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the end of
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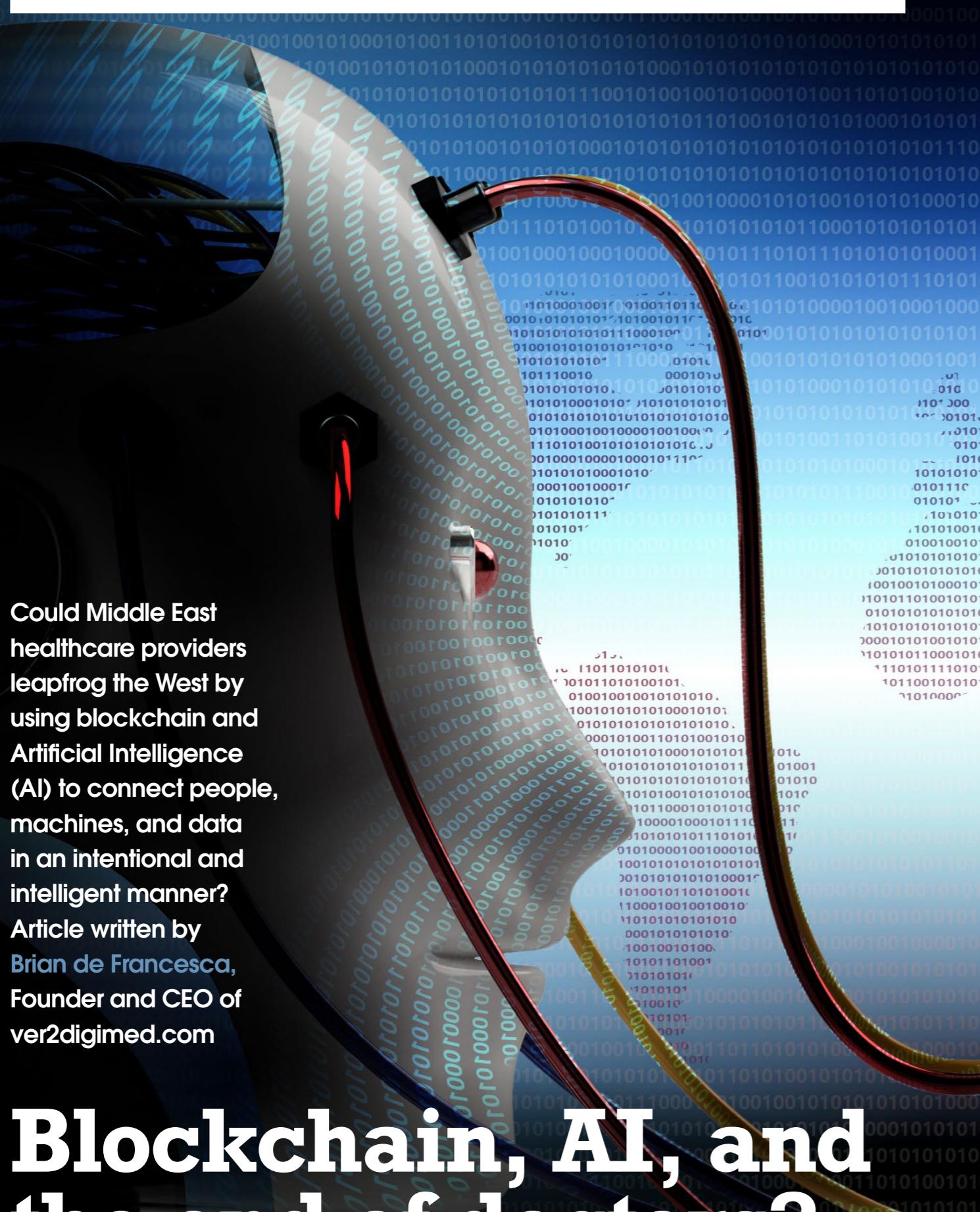
by Brian de Francesca

Could Middle East healthcare providers leapfrog the West by using blockchain and Artificial Intelligence (AI) to connect people, machines, and data in an intentional and intelligent manner?

Article written by Brian de Francesca, Founder and CEO of ver2digimed.com

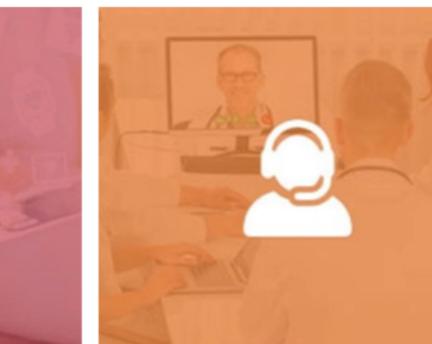
Blockchain, AI, and the end of doctors?

THE PLATFORM



DIAGNOSTICS

Ver2 connects a network of over 700 radiologists and other diagnostic specialists to enable resource optimization for hospitals, clinics and other institutions.



EDUCATION

Ver2 connects teachers and medical content from renowned institutions to medical students located anywhere. This enables access to needs-based, customizable and CME accredited content with a quantifiable impact.

MONITORING

Ver2 can connect patients to caregivers via Bio-sensors to remotely monitor chronically ill or high-risk patients. This reduces costs and prevents health deterioration.

CONSULTATION

Ver2 provides access to specialists for expert medical opinions, for example, telestroke programs, medical travel, second opinions, tumor boards, and more. The consultation module can also operate as a virtual clinic.

HEALTH RECORD

We are in the process of adding a Blockchain authentication feature to maintain personal health records.





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I should have taken heed of the Socratic paradox that 'all I know is that I do not know anything', as in January of 2016, I publicly expressed to the scientific and medical community that 'There are certain things that a human brain does much better than any piece of technology – such as solving a crossword puzzle or playing the game Go.' In January of 2016, I was in lofty company, as the majority of the big brains of Artificial Intelligence (AI) felt that it would take at least 50 years for a computer to beat any human at Go. Three months later the Google DeepMind Alpha Go system did just

that, when it beat not *any* average human Go player – but the world's 18-time world Go champion, Lee Sedol.

This is a non-trivial occurrence. Because there are many tasks that are performed in healthcare each day by humans, that are well suited to be better performed by intelligent thinking machines. For example, the foundation of healthcare – the diagnosis, consists of pattern recognition and algorithms, both of which are superior strengths of machine over humans. My take away from this is that the changes are occurring much more quickly than I realised, not only in the development of AI, but in many other areas such as the global dispersion of high-speed connectivity, blockchain, plummeting costs of data storage, and tremendous improvements in biosensors of all shapes and sizes. The future that many felt was at least 50 years away, appears to already be behind us – and these powerful thinking machines will not stand alone, but will play a central role in our increasing global connectivity. I often refer to *Connecting Minds* and explain it as ‘facilitating collaborative information transfer between connected people, things, and data in an intentional and intelligent manner, so that the total value created is exponentially greater than the sum of the individual parts; this allows us to do more, better, faster, less expensively, everywhere and all of the time, for more people.’

The Middle East has a real opportunity to benefit from *Connecting Minds* and use it to leapfrog’

The Middle East has a real opportunity to benefit from *Connecting Minds*, as it does not have a deeply entrenched elderly legacy healthcare system. Therefore, it is not stuck with an antiquated inbred healthcare system, like in the USA and EU. It can embrace the immense power found in *Connecting Minds* and use it to leapfrog Western Healthcare in healthcare delivery, research, and medical education.



AI managed to beat the world Go champion.

All the technological advancements still need input for the programmes to run.

Data is what to Connected Minds - what food is to humans, *we are what we eat*.

Data comes from many places: Nurses typing into keyboards, the output from diagnostic imaging devices and more but

of greatest importance is the flood of data from sensors attached to patients and otherwise. These are not big pieces of medical equipment or devices – but small sensors, that are getting smaller, better, faster, and cheaper. Soon, the

sensors will be inside of you – it is really only a matter of time. They will be small enough to be injected, float around your body and be powered by your own body motion and chemistry. Sensors will provide a torrent of data into our collaborative network. As data is generated by these sensors, it then sits quietly in *buckets* we call memory banks

(storage in the cloud). Telemonitoring via sensors is already happening with the continual monitoring of the presently ill – like in advanced chronic disease management. However, within a handful of years, once gene sequencing is a common occurrence, we will start to continually monitor the *currently well*, who have the potential of becoming ill according to their genetic profile. Eventually, biosensors will be implanted at birth. Hopefully, we will not be forced to incorporate these sensors into our bodies, but if you choose to *opt-out* of the *network* life maybe more difficult, expensive, and risky. Certainly, there are many yet to be answered questions concerned with giving up a significant amount of our privacy. Will we have the ability to turn these sensors off at will? This is just one, of a growing list of continual remote monitoring questions. When you combined the coming billions of sensors with thinking machines and massive memory in the cloud, that is shared by everyone and everything, the power is truly exponential.

So, all of this *big data* will come from trillions of sensors in and around us, but where will it reside?

Human brains have extraordinary

Researchers at the John Radcliffe Hospital in Oxford, UK developed a diagnostics algorithm system that's more accurate than doctors at diagnosing heart disease at least 80 percent of the time. The doctors then went on to treat the people and caregiver to support them. Another example where non-human decision-making supports doctors is Harvard University researchers *smart* microscope that can detect potentially lethal blood infections and identify the responsible bacteria with a 95% accuracy rate. Cancer is another critical area where thinking machines can be used to optimise and

improve care as their Japanese researchers reported that a new AI aided endoscopic system can reveal signs of potentially cancerous growths in the colon with 94% sensitivity, 79% specificity, and 86% accuracy – all of which is better than current human ability. The evidence of AI use in supporting doctors was published in 2017 in the Journal of the American Medical Association where it was found that *deep learning* algorithms were able better diagnose metastatic breast cancer than human radiologists were when under time pressure, such as in an emergency room.

Doctors will remain, but the definition of a doctor will change, as will the daily tasks they perform. Albert Einstein could have been referring to Western healthcare leaders when he said, ‘We cannot solve our problems with the same thinking we used when we created them.’ Being cognizant of Einstein’s warning, the West continues to be restrained and the Middle East could become the leader for the future in healthcare – if it thoughtfully takes the leap forward.

Western concrete

Many of the technological innovations are currently invented in western countries, but their healthcare systems have become ossified monstrosities and sadly do not embrace these magnificent home-grown technological inventions.

The western countries are stuck in legacy concentrate which leaves an opportunity for the Middle East to overtake them. Each of the important innovation in digitalisation and connectivity such as AI, Blockchain, Telepresence, Sensors, Shared Cloud Storage have value, but when combined thoughtfully in unison and connected, they provide truly exponential benefits far greater than the sum of their parts.

These *connected* synergies are proving to greatly improve access, safety and quality healthcare; while tremendously reducing costs at the same time. It is important and urgent, that we safely and prudently get these innovations out in the field, in broad application as soon as possible, as healthcare around the world is in a state of crisis. We are moving too slowly and making too many costly mistakes.

The majority of these innovations have already been piloted many times over and proven to significantly improve patient care and reduce overall healthcare costs tremendously. There no need for more time and resource consuming ‘pilot projects.’ It is time for leaders to act.

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signs from their homes. Workers who do not require physical presence to provide their work value, we refer to as *Healthcare Knowledge Workers* – it is possible that up to one third to one half of all healthcare tasks are performed by *knowledge workers*.

The development of this digital knowledge worker category, is having a significant impact on healthcare staffing models. For example, one pathologist can work at theoretically, an infinite number of hospitals, providing remote reporting. A smaller facility that normally would not have on-site access to all sub-specialties of radiology covered because of their caseload, can now have access to every sub-specialty in radiology 24/7/365. And this is just the beginning. Improved access to more empathetic caregivers *physical* with support from virtual an artificial is the future model of healthcare.

The New Healthcare Workforce Composition

Physical Virtual Artificial

It takes a long time to become a doctor, and it is expensive. Once you are a doctor, you are required to take so many hours of continuing medical education, to keep your licence active.

There are problems with both primary medical education as well as continuing medical education. Starting with continuing medical education (CME) most of it is not *needs-based* and is not



Modern digital tools can help teach doctors

taught by the *thought leader* of the particular topic. Using digital tools and connectivity, we are developing *needs-based continuing medical education* that will be taught by the best and brightest from around the world. Think of this as *precision personalised continuing medical education*.

Current medical education is also way-out of sync compared to education for other industries. Using modern digital tools and collaborative connectivity, we can teach more doctors, better and faster at a lower cost. Many of us working in

'Using modern digital tools and collaborative connectivity, we can teach more doctors, better and faster'

healthcare in this region received our education in the West and many also worked for some time in Western healthcare. There is a general tendency to consider much *Western Healthcare as world class* healthcare to be emulated. While there are certainly many best practices and inspiring examples of excellence worth replicating, there are also a host of negatives that are best left right where they are. One example of what to leave behind is medical errors.

Medical errors are the third leading cause of death in America. Although IBM's Watson is moving out of healthcare, when it was challenged to glean meaningful insights from the genetic data of tumour cells, a task that took human experts about 160 hours to review and provide treatment recommendations based on their findings. Watson took just ten minutes to deliver the same kind of actionable advice. In this respect, when it comes to healthcare, AI isn't necessarily about replacing doctors, but optimising and improving their abilities.

AI is highly suited to diagnostics in critical areas such as heart disease.

David Taylor

Managing Director of global healthcare workforce solutions company, Medacs Healthcare commented, 'With a solid history of delivery traditional staffing solutions for nearly 30 years to clients across the globe, we know that the impact of digitalization in the healthcare industry is going to have a direct impact on the staffing industry. The sooner we adopt our business models to fit with the objectives of the variety of healthcare facilities we service, the sooner we will be able to support the changing landscape ultimately resulting in supporting delivery of better and outstanding, cost effective care to patients.'



'Doctor'

Whether the label 'Doctor' remains in the future; the following will change

- 1 Who will become doctors – it will continue to become less of an elitist men's club.
- 2 How they will be trained to become doctors and how long this

- 3 How much money it will costs to create and maintain a doctor (it will be cheaper)
- 4 The daily task of a doctor

- 5 The daily tasks of a doctor provided remotely.
- 6 The current daily tasks of a doctor, that have been replaced by automation (AI).

need when, we need it, and to also be able to understand this information. But it is not possible for humans to effectively sort-through and utilise these huge amounts of data. We need the assistance of many powerful processors and massive shared storage devices for this herculean task. Therefore, we will rely on machines, information, and computer technology as a mandatory step to move forward.

In the age of ubiquitous connectedness, we know that one person, thinking, deciding and acting in isolation is limited by who they are, what they know and the information they have readily available to them. My excitement is not only about the value of connecting people (that is old news), but also

what is now being connected in addition to people. While there is obvious power in the *collaborative networking* of humans - there are new factors (non-human) that are making a great thing, even better. Today, we are not only connecting people within these powerful collaborative networks, but also very powerful computers,

massive shared storage systems, and sensors everywhere, including inside of our bodies. This is changing everything. While before it was mainly humans on phones or sending messages via email; now we are sharing cloud resident memory, augmented by powerful processing computers that are receiving data from millions, and soon billions of connected sensors that are cheaply connected all of the time, everywhere.

According to healthcare futurist Jeff Goldsmith, 'Simply connecting people, things, and data is not enough. Something must assist in framing and processing an ocean of knowledge and stuff that hasn't become "knowledge" as yet. It all must be connected in a functional,

organised, intelligent manner.' What does *intelligently* mean? It is not as simple as just *plugging everything together* there needs to be some central nexus, thoughtful, rules based, routing and organising function to make it all work together and minimise the clutter, junk and mistakes. There needs to be a digital ghost in the machine.

The missing link has been found

What has been missing from the internet since its inception is the ability to *trust* any transaction over the internet.

Blockchain technology, being cognizant of the Socratic paradox, will allow us to *trust* transactions made over the internet more than we can now.

The blockchain technology is an undeniably ingenious invention – the brainchild of a person or group of people known by the pseudonym, Satoshi Nakamoto. Originally devised for the digital currency, Bitcoin, the tech community is now finding healthcare uses for the technology.

Hosted by millions of computers simultaneously, its data is accessible to anyone on the internet. Blockchain technology has the real potential to significantly transform healthcare. Placing the patient at the centre of the healthcare ecosystem whilst increasing the security, privacy, and interoperability of health data. Ultimately blockchain could provide a new model for health information exchanges (HIE) by making electronic medical records more efficient, disintermediated, and secure. A

blockchain supported HIE could have the potential to reduce or eliminate the costs of current HIE systems; however, the real benefit is the potential to connect fragmented systems to generate insights and to better assess the value of care. In the long-

term, each country

should run a

nationwide

blockchain network

for electronic

medical records as

this will improve

efficiencies and

support better health

outcomes for

patients. These

national networks

could, and should, integrated into a

cohesive global network.

Connecting Minds is not only about

the use of technology such as

blockchain. It is about changing and

'Blockchain technology has the real potential to significantly transform healthcare'

optimising processes - incorporating technology in our systems to change what we do, how we do it, where we do it and who does it. Simply buying technology without changing processes will result in wasteful disaster. Some

Western examples to keep us sober and sombre - The UK NHS failed *Connected for Health* programme and wasted up to 20 Billion Pounds. The Americans dropped US\$35 Billion into HITECH with little to show for it. We must become big on

process management before being so big on data. So, while connectedness, sensors, processors, and memory in combination are great, we must become much more process literate. The

connecting of minds is the tremendous value to be found at the heart of the digitalisation of medicine.

With all these technological advancements what is the future of the doctor?

On many occasions I have been accused of wanting to replace doctors with computers; I was even brazen enough in one presentation a few years ago, of stating that the age of doctors was coming to an end. I have learned, that I was not correct. For years there was talk of the possibility of a computer beating a chess Grand Master – and that finally happened in 1996 when IBM's Deep Blue beat chess Grand Master Garry Kasparov. Mr Kasparov then went on to discover that while a computer could in fact beat a human – the combination of a computer and a human was better than a computer alone. This gave birth to Advance Chess or Centaur Chess as it is called. Doctors

are smart – many doctors in coordinated combination, are smarter. Computers are smart. Many collaborating doctors augmented by computers with access to shared memory – are the smartest of all – and getting more so every day.

There is a scene in the movie *The Imitation Game*, where Alan Turing is asked 'do you think that computers will ever be able to think as good as

humans.' His response was that 'computers will think as computers.' There are some tasks best suited for human minds and other tasks are better performed by synthetic processors and storage devices. For now, there are certain things that a human brain does much better than any piece of technology – such as writing a book, drawing a painting or composing a symphony (in the back of my mind, I am aware that as I write this – computers are creating literature, art, and music). Today when we speak of connecting minds we are no longer only talking about connecting human brains – but human brains that are augmented by synthetic brains like Minwa, Watson, Deep Mind and an increasing host of others - that are all fed tremendous amounts of real time data from sensors and that have access to all of the world's knowledge and medical information. We are able to access these massively parallel processing computers today, from the cloud on a pay-as-you-need-them basis. They are not replacing human thinking but complementing it – remember Centaur Chess.

In healthcare, we are progressing further into augmented thinking for medical decision support, medical

Michael Schelper,

General Manager UAE & Kuwait – COO MEA at Cerner stated 'We are at an exciting time as healthcare is being profoundly disrupted. It is refreshing to find more and more likeminded people such as Brian and David to challenge the status quo, inject innovative technologies in a new way into the healthcare space and drive the advancements towards the consumerization of health, life, and wellbeing.'

In the end our health is personal, and it requires all of us collaborating to make the future of healthcare a reality.'

analysis, diagnosis, information retrieval and more. We are starting to use thinking computers to analyse and process mountains of noisy data, generate and retrieve relevant health information, using the network of millions of doctors and medical technologies cheaply, quickly, everywhere. Online resources like *UpToDate* provide doctors access to the latest medical research and practice standards, helping to drive evidence-based practice in even the most remote regions.

Whatever label we assign to those who give care, really does not matter. It is what they do each and every day, and no longer need to do, that will matter the most. Historically, healthcare was delivered by people in-person at hospitals (or local clinics). Over the past decade or so, we have started to see some of this work being done remotely via telemedicine such as radiology reporting, ICU monitoring by remote intensivists, virtual tumour boards and remote monitoring of a patient's vital



Brian de Francesca

Brian de Francesca is the founder and CEO of Ver2 Digital Medicine. He has over 20 years experience of using connectivity to improve healthcare. Brian writes and speaks extensively on the use of connectivity to improve care globally.