Learning from the Transition to
TECHNOLOGY-LED
Health Services

INTERVIEW

How Subscriptions will Play a Role in the Future of Health Tech
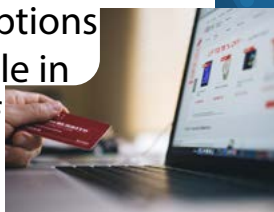
INSIGHT

Why Data Must Underpin Hospitals of the Future

TECH SPOTLIGHT

Voice Automation in Health Services

In This Issue

Industry News

Welcome

With the transition to digital accelerating across healthcare, the changing landscape is presenting providers with a range of fresh challenges. For many healthcare providers the last 12-months have seen rapid transformations in technology-led care provision, necessitated by the need to offer digital-first care solutions.

Given the short period of time that many healthcare services have taken to introduce digital services, process optimisation has not always been possible. However, that need is now becoming evident across the healthcare ecosystem. As we have seen from more digitally mature industries, managing this changing technology landscape quickly becomes a very complex process.

Integration of digital services into existing care provisions, training of clinicians and support staff, patient education, cyber security, data governance, and interoperability are just a few points on an exceptionally long list of considerations that healthcare organisations need to take into account when optimising their digital endeavours.

While these are all well-known factors in any digital transformation project, the scale and speed with which many healthcare organisations have shifted to technology-enabled health services is now placing huge burden on both management teams, and clinicians, as they try to optimise the delivery of care using these new digital channels.

In this issue, we look to provide a range of lessons from different digitally driven health services. We discuss what makes health technology successful and how these tools can be best incorporated into the overall operations of a health system. We also look to the changing digital-landscape and ask what impact these new trends are likely to have on healthcare going forward?

Also inside, we ask, how would you design and plan new hospitals to radically improve the patient experience? Any design for the hospital of the future will need to take advantage of the living and breathing nature of data, recognising the role it can play in improving services and experiences today.

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Why Data Must Underpin Hospitals of the Future

How would you design and plan new hospitals to radically improve the patient experience? This is the question being asked by Lord Wolfson, founder of the Wolfson Economics Prize, who is offering £250,000 for the best design of a new hospital that will improve patient care. The initiative, which is open for everyone around the world to enter, challenges participants to consider that "this is not just a chance to rebuild our hospitals, or even to redesign them – it is a chance to re-imagine what they might achieve".

This is an exciting brief and one which, I'm sure, will bring to the fore many new and innovative ideas. However, there is one element that I believe will be fundamental to the success of the winning proposal, no matter what the design: data. The "lifeblood" of healthcare organisations, it underpins every element of hospital operations and patient care. Any design for the hospital of the future will need to take advantage of the living and breathing nature of data, recognising the role it can not only play in improving services and experiences today, but in continuously informing how processes can be evolved and improved as new trends arise.

When it comes to the use of data, the health service isn't making a standing-start. In the UK, some Trusts are already putting data at the heart of their operations, which in turn is helping them improve patient care and optimise service deliveries. And drawing from these learnings is a great place to start for anyone considering the hospital of the future.

What can we learn from leading industry innovators?

Data and analytics are already empowering health and care organisations around the world to optimise their services and deliver better patient experiences. Indeed, as part of an IDC study commissioned by Qlik, three-quarters of healthcare organisations reported that investments in data management and analytics had improved employee productivity (72%) and operational efficiencies (73%).

Many Trusts are taking advantage of this opportunity by putting data at the heart of decision-making processes. Take the University Hospitals of Morecambe Bay Trust (UHMBT)'s Royal Lancaster Infirmary site, for example, where its cutting-edge Analytical Command Centre presents real-time analysis of demand and capacity, including the number of ambulances on the way to the hospital and availability of beds, on large, interactive screens. The centre enables the team to continuously assess resources against demand, predict when surges may happen, and streamline the patient experience. In turn, this has helped to reduce delays and has increased the percentage of patients triaged within 15 minutes from 65% to 95%.

Empowering hospital staff to easily capture information also improves the ability for more informed decision-making. At Wrightington, Wigan and Leigh (WWL) Teaching Hospitals NHS Foundation Trust, the patient flow manager uses a tablet to easily capture and analyse data on the number of patients awaiting discharge across different wards. The more agile reporting and analysis enabled the BI team to understand the typical wait time for patients awaiting MRIs, which has now been reduced from ten days to two.

The use of analytics helps these healthcare organisations make better and more informed decisions in the moment, directly improving the patient experience. It also proved integral to 84% of NHS Trusts' response to the pandemic, according to research from Qlik. From tracking positive infections of patients, to identifying potential staff exposure to the virus and to inform testing, data analytics helped provide greater transparency of the COVID-19 risk to staff, patients and visitors.

Increasing the use of data in the hospital of the future

While there are great learnings that can be taken from these Trusts' successful data strategies, there are three key ways that I believe we can expand and improve the use of data in the hospital of the future:

Cloud-based analytics – Medical experts can be expected to sit behind a computer screen to access the data which is critical to their decision-making. Analysis needs to be easily consumable on any device, no matter where staff are located in the hospital. Some Trusts currently offer this through VPNs, but cloud-based solutions provide a more seamless approach that takes away the need for time consuming sign-in processes. Cloud-based analytics also enables greater information sharing with other health and care organisations – such as social care, mental health teams, etc. At WWL, for example, the team is currently migrating its analytics solution to the cloud to enable a more joined-up response to every situation. This is all done within a governed framework to that ensures data security is maintained.

Advanced analytics and Machine Learning – The use of predictive analytics and forecasting will play an important role in helping hospitals predict resource and demand. If a Trust is able to forecast a patient's risk of readmittance, for example, it is better prepared to manage the unscheduled demand. The team at UHMBT is currently developing a solution to this challenge that integrates autonomous machine learning capabilities into the analytics application stack. A daily prediction is then shared with the team for readmittance, which can be obtained through the Analytical Command Centre.

A shared-data model – Connecting the data of different health and care organisations to support the shift towards a population health model, which will be crucial to support the sustainability of the health service in the long term. Earlier interventions in the community, for example, can significantly reduce what has come to be an overreliance on emergency departments for primary care. However, there are two challenges that must be overcome: the first of which is data integration, as traditional processes that rely on batch uploads just aren't cut out for a real-time data sharing across different systems and solutions.

Data streaming solutions will be key to ensure information can be replicated and accessed by all organisations at any moment. Secondly, Qlik's research found the majority of analytics solutions currently deployed by NHS Trusts are not capable of identifying population health patterns (60%). To inform population healthcare programmes, organisations need analytical solutions that can combine real-time analysis with hyper-contextual data to drive Active Intelligence.

Putting data at the heart of hospitals of the future

Lord Wolfson believes that money alone isn't enough to solve the future healthcare challenges - we also need new ideas. I believe with data acting as the lifeblood of the organisation, hospitals of the future will be able to continuously learn, innovate and improve. This will empower practitioners to not only deliver the highest quality care in the hospital of tomorrow, but long into the future.

By Adam Mayer, Senior Manager at Qlik ∎

How Subscriptions will Play a Role in the Future of Health Tech

Zuora is the world's leading expert on the subscription economy. We talk to John Phillips, EMEA GM and SVP of Sales at Zuora about how subscriptions will play a role in the future of health tech!

To kick us off, can you tell us a little bit more about Zuora?

Zuora is the world's leading expert on the Subscription Economy. We invented a subscription management platform that functions as the foundation for any company - regardless of industry - to launch, manage and scale subscription business operations. Zuora's technology streamlines the complexity of managing and operating a subscription business - from the initial order a customer makes all the way to the way a company recognizes its revenue.

Since its inception in 2007, Zuora has grown to serve more than 1,000 of the best subscription companies globally including Zoom, Ford, Fender, Siemens Healthineers, Schneider Electric, The Guardian, and more.

We noticed Zuora recently launched its latest Subscription Economy Index. What is the purpose of this report and are there any key findings this

time around in terms of healthcare?

The Subscription Economy Index™ (SEI), a bi-annual report published from our Subscribed Institute - a think tank for the Subscription Economy - analyses the health and growth of global subscription businesses, in various industries including SaaS, IoT, manufac- ☞

turing, publishing, media, telecommunications, healthcare, education and corporate services – in order to compare how subscription-based models are faring compared to traditional companies.

Of course, our latest report – which was released earlier this month and featured new data for the last 6 months, ending in December 2020 – was particularly interesting, given the period of uncertainty that all sectors are currently facing in the light of the pandemic. It sheds some light on how the recent health crisis has impacted the business landscape and speaks to an accelerated preference for (and adoption of) subscription-based offerings.

For the healthcare industry, Zuora's SEI suggests that subscription models are empowering providers to continue to be resilient and adapt in the face of change. The past year has transformed the trajectory of healthcare delivery. Front and center has been the need to provide wider, more affordable access and to provide services remotely when possible.

According to the SEI, healthcare companies with at least some recurring revenue saw some of the lowest churn rates of any industry, underscoring how vital relationships, customer-centric models, and flexible access are to this sector in particular. This is because subscriptions enable healthcare companies to gather insights from minute-by-minute service data, enabling them to better understand and serve patients in a way that wouldn't be possible within a traditional healthcare environment.

Healthcare companies utilising subscription services also saw higher levels of usage-based billing than any other sector. Usage-based pricing is a way of quantifying the value of the product or service provided. The goal is to let customers pay only for the services they need. Incorporating it makes it easier for healthcare providers to align and grow with customer needs – making them both more appealing and more profitable. In fact, according to a Subscribed Institute benchmark on usage-based pricing, companies that implement this model for 1-50% of their overall revenue, grew at 28% year-over-year (1.5 times higher than companies with no usage-based pricing at all).

It sounds like the role of subscriptions in healthcare is set to increase at a global level. Why do you think this is and how will it impact the UK market specifically?

Today's pandemic has brought about some key changes in consumer behaviour, accelerating a trend we've been witnessing over the years known as "the end of ownership". Increasingly, individuals want the freedom to access services and use them anytime, anywhere. They want the latest technology or product model available at their fingertips at all times. They want choice in terms of how they pay, alongside the ability to pause and resume services. Thanks to this shift in behaviour, subscribing is swiftly becoming the new norm, with 77% of UK adults using subscription services today, according to our most recent End of Ownership Report. This is up from the 58% that had subscriptions 5 years ago.

However, the subscription business model is not just for increasing access to software and entertainment services. At its core, it's all about increasing access and improving outcomes, and if there is one outcome that we are all striving for these days, it is

a healthy population. A pricing model focused only on selling units at the highest price possible – which is the current healthcare model in a lot of countries – does not successfully support this outcome. A subscription-based pricing model focused on providing wider and more affordable access to disease-curing medicines could do much better, as long as it provides cost savings for healthcare providers, and enough revenue for pharmaceutical companies to continue their innovative work.

Although the UK's National Health Service is fairly unique and, our healthcare system operates slightly differently, subscription models could still help to improve outcomes and boost the patient experience. For example, thanks to a substantial amount of usage data they collect, subscription companies know who their customers are and what they want. As a result, they can adjust their services to match demand, encouraging longer term commitment. Providers of healthcare services could use this information to personalise their offerings and ensure patients are receiving the best treatment possible.

Are there any other examples of companies in the healthcare space already benefiting from this model?

There certainly are! Another company we work with is Siemens Healthineers. Physicians around the world use equipment manufactured by Siemens Healthineers to produce millions of medical images every year. Medical images contribute to a continuously growing pool of multidimensional health data ranging from electronic medical records, image databases, and other multi-layered health IT systems.

The advent of cloud-based data management and artificial intelligence (AI) have enabled advancements in medical technology that are increasing operational efficiency while improving patient outcomes. Siemens Healthineers has been at the forefront of this trend. The company recently introduced digital health offerings like the teamplay digital health platform, which enables healthcare providers' digital transformation through AI RAD Companion - an AI-supported, cloud-based image interpretation tool - and AI-Pathway Companion - an AI-based software facilitating personalised and standardised diagnosis and treatment decisions.

However, as the team at Siemens Healthineers launched these new subscription-based products driven by the cloud and AI, the existing IT infrastructure (built for one-time transactions) didn't have the capabilities to support a subscription business model with multiple customer touch points. Therefore, the company was unable to fully monetise these new products and unlock the true patient value. In order to solve this, Zuora Billing and Zuora Revenue was added to the IT stack, enabling the team to automate previously manual processes and institute new key performance indicators (KPIs) to power their subscription recurring revenue business model.

From the perspective of Siemens Healthineers, subscriptions mean new revenue streams, increased productivity and significantly less processing time – for example bill run time was reduced by about 75%. But, more importantly, this new model drives the company to focus on the customer relationship, with both hospitals and other healthcare providers, and how to provide value – on a continuously evolving journey. ■

How Voice Automation Could Help Relieve Pressure on Health Services

Gary Williams, Director of Sales and Consultancy at Spitch, explains some of the ways voice automation could help aid the healthcare service following the pandemic.

Once the realm of science fiction, voice technology is now woven into the fabric of everyday life. Around 1 in 5 households in the UK own some form of smart speaker, engaging with businesses like Amazon and Google with words rather than clicks.

As voice technology becomes a permanent fixture of our homes, consumers are now more comfortable with using it to manage every aspect of their lives, from ordering food to booking appointments, and even checking their bank balances. So, what if that same level of convenience and instant service could be applied to healthcare?

With COVID-19 currently stretching the resources of healthcare organisations around the world, automated 'telehealth' is attracting a lot of attention. The positive impact of voice automation has been well documented before the pandemic. In fact, this 2017 case study found a correlation between voice-activated tech and improved clinical outcomes for heart failure patients.

The applications of voice technology in healthcare are almost limitless. With mounting evidence suggesting it could be an integral part of a patient's care programme, here are some examples of how voice technology could be used in healthcare.

Reducing administrative burden
When routine services eventually return to pre-pandemic levels, there will be a significant backlog of appointments that need to be scheduled in. By applying natural language processing and call steering to the appointment booking system, hospitals could free up resource for receptionists and allow patients to choose, book or reschedule visits, reducing costly DNAs (Did Not Attends).

Remote Healthcare
With COVID forcing many non-essen-

tial appointments to be cancelled or postponed, one of the biggest applications of voice technology is in remote healthcare. Voice technology could be programmed so that it works in tandem with those voice assistants that patients recognise at home. This can help to remind doctors about patient needs and also be used as a way to help patients engage with their self-care programmes.

Diagnostics
One remarkable way that voice technology could be deployed is to aid doctors with their diagnoses. Voice technology and machine learning can be programmed to learn and detect changes in patients voices that are associated with certain conditions such as Parkinson's. It is much more accurate than a human ear and can also potentially diagnose conditions before symptoms occur.

By implementing voice technology into healthcare, what kind of benefits can providers expect to see?

Patient empowerment
By giving patients the ability to be a part of their own care, healthcare providers empower them to maintain a better healthcare regime. The use of voice technology as part of a more holistic view of

healthcare means that patients are able to engage with their healthcare and improve the results of the care itself.

Fast diagnostics means better resource allocation
Using voice technology to diagnose diseases such as Parkinson's, Alzheimer's, anxiety, and depression can help clinicians treat those diseases more effectively. A well programmed voice technology solution gives quick, accurate and efficient diagnosis, and improves the effectiveness of treatments without the need for a large outlay of resources.

Reduced workload for doctors
By giving patients the tools they need to be able to manage their own care, enhancing diagnosis and advancing digitisation in healthcare, the workload on doctors is reduced. This means that they are able to treat patients more effectively, especially when patient numbers are high, and the pressure is on.

Voice technology is an effective way to enact a more holistic healthcare strategy that integrates technology alongside patient empowerment. This allows providers to increase the quality of the care they provide whilst also reducing their unnecessary costs. ■

Wearables, Smartphones & Apps
Do they Really Measure Blood Pressure?

There are many devices that claim to be able to estimate blood pressure in a wearable or Smartphone. All except one need the user to measure the blood pressure first with a real pressure sensor and a cuff, and to remeasure it with the cuff frequently. They don't even estimate blood pressure, they estimate the change in blood pressure since the last calibration.

High blood pressure kills as many people every four months as Covid-19 has killed since it first appeared. It is the single biggest cause of early death and is usually easily treated if you know that you have it.

The first measurement is the most important – once you have that, you know if you need to consult your doctor. A device that only works after you have made the first measurement with another device is not helpful.

The only BP measurement worth having is absolute and medically accurate. There is only one truly cuffless device, the LMD V-Sensor, which reproduces the method known, understood and trusted by doctors for the last 100 years with the modern twist that it measures on your fingertip and, instead of a cuff, asks you to press harder or softer.

Before buying, or investing in, a "cuff-less" blood pressure device, ask the supplier one question "How often do I have to tell it the right answer with another device?"

Is it possible to measure your own blood pressure with medical accuracy without a cuff-device? To read recent articles in the media, many people would simply answer "yes" and think that of course, there are countless devices out now that enable any individual to do this should they wish or need to do so. But are they all capable of what they claim, or is it a case of "buyer beware"?

New technologies are always alluring at first – the latest TVs, sound systems, vehicles, all claim to deliver more features, more performance, superior ease of use, indeed everything, in a far superior way to any similar device that preceded it. Rush out and buy it! On closer inspection though, a dissection of the actual performance from the hype is needed to get to the real kernel of the benefits that can be expected.

The traditional way of measuring blood pressure as used by doctors is with a cuff and a pressure meter, known as a sphygmomanometer, and using a stethoscope to detect the sound of the blood flow. The procedure is a familiar one: the cuff is placed around the upper arm and inflated, squeezing the artery and causing it to collapse or occlude which prevents blood from flowing; then the pressure is gradually released until the moment the blood begins to flow through again. At this point, systolic pressure is determined because the pressure in the cuff just balances the pressure in the artery during the contraction (beating) of the heart. The second, the diastolic value, is taken when blood flow is no longer restricted at all: it is the pressure when the heart is between beats. The two values are found from either on a column of mercury or a dial pressure gauge. The resulting reading is expressed as systolic over diastolic. A healthy reading for the majority of adults is around 120/80mm Hg, although this varies according to many factors, including age, fitness, even time of day and caffeine intake.

Moving on from this manual technique, there are many automatic cuff devices. These work in the same way but detect the small changes in the area of the arteries as the heart beats. These cause an increase in the pressure in the cuff which is sensed by the pressure sensor.

With the vast rise in smartphone ownership and the proliferation of wearable devices such as watches, many apps have been launched that claim to be able to estimate the user's or wearer's BP using devices on the phone or sensors in the wearable. All except one claim to be able to estimate blood pressure without a pressure sensor. The rely instead on detecting something related to the speed at which the pulse travels down the arteries.

When the heart beats, a pulse of blood is squeezed into the arteries. This pulse forms a wave that travels at around 10 m per second, so reaches the extremities of the body in around ¼ of a second. Part of the wave is reflected at every branch of the artery so the pressure pattern at any point is a complex function of the speed of the wave and the individual physiology.

It is well known that the speed of the wave depends on the stiffness of the artery and the pressure inside it, so in principle one might infer the pressure inside it from the speed. This is how most of this recent raft of blood pressure measuring devices operate. All of these suffer from a fundamental limitation – they require calibration and frequent re-calibration with a cuff. You have to measure your blood pressure conventionally and tell the device what you measured. It will then tell you how much it has changed and, between a few days and a few weeks later, you have to measure again with the cuff and tell it the results.

The need for a first calibration is not surprising – everyone's pattern of arteries is different in detail, as is the form of the pressure wave created by the heart and the distribution of stiffnesses across different types of artery. Frequent recalibrations are necessary because the physiology changes – the apparent stiffness of the artery depends also on the stiffness of the tissue surrounding it, which in turn is affected by hydration, muscle tone, amount of fat and many other physiological and even psychological parameters.

Given that these devices do not measure blood pressure, they estimate change of blood pressure since the last measurement with a cuff, let's look at how they work. They fall into four distinct groups as far as the technology they employ is concerned:

1. Those that only use a camera in a phone
2. Those that use a purely optical sensor
3. Those that use optical and another sensor
4. Those that use collateral data

Devices without a pressure sensor that estimate change of blood pressure

1 Apps that use only a camera in the phone

These claim to estimate BP by reading the pulse of a finger (usually the index finger) held against the phone camera lens or screen while the flashlight is shining on it and 10 – 15 seconds later you get a reading. The camera is used to detect the absorption of light by the arteries. As the arteries expand, more red light is absorbed. The signal that they derive is therefore related to the immediate area of the arteries and as the pressure rises, the arteries expand with the complex behaviour that arises from the many reflected waves.

It is then possible to use a technique called Pulse Wave Analysis to detect features of the shape of the waveform that can be related to blood pressure. This is usually done by machine learning or Artificial Intelligence, where signals are recorded from many different people at the same time as recording their blood pressure. The AI finds ways to relate the waveform to the measured blood pressure.

This difficult analysis is made even harder because the waveform depends on how hard the finger is pressed against the camera. Pressing raises the pressure in the tissue of the finger, so the area of the arteries (which depends on the difference between the pressure inside and outside the artery) is changed. The change is not constant – it depends on the instantaneous pressure – so the waveform changes.

Some apps go even further and claim to be able to use AI to analyse a video image of the face taken with a "Selfie" camera, a technique known as Transdermal Optical Imaging. This technique is non-contact so there is no effect due to how hard you push. Some published research has demonstrated that blood pressure prediction with this technique is as accurate as using a finger on the camera but the only device of this type to have achieved FDA clearance does not claim to measure blood pressure and is only intended for use in closely-controlled hospital conditions.

2 Devices that use a purely optical sensor

On most activity trackers and smart watches, LEDs shine light on the skin of the wrist and optical sensors make measurements

of the reflected light. This is used to measure pulse rate and, if two colours of light are employed, it can also estimate the degree of oxygenation of the blood (known as SpO2). These sensors can also be used in the same way as the camera of a phone and have the advantages that they are optimised to detect arterial blood and, if in a wearable, can provide continuous monitoring. Their challenge is that the pressure that they apply to the surface of the skin affects the waveform and this can change when the user moves around (an effect known as motion artifacts).

Again, it is necessary to calibrate and recalibrate frequently and some of the leading devices are sold with an automatic cuff.

3 Devices that estimate blood pressure using optical and another sensor

There are devices that estimate Pulse Wave Velocity directly, rather than inferring it from the waveform in a peripheral artery. These fall into two classes:
   » Using an ECG to detect the electrical signal that triggers the heart to pump or using an accelerometer to detect the vibration when the heart pumps
   » Using two optical sensors viewing different locations on the same artery and detecting the time delay of the pulse travelling between them.

The ECG may be detected using two electrodes, often one a finger of each hand. Smartphones routinely include an accelerometer so the vibration may be detected by holding the phone against the chest. There are two limitations with this technique:
   » The triggering peak (QRS complex in the ECG, various positive and negative movements of the heart and its valves) does not coincide with the time that the pulse of blood is ejected. This Pre- Ejection Period varies between people so the time interval between the trigger and detecting the pulse at the periphery is made up of the PEP plus the propagation time
   » The velocity can only be found if the effective distance between the heart and the periphery is known. In practice, it is necessary to estimate this using an alternative (such as how tall the user is) and an empirical rule.

The problem with two sensors is accuracy. The pulse in the artery does not jump up instantly, it rises over a period of about 50 mS and that varies with exercise and even between pulses. It is hard to measure its timing to better than 10mS, and the wave travels 100 mm in that time. Two sensors have to be very far apart to give an accurate estimate of the wave velocity. Even if it is found, there remains the problem that it varies with all of the physiological changes that demand frequent recalibration.

4 Devices that use collateral data

A new class of device has been reported that uses Pulse Wave Analysis of Pulse Wave Velocity together with extensive collateral data such as the user's age, height, sex and weight. These have been trained using machine learning or Artificial Intelligence to analyse the data from many people using both the detected signal and the collateral data. It is claimed that these may make an absolute estimate of blood pressure without the need for personal calibration using a cuff. There is some uncertainty about the effectiveness of this approach and one of ⇨
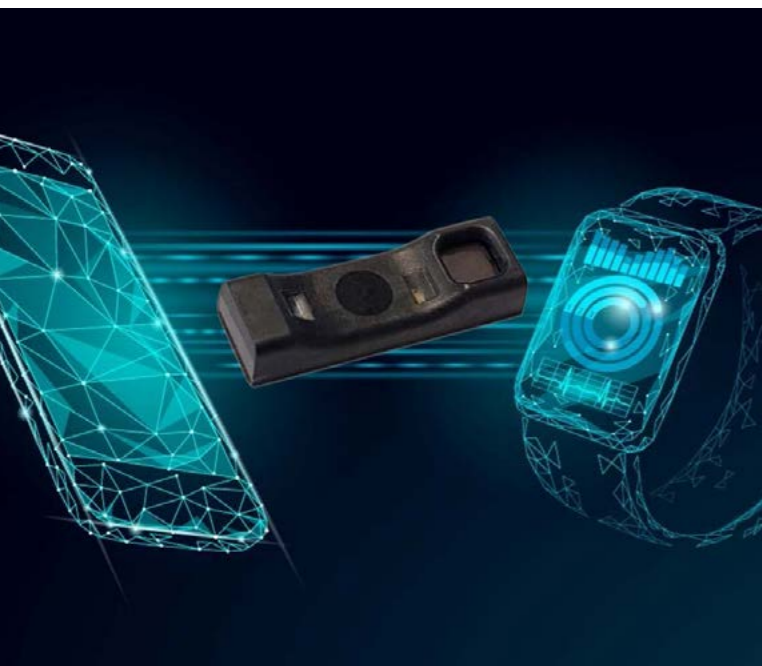
its leading exponents has recently joined the pure PWA camp by offering its solution with a cuff for personal calibrations. Even if it works, it raises a deeper and more worrying concern.

The collateral data alone can make a good estimate of your blood pressure. What it finds is the normal blood pressure for a person of your age, height, sex and weight. Since (by definition) most of us are normal, this gives a good estimate in most cases. Of course, it does not find the people who are abnormal, for whom accurate and early detection is vital. The international standard for blood pressure meters measure the average accuracy, so a device that tells you what your blood pressure should be can pass because the few anomalies are lost in the large number of normal people.

V-Sensor – proven science combined with new technology

There is only one way that is known to measure blood pressure accurately and non-invasively – it is the classic technique of occlusion, where pressure is applied to the tissue surrounding an artery to balance the pressure inside.

LMD, a Swiss company, has brought this technique up-to-date with a tiny device about the size of a peanut that has been developed over the last decade and is now being integrated into smartphones and Bluetooth-enabled wearable devices.

LMD's V-Sensor has an Application-Specific-IC (ASIC) which works with a phone as its computational brain. There is a MEMS pressure sensor embedded in flexible resin that transmits the pressure from an index finger placed on it to the ASIC. That's a key difference from all the others – it measures blood pressure with a pressure sensor. Most people are unaware that there are arteries in the human index finger which are close to the surface of the skin.

Pressure on those arteries cause them to collapse or occlude in the same way that a pressure cuff does when applied to the upper arm. A game-style interface on the smartphone app ensures that the user holds the correct finger pressure for around 45 seconds.

The V-Sensor also has an optical sensor consisting of two LEDs and a photodiode. The optical sensor shining through the skin can see the blood flow and measure both blood oxygen level from the colour of the blood (haemoglobin reflects light) and the pulse rate (bpm). It also incorporates an infra-red thermometer that gives medically-accurate temperature readings from scanning the forehead. Respiration rate is found from the effects of respiration on the pulse. The ASIC also includes circuitry to detect an ECG between the two hands.

LMD is the only manufacturer of such a device. After LMD developed and patented it, a prototype device using the same scientific principles was independently invented by the University of Michigan, which also confirmed that it measures blood pressure accurately and reliably without a cuff.

Featured article from LMD. A White Paper describing LMD's unique solution is available on *www.leman-micro.com*. ■

Some things just...
...stand out from the crowd

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Wellbeing Software and GLEAMER Deliver AI-aided Diagnosis for X-Rays

Connected healthcare specialist Wellbeing Software is working with French medical AI specialist GLEAMER to facilitate seamless AI adoption in bone trauma X-Rays.

BoneView is a Class IIa medical device designed to help clinicians conduct both safer and faster interpretations of traumatic X-Rays through the use of AI technology. It integrates seamlessly into existing workflows and acts as a secondary check to avoid medical errors and can be used to prioritise urgent or difficult cases.

BoneView's AI engine has been clinically validated for clinical use on both adults and paediatric exams, evidencing a reduction of 30% in missed fractures[1]. With BoneView, medical professionals are able to achieve a 99.7% negative predictive value, which means that doctors can be confident they're achieving a near perfect interpretation of true negative results (results under publication).

Christian Allouche, CEO of GLEAMER said: 'Our vision is to bring powerful, validated and integrated AI solutions in clinical use, with a specific focus on user experience to drive optimal adoption. BoneView gives radiologists, emergency physicians and other X-ray readers the assistance they need to ascertain the diagnosis quickly and accurately in traumatic cases. It also has a smart work list integration capability which allows medical professionals to see which patients need to be prioritised, further improving the efficiency of radiology departments.

"As integration specialist, Wellbeing Software is perfectly placed to get our algorithms into NHS Trusts across the UK, and we look forward to working with them."

GLEAMER is the latest AI vendor to join Wellbeing's AI Connect Marketplace, having chosen to integrate their technology through Wellbeing's AI Connect gateway, which allows hospitals to embed their chosen algorithms into their radiology workflow, no matter what RIS or PACS they're running.

Chris Yeowart, Director at Wellbeing Software added: "Working with truly innovative companies like GLEAMER represents not only an opportunity for Wellbeing Software, but the NHS as a whole. Transformative AI technology that can be embedded quickly and easily into existing workflows ultimately creates a safer and more efficient experience for patients and clinicians." ■

CardMedic Signs First UK Healthcare Agreement with Air Ambulance Kent Surrey Sussex

COVID start-up CardMedic, the free web and mobile app for healthcare staff to help breakdown communication barriers with patients at point of care which went from concept to launch in just 72 hours, has signed its first UK healthcare agreement Air Ambulance Kent Surrey Sussex.

Founded by Dr Rachael Grimaldi, an NHS anaesthetist, in April 2020 and based at The Oxford Trust's Oxford Centre for Innovation, CardMedic helps healthcare staff to communicate with patients whether they have visual, hearing or cognitive impairment, language barriers, or are impacted by PPE communication restrictions.

CardMedic replicates conversations around common healthcare topics using flashcards with simple questions and explanations to guide clinical interaction.

The app is simple and easy-to-use and has been developed by clinical experts across the UK, including speech and language therapists, learning disability nurses, midwives, critical care nurses, radiographers, audiologists, dentists, researchers, psychologists and doctors to make sure that the content is accurate.

CardMedic Gains Rapid Traction

With the CardMedic app going from concept to launch in just 72 hours, Rachael promoted the app on Twitter. Within the first three weeks, they had 8,000 users in 50 countries. The feedback

they received was incredible and they now have 50,000 users in 120 countries and over 16,000 app downloads in under a year.

Air Ambulance Kent Surrey Sussex

CardMedic has developed a series of flashcards for different emergency situations and consequently has signed an agreement for use of their app with Air Ambulance Kent Surrey Sussex (KSS), an independent charity which provides world-class, fast response, emergency medical care 24/7 and has attended 30,000 incidents over the last 30 years. KSS are introducing the app from May 2021 with their team of 60 clinicians.

Leigh Curtis, Executive Director of Service Delivery at KSS said: "Each of our missions is attended by a doctor and paramedic who are trained in critical care and accustomed to challenging environments. Their specialist skills mean patients can be treated at the scene with world class urgent medical care. Clear communication is essential for providing the best care, especially in emergency situations, but there are sometimes barriers that can be hard to overcome. Our medical staff will now be able to use the CardMedic app on phones and iPads to help with any language and communication issues they have with patients. Now more than ever this is particularly important when medics are wearing PPE, making it harder for patients to hear and understand. The CardMedic app gives us an innovative tool to help us to continue to give the best pos-

sible care and response to our patients."

Dr Rachael Grimaldi, founder, CardMedic said: "We are really proud to sign our first pre-hospital beacon site agreement with KSS to install the CardMedic app on phones and iPads used by their emergency staff. We hope that CardMedic will help emergency healthcare staff quickly understand patients' needs where there are communication difficulties and explain their care in emergency situations."

Rachael added: "In most circumstances there is little time to call an interpreter and so we tend to use an ad hoc mixture of family members and staff to act as translators and interpreters or, if desperate, Google translate. This has been exacerbated by the pandemic with the rules around numbers of people who can be with the patients."

"The CardMedic flashcards cover topics from breathing and COVID-19 symptoms to end-of-life care and emergency situations. Staff simply select a topic and choose what language they wish to use. The content can be changed to an easy read mode with pictures and sign language videos for the hard of hearing."

At the moment there are 11 language options, but the team is aiming for 30. On the app it is possible to instantly switch the content to sign language with subtitles for deaf users and it has an additional 'read aloud' option for those with visual impairment or literacy issues. The app works on phones, tablets and laptops, making it a flexi tool.

CardMedic is supported by NICE (National Institute for Health and Care Excellence), University Hospitals Sussex NHS Foundation Trust and University of Brighton. They have received two Innovate UK grants, including the incredibly competitive COVID-19 business-led de-minimis grant – and further angel investment. ∎

Unmind Closes $47m Series B for Workplace Mental Health Platform

Workplace mental health platform Unmind has closed a $47 million over-subscribed Series B funding round as it gathers global momentum partnering with some of the world's top employers.

This latest round of funding – led by EQT Ventures – follows a year where demand for Unmind's proactive and preventative approach to mental health increased substantially in the wake of COVID-19, with the company growing revenues more than 3x in the last 12 months. The investment – supported by Sapphire Ventures, as well as existing investors Project A, Felix Capital, and True – now makes Unmind Europe's best-funded workplace mental health startup.

Dr Nick Taylor, Clinical Psychologist, Co-founder and CEO, Unmind said: "Unmind was built on the belief that everyone has the right to a healthy mind. Thanks to the support from our investors, this round of funding gives us the opportunity to scale our team while further developing the product with clinically-backed insights and research. In turn, this will help us to meet growing global demand from employers looking to drive positive cultural change around mental health in the workplace. At Unmind, we see the future of mental healthcare rooted in prevention. After
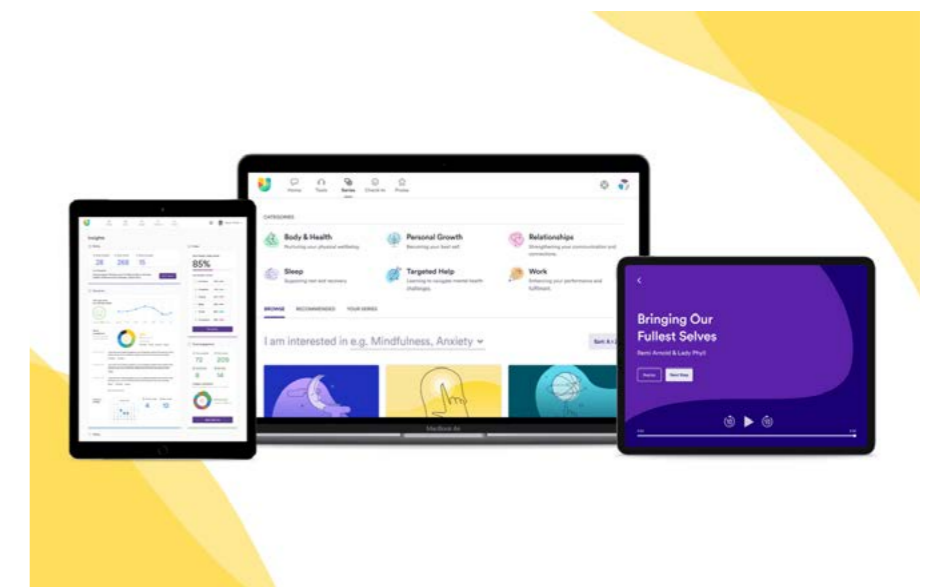
all, we all have mental health, all of the time, and just like physical health or dental health, there's a range of ways we can proactively nurture and improve it."

Going beyond the traditional – often stigmatised – approach of providing support only to those experiencing signs of mental ill-health, Unmind's scalable platform complements reactive services – like EAPs or teletherapy – by providing access to proactive, self-guided tools which empower all employees to measure, understand, and nurture their mental wellbeing. Supporting a diverse range

of topics, from sleep to connection, calmness to coping, Unmind is available to more than 2 million employees in 110 countries, and is used by some of the world's top employers, including Uber, British Airways, Marks & Spencer, and Samsung.

Over the past year, COVID-19, lockdowns and their impact on work-life balance, have taken an enormous toll on the wellbeing of employees around the world, with 78.5% of employers reporting an increase in requests for mental health support and 90% concerned ➯

that their employees are experiencing burnout. However, the pandemic has also catalysed positive change as organisations look to rethink the way they support their people. A majority of employers (about 70%) report they plan to invest in mental health resources by starting, continuing, or expanding benefits in 2021, with 88% of large employers expecting to provide access to online mental health support this year.

"It is now universally recognized that our Mental Health is as important if not more important than our physical health - but has long been neglected. That is now changing rapidly. As a result there has been a massive rise in the popularity of consumer mental health apps which is now being matched by surging demand from employers and employees for the same in the workplace. Unmind is the leading mental health app for the enterprise and we are so excited to work with Dr Nick and the team to support their scaling globally. Along with our investment EQT Ventures is delighted to announce the rollout of Unmind across the whole EQT group and look forward to rolling it out across our many hundreds of portfolio companies in the near future." said Alastair Mitchell, Partner at EQT Ventures.

Unmind will use the new capital to accelerate its international growth and continue to develop the breadth and diversity of its content, features, and integrations. This will be enabled by increasing headcount to 200 people by the end of 2021, across their offices in London, New York, and Sydney. ■

Sensely, Helps NHS App Patients Access Physio and Mental Health Care During COVID Crisis
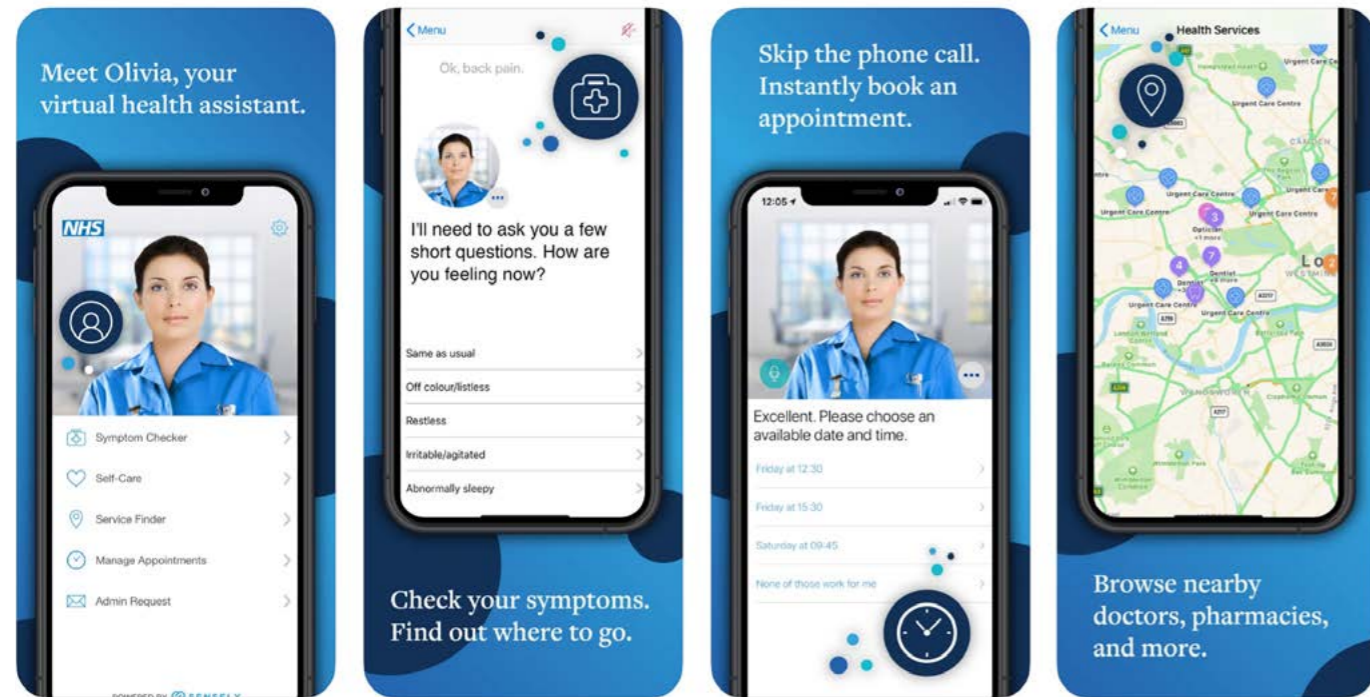
Already trusted by more than 400,000 National Health Service patients to find information, check symptoms and make appointments, the Ask NHS app is now leveraging AI pioneer Sensely's groundbreaking virtual assistant technologies to help users access physiotherapy and mental health resources as well during the continued COVID-19 pandemic.

In a pilot conducted by 18 NHS practices in Lewisham, 50,000 app users were able to book directly into their local Physio First Service without requiring a referral from their GP, and gain trusted advice and treatment from NHS physiotherapists. The upshot: a 3X increase in usage of physiotherapy resources, delivered without any additional burden on healthcare workers, and with a total saving of over 150 hours of clinicians' time. In a recent survey, 87% of respondents found that consultations conducted over the phone were clear with 80% likely to recommend it to a friend or family member.

"As a First Contact Physio I found working with Sensely very useful. I have been able to advise the patient to use the application to book directly back into my diary for a follow up appointment should they need further advice or guidance. This has aided patient continuity whilst accessing the service," said Ryan Bartlett, Clinical Development Manager at Pure Physiotherapy.

Mental Health

In-person mental health services have also been disrupted by the pandemic, even as the stress of the COVID-19 crisis has taken a toll on people's mental health. Working in close collaboration with the NHS's Healthy Minds program (IAPT), the Ask NHS app now leverages Sensely's conversational AI technologies empowers patients to share their mental health concerns, surface online resources and to automatically connect them with local support services. Users can access Healthy Minds resources including online material, insomnia self-help tools, and one-on-one consultations, with more urgent cases triaged for support from human healthcare specialists.

"During the pandemic, we're offering a range of talking therapies and support virtually for people experiencing common mental health difficulties such as depression and anxiety," commented Healthy Minds, the Buckinghamshire IAPT service. "Working with Sensely ASK NHS has helped to ensure that people can be provided with the information and care they need quickly and easily." said Kirsty Matthews, IAPT Team Manager at Healthy Minds.

"Sensely's AI tools empower Ask NHS users to self-manage their healthcare during the COVID-19 crisis, while reducing the risk of infection and easing the strain on hard-working doctors and nurses," says Adam Odessky, Sensely's CEO. "Now more than ever, we need to ensure that people can access the physiotherapy and mental health support they need — and the Ask NHS app is the easiest and quickest way for patients to take charge of their healthcare journey." ■

VitalConnect Adds Mobile Cardiac Telemetry Offering to Its Cardiac Monitoring Platform

Remote and in-hospital monitoring provider, VitalConnect has launched its VitalPatch RTM mobile cardiac telemetry (MCT) solution. The launch of the MCT platform puts VitalConnect in a category by themselves, offering the only cardiac monitoring solution available with a flexible, programmable platform, covering multiple cardiac monitoring needs. Uniquely, and only available from VitalConnect, the platform allows for continuous, real-time cardiac arrhythmia detection while simultaneously measuring patient physiological parameters.

"The launch of a mobile cardiac telemetry offering is another example of VitalConnect providing best-in-class solutions for monitoring patients and advancing care," said Peter Van Haur, CEO of VitalConnect. "This offering makes VitalConnect the only company combining live cardiac and simultaneous physiological parameter monitoring, providing a full view of secure, real-time and historical patient data."

The VitalConnect system provides healthcare professionals full access to real-time patient information which is also analyzed by certified cardiac monitoring technicians through VitalConnect's own independent diagnostic testing facility (IDTF). The VitalPatch RTM uses a wireless low-energy Bluetooth

connection to transfer clean, high-fidelity ECG signals to the secure VitalCloud during the monitoring period. In addition to ECG, the biosensor also streams data on 4 key vital signs: heart rate, heart rate variability, respiratory rate, and activity, providing a more complete view of a patient's condition.

"Having a solution that combines multiple cardiac modalities in one device is exceptionally helpful for patient care," said Dr. Robert Fishel, President and founder, Florida Electrophysiology Associates, Florida's largest group of heart rhythm specialists. "Not only can I capture all of the data I need with VitalPatch RTM, but the fact that it's light and easy to wear helps with patient compliance, giving peace of mind to the patient and the care team. This technology helps monitor and identify patients with arrhythmias in real time and provides information to physicians before the damage of the arrhythmia has been done. In my view, a cloud-based, near real-time or real-time solution is the only way to go when diagnosing ⇨

and treating potentially life-threatening arrhythmias."

Coupled with this launch, in November 2020 VitalConnect announced the launch of its Extended Holter NOW service, which offers an interim diagnostic report after five days of monitoring, providing additional insight that may shorten the monitoring period for select patients. The VitalPatch biosensor is extremely patient friendly as it is slim, lightweight, comfortable, and easy to apply. These features help ensure high patient compliance for extended monitoring periods as patients have a flexible patch with no assembly or charging, ensuring minimal disruption.

Founded in 2011, VitalConnect has deployed more than 130,000 patches across the world, including care facilities such as Hackensack Medical Center, Northwell Health, and John Radcliffe Hospital-Oxford University. The VitalPatch allows real-time remote or in-hospital monitoring, allowing physicians to optimize the delivery of care to their patients. ■

Sensyne Health Signs First U.S. Strategic Research Agreement with St. Luke's University Health Network

Clinical AI provider, Sensyne Health has signed its first Strategic Research Agreement in the U.S. with St. Luke's University Health Network, a leading U.S. health system serving patients in Pennsylvania and New Jersey. The agreement will enable the ethical application of clinical AI research to improve patient care and accelerate medical research.

This agreement represents an important first step in Sensyne's mission of building an international resource for medical research using real world evidence. The St. Luke's dataset covers 2.5 million de-identifed unique patients, from a patient population of approximately one million people across 12 hospitals and over 300 outpatient locations.

Consistent with Sensyne's approach with all of its relationships with health systems, this research will be undertaken to the highest standards of information governance and data security and in accordance with The Health Insurance Portability and Accountability Act (HIPAA), the U.S. data protection legislation that protects sensitive patient information. All data supplied to Sensyne for research will be de-identified by St. Luke's beforehand, will remain in the U.S., and the provision of the data will operate under an agreed set of data processing procedures.

"We are proud of the results we have achieved to-date in partnership with the U.K.'s National Health Service and we are excited to apply our pioneering partnership model in the United States with a respected leader like St. Luke's. Healthcare data saves lives, and our aim is to build the world's best resource for the ethical use of anonymised and de-identified patient data for medical research. This new partnership represents an important step towards that goal." Comments Lord (Paul) Drayson, PhD, CEO of Sensyne Health.

Founded in 1872, St Luke's University Health Network is a fully integrated, regional, non-profit network of more than 16,000 employees providing services at 12 hospital sites and 300 outpatient sites. Dedicated to advancing medical education, St. Luke's is the preeminent teaching hospital in central-eastern Pennsylvania. In partnership with Temple University, St. Luke's established the Lehigh Valley's first and only regional medical school campus. St.

Luke's flagship University Hospital has earned the 100 Top Major Teaching Hospital designation from IBM Watson Health nine times and seven years in a row, including in 2021 when it was identified as the number one 'Teaching Hospital in the Country'.

St. Luke's joins 11 National Health Service (NHS) Trusts in the U.K., covering more than 13% of the U.K. population, which have partnered with Sensyne sharing anonymised clinical datasets to enable the discovery of new treatments, increase disease understanding, and advance clinical trial design.

Under the terms of the agreement, St. Luke's will receive shares in Sensyne Health plc as well as a royalty on revenues that are generated by Sensyne from the research undertaken under this agreement.

Chad Brisendine, VP and Chief Information Officer of St. Luke's said: "At St. Luke's, we are committed to caring not just for the health and physical safety of our patients, but also for the safety and privacy of their information. In an information and data-driven world, we are always looking for ways to lead our industry towards more effective and nuanced approaches to data protection and privacy for patients. Sensyne's ethical model represents the kind of approach we need to embrace to advance our clinical and financial goals while meeting our patients' expectations of us as trusted stewards of their healthcare information." ■
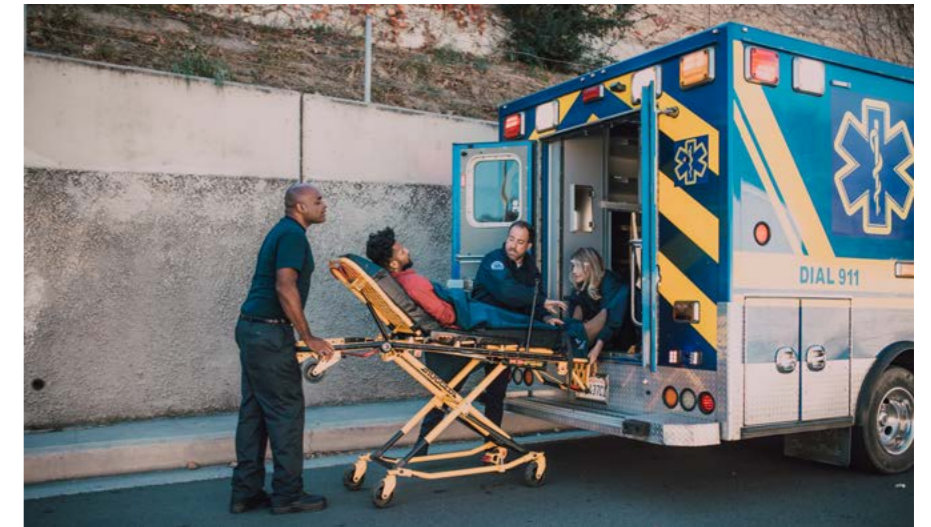
RapidAI Unveils Prehospital Solution to Optimise Stroke Care

U.S. clinical decision-making provider RapidAI has launched a prehospital workflow solution for stroke, which optimises coordination between EMS providers and hospital care teams to help deliver patients the best care as fast as possible.

Recent studies show that every ten-minute delay in the hospital resulted in eight weeks of healthy life lost. Furthermore, every one-hour delay in the hospital resulted in 11 months of healthy life lost. With the new prehospital solution, RapidAI is helping care teams give healthy life back to patients by embracing the value of smart workflows.

By streamlining communication and synchronising patient data, the RapidAI prehospital workflow apps, help both EMS and hospitals strengthen patient care from initial intake and assessment all the way to discharge and follow up. EMS teams using the prehospital workflow mobile app can follow a standardised stroke protocol and streamline data collection to help get patients to an appropriate hospital. Meanwhile, the hospital stroke team can use the prehospital workflow app to more easily collaborate with EMS in route by receiving and reviewing patient data and starting the stroke workflow.

Laying the foundation for quicker, better care throughout every stage of the patient journey, the Rapid prehospital solution enables EMS providers to:

» Establish and follow a standardized stroke protocol
» Select appropriate hospitals for patient care
» Share critical patient data with hospitals and specialists in real time
» Receive feedback on patient outcomes

"Surviving a stroke can no longer be left to chance. Patients should not suffer unnecessarily because of practice variability, inadequate communication, and antiquated point-of-entry protocols for stroke," said Ryan A. McTaggart, MD, Director of Interventional Neuroradiology at Rhode Island Hospital.

"The RapidAI prehospital app is a ground-breaking tool created and designed by EMS professionals and specialized stroke teams to eliminate bottlenecks in care so patients can return home to their loved ones without disability. It's the holy grail for prehospital and in-hospital stroke teams eager to do the best they can for these patients."

"The prehospital solution is a critical piece of our mission to revolutionise patient care for neurovascular and vascular diseases," said Don Listwin, President and CEO of RapidAI. "Inefficient processes have serious consequences, and we're thrilled to lead the charge on shifting this paradigm for good. We'll quickly evolve our prehospital solution beyond stroke to include STEMI and trauma. After all, a stronger workflow between EMS and care teams results in stronger patient care all around. ■

Kepler Vision Prompts Immediate Response to Care Home Resident Falls

In a recent study, Kepler Vision Technologies has demonstrated how its patented care home monitoring solution improves the lives of care home residents by increasing the response speed of staff when residents experience a fall.

Residents falling in care homes is a constant issue. Even when uninjured, 47% of elderly people cannot get up without assistance[1], and research indicates that in the event of a fall residents lie on the floor for 5 minutes or longer in 5 out of 6 cases[2].

In its first extensive real-world application, the Kepler Night Nurse (KNN) solution reduced this to less than 1 out of 6 cases, significantly reducing the chances of being on the floor for a prolonged period and limited the chance of additional injury. Over an evaluation period of nine months, from June 20th, 2020 to March 19th, 2021 with one of the Netherlands' leading ⇨

care home groups, Kepler Night Nurse identified and alerted staff to every instance of a patient falling, with 100% reliability.

KNN reduced the number of false alarms that staff received by over 99%. While traditional motion detection systems generated over 2195 alarms over three weeks, Over the same period, the KNN system produced only 9 false alarms, massively reducing the burden on staff to respond unnecessarily. This reduced the feeling of 'alarm fatigue' among staff, where desensitization to alarms leads to delayed responses to alarms and even ignorance of true alarms where residents need immediate aid.

During a time when there has never been more of a focus on care homes, because of the Covid pandemic, it raises the question as to whether existing technology deployed in care homes is doing a good enough job to protect the health of residents.

Dr. Harro Stokman, CEO of Kepler Vision said: "Residents and families of residents in care homes should be able to have complete confidence that when they fall, they can receive assistance in seconds, not minutes or hours. No-one should have to suffer that kind of indignity and run the risk of catching a cold laying on a cold floor for hours while solutions are available that can make this a thing of the past. We are happy to be able to show how our Kepler Night Nurse solution can give care home residents and their families peace of mind, by guaranteeing that they can receive assistance immediately. The fact we can reduce the number of false alarms that staff need to respond to is so much the better, as this frees up their time to focus on their core purpose of providing person-to-person care."

The KNN solution is a computer vision powered body language detection system which identifies when care home residents are in need of assistance, notifying care staff with simple alerts so they can immediately respond.

Where monitoring systems like motion sensors, bed mats, and wearables are unable to distinguish between a resident in need and a resident just moving in their sleep, Kepler Night Nurse only creates an alert when a resident needs assistance. This allows carers to intervene when necessary, reducing the amount of time spent checking on patients and freeing up staff time and resources, as well as reducing the disruption to residents at night.

References

1. Tinetti, Mary E., Wen-Liang Liu, and Elizabeth B. Claus. "Predictors and prognosis of inability to get up after falls among elderly persons." Jama 269.1 (1993): 65-70.
2. Fleming, Jane, and Carol Brayne. "Inability to get up after falling, subsequent time on floor, and summoning help: prospective cohort study in people over 90." Bmj 337 (2008). ∎

Virtual Simulation and Digital Twins are Key for Sustainable Life Sciences Post-COVID

A new survey into the sustainability of the life sciences industry, has found that the COVID pandemic has acted as a springboard to reassess how the sector operates and helped make leaps towards mass digital transformation. As the industry prepares for a post-COVID world, the tools and skills adopted during the pandemic can act as a blueprint for a more digitally-savvy and sustainable sector.

Lessons from the pandemic

The survey, conducted by Dassault Systèmes, suggests that the COVID pandemic has shed light on many inefficiencies in the life sciences sector. According to the survey: 70% of companies admitted to relying on outdated processes, which prevented them from collaborating remotely during the pandemic. Worse still, 62% even struggled to access COVID-19 research due to these outdated processes. This revelation had a stark impact on the future of the sector amid a global crisis, with almost three in four (73%) companies admitting they struggled to innovate due to the pandemic. A similar proportion (70%) struggled to upskill its workforce, creating additional pressure on an industry that needed to operate faster and more seamlessly than ever before.

While the industry took drastic steps to better address the COVID-19 crisis, these outdated processes have also impacted the industry's ability to improve patient outcomes outside of the pandemic. Most respondents had to postpone R&D efforts into other treatments to focus on COVID-19 (74%), the launch of new treatments and products (69%), or research into sustainable materials (70%). To better manage its new mandate to deliver better patient care at a faster pace than ever before, and across a wider range of disciplines than previously, the industry needs to address three fundamental challenges: business and operating models, product innovation, and upskilling people.

The role of data in supporting the industry's move to a sustainable future

As a result of these outdated processes, the majority of respondents have had to postpone implementing their sustainability goals (70%); by contrast, the pandemic has increased the amount of waste their organisation produces (70%).

Despite this, becoming net zero remains a strategic priority for most organisations (69%), following increased pressure to improve the industry's sustainability credentials and ambitious government goals to drastically reduce the country's emissions by 2050.

To address this, the industry needs access to data to better assess its current practices and devise strategies to become more sustainable. Yet, three in four (77%) companies surveyed admit they lack data to evaluate their carbon footprint accurately. A similar proportion (77%) recognises it needs a centralised data management solution across its entire supply chain to get a holistic picture of the emissions its operations create.

The case for virtual twin

In light of the pandemic, a majority of the industry has quickly adopted solutions to improve digital collaboration, such as virtual twins (71%). Virtual twins are a set of digital tools enabling users to collaborate, access swathes of data and create virtual models and simulations of products to test out hypotheses – from testing out a treatment on a virtual model of an organ such as a heart, to running entire clinical trials without the need for placebos – and simplify information sharing among departments and third parties, including regulatory offices and government bodies to speed up time to market for new treatments. These solutions are already playing an integral part in the clinical trials for COVID-19, and are increasingly being used to provide R&D teams with data to support future research.

Looking to the world post-pandemic, virtual twins will not only play a part in improving collaboration, but also underpin the industry's effort to become more sustainable. Respondents to the survey consider that they are a critical technology required to achieve their business' net zero carbon goals, alongside augmented and virtual reality (51%), automation (44%), the Internet of Things (39%) and Cloud Computing (35%).

By removing the need for physical prototypes, virtual twins enable companies to reduce their waste and carbon emissions. This provides companies with more effective methods to improve the lifecycle of their products and provides an advantage to avoid losing customers to more environmentally-savvy competitors. As a result of this unique approach to innovation and operating models, 70% of respondents see virtual twins as integral to achieving a carbon neutral world by 2050.

Richard Coxon, Director, Life Sciences at Dassault Systèmes, said: "The pandemic was a wakeup call for the life sciences industry: while it had been progressively moving to digital ways of working, most operations were still done in person in a physical lab until governments enforced lockdowns. Overnight, entire companies had to learn to work remotely, while delivering critical support to patients and dealing with the biggest pandemic since the Spanish flu at the start of the 20th century. This shift to a completely digital way of working was unprecedented and the industry had to choose its battles. Unfortunately, this meant that many sustainable initiatives had to be put on hold to provide critical support to patients – and do it fast."

He continued: "We now have vaccines being rolled out all over the world, which means that the industry can start tackling the remainder of its challenges – starting with ensuring it creates a sustainable environment that supports innovation, enabling workers to develop new skills while reducing the sector's impact on the planet. The need for better digital solutions during the pandemic has fast tracked the adoption of virtual twins and shown life sciences professionals all over the world how they could innovate, support patients and each other faster and in a more environmentally-conscious way. As we look to a world post-COVID, it's clear that the industry has turned to a new chapter – one where products, people and the planet are in symbiosis, underpinned by digital tools and strategies, including virtual twins." ∎
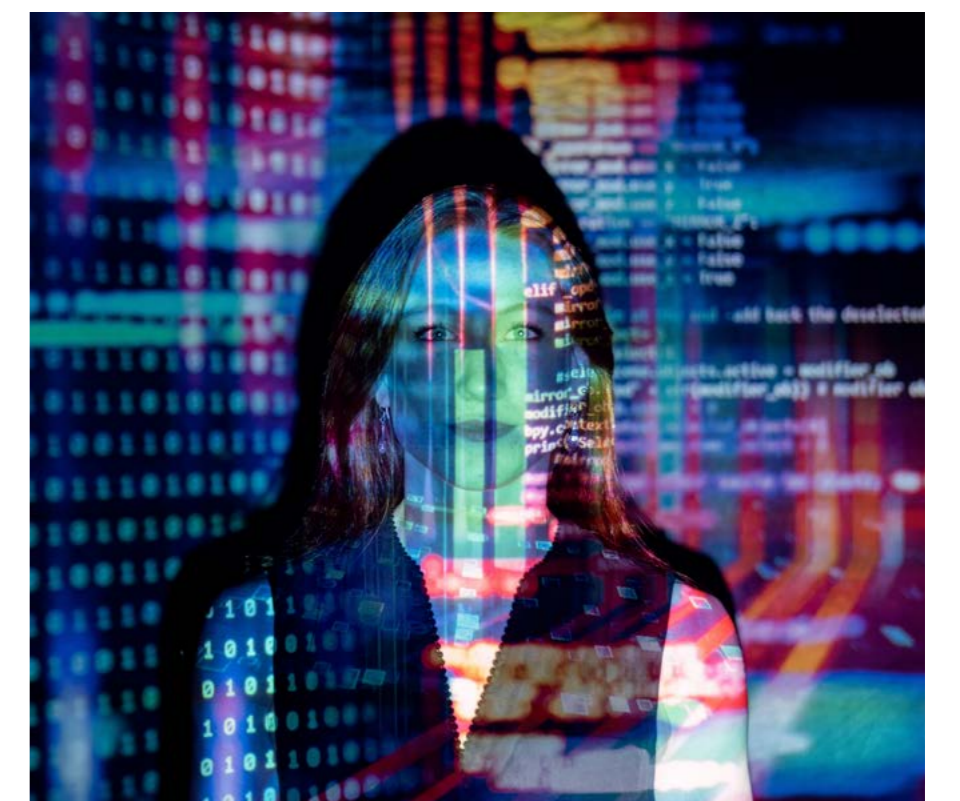
HealthTech Startup of the Month
iPill Dispenser's Hardware Innovation Reduces Opioid Diversion and Abuse

Prescription adherence technology provider iPill Dispenser has been named HealthTech Startup of the Month following a recent pitch session which took place during April's HealthTech RapidConf.

The event which runs every month for members of our HealthTech Networking Club brings together innovative HealthTech startups with investors, consultants and other key stakeholders in the industry. Once a month 4 of these startups pitch their product and receive feedback from investors.

The winner receives a valuable package including a Product Acceleration from bene studio to plan their digital product further based industry best practices and their business goals.

iPill Dispenser is a digital health hardware innovation designed to improve prescription adherence and reduce opioid diversion and abuse through a secure dispenser and mobile application. The dispenser and app ensure that the prescribed person has access to opioids at the prescribed dose, safely disposes of unused opioids, and monitors patient respiration.

The company has seen great traction including recognition by the US FDA for its potential as a device to prevent and treat opioid use disorder. In 2020, the company was named a winner of the 2020 American College of Cardiology Digital Health Innovation Award in association with AngelMD.

iPill Dispenser was joined in the pitch session by 3 other HealthTech Startups:

» *Drift Biotechnologies*, a company developing bioinformatics software for microbial, particularly infectious disease genetic sequencing.
» *USCHAG*, which develops artificial intelligence, machine learning and quantum processing to compare and contrast massive amounts of clean and control health care data.
» *Medical Cooling*, a company that has developed a portable therapeutic hypothermic solution.

All the companies involved made compelling pitches to the judges, receiving valuable feedback from the panel.

Watch all the pitches online *here*.

iPill as HealthTech Startup of the Month

Commenting on being recognized as the HealthTech Startup of the Month CEO and Founder Dr. John Hsu said, "We hope to make the iPill a market leader that will become the standard of practice. The child-resistant cap was developed by Dr. Henri Breault in 1967 and made a federal mandate in 1970. Child hold overdoses dropped 91 percent. Kids have gotten smarter. 1 in 4 opioid overdoses now involves children and teens. By secure opioid storage, active control dispensing, destruction of unused pills upon tampering or prescription end, the iPill can save lives, reduce medical expenses, and improve healthcare."

"This project has so many moving parts and we have been reaching milestone after milestone. We have 3 grants, an FDA breakthrough designation, an FDA Class I 510K exemption, a manufacturer, a distributor, a few purchase orders from customers, and in a recent development a lead investor." concludes Hsu.

HealthTech Networking Club

iPill Dispenser is part of the HealthTech Networking Club, an invite-only networking club that connects key players in the Healthtech industry and provides private networking opportunities.

Become a member and network with John and other HealthTech, Telehealth, or IoMT startup leaders, consultants, investors, and healthcare providers. If your organization is a part of the HealthTech ecosystem, apply for an invitation to the HealthTech Networking Club *here*. ∎

Upcoming events

June 2021

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

13-14
ACO & Payer Leadership Summit

Las Vegas, NV, USA
For more information visit
http://www.acopayerleadership.marcusevans-summits.com/

21-22
National Healthcare CMO Summit

Chicago, IL, USA
For more information visit
http://www.nhcmo.marcusevans-summits.com/

27-28
AUTOMA+ Health

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

28-29
HETT Show

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

October 2021

8
SEHTA International MedTech Expo & Conference

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

November 2021

18-19
Med-Tech World

Malta
For more information visit
https://med-tech.world/

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