments. Pregnant women and particularly those with risk factors for pre-eclampsia, may be concerned about how often they should be checking their blood pressure. Remote or self-monitoring of blood pressure levels has the potential to provide extra blood pressure check which can be useful for clinicians and women to augment the in-person monitoring that occurs at each face-to-face appointment.

Remote monitoring of blood pressure in pregnancy

In 2020, in response to the COVID-19 pandemic, the Royal College of Obstetricians & Gynaecologists published guidelines for self-monitoring of ➪

blood pressure in pregnancy to support enhanced monitoring for pregnant women at risk while minimising face-to-face consultations.

There has been an increased recognition of the benefits from self-monitoring of blood pressure. Remote monitoring of blood pressure during pregnancy could improve and hasten the detection of hypertensive disorders including pre-eclampsia and empower women in their own self-care. Thanks to remote patient monitoring technology, mothers-to-be can self-monitor their blood pressure, and communicate the results to their healthcare team remotely using CE marked applications.

There are multiple potential benefits of remote blood pressure monitoring in pregnancy:

- Patient choice – provides women with choice about how their care is delivered depending on their personal situation, be it face-to-face or remotely.
- Reassurance – provides comfort to mums-to-be who may be concerned about their blood pressure levels.
- Empowerment– self-monitoring can give pregnant women a greater understanding of their condition and control over their pregnancy care
- Efficient Care - helps optimise the amount of time a woman spends in a clinic environment or in a hospital bed by being able to remotely monitor them in their community.
- Capacity – by optimising care pathways to include remote blood pressure monitoring in addition to normal antenatal care, clinicians can manage and improve capacity in day assessment units and community midwife visits.
- Prioritisation – by receiving the results in real time, clinicians can quickly identify those women who need more urgent care and deliver the treatment they need as quickly as possible.

Detecting raised blood pressure sooner could lead to earlier diagnosis and treatment to prevent complications. Care teams can use data from the frequent blood pressure readings to make better and more timely treatment decisions. This could lead to improved health outcomes for mothers and their babies, as well as be a cost-effective way for managing the condition, helping to reduce pressures on our healthcare systems.

The role of data analytics in determining patients most at risk

Analysing large volumes of blood pressure data collected via self-monitoring may lead to the development of decision support algorithms, to help clinicians predict those women that are likely to develop severe hypertension and help to minimise and prevent complications by intervening with blood pressure medication earlier.

However, it wasn't until the pandemic that the use of remote monitoring technology in blood pressure management in pregnancy became more widespread and it will take time to build up the depth and breadth of data required to realise the clinical benefits that AI and data analytics can deliver.

Having access to remote blood pressure monitoring technology has helped to facilitate remote consultations – a change which is likely to continue and could in the future lead to technologies that can detect hypertensive disorders earlier and lead to improvements in maternal and neonatal outcomes.

Remote monitoring and COVID

Remote blood pressure monitoring technology has been invaluable during COVID-19 to help minimise face-to-face contact, whilst providing additional monitoring of pregnant women with, or at risk of, hypertension. It not only allows women to be more engaged with their care, but it also provides them with choices about how their care is delivered. I believe in the near future it will be normal for women to use these technologies to monitor many aspects of health during pregnancy, and to securely share that data with healthcare providers to augment the routinely collected data gathered during pregnancy and help provide enhanced and personalised care for every pregnant woman. ■

Addressing the Epidemic of Loneliness in the Wake of COVID-19

by Steve Morgan, Partnership Director, Agilisys

The pressures of a pandemic

The epidemic of loneliness was worrying health professionals long before coronavirus arrived. UK mental health services were already straining to allocate resources to support the growing number of people with mental health problems. Given the upsurge of service demand because of the psychological sequela of COVID-19, though, those pressures will surely be magnified.

The pandemic has meant we exist in a space filled with tension; we're desperate to connect but prevented from doing so. Furthermore, masks make it difficult to read faces. This is a worry real worry. Numerous studies have found loneliness is associated with a range of health problems – from addiction and depression to heart disease – and shorter life expectancy. In fact, loneliness, living alone and poor social connections are said to be as bad for your health as smoking 15 cigarettes a day.

Whilst they have been exacerbated by the pandemic, the challenges of dealing with a growing epidemic are nothing new. However, there are several technology-led steps that can be taken to bring the epidemic of loneliness under control.

Create a better picture of the need

Estimates often wildly vary regarding the number of people across the UK experiencing loneliness. This disparity is concerning. After all, if we can't measure and record loneliness correctly, what hope do we have of dealing with it? Finding a better way to capture the data is surely the only starting point of any meaningful action. Only when we get the data right can we join up thinking around health and social care to deliver the most suitable interventions.

The University of California recommends three questions, with three clear answer choices for each of the questions (hardly or never, some of the time, often):

1. How often do you feel that you lack companionship?
2. How often do you feel left out?
3. How often do you feel isolated from others?

This method provides some form of measurement. As well as enabling organisations to identify bands of the most isolated or lonely individuals, it also enables the effectiveness of any intervention to be measured.

Bring people together at scale

Much in the same way a virus is a threat to clinical health, loneliness is a threat to mental health. And just as we would shape care according to the clinical health need, we must tailor care to the mental health need. The big difference is that one of the simplest answers to loneliness and social isolation is connection with other individuals – meaning there's the opportunity to address the needs of multiple individuals at one time.

Over 750,000 people offered their time to support at-risk groups and those in need of care across the UK during the pandemic. If we can network and connect available volunteers via technology, tasks can be communicated to the right people with the right skills in a very short space of time. Add in connections into community groups and third sector organisations and we have a large network of people who can be mobilised to deploy an anti-loneliness care plan to isolated people at risk – or simply take a neighbour to their local library.

The contact centre model must be reimagined

Traditional local authority and mental health provider contact centres used to running on an 'inbound' contact model, must now change to a proactive 'outbound' model instead, They should be making video calls to citizens, verifying current situations, and using the proactive support bubble and close integration with primary care in any exception event. Early intervention using a proactive contact model will provide high levels of cost avoidance and better patient outcomes.

Connect through effective technology

The over 75 age group is the fastest growing population now accessing the internet. There is a misplaced assumption that because they are old they've got no digital skills. However, this is rarely the case. Older people may be lonely, but they are not stupid; they can still learn new skills.

I appreciate there's a bigger challenge with individuals who have some form of cognitive impairment. But that is a barrier that can be overcome. We've already seen the use of voice commands via Amazon's Alexa make strides, while smart devices have been rolled out in large quantities to reduce social isolation.

Care needs to come before intervention

Of course, it's incredibly important during this pandemic for people in the highest risk groups to remain cautious about meeting others. Loneliness can still be tackled, but from a safe distance, which is where technology clearly has a role to play.

As well as part of the solution, technology is also part of the problem though. If you go back in time, there were all sorts of social gatherings that would get people out of their homes and engage with other people. However, these have all but disappeared in recent times. The technology advances that have make life apparently more connected have displaced established communities and created circumstances that make it harder to form social bonds. Faced with a damaging epidemic, we need to find ways to replace these interactions and bring people back together, even if that means doing so virtually.

If we can take the right actions and utilise the skills of people in the right way, the hope is that we can get people who have been removed from the loneliness epidemic to go on to help other people in similar situations. That's the success story we should look for.

Above all else, we need to start caring about our population before they need intervention. We need to take a preventative approach. There's no single organisation that can fix any of these issues. People need to work together to solve the challenges… and we need to do it quickly. ■

INDUSTRY NEWS

News and Information for Digital Health Professionals

Biobeat to Trial Patient Monitoring Devices with Acute Ischemic Stroke Patients

Biobeat has begun a new collaborative pilot study with Nuvance Health's Vassar Brothers Medical Center, in New York, to evaluate the practicality and acceptability of using Biobeat's continuous monitoring devices with hospitalized acute cerebrovascular accident (CVA) patients.

The study is designed to measure both patient and staff satisfaction of Biobeat's wearable chest-monitor and identify any benefits or barriers to implementing the wearable patient monitoring devices.

Acute CVA patients, more commonly known as "stroke patients," require intensive vital sign monitoring, as blood pressure, and specifically hypertension, is an important component in the progression of CVA. As such, continuous and strict BP monitoring is of utmost importance in both prevention and treatment of CVA. Moreover, early detection of BP changes may help in early intervention before the devastating effects of blood clots or bleeding are apparent.

"Our wearable vital sign monitoring devices have the potential to support care staff by providing real-time patient health data from a distance, significantly improving patient outcomes," said Arik Ben Ishay, CEO of Biobeat. "We look forward to applying our technology in other clinical studies to further prove the importance of our wearable remote patient monitoring solutions as we look to elevate patient care across the healthcare ecosystem."

Wearable devices, such as Biobeat's continuous non-invasive monitoring of vital signs device (CoNiM), have been shown to increase the periodicity of vital signs monitoring, with the potential to reduce the duration of hospital stays and help decrease mortality.

"We are excited to launch this important pilot study as it may lead to a change in the standard of care as we know it in CVA patients," said Dr. Arik Eisenkraft, CMO of Biobeat. "This study highlights the utility and efficacy of wearable CoNiM devices to monitor and care for patients with acute stroke, and potentially serve as a key tool to improve the medical management provided." ■

First Data Collected in Global Alzheimer's Wearable Project

Could your smartphone hold clues to early Alzheimer's disease? The development of a wearable to detect early Alzheimer's and other neurodegenerative diseases years before symptoms show has taken a step closer to reality as a result of a new partnership between UK charity Alzheimer's Research UK and Boston University. The initiative will see the first digital data flowing into its global Early Detection of Neurodegenerative diseases (EDoN) initiative.

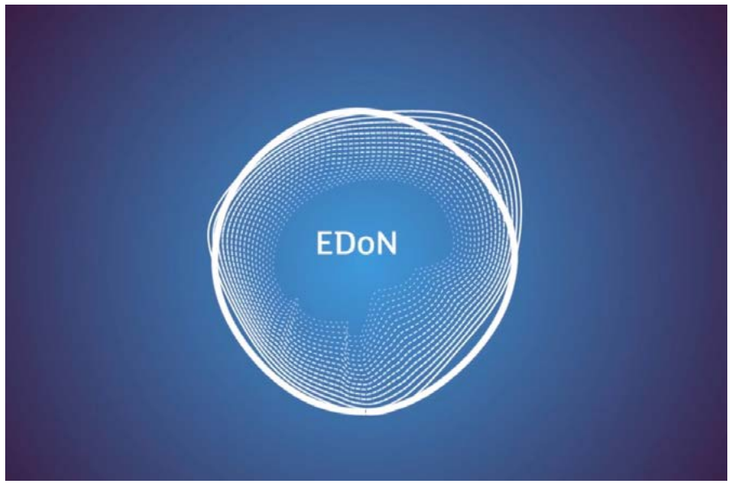
EDoN aims to use smartphone apps and wearables like smart watches and headbands to collect digital data on a range of measures including sleep, neural activity, cognition, speech and language, gait, heart rate, fine motor skills and physical activity.

The data will be validated with clinical data such as brain scans and analysed by EDoN's Analytic Hub, made up of experts from The Alan Turing Institute, University of Exeter, MRC Harwell Institute and the University of Cambridge. By collecting and combining large amounts of retrospective and prospective digital and clinical data, the EDoN team hopes to develop robust machine learning models that could detect subtle patterns or 'fingerprints' in people's digital data that could be a red flag for early disease.

If successful, EDoN will see experts developing a new digital toolkit that can collect the most predictive digital measures of early disease and could be used by doctors as part of a midlife health check to identify those most at risk of developing symptoms of dementia in the years ahead.

The three-year partnership with Boston University Alzheimer's Disease Research Center (BU ADRC) will see up to 200 volunteers with and without dementia using devices, including two smartphone apps, an activity tracking watch and a headband to analyse sleep, with the data being shared with researchers in EDoN.

The participants, who live in the Greater Boston area, will initially use the devices



for two weeks every three months for a year. The partnership is part of a wider project taking place at the BU ADRC testing a range of wearable devices to collect digital data that could give clues to a person's brain health.

"There are currently no treatments to slow or stop diseases like Alzheimer's and this is a major goal for scientists across the world. To have the best chance to change lives in future, we need to be testing potential new treatments and preventions when these diseases are starting to take hold in the brain, not when the damage has already been done." Comments Hilary Evans, CEO of Alzheimer's Research UK.

"Identifying diseases like Alzheimer's much earlier than we can today would transform research efforts into the condition and help bring about these life-changing treatments much sooner. Brain health is an incredibly important part of our overall health. The technology being explored through EDoN could help raise red flags that would see many more people benefit from early conversations, diagnosis and access to treatment and research."

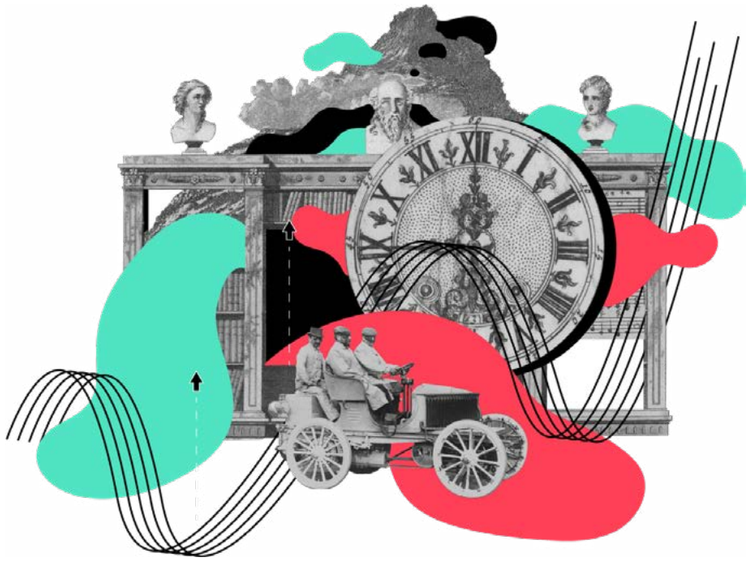
Ultimately EDoN aims to collect data from up to 50,000 people through ongoing research studies across the world before testing its final digital device in up to 1million people through health checks. The charity hopes that the digital fingerprints developed through EDoN's work could not only indicate early disease but distinguish between the different diseases that cause dementia.

Dr Jesse Mez, Clinical Core Director for the BU ADRC, said: "Digital technologies are providing ever more opportunities for people, and their doctors, to understand and monitor their health. The diseases that cause dementia can start in midlife, but we currently don't have inexpensive and non-invasive methods to detect this early disease. Digital technologies like smartphones and wearables could provide a low cost, easy-to-use way to pick up some of the very subtle early changes in diseases like Alzheimer's. The findings of this study could really transform the way we tackle these diseases in the future."

"Last year, Boston University received $2.8m funding from Bill Gates and the American Heart Association to create a Brain Health and Dementia Technology Research Center. This partnership with EDoN brings our two organisations together towards a common goal: to use digital technology to streamline and fast-track better patient care and treatment in the years ahead." ■

New Global HealthTech Product Accelerator

Focuses on Design & Development



A new innovative HealthTech Product Accelerator is now accepting startups for a non-equity, program that will focus exclusively on the enhancement of the participating companies' design and technology.

Apply now at *https://bit.ly/HealthTech-NetworkingClub*

The program - which is run by global digital product consultancy, and Journal of mHealth partner, bene : studio - is a non-equity, online HealthTech Product Accelerator that has been specifically designed to enhance a startups' existing design, whether that be in the form of an idea, concept or already-existing product.

In contrast to other business accelerators, this program focus' exclusively on the enhancement of your design and technology, providing excellent, time-efficient results.

The accelerator is tailored to advanced HealthTech startups with $1M+ yearly revenue or overall funding, with programs including, but not limited to, Telehealth, IoMT devices, Biotech, and Health AI.

> Significant discounts exclusively for The Journal of mHealth readers

The accelerator is zero-equity, so there's no requirement for participating companies to provide shares. The accelerator will have a 100% focus on digital product acceleration, helping with the implementation of UX/UI, architecture, development, testing & operations.

With no application fee, startups can apply risk-free, and the program payment is only required after the application is approved.

The Journal of mHealth readers receive significant discounts on the accelerator fees – see below for details.

Participants can choose one of three different and comprehensive levels of the accelerator that best matches their needs:

Product Booster

Where bene : studio will form an action plan for the idea or product within one week. Journal of mHealth readers can receive 50% off Product Booster fees. Just mention us upon application.

Growth Product Acceleration

bene : studio experts will help the participating startup to plan its entire digital product, new application or subproduct over the course of a month. Journal of mHealth readers can receive 25% off Product Booster fees. Just mention us upon application.

Product Enhancement Program

Where bene : studio's team of experts will collaborate with the participating company to create a technical proof of concept or clickable prototype. The Journal of mHealth readers can receive 10% off Product Booster fees. Just mention us upon application.

HealthTech adoption is growing fast, as the pandemic has manifested the need for better and new technologies. HealthTech startups raised a total of $15.3 billion in 2020, according to Silicon Valley Bank's latest Healthcare Investments and Exits report.

"Since the pandemic started, the need for remote and digital health solutions has steadily increased," said Bálint Bene, founder and CEO of bene : studio. "We have been working on new digital products and businesses for more than 10 years and, over that time, we have collected a lot of tried-and-true practices in helping startups, which we can now share through this program.

"In addition to our directly accessible programs, we are partnering with investors and associations to help their portfolio companies. We also offer product, design, and technology courses from business accelerators, offering a wider scope of mentorship," said Bene.

Applicants can apply via *https://bit.ly/HealthTechNetworkingClub* ■

Healum Closes Investment Round for AI-powered Patient Management System for Long-term Conditions

Healum, a leading digital health company, known for developing a ground-breaking AI powered patient management system to improve health outcomes and quality of life for people with long term conditions, has raised funding from NPIF – Maven Equity Finance, managed by Maven and part of the Northern Powerhouse Investment Fund and Catapult Ventures acting on behalf of the Greater Manchester and Cheshire Life Sciences Fund.

The investments will be used to expand the company's operations in Greater Manchester and to aid healthcare professionals in delivering programmes of remote care, support and behaviour change for people with long term conditions through its unique use of its AI powered clinical software.

Healum's co-founder and CEO, Jonathan Abraham, said: "We are delighted to have received investment from the Northern Powerhouse Investment Fund and the Greater Manchester and Cheshire Life Sciences Fund. This gives us the opportunity to build on our existing clinical and research partnerships in Greater Manchester, to tap into the wealth of talent in the region and to play our part in championing innovations that will help individuals with long-term conditions manage their health so they can live longer, more fulfilling lives."

The investment follows the backing of UKRI through a £530K grant to develop an AI platform that provides healthcare professionals with recommendations for managing patients with long term conditions at the point of care. The company is disrupting the way that AI is developed in healthcare, favouring an approach where AI is used to assist healthcare professionals rather than replace healthcare professionals.

The UKRI-funded project, under the Digital Health Technology Catalyst (DHTC) programme, part of the Medicines Manufacturing Challenge, helped the company to develop the machine learning algorithms that power recommendations in its patient management system by crowdsourcing the training of the algorithms using inputs from networks of healthcare professionals. This disrupts the approach to AI in healthcare by putting healthcare professionals in control of the development and training of the artificial intelligence and ensuring that trust, privacy, safety and diversity come first when using AI to support patients to manage their conditions. The company believes that this approach can help to overcome the issues around trust and algorithmic bias in existing AI solutions that have been developed for use in healthcare.

Vijay Curthan from Catapult Ventures said: "We are delighted to be supporting Healum on its expansion into the Greater Manchester area and on its development of the AI powered patient management system, which we believe will drive a paradigm shift in the manner in which healthcare professionals deliver

holistic care to people with long term conditions."

The investments will also help to bolster Healum's existing clinical research partnerships with NIHR, Greater Manchester CRN and Vernova Healthcare CIC, with whom it is delivering a randomised control trial as part of its Innovate UK project to assess the impact of Healum's smart remote patient management solutions in aiding primary care teams to improve health outcomes for patients with type 2 diabetes. Over the next year, the company will build on its partnerships across the region to launch a live learning research network that powers the inference models behind its integrated patient management system and care planning software.

The company chose Greater Manchester rather than London as a base for its future operations, citing the devolved and integrated nature of the region's health and social care provision as the main reason for the decision. Anuj Saboo, CTO and co-founder of Healum, commented: "Greater Manchester is the only place in the UK that can provide us the data partnerships, research support, diverse population and integrated health and social care practices that will enable us to give healthcare professionals the control and trust in the unbiased intelligence that powers our patient management system."

Healum was previously part of the Greater Manchester Future of Healthcare Programme run by UP Ventures Group, where the team came to understand the benefits of focussing its efforts in the North and were introduced to investors Catapult Ventures and Maven Capital Partners.

Danny Meaney, CEO at UP Ventures Group said: "Congratulations to Jonathan and the team at Healum. It was clear to us at UP that Healum had a world class healthtech product as well as the drive and business intelligence to see it through to success. We are delighted to have played our part by opening the right doors to match the team with the right investors." ■

Study finds URGOnight can Increase Sleep by as much as 2-hours per Night

Clinical study results for URGOnight, the world's first at-home daytime sleep training system based on neurofeedback technology, has found that two-thirds of participants increased their nightly sleep duration by an average of 57 minutes and as much as two hours.

Conducted by the Research Institute Brainclinics, a research institute based in the Netherlands that specializes in advancing the understanding of the brain, the clinical study has been pre-published in the Applied Psychophysiology and Biofeedback Journal.

URGOnight is a guided and personalized brain training sleep system based on neurofeedback therapy. Designed to be used 20 minutes a day (one session), three times a week, its comprised of a wearable Electroencephalogram (EEG) headband and training app that help people naturally train the brain to produce and increase the brainwaves clinically associated with sleep. Until now, this type of technology, which uses real-time displays of brain activity, audio and visual cues, and reward strategies to teach people to identify and modify behaviour, was only available in clinical settings by medical professionals.

Conducted from April 2019 to December 2020 by principal investigator Dr. Martijn Arns, Researcher Director and Founder of Research Institute Brainclinics, individuals who reported dissatisfaction with their sleep participated in the clinical trial. Participants used URGOnight at home five times a week for either eight weeks (40 sessions) or 12 weeks (60 sessions). They had weekly clinic check-in visits during their program and participated in a three or six-month follow-up appointment.

The study's primary goal was to assess the effect of training with URGOnight on subjective sleep quality, which was evaluated by various questionnaires. The clinical study was also designed to retrieve preliminary "objective" sleep quality with actigraphy measurements and monitor the long-term effects of using URGOnight.

A user experience questionnaire issued at the end of each participant's program found that 91.7 percent felt URGOnight was easy to use, and 83 percent understood what to do to succeed. Also, 91.7 percent said they were motivated to complete their program.

The study also found:

- Participants observed sleep improvements after an average of 20 sessions with URGOnight with some as soon as 10 sessions.
- After 40 sessions, sleep improvements persisted for three months on average, with some noticing improvements for up to six months.
- Participants' rated satisfaction towards sleep was significantly increased after 40 sessions. Additionally, their sleep scores, a rating that defines sleep satisfaction, improved by 85%.

"Neurofeedback technology is one that we have investigated in great detail over the last two decades at Research Institute Brainclinics, inspired by the works of Barry Sterman," said Dr. Arns. "We have also applied this technology at our clinics and found that the clearest effects are usually that patients fall asleep faster and have more restful sleep. The first results of our URGOnight study were very encouraging."

"A good night's sleep is critical for overall health and wellbeing, yet so many individuals suffer from restless nights and sleep issues. URGOnight brings the benefits of neurofeedback training, generally only found in a clinical setting, into the home, helping to provide a natural and drug-free way for people to make lasting improvements to their nightly rest," said Guirec Le Lous, founder of URGOTECH. "We are proud to see that the results of the clinical study both validate URGOnight's effectiveness as well as show participants found the technology simple to use and gained more sleep each night."

The findings of Dr. Arns' study is further evidence of the effectiveness of the URGOnight sleep training system, which leverages neurofeedback technology that has been clinically proven to help people to fall asleep 40% faster and cut night-time interruptions by half.

The system is being further assessed in multiple ongoing studies including a 50-patient trial in France that is starting this month to measure its effectiveness through polysomnography.

The full study is pre-published in the Applied Psychophysiology and Biofeedback Journal, and its results can be seen here. *https://psyarxiv.com/2ypmw/* ■

Oxehealth Launches in the US Following FDA Clearance

Oxehealth has announced another world first after the US Food and Drug Administration granted a De Novo clearance for its Oxehealth Vital Signs product, which is incorporated into Oxevision, the vision-based patient monitoring and management platform delivered as software as a service.

The grant means Oxehealth can place Oxevision on the market in all US states, where it will focus on deployment into skilled nursing facilities ("SNFs"). There are more than 15,500 SNFs across the US, that care for more than 1.35 million people who do not need to be in hospital.

Oxevision, which is delivered as part of the Oxehealth Service, has been shown to help clinicians within UK and European healthcare organisations to improve the safety, quality and efficiency of their care.

Chief executive Hugh Lloyd-Jukes said: "Oxehealth secured a world first accreditation for its technology when it obtained European medical device certification two years ago.

"It is a tribute to the hard work of our development teams and our clinical research partners that our Vital Signs technology has now been cleared by the FDA in another world first that has created an entirely new category of medical solution: vision-based patient monitoring and management.

"This is an exceptional achievement for Oxehealth, and we are excited that we can now begin partnering with clinicians and the leadership teams of healthcare providers in America to enable them to deliver safer, higher quality and more cost-efficient care."

Oxehealth was founded by the former Dean of Engineering at the University of Oxford, Professor Lionel Tarassenko, in 2012, with the aim of creating a system for the measurement of pulse and breathing rate without the need to attach a device or wires to a patient's skin.

Oxevision delivers on that ambition. It enables staff to intervene to prevent incidents such as falls and assaults by alerting them to early warning signs; to take accurate visual and vital sign nursing observations without disturbing patients; and to improve care planning by accessing activity reports and reviewing incidents.

Hugh Lloyd Jukes added: "Our evidence demonstrates that deploying the Oxehealth Service leads to an immediate step change in care outcomes and staff and patient experience.

"As significantly, our partners see year on year continuous improvement in their service, with staff making use of the time saved and insights received, to plan care and develop more efficient and effective ways of working.

"That means that, unlike conventional remote patient monitoring devices, such as bed mats, falls monitors or wearables, the Oxehealth Service delivers on the promise of minimising patient harm, maximising patient recovery, and making it possible to reconfigure patient pathways."

In addition to its focus on serving US SNFs, Oxehealth will make Oxevision available to the wide range of provider organisations that have already benefited in the UK and Europe, including: assisted living facilities, general hospitals, behavioral health providers and custodial care settings.

Oxehealth conducted a clinical trial of its technology to support FDA's decision to grant the De Novo, involving participants demographically matched to the US population. The study used reference measurements of pulse rate and breathing rate from an FDA cleared contact device, and again proved that Oxehealth's contact-free device is accurate to within +/- three beats per minute for pulse rate (the benchmark standard for contact pulse oximeters) and +/- two breaths per minute for estimated breathing rate (chest wall movements). ■

26,000 Falls May Have Been Prevented by GPs Employing Prescribing Technology

GPs and other NHS prescribers may have helped avoid tens of thousands of falls amongst the elderly after using prescribing decision technology FDB OptimiseRx to deliver guidance on avoiding adverse drug side effects, an Academic Health Science Network study suggests.

Greater scrutiny in prescribing amongst elderly patients may have prevented 26,000 falls in a single year, according to new analysis by Kent Surrey Sussex Academic Health Science Network (KSS AHSN).

The review examined the benefits of healthcare professionals using a prescribing decision support technology to avoid risky prescription of anticholinergic drugs in elderly patients with dementia or a history of falls, that might then result in potential adverse side effects. These could include impaired cognitive function and further falls.

Undertaken by KSS AHSN, the analysis for 2019/20 calculated that 26,000 falls may have been prevented after it compared the many thousands of times primary care prescribers accepted messages presented through the OptimiseRx solution, against the assessed risk of a fall to patients in question.

The issue of falls in elderly people is a significant concern within the UK, especially at a time when hospitals are dealing with pressures of the coronavirus emergency. A third of elderly people in the UK are expected to suffer one fall a year, with half of those having two or more falls. Currently hip fractures account for 1.8 million bed days nationally, costing the NHS £1.1 billion per year.

Ian Mylon, Head of Analytics Delivery, KSS AHSN, said: "Our initial analysis of specific messages presented to prescribers relating to anticholinergic drugs shows some potentially very positive outcomes for the management and reduction of a serious clinical issue for elderly people. It is an important step towards a full cost-benefit analysis to understand the holistic impact of the use of OptimiseRx on the healthcare system."

Anticholinergic drugs are commonly used to treat a range of conditions including irritable bowel syndrome, excessive drooling, and urinary incontinence. They do this by blocking the neurotransmitter acetylcholine which controls a wide range of functions, from digestion and blood pressure, to muscle function and memory and attention.

However, other drug classes including antidepressants, antipsychotics, and antihistamines can inadvertently affect the acetylcholine system and increase the "anticholinergic burden" for patients, leading to a higher risk of adverse effects, including blurred vision, constipation, dry mouth, disorientation and even delirium and falls.

The analysis, an economic benefit forecast, considered the impact from GPs and other prescribers accepting prescribing guidance messages presented through their clinical system by OptimiseRx, a prescribing decision support technology provided to thousands of GP practices by drug knowledge company FDB (First Databank).

The analysis also forecast millions of pounds in gross benefits for the NHS in specific areas it examined – including reductions in hip fractures, reduced A&E attendance related to falls and subsequent reductions in physio treatment for hip fractures.

OptimiseRx is a software solution local medicines optimisation teams can use to enable a message offering relevant local or national guidance to be presented to prescribers at the point of prescribing, when medications might be suboptimal for a patient or when a prescription requires additional actions, such as observations, tests, or a co-prescription. It supports healthcare professionals with patient specific messages through their existing clinical system relating to a huge range of medicines.

Currently, more than 65% of NHS commissioning bodies and thousands of GP practices use OptimiseRx to provide best practice prescribing guidance, covering an estimated 38 million patients.

Darren Nichols, managing director, FDB UK, said: "Having a fall is a traumatic experience for any patient, with a serious impact on their health and wellbeing and requiring wide health support, especially in the case of a fracture and subsequent recovery, which brings considerable cost to the NHS. Now more than ever at a time when people need to remain at home during the coronavirus crisis, we need to do everything we can to avoid adverse events that could potentially lead to avoidable hospital visits.

"The messages relayed through our system relating to anticholinergic burden are designed as a safeguard within primary care to avoid harmful impact from inappropriate and risky prescribing, and to guide GP practices. The analysis carried out by KSS AHSN demonstrates how prescribing alternatives for patients can make a difference. As we continue to work with CCGs, health boards and healthcare professionals to refine information presented, we hope that even more healthcare professionals will choose to act on OptimiseRx's comprehensive range of best practice guidance messages to improve care even further." ■

Future Health Announces New Digital Events for 2021

Future Health has completely rebranded during lockdown, and the flagship face-to-face event Future Health Innovations at ExCeL is now complemented by a global virtual conference series, under the brand UK Health Week. Free for delegates to attend, it is CPD and CME accredited.

Participants will be able to connect, meet buyers and partake in cross border purchasing, education and deal making, enabling an increased ROI and profitable encounters with its AI powered networking software.

Future Health Week Dates

- Future Health Week Summer Series: 8-10 June 2021
- Future Health Week Autumn Series: 5-7 October 2021

Further Health Weeks are being rolled out around the world over the course of the coming months and will be territory specific. Dawn Barclay-Ross, Event Director commented: "I think there will always be a place for face-to-face events; and we are contracted with ExCeL for a live 'in person' event four years in advance to 2025. However, as a result of international travel restrictions, health professionals in global markets are looking for on-line engagement".

Future Health offers buyers and sellers the ability to operate online, and to research and access the products and services that their hospitals and citizens desperately need. The event, organised in association with the United Kingdom International Healthcare Management Association (UKIHMA), brings together professionals from the world of healthcare to partake in cross border purchasing, education and deal making.

Dawn concluded, "In the immediate post COVID era, health buyers want to be able to operate from the comfort of their desk or smart device, and they now can, from literally anywhere in the world".

Be a part of this global interactive virtual conference where you can gain CPD and CME points through the informative and educational seminars, meet, network and do business with health professionals from the comfort of your desk or smart device. Learn more at https://futurehealthinnovations.com/uk-health-week. ■

Upcoming events

April 2021

20-22

MedTec Live

Online
For more information visit
https://www.medteclive.com/en

The MedTech Forum

Online
For more information visit
www.themedtechforum.eu/

May 2021

17-21

European Health-Tech Innovation Week

Multiple Cities; Liverpool, Paris, Berlin, Stockholm, Barcelona
For more information visit
www.giant.health/european-health-tech-innovation-week

June 2021

9

WSJ Tech Health

Online
For more information visit
https://wsjtechhealth.wsj.com/

15

Digital Health Advances

Online
For more information visit
https://thedigitalhealthconference.com/

28-29

PHARMAP

Berlin, Germany
For more information visit
https://pharmap-congress.com/

30-1

EBME Expo

Milton Keynes, UK
For more information visit
https://www.ebme.co.uk/

Sept 2021

27-28

AUTOMA+ Health

Zurich, Switzerland
For more information visit
https://automahealth.com

October 2021

8

SEHTA International MedTech Expo & Conference

London, UK
For more information visit
www.sehtamedtechexpo.co.uk

The Future of Pharma
Remote Working Post-Covid

Throughout 2020, Covid-19 forced significant changes to the global workforce as remote working became an overnight necessity. Fortunately, many of these changes had already begun organically within the pharma industry before Covid. Instead of being the instigator of these changes, Covid-19 acted as a catalyst for their increased rollout.

With one eye on the end of the pandemic, 74% of companies intend to make remote working a permanent state. Pharma companies will be evaluating this increase in demand to continue to adapt and make a career in pharma as attractive as possible. The consequences of these changes - increased diversity, more flexible talent acquisition and improved remote clinical trials - are likely to shape the future of pharma as we know it.

Remote clinical trials can help pharma keep up with demand

Between 2015-2020, the number of clinical trials nearly doubled from 181,000 to 326,000. This rise in frequency was accompanied by a rise in complexity. According to one study, this increased complexity is linked to lower patient recruitment and retention rates, higher error rates, longer study durations and can potentially delay submissions to regulators.

On top of that, the bottom line of pharma companies is impacted. According to the European Medicines Agency, the cost of bringing a drug to market doubled from 2010-2018, with on-site monitoring a significant factor in these costs.

Whilst clinical research has traditionally been rooted in face-to-face engagements, carrying out specific aspects of trials remotely can have major benefits for the cost and efficiency- making them ideally suited for the digital overhaul.

Remote site access and digital monitoring platforms are now able to seamlessly connect the sponsor, CRO and the research site digitally. This remote site access can bring automatic document routing, standardised processes and efficient communication between site and sponsor. And in removing on site restrictions, companies can avoid problems with travel delays, saving time and cost.

These aren't rapid changes that need to overhaul the whole system. Both research site teams and sponsors expect over 50% of tasks involved in clinical trials to be completed digitally within the coming years. The quicker pharma companies can adapt to this shifted reality, the quicker they can get ahead of the game.

Meeting the work style of digital natives

Like with many industries, digital natives make up increasing portion of the workforce in pharma. In 2021, almost 70% of HCP's are digital natives. This section of the workforce are already up to speed with digital engagement as a primary form of communication, and pharma should look to harness this even more.

Before the pandemic, this generation of HCP's were already altering how sales reps and physicians engaged with each other, and Covid-19 has set the ball firmly in their court. Companies that began to make this shift before Covid will have an advantage in setting up their sales division to thrive post Covid.

A remote, flexible, global workforce can increase diversity

One of the major changes throughout the pandemic has been the availability of a remote work force and the flexibility this provides. Pharma companies are no longer dependent or tied to a small section of the population based on geographic location or available working hours, which has major benefits for improving diversity within the workplace.

With in-person working, a nine to five structure was commonplace. Often, the restriction this provided on people who juggle other commitments, including women coming back from maternity leave, meant that the demands were an unrealistic expectation to keep up with. Women drop out of pharma careers at a higher rate than men at every level, and this restricted structure is part of the reason.

With remote working also comes flexibility. When done right, this flexibility

should people who are juggling childcare commitments are able to fit in their work around their other responsibilities. This isn't a quick fix that negates other support mechanisms for women in pharma, but this flexibility will make pharma a more accessible career opportunity.

Inequality often comes from flawed systems posing as business as usual. Remote working post-covid has given pharma companies an opportunity to review their working patterns to make sure they're attractive to demographics who have previously been shut out.

As search consultants, we've seen a number of our clients not just adjust their work flexibility offer, but also adjust their recruitment patterns to incorporate a global work force. Applicants are becoming much less restricted by their geographical location, with huge implications for diversity.

This globalisation of work is by no means a flawless process, but employees appreciate the ability to work from anywhere- a third report a better work-life balance when doing so. If companies can continue this trend, this new mindset could encourage greater diversity in the industry, a better pool of perspectives, ideas and solutions to fulfil pharma's contract with the public.

Some life sciences companies are already ahead of the game

At RBW Consulting, one of our clients has been walking-the-walk for over a decade. Within 3, a virtual engagement platform, have been remote working for over a decade now.

On remote working, Lance Hill, CEO at Within3 said: "It's crucial to look after your staff, whether remote or office based. During the peak of COVID-19, our client success team were working incredibly hard to make sure all our customers had the tools they needed to succeed. We wanted to show our appreciation to this team so we provided childcare reimbursement, extra time off, and surprise bonuses. These are relatively simple measures to take but show our team that we care."

This change doesn't come without problems, and replicating the upskilling and training needed for an engaged workforce was a problem Within3 had to overcome, and many companies will be facing now.

Hill said: "As home working becomes a more popular option around the world, companies may have to adjust to make sure they don't miss out on any of the 'spontaneous interactions' that can happen at an office. This can be addressed by making sure everyone has an equal voice and feels they can query or challenge everything. Meaning people can proactively reach out to someone to ask why we're doing something or offer some feedback. Not only does this make people more involved in what we're pushing to achieve as a company, it also encourages more open discussions and innovation."

Remote working has opened up many possibilities across the pharma industry. As search consultants, we're already beginning to see our clients put plans in place for these measures to continue. The benefits of diversity, an increased talent pool and remote clinical trials are too good to miss out on. Even when the pandemic is long gone, remote working in pharma is here to stay.

Article by Richard Warren, Founder and CEO of RBW Consulting ■

Proving Long-term Value in Advanced Therapies

Digital technologies can measure durability of effect

"Nature abhors a vacuum," and health technology assessment (HTA) bodies and payers hate uncertainty. Unfortunately, when it comes to advanced therapy medicinal products (ATMPs), they must contend with considerable uncertainty. ATMPs, such as gene therapies, pose a challenge for assessors because they come at a high cost (commonly over $1 million) via a single administration and often are approved by regulators on limited or immature data. Yet, their value is realized over the long term and some are potentially curative.

Meanwhile, drug sponsors are hindered in their ability to produce the evidence that HTA bodies and payers want. ATMPs typically target rare diseases involving small numbers of patients. Clinical trials of these therapies are often open label studies (sometimes with no comparator or historical controls), are of short duration with limited follow up, and in some cases, are lacking in appropriate outcome measures.

The Digital Patient

- 81% of US adults have a smartphone (source: *https://www.pewresearch.org/internet/fact-sheet/mobile/*)
- 21% of US adults use a smartwatch/fitness tracker (source: *https://www.pewresearch.org/fact-tank/2020/01/09/about-one-in-five-americans-use-a-smart-watch-or-fitness-tracker/*)
- 70% of clinical trials will incorporate digital sensors by 2025 (Source: Jansen, Y. and Thornton, G. (2020) Wearables & Big Data In Clinical Trials — Where Do We Stand? Clinical Leader. *https://www.clinicalleader.com/doc/wearables-big-data-in-clinical-trials-where-dowe-stand-000*)

Because assessors aim to evaluate these products on their magnitude and durability of effect and long-term benefit, there is a need to continue generating evidence once they are on the market. Many of these therapies are, therefore, re-evaluated three to five years after the initial assessment, a process that can be supported with data from digital technologies such as sensors and wearables. Interestingly, many of these technologies are the same solutions that the industry has recently embraced to alleviate disruptions and mitigate patient risk during the COVID-19 pandemic. In some cases it maybe that digital technologies may allow assessment of more relevant outcome measures that can be captured in a passive way.

Strategies for Limiting Budget Impact

Payers use a variety of mechanisms to limit the impact of ATMPs on their budgets, to include managed-entry/risk-sharing agreements that are either based on outcomes or characterized by financial mechanisms such as simple discounting or utilization caps.

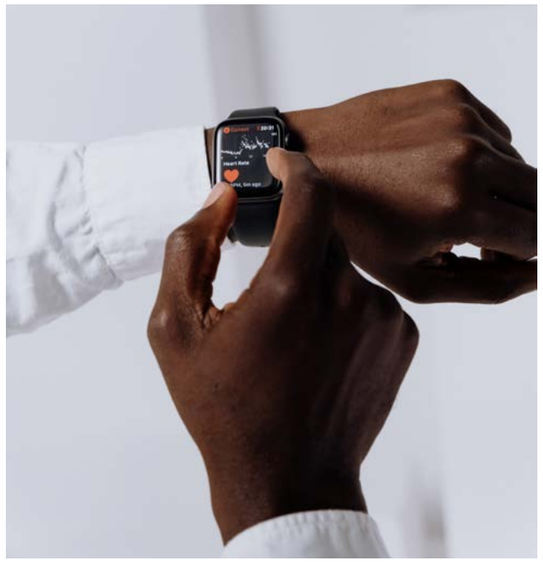
In the UK, the National Institute for Health and Care Excellence (NICE) many years ago moved away from pay-for-performance contracts and instead utilises financial based agreements that essentially requires a discounts to offset the uncertainty over a product's value. In the US where there is no national HTA agency, payers will cover a gene therapy if FDA approved. Many US payers report that if they have the opportunity they will negotiate a performance based agreement with payments made in instalments. This way they limit financial risk by spreading payment over time and by only paying for agreed outcomes. Increasingly, these performance-based arrangements focus on the impact of a therapy on a given patient, rather than across participants in a clinical study.

Solutions within the Digital Ecosystem

The increased use of smartphones and sensors in real-world settings – for example for measuring activity levels – has given Sponsors the impetus to adapt them to generating digital endpoints in clinical research. The industry was collecting data from electronic health records, wearables, sensors, and smartphone apps before the emergence of the global pandemic. However, the necessity of limiting patient visits to clinics during the health crisis has led sponsors, clinicians, and regulators to embrace their full potential.

The pandemic has even spurred the development of new technologies such as tele-ophthalmology to conduct online eye exams. And, inexpensive technologies are being introduced to measure quality of life endpoints (such as sleep and activity) that are both important measures for ATMP assessors and can provide data over many years.
The benefits of collecting data from digital devices include:

- More frequent and continuous monitoring – beyond the walls of the clinic
- Easy and simple data capture
- The possibility of more precise and accurate assessment than traditional observational assessments. Digital sources provide both nuanced information and contextual insight
- Cost effective when patients can use their own devices
- Reduced bias when patients use their own passive devices, as they don't change their behavior for the study



- Development and assessment of more relevant outcome measures
- The ability to answer the efficacy question for individual patients

Advances in Digital Endpoints

As more digital technologies enter the market and are integrated into clinical research, we foresee a shift from digital endpoints being used as supplementary endpoints to their use as primary endpoints. Digital health technologies provide a robust, continuous data stream that enhances the quality, quantity, and frequency of data collection, providing meaningful insights on patient outcomes.

Many technologies, for example, capture digital endpoints that are of keen interest in diseases of the central nervous system as well as in rare diseases, two-thirds of which affect children. For instance, devices and apps are available to measure gait with nuanced information on how people place their feet, their walking velocity, stride length, and step cadence. These measures are more detailed than those of observed walk tests.

As another example, fitness trackers with geolocation capabilities can be used to monitor the impact of a disease on a person's ability to function although this could be problematic from a data privacy perspective. Monitoring a person's movement away from the home environment may serve as an important measure of quality of life for someone with impaired vision or a movement disorder.

Other devices and apps can track and measure falls/spasms, visual function, vital signs, temperature, voice analytics, and respiration – a list that will undoubtedly expand as innovation continues and the demand increases.

The caveat is that selected devices must be capable of producing robust data that meet the same requirements that payers apply to conventional assessments. For example, a common fitness tracker worn on the wrist may not work in assessing gait changes in patients with Duchenne Muscular Dystrophy. ⇨

Rather, digital devices must be validated against a gold standard technology to generate endpoints that are meaningful. And, that robust device and endpoint validation will may be required.

A Promising Example

Duchenne Muscular Dystrophy (DMD) is a rare disease with symptom onset in early childhood, usually around age two or three. While currently there are limited treatment options, it is an area of very active clinical development. The primary outcome in clinical trials is a measure of progression based on movement detected using in clinic assessments such as the six-minute walk test, the North Star Ambulatory Assessment (NSAA) and/or the four-stair climb.

The European Medicines Agency (EMA) has qualified stride velocity 95th centile as a secondary endpoint measured by a valid and suitable wearable device. This ambulatory endpoint which can be captured passively in the home was correlated with both the six-minute walk test and the NSAA. The agency has indicated that the endpoint has the potential to provide data on a primary endpoint in clinical trials, although more robust data from more patients over a longer period is required.

There is the potential to validate other assessments that may be more meaningful to patients and parents and impactful of their over-arching quality of life e.g., upper body movement. Although recognized as an important characteristic for patients living with DMD it is challenging to assess upper body movement in a robust and reliable fashion, and could be the target for new objective digital tools. This would be an example of a new outcome measure that is potentially more clinically and payer relevant.

Conclusion

Robust assessments based on digital data are a means of reducing the uncertainty that HTA bodies and payers face in making decisions around advanced therapy medicinal products. Digital sensors can capture existing measures in a new way and/or collect new measures that were previously impossible. As the global pandemic has accelerated the use of digital technologies for data collection in clinical trials as well as fostered the development of new measures, we see their use as a solution to meeting the evidence needs of HTA bodies and payers on therapy's long-term benefit.

Authors

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Marie has over 20 years' experience working in the area of medical devices and in-vitro diagnostics. At ICON her focus is on the use of wearables and sensors to generate digital endpoints in clinical trials. She provides insight into outcomes addressed by wearable technology and has designed and led a number of pilot projects focusing on the use of mHealth technologies in redesigning the clinical trial.

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Remote Tech Adoption in Healthcare will be Key to Improving Patient and Clinician Experience…Here's Why

By Antonela Ferretti, Lead Business Analyst & Scrum Master at intive

The pandemic has advanced remote healthtech development and adoption at an unprecedented rate. The skepticism around remote healthcare technology withered as the worldwide Covid-19 social distancing measures took hold. Now, patients and clinicians alike have come to embrace digitized versions of previously in-person processes in a way that clearly signals that remote technology and virtual care programs are here to stay.

As early as April 2020, Michael Snyder, professor and chair of genetics at Stanford School of Medicine, predicted, "I think we have hit a turning point. Here at Stanford Medicine, we used to see 1,000 patients a week with telehealth and now we're seeing 3,000 a day."

Telemedicine platforms and remote monitoring solutions have allowed for numerous benefits over the past year.Patients now have access to medical care from the comfort of their homes, shared access to medical data, and ownership of that data. In turn, clinicians have witnessed an overall drive in efficiency.

Let's dive further into how both clinicians and patients are benefiting from remote healthtech—and how tech companies and healthcare institutions further drive its adoption.

How remote technology is improving patient experience

Experts predict that in 2021, consumers will seek to be in the driver's seat of their healthcare. And that means new technologies must provide excellent user and patient experience.

With telehealth innovations, patients are able to gain access to treatment much faster than when using traditional paths, and often from the comfort of their home. This has been especially vital in the age of Covid-19 where catching the virus is still a risk for many, as vaccination efforts work through sections of populations.

The app HeyDoctor offers online visits from as little as $19 and is a convenient platform if you are in need of a licensed medical professional to write you a quick prescription. The platform offers a full range of medical services, including general visits, medicine refills, and specialized treatments for conditions such as acne or eczema, as well as many more.

Amwell is another example of a telehealth platform that provides online consultations with doctors, specialists, psychiatrists and therapists, 24/7. Both of these services are covered by many private health insurance plans.

Another benefit to patients provided by telehealth platforms is the transparency they are provided when it comes to accessing personal health records. Engaging with private medical data in the digital realm grants patients an increased ownership over information that should belong to them to begin with. The shift to telehealth means patient data is no longer siloed in medical records that only clinicians can access. Armed with this knowledge, patients get to view the full picture of their health and are, in turn, more equipped to make the better medical decisions for themselves.

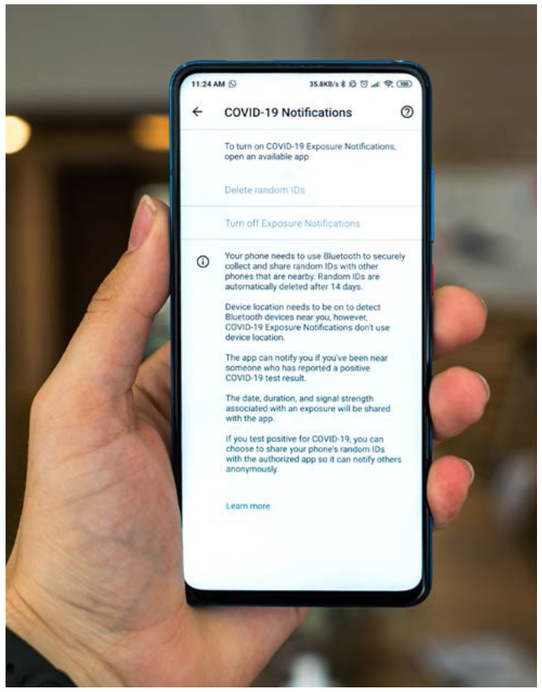
How clinicians benefit from telehealth innovations

With telehealth, doctors can access multiple patients from a single location, allowing them to cut out the time they'd otherwise need to spend physically travelling to their offices, or making house calls.

Remote patient monitoring solutions allow doctors to remotely keep track of patients' vital signs without having to be physically present to conduct checks. IoT wearable devices provide real-time data to doctors who are located elsewhere, be that in another hospital room or across town at home, on things like heart rate and blood sugar levels.

Furthemore, technologies like TeleSitters provide live video and audio feeds from patients' hospital rooms, allowing clinicians to monitor up to 57 patients at a time. Experts forecast that products like this will soon evolve to use IoT and biometric technologies to track patients' vital signs and activity simultaneously.

Naturally, these technologies allow clinicians to store and view



all of that patient data within a digital platform. This drastically reduces the amount of paperwork that needs to be filled out, as the data is already automatically recorded within the telehealth solution. It's no secret that administrative tasks take up a huge chunk of doctors' time on the job—time that they could be spending providing additional care. What's more, purpose-built remote technology platforms allow clinicians to work collaboratively in real-time and share information across multi-disciplinary teams.

Healthcare chatbots (often powered by AI) are also emerging as a way to free up healthcare professionals' time to spend on pressing, complex patient issues rather than answering straightforward questions. The chatbots can play the basic role of a physician by checking up on patient progress, collecting feedback and reminding them of upcoming appointments. Chatbots are even being used to answer FAQs and assessments related to Covid-19 symptoms (like that of Sutter Health).

Making remote healthtech a success for all

Adopting healthtech innovations—whether for the doctor or patient—is not as straightforward as simply downloading a solution and getting started. There are a number of factors that go into successful, continued usage of a tool which maximizes its effectiveness.

User-centered design which prioritizes accessibility is absolutely essential to support sustained and seamless usage of remote health tools. Accessible design not only allows people with diverse needs to easily interact with a digital product, it improves the user experience for everyone else using the tool too. Every healthtech product should follow accessibility guidelines, and UX design teams should ensure they test the solution on ⇨

a wide array of users that encompass all possible user personas.

When it comes to easy-to-use UX, the user flow must be simple and straightforward, especially as healthcare apps need to be usable by seniors who may not be accustomed to using digital products and people from across different cultures who might be heavily dependent upon pictorial clues and a basic grasp of an adoptive language. To do this, digital products should include clear, colloquial language, step by step interface guidance, push notifications and alerts, limited distractions on the interface, easy access to support, and custom experiences. Healthtech products should be sure to be clear about data privacy and stress to the user that any information they enter in the app is secure and HIPAA (or equivalent) compliant.

It's also important to remember that while technology solutions can provide new pathways to care and an improved experience, in many instances patients still require that "human touch"—technology should augment the treatment of doctors, not replace it entirely. This means, when a patient specifically requests the physical presence of a healthcare professional or a clinician is dealing with sensitive matters, technology should take a backseat.

On the hospital side, it's vital to remember the importance of cloud adoption. Hospitals and clinics using on-premise systems will find it difficult to scale up their use of new technologies—something Covid-19 has taught us is essential given changing demands. If financially feasible, healthcare facilities should consider migrating to a cloud-based infrastructure that allows them to be flexible and prepared. Cloud-based systems will enable providers to access patient data anywhere, enabling telehealth and better care coordination.

Remote healthtech might have experienced a spike in adoption due to the pandemic, but now it's here—it's here to stay. Product designers must commit to user-centric, accessible design if they are to promote adoption across people from all walks of life, and healthcare establishments must create robust foundations for these new technologies to thrive and augment the care they deliver. ■

Patient Generated Health Data & Empowerment in a Post-Pandemic World

Andre Van Gils, CEO and President, OMRON Healthcare Europe

Despite various COVID-19 vaccines now being approved and rolled out across Europe, the near year-long wait for their development exposed how ill prepared our delicately balanced health systems are for dealing with new pathogens in the interim.

While lockdown measures reduce risk to patients and practitioners and help toward stemming an overwhelming surge in hospital admissions, they should be seen as necessary knee-jerk reactions - band aids, not solutions. Lockdowns also prevent routine GP and health service visits, created years-long backlogs of delayed non-urgent care (the impact of which is almost immeasurable), and created a general sense of lack of control over one's own health amongst the public. Various reports have highlighted how vulnerable members of the public avoid seeking medical help altogether due to fear of infection or guilt of overwhelming an already under-resourced health service. While these may well be 'unprecedented times', they are also setting new precedents for what we need and how we act in future cases of global emergency. We must get this right for next time.

I believe there is a missing link in the patient-health service relationship that would be beneficial to all parties and drastically reshape the public's role and responsibility in proactively managing their health: patient empowerment through the use of technology. Getting medical grade, consumer friendly technology in the hands of those who need it alongside the prerequisite health service infrastructure immediately lifts a lot of system burden while providing unique and previously unattainable levels of insight and clarity. This has many names, remote patient monitoring (RPM), patient-generated health data (PGHD), and even more consumerised terms such as wellness tracking.

While the industry was already moving in this direction, the pandemic accelerated things. Face-to-face appointments were most easily brought in line with modern technology. While it is crucial they remain available for higher-risk patients, we've witnessed an unprecedented global surge in telehealth, with appointments for those less vulnerable turning virtual with telephone and video consultations. Indeed, McKinsey reported seeing between 50 and 175 times the number of patients via telehealth compared to pre-COVID-19. This has helped to sooth patient anxieties and relieve resource burdens (including physical space) while still adhering to governmental guidelines and providing adequate services.

But remote healthcare can go much further.

People around the world are anxious for reassurance. If they suddenly develop a cough, chances are they will want to know whether they have coronavirus. There are now national initiatives requiring people to prove that they are healthy in order to travel and various organisations developing health passports. This is where technology enabled patient empowerment comes into its own. With the right education and tools, the patient can monitor their own health from the comfort and safety of their own home, and they can be the one to decide what information to share with doctors, with their insurance company or their employer. It also benefits time-poor practitioners who can see reliable data taken over an extended time period, allowing them to assess the patient remotely, and then triage them to provide appropriate levels of care, while still minimising the risk of exposure.

It immediately lifts a lot of system burden while providing unique insight and clarity. The responsibility becomes shared with the patient to take control of their own health and help make doctors' jobs easier. And while remote patient monitoring on its own may not prevent further lockdowns or extreme measures, it may certainly help lessen their extent.

The healthcare system needs to place medical grade, consumer friendly technology in the hands of those who need it. Some of this tech is already readily available on the high street, allowing patients to monitor their blood pressure, heart rate, sleeping patterns,

step count, weight, and more. But it is only through collaboration with health technology companies that new, integrated services can effectively proliferate. With the proper tools in place, RPM can empower patients to monitor their health, track changes and compile health records from the comfort and safety of their own homes.

Will the healthcare system be able to put holistic PGHD into practice quickly enough to have a real impact? Well, without a shared sense of responsibility and collaboration it won't stand a chance. The world view has changed significantly in these most extraordinary of years: intent has moved to commitment. But now is the time that commitment must lead to action, forming real partnerships.

I am confident we can and will rise to this challenge. Care delivery will be transformed. And partnership will be at the centre of it all. ■

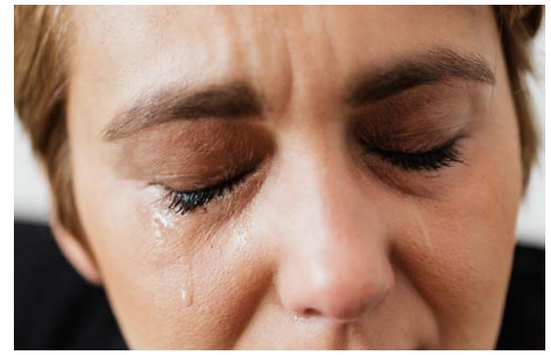
How Access to Mental Health Care has Changed with COVID-19 One Year In

As we approach the one year mark since the World Health Organization confirmed the COVID-19 pandemic, it's no understatement to say that the last 12 months have been a whirlwind, and a transformative time for many reasons. As a result, there is a real collective longing for a return to normality.

With vaccinations being administered at pace and infection levels showing promising signs of reduction, our attention has naturally turned to how and when we can ease back into our pre-pandemic lifestyles. Some aspects of the "new normal" can be reversed overnight, such as relaxing of curfews or stay-at-home orders.

There are other aspects of our lives, however, which won't return to pre-pandemic normality as quickly as we may like. Chief among these is our poor mental health. Students of previous pandemics will know that the full impact of the mental health burden often lags 2-3 years behind the infectious disease, meaning that we could be living with the effects well into this decade.

The mental health impact of the pandemic has been well



researched; by October, mental health was top of the charts in terms of published papers and preprints on the effects of COVID-19.

The vast majority of these papers point to a looming crisis. According to a poll of 1,800 psychologists commissioned ➪

by the American Psychological Association, 74% of psychologists said they were seeing a greater number of patients with anxiety disorders compared with before the pandemic. Tellingly, 30% said they were seeing more patients overall. Tragically, there are many who could not access services altogether; a study of 190 million emergency department visits found that visit rates for mental health conditions, suicide attempts, drug overdoses and child abuse and neglect were higher in March through to October 2020, than the same period in 2019.

These studies have truly exposed the barriers to mental healthcare, many of which are not new. In 2016, 11.8 million Americans had a need for mental health services that went unmet. Of these, nearly 38% could not afford the high costs of treatment. Whilst anti-stigma campaigns are showing moderate signs of success, there remains a real stigma around mental health issues in the US. 2020 erected brand new barriers; physical distancing policies, including stay-at-home orders, made it much more difficult for people with mental health concerns to access in-person psychiatric and peer support services.

Put simply, we must do everything in our collective power to break down barriers to mental health care in 2021, if we are to build back to prosperity. The National Alliance on Mental Illness estimates that untreated mental illness costs us up to $300 billion each year due to lost productivity and associated costs due to absenteeism, employee turnover and increases in medical and disability expenses, and this figure is likely to rise post COVID-19.

This is where I believe technology can be our greatest asset. With more people than ever before living with a mental disorder, evidence-based, ethical and personalized digital solutions present the most accessible route to quality mental health care, especially given the ubiquity of hardware like smartphones. In light of the shortage in clinical staff, digital technology is the only practical solution capable of scaling quickly enough to meet the booming demand for mental health support quickly and at a fraction of the cost of training new psychiatrists. Smartphone apps are a scalable and discreet solution that provide a route to care for those who feel unable to talk to others about their mental health issues. In short, apps are needed now more than ever to form part of integrated care plans, complementing traditional practices such as counseling.

We've already seen a massive uptick in digital mental health solutions. Approximately 76% of clinicians now solely treat patients via telemedicine. Early into the pandemic, first-time downloads of the top 20 mental wellness apps in the US hit 4 million by April, up 29% from the total downloads in January, showing that people took a new approach to healthcare. Investors have taken note as well, with many mental health startups raising record amounts of capital.

While digital mental health solutions are increasing in popularity, they still face challenges if they are to receive widespread adoption. For instance, app creators must win consumer trust by proving that they can handle personal and sensitive data ethically and responsibly. Currently 81% of Americans feel that the risks of sharing personal data outweigh the benefits, and therefore the onus is on providers to demonstrate high standards of security and responsibility in order to ultimately gain that trust. This must go beyond mere compliance with HIPAA, and requires the development and implementation of a robust ethical framework to underpin any digital mental health app.

Digital solutions must also be able to meet the individualized needs of users. At present many apps take a one-size-fits-all approach, overlooking technology's ability to adapt to peoples' unique symptoms and personal preferences. Personalization is about more than offering multiple types of intervention; it's the recognition that people engage in technology in a variety of different ways. Across our platforms, we understand that while some users enjoy going through a program in a step-by-step fashion, others opt to pick up activities as and when they need them. These insights truly reflect the breadth of people needing mental health help in a very challenging time.

In 2021, we can no longer afford to have barriers to mental healthcare. As a sector, digital health providers must strive to demonstrate consistent standards of efficacy, accessibility, affordability, ethics and privacy. COVID-19, and the flaws it has exposed in mental healthcare provision, has provided a golden opportunity. Together, we must seize this moment.

Article by Oliver Harrison, CEO, Koa Health ■

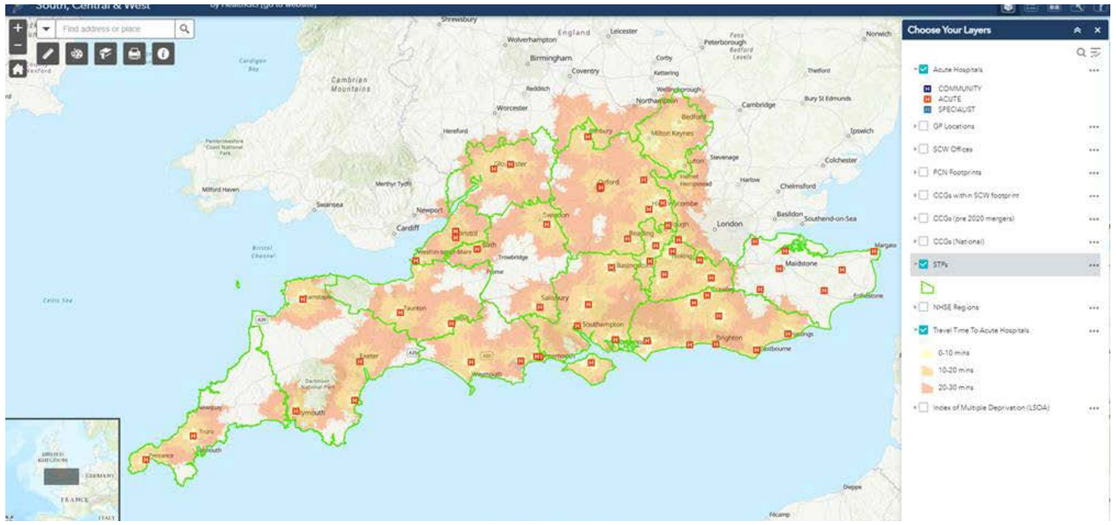
Covid-19: Improving Housebound Patient Vaccinations with GIS

New geospatial mapping techniques have been used to create optimised routes for GPs and nurses in Somerset, so they can give Covid-19 vaccinations to housebound patients more efficiently. Trevor Foster, Associate Director, Geographic Intelligence and Mapping Services, NHS South, Central and West CSU, explains how it was achieved.

The Challenge

We all know that vaccinations are the key to getting through the COVID-19 crisis. But how do you make sure housebound patients receive their vaccines in the most efficient way? PCNs in Somerset pondered this question as they began to rapidly roll out their COVID-19 vaccination programme.

The approach for this first round of vaccinations turned out to be quite hectic. Allison Nation, Associate Director of Digital Strategy for Somerset CCG, was soon approached by one of her PCN GPs asking if there was some clever technology SCW CSU have, such as digital



mapping, which could help support a more efficient method. And this was how our GIS (Geographic Information Systems) team become involved – geospatial analysis being at the heart of what we do. The need for a new approach quickly escalated, as a second PCN in Somerset also wanted the solution urgently for their 200 housebound patients.

The Solution

In planning how vaccinators go out and see patients, there were a few parameters to consider:

1. Where is the vaccine stored? Where does it need to be collected from? This is usually one central place in a PCN area
2. What time of day do vaccinators start and what time do they plan to finish?
3. The vaccine vial contains 11 doses and it is critical to use all doses and not waste any
4. Once open, the vial contents last 6 hours. Within this time, up to 11 jabs need to be completed

Our approach involved taking all the patient addresses and planning the optimal routing to cover as many patients as possible, in as few journeys, so they could fit within the time window for each vial.

This was achieved by modelling a structured data set, which contains a unique patient identifier, such as NHS or EMIS system number and the full address, to pinpoint specific house locations. Using this data, the geospatial analysis creates the fewest number of trips needed over the time period. Each route is sequenced from start to finish, giving the order in which the mapping tool recommends the visits be carried out. The sophisticated modelling also builds in other relevant factors, including breaks, households with more than one patient, time taken to ring the doorbell, chat with the patient, give the jab and sit with each patient for 15 minutes recovery.

Using our Esri GIS software, we were able to react extremely quickly to the request and build the original model and procedures in less than 2 weeks, from the initial contact on 22 January, to launching a full solution to the PCN on 4 February. Esri GIS Network Analyst routing tools are very configurable and were ideal for solving the vaccination logistical challenges presented. We were able to model the specified requirements quickly and provide clients with optimised routes in a relatively short timeframe.

Journey data is supplied in a spreadsheet, with a map providing a visualisation of the routes for the vaccinators, with each location shown as a dot on the map. These are then clustered into groupings to match the dosage and time requirement. Routes can include patients from multiple practices within the PCN, with GPs vaccinating each other's patients to increase efficiency even further.

The Benefits

Critically, the solution minimises wastage of the vaccine and PCNs can plan thoroughly and communicate better with patients in advance. Patients in each cluster will know when to expect their visits and vaccinators can call patients to confirm an accurate time. The model also builds in contingency time for unexplained delays, which maximises the vaccination programme success rate.

The routing solution is saving the PCNs time and money, as previously, the PCNs planning was not often optimised and journeys were quite chaotic. This resulted in increased journey times so the programme was not only taking longer but fewer doses were being given each day. This increased the number of days needed for vaccinations and consequently the cost of delivering the programme.

Using its expertise to model the data and interpret requirements into logical solutions, the GIS team was able to deliver the initial development in less than 2 weeks. With development of all the procedures now complete and any pitfalls already resolved, the solution is now ready to be set-up for new PCNs within only 1-2 days, providing that good patient data is supplied (templates are provided).

Patient confidentiality is protected as no patient identifiable data is transferred from practices. Patient name and contact details are matched only ⇨

within the practice when they follow-up to make appointments. The solution has been developed using proprietary Esri commercial software which SCW CSU owns, so the system is secure. The data used is the most accurate available too. As an Ordnance Survey (OS) partner, SCW has access to specific OS products to deliver this accuracy. As an approved data processor for NHS England national patient data sets, we ensure the most up-to-date details are used, further increasing accuracy.

Overall, the new mapping solution can be used to improve vaccination planning for the remaining first jab patients who are housebound and also to plan the second round of jabs, enabling these to be managed more efficiently.

Allison Nation, Associate Director, Digital Strategy, Somerset CCG commented:

"A well organised, professional and highly responsive team, who clearly wanted to help our local practices as part of the PCN COVID Vaccination programme, in planning large groups of vaccinations for housebound patients. The SCW GIS team engaged to understand the need and context, and were quick to identify the key questions, dataset, work through relevant information governance and technical details. A great outcome in a high-paced programme!"

Dr Sally di Mambro, GP principle/partner at Wellington Medical Centre/Taunton Deane West PCN, said:

"The SCW GIS team assisted at short notice in allocating our 220-ish housebound patient groups into ordered geographical groups. With three practices and crossing over lists/geographical areas, it is a way in which the housebound vaccinating can be organised without the need for agonising lists and cross referencing between practices. They have risen to our last-minute demands with efficiency and professionalism. In short, the exercise has been time well spent."

About the Author

Trevor Foster, Associate Director of Geographic Intelligence and Mapping Services, SCW CSU, has 40 years' experience as a cartographer and GIS specialist. His career started as a Military Survey cartographer in The Royal Engineers, where he was involved in all aspects of cartographic map production, including mapping The Falkland Islands in 1982 and management of senior staff operational charts for the Gulf War in 1990. Trevor now leads a team of GIS Analysts who provide mapping and spatial analysis services to Clinical Commissioning Groups and Integrated Care Systems, NHS England, Hospital Trusts and General Practices.

Over the last three years, Trevor's team has doubled in size from seven to 14 GIS specialists, due to the ever increasing demand on its recognised expertise in the use of GIS technology within healthcare. To compliment this growth, the team has recently migrated onto the Esri GIS software platform, enabling the continued growth of the division and the development of innovative solutions and services. The GIS team is already finding its time-to-market for client solutions is being reduced as a result. ■

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