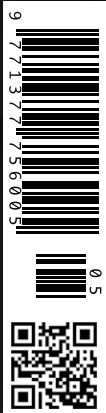




Show Me the Money



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Patient Engagement – An Adjuvant Therapy With Demonstrable ROI





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Show Me the Money

The COVID-19 pandemic has wreaked havoc across the globe. Healthcare systems are facing significant financial challenges in terms of lost revenue, resource shortages, and increased healthcare costs. Never before has there been a greater need to focus on planning and budgeting, identifying reasons for the lack of preparedness by the healthcare sector, improving accountability, analysing performance, and identifying and prioritising strategies and interventions that are cost-effective and that can help healthcare systems around the world recover and forge ahead.

In our latest issue, **Show Me the Money**, our contributors analyse the economic impact of the pandemic on the healthcare industry, the financial burden of chronic disease management and other economic challenges faced by this sector. They talk about strategies that could help healthcare recover from these challenges and attain a new normal and discuss novel solutions and tools that can help improve the bottom line.

Florencio Travieso talks about data monetisation and how data can be used as an economic asset to maximise efficiency, reduce costs and add business value. Hans Erik Henriksen highlights the continued increase in chronic diseases, the resources and costs associated with the treatment of these diseases and the need for a new approach to reduce these costs while improving patient quality of life.

Janette Hughes, Frans Folkvord and Astrid van der Velde introduce the concept of Hospitalisation@Home and the use of a MAFEIP tool that helped assess the impact and cost-effectiveness of this digital home hospitalisation intervention for heart failure patients.

Panagiota Pietri talks about the health, social and economic consequences of the COVID-19 pandemic and highlights the need for more effective strategies for both disease control and economic stability beyond lockdowns and quarantine measures, while Emma Sutcliffe presents the patient's side of the story and discusses why patient engagement is important and how long term patient engagement programmes can result in cost savings and a huge return-on-investment for healthcare organisations.

In our Management Matters section, Diane Bell discusses the power of digital in healthcare, especially evident during the pandemic, and emphasises the importance of human contact and the need to establish digitally enabled healthcare while prioritising the human touch.

Stefan Heinemann and Jochen Werner talk about the principle of digital prevention and why value creation in healthcare should not be limited to disease treatment but should also focus on precision prevention.

We hope you will enjoy this issue. As always, your feedback is welcome.

Happy Reading!

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DISCLOSURE OF CONFLICT OF INTEREST:

Point-of-View articles are the sole opinion of the author(s) and they are part of the HealthManagement.org Corporate Engagement or Educational Community Programme.

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Establishing Digitally Enabled Healthcare – The Need to Move From High Touch to Relevant Touch

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Diagnosing Initial Orthostatic Hypotension – The Race Against Sudden Blood Pressure Drops

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Does Mechanical Thrombectomy Provide Economic Benefit In Ischaemic Stroke?

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Have your say. Engage!



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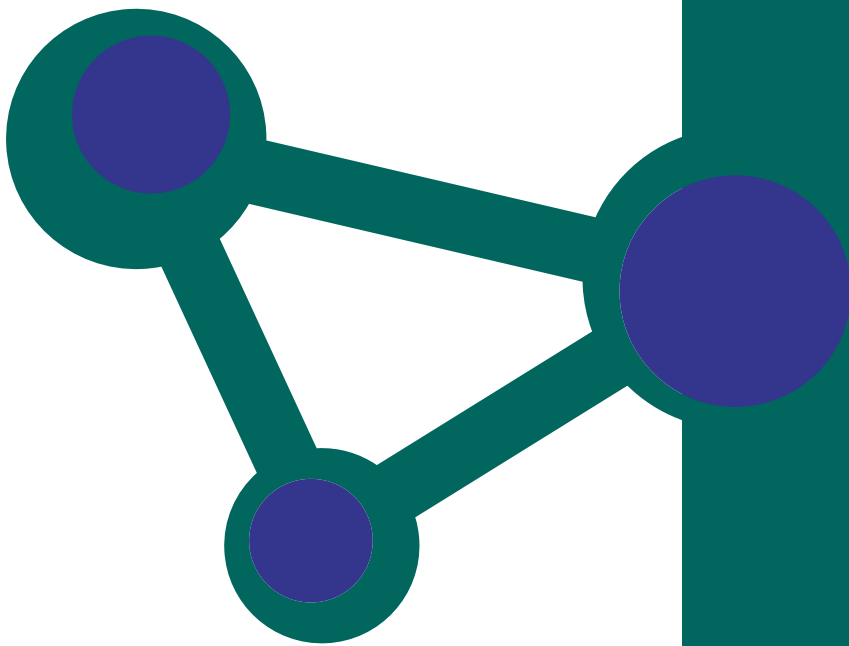
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MANAGEMENT MATTERS

“The legacy of COVID-19 will reach long into the 2020s and starting our recovery on the right footing will be vital. Part of that recovery will be remembering that there can sometimes be no substitute for human contact.” *page 387*

Establishing Digitally Enabled Healthcare – The Need to Move From High Touch to Relevant Touch

◆ Author: Diane Bell | Healthcare Expert | PA Consulting | U.K.

The COVID-19 pandemic highlighted the true power of digital in healthcare. But while technology has helped, it cannot replace the power of human contact. The benefits of digital health cannot be denied but it is also important to establish digitally enabled healthcare while prioritising the human touch.

Key Points

- In healthcare, one of the things COVID-19 highlighted was the true power of digital.
- The future of care will use a service-design approach based around the citizen that is purposefully omnichannel, with care professionals interacting across digital, phone and face to face channels.
- With digital maturity in healthcare systems growing significantly during the pandemic, the need to bring together data from across health and non-health care contexts will also grow.
- It is time to rebalance the role technology plays - keeping the many benefits technology brings while prioritising 'human touch' – what can be described as moving from 'high touch' to 'relevant touch' care.

After a year that's shaken the world, the lessons we've learned during the coronavirus pandemic will continue to affect our lives for months and years to come. In healthcare, one of the things COVID-19 highlighted was the true power of digital. [Virtual consultations](#), digital triage and contact tracing provided access to healthcare at a time when it's been safer to be apart.

But while technology has certainly helped, we've also seen things it can't replace – the power of human contact to psychological health and the contribution body language makes to effective communication, for example.

When there is no longer a requirement for isolated bubbles and restrictions, we'll need to rebalance the role technology plays. We'll need to find a way to keep the many benefits technology brings while prioritising 'human touch' – what we describe as moving from 'high touch' to 'relevant touch' care. If we can use technology to free clinicians' time to hold a hand, or identify what interventions are best and when, then

we are using it to make the best use of human contact time.

Some have already started to seize this opportunity – pre-pandemic, [some larger healthcare organisations were introducing technology designed to free up time for patient care](#). Now this needs turbo-charging across care systems. But after a year of fighting against a crisis, this readjustment in technology's contribution needs a sensitive implementation.

Maximise Digital Opportunities in Care Pathway Redesign

Before the pandemic, centralising specialist skills and services was a core theme in care pathway design. This brings the upsides of increased efficiency and reduced clinical variability, but it also has significant downsides for patients, families and clinicians needing to get to and from these centralised hubs. Moreover, such hubs can't have the same level of knowledge of populations or patient relationships as they're dealing with

much larger areas, which threatens the holistic approach to patient care.

The [rapid increase in telemedicine and virtual doctor appointments](#) shows a different way to provide specialist input into clinical care, with care pathways ranging from [musculoskeletal care](#) to [rare cancer](#) care successfully using such technology. Videoconferencing platforms allow specialists from anywhere in the world, and even other disciplines, to easily contribute and provide more rounded approaches to care.

Echo, with our Argenti service to help care for the vulnerable. And, as more people have suffered from COVID-19, we've seen an increase in home monitoring of blood oxygen levels through pulse oximetry in a bid to catch symptoms sooner.

However, the ability to collect and transmit health data is only one part of the solution. Just as important is the ability to rapidly analyse the growing amounts of health information to extract valuable insights for patients and clinicians, alerting them to early signs of deterioration and supporting clinical decision making. The insight generated can also help

The legacy of COVID-19 will reach long into the 2020s and starting our recovery on the right footing will be vital. Part of that recovery will be remembering that there can sometimes be no substitute for human contact

By using technology to bring together local clinicians who have a relationship with the patient and specialists who bring subject matter expertise, healthcare can provide a more bespoke patient experience while reducing inequalities in access to care. This approach could even improve the understanding of many conditions, as specialists could join more conversations at an earlier stage, thereby enhancing their view. Moreover, the digital connection between this clinical team and their patient constituents can provide both an alternative way for them to engage in care monitoring and planning, and an opportunity to flag when to switch to human contact.

To do this successfully means shifting away from considering digital strategy separately and in isolation from clinical care delivery or defining the clinical strategy first and then considering the digital solutions. We must instead take a service-design approach based around the citizen that is purposefully omnichannel, as care professionals interacting across digital, phone and face to face channels will be part of the future of care. We have seen success in taking this approach in the delivery of national and local services where the local digital infrastructure for care was as important in redesign as considering the physical space and facilities required to deliver care.

Use Artificial Intelligence to Identify Relevant Touchpoints

The advent of smart and wearable technology makes it easier to remotely monitor people's health. Pre-pandemic, we proved the [benefits of using consumer technology](#), such as Amazon

segment patients into those who are more likely to benefit from frequent human touchpoints, those who may thrive on a mix of digital/human, and those for whom a largely digital interface may be optimal. It is also critical in dealing with the inequalities in care provision, such as those cohorts where COVID-19 vaccine uptake is lower whilst the risk of infection remains high.

Technologies such as the those [promoted by the European Institute of Innovation and Technology](#) can process significantly more information in a systematic and consistent way than people can, showing that artificial intelligence (AI) has the [potential to save time, money and lives and is becoming standard technology in some health systems](#). With digital maturity in healthcare systems growing significantly during the pandemic, as will the need to bring together data from across health and non-health care contexts. It is only a matter of time before AI plays a more routine part of clinical care, thereby increasing not just the time available for face-to-face clinical care, but the benefits and improved outcomes of that contact coming at the right time.

As this starts to happen in the post-pandemic healthcare system, it is important not only to consider the technology of AI, but the end-to-end data value chain of data capture, quality, curation and usage, so that when AI-based systems are introduced, they can bring benefits as quickly as possible. We need to move to the concept of "circular data flows" where the insights that we generate then drive routine care delivery and enhance the data being captured.

Make it Easy for the Workforce

Past examples of major technology redesigns, such as the introduction of electronic health records and [clinical decision support systems with the associated business and service change](#), caused clinicians more stresses than they relieved. Faced with a workforce teetering on the edge of burnout and dealing with growing waiting lists for non-COVID-19 related care, it will be crucial to make new technology easy for clinicians to learn and use.

Adapting existing systems gradually, making subtle changes to the care environment that alleviate burden, facilitating more contact with citizens, and gathering frequent feedback will all be essential. It's an [agile approach](#) that focuses on solving the problems clinicians face rather than simply injecting technologies into the workplace. It also helps familiarise care professionals with new ways of working in a more measured way so that they can appreciate the benefits rather than fear the burden that a hybrid digital/human approach can bring.

At the start of the COVID-19 pandemic, [we worked with](#)

[the Norwegian Directorate of Health](#) to identify the best opportunities to use technology to provide care more safely and support the health of vulnerable people. Within a few weeks, we paved the way for the widespread use of video consultations and robotic medicine dispensers across the country. This wasn't just about adding in new technologies but rather working alongside clinicians to help them make the most of what they have – in terms of both technology and time to spend with patients.

The legacy of COVID-19 will reach long into the 2020s and starting our recovery on the right footing will be vital. Part of that recovery will be remembering that there can sometimes be no substitute for human contact. Technology is a means to that end, to help us use our limited human resources in the best way possible.

Conflict of Interest

None. ■

Chronically Healthy, Digitally Sovereign and Sufficiently Successful - On the Way to the Prevention Age?

◆ Author: Stefan Heinemann | Professor of Business Ethics | FOM University of Applied Sciences | Spokesman | Ethics Ellipse Smart Hospital of the University Medicine | Essen, Germany

◆ Author: Jochen A. Werner | Medical Director and CEO | University Medical Center Essen | Essen, Germany

It is time to rethink the healthcare system from the principle of digital prevention. Value creation in healthcare should not be geared to diseases, but to prevention. Prevention should be the priority. Only in this way, we achieve crony health, digital sovereignty and sufficient success for all.



Key Points

- It is a general error of the modern world to repair rather than anticipate and avert worse i.e. to prevent.
- Economically-driven societal designs are relying on the costliest problem-solving imaginable.
- Precision prevention addresses everyone and does so in an educational way, at least if ethically responsible strategies and - in the case of for-profit offerings - corresponding clean business models are in place.
- Any sustainable society must be prevention-centred and health-oriented.

On the Threshold

It is a general error of the modern world to repair rather than anticipate and avert worse, or in other words, to prevent. The much-cited digitalisation does not really change this circumstance, although the prognostic power of mass data systems and the algorithms analysing them are praised again and again in various social contexts such as the economy but also medicine.

We are guessing more and more about a future that, at the same time, we are less and less able to shape despite this plus in digital foreboding competence. At the same time, the world is reaching a tipping point of complexity, the patterns of which can no longer, or soon will no longer, be adequately grasped by human cognition and emotion in the sense of problem solving. Which in turn means relying more on digital intelligence than on natural intelligence. And so on.

In doing so, we (essentially meaning the Western, economically-driven societal designs, and today, by far, this does not only include western states) are relying on the costliest problem-solving imaginable, instead of simply living more foresightedly

together (prevention priority/sustainability), wanting to learn more (sovereignty/autonomy) and generally cutting back a little on production and consumption (sufficiency). So, in the broadest terms, we are on the cusp of an old age of therapy in a new, digital guise, or the dawn of a new, digital values oriented age of prevention. Our generation can still decide, maybe 5-10 or even 10-20 years, but certainly not delegate it to future generations. They will only be left with the rest of the world and society that we will leave behind.

For ethical reasons, a generation-appropriate solution to the problem of the future can neither be dispensed with, nor can it be resolved unilaterally in favour of living generations; whereby large parts of our world already have to live today in the way that the other parts are likely to have to live in the future. To grasp this view argumentatively, rather soft, relativistic ethics are of little use. Only universalist, even cognitivist approaches can help - any ethics that depends on more than itself as a corrective must buckle before the challenges of the future. Yet it is precisely these challenges that are its core business. Ethics cannot be made; it does not follow the logic of economics,

digitalisation or anything else in the world. On the contrary, it should enable us to make these things in the world positive and welcome. But not by exhorting in a moralising way that is distant from the world, by including the facts as such in ethical deliberation; not as justifications - this would be categorically false, but as necessary premises alongside normative considerations. This is not identical with a homage to the supposed normative power of the factual - not everyone can objectively make everything possible, but what is possible must precisely not be dismissed merely subjectively. Without ethics it is not possible; it is the guiding discipline for problem solving. Law can only help where it is itself ethically identifiable, as is often the case in respectable constitutional states (which, however, have not always been such historically). Economics, like its technology sister digitisation, is not normatively active - and thus not per

economic, and therefore social) challenges. The “bias” has many guises in digital prevention, from discrimination to automation to misincentivised consent formats (Friele et al. 2020). These gestalts are familiar from mainstream discourses around the ethics of digital medicine and the health economy (Heinemann and Matusiewicz 2020; Heinemann 2019). And yet, what is addressed with digital prevention in addition to diagnosis, therapy, and follow-up is that preventive measures could potentially lead to covert disadvantages, as it were, for certain groups of people with certain diseases with the corresponding data-driven insights. The preventive successes of the one could become the therapeutic limitations in terms of funding of the other. But only if such secondary use is not clearly restricted (which Art. 9 I GDPR does by way of example).

If the potential of digitisation is to be harnessed for prevention,

Ethics cannot be made; it does not follow the logic of economics, digitalisation or anything else in the world. On the contrary, it should enable us to make these things in the world positive and welcome

se “bad”, “evil” or the like. But should be employed with moral prudence, and above all with a view to a sustainable, prevention-oriented society. For how else could a morally acceptable future succeed?

Digital Medicine As Ethically Grounded, New Medicine and Prevention Utopia

Now just with medicine, in the broader context of “health” as a whole, a very special form of thinking and acting is involved. The fact that the “world” itself, or at least “societies”, are in need of “healing” may at first sound unconventional only to a theologically trained ear. What is meant here, however, is that the basic principles of medicine, which are ethical principles, also offer honey as a guiding principle for a broader perspective, i.e. one that goes beyond medicine and, in the broad sense, healthcare itself. This applies especially for digital medicine, for ethically founded, new medicine with a focus on “prevention”.

It is true that digital prevention cannot succeed without data and its smart use. “Prevention is generally understood to mean measures aimed at reducing the possibility of health damage occurring or damage that has already occurred. Digital products and services can contribute to prevention in different ways” (Friele et al. 2020; Hurrelmann and Laaser 2006). Prevention, in form of the increasingly available precision prevention, thus occupies a special position in the discourse to date. For both from the point of view of efficiency and from the point of view of effectiveness, the concept of digital prevention, sharpened in the self-care approach or in You-Hospital, appears *prima facie* attractive (or disturbing, as the case may be). However, even without the exaggeration offered here towards a general social vision, it must deal with many ethical (but also legal and

major ethical and legal challenges arise in terms of protecting fundamental rights and freedoms and socially relevant values. In addition to the health of the individual and society, these include (informational) self-determination, privacy, solidarity and justice” (Friele et al. 2020; Data Ethics Commission 2019). Beyond Friele et al., one could ask with a slightly different accentuation which ethically fundamental arguments make prevention in particular the guiding paradigm of digital medicine and thus only an appropriately positioned digital transformation of medicine can be designated as welcome. Further questions regarding the ethical dimensions of implementation as well as the scientific-logical preconditions such as the evidence of prevention (Fischer 2020) and many other normative as well as descriptive considerations and discourses are, of course, to be added. If this steep thesis that these considerations could ultimately be productively transferred from medicine to society as a whole (which is only asserted here, far from being demonstrated) were correct, an even greater potential for impact than already exists today could be tapped from medicine. Medicine would not wait to shut the stable door after the horse has bolted, but clearly before, in the “coming to the situation” would lie the actual point.

What medicine is able to achieve digitally as precision prevention as ethical-digital medicine can perhaps make clear overall what would be possible. Because not everyone wants to be driven autonomously (basically heteronomously), but everyone wants to be, become and stay healthy. And always, throughout his life - not just as a young person. Life-long prevention. Separating the world into “sick” and “healthy” requires the conceptual narrowing of prevention to interruption of illness. “The [...] strict separation of “healthy and sick” in one person, on the other

hand, has given way, especially in older patients, to a grey area of documented diagnoses without disease value, chronic illnesses without symptoms, up to permanent suffering and need for care as visible consequences of experienced illness” (Anders 2015). In old age, digital prevention will become increasingly relevant, despite all the challenges of the silver digital divide, driven by an irreversible demographic development (fewer, older, more diverse) - how else should the economic and social consequences in areas such as long-term care of a chronified sub-population be managed in such a way that “life” remains “worth

addiction to exercise, with vital, gene-analytical and/or other phenotypical and core medical data, prevention can be optimised tailored to each individual. Also in the context of old and new work, a “BPGM” (company precision health management) is certainly welcome in companies and among employees by principle. From health promotion to primary, secondary and tertiary prevention, the diverse approaches range, more networking (also with ePA) makes sense. If you look at the “First Prevention Report in accordance with § 20d para. 4 SGB V” of the “National Prevention Conference” (which received the mandate

Economics, like its technology sister digitisation, is not normatively active - and thus not per se bad, evil or the like. But should be employed with moral prudence, and above all with a view to a sustainable, prevention-oriented society

living”, largely autonomously, even in old age?”

Precision prevention addresses everyone and does so in an educational way, at least if ethically responsible strategies and - in the case of for-profit offerings - corresponding clean business models are in place. The threshold of participation, education and strengthening of the health data sovereignty of patients must decrease overall in order to avoid a digital health literacy divide and vice versa. Only an inclusive digital transformation of prevention can be convincing. “In the future, ‘health’ and ‘disease’ will become new or at least adapted terms to be grasped, which also make a new health literacy classification in the digital necessary. Not only more and more digital competencies will become important in medicine and the health industry (and indeed also for the ‘professionals’) (Heinemann 2020), but digital medicine itself offers, in addition to ethical risks, very many opportunities, especially for all those who are able to develop a certain literacy in this context. For those who fail to do so, many doors to new precision prevention options, therapy options, financing channels, etc. will not open in the first place. This triple divide appears to be an essential challenge: the general public in the sense of general digital health literacy, moreover the participation in new opportunities in medicine in particular, as well as the professionals, who could either develop game changing competencies themselves or be left behind” (Heinemann 2021).

Ultimately, precision prevention, data-preventive medicine, will work. At least if it prioritises evidence and methodological credentials, which is also necessary for this form of complex intervention (Fischer 2020). Cyberchondria is not a desirable consequence of persistent self-tracking, and “guessing with data” is not a smart approach for less-smart “health” apps (whether as unregulated apps or as regulated medical devices). It would make sense for ultimately all digital prevention products and services to have evidence of efficacy and safety, even if they are - as is almost always the case currently and “only” - about behavioural prevention. From obesity, diabetes and

for strategy development in 2015 with the Prevention Act) from mid-2019, it outlines actors of prevention, health, safety and participation promotion”, and you immediately get an idea of how the system complexity often makes good ideas difficult to implement, and on the other hand that the private sector and wider society play no role here. Which is certainly a problem, since the social funds can neither restrict nor should restrict private consumption, social disadvantage etc. in a strong sense (loc. cit., p. 257). Thus, prevention is not that simple as it may sound either. “Eat healthy and exercise! Be nice and friendly to people and behave!” - basically, grandma was already a prevention coach.

How Dare We!

Understood in this sense, digital precision is a utopia. If it wants to be more (which it can and thus should, the reverse does not apply) than a renewed - and medico-historically not new - further stage of harnessing technology in the orthodox mindset of “medicine”. In contrast, it would be better and ethically imperative (since it is objectively possible) to abandon chronic treatment in neo-feudally structured institutions, guided by an ethically based but economically reshaped (and therefore also not sustainably economically successful) and overly bureaucratized framework system, in favour of a better, digital, fairer medicine in a sustainable, sufficiency-successful and moderating overall context, which is organised and lived in a data-sovereign and partnership-based manner by professionals as well as the patients standing at the centre. Current discourses on systemic medicine (Schmidt 2021) make it clear within medicine, but also far beyond it, that there may well be a broad sense that “digitisation” in “medicine” is not sufficiently in-depth, is too technocratically conceived, and that the comprehensive change potentials of an overall systemic nature, such as those envisaged by the flagship initiative “Smart Hospital” in a certain reading (Werner et al. 2020), offer much more potential for impact.

Any sustainable society must be prevention-centred and

health-oriented. “How dare you!” (Greta Thunberg’s angry announcement in 2019 before the UN Climate Summit) ([youtube.com/watch?v=qHgKaDUiVhM](https://www.youtube.com/watch?v=qHgKaDUiVhM)) - how can we dare to talk about “future” with any conviction at all and at the same time not let the massive empirical evidence, ethical arguments and the daily growing suffering of more and more people become the principle of our decisions and actions?

Prevention for one’s own health is at the same time always prevention for the health of all and vice versa and in this sense, it is perhaps the highest solidarity that can be had at the same time at the lowest price. However, since human beings do not live on the basis of ethical (as well as economic) insight alone, but rather cling to the often unethical or even supposed benefit, ideas, initiatives, measures etc. that bring a high benefit to all, but at the same time do not bring at least a lower benefit to the individual - and vice versa - are quite regularly not a social success model.

We know that sustainability will only succeed as “sustainable sustainability” (Heinemann 2011), we know that it will not work without changes in consumerist lifestyles marked by renunciation (since efficiency is not enough, what matters is effective sufficiency), we know that health communism is neither just nor realistic, and we also know that without at least a sufficiently large proportion of prevention-centred people shaping their lives, it is five past twelve. Without health there is no sustainability, without sustainability there is no health.

And now? To develop prevention into a leitmotif of an open and successful society in the 21st century is perhaps a utopia without alternatives. There will be “illness”, but to expect a loss of freedom for the eHealth-self where this appears to be avoidable without major efforts is not completely unjustified and can still be shaped. For this is the concrete “how” that matters. Enlightened prevention is the means of choice - not the uncritical, data-forgetting banal use of all kinds of digital measuring devices on people, but the strengthening of digital health literacy for the sustainable development of a digital prevention lifestyle appropriate to the democratically secured form of government. Without encroachment, but also without recklessness at the expense of all.

At least the cost bearers have been dreaming this dream for decades, even in analogue form. So far, however, it has not really succeeded. This is also because the possibilities of marketing campaigns for preventive care, more sport, etc., which could not

be interpreted as a disruptive, patronising intervention, were rather limited, the benefits were already individually hardly directly tangible for too many - and the argument of solidarity with everyone simply does not hold water. In the digital world, different rules apply. Some of them are to be evaluated critically, others can be used wisely. For prevention that is perceived as a benefit, as an opportunity, as positive, that is data-based and therefore precise, and at the same time benefits public health in an equally data-based way, integrated models are still lacking. A sheer immense number of products, institutional activities of hospitals, health insurances, industry etc., governmental formats, research and much more do not shed light on the opaque health care system so far.

This requires a completely new approach to thinking about prevention. Digitally, ethically and critically. In other words, consistently aligning all strategies, measures and success measurements with the idea of precision prevention. Not so that we all become machines that live forever. Not so that we can carry out every overexploitation of ourselves in a controlled manner, but because digital prevention will be a decisive addition to the enlightened citizen in the 21st century, indeed it will co-constitute him. Because without this guiding principle, sustainability worthy of the name will hardly be possible. Where is the motivation to take seriously the ethically first-ranking right of future generations supposed to come from, if even the value of one’s own health is underestimated, and even more so the value of the health of others?

Only by rethinking the healthcare system from the principle of digital prevention. Value creation should no longer be geared to diseases, but to prevention. Medicine should no longer be oriented towards subjects, but towards the human system and ethics as a whole. Care should no longer be interpreted as a tension between the economic and the social, but as economically successful action that is only made possible by values. Thinking of prevention in terms of biographical dynamics, at every age. And much more. Only in this way can we all become and remain chronically healthy, digitally sovereign and sufficiently successful.

Conflict of Interest

None. ■

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Regional Radiology Collaboratives - Benefits of Intelligent Networking?

Author: Daniel Fascia | Director of Radiology | NHS Nightingale Yorkshire | Consultant Musculoskeletal Radiologist | Harrogate & District NHS Foundation Trust | Clinical Lead | Yorkshire Imaging Collaborative Project

The Yorkshire Imaging Collaborative (YIC) is a combined technology and business transformation project which unified radiology imaging and report-sharing between 8 NHS trusts across Yorkshire, including the recently established NHS Nightingale Hospital Yorkshire and the Humber. Dr Daniel Fascia has extensive experience in radiology practices and technologies and has been in post as the Clinical Lead for Transformation at the Yorkshire Imaging Collaborative since 2017.



Key Points

- The Yorkshire Imaging Collaborative (YIC) transformation programme was designed to create a single unified radiology image and report sharing network across central Yorkshire.
- Agfa HealthCare's Enterprise Imaging (EI) is an imaging platform which provides Trusts with a unified PACS, complete with clinical tools, reporting functionality and a powerful workflow engine to maximise productivity.
- Agfa HealthCare's XERO Exchange Network (XEN), a web-based platform, is a sophisticated piece of viewing software that offers clinicians the ability to share images with other XERO users as part of a new XERO exchange network (XEN). This is particularly beneficial in support regional networks and ICSSs.

Background to the Project

Dr Daniel Fascia is the Clinical Lead for the Yorkshire Imaging Collaborative (YIC) project, an eight-site group of NHS Hospitals whose ambition was to ensure that every patient in Yorkshire could attend an appointment and have full availability of their medical images and associated reports at the point of care.

The YIC went out to tender in 2017, and after a competitive process, the final contracts were signed with Agfa HealthCare to implement its Enterprise Imaging (EI) solution and XERO Universal Viewer, collectively known as XERO Exchange Network (XEN). In 2020, the YIC began to connect the XERO Image Viewer at each site to form the XEN across the Trusts.

The network was live within 4 weeks, and enabled the connected hospitals, which collectively cover a patient population of over 3 million, to diagnose patients who are transferred between sites at a much quicker rate than was previously possible.

What was the biggest hurdle in implementing a multi-site project of this size?

The biggest hurdle is less to do with technology, and more to

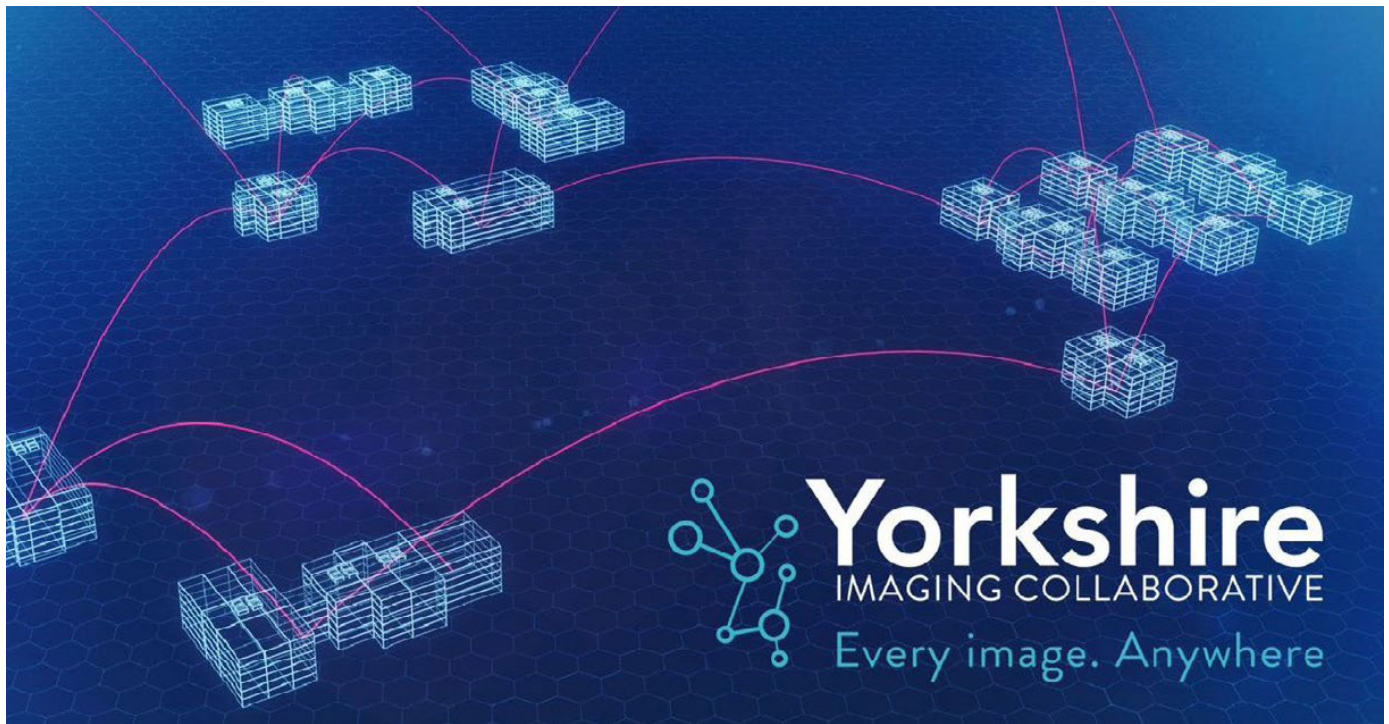
do with the difficulties of the transformation - getting Trust teams philosophically on board.

During the earlier stages, many of the team agreed that the collaborative approach is a great idea, however when it comes to deploying the very concept we've discussed, there is resistance from the same group.

This emphasises that any source of change - positive or negative - is disruptive for human beings. Change needs nurturing carefully, and as a Collaborative, we needed to be sure to manage this diligently.

How did you mitigate these challenges?

The Collaborative adopted a specific approach to support a gentle transformation - a franchise model. This entailed lots of meetings, brainstorming, inviting opinions and reviewing how a change could be implemented. The project board would converge, discuss, and finish the meeting by concluding what we have decided. This way, any decisions and associated actions will not be a surprise, as each franchise holder had a contribution to the conclusion.



Generally, when you explain the concept to the project stakeholders, provide them a background of why a change is needed, and help them to understand how it will improve patient care, improve data accuracy, speed up working and running of meetings, they seem to be on board. This is because they gain an understanding of how it matters, and why it is important to them, the Trust, and our patients.

The Collaborative had the XERO Exchange Network (XEN) deployed within the Enterprise Imaging platform. Can you give an overview of the clinical benefits of a united radiology imaging and report-sharing solution?

The Project Board wanted one key outcome for the Collaborative - that every patient's full set of images, and the associated reports, would be available at point of care. XEN allowed us to do that.

The solution provided us with an index of all medical imaging for the region, along with the relevant reports, so that health-care professionals could search by the patient's NHS number, find their record and view current and prior images across other sites; essentially having the full imaging record available. Reviewing this wider scope of information is an essential part of writing a good radiological report – it reduces administrative questions, enables concise comparisons and allows more certainty. This helps us achieve a gold standard of care.

In addition, as clinicians started to work more remotely due to the pandemic, this exchange of information was a huge benefit. The interruptions of COVID-19 also meant that we were having to ask patients to be scanned in other hospitals - other than what was routine, and yet we still had to review the results. XEN supported this change in working.

We experienced an adoption curve, which was combined with the general disturbance of clinical tasks during COVID-19, but the group soon realised the key feature of seeing images from everywhere and understood that it was a big game changer.

How did these clinical realisations equate to benefit to the patient?

The ability to receive remote care. As an example, a patient can receive a scan in one of the peripheral hospitals, and yet his/her clinician at Leeds Teaching Hospital can still review it as simply as if the study was performed in Leeds.

This flexibility for the patient was paramount, especially during the pandemic when travelling was compromised and larger hospitals were already under significant strain with managing the surges in admissions and wanting to reduce the number of visitors to site.

What is your overall experience of the Enterprise Imaging concept within a Collaborative project?

Enterprise Imaging has been a very successful PACs replacement across our Imaging departments. It's a very modern piece of software which has a higher emphasis on workflow and built-in image viewing capabilities. The YIC found it to be an incredible productivity upgrade.

As a Collaborative, XERO Exchange Network allows Yorkshire NHS Trusts to collectively access radiology reports and view all images - across our entire region, completing the clinical history and helping us to write a more accurate report. As a radiologist, EI helps achieve that gold standard and is what makes a difference, to us and patients, on a daily basis. ■




COVER

STORIES

“One may be data-rich but could be information poor. Data are content, but information provides the context”. *page 397*

Healthcare Data: A Holy Grail for Data Monetisation

 **Author:** Florencio Travieso | Academic Director of the MSc in Health Management & Data Intelligence | Emlyon Business School | Écully, France

With the increased circulation of healthcare data, data monetisation has become one of the main topics in the data industry. The goal is to turn data into an economic asset to maximise efficiency, reduce costs and increase business value. This article discusses the need to monetise data and how this can be done ethically and efficiently.



Key Points

- Any data can be collected and translated into healthcare data.
- Healthcare data collection and its monetisation create new revenue streams.
- Privacy and regulatory concerns accompany healthcare user data collection.
- Healthcare dispersion is shifting user roles to benefit interlinked services that require fewer intermediaries.

Data vs information - one may be data-rich but could be information poor. Data are content, but information provides the context. With the increased circulation of healthcare data, data monetisation has become one of the main topics in the data industry. The goal is to turn data into an economic asset to maximise efficiency, reduce costs and increase business value. Data and technology have converged so that any device today can transform any data set into healthcare valuable data. This innovation brings both advantages and disadvantages.

Data is the New Commodity

We are all aware of the growing spree of 'big' data and how healthcare data has exploded in the last years. With automatisisation and rapid healthcare data collection and access, we have also witnessed the entry of major disruptors like Amazon, Google, Apple, and Walmart within the realm of healthcare (Smith 2020). As a corollary, the COVID-19 pandemic has operated as a sheer accelerator of these trends. Innovations that were supposed to exist in three to five years are now current.

Data units have shifted from paper to Electronic Medical Records. Data has grown exponentially at a rate of 1400% between 2013 and 2020 (153 exabytes in 2013 to 2314

exabytes in 2020 growth of healthcare data) (Stewart 2020). 'Big' data has a unique healthcare twist: data not explicitly linked to health can be easily attributed as health markers algorithmically. This implies that we can collect almost any data, which can be translated into healthcare data, injecting an enormous amount of value.

Digital Adoption

In the last ten years, patients have accepted smartphone use as a continuation of their bodies. They trust phone applications that gather user-submitted personal and sensitive data and benefit from all the surrounding data that smartphone interaction constantly produces.

Digital adoption has been a game-changer for the industry, exploding the amount of data involved and the trust users have in their devices (RBC Capital Markets 2020).

Pure Healthcare Data

Clinical data is critical for patient diagnosis, treatment, information, and prevention. More importantly, it also contributes to allocating and distributing healthcare resources (decision making) at a larger scale.

Patient data originate from self-reporting in surveys and

forms, information collected at hospitals, pharmacies, health centres, and wearable tracking and connected devices like pacemakers and insulin pumps.

Healthcare Data Can Come With a Price Tag

Understanding the importance of their secondary purpose in the market is a key part of monetising healthcare data. Patient data can be used for research.

An interesting discussion has developed around the idea of patient co-ownership of clinical data. It has been argued that patients benefit from the past use of other peoples' data in their treatment. In other words, the collection of patient treatment data can help develop, improve, and grow the healthcare data landscape (Ballantyne 2020).

This discussion is linked to the term social license: a proposal for extracting data from primary care medical records for commissioning and other purposes, including research

customer and partner relationships.

Two classic examples illustrate this principle but also highlight privacy concerns. In 2018, GlaxoSmithKline obtained exclusive access to process genomics company 23andMe's user data for drug targets (in exchange for \$300M USD), which rattled privacy concerns. In November 2019, Ascension, a private healthcare system in the US, partnered with Google, giving access to its patient health records. This move allowed the tech giant to apply Google's data infrastructure, Google Cloud and G Suite (Schneble et al. 2020). The deal also included enhanced search engine technology on the system's EMRs, improving patient data searchability from the company clinics. Meanwhile, Google had access to over 50 million health records of patients from different providers without a proper consensual warning from Ascension. This triggered action from several U.S. Senators demanding the respect of patients' privacy (Landi 2020).

One may be data-rich but could be information poor. Data are content, but information provides the context

(Carter et al. 2015). These are proposals that tend to make the handling and processing of this data more transparent.

Why Monetise?

Digital transformation of business models implies acceleration, simplification of processes, making them more efficient and - most of all - cheaper. At the same time, these processes create new sources of revenue streams.

Monetisation can happen in two ways, with clearly different consequences. A business can monetise its own data by opening these to third parties (direct monetisation) or can enhance its proprietary data (or public access data) to improve its services (indirect monetisation).

- **Direct monetisation:** Companies can, through partnerships, exchange various information elements between partners without an expressed financial transaction. Start-ups may use this information to enhance their product application data with tailored, personalised recommendations. Very common in the U.S. landscape, direct monetisation can also imply selling raw data straight through data brokers. Indeed, some companies are devoted to collect aggregating, enriching, and monetising public data. These can be used for market forecasting, report subscriptions, and creating analytic data services.
- **Indirect Monetisation:** In this case, companies use insights to improve internal efficiencies (services and outcomes). Businesses can develop products and markets through the use of predictive algorithms, build and solidify

Responsible Monetisation

Companies that wish to proceed in the data healthcare monetisation arena should be prepared for complications, depending on where (what countries) they operate.

Growing concerns around General Data Protection Regulation (GDPR), together with potential future developments in European Health Data Space, imply that companies must comply with an extensive list of requirements for collecting and treating personal (and sensitive) data.

The notion of accountability, responsibility, data identification, processing, ethics, staff training, and cybersecurity and hacking risks are traditional obligations associated with the European Union's regulation.

Companies that collect and treat data require an extensive framework on data protection, data management, data flow, and data asset mapping. This forces entities to track early on how they are collecting data. They also need to justify why they need a user's consent for providing data, why the data is being collected, data collection limits, and the rejection of irregular data.

Collecting data also entails being accountable and prepared to give explanations to local regulators. Controllers and processors must keep a well-documented track of what is performed in terms of data protection compliance (Westphal and Seitz 2021). Documenting the processes confers a better understanding of the reasons behind these decisions and probably a better position in the case of a regulator's audit proceeding.

Finally, but not last: ethics. A strong presence of ethics

throughout the company's culture is an essential step in this process. An understanding of ethical data collection in the business context must be complemented with properly documented training sessions for a broad array of employees within the organisation. This guarantees compliant and efficient operation and reduces the likelihood of future violations of user privacy.

The Door is Open

Healthcare is experiencing important changes that have accelerated in the last decade. The shifting role of traditional businesses in the sector and the looming shadow of tech giants constantly create a new landscape almost every six

months. At the same time, the phenomenon of healthcare dispersion is shifting user roles to benefit more closely interlinked services that require fewer intermediaries. This gives users more power in protecting their data, together with a growing legal framework that is converging in making the user, in a way, the king. Meanwhile, the discussion on data dignity and data dividend is slowly but surely growing in volume.

Healthcare data monetisation opportunities are available, and the options are laid out. What the market (and we) decide to do with them is still unknown.

Conflict of Interest

None. ■

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Patient Pathway Digitisation – More Than Meets the Eye

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An overview of the patient pathway digitisation process and the tools and strategies that can facilitate the journey of digitisation in radiology.



Key Points

- Can digitisation of patient pathways create seamless patient interactions with healthcare providers and enable novel ways of cooperation between clinicians?
- To what extent, in the design of digital tools, can we draw on the experience of other service industries where digitisation is more advanced?
- How much of the success relies on properly tackling healthcare specific challenges in user experience and technology?

As consumers we have come to expect a hassle free and personalised digital online shopping experience. As business professionals, our interactions have changed thanks to a wide range of new digital tools at our disposal. Can digitisation of patient pathways create similarly seamless patient interactions with healthcare providers and enable novel ways of cooperation between clinicians? To what extent, in the design of digital tools, can we draw on the experience of other service industries where digitisation is more advanced? And how much of the success relies on properly tackling healthcare specific challenges in user experience and technology?

Creating a website with medical appointment bookings is a typical place to start the digitisation journey. Here, seemingly - adapting user experience designs from e-commerce or hotel booking websites - should result in a positive patient experience and in efficiency gains for healthcare providers. But while this approach may be enough for standard general practitioner appointments, booking more complex procedures, such as MRI or CT scans on the Internet presents a whole new set of challenges. For example, the required procedure should preferably be correctly and precisely identified at the time of booking rather than only when the patient shows up at the clinic. This is important to adapt bookings to efficient rostering, especially in high-volume imaging centres where grouping similar procedures saves time and allows to serve more patients on any given day. At the same time, it should

ensure, that all patients are accommodated. So, what degree of precision is right: for example, in the choice of the anatomical area, should we stop at “head” in a drop-down menu or distinguish between “brain”, “sinuses” etc. and how can patients alone choose the right specification for their MRI exam?

The difficulty is that with each gain in precision, the booking platform becomes more complex. This in turn leads to some patients becoming confused – especially when medical terms are used, giving up the web booking process altogether and calling the call centre or visiting the clinic. Hence, actively managing the trade-off between simplicity and precision is key to good healthcare services booking web design. Such choices cannot be simply outsourced to a web design consultant - they need to be decided upon in a collaborative effort involving digital, operational, and clinical areas. This type of collaboration enables to consider the consequences of the input gathered during the booking process for the entire patient journey. This is similar to e-commerce – where transactional web design is adapted to the order fulfilment process.

The standard approach to develop such websites – typical in e-business, but often new to healthcare organisations – is that of continuous improvement, following the launch of an initial version, based on relentless drilling down detailed usage data to identify and remove pain points at every digital touch-point along their journey. This approach has been proven to work at Affidea: web bookings of complex MRI and CT exams



can increase 2-3 fold post initial launch and reach levels of several thousand a month in a single country operation.

How will the process of advanced healthcare services web booking evolve in the future? Looking at other industries, the direction is in reducing the number of questions that the customer/patient needs to answer. For example, banks and insurance companies have successfully achieved this in the

or second opinion reports in sub-specialised areas: prostate and breast scans with PI-RADS/ BI-RADS gradings are a common example. The breadth of specialities that becomes available in this way is an important part of the value proposition that a focused diagnostic company brings to any single hospital on top of economic considerations.

For patients and referring clinicians – the technological chal-

Allowing radiologists' remote work enables easier demand-capacity management. It also gives patients in smaller or more remote centres access to primary or second opinion reports

purchase process of say – a consumer loan, a car insurance or home insurance, by drawing on information from available databases.

Similarly – in healthcare, what consumers want is personalised information and guidance. One might expect that in the near future – key information will be read directly from a digitised referral and patients' medical records rather than input by hand by the patient. E-referrals are an important step in that direction.

A second natural area of digitisation is making results of medical exams available remotely. Making the test results of any medical examination available online is nowadays practically commonplace. However, for a company like Affidea, which has a significant diagnostic imaging business, delivering images of CT and MRI scans to reporting radiologists, to patients and to referring clinicians is also of immense value for each of these groups and creates new network effects.

Reporting radiologists typically access these images directly in diagnostic companies' Picture Archiving and Communication Systems (PACS) and work in dedicated centres or at home on medical grade monitors. Allowing radiologists' remote work enables easier demand-capacity management. It also gives patients in smaller or more remote centres, access to primary

challenge of offering access to images is greater, since standard web browsing technologies – on desktops and mobile devices need to be accommodated. Images from MRI and CT scans are delivered in DICOM files which measure several hundred megabytes, while the size of an entire repository of a diagnostic imaging business can easily approach petabytes. But, if movie streaming companies can overcome the challenge, so can a diagnostic imaging business, using some of the same streaming technologies.

While formal reporting needs to be done by qualified radiologists on medical grade monitors, easy access to diagnostic images is valued by referring clinicians for illustrative purposes, e.g., for discussing surgery options. Affidea is deploying the access to images feature via patient portals and clinician portals in more and more markets. Where this feature is already in place, it has shown to facilitate discussions of the more complex cases between radiologists and referring clinicians as well as between referring clinicians themselves in both formal and informal settings. This way – existing networks are being strengthened and new networks are being formed between referring clinicians and radiologists in a way which benefits the patients and cements the relationship of the company with the broader medical ecosystem. ■

Chronic Disease Management – Need For a Paradigm Shift to Reduce Costs and Maintain High Quality of Treatment

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Resources and costs associated with the treatment of chronic diseases account for more than 80% of total healthcare costs in many countries. As our population grows older and with more lifestyle issues and obesity among younger generations, the challenge of chronic diseases will increase in the coming years. New research documents that a new approach to chronic patients can significantly reduce resources and costs and at the same time improve patients' quality of life and help them live longer with their disease.



Key Points

- Resources and costs associated with the treatment of chronic diseases account for more than 80% of total healthcare costs in many countries.
- The Epital Care Model (ECM), a research-based new treatment model, focuses on optimising the treatment of chronic patients.
- The ECM treatment model is more powerful than traditional telehealth because it is based on an optimised patient-centred approach and procedures.
- The 6 step ECM model incorporates clear thresholds and procedures which allow certain tasks to be transferred to non-clinical staff in a secure and regulatory compliant way.
- Technology alone does not lead to new models of care. There needs to be a re-design of the organisational setup which enables healthcare organisations to optimise the value which new technology can provide.

Chronic Patients and Our Current Healthcare System

If we go back in history to the 19th century when the first healthcare systems emerged, the background and driving force was a focus on acute care and the ability to help people who were injured in wars, accidents or who suffered from infections or infectious diseases.

Today, healthcare systems continue to carry reminders of past ways of organising themselves and the underlying culture that underpinned this, although the growing challenge of chronic diseases has radically changed both context and needs. Even though primary care is established and provides an increasing and important contribution to patient-centric

healthcare, it is evident that today's healthcare systems have not been designed with chronic patients in mind.

Chronic patients rely on compliance and on the ability to keep their chronic disease well-regulated and in perfect balance. The obvious example which everybody would understand is the diabetes patient who needs to constantly ensure that their insulin is balanced with their food intake. But the same need for constant compliance is also vital for other chronic patients – e.g., COPD and heart patients. If the period between the first symptoms of exacerbation or worsening and clinical intervention is too long, the result is often a faster deterioration over time of the patient's health status. COPD patients who experience a higher number of severe exacerbations which

result in hospital admittance lose their lung capacity faster than patients who are compliant, well-regulated and avoid severe exacerbations.

The Epital Care Model - A Healthcare System Designed for Chronic Patients

How do we design a healthcare system for chronic patients with a focus on their need for prevention and early intervention? One possible solution could be a reorganisation of services in a proactive direction using Patient Related Outcome Measures (PROM) data generated by patients through telehealth technology. This solution was tested out by a group of physicians, researchers, and municipalities in Denmark back in 2011 when they established the Epital Care project. The Epital Care project led to the Epital Care Model (ECM), a research-based new treatment model with a focus on optimising the treatment of chronic patients. The ECM model is not a completely new healthcare system as such, but rather a way to organise chronic patient treatment in a new organisational setup driven by PROM data, which supplement and support existing healthcare systems.

The ECM model sees through the establishment of a close collaboration between the chronic patient and the healthcare professionals, where the patient contributes with daily condition measurements, which, using telehealth technology, is immediately reported to a call centre.

The call centre staff and healthcare professionals use this information to react proactively and quickly in the event of changes or worsening of the condition over time. With the help of telehealth tools and dispensed medicine available at the patient home, the staff can subsequently carry out even difficult treatments right there. The close and real-time monitoring of the chronic patient's condition and subsequent immediate interventions, when needed, results in constant adjustments of the chronic patient's health status. For the COPD patient, this means that even small and early indications of inflammation, which can lead to a severe exacerbation, are addressed with an intervention that reduces or prevents the exacerbation.

When chronic patients are referred to treatment in their own homes based on the ECM model, the first step is to educate the patients and increase their health literacy. The next step is to introduce the ECM telehealth home kit, which consists of a tablet and medical devices. In the case of COPD patients, medical devices include a spirometer, a pulse-oximeter and a prescription of specific drugs used for severe acute exacerbations. As mentioned, enrolled patients measure and report their status 1-2 times every day, and this reporting enables the call centre staff to follow the patient's condition and intervene when needed. After completing their daily reporting, patients also get an overview of their health status, and this increases the patient's awareness, motivation, and compliance. Patients who are in ECM treatment are therefore generally more compliant and observant on taking their medicine correctly and on their lifestyle and exercises.

The ECM model includes holistic measurements of mental well-being as part of the PROM data (based on the WHO-5 Well-Being Index), and this helps reduce patient anxiety and increase their mental health status.

Can a New Approach Reduce Costs and Benefit Chronic Patients?

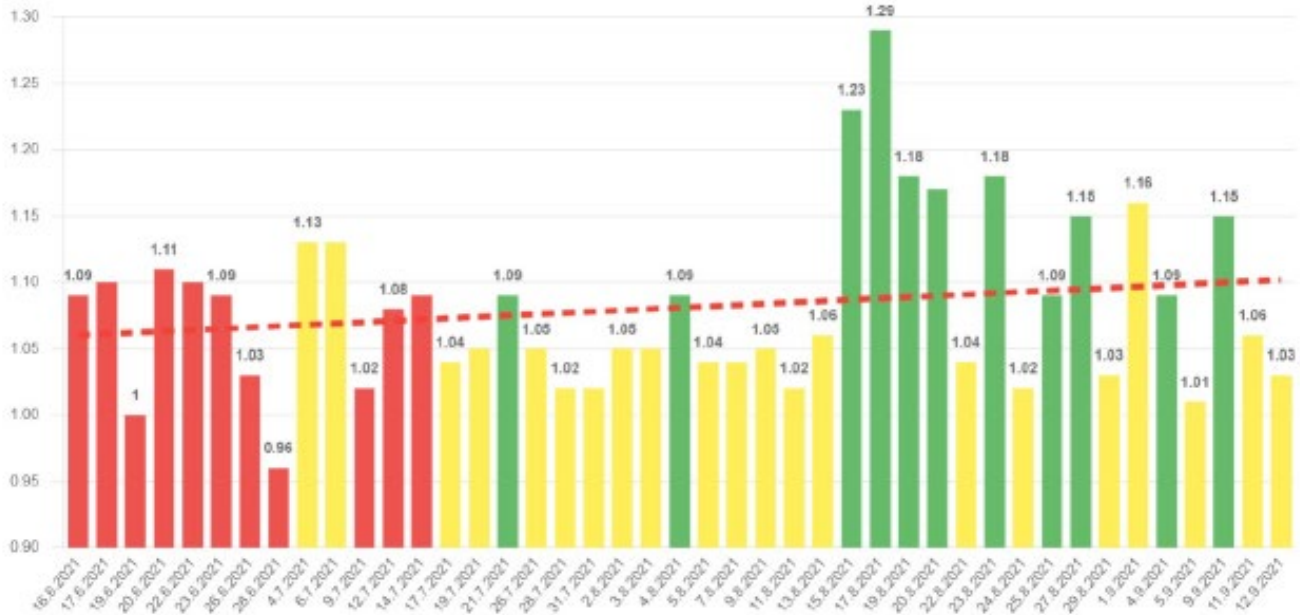
Until recently, it was not clear whether telehealth treatment of patients in their own homes would lead to cost savings and benefits for the patients. Research and studies in Denmark based on large-scale telehealth projects document cost savings in the range of 1,000 € per chronic patient per year and that patients at the same time increase their quality of life – and achieve more healthy life years.

The ECM treatment model, which, as mentioned earlier, can be considered a newly designed mini healthcare system. It is, however, more powerful than traditional telehealth because the model is based on an optimised patient-centred approach and procedures. Preliminary results from ongoing research projects in Denmark to document the effects of the ECM organisational model indicate that the average cost associated with the treatment of a chronic COPD patient can be reduced by almost 50%. This is equivalent to an estimated saving per patient of 3,200 € per year vs. an average cost per COPD patient in the Danish healthcare system of 6,700 € per year.

The major contribution to this cost reduction is from avoidable visits and contacts with GPs, emergency departments, outpatient clinics and hospital admittance. If we take the study of a particular patient enrolled in the project as an example, the estimated savings related to avoidable hospital inpatient admittance amounts to 18,000 € for the first year of enrollment in the project. During the year leading up to enrollment in the project, the patient had 2.900 km transport related to GP, clinic and hospital visits, and this indicates that the agenda of telehealth and in-home remote treatment can also contribute to the climate agenda – and to saving chronic patients time related to transport.

The **lung capacity chart below** (a real-life example from an ECM patient) explains why it is possible to reduce clinic and hospital visits and at the same time improve the patient's quality of life. From the chart, we can see the daily reporting from a patient, and we see that there are red columns in the beginning, after the patient has been enrolled. The red columns indicate low lung capacity or indication of exacerbation risk based on other monitoring parameters from the patient.

Gradually, as the clinical staff intervene, the medical in-home treatment of the patient leads to improvements, and the red columns over the following weeks changes to yellow and green, which indicate that the patient is now well regulated and not at risk of exacerbations. The dotted red line indicates the development of the lung capacity of the patient. It is not possible to cure COPD, but avoiding exacerbations can preserve lung capacity, increase the quality of life, and delay the development of the COPD disease.



Staff and Workforce Issues

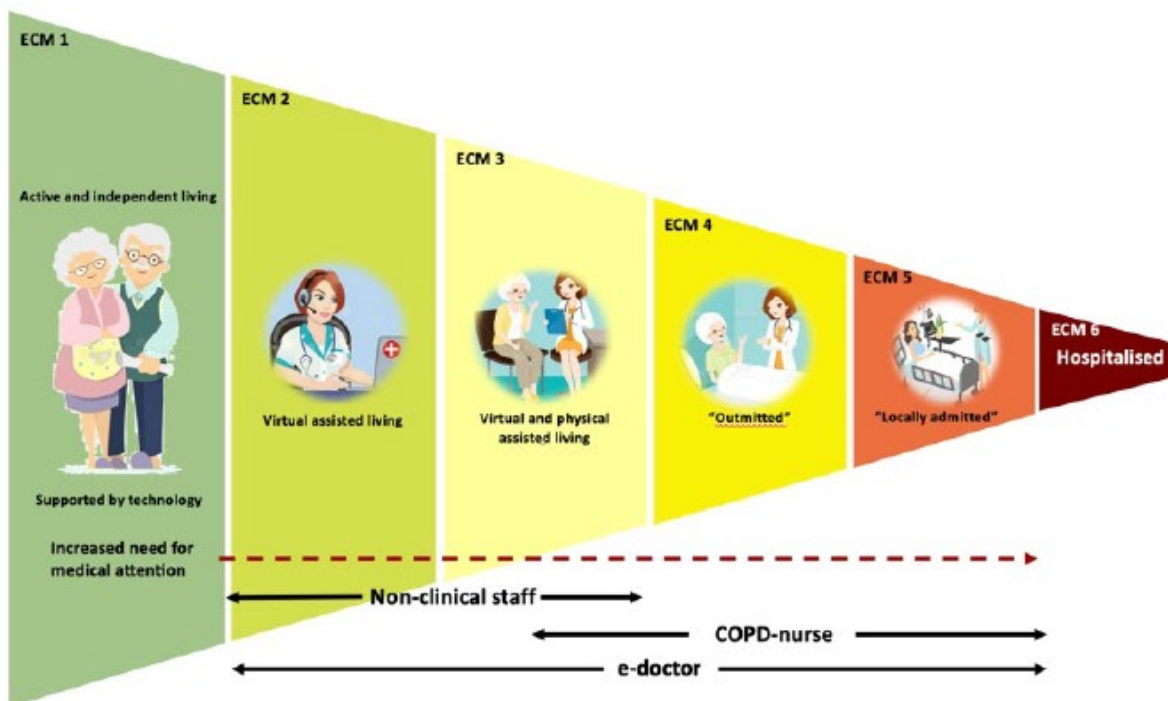
A population that grows older and lives longer, resulting in more chronic diseases and comorbidity, means that demand for healthcare treatment increases. At the same time, a smaller proportion of the population will be of working age. In Europe, more than one-third of the population will be older than the age of 65 years by 2060, and this means that the working-to-age ratio will change from 1,86 to 1,25, meaning that there will only be 1,25 persons working in 2060 for each retired, elderly citizen.

The staff and workforce issues related to recruiting healthcare professionals are already a challenge in many

countries. Increasing demands for healthcare services, but also more competition from new healthcare providers (e.g. Amazon Care, Microsoft and Google), will only increase the challenge in the coming years.

New models of care which reduce and avoid clinic visits and hospital admittance obviously reduce the need for healthcare professional intervention, and this means that more patients can be treated by the same medical staff. But – what about the medical staff needed to deliver in-home treatment?

The **6 step ECM model** incorporates clear thresholds and procedures which allow certain tasks to be transferred to non-clinical staff in a secure and regulatory compliant way.



The 6 step Epital Care Model relies on increased health literacy and empowerment for chronic patients to manage their own compliance and health status in step 1. In step 2, call centre staff will reach out to patients based on their daily reporting. Call centre staff are non-clinical personnel who are authorised and certified to interact with patients based on ECM procedures. Procedures may require call-centre staff to involve physicians and nurses on duty (step 3), which can then be immediately involved in the patient dialogue. The ECM model also involves physical treatment of the patient in their home (nurse/physician visits – step 4) and forward sub-acute functions where a patient can be admitted (step 5). The overall responsibility for treatment always remains with the senior doctor, who can be contacted 24/7.

The experience from Denmark, where ECM treatment is in operation in certain local regions and for certain patients, is also that new models of care offer new career opportunities for nurses and physicians, and this can, of course be an important factor in the competition to attract the workforce needed in the future. The use of non-medical staff for simple monitoring tasks and standardised treatments controlled by well-documented algorithms - and with the overall treatment responsibility placed with the chief physician, is also an opportunity to add new resources to the health care system.

Wearables and Future Technology

Rumours suggest that the next generation of the Apple Watch

will include functionality to measure blood sugar and that the next generation of the Samsung Watch will be able to measure the level of blood oxygen. So, do we need to establish telehealth projects based on current technology? Are we approaching a near future where we can just harvest the data from chronic patient wearables and, this way, achieve the same value and benefits?

New and emerging wearable technology is an opportunity to increase the cost savings from new models of care. The price of the ECM patient home kit is currently 450€, and if, e.g., pulse and blood oxygen levels in the near future can be measured with regulatory-approved wearable technology, this will reduce the price of the home kit to approximately 200€.

Technology alone does not lead to new models of care. There needs to be a re-design of the organisational setup which enables healthcare organisations to optimise the value which new technology can provide. And healthcare authorities need to offer technology platforms that can harvest data from wearables in a secure and regulatory-approved way to make such data available for the treatment of their patients.

The ECM model and technology platform can help healthcare authorities to initiate home treatment of chronic patients now, with a strategic opportunity to increase value and cost savings as new wearable technology is introduced in the coming years.

Conflict of Interest

None. ■

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Does Mechanical Thrombectomy Provide Economic Benefit In Ischaemic Stroke?

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The impact of COVID-19 on stroke services and using mechanical thrombectomy and best medical management, as per national guidelines, for patients with large vessel occlusion-related acute ischaemic stroke.

In the last 20 years, death rates from stroke have fallen mostly due to successful prevention strategies such as hypertension control and smoking cessation (<https://strokeeurope.eu/>).

Although it is positive to see the decreasing numbers of deaths from stroke, there is paradoxically an increase in stroke events, meaning more people are surviving but with the consequences of stroke. In Europe, it is estimated that by 2047, there will be an additional 2.58 million cases (+27%) of stroke compared to cases observed in 2017 (Wafa et al. 2020). That said, stroke is still a leading cause of death and disability (Wilkins et al. 2017).

The Impact of COVID-19

Stroke services, like so many specialties, have been adversely affected by the impact of COVID-19 (Bersano et al. 2020). In delivering stroke services, the additional complications of working around COVID-19 has put further strain on staff and resources – regular staff testing, supplementary protocol and pathways for emergencies, physical discomfort from wearing restrictive PPE, more cleaning requirements, etc (Baracchini et al. 2020).

In light of the changes forced upon health services globally by the COVID-19 pandemic, the need to deploy finite resources efficiently and smartly is even more pressing. That certainly applies in stroke medicine where mechanical thrombectomy (MT) plus best medical management is recommended in national guidelines for patients with large vessel occlusion-related acute ischaemic stroke (Turc et al. 2019).

What are the Benefits of MT?

MT has been proven to improve long-term outcomes compared with intravenous thrombolysis alone (Turc et al. 2019; Ziadat et al. 2018a; Goyal et al. 2015). In particular, achieving complete or near complete perfusion in a single pass (first-pass effect, or FPE) has been shown to have clinical advantages over multiple

attempts to remove thrombi (Ziadat et al. 2018b; Ziadat et al. 2020). Importantly for patients, FPE results in improved outcomes in terms of time spent in hospital, disability and functional independence compared with patients who did not achieve first-pass success. More recent analysis has highlighted economic advantages as well (Ziadat et al. 2020).

Therefore, not only is it important to optimise resource deployment, but it is also critical to use the resources optimally to achieve the best outcome for patients in the most cost-efficient way possible.

Cost Benefit of MT

Analyses suggest MT in combination with intravenous thrombolysis is cost-effective compared to intravenous thrombolysis alone when viewed in terms of the incremental cost per quality-adjusted life year (QALY) gained. Costs vary from one health system to another and differ according to the costs studies took into account and the time horizon considered, so the results from the different studies cannot be directly compared. For example,

- In Sweden, in 2015, the incremental cost-effectiveness ratio (ICER) per QALY was calculated as \$-223 over a patient's lifetime (Aronsson et al. 2016).
- In Canada, in a 2015 study, the ICER calculated was \$11,990 per QALY over a five-year time horizon (Xie et al. 2016).
- In the US, the ICER was determined to be \$3,096 per QALY over a 30 year period, in a 2015 study (Kunz et al. 2016), and \$14,137 in a second study (Leppert et al. 2015).
- In a 2013 UK study, over a 20 year period, the ICER of the technology gained was \$11,651 per QALY (Ganesalingam et al. 2015) and was dominant compared with intravenous t-PA alone, in another study conducted in 2016 (Lobotesis et al. 2016).



Better Patient Outcomes From Achieving FPE

The benefits of thrombectomy to patients are substantial: for every 100 patients treated, 38 have a less disabled outcome than with best medical management, and 20 more achieve functional independence (mRS 0–2) (Patel et al. 2018). Thus higher treatment costs associated with MT in the short-term can be offset in the longer term (Lobotesis et al. 2016).

A *post hoc* analysis of ARISE II study data assessed the

the two groups (3.39 [IQR=2.0–4.0] versus 3.58 [IQR=2.0–4.0], $p=0.70$) (Ziadat et al. 2020).

Patients who achieved FPE were discharged significantly sooner with a shorter length of hospital stay (6.10 [IQR=3.00–8.00] days) than patients in the group who did not achieve FPE (9.48 [IQR=3.00–11.00] days, $p<0.01$) (Ziadat et al. 2020).

The proportion of deaths and patients who had symptomatic intracranial haemorrhage (sICH) were lower in the FPE group

Mechanical thrombectomy has been proven to improve long-term outcomes compared with intravenous thrombolysis alone

economic impact of achieving complete or near complete reperfusion after first pass compared with multiple passes – the first study to look at this topic. Three-quarters (76%; $n=172$) of patients in ARISE II achieved complete or near-complete reperfusion (mTICI 2c–3) and among those FPE was seen in 53% ($n=91$) (Ziadat et al. 2020).

Clinical improvements seen in patients who achieved FPE resulted in better functional outcomes and fewer days in hospital compared with patients who did not achieve FPE: 80.5% achieved good (mRS 0–2) and 63.2% achieved excellent (mRS 0–1) functional outcomes compared with 61% ($p<0.01$) and 46.8% ($p=0.03$), respectively, of patients who did not achieve FPE. Patients in the FPE group also spent significantly fewer days in a standard bed ([mean] 3.05 [interquartile range {IQR}=0.0–5.0] versus 6.13 [IQR=1.0–8.0], $p<0.01$), whereas the mean number of days spent in ICU was similar between

than among patients who did not achieve FPE, but not significantly so – 90-day mortality: 5.68% versus 13.75%, $p=0.08$; sICH within 24 hours: 2.20% versus 4.94%, $p=0.42$) (Ziadat et al. 2020).


These improvements led to reduced healthcare resource use and therefore lower annual care costs. The analysis compared costs in FPE and non-FPE groups in the USA, France, Germany, Italy, Spain, Sweden and the UK. Country-specific healthcare resource costs were taken from peer-reviewed publications and market research reports validated by interviews with clinical experts (Ziadat et al. 2020).

Ziadat et al. (2020) conclude that ‘FPE represents a relevant procedural goal for endovascular treatment of acute ischaemic stroke. Moreover, the first-line treatment should ideally involve a thrombectomy technique that provides the best chance of succeeding in the first pass’. ■

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Introducing Hospitalisation@Home - Analysed Using the MAFEIP Tool

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This article explains how the MAFEIP tool helped project partners assess the impact and cost effectiveness of a digital home hospitalisation intervention project (NWE-Chance) for heart failure patients in the Netherlands and Belgium.



Key Points

- Hospitalisation@Home (H@H) will move healthcare towards better sustainability and cost-effectiveness.
- MAFEIP is a web-based financial and quality of life measurement tool that can assess a project's feasibility for H@H.
- NWE-Chance used the MAFEIP tool for financial modelling to determine H@H's feasibility for heart failure patients in Belgium and the Netherlands.

Introducing Hospitalisation@Home

Home hospital admissions will help innovate healthcare and move it towards a more sustainable and cost-effective model. The concept, however, is still at an early stage globally, with only a minority of hospitals undertaking hospitalisation at home (H@H) as a usual service offering. Two key challenges in making progress with such an innovation are developing a case for its use at scale and advancing a sustainable business model for the service. To build the case for scale, sufficient evidence is required – financial cost-effective data, being paramount. These challenges are undeniable in Europe – where health systems are fragmented, with many different reimbursement models, organisational processes and procedures, and a wide variety of companies providing technological solutions – when attempting to design a case for scale for H@H services and a sustainable business model.

The NWE-Chance initiative (www.nweurope.eu/nwe-chance) is made up of a consortium of hospitals, industry, and business innovators. Among others, it aims to develop a feasibility study of H@H for heart failure patients (Van der Velde and De Kluiver 2020; Scherrenberg et al. 2021). NWE-Chance searched for an appropriate financial measurement tool to assess the project's

work. The team decided to use the MAFEIP (Monitoring and Assessment Framework for the European Innovation Partnership on Active and Healthy Ageing, www.mafeip.eu) tool to investigate H@H's financial and quality of life (QoL) aspects. The tool was originally developed with support from the European Commission. Facilitated workshops were led by the Scottish Digital Health and Care Innovation Centre (www.dhi-scotland.com), which used the MAFEIP tool with several key NWE-Chance implementation pilot partners, chiefly hospitals, across the Netherlands and Belgium.

This article explains how the project used the MAFEIP tool to understand better the benefits and impacts of adopting H@H innovations. It shows how data collected in pilot hospital and entered in the MAFEIP tool matters. With appropriate data, it is possible to develop evidence on the cost-effectiveness of the H@H innovation. The MAFEIP tool can also help shape a sustainable business model that can work in different jurisdictions.

What NWE-Chance Is Doing

NWE-Chance addresses the organisational and technological innovations of hospital admissions at home for heart failure

patients. NWE-Chance promises the development/optimisation of several integrated eHealth applications (they include blood pressure, weight and oxygen saturation measurements; a vital signs patch for heart rhythm, respiratory rate, posture and activity; plus, an eCoach – a virtual coach). The initiative has a portal for caregivers and a patient app. All have been used to facilitate the admission of heart failure patients at home.

The feasibility of both technology and the supporting care and service process has been tested by three hospitals (each

hospital has a different state of organisational readiness concerning home hospital admissions) (Figure 1). The design of the feasibility study has been described by Scherrenberg et al. 2021. NWE-Chance will also launch an innovation hub to bring the stakeholders involved in this organisational shift together: they will share their knowledge concerning home hospitalisations. All these initiatives have been undertaken to enable a profound, sustainable transition of the healthcare sector by implementing home hospital admissions at scale.

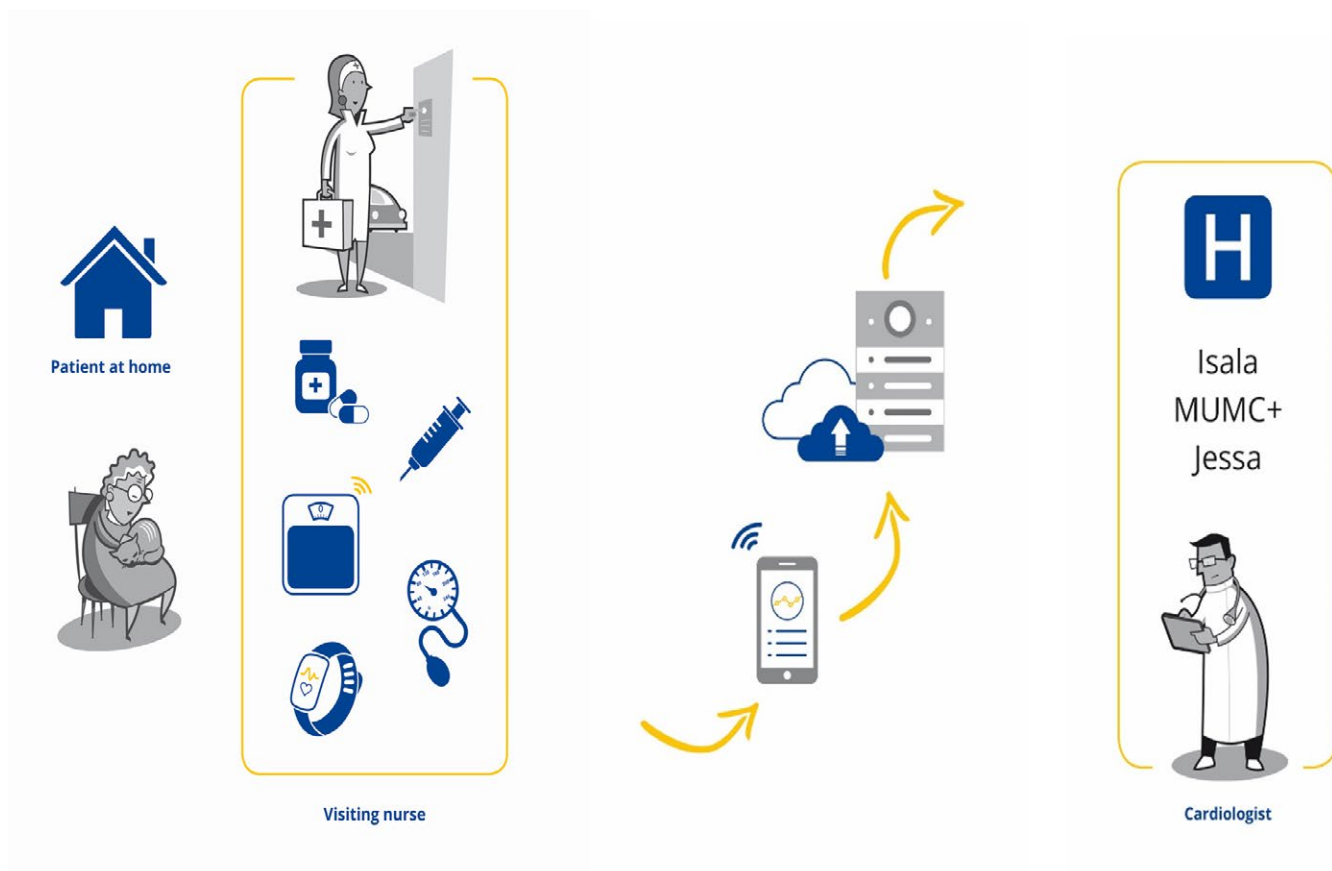


Figure 1: Hospitalisation@home by NWE-Chance

The MAFEIP Tool

The MAFEIP tool supports evidence-based decision making. Users fill out a range of questions in a web-based application that performs analytic modelling. It presents users with impact assessment health and economic outcome models (value, cost-effectiveness, cumulative utility, transitions between health states, and simulations). Decision-makers need to understand if the intervention will offer good value for the money and is affordable compared to the current service. The diagrams illustrate this concept (Figures 2 and 3). The red and green dots represent examples of outcomes of interventions.

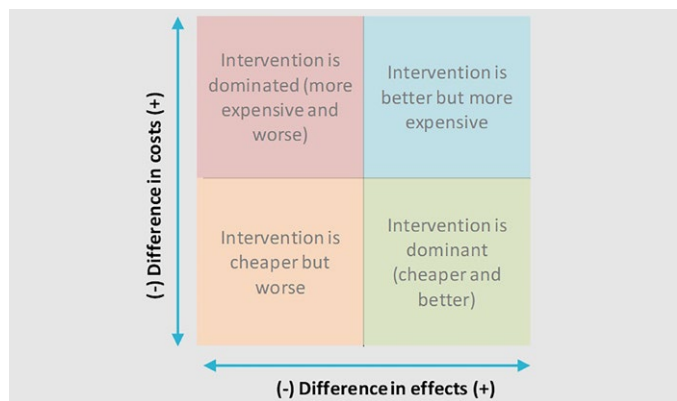


Figure 2: Cost-effectiveness table

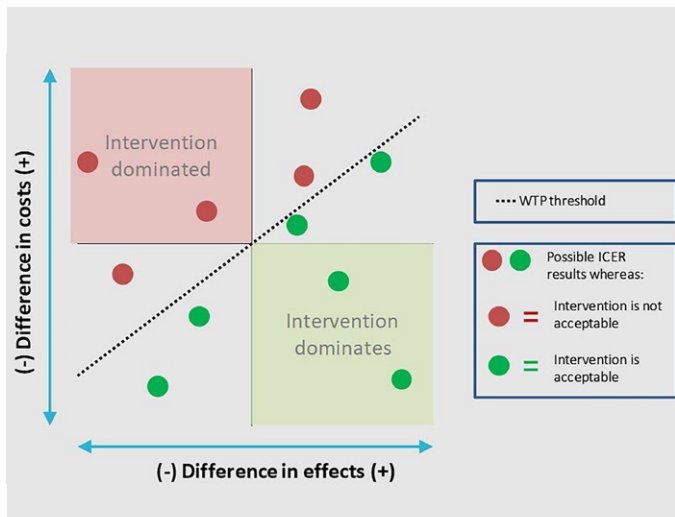


Figure 3: Cost-effectiveness table and incremental cost and effects (ICE)

In particular, MAFEIP is helpful for teams and people who have minimum training in economics. MAFEIP allows project teams and their partners to create models that would, otherwise, have to be outsourced to highly-trained and scarce economic skilled staff.

How NWE-Chance Has Used the MAFEIP Tool

The MAFEIP tool permitted the NWE-Chance team to assess the notions of cost-effectiveness, scale, and new business models. The MAFEIP tool guided the NWE-Chance consortium to evaluate the cost-effectiveness and potential impact.

NWE-Chance has, however, used only a limited part of the total functionality that the MAFEIP tool has to offer, and instead concentrated on models for cost-effectiveness and cumulative utility. The partners did not utilise MAFEIP's full simulation functionality. In total MAFEIP has five stages. The NWE-Chance project used only the first three out of these five; this restriction was due to the limitations on the project's data availability from the pilot sites. Nevertheless, NWE-Chance was able to run a full model of the data that it had collected to analyse the intervention's impact.

Data Required for the Intervention Analysis

NWE-Chance ran two MAFEIP related workshops with partners. The workshops' purpose was to ensure all data input was completed and validated, and that there was a general understanding of data input sources and assumptions being made. The pilot sites which tested the MAFEIP tool were hospital partners Isala and Maastricht University Medical Centre (MUMC) in the Netherlands and Jessa in Belgium.

The MAFEIP tool is organised into a five-stage process. The use of the step-by-step web-based tool was facilitated by the Scottish Digital Health and Care Innovation Centre, whose staff consulted with project partners to answer each

of the questions. The tool supported the team members analysing the outcomes and, where necessary, linked to national database sources for the specific country of interest.

Stage 1 – the first three key questions to be answered by the NWE-Chance team relate to the:

- H@H interventions' **Characteristics** and aims (this included the project name, which action group it came under, target population such as demography, geography, condition focus, and disease characteristics).
- **Description of the intervention** (device or/and protocol, clinical implementation, current care state impact on health and resource use in comparison to the current state and the stage of the project (trial, clinical trials ongoing, pilot implementation, routine use etc.).
- **Evidenced** collected (empirical and/or alternative evidence on effectiveness, impact on resource use, study design, control group, number of patients, empirical or/and alternative health-related Quality of Life (QoL) data – called HRQoL).

This first data collection stage (Figure 4) was relatively easy to complete for the NWE-Chance partners. However, there were gaps, empirical and alternative evidence on effectiveness and study design. Completing the tool at this stage was a challenge for a variety of reasons. The difficulties included the fact that NWE-Chance had no control group (the control group data input collected and referenced from national statistical databases - general information available at a population level) with which to compare the pilots, and no specific HRQoL data available to reference.

Stage 2 – questions at this point focused on how the intervention had been set up. This included:

- Discount factor (discount rate should equal the level of return that similar stabilised investments are currently yielding) for cost and utility.
- Target population data (minimum and maximum age, gender, country, and currency).
- Patient flow (where the NWE-Chance group could be specific about age and gender of patients if required).

This stage of the tool was easily answered. With direct data input from the split studies having been collected, it was therefore completed in a straightforward manner.

Stage 3 of the MAFEIP tool concentrated on probabilities using the Markov model (Boehler et al. 2015), which considers three states - 'Baseline', 'Disease impaired', and 'Dead'. These states are categorised into two groups, a control group and an intervention group. They were arranged to examine the initial distribution among the states. In addition, the tool allowed the NWE-Chance partners to consider the transition probabilities as per average incidence of disease occurrence and recovery for this cohort, as per the control and intervention groups. For our intervention, this refers to the baseline state patients with chronic heart failure that don't need hospital admission

About your intervention
▼

Your intervention relates to a: Device Protocol/treatment method Other, please specify

Brief description of the clinical implementation of your intervention (e.g. who uses it, when, in which setting, how often etc.)

Brief description of the current care situation without the intervention (e.g. current treatments provided, whether the intervention replaces or complements the current therapy, etc.)

Does your intervention have an impact on health and resource use compared to current care? (please describe briefly).

Stage of development of your intervention Pre-trial (e.g. proof of concept) Clinical trials ongoing Pilot implementation Routine use Other, please specify

Figure 4: Screen extract of the NWE-Chance project data input for the MAFEIP tool

and the disease impaired state patients with chronic heart failure that are hospitalised (at home).

The data for the control group for the NWE-Chance project was referenced from general population statistics and publications on heart failure. Therefore, assumptions were made as per generic referenced data sources for the control group. It should be noted that the NWE-Chance project did not possess data on project-specific mortality (relative risk for mortality in both control and intervention group states). As a result, NWE-Chance opted for general mortality rates linked to human mortality as per a standard database, specific to the country of choice declared as part of the input at Stage 1 of MAFEIP tool. This was why the project workshop and tool had to be used as separate instances, once for the pilots in the Netherlands and then separately for the Belgium pilot. NWE-Chance Belgium pilot focused on Flanders (a region in Belgium). It should be noted that the MAFEIP tool does not go down to the granular level of a specific region in a country.

Other key cost data was required at this stage (3), including healthcare-associated costs (resources used within the healthcare system along with the societal costs). This data was provided by project pilot leads, based on a combination of population statistics (societal costs and project information - resources). If the healthcare data had not been collected at the pilot sites, then this task and input would have been made more difficult. Retrospective data collection would have been required.

Data Assumptions Made by the NWE-Chance Project Partners

Several assumptions had to be made to fulfil the data inputs needed by the MAFEIP model. The partners had either collected specific data themselves or, due to their knowledge of the two countries' contexts, they could cite information from key publications and national statistical databases. This approach ensured data was reliable and referenced. For both countries, the data input included data on mortality rates, costs of standard care, and incidence prevalence specific to heart failure (which was the disease group focus of the NWE-Chance project).

How NWE-Chance Used the MAFEIP Model to Develop Financial Models

Using the MAFEIP tool in NWE-Chance allowed comparisons to be made between the results measured in the Netherlands and Belgium. More specifically, we analysed the relation to the intervention state (i.e., NWE-Chance apps and technologies) versus the control state (traditional model of care). The measurements occurred in respect of the expected impact in terms of Incremental Effects by Age, Cost-Effectiveness, and Alive states. They are illustrated by three figures divided by country: Incremental cost and effects by age (Figure 5); the healthcare Cost-Effectiveness plane (Figure 6); and patient flow for Alive states (Figure 7).

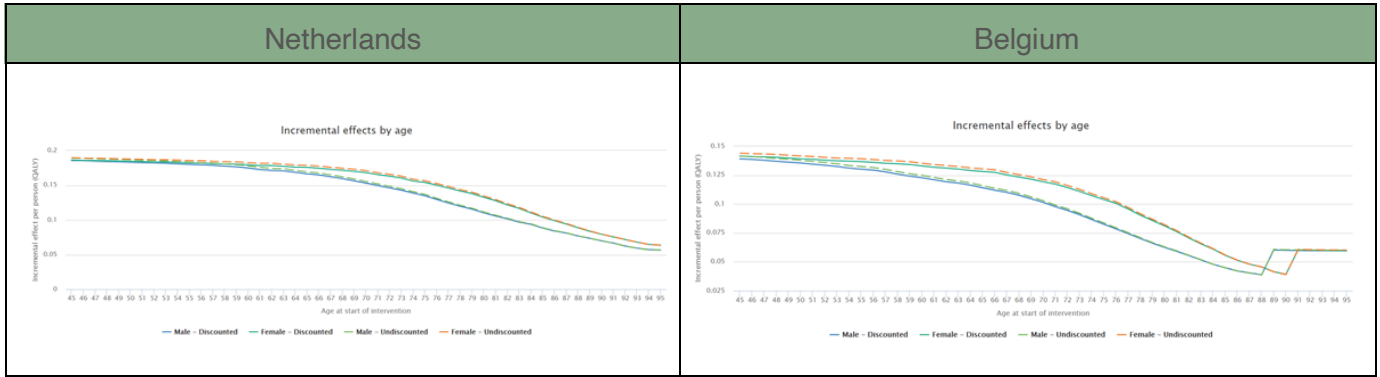


Figure 5: Incremental effects by age

Figure 5 shows that, both in the Netherlands and Belgium, there is a decrease of the incremental effects by age (for both genders). Although the decrease is stronger in Belgium than for the Netherlands, we see an increase among 87+ people in Belgium, possibly due to the small number of participants. These findings clinically show that although both genders benefit from the NWE-Chance intervention, the intervention benefits lessen over time.

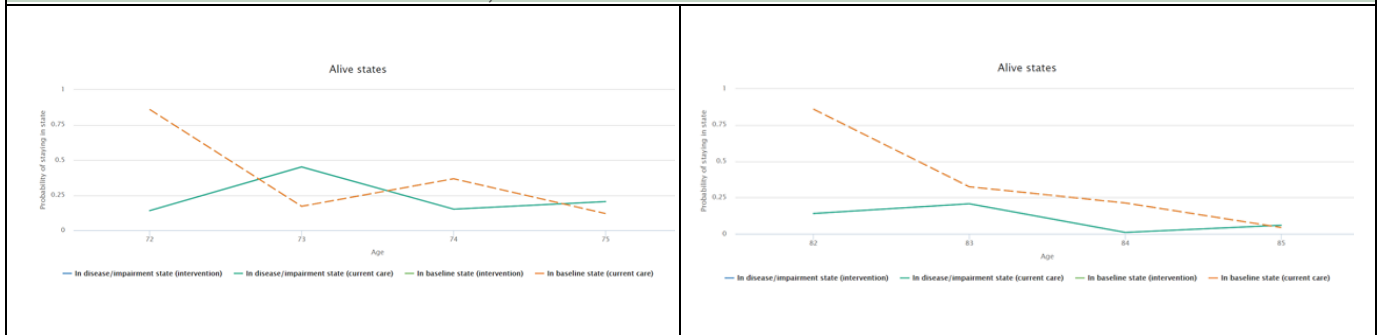


Figure 6: Alive states

Figure 6 shows that the probability of remaining at baseline decreases significantly in the current care group in the Netherlands and Belgium (see the yellow line). While no probability decrease for worsening is seen in the intervention group, their state becomes worse (green line). These findings show that the NWE-Chance intervention prevents people from worsening their state.

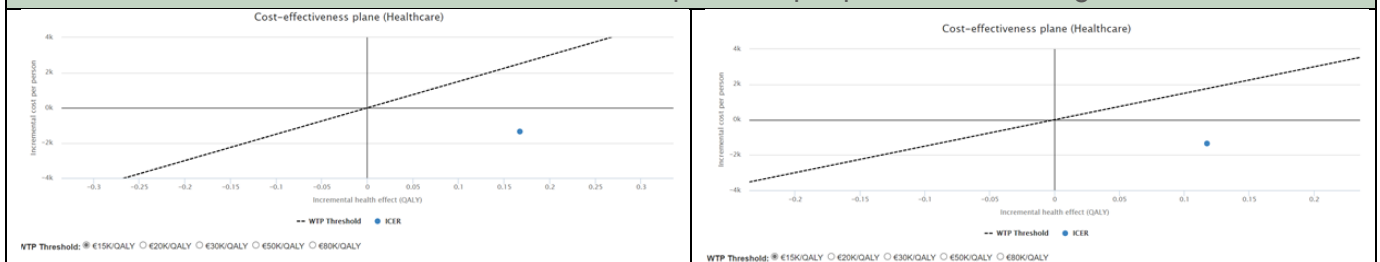


Figure 7: Cost-effectiveness

Figure 7 illustrates that the intervention is dominant in both the Netherlands and Belgium (meaning that it is more effective and less costly than current care). This finding supports implementing or upscaling the intervention.

Benefits of Using the MAFEIP Tool and Next Steps

The NWE-Chance project partners have found MAFEIP a useful tool. It has helped them by highlighting how to undertake initial assessments on whether the H@H heart failure intervention is effective in cost and value. It shows how the intervention and its outcomes differs in each country, with different contexts, and costs taken into consideration in the MAFEIP modelling algorithms. Isala hospital clinical colleagues stated: 'We will use the MAFEIP outcomes for the development of a business plan for the H@H platform. Furthermore, MAFEIP really pointed

focus on how effective it is in terms of the Health-Related Quality of Life (HRQoL) for patients. These models are difficult to produce when there are no in-house economic experts who can undertake economic modelling. At the feasibility stage, there is often not an extensive budget to commission such expertise, which is usually not readily available due to high demand and being cost-prohibitive.

Therefore, the ability to create economic modelling by project teams with the MAFEIP tool is advantageous. With projects partners that often can input the data easily, this tool with its embedded algorithms has allowed the partners

With projects partners that often can input the data easily, this tool with its embedded algorithms has allowed the partners to extract insights from the MAFEIP models to understand the initial financial effects of the intervention

us to some opportunities for our future use of H@H.'

Overall, the project partners felt the tool was of interest to both healthcare providers and digital technology providers in moving forward innovations in this field and cases for scale. The next stage for NWE-Chance is to review the modelling outputs in more detail; this deeper insight will help the team to create different future costing scenarios for the financial models. As a result of such an investigation, the NWE-Chance partners could then optimise the value and return for the person, healthcare partners, and society.

Conclusion

At the end of feasibility projects, decision-makers often say, 'show me the money'. As it moves towards a more mature state of readiness and case for scale, this question becomes more acute. This relates to firstly how much it will cost and how it compares to the existing service costs, and secondly with a

to extract insights from the MAFEIP models to understand the initial financial effects of the intervention. This will allow the consortium to create future scenarios for the target patient population of the intervention and the best business model for service and commercialisation purposes. It is well recognised that to scale digital health in healthcare, the finances need to 'add up'. An early indication that a new service is cost-effective is key. Providing this reassurance for decision-makers at this stage will prepare a route for a future case for scale to be developed for our and other initiatives.

Acknowledgements

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Conflict of Interest

None. ■

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Diagnosing Initial Orthostatic Hypotension – The Race Against Sudden Blood Pressure Drops

◆ Author: Jürgen Fortin | CEO & Chief Scientific Officer | CNSystems | Austria

Initial Orthostatic Hypotension (OH) is described as a rapid and transient drop in blood pressure associated with the increased risk of falls, fractures and syncope, especially in the ageing population (Tran et al. 2021). As prevalence is high, the problem is evident, but due to limited access to reliable continuous diagnostic methods, the detection of OH is restricted. Experts demand continuous blood pressure measurements instead of the intermittent upper arm method with sphygmomanometers.

Can a disease such as Orthostatic Hypotension (OH), which is characterised by extremely rapid changes in haemodynamics, be efficiently diagnosed using standard methods such as upper arm blood pressure measurement? The answer is no! This has just recently been confirmed by a brand-new meta-analysis of the prevalence of initial orthostatic hypotension in adults aged 65 and older by Tran et al. (2021). Data of more than 5,400 individuals underlines the insufficiency of intermittent blood pressure measurements to reliably diagnose OH, compared to continuous methods. In patients suffering from initial OH, systolic blood pressure drops to > 40 mmHg or to > 20 mmHg in diastolic blood pressure within the first 15 seconds of Active Standing - a commonly used test to assess the cardiovascular response to standing. The rapid blood pressure changes can hardly be detected with an upper arm sphygmomanometer. In fact, the pooled prevalence of continuously measured initial OH was five times higher than intermittently measured initial OH. "Continuous blood pressure monitoring is recommended to capture the transient changes in blood pressure upon immediate active standing or passive tilting" (Tran et al. 2021).

Other scientific data by Mol et al. (2021) also shows the need for continuous measurements in Active Standing Tests as "Orthostatic BP measurements using sphygmomanometer have an inadequate time resolution to record clinically relevant dynamics of orthostatic blood pressure recovery" (Mol



et al. 2021).

With regard to the negative implications such as pre-syncope episodes or falls, the demand for continuous methods to reliably diagnose initial OH is evident. “There is a need to establish a consensus on the diagnosis of initial OH using continuous blood pressure devices to consistently identify participants with initial OH” (Tran et al. 2021).

Reliable non-invasive continuous blood pressure monitors have been on the market for a long time and have proven

their importance for diagnosing initial OH. “Continuous BP measurements should be made routinely available and used in geriatric outpatient clinics” (Mol et al. 2021).

A comprehensive implementation of this claim is now easier than ever: CNSystems is launching the Touch Force® Touch CARDIO - an optimised solution for non-invasive haemodynamic measurement. It includes the successfully established CNAP® technology and has especially been designed for an easy application in the area of syncope assessment. ■

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COVID-19 Pandemic: Health, Social and Economic Consequences

 **Author: Panagiota Pietri | Cardiologist | Research Institute for Longevity and Aging-Related Diseases | Athens, Greece**

The spread of the novel coronavirus SARS-COV-2, originating from Wuhan, China two years ago, has brought dramatic changes in global health systems, leading to thousands of deaths worldwide, jeopardising the treatment of patients with chronic diseases and pushing societies to psychological breakdown. If economic 'dyspragia' is added, the mixture of the COVID-19 pandemic becomes explosive.

Key Points

- The COVID-19 pandemic has brought dramatic changes in global health systems.
- Initial restrictive measures effectively reduced active cases, hospitalisation and death rates but repetitive lockdowns have led to health, social and economic decline.
- Given that the least developed countries are far behind others in vaccination programmes, the hope for a pandemic termination seems a utopia.
- The worrying social phenomenon that emerged during the vaccination period, namely the division of the population into vaccinated and unvaccinated citizens, may have dramatic effects for social cohesion and solidarity.
- How can we escape from this difficult situation? How will we manage to reverse the health, social and economic distress?

The shock from the arrival of SARS-COV-2 in Europe and the absence of any preparations for the viral attack, along with the lack of data from China, forced several European countries to impose strict restrictions ('lockdown') as the only effective measure to prevent virus spread and contamination. Although initial restrictive measures seemed to effectively reduce active cases, hospitalisation and death rates, the repetitive lockdown periods led to health, social and economic decline. Many of the scheduled therapeutic interventions, including surgical procedures, were postponed, whereas outpatients with chronic diseases were deprived of public health care due to the dedicated management of COVID-19 patients. Moreover, the psychological burden from the sequential imposed restrictions in everyday life and the job losses, particularly among the poorest and most vulnerable citizens, led to an increase in depression and anxiety disorders. Interestingly, in Greece, domestic violence increased after withdrawal of restrictions. Notably, apart from the lockdown-related psychosocial adverse events, patients with COVID-19 also suffered from long

psychological impairment after hospital discharge.

The unfavourable effect of lockdown and COVID-19 hospitalisations on economic figures was also evident. Governments spent a huge amount of money to support almost every business in the private sector, both employers and employees, thus fuelling a future economic recession. The economic burden of healthcare systems due to the long hospitalisation of COVID-19 patients and the subsequent rehabilitation was also considerable.

The initial enthusiasm derived from the onset of mass vaccinations in January 2021 was replaced, a few months later, by scepticism about their effectiveness to stop the pandemic. Although hospitalisation and death rates were decreased, the authorised vaccines proved to be less sufficient to interrupt the spread of SARS-COV-2 and thus, to avoid contaminations. Moreover, given that the least developed countries are far behind others in vaccination programmes, the hope for a pandemic termination seems a utopia, at least for some countries. According to the recent World Health

Organization arguments, vaccination is a significant tool, but it is not sufficient itself to solve the problem. Other measures should also be implemented. In addition, the worrying social phenomenon that emerged during the vaccination period,

the contrary, countries that implemented less restrictive measures such as Sweden, managed to almost eliminate COVID-19 since the number of active cases showed a significant constant decrease, beginning from April 2021

Lockdown and quarantine measures may not be the key answer to the pandemic limitation ... return to normal living activities with adoption of healthy protocols and frequent diagnostic tests may be a more effective strategy for both disease control and economic stability

namely the division of the population into vaccinated and unvaccinated citizens, may have dramatic effects for social cohesion and solidarity and should be taken into account from the authorities when mandatory vaccinations are under consideration. In addition, the deprivation of unvaccinated people from consumptive and social activities may further strengthen health, social and economic destabilisation.

Given the abovementioned detrimental effects of the COVID-19 pandemic, the reasonable question is how can we escape from this difficult situation? How will we manage to reverse the health, social and economic distress?

Several measures may be proposed:

- Governments should be supportive and reassuring, avoiding punitive actions. Authorities should encourage citizens to follow health protocols and be vaccinated. Vaccine hesitancy may be overcome with public dialogue where the pros and cons of vaccination will be analysed by expert scientists with divergent position statements. Official approval of more vaccine platforms may also aid to this direction. Moreover, donation of vaccines to poorest countries will increase the rates of vaccination in those countries, thus reducing the risk of new viral mutations and subsequent uncontrolled spread.
- Model countries that managed to restrain the pandemic should guide health policies of other countries. There is the paradox where countries with high vaccination rates, such as United Kingdom or Israel, presented high rates of COVID-19 cases due to the predominance of the more infectious delta variant in August 2021, however, with decreased mortality rates among vaccinated people. On

(Our World in Data). Thus, lockdown and quarantine measures may not be the key answer to the pandemic limitation. On the contrary, return to normal living activities with adoption of healthy protocols (use of mask, distancing etc) and frequent diagnostic tests may be a more effective strategy for both disease control and economic stability.

- Public healthcare systems should not be confined to COVID-19 patients. Patients with chronic diseases must continue to take advantage of public health care. Hospitals dedicated to contagious diseases may be recruited instead of general hospitals. Accordingly, private health systems should take part in the battle against COVID-19 by giving hospital beds for COVID-19 patients and/or lowering the hospitalisation costs for non COVID-19 patients. In every case, governments should provide financial support for both public and private health sectors.
- Emphasis should be given to patients with chronic psychiatric diseases or newly, pandemic-related, psychological disorders. Growth of infrastructures focusing on psychiatric support are warranted.

In conclusion, both governments and societies should work to alleviate the adverse effects of the pandemic. Hard restrictions, punitive measures and social division are harmful and should be avoided. By contrast, implemented measures with human orientation may inspire people and lead to the successful management of the pandemic.

Conflict of Interest

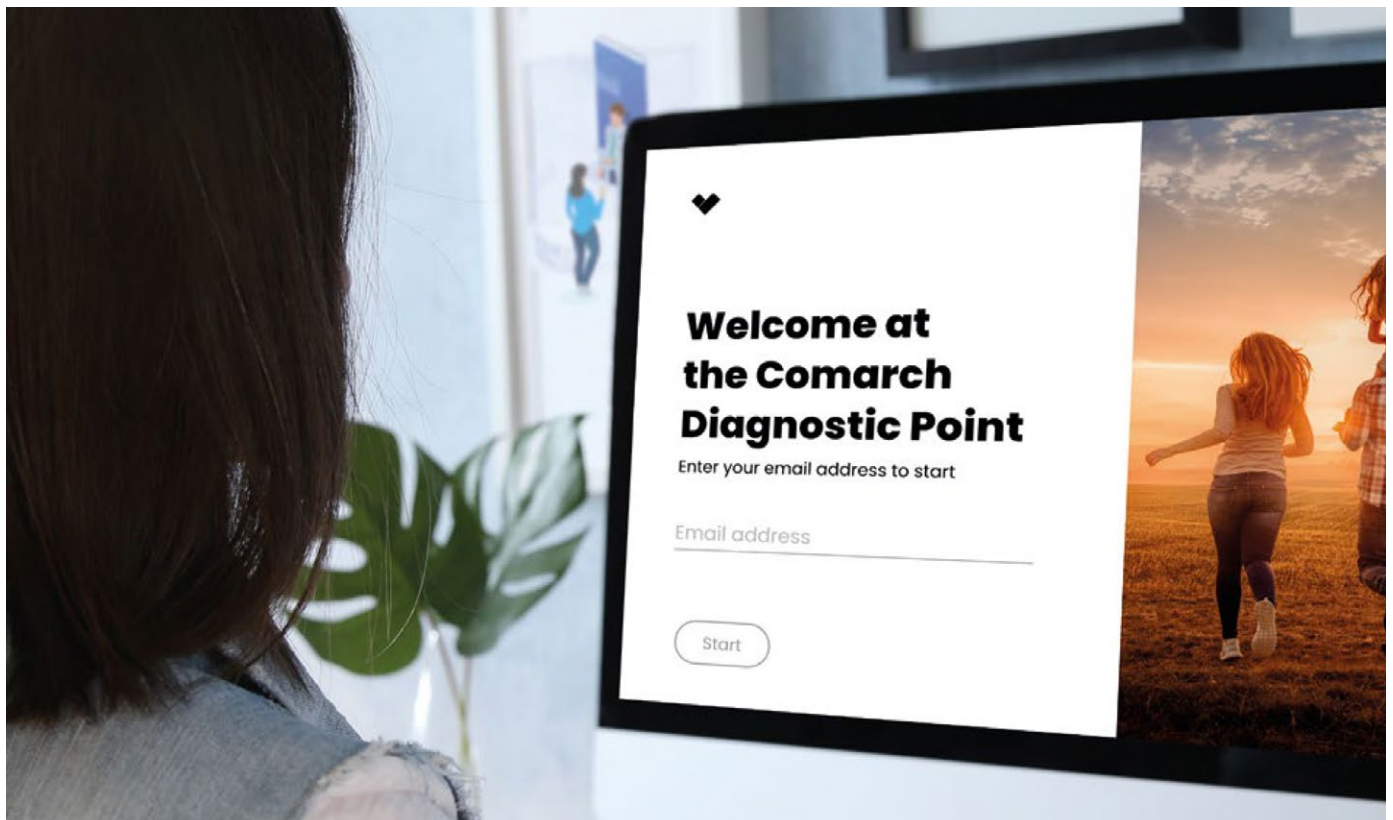
None. ■



Can Telemedicine Save Money? Case Study of Comarch Diagnostic Point in the Workplace

◆ Author: Alicja Warmusz | Digital Health Manager | Comarch Italia

A case study of Comarch Diagnostic Point and its application and results at a large organisation with twenty offices in Italy.



We speak a lot about **equity**, equal treatment, **equal access to care**. But does it include workplaces? After all, we all spend a lot of time there. Employers care for their employees health in many ways. But how can a big company with several offices all over the country or all over the world provide its employees equal treatment in terms of well-being?

One of the cases that Comarch has faced was a big company with around 20 offices in different spots in Italy. The biggest

one, with thousands of employees in one building, has a physician always at employees' disposal. The rest didn't have such a service, mainly because they had less than a hundred employees. But, of course, they were all equally important as those in the main office.

The HR department started to wonder what to do to grant all the employees equal treatment and privileges. It would be unimaginable to hire 20 physicians and place them each

in one office. It would be too expensive for the frequency in which employees would go to visit.

But sometimes, it's not the case of physical access. It's about the **connection**.

Here comes a use case that Comarch made to help with this

In terms of money for the employer, it's easy to deduce that most of these events would cause longer work absence for diagnosis and sick leave in the future, and that would cause higher expenses for the company. In the United States, approximately 140 million working days are wasted every year due

The greatest result of this project was the prevention of future major events that could have been fatal for some of the employees that took part in this test

issue. The project started with a PoC in one of their offices a few months before the COVID-19 pandemic. There was an unused, small room where it was possible to set up a [Comarch Diagnostic Point](#). It is a point of care where a person can register, make some self-measurement for example event ECG, blood pressure, or saturation, and if needed, a video call with a company's physician.

Results

In the first month of PoC, more than 80 employees used Comarch Diagnostic Point for self-measurement. In fifteen cases, there was a suspicion of **hypertension** and Diagnostic Point users were recommended to contact their GP or cardiologist for further screening. There was a suspicion of cardiac arrhythmias in eight cases, and more detailed ECG exams were recommended. Two of the workers who made the screening in Diagnostic Point had low **blood pressure**, and three suffered from **bradycardia**.

Prevention Is Better Than Cure

The greatest result of this project was the prevention of some future major events that could have been fatal for some of the employees that took part in this test. It has been demonstrated that, for example, frequent control and lowering of blood pressure can prevent cardiovascular disease (Ettehad et al. 2016). Curing those conditions is much more costly and uses way more resources than a simple control. Thus, it's a great idea to give people the opportunity to check it even in the workplace and if anything is wrong, contact the physician directly with a video-call.

to health-related absenteeism. Entrepreneurs stand to lose about \$14.6 billion annually due to employee absenteeism for health reasons. Moreover, every year, more than 300,000 employees stop working and start collecting state health benefits following a long period of absence from work (Black and Forest 2011).

Last but not least: the cost of the solution itself. In this case, the company chose to keep one physician, as it was before, and installed less expensive but more efficient Diagnostic Points. The other option would be to hire other 19 physicians, who would probably usually work just for a few hours a day since they didn't have enough patients to visit.

Come Back to the Office After the Pandemic

Nowadays, the challenge is even higher. The COVID-19 pandemic has taught us to appreciate new technologies even more because they enable us to take care of ourselves and our employees.

Most companies are slowly going back to the offices, even if in hybrid mode, but workplaces are perceived much differently by employees. Even with the vaccinations, we will probably see next waves of coronavirus, and, with that in mind, people value their health even more.

Employees want to be secure and want assurance that they will receive good care if they are unwell. Giving them the possibility to check their temperature, saturation, and other vital parameters and having the possibility to speak with a physician whenever they need, would not only improve their well-being but also increase their sense of security. ■

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Patient Engagement – An Adjuvant Therapy With Demonstrable ROI

◆ Author: Emma Sutcliffe | SVP | Patient Insights and Solutions | Prime Patient | U.K.

An overview of patient engagement, benefits of investing in patient engagement programmes and why elevating patient engagement should be an essential business spend for patient safety, support and societal gain.

Key Points

- Patient engagement is the next blockbuster drug.
- Patient engagement has long-proved to improve patient safety, reduce hospital admissions and substantially lower use of other healthcare resources.
- There is undeniable cost savings and a huge return-on-investment (ROI) when industry adopts these programmes.
- Getting patient engagement right – from the inside out – and creating a transferable business value from patient engagement is key to making sure that a patient centric organisational mindset works – and pays.

If a pharma company had a medicine that could be developed without risk, was highly-efficacious and made significant improvements to the patient's life, it would be a no-brainer to invest in bringing that asset through the pipeline as quickly as possible, right?

This is the assertion made by [health journalist, Leonard Kish](#), in 2012 when he predicted that "patient engagement is the next blockbuster drug". In fact, Kish was so convinced about the therapeutic benefits of patient engagement that he postulated that it should be routinely 'prescribed' as an adjuvant, such that not to provide patient engagement would be a serious breach of medical responsibility. Patient engagement has long-proved to improve patient safety, reduce hospital admissions and substantially lower use of other healthcare resources so reducing healthcare costs. When it comes to the question of 'show me the money' when considering investing in a long term patient engagement programme, there is undeniable cost savings and a huge return-on-investment (ROI) when industry adopts these programmes into their R&D system as early as possible.

The potential for patient engagement to become a therapy, a commodity and a catalyst to improve all aspects of pharma business and product development from that clarion call is

coming to fruition. Getting patient engagement right – from the inside out – and creating a transferable business value from patient engagement is key to making sure that a patient centric organisational mindset works – and pays. Payment is in the form of the 'triple win' – approaches, products services and enduring policies that deliver benefits for patients, for pharma and for society.

Patient Centricity Is Not An Overnight Success

Despite the intensity of patient centricity projects and the plethora of branded patient engagement programmes run by pharma, we are still struggling to justify investment in approaching patient engagement as a strategic business essential for a company. The milestones of patient engagement are given in Figure 1, behind which are inputs from broader societal change and expectations from patient and advocacy groups which started more than three decades ago with the first 'patient centric ward 4b' opening for people being treated in 1984 for HIV infection. There are parallels for patients living with rare conditions today to those early struggles and patient lobbying groups for people living with HIV. Both patients group share the determination to be 'heard' within pharma – to disrupt, contribute to and

challenge clinical trial protocols – to do whatever needs to be done to get new medicines to patients as soon as possible. As such, it is evident that patient engagement impacts on every ‘department’ within pharma walls and the outcomes of patient engagement practices internally provide huge societal impact. Patient engagement therefore, must be strategically

relationships it has with Patient Advocacy Groups, it is crucial that, internally and externally, a company has a transparent standard operating and reporting procedure for all investment in patient engagement activities. The return on investment must be demonstrated from all patient engagement projects. Again, there is nothing sinister in this reporting when it is

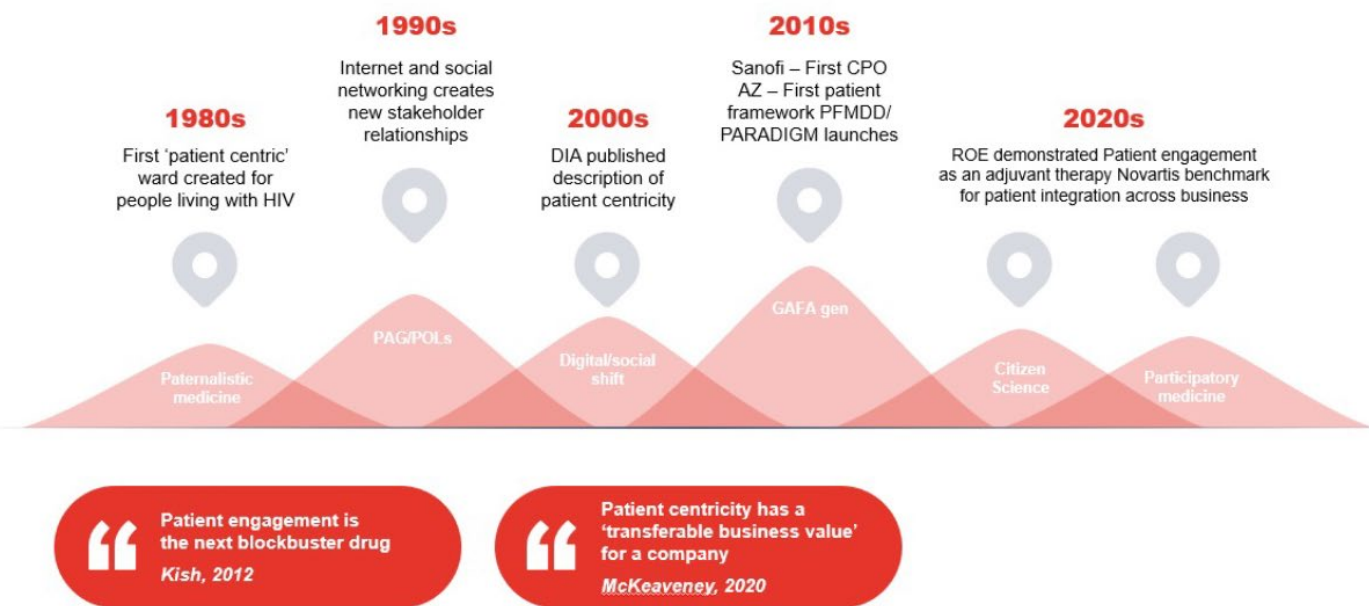


Figure 1. Background: milestones in the Patient Economy

driven and recognised as requiring end-to-end practices from patient-focused drug development through to long-term patient support programmes.

Given that bottomless funding pockets do not exist and that pharma is increasingly scrutinised for the financial

approached from the ‘triple win’ perspective. Figure 2 summarises the current academic ‘proof’ that this triple win is achievable – and acceptable to our different healthcare regulators and society itself.



Figure 2. Every engagement project improves outcomes for patients, pharma and society

Proof That Patient Engagement Secures The 'Triple Win'

Within a pharma company, the importance of, and needs for, patient engagement differs according to the department (Figure 3). This serves to demonstrate that an overall patient centric approach for an organisation is essential.

The pivotal 'relationship vignettes' that require a strategic approach to patient engagement are as follows:

- Product development depends on clinical trial participation – clinical trial participation depends on engaged patients being recruited and staying in the trial – the clinical trial protocol needs to be practically and psychologically percipient of the patient's needs and expectations and this relationship must be established as early as possible to build trust and collaboration.
- Patient advocacy and lobbying for early diagnosis and to truncate the patient journey can be assisted by

pharma-sponsored awareness and patient educational programmes.

- Regulatory approval routinely expects data from Patient Reported Outcome Measures and Patient Reported Experience Measures – PROMS and PREMS – are expected to be part of clinical trial protocols by expert patients. Again, including patients in the creation of PROMS and PREMS requires early and enduring relationships.
- Access to treatment and care is competently improved and expedited when pharma and patient groups collaborate to highlight unmet medical needs.
- Long term benefits of treatment – adherence and compliance and patients who are motivated in self-care contributions to their wellbeing have a measurable reduced use of other healthcare resources which is of great benefit to society.

Companies who 'join the dots' as described above, within

Patient engagement must be strategically driven and recognised as requiring end-to-end practices from patient focused drug development through to long-term patient support programmes

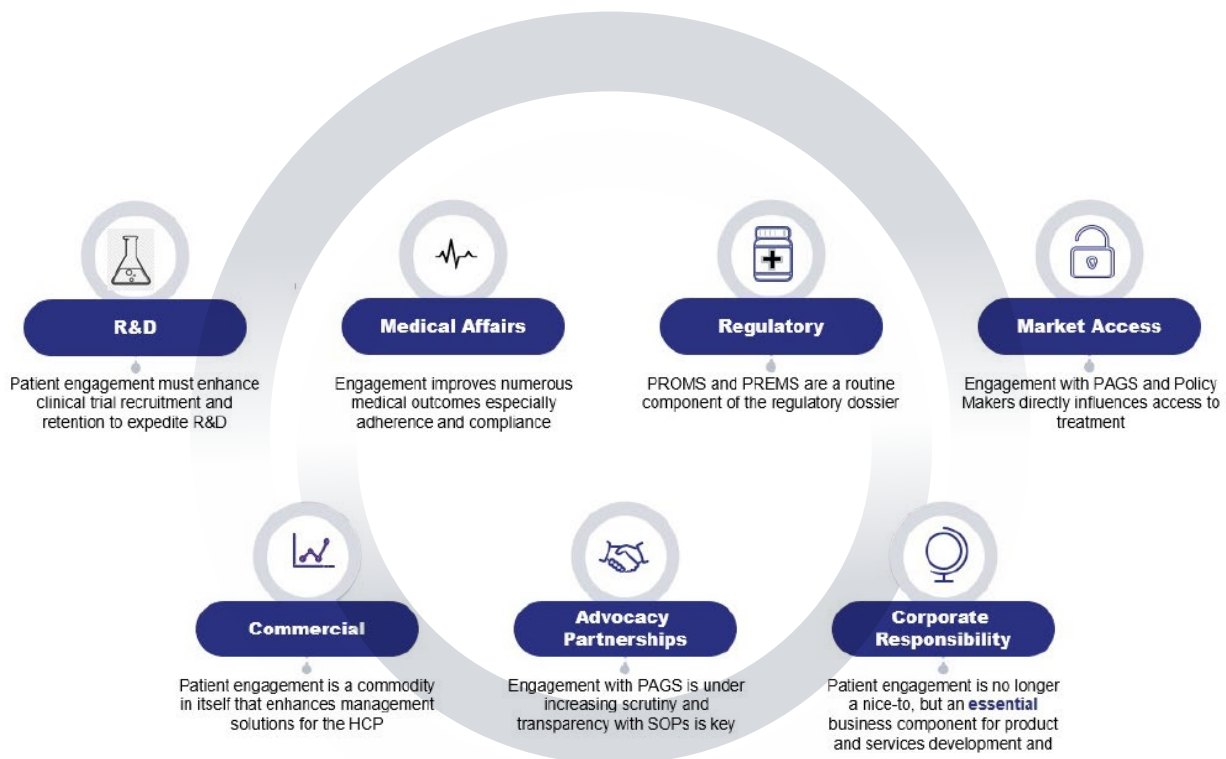


Figure 3. Needs profiles within clients and partner organisations

their organisation and communicate, upskill, and train employees to recognise their contribution within a patient centric approach to patient engagement to deliver the ‘triple win’ are assured of more efficient and justifiable return on investment in patient engagement initiatives. Companies who communicate this intent externally are able to improve measurement and validation of a strategic approach to patient engagement across the sector and to retain the current increased societal trust that is resulting from offering life-saving solutions in response to COVID-19 infection. The time is right for pharma to be recognised for the incredible contributions made to improving and elongating human health. The triple win attitude amplifies the importance of pharma’s role in the global healthcare infrastructure. Importantly, it can be evidenced that patient engagement activities demonstrate excellent ROI in every desired outcome – from R&D through to global sustainability in healthcare initiatives (Figure 4). Crucially, for pharma, patient centricity across the organisation – by investing in patient engagement activities in all areas of

the business, ultimately has the potential to bring a product to market some two and a half years earlier and patient support programmes substantially reduce all disease related health costs. As a ‘blockbuster’ drug, therefore, it is little wonder that such invaluable return is establishing patient engagement initiatives as therapeutic/adjutant products in their own right.

Show Me the Strategy Then Show Me the Money: PEP, PIPP and PVP

At Prime Patient we work with clients at the strategic outset to create their ‘Patient Engagement Programme’ (PEP) and to consult with all departments to identify where the ‘money saving’ aspects of patient engagement exist and where patient engagement campaigns will have the greatest ROI. This is a deep-dive, highly methodological approach which generates a ‘Patient Insights Positional Paper’ (PIPP) where our clients benchmark their patient engagement capabilities and successes to date compared with up to 10

It is crucial that, internally and externally, a company has a transparent standard operating and reporting procedure for all investment in patient engagement activities

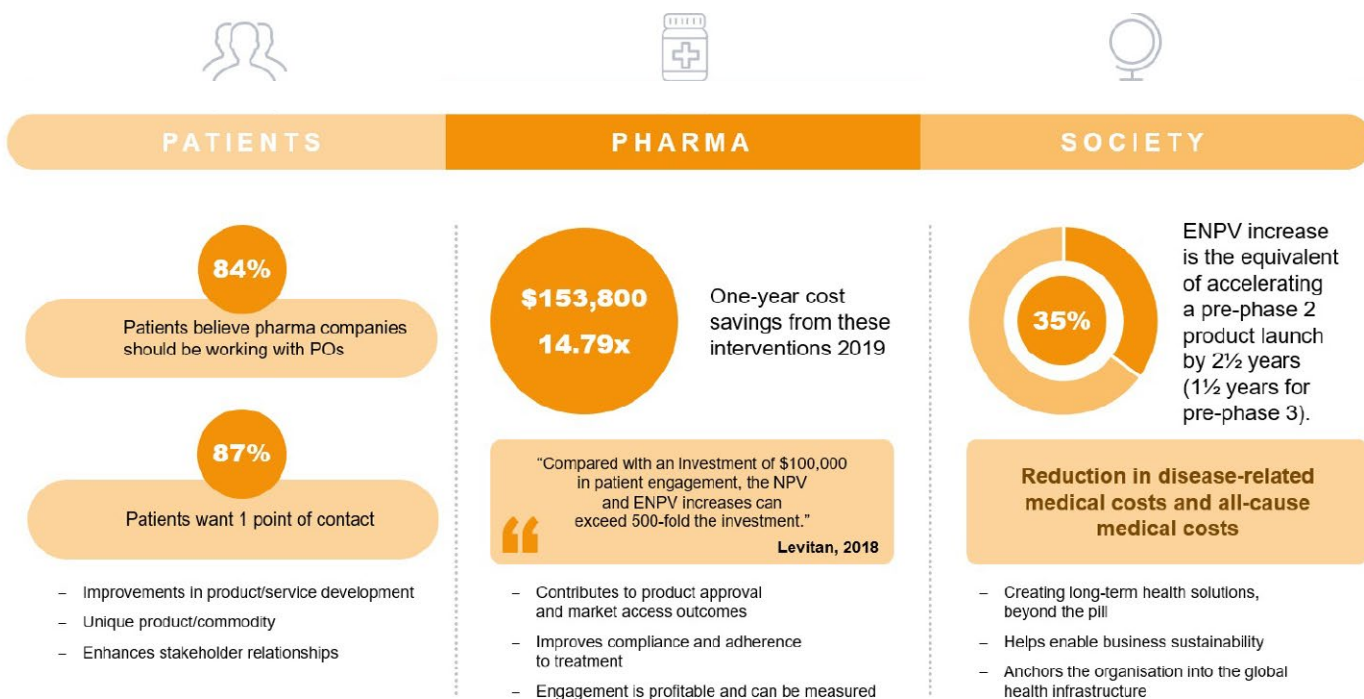


Figure 4. Patient Engagement activities and ROI

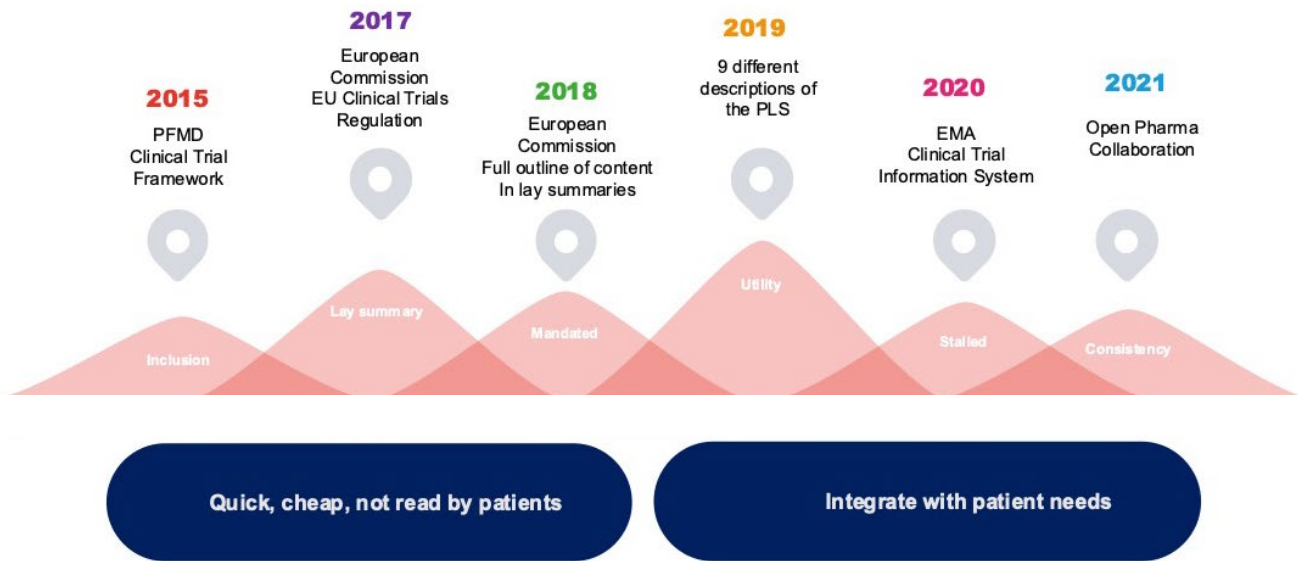


Figure 5: Poor spending on the PLS

other companies competing for the same patient-attention bandwidth. This provides clear indication of where to spend and where not to spend. As such, when an industry client approaches us with a ‘shopping list’ of patient materials we like to reassure them to take a step-back and evaluate if the individual activities will ultimately deliver the triple-win using the PIPP to facilitate decision-making. The internet is saturated with patient websites, attempts by pharma to create ‘new patient communities’ and most companies will have a pile of ‘patient journeys’ gathering dust once created. This is spend for the sake of it. Take the example of the ‘Plain Language/Patient Lay Summary’ (PLS) which has been in circulation since 2017 (Figure 5). For patients – they don’t read them, they don’t access them, they don’t share them. The PLS does little to increase patient activation or boost patient-pharma collaboration. Enter then the newly launched

‘Patient Voice Publication’ (PVP) – our answer to creating a patient-pharma connecting tool that enable patients to describe their ‘real word’ needs to pharma to improve product, service and clinical trial design, gains insights from patients for pharma and increases health literacy. This is perfect ‘triple win’ thinking ... and the right spend.

Increasingly pharma will come under scrutiny to defend their relationships with Patient Advocacy Groups and to highlight the benefits of their patient support programmes (PSPs). Elevating patient engagement to be an essential business spend for patient safety, support and societal gain is the perfect way to ‘show the benefit of the money’ invested in patient engagement programmes by pharma.

Conflict of Interest

None. ■

Digital Solutions Are the Now and the Future of Diabetes Management

◆ Author: Matt Jewett | Senior Vice President and General Manager | Roche Diabetes Care | USA

Diabetes is a chronic disease that requires daily management including lifestyle and behavioural modifications, compliance with medications, blood glucose control and close patient monitoring, all of which can be efficiently supported by digital solutions.

Diabetes is a global health crisis. Recent estimates suggest the incidence of diabetes will increase to 1 in 10 adults by 2040 (Bommer et al. 2018). It is a chronic disease accompanied by co-morbid conditions that together require daily management including lifestyle and behavioural modifications, compliance with medications, blood glucose control and close patient monitoring. Interestingly, and quite optimistically, from my perspective, we've seen over the last 18 months or so that all of these needs can be efficiently supported by digital solutions.

What's more, integration of digital technology including telehealth and mobile health into everyday diabetes care may actually improve diabetes management and increase its efficiency. The economic benefits follow.

These are exciting developments in many ways. While COVID-19 has been especially difficult for people with diabetes because of the increased risk, innovation in digital technology and the enthusiasm with which it has been embraced represents important progress. Among the myriad benefits, digital solutions enable personalised care, which is so critical for this disease. If there's anything we know about diabetes care, it doesn't quit, and one size doesn't fit all. With telehealth services such as remote coaching, people with diabetes can get what they need when they need it. It follows then that this level of access and convenience should lead to better control, more productivity at work, and reduced costs. And it does.

One example is mySugr, a personalised diabetes management app with an accredited coaching programme available in 82 countries and 24 languages. The benefits of mySugr have been analysed through a retrospective real world data analysis where the anonymised data of 440 active type 1 diabetes users was observed. After one month, the estimated HbA1c

dropped from an average of 9% to 7.8%. After six months, estimated HbA1c decreased further to 7.7% (Dehong et al. 2019).

From the cost perspective, one group for whom the economic benefits of improved and more efficient diabetes care can be realised is employers, given the working-age group is mostly affected by diabetes and its complications, which subsequently affects quality of life and work productivity (Alsaalem et al. 2021). Diabetes now accounts for 1 in every 4 healthcare dollars spent in the U.S (American Diabetes Association 2017). Digital solutions are now available in comprehensive diabetes support programmes employers can offer to employees with diabetes. Our own programme, Roche Diabetes Health Connection, which includes the mySugr app, an Accu-Chek® Guide Me meter and unlimited test strips delivered to employees' homes, provides improved glycaemic control among users and up to \$2,500 in savings per participant in the first year following improvement (Bonsai et al. 2018; Mayer et al. 2019).

There's been much discussion about when things will return to "normal" after the pandemic. People are eager to gather with their loved ones, employers are hoping to reconvene in office spaces with fewer health risks, and the world at large is yearning to put social distancing and isolation in the rearview mirror. But telehealth, use of which rose dramatically during the pandemic, is here to stay — and for people with diabetes, that could spell a very significant victory for their health. Endocrinology was one of the top specialties to take advantage of remote care early in the pandemic (Doximity 2020), and to great effect.

With the global economic burden of diabetes and its complications on track to grow to \$2.1 trillion by 2030 (Bommer et al. 2018), digital solutions are the present of improved diabetes care – and its future. ■


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For full references, please email edito@healthmanagement.org or visit <https://iii.hm/1cmm>



The Wait is Almost Over – An Imminent Return to Elective Orthopedic Surgeries

 **Author:** Torbjorn Skold | Vice President | EMEA DePuy Synthes Joint Reconstruction

 **Author:** David Barrett | Lead Consultant | Southampton University Hospital | Professor of Orthopedic Engineering

Torbjorn Skold and Prof David Barrett, one of the design surgeons for ATTUNE Knee System, explore ways to tackle the backlog in orthopedics and get more people moving pain free.

Key Points

- Osteoarthritis is one of the most frequent diseases leading to the need for joint replacement.
- Medical professionals face huge challenges in addressing the mounting quantity of cases.
- One major goal is to reduce the waiting lists. This need can be addressed by simplifying the time requirements related to diagnostics, scheduling, procedural efficiency, and follow-up care.
- Continued evolution in the orthopedics world brings with it increasing patient demand, higher expectations, and an unrelenting focus on driving efficiencies in costs, time, and resources.
- Helping surgeons build a strong provider-to-patient connection may enable a more positive patient experience.

Torbjorn Skold: Over the last 18 months, many hospitals were forced to postpone elective surgeries to make room for COVID-19 critical care. In the UK alone, 100,000 people had their joint replacement procedures cancelled during first wave, leaving them with untreated pain and mobility challenges.¹

More than one-third of those waiting for a total knee or hip arthroplasty described their state of being as “worse than death,” a situation twice as bad as that observed prior to the pandemic.² The picture is similar across Europe.

Osteoarthritis (OA), a degenerative joint condition that affects approximately 350 million people worldwide, is one of the most frequent conditions for which patients may need a total knee replacement.³ We know that as populations age, the risk of OA increases – leading to higher demand for care.

The pandemic has made medical professionals face huge challenges in addressing the decreasing quality of life and the mounting quantity of cases. At DePuy Synthes we believe

that our industry should focus on helping surgeons, patients, nurses, and healthcare systems work through this backlog.

Prof. Barrett: Total knee arthroplasty (TKA), commonly known as knee replacement surgery, is the gold standard treatment for OA, and the number of procedures carried out annually is projected to grow 189% by 2030, representing 1.28 million procedures annually.⁴

However, the image of an older person undergoing a knee replacement before settling down to a quiet, sedentary life is outdated. The success of TKA has led to its increasing use in younger patients, with a recent study indicating a 188% rise in procedures among people aged 45 to 64 years old.⁵

Younger patients often have more work or family commitments, as well as a higher expectation of their ability to resume normal activities such as sport. Different knee systems offer different levels of benefit to patients – yet up to a fifth of all patients are dissatisfied with their surgery, with their



expectations for ease of movement post-surgery unmet.⁶

If we're to keep patient outcomes as our focus and goal, the product innovation must be patient centric. **From an initial goal of increasing longevity of the implant, in recent years the goal of innovation has been to address unmet patient need.** It is only by considering the patient perspective that we'll be able to realize the true transformational potential of this surgery, giving patients that freedom of pain-free movement they need.

Although challenged with the increasing burden of OA, I must admit that we're in an exciting time for orthopedic surgery in general, particularly with TKA. New technology is set to evolve how surgeons, and the whole healthcare team, manage patients' care from pre-admission to long-term recovery.

Torbjorn Skold: The ATTUNE Knee System was developed from a commitment to put patient needs at the heart of product design. It was created around one key principle: **the right implant for the right patient, in the right setting with the right surgical approach, at the right cost.**

In 2019, several innovations were introduced across primary and revision procedures that had the potential to significantly transform patient outcomes by achieving improved stability in motion.

Prof. Barrett: Innovation shouldn't stop with the implant – it has to cover the whole care management system and the patient pathway. **The challenge we've got with the healthcare is that we have to look at it as the whole process** and take it to a drastically new level where the planning of the procedure, speedy throughput, rapid discharge, and reducing prolonged hospital stays and complications, are the important components of success. The desired outcome is a streamlined patient pathway with meaningful economies and savings of time and space.

Torbjorn Skold: Our goal is to achieve and maintain a high throughput of patients without compromising on either the outcomes or the standards of care. Since it's unlikely that hospitals can double the number of surgeons or that they will receive extra resources, what remains within our control is to perform orthopedic procedures more effectively and efficiently.

In essence, patient throughput is a function of three factors: operating time, complications, and length of stay (LOS).

Consistently shorter procedure times allow planners to put more patients on a list, maximizing the use of available operating theater space. Choosing one implant over another could reduce surgery time allowing an additional patient to be added to each operating list.

For example, mean operative time for cemented TKA equates to about 93.7 minutes.⁷ Cementless solutions have been shown to save about 11.6 minutes per surgery. This 11-minute boost per procedure can represent a significant time saving.

Each complication is likely to block a bed and to affect operating capacities and hospital personnel. The quality of implant



used is one of the ways to decrease the rate of complications. The latest digital technologies designed to reduce surgical variation and improve consistency of outcomes can also contribute to a reduction in those rates. This can translate directly into shorter hospital stays and bypassing rehabilitation centers.

The choice of surgical approach can result in significant LOS reduction. For many patients LOS could be as short as 24 hours in a hospital. This shift from inpatient to outpatient care can alleviate pressure on the hospital system and reduce associated costs.

With the right support, hospitals can optimize and streamline the patient pathway from pre-admission to post-discharge care. It is important that the patient also understands what they can do to contribute to a successful outcome following surgery.

Prof. Barrett: Some may wonder if 24-hours rehab is possible at all? The answer is yes – **COVID-19 has changed patients' perceptions because they're quite anxious about spending a lot of time in the hospital.** Whereas previously it's been tough for us to get them home because they wanted to stay for as long as possible as they felt better with the opportunity to socialize with other patients and have access to physio etc. Now they realize that the longer they spend in the hospital the higher their chances to contract the virus.

Some of my colleagues in the U.S. mentioned about 95% of their patients, who undergo a total knee replacement, go home on the day of the surgery. Surgeons have been moving to a very efficient fast-track procedure and this is most definitely changing patients' perception, converting them to being fully up for going home as soon as possible.

In addition to those in the private sector, there are a number of projects in the NHS which aim to install "hospitals within hospitals," which are COVID-free and have very rapid



throughput for elective surgeries.

Torbjorn Skold: What happens before the patient reaches the operating theater makes a difference. The more the procedure and the implant are appropriate for the specific needs and physiology of the patient, the less likely the patient is to be dissatisfied and/or need revision surgery, and the more likely they are to recover more smoothly. **Investing in the pre-surgery stage leads to downstream savings post-surgery.**

Pre-operative surgical planning and patient-specific guides are enabling technology to design customized instruments. Using proprietary software, the surgical team works to better understand the patient's anatomy and soft tissue, to ensure the implant is placed as accurately as possible.

Prof. Barrett: Digital workflows can also improve both

consistency and quality across the surgical process as a whole. Synchronized digital workflow technology and real-time insights reduce variability and work to support surgical teams by giving them increased, and more detailed, information.

The development and adoption of artificial intelligence (AI) has real potential in the field of orthopedics.

Innovations in digital technology means that after the surgery, most patients move forward through their mobile phones. There is never a need to go back to the hospital. **With smart technology, we can monitor at a distance better than we could when we were making outpatient visits.**

We have information on the number of patients take, who take the stairs, where they go in the house – this really helps. There is no longer need in outpatient facilities: we can run virtual patients through virtual clinics – available any time any place, helping hospitals save time, and it's a lot easier to organize.

Torbjorn Skold: Lastly, we would like to mention that education of the hospital team plays a crucial role in ensuring every patient gets a consistent high level of care. A surgeon's learning curve on ATTUNE is often short; it can take about five cases to start becoming proficient with the products and procedures.⁸ So we focus on getting practicing surgeons up to speed and accelerating them as quickly as possible. A combination of in-person and virtual events, along with online platforms, virtual reality, and tele-mentoring, can all be used to support the learning of everyone involved.

Surgeons and healthcare teams must take advantage of the promise that new technology brings to better map procedures to patients, to drive consistency and efficiency, and reduce the need for surgical revisions. Only then will we be able to avoid overwhelming health systems and, most importantly, help patients achieve the surgical outcome that will enable them to resume normal life. ■

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Upcoming Issue

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