The
Journal of mHealth
The Global Voice of Digital Health

THE PERSONALISATION REVOLUTION

INSIGHT

Could Digital Technologies Spell the End of Pain?

FEATURE

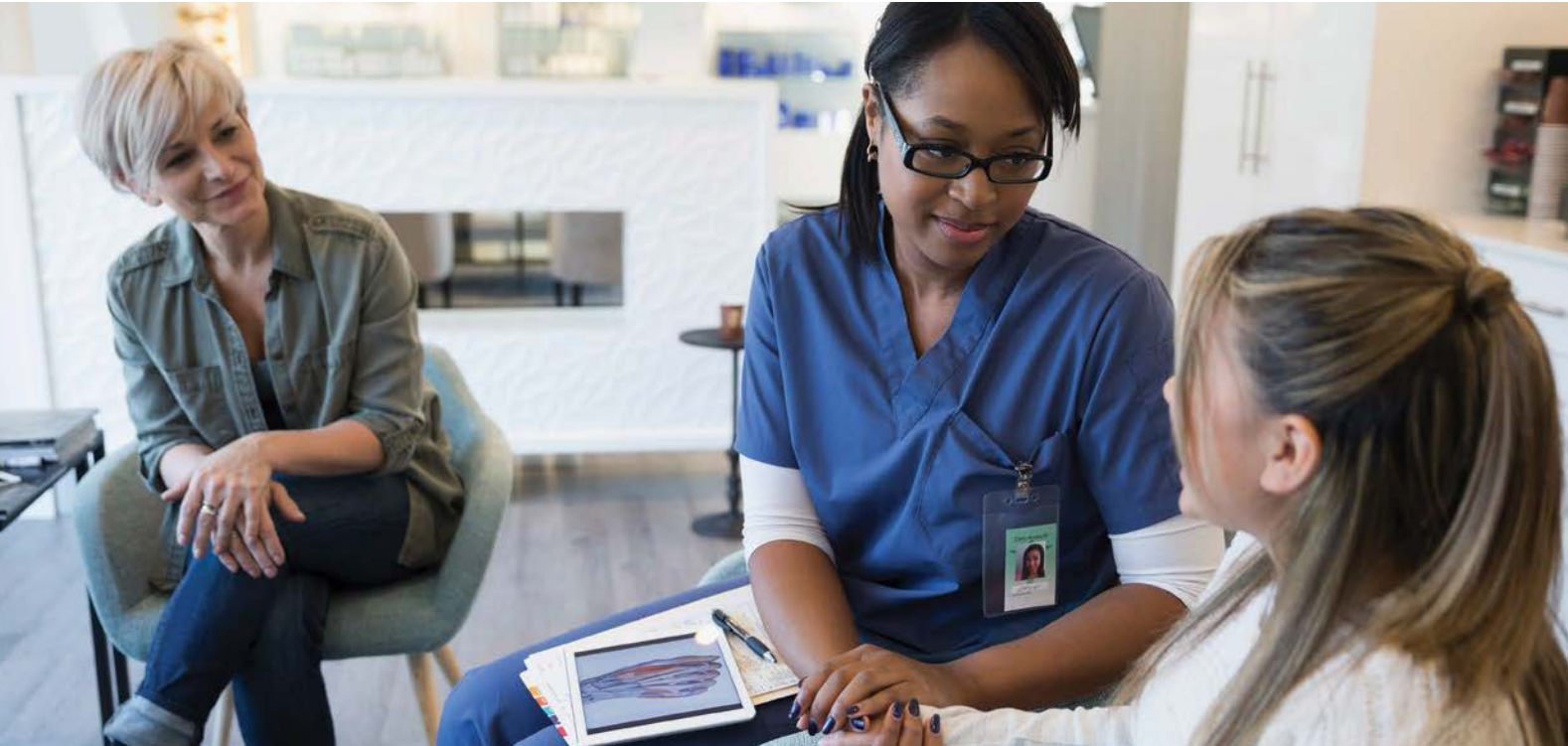Combining Bedside Manner with IT

INTERVIEW

Benefits of Tele-ICU for Critical Care Teams

KEEPING HEALTHCARE CONNECTED MATTERS.

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In This Issue

Over the past decade, our understanding of pain has grown while digital technologies have developed at breakneck pace. These advancements are now converging and have the potential to drive significant innovation in pain management. However, achieving this will depend on fostering inter-disciplinary collaboration between technologists, researchers, behavioural scientists – and countless other parties...

Industry News

Achieving excellent patient care requires a combination of factors. From diagnosis to aftercare, each step is critical to ensuring the best outcome. Patients should feel that medical professionals understand their concerns and circumstances, including pre-existing conditions. Armed with this information, medical experts can outline a treatment plan which is tailored to the individual. This is where technology can make a significant difference.

3D printing is seeing increasingly widespread adoption in the medical field, with numerous examples of applications that help surgeons accurately plan cosmetic surgery. Now, the potential of 3D printing is being examined by hospitals treating patients who are fighting for their life.

Welcome

When it comes to thinking about what it means to be an individual, our health is a defining element of what makes us unique! Even when we suffer from common conditions, the ways in which that condition will impact our own bodies and influence our lives are vastly different from one person to another. While traditional approaches to healthcare look for broad spectrum treatments and ways to manage large cohorts of people with similar conditions digital solutions and technology offer us the unique opportunity to personalise the way that we diagnose, monitor and treat patients.

Making approaches to healthcare as unique as us!

Healthcare personalisation is about harnessing digital technology to meet the patient's ever-changing needs. Despite the traction that digital and technology-led solutions have experienced in recent years, we are only now beginning to really see the true potential of applying technology to deliver individual care. With the greater application and adoption of machine learning, and other artificial technology techniques, chatbots, data-driven-decision support tools, and many other applied digital health technologies we are now, more than ever, at the start of the roadway that will ultimately provide patients with truly personalised health care.

In this edition we ask how providers need to be more user-focused, by empowering patients to identify treatment options earlier and navigate care pathways more efficiently, and look at the ways that technologies are using the data from the many to benefit the uniqueness of the individual.

December will also see the announcement of our annual Global Digital Health 100 award list. Each year the popularity and scope of this endeavour continues to grow and this year has seen nominations from a fantastically diverse range of companies. It has been an extremely competitive process that has led us to our final 100. Watch out for the announcement in December, and the full list will be published in our Jan/Feb issue of the Journal.

Once again it is that time of the year where we come to the end of another annual series of Journals. I cannot believe that this will mark the end of our 7th year. In that time we have become one of the leading resources, globally, in this space and it has been amazing to see how the industry of healthcare technology has developed.

I would like to take this opportunity to thank everyone who continues to support the publication and all our readers from around the world. We wish you a very enjoyable holiday season from all the team at The Journal of mHealth!

Matthew Driver
Editor

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Could Digital Technologies Spell the End of Pain?

By Dan Boot, Head of Digital Disruptive Innovation at RB

Around the world, people are suffering from pain. It drastically reduces quality of life for individuals and has an evidenced negative effect on global economies. In the UK alone, a third of employees took at least one day off work due to back or neck pain in 2018 – and this number is only set to grow as urbanisation drives more people into cities and increasingly sedentary lifestyles.

For pain sufferers, speed of relief is paramount. This is why fast-acting solutions containing ibuprofen have become commonplace in medicine boxes around the world, and why pain management remains a continued focus for healthcare innovation.

Over the past decade, our understanding of pain has grown while digital technologies have developed at breakneck pace. These advancements are now converging and have the potential to drive significant innovation in pain management. However, achieving this will depend on fostering inter-disciplinary collaboration between technologists, researchers, behavioural scientists – and countless other parties. This is a primary finding of Consumer Health Futures, a new report from RB charting just a few of the new approaches to pain management that we could witness over the coming decades.

Next level localisation

We're already seeing the concept of localised treatment applied to pain management, with the advent of pain relief patches using sticking gel adhesives to target specific areas.

Over the coming decades, localised relief will be taken to the next level, thanks in part to increasing consumer acceptance of high-tech solutions and advances in nanotechnology. This allows the use of materials at a molecular, or even sub-atomic level, to provide personalised and therefore incredibly accurate diagnosis and treatment.

Researchers are already working on a technique where minute amounts of over-the-counter pain medication are inserted into microscopic carriers called nanoparticles. These can then be injected into sufferers' own immune cells and travel through the body to identify where there is inflammation and pain relief needed.

Building on this, we soon expect to see ingestible smart pills adapted to include sensors made from naturally occurring materials. These will monitor things such as stomach acid and body temperature, notifying users if action needs to be taken to manage their own pain.

Pain management gets personal

Personalisation may be the buzz word of the moment in consumer healthcare, but it's much more than a passing fad. As our understanding of the human body grows, individual differences are becoming more apparent.

Every person's electrical activity and nervous system are unique for example, which is why our responses to pain differ hugely. This variation is fuelling the search for pain management solutions that are uniformly effective, regardless of individual differences.

One area offering up a potential solution is bioelectronics. Bioelectronic treatment uses device technology to read and regulate the electrical activity within a person's nervous system. This allows more responsive tracking, active diagnosis, treatment and pain management on a genetic level.

Pain messages can be blocked from being communicated by monitoring and re-aligning electronic signals that pass along the nervous system – tricking the brain into thinking that there isn't any pain. The concept is still in its infancy, but has already proven effective in reducing pain for patients with Lupus and is set to revolutionise pain management as we know it by providing hyper-targeted, customisable relief.

Turning to consumer tech

Healthcare innovators are also turning to more visible technologies in the fight against pain.

The huge popularity and now ubiquity of wearables, such as FitBits and Apple watches, underscores the healthy consumer appetite for using technology to monitor and improve personal wellbeing. Looking to the future, I see a continuation of this trend, with healthcare professionals exploring the potential of increasingly advanced technologies, including virtual reality (VR), to help people manage their pain within their own homes.

BreatheVR is one innovative health company already exploring VR's potential to relieve chronic pain. Wearing a VR headset, users see their breathing represented by leaves rising and falling in a calming meadow. The multisensory experience engages users' attention on a deeper level and encourages a pattern of diaphragmatic breathing crucial for the treatment of chronic pain. Scientific studies also back this up, showing that VR treatments can reduce acute and chronic pain in a quantifiable way, free of side effects.

Why collaboration will be key to unlocking technology's potential

Advanced technologies promise to revolutionise pain management. However, technologists, healthcare innovators, researchers and corporates will need to work together if we're to fine-tune these solutions and making them palatable to global consumers.

Healthcare researchers are breaking new boundaries every day, leveraging the likes of bioelectronics and nanotechnology to deliver effective, ever more sophisticated, personalised solutions. The next frontier is taking these innovations from the laboratory, and placing them into the hands of global consumers, where they can truly meet their potential in pain management. ∎

Personalisation in Healthcare
Combining Bedside Manner with IT

In the latest of a series of articles Alison Houghton, of Progress, discusses the ways in which technology can personalise the healthcare experience.

Population diversity has been a driving factor for information technology (IT) adoption. According to Our World in Data, new technology adoption and saturation is occurring at double-digit rates, e.g., in 2011 only 35% of Americans had a smartphone and eight years later nearly 81% of Americans have a smartphone. In comparison, the telephone was invented in Italy in 1849; the first US patent for the phone was granted 27 years later in 1876; and it took another century for the telephone to be widely adopted.

The speed of IT adoption coupled with saturation creates a potent brew for personalization in healthcare. With a growing population that is hyper-diverse, personalization is about building care models and solutions that enable inclusion and standardization. The healthcare industry, which is standards-based, has the optimal foundation for delivering personalization that can improve patient experience and drive clinical outcomes.

"I Am Not a Number…"

We live in a world where every interaction is a data point that fuels algorithms that tailor information and resources to our unique wants and desires. As we move from volume to value, the drive to efficiency, standardization and modernization has created an unforeseen consequence—the indignation of patients being dehumanized to statistics. ➡

Personalization in healthcare is like the 1967 Ali vs Liston match– raw, powerful, and emotional. During the fight, Mohammed Ali kept screaming at Liston: "What's my name?" Personalization in healthcare answers: "What's my name?", which is a necessary question that establishes the human connection in how patients and providers interact.

Aldous Huxley wrote: If one's different, one's bound to be lonely. When we strip away the data noise of our digital world, we are simply left with the basic and raw desire to be seen and heard as a unique individual, not a number. In the brave new world of digital connectivity, the seamless nature of algorithmic personalization or being seen as different is a driving force in how many of us engage with our care providers.

The Role of AI/ML

The benefits of IT can be limitless however, the vastness of readily available information can be intimidating and daunting. In the last decade, healthcare has embraced artificial intelligence (AI) and machine learning (ML) to automate processes, personalize care management and deliver new care models. Healthcare practioners and IT professionals are maximizing prodigious amounts of personal health information to deliver personalization for behavior modification (e.g., medication and scheduling adherence).

Currently, the most successful adaption of AI/ML occurs when IT solutions are used to solve real-world healthcare pain-points. For example, chatbots can be used in personalized care management to deliver critical information to patients about their appointments, procedures or care. Chatbots can also be used to facilitate communications amongst caregivers and providers. When chatbots are layered with AI/ML, they can be used to ascertain the likelihood of what type of information the patient will need and what level of detail should be provided.

Personalization to drive behavior modification can reduce recidivism due to drug dependence. Some healthcare organizations are utilizing AI/ML to tailor treatments to patients—anywhere, anytime—by using multiple patient data points such as type of drug dependency, race, age, postal code and socio-economic factors. These new behavior modification treatment models are using personalization to uncover the public health ramifications of addiction for the individual and their communities. It should be noted that many of these personalized behavior treatment models are new, but the initial results are promising.

The Key to Inclusive Patient Care

Necessity is the mother of invention and for healthcare practioners, who are caught in a unique quagmire—high rates of clinician burn out coupled with a chronically ill population living longer—IT solutions with personalization are a scalable necessity for delivering inclusive patient care across the continuum of care. As healthcare boldly combines IT solutions, clinical standards and bedside manner to create new care models to deliver real world results, healthcare organizations are in an enviable position of being innovators, not laggards. ■

Improved Personalisation is the
Future of Healthcare

By Jon Lee-Davey, Health Lead for Vodafone IoT

Providing a high standard of patient healthcare continues to be top of the agenda for the public sector. Faced with an ageing population who is likely to need long-term medical intervention, healthcare providers are forced to balance high quality care with efficiency. In April 2019, a study from the Taxpayers Alliance suggested that one tenth of the NHS budget could be saved by the introduction of "automation" across the health service. At the start of the year, venture capital firm PitchBook Data reported that there was a 148% increase in healthcare devices and supplies across Europe in 2018. While these moves demonstrate a valid commitment, it's important that changes have the net effect of improving patient care.

Quality patient care and personalisation go hand in hand

Achieving excellent patient care requires a combination of factors. From diagnosis to aftercare, each step is critical to ensuring the best outcome. Patients should feel that medical professionals understand their concerns and circumstances, including pre-existing conditions. Armed with this information, medical experts can outline a treatment plan which is tailored to the individual. This is where technology can make a significant difference. Data from the patient can be collected and analysed for insights to inform the approach taken to them. Rather than rely on established protocols which may not be appropriate for the patient, medical staff can use the data intelligently to gain the complete picture. This creates a truly personalised plan for each case.

From the patient's perspective, this personalisation will reassure them that their treatment is appropriate to their needs. The resulting approach will be based on a deep understanding of the patient's specific condition and take any challenges into account. For example, if there are issues with mobility, meaning that a patient is not able to attend a clinic, then video consultations may be planned into that individual's care plan. Ultimately, delivering the best healthcare to a population who needs it.

How this is done in practice

Improvements in connectivity – especially in 5G and the use of IoT – will play a vital role in helping to drive a shift to a more personalised approach. Fortunately, IoT devices are becoming more advanced and cheaper to produce, making them more accessible for the industry. Technologies such as low power wide area networks (e.g. NB-IoT), secure cloud services and application development platforms give organisations the tools needed: longer battery life for improved usability and the ability to create tailor-made applications.

An IoT-enabled platform utilising the cloud, data analytics and smart devices will connect to patients and clinicians at each stage of the treatment journey. Medical staff will be able to review the data remotely and in real-time, using advanced modalities such as AI or Machine Learning. The insights gained from this analysis will help improve the quality of care and medical adherence.

There are several organisations who work within the healthcare industry that are making this a reality. Kinseed was committed to ensuring meaningful connections – between people, information and processes. Working with Great Ormond Street Hospital, Kinseed identified a major gap in accessing patient data. The monitoring of patients at the critical time during transit to the hospital was predominantly manual and required resource investment. A solution for real-time monitoring did not exist and handover processes were manual, slow and prone to error.

Using a standard bedside monitor to track patients' vital signs, Kinseed created an application to access and analyse this data in real-time. This allowed consultants to access data from their phones and tablets at Great Ormond Street Hospital or from wherever the specialist resided when providing care. The challenge for Kinseed was connectivity. The company worked with Vodafone Business to provide reliable and robust connectivity, ensuring that consultants were able to access patient data without issue.

Kinseed's MediConnect devices are now able to output data in near real-time, allowing consultants to monitor every journey and proactively intervene should they spot an issue. As a result, patient handover was much smoother as the hospital consultants were fully aware of the history, having had direct access to the medical data during the transport journey. There were no gaps - clinicians had a full picture of a patient's medical data. Having this technology on the back-end ensured that the standard of patient care was maintained.

Personalised care continues after the patient has left the treatment facility. Switzerland-based device provider Medisanté is focused on the long-term monitoring of patients with chronic illnesses. The health data captured using the devices is securely transmitted via a mobile network to doctors, hospitals and healthcare providers. Using this data, patient response to treatment could be tracked and adjusted over time to determine next steps and predict long-term prognosis. The company was keen to extend its reach to multiple countries and worked with Vodafone Business to achieve the global IoT connectivity it needed to connect its measurement systems to its connected care platform.

Data collection and transfer – what about security?

The increased digitisation of any industry raises concerns regarding how the data generated will be protected. Patients need to be certain that their data is kept private and confidential and only accessed by those who have just cause. Any weak points in the system which allow cyber-criminals or unauthorised individuals to access data must be addressed – both while data is stored and in transit. To underscore these measures to protect data, clear communication with the patient about these aspects of data collection and use is key to maintaining confidence and trust.

The healthcare industry is built on trust and care. As the population needing care expands, it is crucial that healthcare maintains a personal approach. With increased investment in technology, there is an opportunity to achieve this personalisation at scale. By implementing AI, a vast amount of data can be processed from devices which detect a variety of aspects of the patient's condition. Insights can be generated quickly. Technology will improve efficiencies in the healthcare industry and enable medical staff to bring their expertise to a wide range of patients, while maintaining a personal approach. ■

Investors in Healthtech are still Sipping the Snake Oil

By Roeland Pater, Founder and CEO, Nori Health

From 2017 to 2018 Investment into healthtech nearly doubled, from $12.2 billion to $22.8 billion. 2019 is expected to break all records in this space, for example, just last month Babylon Health closed a $550M funding round. According to Hampleton Partners '2019 is set to reach the highest deal count yet with more than 4,500 fundraises projected to occur by the end of the year, compared to 4,395 in 2018'.

In healthtech the stakes are being set ever higher. However, behind the headline spends are also quiet (and not so quiet) failures. The Theranos saga may be a hyperbolic example but other once headline-grabbing startups have also faded into quiet failure. Zeo, an AI-empowered sleep tracker raised over $30m only to wither within a few years. Theranos of course was brought down by lies, cover ups and misdirection. Others however, are falling at the very simple hurdle of need.

Take the fact that studies are increasingly questioning the benefit of sleep trackers showing they can in fact lead to sleep-depriving anxiety. The issue - just because we can have a sleep tracker, do we really need one? Is time, resource and brainpower being wasted creating solutions that simply aren't based on patient need?

A recent article from the University of Warwick goes further and asks if technologists should undertake a hippocratic oath, comparing the issues posed by new technologies to that of the moral question posed in the hit movie Jurassic Park;

"Your scientists were so preoccupied with whether or not they could, they didn't stop to think if they should."

There is of course a difference between wilful harm and simple waste. However with patients hoping for cures and limited resources available to support them, any technology that wastes that resource is ultimately damaging.

Having suffered from Crohn's Disease for over 15 years my involvement in healthtech is personal. The lack of support services I encountered as I battled with a diagnosis of chronic bowel disease was the impetus for Nori Health.

Along with my co-founders (all of whom have experience of either living with or treating chronic illnesses) we knew that sufferers need psychological support to manage their lives, which is sorely lacking. Crohn's & Colitis UK and IBD UK recently recognised the increasing shift to self-management for bowel disease sufferers and that personalised support is just not possible otherwise.

Healthtech can help fill the gaps in specialised care that self-management creates. Further, technologies such as AI can offer personalisation that current services can't. If this is done smartly these technologies can also gather valuable insight into patient behaviour to inform future innovation - based on evidence of need.

The point is that we started with a very human problem and hunted for the technology that would help solve it - namely AI. We didn't devise a technology and then find a reason why the world needed it. This is an important distinction when considering that healthcare is a complex and regulated industry with its own set of rules, specific workflows and complicated landscape of stakeholders. Patients, doctors, regulators and insurers all influence whether a technology is adopted. They also all have differing needs.

A technology may deliver great time saving gains for healthcare staff, but is it at the cost of patient welfare? An AI, data-based solution clearly comes with a raft of potential privacy and security issues, not to mention DNA-based services such as 23andMe. At what point does potential impact trump privacy? These are questions that are becoming ever more pertinent.

Of course, these questions firstly assume that a given technology actually provides demonstrable impact. Unfortunately some of the public examples of expensive failure show that evidencing impact isn't always the primary concern. It's obvious to say, but treating healthtech as a playground is inappropriate - lives are at stake! 'Failing fast' and other startup jargon doesn't work in a patient care setting. This is an industry setting sights on long-term impact not flash-in-the-pan hype.

When you consider the fact that 40% of 'AI startups' don't actually use AI it's clear that the scientific community must have a larger scrutinising stake in healthtech's claims - and investors must engage in evidence-based strategies. In August, CNBC reported the launch of MDisrupt, "the world's first medical diligence company for the healthtech industry… to help investors with the vetting of health-technology companies by determining if there's evidence to backup the founders' scientific claims." It's clear there is a need for an evidence-based investing that seems to be lacking.

If they don't already, healthcare startups now need to have one eye totally focused on demonstrating impact through empirical evidence and transparent research. At Nori we've publicised our smaller-scale successes but are equally concerned that we have a way to go to prove our worth. We want to be scrutinised, challenged and questioned - and crucially we are in it for the long term. For that reason we're keen to engage stakeholders in the UK to become partners to improve patient outcomes together.

While the rapid innovation we're experiencing in healthcare is incredible and will likely deliver longer, happier and healthier lives, we need to be increasingly wary of hype. Unlike the snake oil salesmen of old I have no doubt that the vast majority of health startups hold the best of intentions. Intention must now be matched by evidence. This takes time, transparency and collaboration. Investors must understand that this is the first place their money should be directed and that they too will be in it for the long term return, not short term gains. ∎

INDUSTRY NEWS

News and Information for Digital Health Professionals

iRhythm Launches in UK to Tackle Growing Vascular Health Challenges

Digital healthcare company iRhythm Technologies has launched in the UK to support the identification and superior clinical diagnoses of cardiac arrhythmias such as atrial fibrillation (AF), the most common form of irregular heartbeat.

Around 1.2 million people in the UK are registered with atrial fibrillation, with nearly half a million (422,600) predicted to have AF undiagnosed according to Public Health England. AF is known to increase a patient's stroke risk by five times, contributing to just under one in five strokes in the UK. There are more than 100,000 strokes in the UK each year, causing 38,000 deaths, making it a leading cause of death and disability.

Strokes are estimated to cost the NHS around £3 billion per year, with additional costs to the economy of a further £4 billion in lost productivity, disability and informal care.

Outdated detection methods

Despite some arrhythmias having the potential to cause life threatening health issues, the process of detecting heart conditions - such as AF, that can lead to a stroke - typically relies on outdated devices. Conventional short-term monitoring methods - such as the Holter device, which is widely used to monitor for such heart conditions, misses over 50 percent of arrhythmias due to the short wear time of 24 to 48 hours. The Holter is a burden to clinicians and patients alike, as its usage often requires multiple appointments before an arrhythmia is discovered and managed - resulting in potentially detrimental health impacts, as well as being uncomfortable for the patient.

A new era of heart monitor

To ensure diagnoses aren't missed or delayed, iRhythm has launched its Zio service in the UK. The Zio system is a small wearable heart monitor that attaches seamlessly to the patient's chest for a period of up-to 14 days – providing uninterrupted, comprehensive monitoring of a patient's heartbeats as they go about their daily lives, including showering, sleeping and exercising.

Underpinned by artificial intelligence (AI), the Zio patch detects arrhythmias, such as AF, at the first time of asking – and without the need for numerous patient visits. Between June and August 2019, iRhythm identified an arrhythmia in 72% of patients that were issued monitors, with nearly one in 10 then going on to be diagnosed with AF*. Powered by the world's largest heart rhythm dataset and curated by expert cardiac technicians, the data generated by the Zio device gives almost complete certainty in a single test.

"AF is one of the most important preventable risk factors for stroke disease. Patients who suffer an AF-related stroke often have poor outcomes – and we're launching in the UK to change that," Justin Hall, VP and GM EMEA at iRhythm Technologies, said. "With access to such innovative digital technologies – which utilise AI to accurately and efficiently aid detection and diagnosis of arrhythmias, such as AF, at the first time of asking, we can eliminate the need for numerous patient visits due to indeterminate repeat tests, as well as significantly improving the patient experience."

"Compared to traditional cardiac monitoring devices, the Zio service streamlines the patient diagnostic journey – ensuring patients and clinicians get the answers they need for the right treatment path," Hall added.

*Based on iRhythm data collected between June 2019 and August 2019 as confirmed with physician's diagnosis. Data on file at iRhythm Technologies, Inc ∎

AI to Help Nearly Half a Million with Chronic Conditions

In an unprecedented partnership, a digital social enterprise and four UK health charities are coming together to harness the power of artificial intelligence (AI) for good – creating the UK's first AI coaching tool of its kind to support long term health conditions.

Reason Digital is teaming up with Parkinson's UK, the Stroke Association, Muscular Dystrophy UK and the MS Society to develop the project, which is set to transform the way medical advice and information is delivered to almost half-a-million* people in the UK.

The Digital Health Assistant (DHA) will use machine learning to develop an understanding of the person being supported and continues to adapt to their needs over time based on interactions. This allows DHA to provide emailed content and support specific to the individual's needs, making it more effective than current alternatives.

Alison Butt, 52, a health visitor living with Parkinson's who tested the assistant, explained; "When I first heard about an AI health assistant I thought it sounded innovative and wanted to take part in a project to help others with Parkinson's.

"I have been living with the condition for the last year after noticing a tremor in my right hand. Following diagnosis by a neurologist Iwas given a hefty folder of information which was overwhelming. I refused to Google my condition and instead found the Parkinson's UK website very helpful. I joined a local support group and spoke to my friend who also has the same condition.

"I've found there's an ongoing process of coming to terms with the condition. The DHA trial was a real eye-opener, I liked the idea of receiving weekly bite-sized tips and this influenced me to find new ways to slow the condition down. I discovered specially designed exercises for those with Parkinson's such as PD Warrior, which helps improve functionality and prolong quality of life. The weekly classes I attend are motivating, run by neuro physios and help correct posture and strengthen your core."

Richard Nash, 54, a physiotherapist living with Parkinson's who trialled the system, added; "After being diagnosed in January I was asked to take part in the DHA pilot. It was great as there is a real need for two-way information sharing and up-to-date content that's relevant to each stage of your condition. When it's developed DHA will be a reliable and relevant portal that's efficient and accessible. It will act as a gatekeeper that can be accessed at any time online, so users won't have to spend hours researching from unofficial sources online.

"The main challenge I've encountered since diagnosis is a psychological one, as I'm concerned about keeping my job and thinking about the future. It's been hard coming to terms with how things will be. I found researching Parkinson's online hard as there's no filter and some sites are untrustworthy. DHA is a
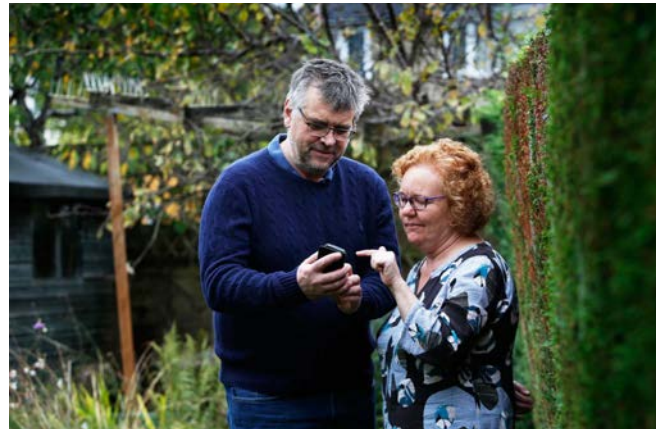
real breakthrough as it's convenient, can be accessed at home, is official and guides you every step of the way. "

Matt Haworth, co-founder of Reason Digital, said; "Understandably there's a lot of fear around the implications of AI for society. The reality is that whether it empowers us or oppresses us simply depends on who's using it. That's why with DHA, we're putting the power of AI in the hands of people who need support for their long-term health conditions.

"Diagnosis of a serious health condition such as Parkinson's, Muscular Dystrophy or multiple sclerosis, or experiencing a stroke, naturally generates an abundance of questions for the person receiving the news. Online research so often results in unanswered questions and out of date, generic information which just adds to the stress and anxiety of an individual's situation. What people want is curated information and updates from a trusted source."

Ed Holloway, director of services and support for the MS Society, commented; "What's incredible about this project is that it's four charities coming together to achieve in partnership something we couldn't alone. It's not just our communities who will benefit, more than 100,000 people live with MS in the UK but down the line this tool could help millions more living with chronic conditions.

"The future is changing rapidly, and we need to adapt with it to find new and innovative ways to support people. Having access to tailored, information and personalised support is a critical part of that, which right now our health service isn't equipped for. Digitising healthcare where we can is an essential solution, and one we're excited to embrace."

The tool has been designed to tackle common issues pervading chronic conditions in the UK, including the lack of tailored and up to date information available for people who've recently been diagnosed, and staff shortages. The four charities involved expect it to dramatically improve the quality of practical and emotional care on offer to individuals following a diagnosis and, longer-term, support them in successfully managing their condition. ■

A Chatbot Therapist to Combat Depression

A chatbot therapist to treat depression has launched as recent figures show that NHS patients, in the UK, seeking help with their mental health are waiting more than eight weeks to see a doctor after their first appointment.[1] The chatbot therapist was developed by medical device company Flow, which in June launched a brain stimulation headset treatment for depression, the first and only medically approved at-home treatment of its kind in the UK and EU.

The chatbot therapist, called Flow, engages users with daily chat conversations and offers self-help techniques, mood tracking, curated videos, meditation and mental exercises. It helps users to learn why sleep, exercise, nutrition and meditation are the main pillars in recovering from depression - and gathers mood data to offer a personalised response modelled on behavioural therapy.

Nearly one in four adults in the UK are affected by a mental illness.[2] Suicide is the most common cause of death for men aged 20-49 years in England and Wales.[3] The economic costs of mental illness in

England is estimated at £105.[2] billion annually.[4] And one in three work sickness notes handed out by GPs are for mental health reasons, including depression.[5]

"Accessibility and early intervention in depression is crucial," says Daniel Mansson, Clinical Psychologist, CEO and Co-Founder of Flow. "The 'always-on' source of therapy provided by Flow ensures people get the help they need as quickly as possible. Flow can provide anonymity without the fear of being judged by others. This is great as some people feel anxious when it comes to talking about their depression to another human."

To maximise the chance of recovery, Flow can be used in conjunction with the Flow brain stimulation headset. Randomised controlled trials published in the New England Journal of Medicine and the British Journal of Psychiatry show that brain stimulation, of the type used in the Flow headset, had a similar impact to antidepressants but with fewer and less-severe side effects.[6,7,8]

Flow joins a growing number of men-

tal health chatbots, including Woebot and Wysa, which are playing an increasing role in the mental health landscape. Whilst Woebot and Wysa use a cognitive behavioural approach to change the way people think, Flow has one goal: to reduce clinical depression based on well-grounded science.

Flow is starting talks with the NHS to have its brain stimulation headset available on prescription. The company recently announced an investment of £1.2 million by Khosla Ventures to roll out its offering across Europe, introduce the Flow headset to healthcare clinics in the UK, and fund clinical studies.

References
1. NHS Mental Health Treatment Therapy Waiting List Appointment *https://www.independent.co.uk/news/health/nhs-mental-health-treatment-therapy-waiting-list-appointment-a9079541.html*
2. NHS England: Mental Health *https://www.england.nhs.uk/mental-health/*
3. Office for National Statistics (2015). Suicides in the United Kingdom *http://www.ons.gov.uk/ons/rel/* ⇨

subnational-health4/suicides-in-the-united-kingdom

4. Department of Health: No health without mental health *https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/215808/dh_123993.pdf*

5. One in three 'sick notes' for mental health, says NHS *https://www.bbc.co.uk/news/health-41124238*

6. Brunoni, A. R., Moffa, A. H., Sampaio-Junior, B., Borrione, L., Moreno, M. L., Fernandes, R. A., Benseñor, I. M. (2017). Trial of Electrical Direct-Current Therapy versus Escitalopram for Depression. New England Journal of Medicine (26), 2523–2533. *https://doi.org/10.1056/NEJMoa1612999*

7. Brunoni, A. R., Moffa, A. H., Fregni, F., Palm, U., Padberg, F., Blumberger, D. M., … Loo, C. K. (2016). Transcranial direct current stimulation for acute major depressive episodes: meta-analysis of individual patient data. The British Journal of Psychiatry : The Journal of Mental Science, 208(6), 522–531. *https://doi.org/10.1192/bjp.bp.115.164715*

8. Bikson et al., Safety of Transcranial Direct Current Stimulation: Evidence Based Update 2016. Brain Stimulation, 9(2016), 641–661. *http://dx.doi.org/10.1016/j.brs.2016.06.004* ∎

ESA Awards Contract to Develop Satellite Enabled Healthcare Platform

Spirit Digital, part of the innovative healthcare organisation Spirit Health Group, has been awarded a European Space Agency (ESA) Business Applications and Space Solutions contract and funding to deliver real-time remote monitoring for patients with long-term conditions augmented with accurate, location-based satellite air quality data to enhance care provision and patient self-management options.
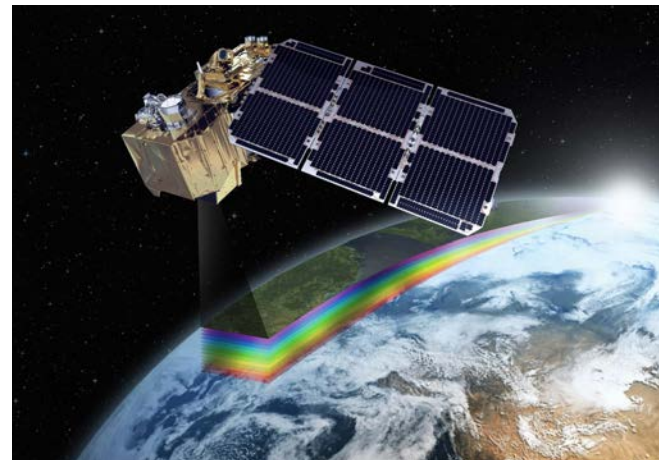
CliniTouch Vie II will provide patients and clinicians with real-time visibility through an enhanced system that provides advanced warning of when a patient's condition is likely to deteriorate by vital signs monitoring - enabling prompt pre-emptive interventions for the patient and the healthcare practitioner. Providing air quality data will give patient's real time information empowering them to help make decisions about how they manage their day.

CliniTouch Vie is a proven and MHRA approved medical device that proactively improves patient outcomes by reducing hospital admissions, enhancing case management capacity, preventing acute exacerbations, improving efficiency and collaboration and promoting patient self-management. In its Leicester COPD service, the digital platform has delivered a 67% reduction in emergency admissions amongst high-risk patients, working in parallel with health coaching and specialist nurse interventions.

With this new ESA initiative, Spirit Digital will lead a project team comprising air quality expert, EarthSense; not-for-profit innovation and technology network, Satellite Applications Catapult; and NHS support organisation Arden & GEM Commissioning Support Unit, to add Earth Observation data into CliniTouch Vie for improved healthcare decisions.

This data includes:
» Data from the Copernicus Atmosphere Monitoring Service (CAMS) - used for a range of species including NO2, O3, PM5 and PM10. These inputs will be critical to informing surface concentrations of key pollutants.
» Direct L3 NO2 data from Sentinel 5P to enhance regional import estimates within the air quality modelling.
» Meteorological data (EUMETSAT via ECMWF) contributing vital wind vector information to enable pollution dispersion to be accurately calculated.
» A satellite-enhanced digital elevation model is used to provide surface feature information (including buildings and trees).

In addition, GNSS data is used for location tracking for both patients and mobile air quality sensors and provides tailored position-based information on pollution concentrations.

CliniTouch Vie II is being developed to help people with respiratory conditions, initially COPD, better plan their day so that they can have better health outcomes. Plans to expand the platform to include asthma and other respiratory conditions are in place.

Chris Barker, CEO, Spirit Health Group, comments: "In the UK alone, 1.2 million people are diagnosed with COPD, with in excess of 140,000 unscheduled hospital admissions and 30,000 deaths per year. We know that poor air quality contributes to morbidity and mortality, and is estimated to have cost £157 million in health and social care in 2017. Yet, we can change this!

"By providing an enhanced system that will offer advanced warning of potential condition deterioration alongside pre-emptive intervention data, we can shift the focus from treatment to prevention. We are delighted that the ESA has recognised the huge potential of CliniTouchVie II and are thrilled to be working alongside our partners to deliver this ground-breaking project." ∎

AI-Analysis Software Supports Intelligent Detection of Eye Diseases

New RetCAD software employs artificial intelligence to assist opticians, optometrists and eye care clinics in the detection of eye diseases like macular degeneration and diabetic retinopathy.

The RetCAD technology, that has been developed by Dutch clinical SI-specialist Thirona, analyses retina scans for abnormalities and alerts clinicians to the potential diseases helping to identify cases at an earlier stage.

RetCAD uses a fundus camera that scans the retina, the software rings the alarm when imperfections are registered. Such a scan can be performed by specialist eye clinics but will also be offered by regular opticians and optometrists. Macular degeneration or diabetic retinopathy are registered automatically by RetCAD and patients can be referred to specialist care without delay. In the absence of defects a follow up is not necessary until the next checkup within 1-2 years. The Harmony RS platform launches the RetCAD algorithm and presents a clear overview of the results; the analysis is consistent and reproducible. Thirona is developing an extension of RetCad to increase the number of eye conditions, e.g. glaucoma, that can be recognized.

Hans Liefting, Business Development Director of RetCAD, spoke about the about the software's core functions during an announcement at the ESCRS Congress, in Paris: "medical care is offered in shops more often as an extra service for customers. Harmony enables opticians and optometrists to extend their services from eye measurements to eye analysis. The analysis obtained using our software is on par with the one performed by a certified ophthalmologist; a specialist should be consulted only in case a defect has been identified. RetCAD extends the selection of readily available eye care while relieving the workload for eye care specialists. Only those patients with an indicated ailment are referred to an ophthalmologist. The Harmony RS platform stores the patients' earlier scan for reviewing. In short: more care and treatment for those who need it."

Thirona is an innovator in artificial intelligence for medical image analysis. By creating intuitive and user-friendly products they shrink the gap between academic ideas and clinical usefulness. Founders Eva Rikxoort and Bram van Ginneken, both researchers at Radboud UMC, apply artificial intelligence in order to develop diagnostic software-solutions. The company also applies its AI-driven approach to thoracic CT-scans and thorax imaging. ∎

Funding Aids Development of Saliva-based Diagnostic Tool in Bid to Rid World of Malaria
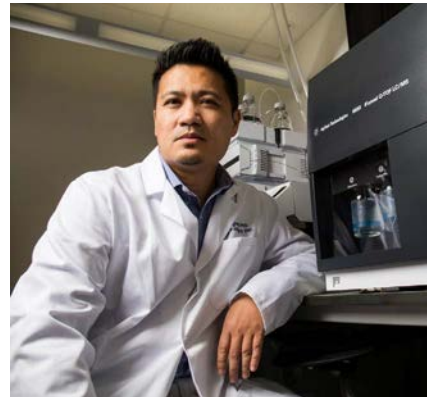
The eradication of malaria has been given a boost this week following a grant of more than £1 Million from Japan's Global Health Innovative Technology (GHIT) Fund to facilitate the production, testing and validation trials of the world's first ever saliva-based rapid diagnostic test (RDT).

This significant round of funding, secured earlier this month by the University of Florida, will aid final product development to complete the commercialisation process of the RDT, by medical technology start-up Erada Technology Alliance.

South Africa-based Erada Technology Alliance, in collaboration with international partners CellFree Sciences, Frontier Institute, Johns Hopkins University and Oasis Diagnostics, aims to launch the diagnostic tool in 2021, with field trials being rolled out in the Democratic Republic of Congo or Uganda in Q2, 2020.

Easy to use, the tool incorporates a simple device for the collection of saliva and is designed so that healthcare professionals, teachers and parents can implement the procedure quickly and simply.

Conventional blood-based tests are more invasive, have to be administered by clinicians and encroach upon the 'blood taboos' which exist in many countries. Skin-prick tests moreover are often stress-ful for children and indeed their parents.

The grant for this pioneering innovation has come at a time when the World Health Organisation's (WHO) Strategic Advisory Group on malaria eradication is calling for more innovative tools to overcome the existing suite of diagnostic tests.

The new diagnostic is to be marketed around the world under the brand name SALVA! and uses technology developed out of research carried out by Professor Rhoel Dinglasan at the University of Florida.

Dr Dinglasan and his team identified a new P. falciparum protein biomarker (PSSP17) in saliva that could replace presently used parasite markers like the Plasmodium histidine-rich protein-2 (HRP-2), which have become increasingly ineffective due to a growing prevalence of parasite mutations and inherent difficulties and shortcomings of blood-based RDTs.

The Global Health Innovative Technology (GHIT) Fund, headquartered in Japan, is an international public-private partnership between the Government of Japan, 16 pharmaceutical and diagnostics companies, the Bill & Melinda Gates Foundation, the Wellcome Trust and United Nations Development Programme.

GHIT facilitates international partnerships that bring R&D innovation, investment, and leadership to the global fight against infectious diseases such as malaria, tuberculosis, and neglected tropical diseases in the developing world.

Ms. Catherine K. Ohura, CEO of GHIT said: "Through this investment, we are thrilled to have extended our portfolio in our quest to use technology to save lives across the globe. We have now invested more than 17 Billion Yen to causes that will help prevent the deaths of millions of children and adults.

"Rapid diagnostic tests are crucial in curtailing malaria, the reason why we decided to invest in this innovative project and partnership led by the University of Florida."

Erada Technology founder, Dr Benji Pretorius, said: "This vitally important investment paves the way for the eradication of malaria. The deadly disease, indeed one that I was fortunate to recover from myself, snatches the lives of more than 435,000 globally each year. Many of whom are children under the age of five.

"That this swiftly follows a foundation grant from De Beers Group has significantly aided both the work that we and our collaborative partners are striving to achieve, and the fight to eradicate malaria on a global scale. We can now push on with field trials and commercialisation which we hope to complete by World Malaria Day in April 2020."

GHIT's six-figure backing of the commercial development of SALVA! will cover three essential objectives:
1. Design and small-scale production of 2,000 SALVA! kits, which contains a saliva-collection device and a lateral flow immunoassay cassette.
2. Quality-assured medical device production conditions of heat-stable, high-affinity recombinant humanized monoclonal antibodies for capture and detection of PSSP17 on a lateral flow test.
3. Thorough testing and validation of the commercial SALVA! test in the Democratic Republic of Congo (DRC), a priority malaria endemic country, or Uganda.

During these studies, the acceptability, usability, sensitivity and reliability of SALVA! will be compared to the most sensitive molecular laboratory tests used in malaria detection.

The overall outcome of the project is to fulfil all the criteria for obtaining CE marking and subsequent WHO prequalification of the SALVA! kit.

ERADA's saliva test detects a unique biomarker from female parasites circulating in an infected human who is asymptomatic (not displaying symptoms) but is carrying the parasite and likely to come down with malaria within a week.

Early subclinical and asymptomatic disease detection, in addition to detection of carriers – individuals who carry a specific parasite lifecycle component without falling ill from it - is crucial to malaria eradication. Carriers are the reservoirs which lead to infection of mosquitoes and transmission of the disease.

Detecting the presence of the parasite before symptoms appear can save lives because malaria visible disease only erupts a couple of days after the mosquito bite.

The SALVA! detection tool works by detecting a novel biomarker for Plasmodium falciparum parasites in saliva. In some areas of the world, the parasites have acquired a mutation and are therefore no longer detected by current blood-based tests. But ERADA's saliva test detects an essential protein the parasite needs for survival, which should avoid the problem of influence from the mutation and keep the test effective long-term. ∎

Study Shows Smartphone App could be a 'Green Prescription' for Mental Health

A study that prompted users to record the 'good things' in nature in urban areas, such as trees, flowers and birds, has found that a smartphone app can bring clinically significant improvements in mental health.

A University of Derby team led by Professor Miles Richardson and involving colleagues from the University of Sheffield, examined the responses of more than 582 residents of Sheffield, including 150 people with a mental health condition.

When near an urban green space, they were prompted by the research app to notice and record the good things in nature every day for one week.

The findings, published in the International Journal of Environmental Research and Public Health, show a clinically significant and positive effect on wellbeing not just at the end of the seven-day period, but one month later when a follow-up assessment was carried out.

This was particularly the case for people:
» With mental health difficulties
» Who had spent more time outdoors as children
» Who had spent little time outdoors in the 12 months prior to taking part in the study.

Miles Richardson, Professor of Human Factors and Nature Connectedness at the University of Derby, said the study showed promise that a smartphone-based 'green prescription' to connect with nature in urban areas could play a role in delivering mental health and wellbeing.

He explained: "Providing everyday opportunities to improve wellbeing and reduce health inequalities through engaging with urban nature with a brief, portable, widely accessible and
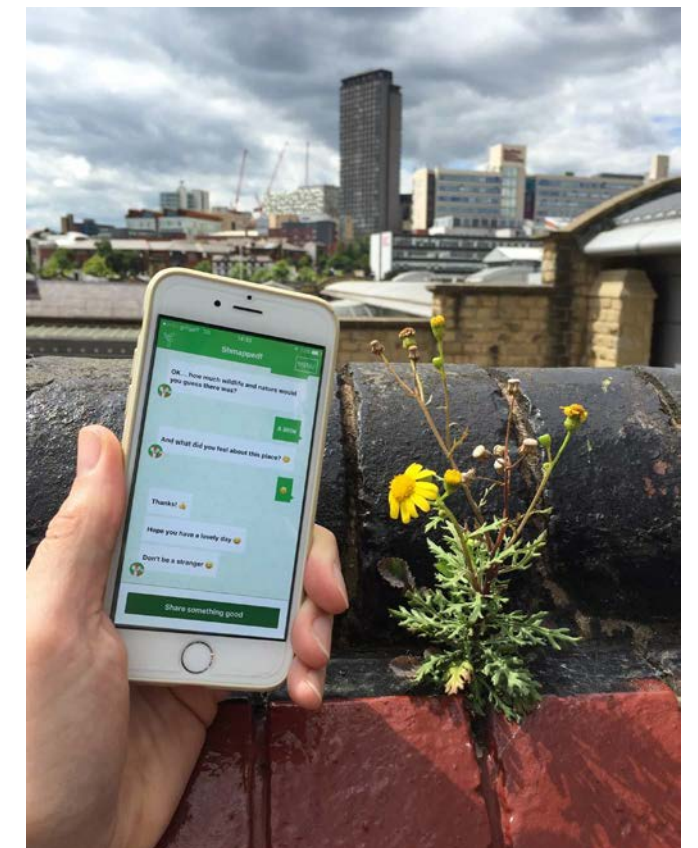
cost-effective smartphone app intervention is of interest to public health organisations seeking solutions to mental health crises in an increasingly urbanised society."

Dr Kirsten McEwan, Senior Researcher at the University of Derby, said: "Adults spend, on average, less than eight per cent of their time outside, so to see the positive impact it had on those who spend little time outdoors suggests that there is a ⇨

need for engagement with nature in everyday life. Just noticing simple things in nature, such as trees, skies, flowers, birds and wildlife, can have a beneficial impact."

David Sheffield, Professor of Psychology at the University of Derby, said: "The findings also provide evidence that exposure to nature in childhood is important to help adults achieve a sense of wellbeing by renewing and reigniting that connection."

The University of Derby team and Furthermore, the company which developed the app for the study, are working with walking app Go Jauntly on a new version which could be rolled out in 2020.

Steve Johnson of Furthermore said : "We're excited to see the results of the study and the positive effect of urban nature on our wellbeing. This really begins to pave the way for more proactive 'green prescriptions' and we are planning to continue to work with the University to bring this noticing the good things in nature feature-set to the Go Jauntly app."

Find out more about the work of the Nature Connectedness Research Group at the University of Derby. ∎

Simulation Provider bears WITNESS to Ground-breaking Philippines TB Modelling

Leading predictive simulation specialists, Lanner, have helped pave the way in a pioneering three-year research programme designed to tackle escalating Tuberculosis (TB) rates in the Philippines, working in partnership with the Liverpool School of Tropical Medicine.

The ground-breaking project comes after a study which, in 2016, revealed there are 1 million people in the Philippines with active TB, a figure which is reportedly on the rise.

Using detailed process mapping and mathematical logic, developed using Lanner's simulation software platform WITNESS, real-life scenarios are modelled, allowing Da La Salle Medical and Health Sciences Institute (DLS-MHSI) in the Philippines and the Liverpool School of Tropical Medicine to analyse the impacts of new diagnostic tests for TB.

The WITNESS model simulated ten years of real-time diagnoses and compared many elements of the operational and financial outcomes, particularly considering the innovative GeneXpert introduced additional costs along with its efficiencies.

"Though we recognised the new GeneXpert test was our best option for quickly identifying TB within a patient, as it analyses samples at a genetic level, it is considerably more expensive than

microscopy; costing around £13,000 per diagnostic machine and each test costing another £12," explains lead modeller Ewan Tomeny from the Liverpool School of Tropical Medicine. "It is therefore critical that policy-makers and patrons are confident that extra investment is justified, and that the machines are incorporated into the testing process in the right place."

Through a collaboration with colleagues at DLSMHSI, the Liverpool School of Tropical Medicine were able to secure funding from the UK Medical Research Council and the Philippine Coalition of Health Research and Development to explore the different diagnostic options for GeneXpert using WITNESS.

Part of the Royal HaskoningDHV group of companies, Lanner's WITNESS modelling is renowned within the manufacturing sector, supporting companies such as Britvic, Mars, Nissan and Diageo, to help answer the 'what if' questions for capital investments, business transformation and scenario planning in manufacturing and production processes.

Allowing its commercial know-how to benefit wider society is one of the core underlying principles that Royal HaskoningDHV supports, as set out in its 'Enhance Society Together' strategy. By working in partnership with its clients and other stakeholders, the group is committed to making an impactful contribution to society through its projects.

Professor Charles Yu, the Principal Investigator in the Philippines reflected: "The WITNESS model provided us with many of the key insights we needed to inform decisions relating to rolling out the new technology, including the number of patients who could be correctly diagnosed with TB (true positives), those who would be missed (false negatives) and those, who don't have TB and would nevertheless be placed on to treatment (false positives).

"WITNESS enabled us to not just calculate the benefits of implementing GeneXpert, it also enabled us to measure and analyse patient impact. This included direct out-of-pocket spending associated with taking part in the diagnostic tests, but also transport, food and accommodation, as well as any indirect costs related to lost time, which WITNESS was able to expose effortlessly."

Andrew Aitken, COO for Lanner Group, said: "WITNESS was invaluable to this pioneering research, allowing the team to represent multiple intricate real-world pathways in a clear and precise way, while easily accommodating the complex underlying logic.

"As well as enabling the team to clearly explore the impact of implementing GeneXpert testing, we trained clinicians, programme managers and junior researchers on how to use WITNESS for planning TB diagnosis operations in the Philippines. We are proud to work to be a part of this project, ensuring we are enhancing society together – a key strategic principle from our parent company Royal HaskoningDHV."

The Liverpool School of Tropical Medicine has been modelling with WITNESS for 9 years, and in this time have worked in many countries, including Brazil, South Africa, Ethiopia and Tanzania. They have also modelled important health issues such as sepsis, child and maternal health and emergency care.

The team's modelling in the Philippines predicts that full rollout of GeneXpert will see more patients correctly diagnosed, with patients facing lower patient costs and a faster time to diagnosis. It also projects an increase to the number of Multi-Drug resistant TB (MDR-TB) cases receiving appropriate treatment, which is vital for progress towards Ending TB in line with WHO's goals. ∎

HealthMatch Raises $6m following Partnership with Roche

HealthMatch, an Australian start-up that has created a digital platform for patients to be matched with suitable clinical trials, has raised $6 million in funding following a recent commercial multi-country partnership with Swiss-based Roche Pharmaceuticals.

The investment led by Square Peg and Tempus Partners will be used to grow the HealthMatch team and recruit new trials to the platform, following the company's rapid recent growth.

The new commercial partnership allows the platform to list clinical trials from Roche directly, rather than just off public registries, and it will take a cut each time a patient is successfully matched to one of their trials.

HealthMatch was co-founded by its chief executive, Manuri Gunawardena, when she was studying medicine and has grown rapidly. In the year and a half since HealthMatch banked its first $1.3 million capital raising it has evolved its product from being just a prototype to a fully-functional platform, which was launched in January.

"It was really exciting, because from day dot we had patients come through and fill in applications for clinical trials for a whole range of conditions, and areas that we didn't necessarily think there were going to be of interest," said Ms Gunawardena.

"We had expected cancer patients to be a big category, so it was a surprise to see the number of people with chronic conditions, ranging from asthma to Parkinson's disease, among the 7000 patients (or "users" to adopt the more techy term) who have joined the platform so far."
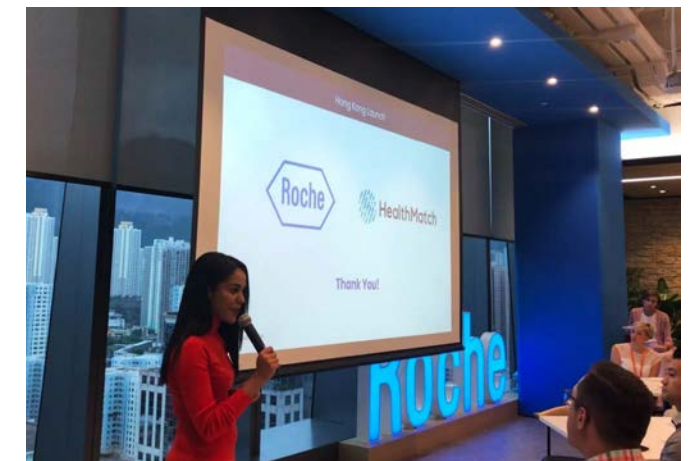
Whilst drug development is evolving with the benefit of innovative technologies such as artificial intelligence making complex breakthroughs in molecular and cancer therapeutics, patient recruitment for clinical trials remains the Achilles heel of drug development.

In an industry where the patient has typically been a by-product in the drug development process, HealthMatch's partnership with Roche will ensure patients have better access, choice and empowerment when dealing with their health.

"HealthMatch's goal is to dramatically accelerate the recruitment process," continues Gunawardena, "allowing for faster and more efficient access to life-saving medication. By employing innovative technology, we are able to both translate unstructured clinical criteria and match patients to trials in a matter of minutes." ∎

AI Service Detects Vertebral Fractures in more than 2,000 Patients

More than 2,000 NHS patients, in the UK, have had previously undiagnosed spinal fractures detected by an Artificial Intelligence algorithm.

Working with bone health teams in Nottingham, Bradford and Guildford, AI engineers were rapidly able to identify the vertebral fragility fractures (VFFs) and refer patients onward for further investigation and treatment.

Funded by the National Institute for Health Research Invention for Innovation programme, the process has been developed by the University of Manchester and Central Manchester Hospitals NHS Foundation Trust, in collaboration with Optasia Medical Ltd with input from the Royal Osteoporosis Society.

The service processes CT scans which are already held by hospitals – patients are not required to have an additional scan. After the algorithm has quickly identified the fractures, the results are verified by a consultant radiologist before being passed back to the hospital.

Announcing the results, Shawn Luetchens, CEO of UK start-up company Optasia Medical, said the development would enable earlier diagnosis of osteoporosis which affects half of all women in their later years.

"This is a big tick in the box for British AI technology and a model of how AI companies can work in partnership with the NHS to deliver better healthcare for patients", he said.
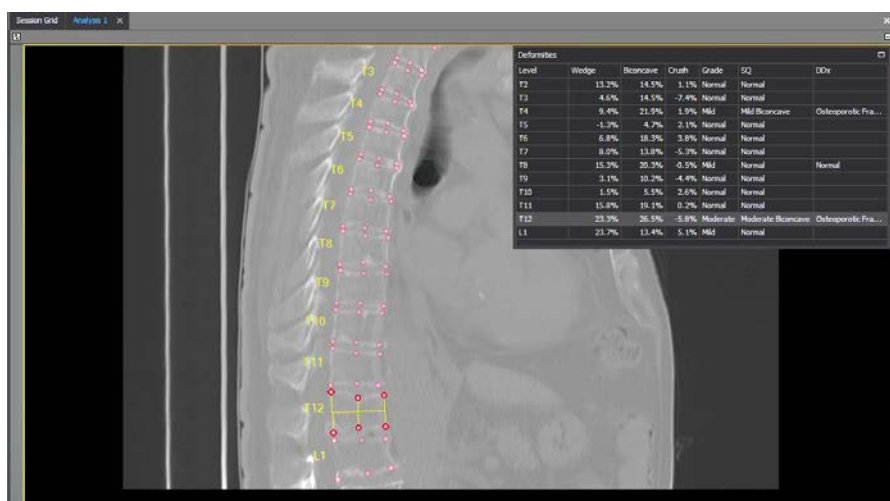
"The potential health and wellbeing benefits, particularly for women, are significant. Vertebral fractures are the most common osteoporotic fracture and a predictor of future hip fractures – more than 55% of patients with hip fracture have evidence of a prior vertebral fracture.

"Once the algorithm has done the spadework by finding the fractures and flagging them up, the results are verified by a consultant radiologist before being returned to the hospital.

"This is a very efficient use of a consultant radiologist's expertise at a time when the UK has a shortage of them".

Fractures due to osteoporosis affect half of all women and 1 in 5 men aged over 50. The average cost of a hip fracture to an NHS hospital was found in a 2015 study to be £16,302 in the first two years. By 2025, treatment of fractures is estimated to cost the UK over £5.5 billion.

Once at-risk osteoporosis patients have been identified they can be placed on a drug regime to help strengthen bone density and also given lifestyle assistance.

Although the current programme makes use of existing CT scans already held by NHS Trusts, Mr Luetchens said the technology was now available to run a national pre-retirement screening service for older people.

"NHSX is actively looking at screening programmes for high-risk populations and older people certainly fall into that category.

"With pre-retirement screening for osteoporosis, patients would have the opportunity to lead a healthier, more protected and active life. And over the course of a few years, hospitals would start to see a big reduction in the number of elderly patients coming back into hospital with costly hip fractures". ■

Unique Wearable Device Monitors the Health of Mum and Fetus during Pregnancy

Monash University researchers in Melbourne, in partnership with Biorithm, a Singapore-based start-up, are bringing obstetric healthcare into the 21st century, trialling a new wearable device that remotely monitors a mother and unborn baby's heart rate, and maternal contractions.

The remote monitoring device, Femom, is placed on the stomach by expectant mums in the comfort of their own home, tracking vital information and reporting to the treating doctor via a phone app. If current hospital trials continue to be successful, the device could be made commercially available next year. Researchers believe it has the potential to revolutionise obstetric care because foetal monitoring through CTG has remained unchanged since its invention in the 1960's.

A patients' treating doctor prescribes the device and kit along with regular scheduled self-monitoring during 'virtual appointments'. Depending on the patient's needs, the kit comes complete with connecting devices such as a blood pressure monitor, glucometer and a digital weight scale, providing a detailed profile of the patient's and unborn baby's health.

With 50 million pregnancies (30 per cent worldwide) considered high-risk, co-developer Dr Vinayak Smith, of Monash University's Department of Obstetrics and Gynaecology, said the device could lead to more reliable and individualised care for vulnerable patients, while easing the burden on the health system.

"This device is essentially a virtual maternity clinic - meaning pregnant woman no longer need to leave home to be monitored. It's a world first solution in outpatient antenatal monitoring, and addresses an urgent global need to rethink how we deliver maternity care," Dr Smith said.

"It has the potential to dramatically reduce the cost of care, hospital wait times, and provide closer monitoring and personalised support to pregnant women, especially for high-risk pregnancies."

Dr Smith said the Femom device can not only monitor heart rates in a more detailed way but it can provide clearer distinctions between the mother and baby's heartbeats, allowing faster and clearer identification of babies showing early sign of distress.

"The technology is science at its best - the device also gives us a lot more insight into what is going on physiologically - we can see much more in terms of heart rate intervals an morphology for example. We have never been able to do this from the current available monitoring systems," Dr Smith said.

Fetal heart rate monitoring is currently done in hospitals – with the women as inpatients – via cardiotocography (CTG) technology. Women commonly have to go to hospital two or three times a week and sometimes travel long distances, and endure long waiting times.

One of Australia's leading specialists in obstetrics and gynaecology and supervisor of the trial team, Professor Euan Wallace AM, said handing control to women was a key driver of the project. Professor Wallace is head of Obstetrics and Gynaecology at Monash University.

"This is obstetric healthcare slowly dragging itself into the 21st century. It certainly has the promise of better outcomes," Professor Wallace said.

"Essentially this is about moving control into the hands of the woman so she can do the monitoring at home. It can then be interpreted at the hospital or a central point in real time. It allows a much timelier intervention if that is what is needed, enabling us to deliver babies in better condition."

The researchers conducted a survey during pilot trials that showed 80 per cent of mothers would prefer to use the device than standard CTG. They anticipate the device could be used as a standard-of-care for remote monitoring and potentially replace standard CTG in hospitals during pre-labor care.

The device is currently being trialled at the Monash Medical Centre in Melbourne and collaborating hospitals around the world. ■

Upcoming events

December 2019

10–11 **Biofit**

Marseille, France
For more information visit
https://www.biofit-event.com/

January 2020

28–29 **AgeingFit**

Nice, France
For more information visit
https://www.ageingfit-event.com/

March 2020

1–4 **TRI-CON**

San Francisco, CA, USA
For more information visit
https://www.
TriConference.com

3–4 **Digital Health Rewired**

London, UK
For more information visit
https://www.
digitalhealthrewired.com

17–18 **Medical Imaging Convention**

Birmingham, UK
For more information visit
http://www.
imagingconvention.com

17–18 **European Neuro Convention**

Birmingham, UK
For more information visit
http://www.
neuroconvention.com

17–18 **Oncology Convention**

Birmingham, UK
For more information visit
http://www.
oncologyconvention.com

26 **SEHTA International MedTech**

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

April 2020

21–23 **DMEA**

Berlin, Germany
For more information visit
www.dmea.de/en

June 2020

30–1 **MedFIT**

Grenoble, France
For more information visit
https://www.medfit-event.com