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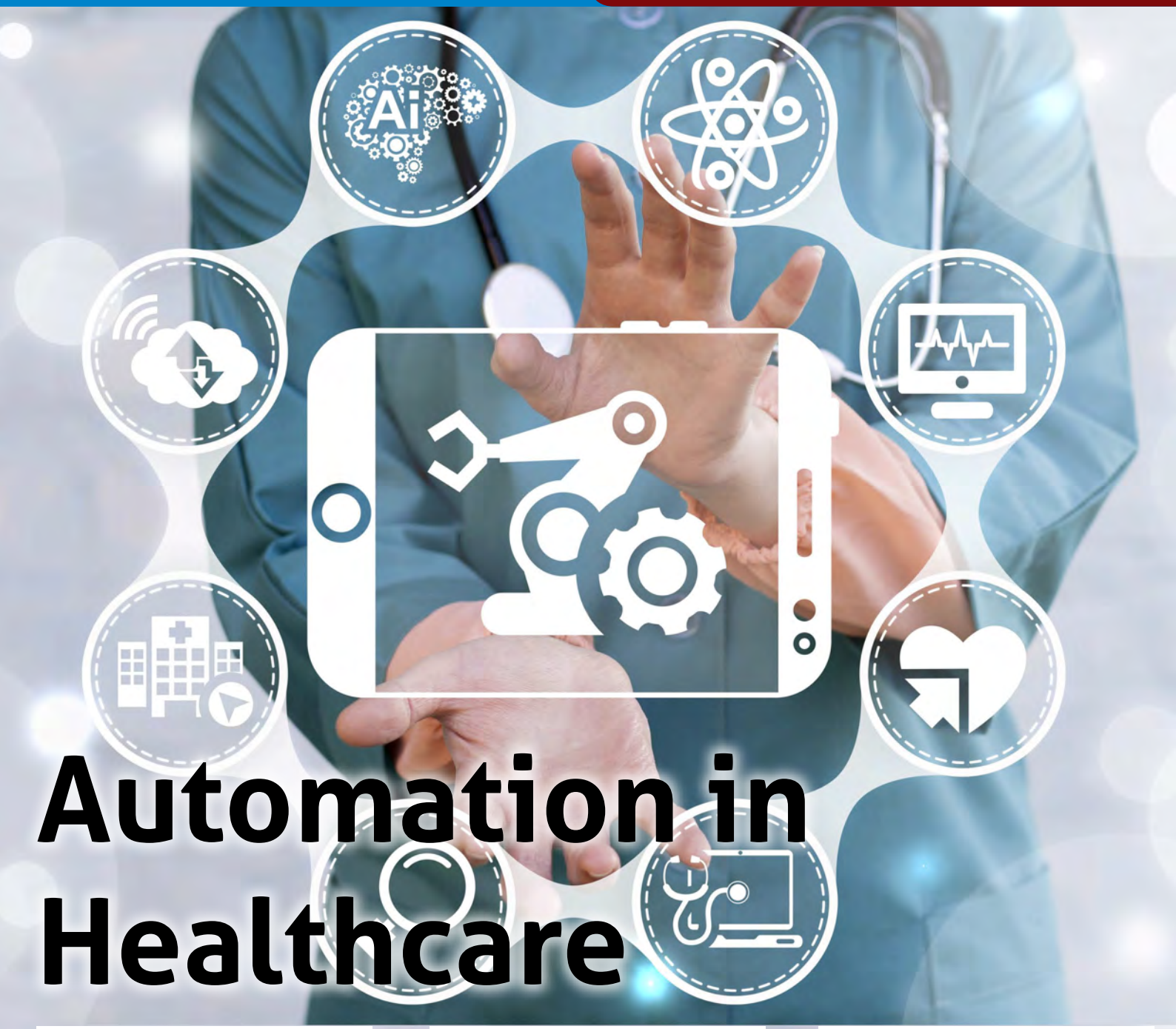
The Journal of mHealth

The Global Voice of Digital Health

March / April 2018 | Volume 5 Issue 2



Automation in Healthcare

FEATURE

upgraded HEALTH STARTUP ASSOCIATION OF FINLAND

Health Innovation from Finland

INTERVIEW

The Role of Acute Care Telemedicine in Hospitals

ANALYSIS

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In This Issue

Welcome

Automation for many industries has been a steady progression since the industrial revolution. As new technologies are introduced, work processes have needed to constantly evolve in order to keep pace with these changes and maintain a workforce that is capable of providing the necessary elements that technology cannot. Healthcare, however, has traditionally remained relatively unchanged, in terms of organisational processes, by technology. Obviously, advancements in medical devices and treatments has been one area where delivery has been significantly impacted by technology, however in many other areas delivery remains labour-intensive and predominantly human.

This is all beginning to change, and as the healthcare industry becomes much more open to the adoption of different technologies, then over the course of the next 5-10 years automation looks set to have a profound impact across the industry.

Increased automation causes significant debate, and ultimately despite the huge potential to streamline and improve efficiency within health systems, many healthcare professionals, and patients, remain cautious and recognise the need to maintain a balance between automated and human processes.

For this edition of the Journal we include a number of articles which look at some of the issues, and the technologies, surrounding automation in healthcare.

Also, inside we have a fantastic feature titled 'Health Innovation from Finland'. The country is home to a rapidly growing ecosystem of health and wellbeing startups and in this special feature we profile a range of these innovators.

On a similar note, when it comes to innovators in healthcare technology our annual Global Digital Health 100 has become established as an international benchmark of innovation in the healthcare technology industry and in this issue we are pleased to be able to bring you an in-depth look at some of the companies featured in our 2017 awards.

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Published by Simedics Limited
www.simedics.org

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Design: Jennifer Edwards

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ISSN 2055-270X
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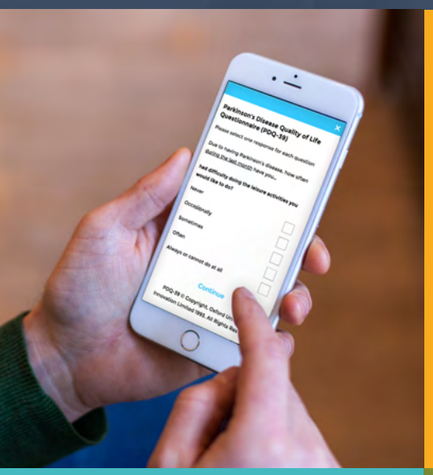

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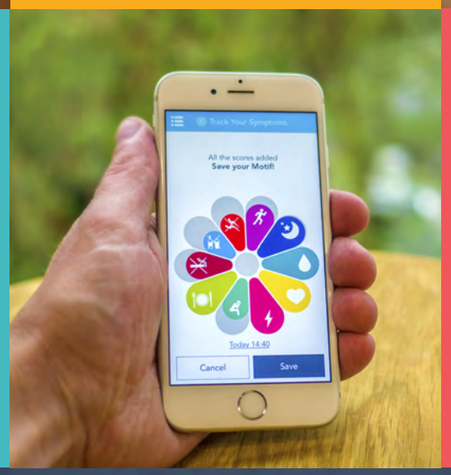

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Artificial Intelligence and the Internet of Things in Healthcare

By Sangita Singh, EVP, Healthcare and Life Sciences, Infosys

The pace of digital change in the healthcare sector extends right the way across the spectrum – from the development of new medicines and treatments to the frontline delivery of emergency and outpatient care. However, it is at the frontline where the most significant advances are being found and where benefit is registering in the greatest volume.

Healthcare providers worldwide are among the most prolific generators of data, from patient records to drug trials. With this data increasingly being digitised as part of electronic patient record initiatives, it is getting easier for practitioners and their industry partners to leverage data to make more informed care decisions.

This data is already used in a number of ways to understand historic events and help predict and understand current and future trends. Paired with the latest artificial intelligence (AI) algorithms, this data can drive intelligent decision-making and reasoning, speeding up the analysis of data and providing healthcare organisations with more informed insight on which to make decisions such as where to build hospitals and what equipment to invest in.

Combining AI and the IoT in healthcare

Critical to the digital transformation of modern healthcare has been the rise of the internet of things (IoT), in regard to healthcare delivery and monitoring. An additional source of rich data, healthcare IoT devices also allow for more connected, remotely managed healthcare equipment that can directly feed data not only into individual treatment plans and patient records, but into larger AI-driven healthcare analytics systems.

Take for example the growth in wearable healthcare devices, from fitness trackers to portable blood pressure and insulin monitors. Demand for IoT devices for wellness management has surged in recent years. In fact, according to data from Global Industry Analysts, the market is set to be worth $4.5 billion by 2020, driven by growing need for more automated management and monitoring of chronic conditions and buoyed by the growing popularity of healthier living. While the US is still the largest market, the biggest growth opportunity lies in Asia-Pacific, which is growing at a CAGR of 23.8%. Increased instances of diabetes, triggered by changes to diet, are the primary driver for this growth.

The growing demand for these devices is for much more than just step counting and simple individual health monitoring. Devices allow for remote and at-home management and monitoring of acute conditions, allowing practitioners to make better decisions and risk assessments. Faster change to treatments based on faster diagnosis of changing conditions can ultimately deliver a lower cost of care, enhanced quality of care and improvement in patient engagement.

Keeping control of inventory

Beyond the patient, the IoT is also at the forefront of improving inventory management. Tracking the whereabouts of expensive, reusable medial equipment both in hospitals and in patients' homes has the potential to drastically cut the amount spent on replacing reusable hardware. For example, in the UK the National Health Service (NHS) spends on average £32 on a zimmer frame is £32, £23 per pair for elbow crutches and £6 for a wooden walking stick. Last year the NHS in England spent around £18 million on crutches, walking sticks and frames, according to industry sources.

Using RFID technology, hospitals and equipment rental companies can manage and track their inventories of medical equipment, as well as other supplies such as drugs and disposables. Again, this strategy will result in lower inventory carrying costs and overall variable costs across healthcare bodies, as well as reducing waste, as many un-returned or misplaced items simply end up in landfill.

Remote data and accurate assessment

Advances in connectivity and a growing demand for at-home and out-patient care is also driving the use of devices that can remotely monitor a patient. Private medial insurers are already using two-way smartphone apps to connect customers with GPs for initial consultation and diagnosis, as a lower-cost option to avoid an unnecessary in-person consultation for a minor ailment. The next steps for this is to be able to share vitals with the healthcare practitioner in real-time, enabling multi-faceted telehealth services using inexpensive devices to interface users together and transmit the data from connected devices such as pacemakers, monitors, ECG machines and other devices.

Furthermore, this ability to share vital health data in real-time can also be used by healthcare insurers to make more informed risk assessments when determining insurance premiums and incentivising customers to be healthier.

Overcoming security concerns

With so much healthcare data already digital, and more being added thanks to the growing use of connected devices and AI systems to inform decision-making, there are obvious user and organisational concerns about data security.

In particular, whether data can be intercepted in-flight, and whether devices can be hacked and manipulated, creating an immediate life-threatening risk to the patient. As we are in the infancy of digital healthcare, single industry-wide standards have yet to be established. There is not a consistent communication protocol like EDI or HL7 that is governing these devices and the information they collect and broadcast, yet.

In addition to this, the collection of data will require tighter regulation and uniform processes, else data is at risk of being retained in silos, limiting its value and potentially exposing the healthcare provider or other organisation to regulatory penalties. For example, the forthcoming European Union General Data Protection Regulation (GDPR) carries significant financial penalties for the misuse of data, as well as for failure to find and purge data on request. The proliferation of IoT and other data driving digital healthcare initiatives could fall foul of this if is not integrated into a single place, or at least a smaller, more manageable number of silos.

Ultimately, the feed of IoT medical data into healthcare bodies and treatment processes is not enough on its own to effect meaningful change and to lower the cost of healthcare delivery. In order to verify the data from IoT devices such as wearables, this fresh stream of real-time and near real-time data needs to be interpreted alongside other sources. These include historical patient record data, drug trial data, lifestyle and lifespan data for the given region and other environmental and societal variables. This is in order to gain the clearest view of the patient and the potential for future healthcare needs, as well as current issues. ■

Global Digital Health 100

The most innovative companies in the field of digital health

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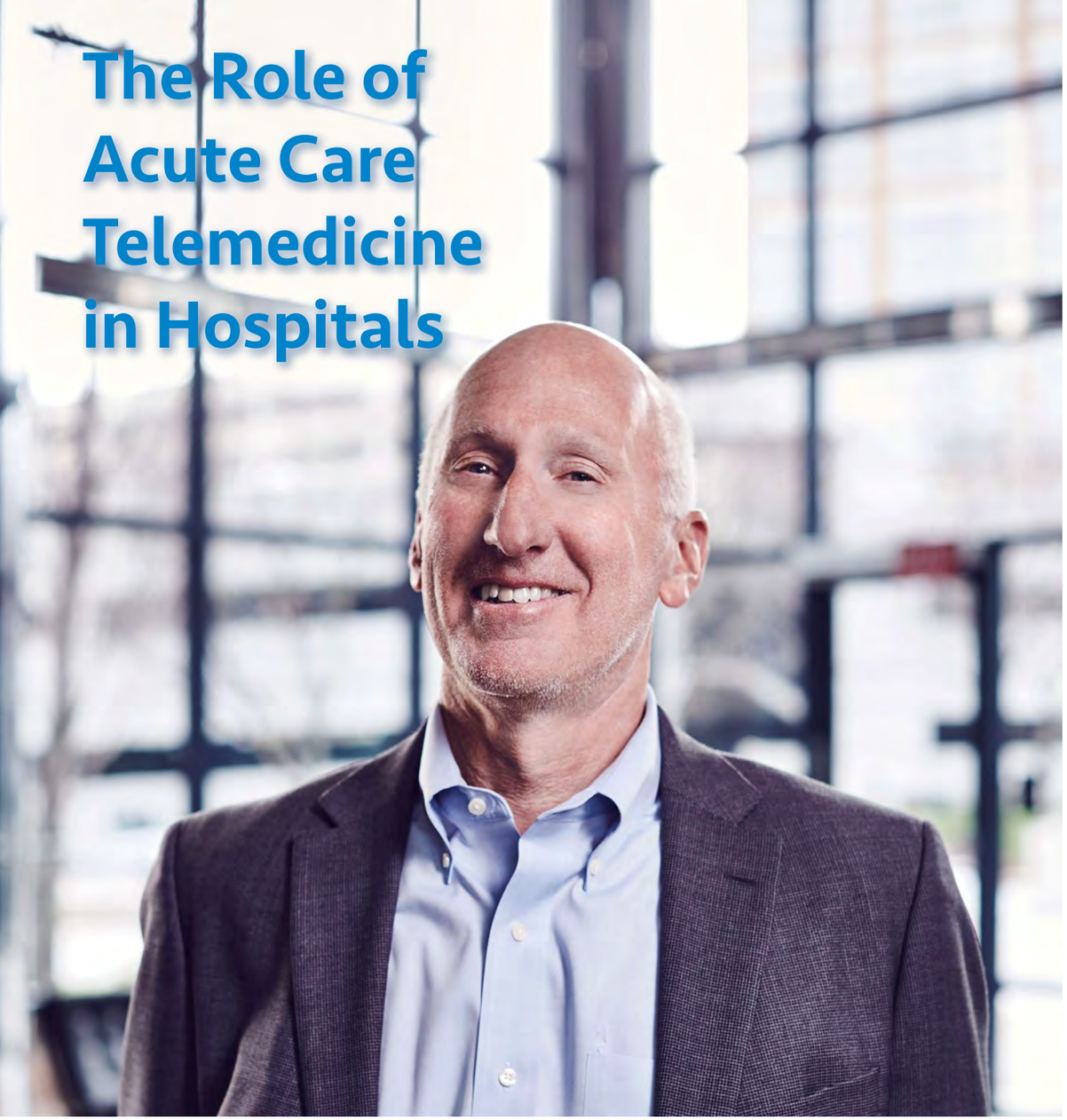
Digital Health Global 100

The Role of Acute Care Telemedicine in Hospitals



What strategic initiatives in a hospital can acute care telemedicine help address?

Acute care telemedicine supports a hospital and health system's primary focus: improving patient outcomes. By leveraging technology-enabled clinical services, telemedicine can positively impact the evolution of facility and care delivery processes and methods in ways proven to enhance clinical outcomes. New initiatives that improve clinical outcomes while generating a positive ROI are doubly beneficial. Using tele-technology to connect patients and existing bedside care teams with expert providers located in alternate locations is a natural step in the ongoing evolution of clinical services. Tele-ICU services are a primary example of an acute care telemedicine application that delivers proven, enhanced clinical outcomes and additionally respects the hospital's need for delivering care in a financially responsible manner.

Tele-ICU clinical services deliver 24/7 intensivist oversight of ICU patients, which is proven to elevate care quality and lead to documented reductions in many important clinical and outcomes measures – including mortality and Length of Stay. This around-the-clock care by critical care specialists promotes consistent compliance with clinical best-practices. These, in turn, deliver improved patient care outcomes and metrics, including lung-protective ventilation, ventilator LOS and use of blood transfusions. Clinical improvements such as these, in addition to reduced LOS, directly lead to cost efficiencies as well. Critical care telemedicine further contributes to a robust ROI by improving a hospital's ability to treat higher-acuity patients, leading to an increased Case Mix Index, decreasing physician and nurse turnover and supporting other service lines such as surgery. Finally, increases in case volume directly contribute to increased revenue.

Hospitals can deliver improved clinical outcomes and simultaneously benefit from a positive ROI by employing telemedicine in the acute care setting.

How does a clinical care service such as tele-ICU relate to a hospital's overall telehealth initiatives?

In addition to supporting improved outcomes and robust ROI, 24 x 7 x 365 tele-ICU initiatives leverage innovative technology and skilled critical care providers to efficiently deliver the right critical care, to the right patient, at the right time. While individual hospitals may prioritize the benefits of the broad range of telemedicine initiatives differently, the basic benefits of an overall telemedicine strategy typically include accessing an expanded pool of limited clinical resources and improving patient access to high quality healthcare. Further, a robust telemedicine strategy enables many hospitals to deliver and sustain a higher level of care than would be possible without tapping the efficiency, scalability and cost efficiency of the telemedicine model.

Tele-ICU is a proven means of delivering on the above principles and, as such, should be foundational in any telemedicine strategy. Because of the limited supply of intensivists and the cost to attract and retain them, most hospitals find it difficult – or even impossible – to fully staff their ICUs with intensivists to the 24 x 7 x 365 "gold standard," which can lead to a well-documented gap in ICU performance and outcomes. A healthy telemedicine strategy ideally anchors to proven use cases, such as tele-ICU, and subsequently layers on more experimental efforts.

Why are hospitals tempted to overlook clinical services such as tele-ICU in the rush to consumer telehealth?

We believe that consumer telehealth and clinical telemedicine services are two distinct concepts. Therefore, the data points relevant to one concept do not translate to the other. Consumer telehealth is essentially an employee benefits play, with employers and insurers serving as the purchasers of such services for their aggregated patient populations. Utilization is typically measured in non-clinical metrics. Clinical telemedicine, on the other hand, is squarely focused on patient clinical outcomes and refined clinical delivery systems. Hospitals and hospital systems are the purchasers of such services.

Over the past couple of years, there has clearly been more mainstream attention paid to direct-to-consumer telehealth applications, and companies involved in this arena appear to be, in aggregate, delivering convenience to subscribing parties. They are additive to existing delivery systems and exist in parallel with those systems.

While operating in the "quieter" clinical environment, the clinical telemedicine eco-system continues to enjoy outstanding adoption and continued innovation and is increasingly viewed as the standard of care for both today – and tomorrow. Clinically oriented telemedicine programs, such as tele-ICU, integrate into existing clinical organizations and require collaboration and innovation around clinical workflows and communication protocols, with individualized delineation of responsibilities between existing bedside teams and their tele-medicine partners.

Bottom line, we do not view consumer telehealth and clinical telemedicine as an either/or discussion. They are two different services serving two different purposes, with different measures, buyers and benefits to patients. Each is bringing innovation and results to the markets and constituencies they serve. Both are adding material value today and have bright future prospects.

How do patients and their families react to remote ICU care?

The interactions that we have with our patients and their families are overwhelmingly positive. Our team is heartened each day by the testimonials and commendations we receive from patients and their families. There is an increasingly broad realization that we are additive to the attention and care patients receive. The fact that a tele-ICU capability enables many patients to be treated in closer proximity to home and with family present is an additional, highly appreciated benefit.

Because tele-ICU complements the work of bedside providers, more time and more attention can be spent on individual patients – a level of service which patients and their loved ones recognize. The around-the-clock availability of tele-ICU clinicians provides benefits to both patients and bedside teams, often expediting clinical interventions and assisting often harried bedside teams. Enhanced clinical outcomes, shortened lengths of stay and near universal availability of tele-ICU teams to work on both an emergent and ongoing basis benefits patients, their families and, by extension, the hospital.

What trends are driving hospitals and health systems to embrace next generation healthcare IT innovations?

The trends are oft-discussed and well documented. They include the need for enhanced access, improved outcomes, best practices, data-driven care and cost effectiveness. Technology-enabled clinical teams are aligned with each of these important themes.

We can expect continued industry disruption as companies and healthcare providers leverage emerging technologies to both build on existing delivery systems and develop non-traditional delivery methods. Additionally, partnerships with third party innovators will continue, accelerating the reengineering and reorganization of current care delivery mechanisms.

Data collection, analysis and integration will continue to evolve – providing documentation of progress, opportunities for improvement and proof of the overall health of operations – enabling hospitals to adopt innovative care approaches based on actionable insights. In healthcare, technology and data combined with the very necessary human element enable everyone in the healthcare ecosystem to leverage telemedicine to the advantage of all constituents – patients, families and providers.

LOU SILVERMAN, Chairman and CEO, Advanced ICU Care

Lou Silverman has a 20+ year track record of healthcare success across technology, services, pharma, and analytics companies – including publicly traded, private equity backed and venture funded organizations. Across the years, sectors and organizations, common denominators driving success include building companies and teams that thrive on and excel at anticipation, execution, creativity and quality. Since joining Advanced ICU Care, the nation's largest tele-ICU company, as CEO and Chairman, Silverman has led significant growth, more than doubling the number of hospitals and beds served by the company over his 3+ year tenure. ■

In Depth with the Global Digital Health 100

Over the past four years, the Global Digital Health 100 has become established as an international benchmark of innovation in the healthcare technology industry.

This year's 100 sees many new entrants from all sides of the HealthTech spectrum, from new innovators looking to apply technologies like blockchain and AI to healthcare, to solution providers who are demonstrating rapid growth in more established tech-led services like teleheath.

Artificial Intelligence

When it comes to the application of artificial intelligence, healthcare represents a valuable proposition for solution providers. As an industry which has traditionally been slower than others to adopt new technology, in many cases, AI is now being applied in healthcare situations where digital technologies are being used for the first time. Without the need to migrate from legacy solutions this means that in certain areas healthcare is starting to leapfrog other industries when it comes to the use of AI.

Many of our Global Digital Health 100 already incorporate AI and machine learning techniques within their solutions. **Medial EarlySign** creates AI-powered software tools that give health professionals robust risk predictors that enhance care management opportunities by helping identify patients with life-altering medical conditions as early as possible, sometimes even before they appear symptomatic. The company recently announced the results from a study, which found that the combination of machine learning technology and electronic health record (EHR) data can be more effective than current clinical tools in identifying the risk of kidney damage in diabetics.

"Immense efforts are invested in developing treatment protocols to reduce the number of patients who will develop renal dysfunction due to diabetes," said Dr. Ran Goshen, Medial EarlySign's Chief Medical Officer. "Medial EarlySign's algorithm can aid decision-makers, drug developers, insurers and providers to better allocate their capped resources and secure preferential clinical outcome as well. This can help reduce the likelihood for diabetes related end stage renal disease (ESRD)."

Dutch data science company **Orikami**, is another example where state-of-the-art machine learning techniques are being used to discover hidden patterns in healthcare data and make predictions based on these patterns. The company recently worked with MS patients and MS clinics in the Netherlands to develop a Multiple-Sclerosis self-monitoring and predictive analytics tool. The project provided a smartphone based multi-dimensional longitudinal measurement of disease activity in MS and predicting personalised treatment trajectories. By combining data from a smartphone app (including clinical neurological tests & queries) with Fitbit data, the aim was to achieve personalised diagnosis, prognosis and treatment of Multiple Sclerosis in order to help people with the condition gain control over their lives again.

Consumerisation of healthcare

Success, in the delivery of direct-to-consumer healthcare solutions, has proven problematic for many companies in recent years. Attracting consumers to a solution has often been relatively straight-forward, however, maintaining engagement over the longer-term is extremely difficult. A number of companies in this year's awards list have managed to negotiate these difficulties by delivering solutions that have been successfully adopted at scale by consumers.

Swedish based **Natural Cycles** is one company leading the way in this area. With the only app certified in Europe as a medical device intended to be used for contraception, Natural Cycles combines scientific research and mobile tech to empower woman with knowledge about their bodies, menstrual cycles and fertility. Allowing them to make conscious decisions on whether and when they want to get pregnant.

With the rise of in-home voice activated personal assistants like the Amazon Echo and the Google Home, opportunities to provide voice-first and conversational experiences in healthcare applications is another opportunity to target patients as consumers. **Orbita** is experiencing significant success with a platform designed to power next-generation voice assistant and AI solutions for healthcare that improve the effectiveness and efficiency of remote patient monitoring, clinical education, care coordination, and research. Similarly, **spencer Health Solutions'** breakthrough in-home prescription drug delivery, monitoring and engagement technology is at the forefront of patient/consumer health innovation.

"Patient-reported health information is already playing a vital role in clinical trials, and with remote monitoring, this trend will continue, especially in shaping the treatment of depression, stroke, diabetes and cancer," said Tom Rhoads, Founder and CEO of spencer Health Solutions, LLC. "Today, these are prioritised initiatives for health systems and payers; and spencer is at the forefront, selected by ACOs (accountable care organisations) as the most desirable technology for their chronic care patients."

The use of conversational interfaces is not limited to voice. Messaging interfaces and chatbots are also becoming more commonplace within health and wellness solutions. **Lysa-Health** has developed Lysa, a smart nutrition coach who adapts to app users lifestyles, and helps them to eat better and be healthier, without having to follow a restrictive diet or any meal plan. While **Virta** has combined decades of scientific research to develop a new, patient-centred comprehensive care model to reverse diabetes, rather than just manage it. A bold proposition, the company provides patients with a technology-enabled remote care team — a health coach and physician who continuously customize care plans for patients, helping them achieve and sustain nutritional ketosis, behaviour change, and reach their goals. Patients regularly log biomarkers and subjective feedback via an app, while the remote care team monitors this information to further personalize their care, and physicians adjust medications as needed. Patients are also supported by peers through an online social community. The company recently published extremely positive results from their year-long clinical trial.

DarioHealth is one company that has steadily grown from being a user-centric, direct-to-consumer company to a mature organisation that is fully data-driven and able to provide a wide-range of managed care solutions. At the hub of it ➪

Interview with Shane Tickell, CEO of IMS MAXIMS

What differentiates IMS MAXIMS from other healthcare IT vendors?
We don't see ourselves as a vendor because of its binary, transactional nature. We co-collaborate with customers to develop a tailored strategy for sustainable and transformative change, using technology as the enabler, not the end in itself. It's a combination of our clinical solutions, change management programme and subject matter experts that deliver safer, patient-centric, integrated services.

What is your approach to innovation and how do you ensure that your solutions meet client's requirements?
Innovation must be safe and practical, as we provide mission-critical solutions for healthcare providers and their patients. Striking the right balance between innovation and pragmatism involves regularly reviewing and refining our product roadmap with our user community, as well as investing in R&D. We identify the trends, opportunities and potential pitfalls of future technology and match it against our customer needs.

IMS MAXIMS has taken significant steps to develop solutions that are open source. What have been the driving forces behind this approach?
It was developed to encourage more innovation in the health service and facilitate the transition to a safer, patient-focused NHS. This flexible strategy has taken us on an incredible journey, including multiple go-lives with trusts and our first customer, Taunton and Somerset NHS Foundation Trust (TSFT) named by Government as a Global Digital Exemplar (GDE). Together, we will be using the GDE programme to help fast-track the adoption of digital best practice across the NHS.

How are your solutions changing the way in which healthcare providers are operating?
Staff have access to real-time, auditable clinical pathways from anywhere in their organisation, with patient alerts and decision support accessible on their mobile devices. It means clinicians can diagnose, triage and treat patients more quickly and easily. It also frees up staff capacity to spend more time with patients, improves clinical safety and reduces the length of stay in hospital. These improvements translate into tangible savings too, with our GDE partner TSFT on track to make £90m+ over 10 years.

How do you see the company growing over the next few years and what are the biggest opportunities to deliver that growth?
To meet increasing demands on the system, we need to redefine the way healthcare is delivered, with the focus on the patient, not the care setting. It's why mobile working remains a priority for us. We'll also continue to drive forward the interoperability agenda, by using open standards and APIs that support integrated care systems. Investment in our Innovation Centre also continues, so that our customers can capitalise on innovation including population health management, genomic mapping and AI. ■

all is DarioHealth's proprietary engagement platform, which has been painstakingly built by carefully monitoring and analysing big data. Today, DarioHealth boasts phenomenal solutions and automated, full-suite services for the biggest players in the diabetes care management space.

Digital Mental Health

In mental health provision there is massive potential to apply digital technologies in the diagnosis and treatment of patients. Advancements in e-health present an opportunity to provide high-quality care at low costs. Combined with traditional, face-to-face treatment, this so-called 'blended care' can provide the best of two worlds.

TelePsy offers mental healthcare professionals an online platform with digital tools to support them throughout the therapeutic process of their service users. This includes an extensive test library for diagnostics and evaluation. The content can be used flexibly within any individual treatment process. TelePsy's extensive platform is broadly applied by thousands of healthcare professionals. Every year, an additional 200.000 service users receive help through the platform.

Ieso is a world leading digital health company specialising in internet enabled evidence-based psychological therapies. Using proprietary technology, augmented with natural language processing and artificial intelligence, the company amplifies therapy outcomes for patients while providing personalised training and supervision for therapists. This generates higher recovery rates and better outcomes for patients.

Precision Medicine

It's becoming very clear that the time for precision dosing – a key component of precision medicine – has now come. **DoseMe** provides unique decision support software that leverages clinically validated pharmacokinetic drug models, patient characteristics, drug concentrations and genotype to guide dose optimisation. It's the world's first precision dosing tool designed for clinical practice that uses Bayesian dosing methods. With DoseMeRx now available in Cerner Millennium® via SMART® and FHIR® technologies, with other major EHR providers including Epic and Allscripts due to launch early this year, access to precision dosing has become simple to deploy and easy to use within hospital and clinical workflows.

Also operating in the realm of personalised medicine, **Biolumo** is currently developing a mass-produced, inexpensive, rapid point-of-care tool that will help GPs select appropriate antibiotics for every patient. This will improve mortality rates associated with the improper treatment of bacterial diseases. The precise selection of an antibiotic for infection treatment will also slow down the drug-resistance process.

Clinical solutions

While consumer-led telehealth solutions tend to gain many of the headlines, clinical telemedicine, from providers like **Advanced ICU Care** are increasingly viewed as the standard of care for both today – and tomorrow. Clinically oriented telemedicine programs, such as tele-ICU, integrate into existing clinical organisations and require collaboration and innovation around clinical workflows and communication protocols, with individualized delineation of responsibilities between existing bedside teams and their tele-medicine partners.

Other solutions recognised in this year's list are having a significant improvement on the quality and efficiency of care delivery. **Perfect Ward** has developed a simple digital inspection tool that is having a big impact on healthcare quality. As well as enabling hospitals to more accurately record and analyse data, quality audits take less time and provide managers with rapid feedback, helping organisations to achieve continuous quality improvements.

And, leveraging its extensive experience in healthcare, **Nuance's** new Dragon Medical Virtual Assistant will further streamline a wide variety of clinical workflows, by introducing New Virtual Assistant Capabilities Enhance Interactions between Clinicians and Patients, Improving Patient Experience and Reducing Physician Burnout. "Technology needs to be unobtrusive and support the process of providing high quality patient care—not get in the way," said David Y. Ting, MD, CMIO, Massachusetts General Physicians Organization. "Having Nuance's AI-powered virtual assistant technology embedded into the EHR will help make a new generation of patient care a reality – for both clinicians and patients."

Zilico's product portfolio is centred on its patented Electrical Impedance Spectroscopy (EIS) technology, which has applicability across a wide range of neoplastic conditions. ZedScan™, the company's first product to market is a portable, handheld device, which uses real-time EIS technology to increase the detection of high grade cervical intraepithelial neoplasia (HG-CIN) and cancer of the cervix, removing subjectivity and increasing diagnostic accuracy.

"We are delighted, as a company to be included in Global Digital Health 100, which is the international benchmark of innovation in the healthcare technology industry," enthuses Sameer Kothari, CEO of Zilico. "As well as cervical cancer application, our patented diagnostic EIS technology is being developed across a wide range of other diagnostic areas such as oral, anal and vulval cancers. This award recognises the impact and importance that our technology has in improving diagnostic outcomes across different global healthcare settings – from mature to emerging."

Clinical collaboration

Communication platforms designed to meet the needs of healthcare professionals are rapidly transforming the way in which healthcare is delivered. Doctors and clinicians now have the ability to consult with peers from around the world in ways that allow them to gain rapid insight from digital communities.

Mobile messaging has seen tremendous growth and it's now an established category of communication. When physicians encounter a clinical phenomenon that seems to have a positive impact on the care of their patients, they study it. In the last three years, 108 studies have been published to demonstrate the clinical impact of WhatsApp. That impact comes down to two main advantages; (1) doctors are saving time in clinical decision making, and (2) doctors do higher quality patient referrals, i.e. avoiding unnecessary referrals and better precision.

Siilo was developed to fill the need that WhatsApp has created for clinicians. Healthcare organisations are embracing Siilo because it helps them avoid BYOD risks associated with social media messenger apps with an app that has a proven track record of adoption and affection by its users. In addition, Siilo's implementation leads to cost-reduction, a better patient experience and an efficient and content clinical workforce as all the employees are organised in a proprietary messaging directory in a messenger that they love to use. **InsightMedi** provide a similar means for collaboration with a global platform designed to allow healthcare professionals to interact around real clinical cases based on medical images. InsightMedi aims to foster the healthcare community by providing innovative ways to share, update, and expand their knowledge.

Patientory is revolutionizing the way doctors, and patients interact and gain access to information, cutting out all layers and processes that currently are stumbling blocks in care coordination. The company's platform connects doctors, care providers, and consumers all within a single, secure platform – creating a care team that works together to provide the best care. Patientory also uses blockchain technology to ensure end-to-end encryption while adhering to regulatory guidelines and compliance requirements.

The Global Digital Health 100 is one of the HealthTech industries foremost technology award programmes, celebrating innovation and entrepreneurship. It recognises and supports health technology companies that are demonstrating the greatest potential to change the way that healthcare is delivered.

To view the full 2017 Global Digital Health 100 and nominate for the 2018 awards visit *thejournalofmhealth.com/digital-health-100* ■

Revolutionising Patient Testing Using Artificial Intelligence

Diagnostics.ai is making disease tests more automated and accurate using cutting-edge patented AI and machine learning based technology. This improves efficiency and utilisation of expensive diagnostic equipment, meaning more tests can be run with higher reliability – and with less resources and thus lower costs. Better access to more accurate tests enables patients to receive optimum treatment as quickly as possible. Diagnostics.ai's unique system provides digitised and standardised results, this enabling disease tracking which is valuable for outbreak alerts and prevention.

Diagnostics.ai technology is clinically validated as having above 99.9% levels of accuracy, analysing samples in milliseconds and reducing hands-on time. Currently diagnostics.ai is working with customer laboratories in the USA, England, Scotland and India. The company is scaling up in order to meet demand from clinical laboratories internationally. ■

"CRF Health is leading the development and utilization of new digital health solutions to enhance the way we conduct clinical trials and collect patient data, evidenced by their leading TrialMax® and TrialConsent® solutions. Established in technical, scientific, and regulatory excellence, their drive is to continue providing disruptive solutions to enhance and change the way we conduct clinical research. CRF Health intimately understands the patient and the clinical research subject. They strive to continue to develop new and enhanced patient-facing solutions that leverage new technology while keeping the benefit, convenience, and usability for the patient paramount. Looking to 2018 and beyond, the increased adoption of eConsent, eCOA, bring-your-own-device (BYOD) mobile solutions, and wearable and sensor technology compliments CRF Health's commitment to continued patient-centric eClinical technology research and development."

Bill Byrom
Vice President of Product Strategy & Innovation ■

AR Giving Surgeons 'X-ray Vision'

Augmedics' XVISION system is an AR surgical visualization system designed to give surgeons "X-ray vision" during complex procedures. With XVISION, surgeons can see inside a patient's anatomy through skin and tissue, for easier, faster and safer surgeries. XVISION has the potential for use in many procedures, with its first intended use in minimally invasive spine surgeries (MISS). XVISION uses proprietary patented see-through AR optics to project a 3D image of a patient's spine onto a surgeon's retina, in real-time, with surgical precision and outstanding depth perception. The technology was designed to save time during surgery, increase precision in MISS, open spine surgeries, and other minimally-invasive surgeries, reduce radiation exposure, and reduce repeat operations and hospitalizations. ■

The Evolution of Digital Health:

Developing an Effective Patient Support Program

The Journal of mHealth talks to Tim Davis, Vice President, Digital Patient, ERT, about the evolution of digital health programs – how do today's programs compare to those of a few years ago, what lessons have been learned and what are the biggest barriers still to be overcome?

Pharma has been investing in digital health programs in recent years. What do they hope to achieve, and has anything changed in the past decade?

With the growing burden of rising healthcare costs, Pharma has been looking at ways to move beyond their role as manufacturers of medication toward becoming healthcare service providers. Digital advances have provided an ideal platform for this, meaning Pharma has been developing digital health strategies with two over-arching aims. Firstly, and always at the heart of what Pharma does, is the goal of improving health outcomes for patients. However, to create a viable, sustainable model for pharma these programs commonly focus on a specific brand with the goal of increasing – or protecting – market share.

Despite almost a decade of trying, a model of 'successful' digital health programs is not yet proven. Early programs, for example those focused on simple adherence reminders, have experienced difficulties in providing sufficient value for patients over extended durations. Therefore, the industry has come to realize that to provide treatment optimization, it must improve insights into marketed products, patients' use of them and the challenges these patients face.

This need is driving a change in the type of solutions we now see, moving away from simple reminder services toward richer, more personalized, patient support programs.

This change is also driven in part by the 21st Century Cures Act, which, for the next 5 years focuses on patient experience and feedback, pushing Pharma to build insight into real-world patient experience to provide better informed research and drive more effective medicines and treatments in the future.

What does pharma need to consider when developing effective patient support programs?

The digital health market is still relatively new, meaning there are no 'standard methods' or program types when it comes to developing effective patient support programs. This poses challenges for an industry that traditionally needs to provide a clear return on investment for new initiatives. As a result, programs can stall in concept or in early development phases as stakeholders struggle to agree on clear objectives for these initiatives.

To overcome this, it is important for program stakeholders to identify specific, measurable objectives — for both the patient population and the organization — at the outset. Only then can they evaluate possible approaches to meet these objectives and have the greatest impact on health outcomes.

Similarly, it is important to manage the initial scope of the program to limit development timelines and prevent endless cycles of review and refinement. Pharma is increasingly moving towards a minimum viable product (MVP) approach, whereby initial development focuses only on the core requirements of the program. This expedites the route to market launch, saving time and money, and critically, it allows Pharma to gain insights to program usage and impact on objectives that can drive refinements in additional functionalities and subsequent version releases.

There are so many advances in technology: New ideas are being developed on an almost daily basis. How do you determine which technology to incorporate into programs?

By following the process outlined above, Pharma will have identified actionable needs and objectives for their programs. The next step is to identify technologies that could address these challenges. The breadth of technology available is phenomenal, and this presents the opportunity to integrate all kinds of different options - not just medical devices or sensors, but many consumer technologies like voice assistance and smart products for the home e.g., HiveHome can build a richer experience for patients. The key is to focus on how such technologies can address specific patient challenges - Pharma must consider what patients need, not just the actions they want patients to take - so that they remain engaged throughout the program. Finding technology that the patient is familiar with and that fits in with their lifestyle is absolutely key.

What are the biggest challenges Pharma faces when developing patient support programs?

Beyond the complexity of defining patient support program requirements based on specific, value-based objectives, perhaps one of the biggest challenges Pharma will face when developing an effective digital health program is how to scale from small regional programs to large, multi-territory programs in line with regulatory and data privacy requirements.

Early programs used attractive yet very simple apps to test a concept in a specific region, but quickly found that this approach does not scale. There are varied and complex regulations across territories, as well as differing patient requirements for the precise type and form of digital technology to be applied. To standardize programs across different territories requires one single solution, rather than multiple solutions to support and maintain. This necessitates highly adaptable technology, built on scalable foundations that not only manage data in accordance with local standards, but can also incorporate different elements such as regional settings and differences in grammar, punctuation, and date formats.

It's true that Pharma is currently investing heavily in digital health programs, but in order to develop effective patient support programs, they must take a step back, identify patients' needs and challenges, and define their programs before they even begin the development process. ■

Tim Davis, Vice President, Digital Patient, ERT

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Driving Real World Research Through Patient-centric Engagement

By Bruce Hellman, CEO uMotif

Clinical research is going through an exciting period of digitization. One area being modernized using digital technology is research in the 'Real World' - once drugs and devices are approved for market. Such research increasingly uses patient-generated 'Real World Data' (RWD) to drive new insights.

The increasing use of RWD is being driven by legislators, regulators and pricing bodies across the world, which require companies and health systems to demonstrate the value of treatments, pathways, devices and medications.

Capturing RWD can raise practical questions around how to retain engagement of patients using digital tech, and how to ensure usability by all patient groups.

The good news is that there's increasing evidence that these concerns can be addressed by taking a patient-centred design approach.

For example, a patient-centred approach was taken by the University of Manchester, who used the uMotif platform for their 'Cloudy with a Chance of Pain' study in chronic pain and rheumatoid arthritis. By giving the 13,500 e-consented participants regular feedback during the research period, the study app engaged thousands of patients to track daily data for over 6 months. This provided an unrivalled quantity of RWD for the research team, and showed that patients can be engaged over long periods.

Another common misconception is that 'old people' don't use technology and won't be able to capture RWD. Our experience is the contrary.

In a number of studies 'older people' have been the most consistent users of the study technology, capturing more RWD more often. In the '100 for Parkinson's' study, analysis by IQVIA demonstrated that patients of all age groups captured around 10 data points per day – even including those over the age of 70. The most consistent trackers were women between 60 – 65. So age really isn't a barrier to use and engagement.

Finally, there is the question of how to combine in-person visits with data captured while patients are at home. There is huge potential for studies to leverage both research settings. This is a topic where researchers can learn from other industries – like how modern retailers use digital journeys to support and drive an in-store shopping experience. When designed well, a mix of virtual and in-person visits can enhance studies, improve engagement and reduce costs.

At a time when the RWD sector is quickly growing, it's incredibly exciting to see this new paradigm of patient-centric Real World research, which has the potential to deliver benefits for all stakeholders. Most importantly, the people who really matter – patients.

What is RWD?

RWD is patient-level data not collected in conventional randomized controlled trials, and can be captured alongside normal clinical care. It can include common eCOA / ePRO instruments like the EQ-5D, as well as symptoms, medications, diary and wearable device data. Source: RWEdictionary.com

uMotif – data capture platform patients love to use

uMotif is the leading modern data capture platform for research, that patients love to use. With industry leading expertise in Real World and non-interventional studies, the engaging and clinically-proven platform captures e-consent, eCOA / ePRO, symptom and wearable device data. Working with top pharma, CROs and e-clinical platforms, uMotif can be deployed quickly across the world in any condition. For more information visit *umotif.com*

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INDUSTRY NEWS

News and Information for Digital Health Professionals

Analytics Tool Helps Drive Precision Health at the Olympic Winter Games

In addition to a fantastic spectacle of pulse-racing sport, last month's Winter Olympics also included the launch of a new advanced health analytics solution, that was used throughout the games and which will also be used for the 2020 Olympic Games in Tokyo.

Developed by GE Healthcare and designed in partnership with the International Olympic Committee (IOC), the tool integrates valuable information, such as athlete injury and illness data, with venue, sport and training procedures, to help ensure clinicians have a comprehensive view of a patient's health and can make an informed, rapid treatment decision. The insights also aim to inform long-term improvements to health and safety at the Olympic Games.

The GE Athlete Management Solution (AMS) collects multiple kinds of data, including imaging scans, patient vitals, and venue, event and sport-specific information, and provides real-time dashboards that can help inform medical staff and allow them to personalize treatment for athletes while identifying trends in injury and illness across the Games. For example, the tool can flag a "hot spot" where multiple injuries are occurring, or a spike in illness among spectators who attended an event at a specific venue.

The tool is cloud-based, embedded with appropriate security controls, and ➪

enables remote entry of and access to data by clinicians anywhere and at any time – whether they are in a Polyclinic, the facility that provides care to anyone involved in the Games, a local hospital, or their hotel room.

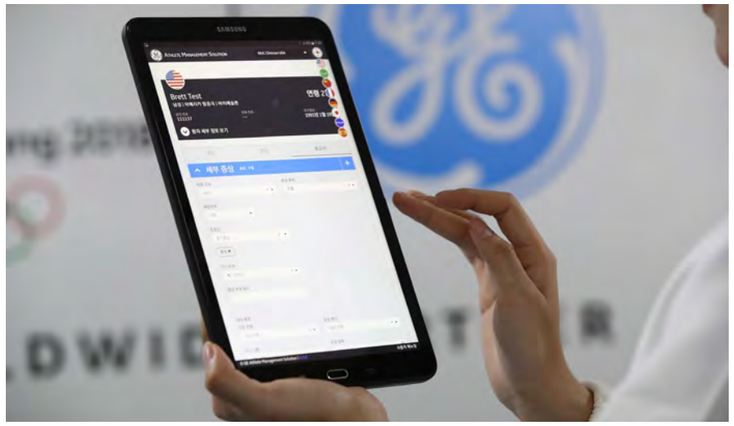
"Through digital transformation, the IOC is pursuing its mission of helping to prevent injuries among our world-class athletes," said Dr. Richard Budgett, Medical and Scientific Director for the IOC. "With 40 sports across the Olympic Games and Olympic Winter Games, each athlete requires unique healthcare monitoring and care. AMS will provide information that helps clinicians personalise training and treatment, so Olympians are best positioned to compete."

The solution reflects GE Healthcare's commitment to precision health, a holistic approach to patient care which encompasses diagnostics, therapeutics and monitoring to help ensure that appropriate actions are taken at the right time for each individual patient. In the context of the Games, this means considering differences in athlete's medical histories, training environments and sport.

With the multilingual AMS, team doctors from different countries can work and collaborate with other physicians in their native language, all with the click of a button. Supported languages include English, French, Arabic, Russian, Chinese, Japanese, German, Spanish and Korean. All AMS terms and data were edited and validated by native speakers to help ensure proper and accurate translation. Additional information such as medications approved for prescription is also integrated into the solution. All features aim to inform the IOC and clinicians so that they have the ability to rapidly and effectively address injury and illness, with the goal of driving the best possible performance by athletes and the best possible experience for spectators.

"Olympians train for many years to represent their nations at the Games," said Dr. Jorg Debatin, Vice President & Chief Technology Officer for GE Healthcare. "Their Herculean efforts must be matched with superhuman clinical speed and quality. AMS helps clinicians do just that – by making data and actionable insights readily available to the treating clinicians."

Representatives from the United States Center for Disease Control, the Korean Center for Disease Control and Prevention, and the Public Health England Centre of Infectious Disease Surveillance and Control have all been trained on AMS and will use the solution to support public health monitoring during the Games. ■



Medicalchain Lists Tokens on Major Exchanges Following Successful ICO

Medicalchain has announced the listing of its 'MedTokens' on five major exchanges – Huobi Pro, Kucoin, Gate.io, Coinbene and QRYPTOS - following the successful completion of its token sale on 1st February 2018.

Medicalchain was founded to improve the way in which patients' medical data is collected, collated, shared and secured within the current healthcare system. At present, record keeping within healthcare is flawed; patients' information is spread over multiple systems, hospitals, networks and physicians, with siloed communication taking place between all parties. This fragmented record keeping has led to security lapses in patients' data protection (as demonstrated by the 2017 NHS WannaCry malware attack), unnecessary risks for patient care including incorrect decision making and delays, and needless costs for the patient or healthcare institution.

Medicalchain addresses issues facing healthcare systems all over the world which are suffering from burdened and outdated record-keeping, and oversubscribed GPs and healthcare professionals working within severe time constraints and without sufficient resources to hand. These situations result in routine appointments such as referrals, second opinions, education, follow-up care, monitoring, and diagnosis being incredibly cumbersome and costly for patients to organise.

Dr Abdullah Albeyatti, Co-Founder and CEO of Medicalchain, commented: "Medicalchain is focused on addressing the issue of a fragmented healthcare system. By creating an immutable, healthcare record that is incorruptible, trusted and cannot be deleted or tampered with – by patients or clinicians alike – we're empowering patients to be at the centre of their care and enabling clinicians to make informed decision-making, as well as communicate to each other with ease."

One of the most highly anticipated ICOs of Q1 2018, it had received over 135,000 registrations prior to launch. MedTokens went on sale at 10:00hrs on 1st February 2018 and within two minutes of launching the sale Medicalchain received 45,000 KYC (Know Your Customer) registrations. The sale completed, achieving the target pre-sale and ICO hardcap of $24,000,000 USD. The speed with which it completed was a testament to the belief in Medicalchain's platform among the committed community that Medicalchain has built over the past year.

Commenting on the ICO, Mo Tayeb, Co-Founder and COO of Medicalchain, said: "We are really excited to have brought the ICO to a close and listed on these exchanges today. Blockchain is changing the way we approach virtually every industry and the security and transparency it offers makes it perfect for health data. In the coming months, we will be developing our Medicalchain platform and rolling out some exciting applications which will give millions of people access to better healthcare."

The company is already working with healthcare professionals in several countries on projects to pilot the new healthcare records system. Following the launch of its product, Medicalchain plans to roll out two platform applications:

» A Telemedicine app which will connect doctors and patients around the world via video. Patients will be able to, for the first time, share their records with doctors online whilst having a remote consultation. This leads to a more complete consultation for both patient and doctor, who is safe in the knowledge that they'll have access to the patients' full medical history, allowing them to perform more complex diagnoses remotely than ever before.

» A Health Data Marketplace which will allow patients to monetise their healthcare records and agree to share their records with research companies by granting them access to the records. The process would be completely anonymous to protect patients' privacy.

Transactions over the Medicalchain platform will be completed using MedTokens. ■

Ulcer and Wound Treatment Revolutionised by New Technology

The effective treatment of patients suffering from debilitating pressure ulcers, burns and other wounds is being revolutionised by new 3D imaging software that runs on rugged Panasonic Toughpad tablets and has been developed by Swansea-based health informatics company GPC.

This latest 3D WoundCare solution easily captures and accurately measures a 3D image of any ulcer or burn wound using a unique photo taken by the Panasonic tablet. This fast and simple system replaces the outdated practices, used by the NHS and clinicians around the world, of measuring ulcers with a ruler or calipers or drawing around them to check for changes - but not routinely measuring the volume of the ulcer.

Crucially, the WoundCare application is able to instantly calculate the depth, as well as the surface area of the injury; and it is this depth calculation that is most important to clinicians when assessing the risk to the patient, identifying trends and checking the healing progress.

"With the annual cost of ulcer care for the NHS at more than £5 billion, this effective and relatively inexpensive use of new technology can transform the way clinicians deal with one of the most common and difficult everyday challenges," said Ian Wiles, Medical Director at GPC.

"The NHS' own statistics show that it is dealing with more than 2,000 new pressure ulcers*, commonly known as bed sores, per month; alongside numerous burn, arterial and venous ulcers, as well as other ➪

wounds. This solution is faster, more accurate, mobile and can be used by anyone – not just trained medical staff."

Running on a lightweight, yet rugged Panasonic Toughpad FZ-M1 Standard tablet with an integrated Intel RealSense 3D camera, the 3D WoundCare software captures the ulcer image using a simple point and click process. The software ensures the image is in focus and taken at the right distance away from the ulcer for accurate measurement. Results are then automatically measured, recorded and can be graphically displayed to help clinicians review progress and spot trends. Using the tablet, digital images can also easily be sent to medical experts, based at other locations, for review. The solution also has simple interfaces to Electronic Medical Records systems and GP systems.

Professor Steven Jeffery, Burns and Plastics Consultant Surgeon at the Queen Elizabeth Hospital in Birmingham, is using the solution when treating burns victims and his input has been invaluable in developing the software.

"The ability to determine the size and depth of a wound without having to actually touch it is very useful to both the clinician and the patient," said Professor Jeffery. "The potential for cost savings by changing interventions earlier, reducing dressings and clinical resources and delivering better patient outcomes will be significant. Further cost savings could result from remote monitoring and diagnosis of wounds in the community."

"The camera, tablet and software is simple to use, and any clinician can be trained to use it, with very little experience in burns or wound care required. It is a cheap and efficient adjunct to training a doctor, nurse or paramedic to assess the size of any wound including burns. We also feel this has significant implications for assessment in the Emergency Department, in military medicine and in pre-hospital care."

The 3D WoundCare solution is also being used in Scotland and Wales, as well as internationally in Canada, Australia and Taiwan. ■

Changing Health and Ascensia Team up to Offer Game-changing Diabetes Support

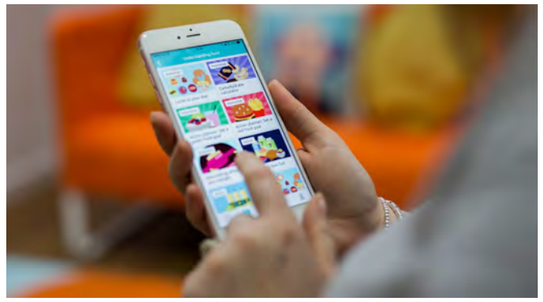
Changing Health, the service transforming digital education and support for people with Type 2 diabetes, has partnered with Ascensia Diabetes Care to combine cutting edge behavioural change programmes and a state-of-the-art diabetes management solution.

The collaboration empowers people with Type 2 diabetes to take control of their health, make lasting lifestyle changes and monitor their diabetes in real time, with three months of free access to the Changing Health programme and a free CONTOUR® NEXT ONE blood glucose meter and test strips.

Changing Health users benefit from one-to-one telephone coaching sessions with professionally trained health coaches, along with an app incorporating the most effective evidence-based diabetes education available.

The remarkably accurate CONTOUR®NEXT ONE blood glucose meter seamlessly connects with the CONTOUR®DIABETES app, providing a self-management solution for people living with diabetes that enables them to better understand and manage their diabetes.

John Grumitt, Changing Health Chief Executive, said: "We're excited to be teaming up with one of the global market leaders in diabetes management solutions to offer a new, accessible way to take control of diabetes. Combining high-impact behaviour change support with highly accurate blood glucose monitoring makes diabetes management simpler. People with diabetes can better control their condition through positive lifestyle changes, while gaining instant feedback on whether

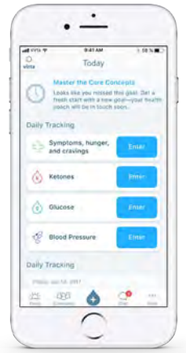


their blood glucose is on, above or below target."

Ros Barker, Country Head UK & Ireland for Ascensia Diabetes Care, said: "Coaching and education are a key part of managing type 2 diabetes. They can help individuals to better understand their condition and provide personalised feedback to improve self-management. We are delighted to be collaborating with a pioneering company in this field. The programme from Changing Health is based on robust behavioural science and is designed to support and empower people with diabetes. Using these services alongside our highly accurate blood glucose meter has the potential to help people manage their diabetes in a better and easier way."

Changing Health and Ascensia are offering 200 free CONTOUR® NEXT ONE blood glucose meters along with three months of access to the Changing Health lifestyle behaviour change coaching programme in a prize draw. To enter the draw, visit *www.changinghealth.com/offer* ■

Virta Health Making Type 2 Diabetes a Thing of the Past with Sustainable Treatment for Diabetes Reversal



Virta Health has released a peer-reviewed publication which details 1-year results from its ongoing clinical trial, now 2.5 years in duration. The study augments Virta Health's existing body of peer-reviewed research, which proved that the Virta Treatment could systematically reverse type 2 diabetes in as little as 10 weeks.

Newly released data demonstrates that diabetes reversal rates are sustained and in fact improved at one year, while metrics of other chronic conditions, such as obesity, high blood pressure, cardiovascular disease and inflammation, are also substantially improved.

"What's exciting about this new data is that the results are demonstrably sustainable, and the Virta Treatment is proving to simultaneously improve other comorbidities, such as blood pressure, inflammation and heart disease," said Sami Inkinen, CEO and Co-Founder of Virta Health. "I am more excited than ever about what this means for our current and future patients, not to mention the impact we can make on the economic burden of chronic disease as we scale towards our long-term goal of reversing type 2 diabetes in 100 million people by 2025."

By combining highly-individualized nutritional ketosis, medical supervision, and innovations in technology and artificial intelligence, the Virta Treatment helps people eliminate medications safely and sustainably while simultaneously lowering blood sugar and restoring metabolic health. Virta's continuous remote care model—near real-time access to physicians and other clinical team members via a mobile device—allows for scale to millions of people like Larry, who is making type 2 diabetes a thing of the past.

Enterprises, such as Virta customer Purdue, are benefitting by creating a healthier workforce and experiencing significant savings for each employee receiving the Virta Treatment.

Key Study Findings:

The study, published in the peer-reviewed healthcare journal Diabetes Therapy, evaluates health outcomes after 1 year for 262 adults with diagnosed type 2 diabetes who received the Virta Treatment, and an additional 87 adults with type 2 diabetes who received usual care from their doctors and diabetes educators. Key findings of the Virta Treatment group at 1-year include:

- 60 percent of those completing one year had type 2 diabetes reversed (HbA1c < 6.5% while taking no glycemic control medications or only metformin).
- 83 percent remained enrolled in the trial.
- 94 percent of insulin users reduced or stopped usage altogether.
- Participants experienced 1.3 percent average reduction in HbA1c (while reducing or eliminating medications).
- Participants achieved 12 percent weight loss on average

Usual care participants had no significant changes to HbA1c, weight or diabetes medicine use. With the Virta Treatment, however, results go beyond blood sugar and obesity reduction and included the following statistically significant changes:

- 24 percent decrease in triglycerides
- 18 percent increase in HDL-C (i.e. 'good' cholesterol)
- 39 percent decrease in C-reactive protein (a marker of inflammation)
- Decrease in both systolic and diastolic blood pressure

To learn more about the Virta Treatment and to view the full results of the 1-year study, please visit *www.virtahealth.com* ■

'Perfect Storm' Driving $10bn in HealthTech Deals

The latest Healthtech M&A Report from international technology mergers and acquisitions advisors, Hampleton Partners, reveals how the 'perfect storm' of rapidly converging digital technologies and societal changes, coupled with the entrance of tech giants, such as Amazon into the healthcare and medical systems market, is driving intense innovation and M&A activity in the Healthtech sector.

A wave of deals delivered disclosed amounts of nearly $9.5bn, up 140 per cent year-over-year.

Express Scripts' $3.6bn acquisition of eviCore healthcare, the health benefit and claims management market serving 100 million people, topped the table as the Healthtech sector's largest deal in 2H 2017.

The next largest deal was KKR-backed Internet Brands' purchase of WebMD for $2.8bn. This brought a string of popular online health websites, including Medscape.com; DentalPlans.com and AllAboutCounseling.com under one umbrella company. KKR also closed a $1.45 Billion health care strategic growth fund during the same period.

North America led the way in Healthtech M&A, with 77 out of the 100 announced deals driven out of the U.S., to help meet the huge domestic demand and ability to thrive in the competitive private healthcare market.

Jonathan Simnett, director, Hampleton Partners, said: "Advanced healthcare systems around the world are struggling to deal with the perfect storm of spiraling costs allied to rising patient expectations, more expensive treatments, and the consequences of dealing with ageing populations and chronic lifestyle diseases.

"This vast healthtech sector where patient care systems have remained largely unchanged for decades is experiencing a seismic shift in funding and technology innovation. The customer care and logistics expertise that comes with Amazon's market-moving plan to offer healthcare services is an indication of just how big this shift is going to be," continued Simnett.

Other key points from the Hampleton Healthtech M&A Market Report:

» Bertelsmann's Relias Learning and Royal Philips led the buyer table, with seven acquisitions each over 30 months
» Of the five announced deals in the Medical Hardware category, three involved a private equity buyer. The largest disclosed deal was the acquisition of Servelec Group, a UK-based automation systems & healthcare software firm, by pan-European buy-out fund, Montagu, for just under $300 million and 3.6x revenue
» Indian investors ramped up spending when the country's government introduced a new National Health Policy aimed at raising public health spending. Indian investors quickly contributed to two of top ten highest valued deals in the Health IT services and BPO space, including Tech Mahindra, the Indian IT Services, outsourcing & IT consulting group, paid $89.5 million upfront for an 84.7 per cent stake in CJS Solutions Group LLC, a US-based healthcare information technology consulting company. The remaining 15.3 per cent stake is to be acquired of a period of three years at an enterprise value of $110 million.

As for the coming year, Hampleton expects a raft of new players into the healthcare M&A market, driven by the likes of Amazon, Apple and Google, which have access to consumers, devices, data and vast resources to drive change even in a highly-regulated market.

Hampleton anticipates that the incumbents' response to new competitive pressure will be to increase the intensity of their M&A activity with a resulting upward pressure on valuations.

Hampleton healthtech M&A expertise

During the period, Hampleton advised on the sale of BaseCase Management GmbH, a data visualisation software as a service (SaaS) company, headquartered in Berlin, Germany, with offices in New York, on its sale to Princeton, New Jersey-based Certara, the global leader in model-informed drug development and regulatory science.

As budget pressure on healthcare providers increased, the healthcare industry is under increasing pressure to demonstrate the value delivered by new medications and devices. BaseCase's interactive platform improves how life science companies communicate and present that value, whether to C-suite executives, physicians and healthcare providers, or payers and health authorities. ■

New Digital Health Company Brings Blended Care to Mental Health Provision

Three in four mental illnesses start in childhood[1]. Yet, 75 per cent of young people with mental health problems are not receiving the treatment they need[2]. New digital health company Oh My Mood UK Ltd wants to shake up mental health provision by introducing a 'blended care' approach to make mental health care more effective and easily accessible.

As a mental health interventions provider, Oh My Mood develops blended care pathways, where digital solutions support face-to-face therapies. This approach improves the quality of care and makes mental health therapy scalable and more efficient. It additionally eases the strain on care practitioners without adding pressure on NHS budgets.

The company will work with clinicians, universities and digital health platforms globally to make evidence-based blended care pathways available to large audiences of mental health therapists and service users.

Jaime Essed is the founder of Oh My Mood and has over 12 years' experience working in the health sector. Previously, he was international manager at TelePsy, a Dutch digital health platform, where he successfully led its international expansion into the German and UK markets. In 2005, he co-founded Lionarons GGZ, a Dutch mental health clinic that currently employs 110 people.

Jaime Essed, founder of Oh My Mood, said: "An increased awareness of mental health has given rise to the number of people seeking help. Unfortunately, the mental health system struggles to cope and we are seeing longer waiting lists and more people being turned away.

"In mental health, digital solutions should support face-to-face therapies, not replace them. We are on a mission to improve the quality of care for mental health service users without putting decreasing budgets under more strain."

The company has chosen the North West of England as its base because the region provides easy access to some of the UK's best research universities. Oh My Mood's main operations will run from the Innovation Centre in the Liverpool Science Park in Liverpool, as well as an office in Manchester.

Essed adds: "The North West is a great location for building and growing our company nationally and globally. The region will give us access to some of the best research & development teams in the country, while costs are relatively low in comparison with cities in the south of England. We have ambitious plans and expect to build a team of 50 employees within the next five years."

Matt Biagetti, investment manager at Invest Liverpool, said: "I'm very excited to see Oh My Mood locate in Liverpool. I know the company has looked thoroughly at locations across the UK, so this is a clear demonstration of the attraction that Liverpool has for companies working in healthcare. Liverpool has the perfect environment for collaboration, business growth and international connections. I look forward to working with Jaime and the team at Oh My Mood."

George Barclay, business developer coordinator at Liverpool Science Park, adds: "We welcome Oh My Mood to our science park. Digital health companies benefit from close collaboration and strategic partnerships with academic R&D departments. For that reason, we have built a purpose-built environment to make it as easy as possible for organisations to succeed. We look forward to seeing Oh My Mood grow and thrive."

1. Annual Report of the Chief Medical Officer 2012, Our Children Deserve Better: Prevention Pays
2. Children's Commissioner, Lightning Review: Access to Child and Adolescent Mental Health Services, May 2016 ■

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Upcoming events

March 2018

13-14 **Future Healthcare 2018**
London, UK
For more information visit http://futurehealthcareuk.com/

13-14 **Digital Health Technology Show**
London, UK
For more information visit www.digitalhealthtechshow.com

26-28 **Pharma Anti-counterfeiting & Brand Protection**
Philadelphia, PA, USA
For more information visit www.anticounterfeitingpharma.iqpc.com/

April 2018

12-13 **ACO & Payer Leadership Summit**
London, UK
For more information visit https://events.marcusevans-events.com/aco-and-payer-leadership-summit2018-3/

16-17 **mHealth for Clinical Trials EU**
London, UK
For more information visit www.mhealth-clinicaltrials-europe.com/

17-19 **conhIT: Connecting Healthcare IT**
Berlin, Germany
For more information visit www.conhit.com

30-2 **Health GB**
Manchester, UK
For more information visit https://www.healthgbexhibition.com

May 2018

20-22 **National Healthcare CXO Summit**
Orlando, Florida, USA
For more information visit https://events.marcusevans-events.com/healthcare-cxo-sp-34/

June 2018

27-28 **Digital Healthcare**
London, UK
For more information visit www.digitalhealthcareshow.com

Inaugural...

mHealth for Clinical Trials Europe 2018

Dates: April 16-18, 2018

Location: London (UK)

Digital transformation is revolutionising clinical research, with mHealth capabilities and use-cases in pharma clinical R&D exploding with exciting advances.

The application of mobile tools and technologies is, more than ever, a key driver for innovation and acceleration in drug development. By promoting patient-centricity and a redefinition of the patient role in clinical studies, as well as enhancing data collection or real-time remote monitoring (just to name a few), mHealth strategies are opening doors for huge advancements.

The inaugural mHealth for Clinical Trials Europe meeting comes to London in April, bringing together leading industry experts in this space to discuss and share their latest learnings and case-studies on how to effectively implement mHealth in clinical trials and how to successfully harness the power of these tools to improve patient engagement and streamline pipelines. The complex operational challenges and regulatory environment will be taking the stage at this forum.

Patient Centricity – and Evolving Paradigm in Clinical Development

Here, the patient takes the stand and is the driver of innovation. How can we maximize this? In a comprehensive collection of perspectives and experiences from different stakeholders, the key areas to be explored include:

- the potential to leverage mobile tools into easier and more effective recruitment, enrolment and consent
- how mobile technologies can support patient awareness, engagement and involvement, and what are the main challenges of doing so

Hear from case-studies and real-world insights from speakers including:

- Seleen Ong, Clinical Sciences Group Lead & Clinical Program Lead for Clinical Trial Innovation, **Pfizer**
- Tim Cave, VP & Head, Strategic Planning & Digital Practices, **GSK**
- Derek Stewart, Associate Director – Patient & Public Involvement, **NIHR Clinical Research Network**

Thinking of Going Remote?

What's the future holding for virtual or decentralized trial methodologies? Industry pioneers will share their latest initiatives and projects to bring remote studies to the next level.

- How to overcome the challenges to implementation?
- Where is the value?
- Where are we currently standing and where are we trying to be?

Hear the Latest Case-studies & Industry Insights on the Application of mHealth Technology in Clinical Trials

Kai Langel (Director, R&D Operations Innovation, **Janssen Pharmaceuticals**) and Bryan McDowell (Global Program Lead, Digital Development, **Novartis**) will take us through their journey.

Beyond the Hype – Operationalising mHealth in Clinical Trials

The implementation of mHealth tools in clinical studies can improve trial efficiency and outcomes but disrupting traditional processes comes with its challenges.

- How to establish a solid framework for mHealth implementation? What's the right mHealth strategy?
- Managing vendor partnerships and collaborations
- Tackling data integration, management and analytics
- Are wearable devices supplementing or replacing standard reporting measures?
- How to operationalise these new technologies into routine clinical operations?
- Overcoming organizational barriers to adoption

All this from exciting case-studies from the likes of:

- Hilde Vanaken, Director, Janssen Clinical Innovation, **Janssen Pharmaceuticals**
- Daragh Ryan, Clinical Trials Technology Consultant, **Actelion Pharmaceuticals**
- Charles Wolfus, Ex. Director – Digital Health, Technology & Business Operations, **Myokardia**

Pre-Conference Workshops

In a pre-conference add-on, on April 16th, industry experts will walk participants through two thought-provoking in-depth sessions one cannot miss on:

- Rethinking the whole clinical R&D model and boosting innovative mHealth approaches in clinical programs
- Navigating the current regulatory framework for mHealth applications in clinical research

Find the detailed program and speaker line-up at: *www.mhealth-clinicaltrials-europe.com/jmh*.

Join peers and leaders in mHealth, clinical innovation and clinical operations for three days of inspiring learning.

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Supporting Patient Wellbeing Through Technology

For many, a visit to the GP is thankfully a rare occurrence. Much has been made of the need to improve waiting times and customer care for patients like these, often in high-pressure situations such as within Emergency Departments, and rightly so. For other more regular visitors, like those with long-term health conditions or care home residents, however, the need to improve the speed and quality of care is just as important, argues Lee Copestake, technical director at UK healthcare scheduling specialist, BookWise Solutions.

According to the Office of National Statistics, the percentage of the UK population that is 65 years or older increased from 14.1% in 1975 to 17.8% in 2015, and is projected to grow to nearly a quarter of the population by 2045[1].

With this ageing population comes an increasing number of chronic health concerns, and a corresponding impact on our health services. The number of hospital outpatients seen more than once within the same quarter, for example, has already risen by 30% between 2011 and 2017[2].

With statistics such as these, Trusts clearly need to explore ways to improve on-going care within Trusts with some urgency.

Ensuring patients have access to regular appointments at times that are convenient to their daily lives is crucial, particularly for people such as those living with long-term conditions requiring frequent medical visits, such as those with kidney disease, diabetes or heart problems.

Dwindling NHS budgets and resources mean that many within this demographic experience difficulties in seeing a healthcare consultant on a regular basis. The stress caused can further exacerbate conditions, having a negative impact on health. It can affect their quality of life, preventing them enjoying time with family or other commitments within their daily routine. At the very least, they cause a great deal of frustration for the patient.

It is clear, then, that any methods that can streamline processes, increase efficiency and free up staff time could make a real difference to the quality of care that can be delivered.

One example is the use of room scheduling software. With the current digitisation of the health service, it is somewhat surprising that this task is still carried out with an antiquated system, such as a paper diary. This makes it impossible to efficiently manage the complex coordination of equipment, rooms and staff in such a high-pressured environment, where situations regarding asset requirements can change on a frequent basis.

Room scheduling software provides an overview of resources within the whole environment, with the ability to update quickly and easily across the whole system. This can remove the risk of errors such as double booking, reduce the pressure on staff, which improves morale, and ensures that all assets can be most effectively deployed.

As an example, BookWise Outpatients software has helped one NHS Trust to increase room booking approval rates from 47 per cent to 80 per cent. The Trust manages more than 1,300 outpatients clinics across two sites, including a Hyper Acute Stroke unit, regional neuroscience centre and a cancer centre. Within the first month alone the Trust had achieved a 76 per cent approval rate on 301 requests.

Practices often invest a great deal of time into evaluating the latest systems to improve outcomes for patients, particularly when dealing with critical situations. Technology can also play a huge role in making improvements in other areas of the healthcare environment, such as with clerical tasks. If the benefits improve the on-going general health of a large section of the population, they are arguably no less important.

To enable the very best use of budgets, effective use of resources is essential. Technology can facilitate the most efficient allocation of all available assets, enabling practices to focus on the ultimate goal of delivering the highest quality of care to patients.

References

1. *https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/articles/overviewoftheukpopulation/mar2017*
2. Statistics gathered from *https://www.england.nhs.uk/statistics/statistical-work-areas/hospital-activity/quarterly-hospital-activity/qar-data/*

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Health Innovation from Finland

upgraded HEALTH STARTUP ASSOCIATION OF FINLAND

Finland ranks among the three strongest health technology economies in the world. Multidisciplinary expertise and problem-solving has raised the country among the main players of digital health. The country is home to a rapidly growing ecosystem of health and wellbeing startups. This special feature will serve on a silver platter a few of them, enjoy reading!

Upgraded Life Festival

The Premier Startup-driven Health Innovation Event in the Nordics

Upgraded Life Festival started as a community get-together of 500 health enthusiast five years ago. This was the beginning of something that grew to be one of the leading startup-driven health innovation events in Europe. Today, 1200 professionals from all key sectors join one another for two days of the latest topics of health, technology and wellbeing.

Upgraded Life Festival is a joint get-together for those international startups, academics, corporates, investors, health professionals and civil servants to whom health and wellbeing is the key focus. **Sickness has no borders, nor should the cure have.**

What gives Upgraded Life Festival it's distinct character, is the presence of **medical and health professionals.** The festival is not only about companies and investors discussing business, but a platform of dialogue, where also the practitioners of health have their heavy say on what is needed, and where the focus should be. To make the case, the event is arranged for the 5th time at the heart of one of the leading health care organizations in Europe, HUS - The Hospital District of Helsinki and Uusimaa.

The community who arranges the festival, and invites the others to join, is the health startups. **Startups** are the herald of change. They break silos by default, and shuffle the pieces of a puzzle we thought can not be touched. Who would be a better driver for a health event?

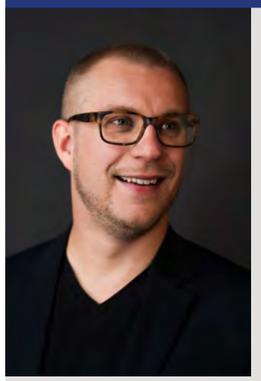
Size matters. It is hard to find your match in the masses. **That's why we like it moderate**. The mix of stage talks, workshops, roundtables, one-to-one meetings, and the exhibition area are together designed to offer multiple touch points ensuring the right business cards to be exchanged and the right hands to be shook. The keynote presenter you just saw on stage might be the next person you queue for a coffee with. Everyone is there to meet you. Want to be a part of this dialogue? See you at Upgraded Life Festival 31st May – 1st June 2018 in Helsinki.

More information:
Maria Nygård, Head of Upgraded Life Festival
maria@upgraded.fi
@upgradedFI
www.upgradedlifefestival.com

upgraded life festival

Buddycare

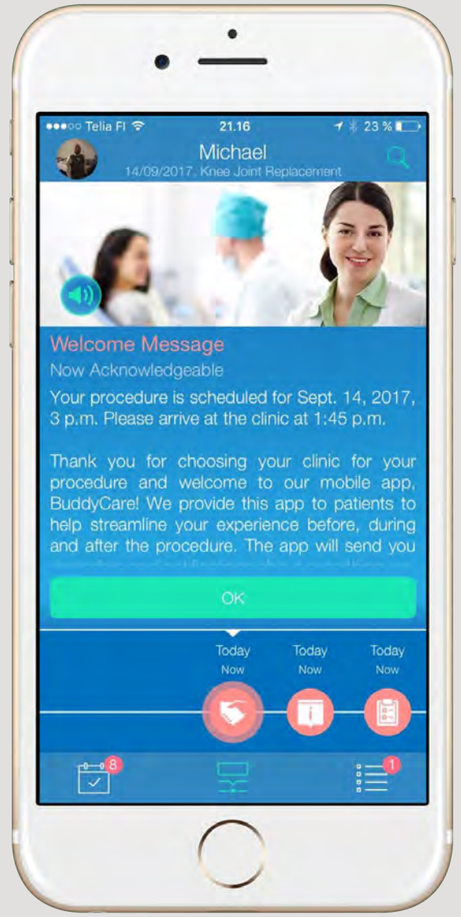
Automated Care Pathways for Surgery & Procedure Patients



Jussi Määttä,
CEO & Founder

The higher the patient's knowledge about the surgery is, the higher self-caring abilities the patient has, resulting in greater confidence in managing care, better clinical outcomes and reduced readmissions and cancellations. These are some of the drivers why Buddy Healthcare was founded.

Our product BuddyCare is a surgery patients' and their families ultimate mobile guide that helps them navigate throughout the whole perioperative care process from preparation to recovery. Checklists, pre-assessment forms, reminders and timely education keeps the patient on track on the most important instructions that must be followed at a given time. The BuddyCare mobile app draws the whole care path where it's easy for patients to see in chronological order what's happening at what point of the process. So far, patients have reported reduced stress, fears, anxiety and obscurity before and after the procedure, as all the information is smoothly stored in one single app.



In addition to the patient app, we provide hospitals and clinics a simple web dashboard where care personnel may identify those patients that have deviated from the care plan and for what reasons. Alerts are automatically raised of those issues and care providers may intervene in the situation well in advance. This gains more effective resource allocation as care personnel can focus on those patients requiring most attention. Therefore, the smart and timely data exchange and communication between the patient app and dashboard enables much more efficient care coordination compared to phone calls, paper forms and unnecessary appointments.

BuddyCare has already been used by multiple university hospitals and clinics resulting in reduced surgery cancellations and delays, fewer phone calls and less time spent on patient communication, as well as the patient net promoter score being close to perfect. Now we are looking for innovative hospitals, clinics and partners to join forces with us and create the best pre- and post-operative care pathways in the market.

If you wish to know more about our CE marked and HIPAA compliant BuddyCare solution, please visit **www.buddyhealthcare.com** or directly send email to care@buddyhealthcare.com.

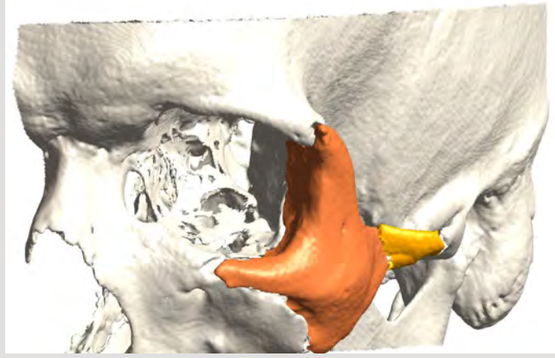
We are more than pleased to show our product in action!

Buddy Healthcare

Disior

Data-driven Diagnostics and Treatment Planning

Anna-Maria Henell, CEO & Founder



What do you get, when you combine a maxillofacial surgeon, an orthopedic surgeon, a doctor of biomechanics and two engineers who are experts in computational analysis and modelling systems? With Disior, you get a new technology maximizing the benefit of today's medical images, for better diagnostics and treatment planning. You get the data you need – and the way you get it is faster, easier and more accurate.

At Disior, we develop software that automatically creates mathematical models of tissues visible in CT or MRI images. This allows automatic measurement of diagnostics related critical parameters, like shapes, sizes, angles, volumes and distances. The method allows also the implementation of body movement into the equation, so it does not only allow you to better analyse what is in the image, but also to predict what will happen to the critical structures after the image is taken. And through this analysis, to optimize the treatment for best possible outcome.

The software is based on mathematical modelling, which makes measuring objective, systematic and repeatable. The algorithms extract the correct shape or structure from the medical image, and measure pre-set reference points. This way, the software is not dependent on finding familiar structures or comparing something to reference data. The data created allows also the usage of Artificial Intelligence and Mixed Reality for better treatments and their visualizations in the future.

Cranio-maxillofacial:

- Orbital fractures: automatic volume and shape analysis
- Zygoma fractures: Analysis for critical parameters, repositioning of fracture area
- Maxillofacial fractures: Fracture area analysis, mechanical optimization for fracture fixation in pre-operative planning.

Orthopedics:

- Wrist fractures: Automatic measurement of fracture area and related critical parameters. Possibility to analyze fracture behavior under mechanical loading.

Neurosurgery:

- Ventricle analysis: Automatic analysis of ventricle volumes as well as shape and size related key parameters.

Soft tissue:

- Soft tissue analysis for plastic surgery: Automatic analysis of tissue size, shape and volumes.

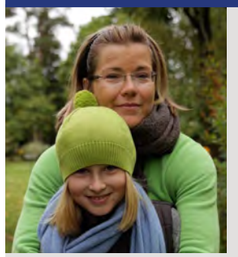
Today, we are piloting and validating our software with several clinics at HUS, the largest hospital district in Finland. We would love to show you what we do, and how we can work together in getting the full data out of your medical images.

To innovate together, contact:
Anna-Maria Henell (CEO)
+358 50 48 36433
anna-maria@disior.com
www.disior.com

DISiOR Analytics

Dottli

App and Community for Diabetes Management



Carina Nellie

Finnish app Dottli helps people with diabetes understand that just treating the symptoms is not enough. The goal is to improve users overall well-being and to remove the stigma of having an illness.

Co-founder Carina Rajala was diagnosed with diabetes when she was three, and through a personal need to collect specific data about her condition every day, she decided to develop the app which she hopes will help people around the world.

In a messenger-style, the data is spread across different specialised systems and apps, and enables an efficient and fun way to utilise data. Encouraging happiness, being motivated by data, having the support of your peers are the building blocks for overall well-being.

In addition to making your tracking results visible and actionable, Dottli is your favourite companion in improving holistic quality of life and in keeping your goals. Dottli allows diabetics to sync their gadgets with the app – such as activity and fitness trackers, medical devices and sensors such as continuous glucose monitors , and health apps.

Rajala finds it extremely comforting to know that she isn't alone with her diabetes. "I know that somebody else is also checking up on me and perhaps wondering if I didn't log data one day – they might call and ask if everything's ok," she explains.

Currently Dottli has close to 100k users in many parts of the world including India, UK, Brazil, Australia and Scandinavia. A new version of the app is about to be launched in Spring 2018. Diabetes is only the beginning – Dottli's aim is to tackle a range of chronic diseases in the coming years.

dottli

Web: www.dottli.com

Klinik Healthcare Solutions

Klinik Healthcare Solutions is a health technology company that produces clinically proven solutions and services for condition and urgency recognition, customer segmentation and patient flow management.

Everyone deserves to have a quick and easy way to find out what their health-related symptoms and ailments mean, and what treatment they may need. Klinik Healthcare Solutions was born of the desire and ability to respond to this challenge.

The Klinik AI provides a quick and accurate medical analysis on the basis of symptoms supplied by the user. It identifies the health issue and gives clear instructions on how to proceed with treatment.

Klinik provides an easy to implement solution for health centres to manage patient flow, enhance customer experience and save healthcare professionals time. Service helps the patient to define their health issues and symptoms and to supply any other necessary information about themselves. By analysing the information provided, the system diagnoses the problem, assesses how urgent it is, and recommends to the healthcare professional what treatment the patient needs.

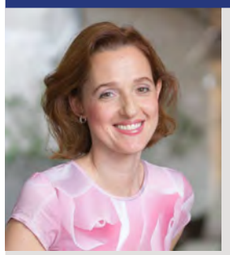
The backroom staff and operative team at Klinik Healthcare Solutions are professionals of medicine, software development and healthcare technology. Through their work they intend to make it easier for everyone to maintain health, for illness to be treated, and to reform the entire field of healthcare internationally.

KLINIK HEALTHCARE SOLUTIONS

Website: www.klinikhealthcaresolutions.com

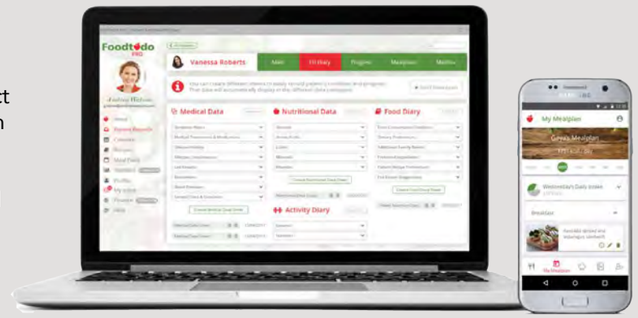
FoodToDo

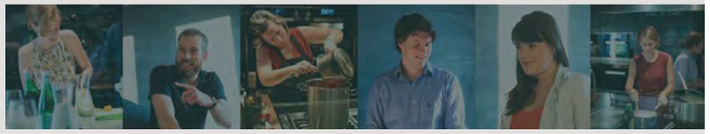
A Platform for Nutrition Professionals



Sophie Michelin, Founder & CEO

In the last year, FoodToDo has invested over €1 million to develop a comprehensive solution to connect nutrition professionals with their clients. Comprising thousands of recipes and meal plans for diet-related conditions ranging from pre-diabetes to heart disease and obesity, FoodToDo combines the latest IoT technologies with automated recommendations, blood glucose management and a wide variety of features to empower the diet-professional.





Who is FoodToDo for?

Although FoodToDo is specifically built for nutrition professionals, our technology can be adapted for clinics, occupational health and insurance companies, making it easier for them to track their customers' health.

I'm a nutrition professional, do I need FoodToDo?

In the last couple of years, we've seen numerous professions being revamped by technology, yet many nutrition practitioners still haven't experienced the benefits of integrated technology. We believe our solution, which revolves around macro and micro nutrient-based meal planning, will allow you to save time, offer a more bespoke service and increase your income.

As we understand that switching from paper and pen to a digital solution could be intimidating, our product development team has created a clear and simple onboarding process. You can try FoodToDo PRO free for 14 days by signing up for the trial on our website or by contacting our team directly via the email address mentioned below.

What does the future hold for FoodToDo?

At FoodToDo, our most valuable resource is our community of nutrition professionals and we intend to keep it this way. Our plan is to build an ecosystem connecting nutrition practitioners and their clients, food services, healthcare providers and IoT devices. In order to achieve this, we will continue to invest our resources in new technology and partnerships.

FoodToDo's Corporate Social Responsibility

Working with people from across the world has taught us that an early education about health and food is the key to establishing a healthy society. Starting in 2018, we intend to join and establish local food programs in the UK, Finland and Hungary to educate children about healthy food and teach them how to cook.

Contact us

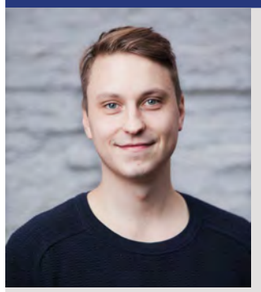
We'd love to hear from you! For further information or to give your feedback, feel free to contact our team anytime at support@foodtodo.com.

Foodtodo

Follow us on Facebook, Twitter, LinkedIn and check our website www.foodtodo.com

Kaiku Health

AI Powered Patient Journey



Lauri Sippola, CEO & Co-Founder

Kaiku Health is a digital platform for monitoring patient-reported outcomes. Its unique algorithms enable early interventions and personalized patient support.

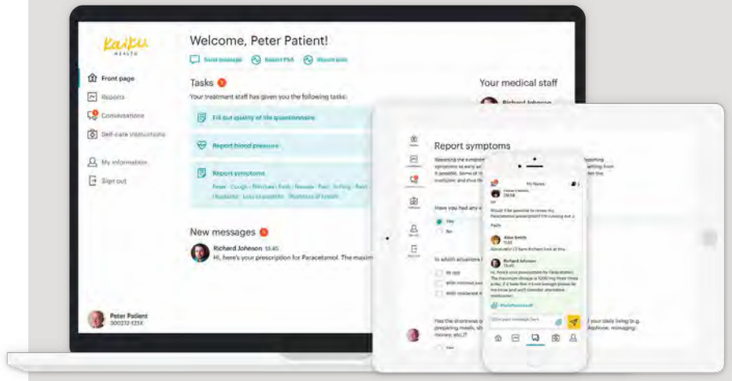
Currently over 30 European hospitals and clinics are using our platform to better monitor their patients, reducing manual work and allowing prioritization of clinical actions. This along with the capture and analysis of real-world data paves the way for more personalized and effective care of each patient.

Kaiku Health patient monitoring platform has been applied to several medical specialties, such as cancer care, fertility treatments and preventive health care. Kaiku Health for cancer consists of over 20 follow-up algorithms that address all common cancer types and their different therapy options.

Digital patient monitoring can improve quality of life and saves costs of healthcare

In cancer care, recent evidence shows that digital monitoring of patient-reported outcomes can lead to improved quality of life and survival of patients (Basch & al. 2017).

Patients use Kaiku Health to connect with their care teams and report on their symptoms between clinical visits. The care team receives all new data through the platform, and relevant information is highlighted according to intelligent alarm algorithms. If needed, patient-reported data can be directed to a specialist with one click. Enabling patients to report their health at any given moment not only helps alleviate stress, but also ensures that the care team is always up-to-date on patients' condition and can react to alarming symptoms early on.



Digital patient monitoring decreases manual work related to patient monitoring. Hospitals using Kaiku Health have seen a 75% reduction in patient calls. Patient-reported data increases the efficiency of clinical visits as the staff is well informed on the patient's condition upon arrival. Digital patient follow-up can also reduce emergency room admissions by 5-10% (Basch & al. 2016). Patient-reported information combined with therapeutic data opens significant new opportunities for evaluating the efficacy of treatments and their long-term outcomes, and thus enables the development of new, better targeted ways to treat cancer.

Together with patients and world-leading medical experts, we strive towards our mission of improving lives through health data science. Supporting "one patient at a time".

Read more: www.kaikuhealth.com
Follow us: Facebook, Twitter, LinkedIn

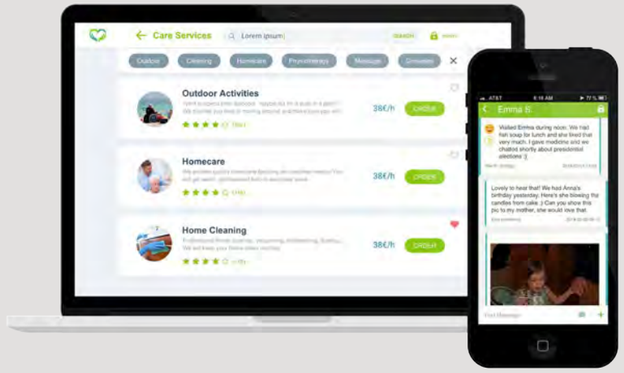
kaiku HEALTH

Onerva

Caring Platform for Eldercare

Ville Niemijärvi,
Founder

Onerva is a Caring Platform – connecting eldercare customers, their families and care providers. Enabling secure and real-time communication and offering an easy way to find help and care providers.



Growth of aging population and lack of resources = Lack of trust and worried families

Growth of aging population is one of the biggest challenges in aging countries. For example in Finland, some experts estimate that we need to double the amount of nurses by 2025. But according to official statistics, the workforce is decreasing.

Lack of resources will lead, in worst cases, to human suffering for elder citizens that are in need of care, worried family members and a lack of trust in the whole healthcare system.

How do we make sure that aging citizens have quality care and attention?

Through transparency you will win trust

We built Onerva to bring transparency to eldercare and to build trust between care providers, family members and customers.

Onerva has an instant-messaging service, kind of a "whatsapp for eldercare". It allows real-time, secure communication between nurses, customers and their family members. This way family members will always know how their aging loved one is doing, have they got their medicine and if there is anything that requires extra attention.

Onerva messaging service is now used all over Finland, by both public and private sectors, and it has users in Sweden, Germany and US.

Market place for care and wellbeing services

When the need for care arises: whether it's home care, nurse, help with groceries, somebody to take you out - It should be available with a click of a button. Most suitable services should be recommended as they are in Amazon or Spotify.

So we decide to build this in Onerva. Now family members can move from instant-messaging (where the need is raised) into market place and find the right care provider. We want to create also an incentive for volunteers and local community to contribute to the care. We will be testing a digital reward system that allows you to collect credits for helping elder people and use those credits for your own services. We believe this will be a way to motivate local community to provide help to elder neighbours.

Our mission is to make sure that our aging loved ones will have the quality care that they deserve.

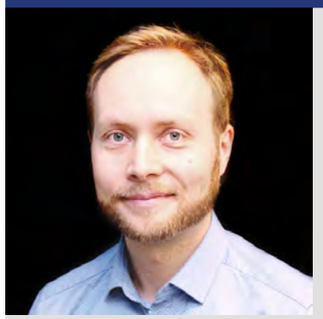
Follow our journey or contact us:

info@onervahoiva.fi
p. +358 50 326 4989
www.onervahoiva.fi

ONERVA

Popit

Doctor's Orders: Don't Forget Your Pills



Timo Heikkilä
Co-Founder

Easier said than done, right? We've all missed a pill sometimes. Either it was because of forgetting or we just felt the medication wasn't working for us.

This is actually all too common. A staggering 50% of patients do not take their medications as they should, and it causes a whole lot of avoidable harm. Medication non-adherence leads to 300 000 lives lost annually in the EU & US and causes several hundreds of billions of dollars extra costs on the healthcare system worldwide.

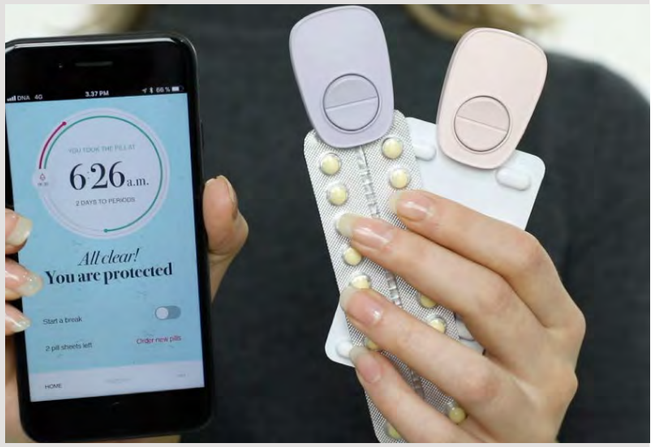
Popit has developed a solution to improve adherence

To address the growing problem of non-adherence, Popit has developed the world's first smart pill tracker solution (device, app, cloud) for pills that come in blisters. This type of packaging is used for about 70-80% of solid drugs in the world.

Popit's solution does not require changes to medication packaging and can therefore be easily used by patients for medications they are already using.

Popit automatically tracks pill consumption

The device, Popit Sense, automatically detects with patented technology when pills are 'popped' from various types of blister packs. This information is relayed onto the app where it is recorded. The app provides additional features like smart alarms, insights and statistics. It can also function as an educational channel for the patient on medication that's currently being used.



The pill consumption data can be made visible to healthcare payers and pharmaceutical companies in a secure and anonymous format to support value-based healthcare and pharmaceutical R&D. Through research the unprecedented data also has the potential to help patients by uncovering patterns leading to non-adherence.

Reduces missed pills by over 80%

According to a recent study done together with the Kuopio University Hospital, Popit's solution can reduce missed pills by over 80%. It also significantly reduces the time variance in dosing, meaning pill-taking became more regular. This improvement is especially valuable with medications where consistency is crucial. Inconsistent use can also cause unwanted side effects, like nausea.

Popit helps to solve the problem of medication non-adherence and how to track pill consumption. The solution makes medication connected and enables the Internet of Pills.

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popit

Wellmo

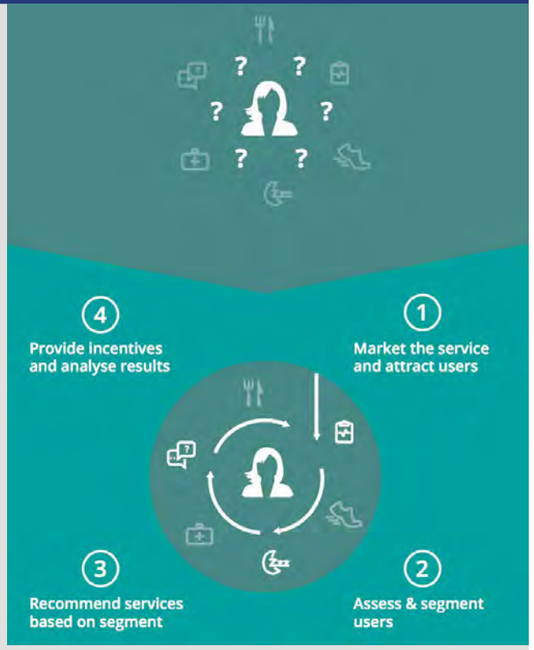
A Mobile Health Platform for Insurance Companies

Jaakko Olkkonen

Achieving 80% adoption and 90% retention rate in insurer's digital health services

Digitalization opens up new opportunities for insurance companies. Preventative programs, new digital health services, and product innovations have been developed, often in cooperation with variety of partners.

The members' wide-ranging needs easily lead to a broad variety of digital services and apps. Separate services and apps alone can be difficult to market, and members have a hard time finding their way within fragmented service portfolio. This often results in low adoption and retention levels of digital health services.



Move from siloed apps to an integrated service

With a platform approach, an insurance company can integrate their digital health services offering under one unified and branded mobile experience.

Typically such an integrated service helps users analyze their health state and provides them with targeted recommendations on programs or services to join. Rewards will be provided for recommended behavior.

The Platform Solution for insurers powered by Wellmo

Wellmo is a platform-as-a-service for integrating a digital health service set. It supports extensive branding and customization, without the burden of a costly and risky IT project. It allows for integration of any 3rd party, or insurer's own, app or service. 10's of services and apps, and 100's of consumer health devices are already integrated.

Insurer's own engagement cycle and reward system can be implemented and continuously improved with Wellmo's agile tools. Analytics provide insights into health behavior, usage and outcomes. Wellmo's experienced team helps insurers to design their service and engagement cycle and continually improve them.

Get quick results and gain a competitive edge

The flexibility and development speed give the Wellmo customer a clear competitive edge compared to companies trying to build their own umbrella app, or to the ones locked in a single provider approach.

Finland's second largest insurance company, LocalTapiola, experienced 3% points increase in the life insurance's market share, after a year from the launch of Smart Life insurance, powered by Wellmo. 70% of the members took the service in use, of which 83% used the service after six months.

With the Wellmo platform, you can harness the power of the ecosystem for the benefit of your members' health, and for the success of your business.

Want to know more?

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Artificial Intelligence and the Indispensable Human in Diagnostics

AI is now essential for automation in radiology and pathology, but it provides a means to support the human, not replace, writes Chris Scarisbrick, Sectra UK & Ireland.

Will I be replaced by a robot? Mainstream media reporting on artificial intelligence has led many people to ask this question. AI has gone from being the subject of science fiction and theory, to creeping into the reality of everyday life – either augmenting or starting to replace the way people carry out mundane tasks in their homes, in our supermarkets, on our roads and even where we work.

With a growth of AI in healthcare too, people who work in diagnostic disciplines such as radiology and pathology might just as easily ask questions about the security and shape of their future role.

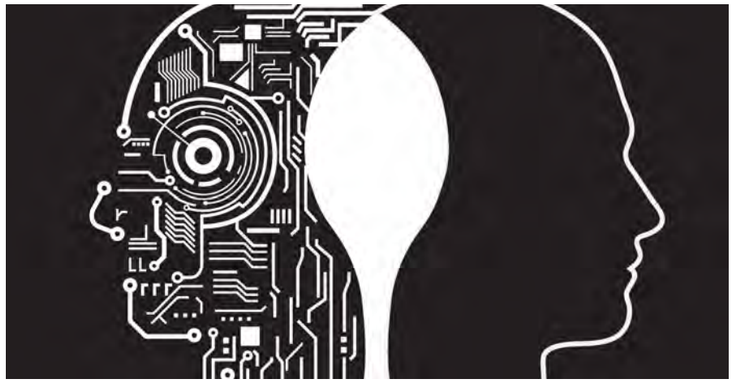
Pragmatically, there is a very important role for AI in diagnosing illness – but for the foreseeable future, AI cannot make the human redundant. Instead it is a means to eliminate repetitiveness through automation and in turn to make sure professionals have the capacity to do those tasks for which they are indispensable.

Descending from a peak of inflated expectations

When people think about what AI might do to help identify illnesses, there has been a tendency to leap to extreme use cases.

People might think of man vs machine scenarios, where computers will take over the prediction and identification of cancers and other illnesses altogether. A peak of inflated expectations has emerged, as Gartner might describe it in its Hype Cycle for Emerging Technologies.

When we start to come down from that peak to look at the low hanging fruit, it becomes clear that AI and the associated possibilities for automation, can make a more mundane, but nevertheless more immediate and positive difference to the productivity of our radiologists and pathologists.



The real value of AI in diagnosing illnesses might not create attention grabbing headlines, but it means improving the ability of the NHS to orchestrate its workflow and to enable a more automatic triaging of imaging, so that serious cases can be prioritised.

Overcoming resource dilemma

The idea of 100% of imaging being analysed and reported by machines, rather than a person, is many, many years away from reality, and may possibly never happen. But that doesn't mean there aren't massive gains to be made today.

With an urgent need to respond to growing volumes of work, rising masses of imaging, and the fact that there are simply too few professionals to cope with escalating demand, AI offers opportunities to avoid costly delays in diagnoses that could significantly harm patient outcomes, even in the context of modern healthcare pressures.

AI applications and algorithms emerging now, mean that computing technologies are able to recognise abnormalities and flag those cases to relevant staff.

This automation supports radiologists and pathologists, not only enabling the most urgent studies to be reviewed first, but more than that, allowing specialist staff to be alerted to the more complex cases that require their attention, whilst others might be dealt with by less experienced teams.

Human in the loop

Diagnosis of a huge range of conditions are particularly well suited to AI assistance, in particular conditions which are more common, where potentially millions of images have been used to train algorithms through extensive machine learning.

Many other, more specialist cases, are not yet suited to AI techniques, where it remains of crucial importance that they are visualised from the beginning by a professional.

In either of these instances the radiologist or pathologist still performs a very necessary role, supported by technology that helps to ensure a greater level of consistency. These human in the loop interactions allow for the best in time efficiency and diagnostic accuracy.

Ki-67 protein cell counting is a strong example of AI in reality. This very time consuming and laborious task, has been automated in parts of the world including Linköping and Utrecht, by applying an algorithm that within seconds identifies up to 1,000 cells within a region of interest – the area that the pathologist needs to be concerned with.

The human is in the loop to fix any incorrect positives and negatives, but the algorithm in conjunction with the pathologist, reduces the time that would be spent manually counting cells, whilst ensuring the highest level of accuracy.

No single technology

AI is advancing at such a pace it is far beyond what any single technology provider could ever hope to cover. Medical imaging technology suppliers must provide an open interface to give very clever people the opportunity to apply their innovations.

Radiologists, and increasingly pathologists, are accustomed to working with a single harmonised user interface, where they have all the diagnostic information at their fingertips.

If it is to be used and accepted, AI must become harmoniously available to users in the systems already being used – such as their picture archiving and communication system, so that they can access that AI functionality for imaging they are working with. In November 2017 a vendor neutral ecosystem was launched to make this possible, enabling hospitals to choose which AI vendors to work with.

We are working with AI partners to enable algorithms to run in the background on a CT scan or any imaging, to highlight conditions that the radiologist might not otherwise be looking for.

AI acceptance

AI is now increasingly being accepted by the clinical community as being absolutely essential. Diagnostic departments too are embracing this trend, and just as 10 years ago radiology looked very different than it does today, 10 years into the future, I have no doubt that will be repeated for many 'ologies'.

The drive for better diagnoses will be the prevailing factor. A radiologist or pathologist that uses AI will be better than one that doesn't. ■

Human Transformations that Could Make Us Healthier in the Next Decade

By Rohit Talwar, Steve Wells, Alexandra Whittington, April Koury, and Maria Romero

In the coming decade will we see disease and disability disappear? We are entering the age of artificial intelligence (AI). But, rather than wither away in the face of AI, humanity is now positioned for an evolutionary leap through the inventions being pioneered today in human augmentation science. It is increasingly conceivable, and scientifically possible, that humanity might be ready to surpass all previous real or imagined limitations of our brains and bodies.

Here are 14 radical suggestions that may change the health of humans in the coming decade:

1. Organ Regeneration

The ability to regenerate human organs could end the ravages of disease, aging, and even injury. By 2030, organ regeneration modification may be the signature transformation of life-extension adopters.

2. Implanted Immunity

Subcutaneous implants would detect pathogens in the immediate environment and provide antibodies to protect us from specific contagious diseases. This would make most public health measures irrelevant as coughing, sneezing, and touching may no longer pose a risk. Handwashing could become a redundant activity and vaccines unnecessary, while a global antibiotic crisis could also be averted.

3. Content Upgrades

In the next 10-15 years we could be able to perform instant content updates to the human brain e.g. uploading a new language, a map, knowledge about a client or project, and key information prior to a romantic date or a business meeting. This would be achieved either through direct downloads to our web-connected brains or via plug-in memory devices for more confidential information.

4. Colour Blindness

Gene therapy has cured colour blindness in monkeys; if clinical trials are allowed, colour blind humans may be next. Eventually, science may expand our colour vision to include all wavelengths of light, from gamma rays to ultraviolet to radio waves. Humans might literally see the world in a whole new light.

5. Hearing

As humans age, we naturally lose the ability to hear higher frequencies. In the future, we may be able to reverse this, or even enhance human hearing beyond the normal range via aural implants directly connected to our brains.

6. Perfect Body in a Pill

What if, at last, medical science achieves the ultimate win for sofa surfers, and creates a pill to give you the body of a god without putting in all the work or adopting any healthy habits? Ripped abs, ageless skin, perfect proportions—what more could someone want? For those who ➪

want more, a second daily pill could generate an intoxicating body odour.

7. Endoskeleton

Become stronger and fitter from the inside out, but without most of the requirement for exercise and healthy eating. Physical and genetic enhancements applied to your bones and muscles would improve your BMI and performance from the get-go. Reinforced bones would improve tone and strength with no extra work needed.

8. Heightened Sensitivity

Through deep brain stimulation, humans may eventually have total control of how much physical sensations affect them. We could turn a dial to increase touch sensitivity during intimate moments, or while playing a car chase computer game, but dial down our sensitivity in anticipation of a physical altercation.

9. Cosmetic Gene Editing

The gene modification technology known as CRISPR introduced in 2012 has already made it "cheap and easy" to edit genomes inside the body. The CRISPR system's ease of use means it could be used for almost any gene-editing technique. While doctors could apply the technology as a targeted cancer treatment, we could also see the same approach used for cosmetic augmentation. For example, high street centres could provide services to change clients' hair thickness, eye colour, and skin pigmentation, making CRISPR treatments as common as other beauty and lifestyle options.

10. Digital Happy Pill

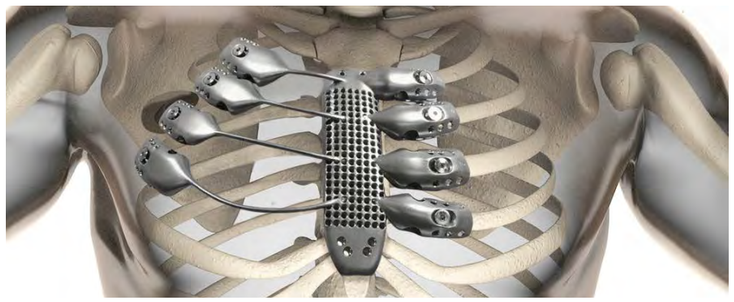
Dwellers of the world's high-tech smart cities could opt to take a pill that lets them have their lives monitored and managed remotely with 24/7 data capture and surveillance, day in and day out. Imagine each and every behaviour monitored, and, if necessary, modified, by the city's central nervous system based on a smart city artificial intelligence (AI) program. One of the ways to alleviate fears, paranoias or other mental delusions concerning "privacy" might be to take this daily "digital happy pill", jointly monitored by city planners and medical professionals to ensure smart city residents are the happiest citizens on earth! Smile, you're on camera (constantly, even in your own home)!

11. 3D Cloner: See and Print

This device would allow a product to be identified and 3D printed in real time and "on sight" with special optical lens implants which trigger the cloning of the item being viewed by the wearer, like taking a snapshot. Clothing, food, and even medical products like prosthetic arms or legs could be created instantaneously on the spot, "cloning" whatever item the user glances at, and transmitting them to be produced on 3D printing machines.

12. The God Pill

Advances in pharmaceuticals and neuroscience could lead to a breakthrough drug designed to experience a higher state of consciousness which some might call 'God'. This might provide a feeling of one's place in the universe, a sense of oneness with nature, or help you visualize yourself face to face with an actual deity. These hallucinogenic experiences would fall somewhere on a spectrum between recreational and therapeutic, depending on the recipient's state of mind at the time. This could be perfect for coping with mid-life crises, dealing with the death of a loved one, anxiety disorders, accepting a terminal diagnosis, and recovering from addiction. Or, just try it for fun.



13. VR Empathy Machine: Walk a Mile in My Shoes*

Conflict resolution would be simplified with VR empathy films which allow friends, family members, teachers, students, bosses, workers, and even litigators in court to literally see the world through each other's eyes. Benefits would include greater interpersonal intimacy and understanding, elimination of sibling rivalries, and dealing swiftly with difficult people.

**Requires pre-installation of memory recording device.*

14. Exoskeleton

Achieving superhuman strength and endurance might be possible with an exoskeleton suit of external body armour that turns any average person into Iron Man. Physical labour would be a breeze with the addition robotic arms, legs, and a back which never tire or run low on energy. Whilst this would be great for work or recreational sports, it puts house movers, construction workers, and weight lifters at risk of being "replaced by cyborgs."

These may seem like something out of a Luc Besson movie, but by 2030 they could be, not just reality, but commonplace.

About the Authors

Rohit Talwar, Steve Wells, Alexandra Whittington, Maria Romero, and April Koury are from Fast Future which publishes books from future thinkers around the world exploring how developments such as AI, robotics and disruptive thinking could impact individuals, society and business and create new trillion-dollar sectors. Two new books from Fast Future are: 'Beyond Genuine Stupidity - Ensuring AI Serves Humanity', and 'The Future - Reinvented: Reimagining Life, Society, and Business'. ■

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