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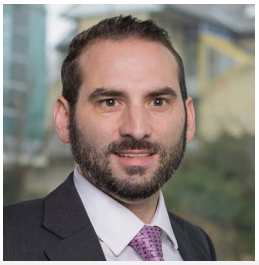
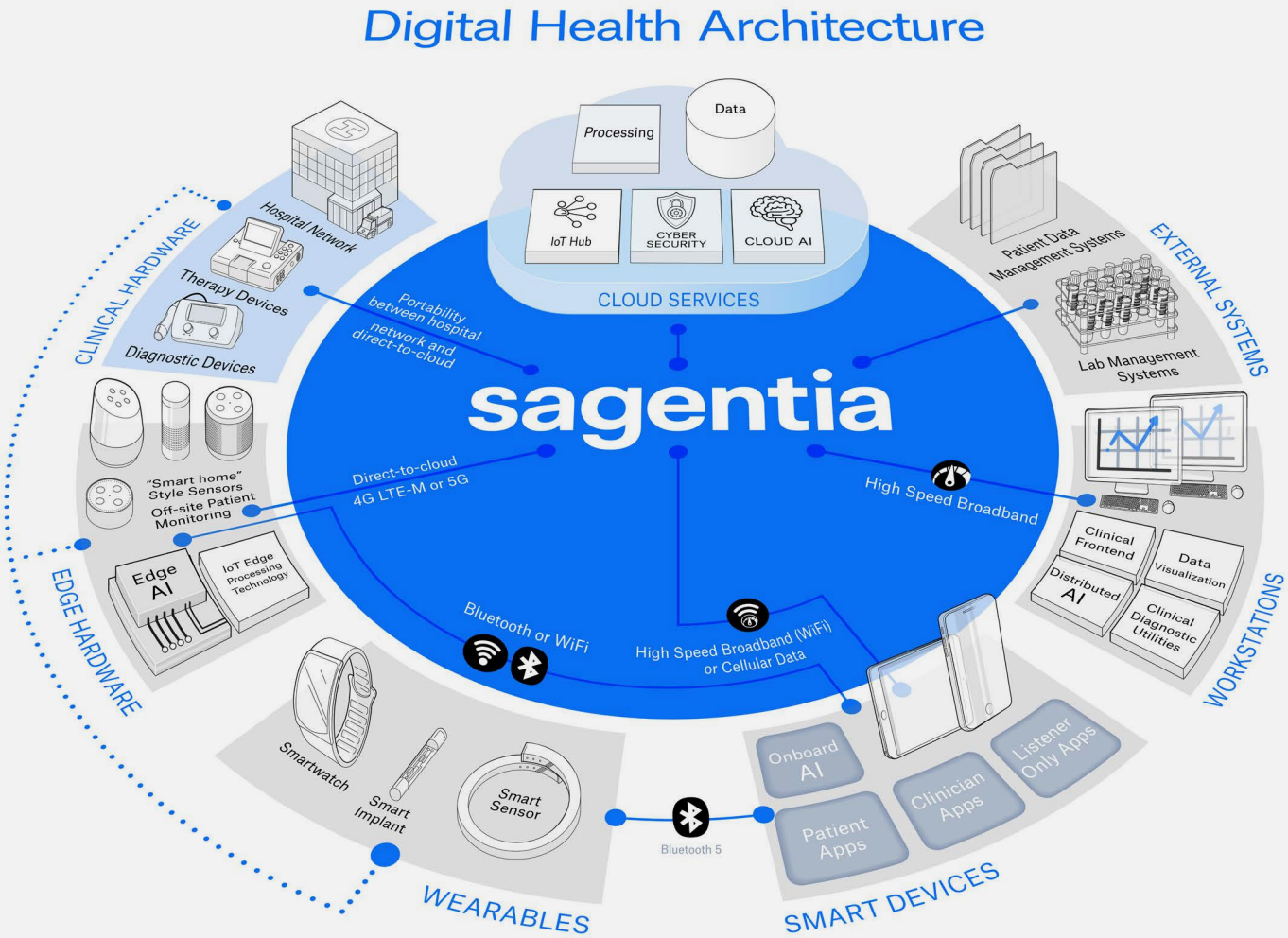


Meeting the demands of the virtual care revolution

By Andrew Chapman



Current forms of telehealth are not enough to address the immense challenges facing global and local healthcare in the 2020s. As well as taking diagnostics to the home, there's a need to revolutionize healthcare with a wider range of treatments in this setting. Clinical hardware purposefully designed for safe and effective use by patients at home will represent an increasingly important part of the equation over the next decade and beyond.

Our Architecting Digital Health Platforms series explores core segments of the dynamic digital health environment. We unravel the complexity and identify issues that medical device and biopharma companies may need to overcome to gain competitive edge. Demand for virtual care solutions is set to increase, so we consider how to get a head-start with focused innovation.

Traditionally, virtual healthcare refers to remote engagements between patients and clinicians via communications technology. So, a doctor might hold a videoconference with a patient at home. Or a patient might interact with offsite medical specialists via an audio or video link in their locality, instead of traveling to another city. It can also give patients ready access to expert second opinions.

As communications technology evolves, there is much potential for virtual healthcare to move beyond meetings, consultations and check-ups. Chronic diseases like diabetes already fall under its remit. And in the future it will play an increasingly important role in the monitoring and treatment of medical conditions in the home environment.

With the relative cost of healthcare provision on the up, new approaches are needed to ensure growing and ageing populations receive quality care. According to a report published by the World Health Organization:

> "Total health spending is growing faster than gross domestic product, increasing more rapidly in low and middle income countries (close to 6% on average) than in high income (4%)."
>
> *Public Spending on Health: A Closer Look at Global Trends (2018)*

But does increased spend equate to improved outcomes? UK spend on the NHS hit £153bn in 2018-19, up from around £12.6bn (in real terms) in the early years after it was founded. Life expectancy in the UK has also increased dramatically during this time. However, once a certain level of life expectancy is achieved, additional gains become more difficult.

Furthermore, better life expectancy doesn't necessarily correlate with increased years of 'good health'.

There is an urgent need to optimize spend on healthcare to deliver better long-term health, clinical outcomes and patient reported outcome measures (PROMs) for ever-increasing numbers of patients. Spending more on traditional healthcare models has limited scope to make a positive impact, but spending strategically and intelligently on alternative approaches could unlock new ways to improve outcomes.

Digital technologies hold much promise here. With strategic and focused innovation, they can take virtual care to the next level, reducing overall healthcare costs while ensuring better experiences and outcomes for individual patients.

Unlocking the potential of digital health solutions

It's easy to talk about digital technologies having the potential to boost healthcare effectiveness and efficiency. Actually achieving demonstrable improvements safely, consistently and at scale is another matter entirely.

Telehealth has received a lot of attention over the past decade. Facilitating remote primary care appointments, for example, can improve healthcare convenience and accessibility while potentially reducing costs. This is especially compelling in countries where there is a high ratio of patients to doctors, or where people have to travel great distances to the nearest healthcare provider.

In the first half of this decade telehealth will become mainstream. Better penetration and reliability of advanced mobile technologies will help, and well-funded start-ups in this space will gain traction with healthcare providers. Yet in its current form, telehealth will not go far enough to achieve the necessary sea-change in the way personalized healthcare is delivered to the masses. There's a pressing need to reimagine the way treatments and therapies are delivered to patients via clinical hardware.

Clinical hardware in the home

Therapies currently delivered in the home environment include those related to infusion treatments such as pain management drugs, anti-infectives or enteral and parenteral nutrition. This represents a win-win alternative to treatment in a hospital or clinic. Patients' exposure to potential infections is reduced, and treatment is less disruptive to normal daily life. At the same time, the costs associated with home infusion are significantly lower and clinical outcomes are on par with, or better than, those associated with treatment in a conventional setting. In fact, a research project looking at home infusion in the US concluded:

> Home infusion care can provide safe, clinically effective care to improve patients' quality of life and reduce healthcare costs...the home infusion care delivery model offers strong promise as one in a set of approaches that can improve care and lower costs.

Healthcare: The Journal of Delivery Science and Innovation (2016)

Learnings from existing home-based treatments like this can be harnessed to inform and accelerate the development of a new age of advanced virtual care solutions. We anticipate that the most immediate opportunities lie in areas related to the treatment of chronic conditions such as kidney disease and Parkinson's disease as well as rehabilitation following cardiovascular events or strokes.

Significant change is already afoot in the US, with the President's executive order on 'Advancing American Kidney Health'. Launched in July 2019, it encourages greater rates of home dialysis to improve patients' quality of life.

Taking virtual care to the next level

Clearly there are opportunities for disruptive innovation in this space. But how do you ensure R&D is focused and targeted enough to address patient and healthcare system needs while meeting medical standards?

Our work with medical device manufacturers shows that an end-to-end approach is always best, but critical considerations are sometimes overlooked at the outset. This can result in serious problems further down the line, preventing regulatory approval or hindering market penetration. By acknowledging and addressing these issues upfront, you can foster a more seamless journey from inception to uptake.

1. Take a user-centred approach to product and platform design – as far as possible, patients need to be able to administer at-home treatments themselves with minimal instruction or intervention. Focusing on this from the outset can ensure ease of use is a winning feature of the device and platform. For instance, a direct-to-cloud set-up which doesn't require any technical input from the patient, enables them to focus on treatment and therefore reduces the risk of errors.

2. Consider safety, security and privacy – naturally the safety of users and patients is a top concern for any medical device. With connected devices, additional factors related to data security are also paramount. Proactively considering functional safety alongside techniques such as threat-modelling and privacy-by-design at the system architecture stage results in a smoother development path. For instance, at-home clinical hardware could isolate particularly sensitive data for analysis on-board the device rather than allowing it to be transmitted to the cloud.

3. Evaluate the value of data gathered – devices can be used to reveal ground-breaking new insights if they are designed with advanced analytics in mind. This can offer immediate value in the monitoring of continuously gathered real-world data for efficient post-market surveillance to evaluate performance. Such insights could enable significant performance improvements, expansion of indications for use and provide a gateway to personalized care. Over time, this approach may enable 'micropayments by use' or even 'by outcome', radically altering payment models and improving access.

A window of opportunity

With its dual aims of cost reduction and outcome improvements, healthcare is crying out for virtual care innovation that embraces diagnostics and treatment. When you account for the lifecycle of existing clinical hardware, a significant shift from hospital to home-based treatment is likely to be achievable in the second half of this decade. However, some markets, such as China and Singapore, are ready to move more quickly.

> The window of opportunity to gain competitive advantage is now open. Players that mobilize their efforts quickly and effectively will win significant share. What's more, in the medium-term, they will be well positioned to drive further innovation etched into the rich datasets that will emerge from connected clinical hardware in the home.

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Sagentia is a global science, product and technology development company. Our mission is to help companies maximize the value of their investments in R&D. We partner with clients in the medical, consumer, industrial and food & beverage sectors to help them understand the technology and market landscape, decide their future strategy, solve the complex science and technology challenges and deliver commercially successful products.

Sagentia employs over 150 scientists, engineers and market experts and is a Science Group company. Science Group provides independent advisory and leading-edge product development services focused on science and technology initiatives. It has ten offices globally, two UK-based dedicated R&D innovation centers and more than 350 employees. Other Science Group companies include OTM Consulting, Oakland Innovation, Leatherhead Food Research, TSG Consulting and Frontier Smart Technologies.

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