



Towards Better Patient Outcomes and Staying Well:

The Promise of Cloud Computing for
the Healthcare Industry





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Published in Jun 2017 by the Asia Cloud Computing Association
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EXECUTIVE SUMMARY

The healthcare industry is one which is often at the forefront of technology change. From hospital management to rural healthcare communities, from doctors and surgeons to pharmacists and lab technicians—there is often a tension between the urgent needs of the healthcare industry that compels rapid technology adoption, and a strict and heavily-regulated environment that defaults to caution when embracing new technology. Today, we see a healthcare industry that is moving towards the new paradigm of cloud computing with increasing optimism and trust.

The shift towards the increasing use of cloud computing in the healthcare industry is driven by the industry's relentless pursuit of the health and welfare of patients—to treat and make the sick better, to prevent illness where possible, and ultimately promote well-being. With cloud technology, many healthcare institutions are benefiting exponentially from the scalability, cost savings and efficiency of the cloud, to transform their businesses for a digital future.

Some are going further by using the reach and flexibility of the cloud to provide new and improved experiences for customers and patients. Others are improving access to more information and leveraging the on-demand resource model of the cloud to enable new use cases that require real-time data processing and analytics.

What we see is a shift of attitudes towards using cloud computing in the various healthcare sectors. With technologies evolving quickly alongside ever-improving security measures, cloud computing holds much promise and opportunity for the healthcare industry in the years ahead.

For example, in Malaysia, data analytics and cloud computing are enabling the collection, management and use of health information vital to the country's healthcare system. ⁱ

Elsewhere, the power and scalability of cloud computing facilitate researchers' use of high-performance computing to discover targeted treatments for cancers, including ones that affect children. ⁱⁱ

How can the healthcare industry best deploy cloud computing to achieve better patient outcomes? What are the current opportunities to start a digital transformation in a healthcare institution? Where are the opportunities for the healthcare industry to leverage cloud technology, and move towards an ideal of preventing disease whenever we can, for prevention is preferable to cure? What other prospects does cloud computing hold for the healthcare sector?

This report will answer these questions by demonstrating the different innovative uses and deployment of cloud computing in six healthcare sub-verticals. These case studies show how technology and the healthcare industry can strengthen patient outcomes, and together, work towards the goal of staying healthy and well.

(A) Healthcare and Electronic Records

Stored on the cloud, electronic health records provide better patient care and up-to-date record keeping. Users can easily access the latest patient records, while real-time centralisation enables medical professionals to access a single, coherent view of clinical information for improved treatment.

In Brunei, the health authorities are leading the way to streamline medical records so each patient has a single record that can be pulled by physicians examining a patient. In Singapore, well-connected consumers expect to have the same access to their records as doctors.

As patient confidentiality and privacy is of utmost importance, stringent security standards in cloud are in place, winning the trust of many healthcare providers.

Innovations in cloud-based data management and advanced analytics also provide government and international agencies with vector tracing information to identify and halt the spread of pandemics such as the Zika virus, avian flu, and Severe Acute Respiratory Syndrome (SARS).

(B) Connecting Remote Communities

Cloud-based infrastructure is also transforming how people “see” a doctor in remote areas. For example, Philippines start-up Medifi is matching patients with doctors and enabling them to video-conference, chat online and share medical records. Instead of travelling long distances to get a diagnosis, some patients can rely on a video-conferencing system to obtain a diagnosis from a doctor. This helps more people seek medical assistance in a country where there is geographically unequal doctor-to-patient ratio.

(C) Digital Consumers and Patients

The cloud is empowering increasingly connected consumers, who can benefit from having access to their medical records as well as an interface that presents the information in a friendly, useful manner. To meet the demands of consumers, the cloud offers the high performance and efficiency needed. Wearable health devices such as heartbeat monitors and RFID-enabled pacemakers hosted on scalable cloud-based infrastructure enable doctors and patients improved monitoring and intervention through a shared view of vital health signs.

In Singapore, SingHealth Group’s Health Buddy app is enabling patients to schedule their appointments themselves, while also receiving regular tips on keeping healthy. It empowers consumers, and provides patients with a self-service mechanism, improving service efficiency.

(D) Empowering First Responders

Responding to a disaster area such as in the Sichuan earthquake of 2008, aid workers often face the challenges of finding information on the ground and coordinating their efforts. When on-premise infrastructure is damaged during a crisis, cloud computing offers a robust disaster recovery and operational continuity alternative, thanks to its wide reach and easy accessibility.

(E) Transformation at the Hospital

In hospitals, the need to focus on patient experience and bolster medical outcomes has pushed them to adopt more agile infrastructure based in the cloud. By shifting from vendor-specific and resource intensive on premise infrastructure, and moving to commoditised and scalable cloud-based hardware, they can free up infrastructure operations and maintenance time to see more patients and provide timely, customised care at a lower cost structure.

India’s Fortis healthcare group could see twice as many outpatients by moving its applications to the cloud. Meanwhile, Thailand’s Paknampo Hospital has seen improved accuracy in reporting and fewer duplicates in tests such as X-rays after adopting a cloud solution.

(F) Cloud for Pharmaceuticals and Diagnostic Labs

If pharmaceutical firms and diagnostic labs can more efficiently collect and analyse data from clinical trials, and bring greater computational resources to bear during drug discovery, they can produce new drugs in less time. Start-up company Promeditec, has moved to the cloud to better conduct and monitor trials closely and efficiently. In accelerating the data capture of these trials, it is making it possible for results to emerge more quickly – and new treatments to be made available more swiftly.

(A) TRANSFORMING HEALTHCARE WITH ELECTRONIC RECORDS

Electronic health records offer many benefits, such as providing real-time information to clinicians, which in turn, empowers doctors to offer evidence-based treatment that ultimately raises the quality of patient care. Allaying privacy concerns, these records can be safeguarded electronically through a secure, compliant cloud system. Doctors may be given temporary access, and only when treating of a patient.

Brunei Creates One-patient, One-record System

One of the biggest challenges faced by healthcare providers is consolidation of data from disparate sources into a real-time Electronic Medical Record (EMR).

The healthcare management system deployed in the Sultanate of Brunei provides each of its citizens a single record that is accessible across the country.



Source: DXC Technology

The presentation of an ID card provides healthcare professionals with an EMR that contains information such as allergies, test reports, prescribed medication and notes related to past visits. Digitalisation in Brunei has provided a platform for information sharing, resulting in improved care and enhanced patient experiences.

The technological advances have been made possible through a real-time cloud-based Enterprise Management system, deployed by DXC Technology, that is scalable and agile. The Brunei Health Information and Management System (Bru-HIMS) is part of a larger effort by the Ministry of Health Brunei (MOHB) to raise

the quality of care in its four hospitals and 60 health centers and clinics.

Ninety percent of the population has signed up for the system, which offers real-time data integration and replication. Data privacy is a key facet of the solution with detailed audit trails embedded as well.

DXC Technology has recently added new functionality to the system, which includes scheduling, improved device integration and enhanced business intelligence and analytics capabilities. Roadmap items include the use of data science to plot future expansions and enhancements.

“Cloud computing can make a real difference in the future of population health management, which will be one of the main drivers for healthcare providers to migrate to cloud platforms,” said Jegatheswaren Ponnudurai, general manager, Healthcare, AMEA, DXC Technology.

“Cloud-based technologies enable information from different data sources and systems to be shared and analyzed for a more holistic view. By leveraging patient data, healthcare organizations can understand the specific care needed for individual patients, recognize patterns faster and address preventive and chronic care needs,” he added.

Source: Thanks to DXC Technology for providing this case study. For more information, contact amea-marketing@dxc.com or visit www.dxc.technology/healthcare

From Paper to the Cloud in New Zealand

What used to be done on pen and paper at a children's support services provider in New Zealand is being processed on the cloud today in real time. The result: a more customer-centric service that brings a modern, mobile approach to patient care.

In 2015, Plunket launched an electronic health record application that handles its 60,000 clinical records each year. It was among the first in the country to do so.

With that, it did away with the difficulties managing and auditing the data each year. Today, it is leading the industry in using cloud technologies to transform business operations and improve customer care.

Plunket's nurses are empowered with 800 Windows tablets that enable them to view relevant information in real time. Having that data on hand brings efficient and effective service to patients throughout New Zealand.



Source: Microsoft NZ News Centre

Nurses can also add rich content like photos of a child at various stages of his or her development. This brings a lot of useful data that was not available previously. Always connected, the cloud enables the secure storage of such information.

"Our service is about protecting and improving the health of New Zealand children. We

realised that our current system wouldn't allow a quick response to negative population health trends, such as an outbreak of an infectious disease," said Plunket's Chief Operating Officer, Andrea McLeod.

"With real-time data, Plunket will be well positioned to monitor and respond to these events ensuring health messages can be targeted and families quickly contacted with information and advice," she added.

Key to the adoption of the mobile app and mobile devices is how user-friendly they are.

With an average age of 50, many nurses in Plunket could find the technology new so the interface had to be made intuitive and useful for their day-to-day work.

Indeed, the mobile app is merely the tip of the iceberg for the adoption of cloud technologies at Plunket. Using Microsoft's cloud technologies, such as customer relationship management and Internet telephony, it is transforming the way it interacts with patients and how team members collaborate.

Among the concerns that Plunket had was ensuring that the customer data was stored securely. Privacy was a top priority from the start. In Microsoft, it found a partner that brought assurances in the form of independent certification and adherence to international privacy standards.

Source: For more information, please visit Microsoft in Health microsoft.com/health and Microsoft Digital Transformation in Health healthdigitaltransformation.comⁱⁱⁱ

In Singapore, citizens can check on their latest health records and make appointments at public hospitals and polyclinics right on their smartphone. An app called HealthHub, first launched by the country's Ministry of Health in 2015, enables them to gain instant access to their health information and learn how to lead a healthier lifestyle.

The app is part of a larger portal that serves citizens by providing a one-stop resource for all their health needs. It is also a key component of the government's push for deeper health literacy among citizens, who are some of the most well-connected in the world.



Source: HealthHub website

Central to this is information that can be accessed any time, on multiple platforms, by citizens, as well as an infrastructure that is robust and secure at the same time.

With the HealthHub app, citizens can see their test results, screening history and make medical appointments with government health institutions easily. Parents can also check the health assessment carried out in school for their children.

To safeguard the information, users must provide the right digital credentials to access

the records. They log in with a national ID, called SingPass, which enables them to access a wide variety of e-services with other government agencies, from filing taxes to accessing their retirement account statements. Two-factor authentication provides additional protection.

In the years ahead, the HealthHub portal aims to include even more useful information and features, such as allowing users to pay for their medical bills, and access a medication list that helps patients and caregivers keep track of the medication that the patient is on. Additionally, parents will be able to check each on their children's immunisation history.

The trend is in line with Singaporeans' wish to be in the know of their medical conditions. Two-thirds of consumers who believe they should have access to electronic health records want to see exactly what the doctor sees—not a summary, per an Accenture survey in 2016.^{iv}

The Singapore government also recognises that healthcare is intimately linked to a person's lifestyle as well. As part of a holistic approach, the HealthHub portal encourages users to keep fit and eat healthily, while linking rewards and deals with supermarkets and restaurants.

A section on a mobile app even has advice on healthy living. For example, it addresses common fears with health screening and reveals dietary information on common foods that are consumed locally. All in, it is a strong advocate of not just better medical care but preventive measures as well.

Source: Publicly-available information.^v

(B) ENABLING BETTER HEALTHCARE FOR REMOTE COMMUNITIES

The reach and scalability of a cloud-based system mean that communities that are far from a hospital or healthcare facility can tap on a network link to “see” a doctor and share information remotely. Empowered by online matching technologies, new services are expanding the medical care choices and personnel that these remote communities have access to.

Seeing a Doctor Anytime, Anywhere in the Philippines

As broadband connectivity spreads across the Philippines, one start-up is building a service that brings doctors to rural communities. It reduces patients’ time spent travelling long distances to receive medical care. In cities, it spares people hours of waiting time for a simple five-minute diagnosis with a physician.

Medifi, which has offices in Manila and San Francisco, has the ability to match patients with doctors whether they are seeking a specialist in neuromuscular medicine or a general practitioner for a common flu bug.

Using the scale and reach of Microsoft’s Azure cloud technology, it has built a service that enables patients to seek online consultations on demand, regardless of their geographic location. Patients have the option to be comfortably sitting at home and speak with a doctor within minutes.

Patients use the platform by searching for a doctor from a list on Medifi, followed by a video conference or chat with the physician using their computers or mobile devices. They can even share medical records with the doctors online. These consultations are particularly useful for sessions which do not require physical examination.

For remote communities in the Philippines, cloud-based services such as Medifi can make a real difference. It enables them to “see” a doctor remotely and more efficiently than before, in a country where more doctors are needed.

On average, there is one doctor to about 1,400 patients in 2014, according to the country’s

authorities.^{vi} The ideal ratio, they add, is 1:1,000. This is where cloud technology can be a “force multiplier” to alleviate the shortage of experts, while the country increases its number of licensed doctors.

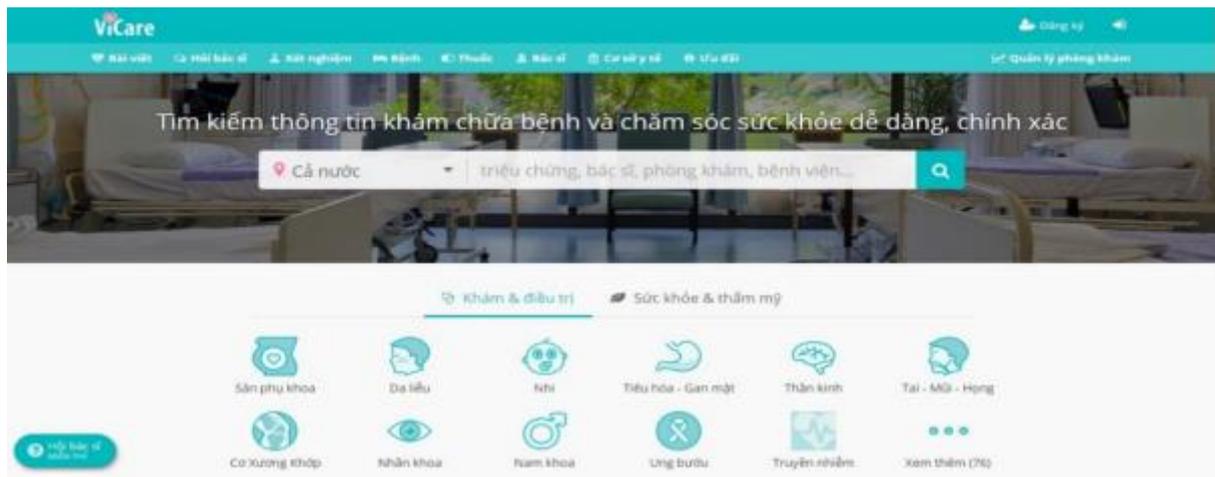


By matching patients not just to doctors in the Philippines but also those from the rest of the world, Medifi can expand the options for patients.

Particularly for patients in remote communities, who may be served by a small number of doctors, the new technology changes things dramatically. In an instant, those who may not have been able to see a doctor or who have had to wait in long lines can now get an assessment from a doctor online.

Source: For more information, please visit Microsoft in Health microsoft.com/health and Microsoft Digital Transformation in Health healthdigitaltransformation.com^{vii}

Connecting Patients with Doctors in Vietnam



Source: ViCare website

In fast-growing Vietnam, a web database and app called ViCare is helping to match patients with doctors and medical facilities online. In doing so, it has been working on resolving one of the country's most pressing issues: access to healthcare facilities.

Launched in early 2016, the online service took only six months to register more than 19,000 healthcare facilities and 20,000 doctors in its database. ViCare attracted more than 200,000 visits a month on its website and handled 6,000 user enquiries.

Like other online platforms, what makes ViCare possible is the scalability and robustness of its Internet infrastructure. Expanding at a fast pace, it must constantly cater to the increasing number of healthcare facilities listed, as well as users who want to access the site. Platform and website performance is an important measure of customer experience and the company's ultimate success.

On the Vietnamese-language website, users can choose the doctor they wish to seek treatment or medical advice on in about 60 localities in Vietnam. For example, they can

choose to see an ophthalmologist for eye problems, a dentist for their teeth or an ear-nose-throat (ENT) specialist for nasal issues. There is also information on the type of facilities and services that one can sign up for online, such as dental treatment.

As user feedback is a key component of ViCare's success, patients can review and refer to the experience of other patients to find out more about a hospital or specialised healthcare service provider before going there for treatment. To contact a hospital directly, potential patients can simply click on the call icon to get in touch. Alternatively, they can leave a message on a Facebook page or send an e-mail to a customer service officer. The online links give patients quick access to information and reaching the facility they wish to visit.

ViCare fills a gap in the Vietnamese healthcare market, which faces a shortage of doctors and overloading facilities. It improves the reach of healthcare facilities beyond people who live near them to those who find it difficult to travel to facilities.

Source: Publicly-available information.^{viii}

Australia's Round-the-Clock Medical Care

Seeing a doctor is literally a phone or video call away in Australia today for some citizens, thanks to a telemedicine service launched in 2015. Called ReadyCare, it links up patients to general practitioners (GPs) with patients 24 hours a day, whenever they need to seek advice on common ailments or issues that don't require an emergency.

Patients can call a phone number or use the mobile app to get in touch. An assistant then checks if a case is suitable for a remote consultation, before they are booked in for an appointment. Once they are booked, they can see a doctor at the stipulated time via a video or phone call.



Source: Telstra

Should they need to share more details, they can upload images to a website. Paying AUD69 for each online consultation, patients do not have to rush to a local clinic to see a doctor,

especially if they do not live near one. They can also get medical advice after office hours.

In doing so, the service, set up by Swiss-based telemedicine provider Medgate in partnership with Telstra Health, is helping to optimise the use of limited resources by people who require them. Central to this is Telstra's Clarity healthcare software which is the engine behind the online link-ups.

In the case of ReadyCare, the patients' regular doctors can receive messages from a doctor that they have seen remotely. This means the new system complements, rather than replaces, existing medical facilities that users would access.

This allows for continuity of care, a unique feature of the system. If they agree, patients can have details of any advice or treatment provided with the patient's regular GP.

Cloud technology is enabling improved care for patient, while not replacing the important face-to-face interactions and physical examination that doctors still must conduct for some patients. It is proof that telemedicine can benefit patients in a more connected future in healthcare.

Further quality care is all important to the service. Each doctor has more than five years of medical experience. They either work from home or go to a centre set up in a suburb of Sydney to connect with patients remotely.

Source: Thanks to Telstra for providing this case study.^{ix}

(C) CONNECTED USERS AND PATIENTS

Increasingly tech-savvy consumers are seeking transparency, control and access to information when they interact with healthcare institutions. Cloud technologies can provide this to users anytime, anywhere, by presenting information in easy-to-use formats and enabling self-service transactions, where possible. Key to success here is the reach, agility and portability of information.

Getting Help via a Health Buddy in Singapore

Calling up a clinic to change an appointment is a troublesome, time-consuming exercise for many patients today. Similarly, it ties up resources for healthcare organisations to constantly update the information, when schedules move.

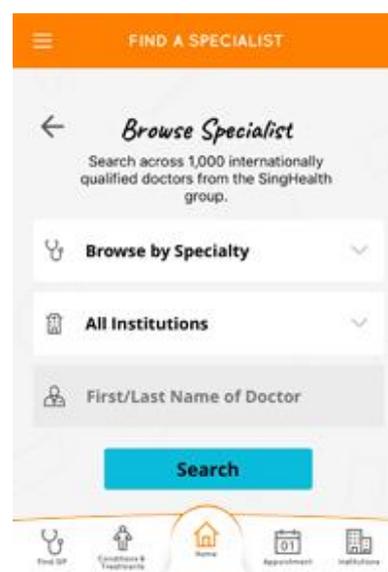
One way to make the process smoother is having patients update such changes themselves. In Singapore, the SingHealth group of hospitals, polyclinics and other healthcare centres has developed a cloud-based mobile app called Health Buddy to enable users to do just that.

The power-packed app brings a wide range of information to increasingly connected users and patients, who desire greater control and access in their interactions with healthcare providers. Besides easily changing an appointment with a doctor, a user can also use the Health Buddy app to find a specialist, get health tips and participate in health events.

For users who have a quick question to ask, a Q&A forum in the app enables them to pose their queries to a specialist. While this is no substitute for seeing a doctor, answers from medical experts could help a user decide if he needs to head to a hospital for treatment, or to weigh up the various other options available.

Running on Android and iOS devices, Health Buddy is a one-stop app that puts information at the fingertips of users. It provides weekly articles and videos, as well as health alerts from the SingHealth group. Users can also

watch live web cams to see how crowded polyclinics are before they plan a visit to the neighbourhood healthcare facility.



Source: SingHealth App

The app is an example of the reach and agility that a cloud-based service can offer. More importantly, it empowers consumers in an age where transparency, real-time access and mobility are key to a satisfactory experience.

For healthcare providers, this represents the seed of a revolutionary change. More than ever, a cloud- and mobile-focused information service that delves deep into one's data systems to retrieve useful and updated information for users will be the cutting-edge difference between healthcare providers.

Source: Publicly-available information.^x

(D) THE CLOUD EMPOWERS FIRST RESPONDERS

In an emergency, the resilience and scalability of the cloud are qualities that have proven critical. From providing the communications tools to first responders to uplifting the recovery efforts following the immediate aftermath, cloud-based systems have made a real difference in the real world. Reducing the points of failure has been key to relief efforts.

Cloud Communications Making an Impact in China, and Japan

A devastating earthquake in China's Sichuan province displaced 4.8 million residents and claimed the lives of 68,000 in 2008. In the immediate aftermath, as aid workers scrambled to provide the most essential aid, their relief work was hampered by the lack of basic connectivity and communications.

A cloud networking company worked with the Chinese authorities and non-government agencies in a public-private partnership, to develop three mobile clinics, and connected 66 healthcare organisations, and 32 "smart" hospitals. Hooked up to telehealth networks and healthcare "clouds", they provided rural villages with much-needed access to remote medical services.

Using these cloud-based videoconference communications, physical distances were reduced through near-instantaneous connections, which enabled doctors and other healthcare professionals to examine patients remotely. While shelter, healthcare and food were the most critical elements in the immediate aftermath, as the province recovered gradually from the earthquake, this connectivity proved vital in the early days after the unexpected event, and also paved the way for swifter recovery.

By making use of network technology, the cost of antibiotics was reduced by 32 per cent, per a Peking University study of the *Connecting Sichuan* programme. It also found that 280,000 outpatients a month received quality care regardless of where they lived. These networks now deliver quality healthcare to thousands of citizens in previously hard-to-reach parts of

Sichuan Province, connecting 7,000 practitioners in supporting 300,000 patients each month.

Similarly, right after a disaster strikes, one of the most important things to assist recovery is having aid agencies and volunteers communicate effectively to coordinate efforts. During an emergency, aid agencies need a clear idea of the gravity of the disaster to optimise efforts deployed to address problems on the ground. This was seen when a 9.0-magnitude earthquake in the Pacific Ocean caused a massive tsunami that claimed thousands of lives in Japan, damaged several nuclear reactors and caused widespread electricity shortage in the country.

A robust disaster response plan calls for a host of observation systems that rely on the cloud and big data to give more information from the ground after a natural disaster. For example, SIM-card based devices can be used to monitor radiation levels in common areas such as parks, offices, farmlands etc. Known danger areas may be monitored in real-time, as can soil and groundwater salinity. The data is fed into a system which would give aid agencies a glimpse of the ground situation.

Utilising the scale and reach of the cloud technologies, aid agencies could be connected quickly, and the data collected by machine-to-machine (M2M) systems could be processed to provide a glimpse of where the most affected areas are and where help is required the most.

Source: Publicly-available information.^{xi}

(E) IMPROVING CARE AT THE HOSPITAL

A well-run hospital is one where staff work closely together to provide the best patient care. Today's cloud-based systems for the healthcare sector provide large-scale administration and financial management, as well as patient information and clinical data management. Offering unified, real-time insights, they are transforming processes and providing measurable benefits to patients.

Enhancing Patient Care in Asia with Unified Communications Network

When KPJ Healthcare wanted to improve how it interacted with patients in 2014, one of the first things it identified was the way its staff communicated with each other and with patients coming to see a doctor. It relied on several different systems in the past, including a private-branch exchange (PBX) telephone system, text messages, e-mail and online messaging from Yahoo and Google.

What it clearly lacked was a single point of communication: in other words, its physicians and staff often could not get the information required and were unable to respond fast enough. Consequently, productivity suffered.

Through its partnership with Microsoft, it switched to Office 365 and Skype for Business, a system that unified existing communication channels. In doing so, it improved collaboration between employees while delivering an enhanced level of patient care.

With the new system in place, employees were able to collaborate more effectively. They could use either instant messaging or Web conferencing to get in touch. Most importantly, most users were already familiar with the interface.

KPJ subsequently installed other Office 365 components, including Exchange Online and SharePoint Online, which are services powered by the cloud. This enables the healthcare provider to leave communications to the robust and secure environment while allowing them to concentrate on their core task of caring for patients.

“Moving forward in this consumer-driven world, healthcare is also facing the challenge in how we are having the interaction with patients. We have to adopt new technologies to enhance this interaction,” said Dr Mubbashir Iftikhar, Chief Information Officer of KPJ Healthcare.

One important element was interoperability. Like many healthcare organisations, KPJ wanted to ensure that its new cloud-based services could work well with existing ones. It could do so by seamlessly incorporating the Microsoft services with its existing teleconferencing environment.



Today, KPJ has adopted new technologies such as electronic medical records as well. With operations in Malaysia, Indonesia, Bangladesh and Thailand, it is committed to investing in new medical technologies to provide better patient experiences and enhance medical procedures.

Source: For more information, please visit Microsoft in Health microsoft.com/health and Microsoft Digital Transformation in Health healthdigitaltransformation.com^{xii}

In the past few years, Indian healthcare provider Fortis has been reaping the benefits of the cloud by tapping on Microsoft's Azure platform. In moving much of its applications and operations on to the cloud, it has managed to improve patient experience as well as its clinical care.

Today, the healthcare group uses the cloud extensively. Forty applications across 21 of its institutions have been moved to the Azure platform. This means customers have a consistent experience across all Fortis companies.

Today, the Fortis group has a common Microsoft SharePoint portal used by employees, doctors and nurses to better collaborate. They can share documents in a more streamlined workflow than before.

By making use of the cloud, Fortis has also managed to provide care for more patients. On weekends, it now handles twice as many outpatients. Thanks to the on-demand scalability of the cloud platform from Microsoft, it managed to launch its patient care portal quickly. This portal has provided

the agility it seeks to handle a larger number of outpatients.

By going on the cloud, Fortis has also managed to reduce its cost of ownership, a major bugbear for many healthcare organisations looking to expand. It has managed to reduce the number of on-premise servers it must buy and maintain by going with Microsoft. In doing so, it lowered acquisition and infrastructure costs by 50 per cent.

"The enterprise agreement enables Fortis to streamline its group-wide investment and leverage best collaborative solutions. It also allows us to scale up without worrying about software management and focus more on healthcare technology," Fortis CIO Manish Gupta said, in a report on the iGovernment website.^{xiii}

Source: For more information, please visit Microsoft in Health microsoft.com/health and Microsoft Digital Transformation in Health healthdigitaltransformation.com^{xiv}

Reducing Complexity with the Cloud in Singapore

In an inter-connected world, making things less complex is one important strategy for Singapore's Fullerton Healthcare Group. It was with this mind that it decided in 2015 to adopt Microsoft's Office 365 online productivity tools for its global operations.

Headquartered in Singapore, the group operates more than 180 fully-owned medical clinics in Singapore, Indonesia, Malaysia, Hong Kong, China and Australia. Working with 25,000 companies in the region, it provides care for eight million people.

As it grew its operations organically and through mergers and acquisitions, Fullerton Healthcare looked for a way to enable staff to communicate effectively and efficiently. In the cloud-based Office 365 productivity suite, it found a solution that empowered staff and was scalable to its needs.

The migration to the Office 365 Enterprise system was expected to take only 60 days. After that, Fullerton Healthcare's back-end IT operations were integrated closely with what front-end service staff used Microsoft Suite Applications including Word, Excel, PowerPoint, Outlook, OneNote, Publish, Skype for Business and more.

Using OneDrive for Business, Fullerton Healthcare employees can access share documents and care plans from any device, regardless of their location. This frees them from being bound to a particular location to access work files.

With SharePoint for intranet collaboration, they could easily exchange files and share notes. Care team members could easily access patient notes taken by another caregiver in a secure manner. This brought improved operation efficiency.

In the front end, patient experience also improved. With virtual healthcare, provided

for by Skype for Business, care team members could use telehealth capabilities built into the system to communicate via instant messaging, audio and video calls and online meetings.



With so much data in the cloud, trust had to be built on a secure platform. Fullerton Healthcare's electronic health records, digital images, e-prescriptions and patient scheduling are all protected by cutting-edge security practices with five layers of security and proactive monitoring.

The move has enabled the group to better run its business. With less complexity in the way, team members can spend more time and energy providing the best care for patients.

“By leveraging the world's most secure and advanced technology, we are able to extend our best-in-class healthcare services throughout Asia and deliver on our mission to transform healthcare standards in the region, making quality healthcare accessible and affordable to all,” said Ted Minkinow, Chief Information Officer of Fullerton Healthcare Group.

Source: For more information, please visit Microsoft in Health microsoft.com/health and Microsoft Digital Transformation in Health healthdigitaltransformation.com^{xv}

Integrated Care gets a Boost in Thailand

When Thailand's Paknam Hospital sought to improve patient care after a change of management in 2014, it looked to a cloud solution that would increase patient safety while enabling clinicians and staff to work faster and more efficiently.

Today, the hospital 250km north of Bangkok is blazing a trail with its integrated care. Using Telstra's Arcus Hospital Information System (HIS), it has transformed the way its operations are run, to the satisfaction of its practitioners as well as patients.

The workflow at the hospital, which serves the 1.2 million population in the Nakornsan province, is integrated seamlessly. That enables it to monitor patient numbers and delivery processes. At the same time, the hospital's leaders receive financial reports and data in real time, enabling them to make critical administration and business decisions.

For visiting patients, they now have more accurate patient IDs after the rollout of the cloud-based solution. There is also greater accuracy in medication and test ordering, along with a reduced duplication of X-rays and other imaging. With clinicians spending their time optimally, patients end up waiting for shorter periods than before.

The success of the deployment is testament to the scalability and flexibility that a cloud-based hospital management system provides. As medical institutions globally seek to improve patient care, such technology is proving invaluable.

From patient administration to advanced clinical information, such cloud-based

electronic systems offer insights that enable hospitals to transform the way they operate. In particular, the ability to quickly access electronic medical records in real time allows physicians to provide evidence-based care.



Source: Telstra

In the Arcus HIS, Telstra also delivers a modular system, which is template-driven and unified. This enables the various users in a hospital to configure and customise to their needs. The result—quick deployment and measurable results.

With Paknam, the private cloud that the information system is hosted on is a key part of the solution. Instead of having many in-house IT professionals to look after the system and paying licences on separate computers, the hospital now relies on a company with a high level of expertise to do the job. This has brought flexibility, safety and cost savings.

Source: Thanks to Telstra for providing this case study.^{xvi}

Digital Transformation Project Bears Fruit in Indian Hospital

Doctors at Rainbow Children's Hospitals used to find it hard to get a patient's latest clinical notes. Meanwhile, outpatient flow at the paediatric hospital was growing and resulting in low waits for patients. At the same time, there was a risk of human error despite careful staff members manually performing patient registration and ordering.

These were some of the issues that the hospital chain in India sought to improve by digitally transforming its business with cloud technology in 2014. Turning to its partner Telstra Health CloudMed, it overhauled its legacy IT systems and adopted a state-of-the-art integrated solution.

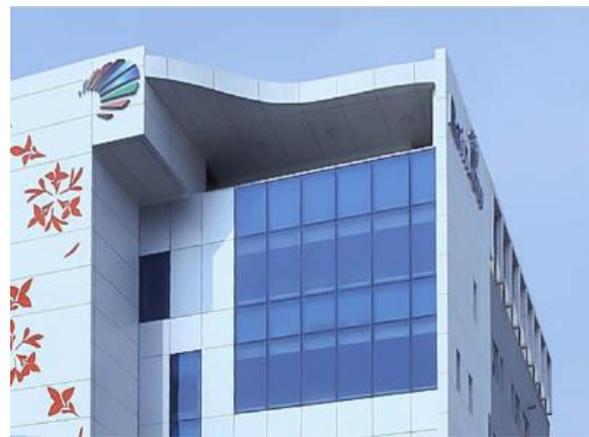
The 700-bed hospital group has more than 400 inpatients and 800 outpatients across the country each day. As it grew in scale over the years, it looked to a solution that could improve the quality of care while improving efficiency across the board.

Previously, Rainbow ran two large computer servers to support two clusters in different regions. With the transformation, it shifted to a new Hospital Information System (HIS) that ran on cloud technology. Today, electronic medical records and business and human resource functions are delivered from the new platform.

As it hosted its private cloud at a Hyderabad data centre, one of the biggest benefits is the ability to scale up or down based on fluctuating and evolving demand. This is without involving heavy investments in IT infrastructure.

Outsourcing means its in-house IT experts can dedicate time to supporting and training the hospital community. Today, Rainbow's clinicians have immediate access to data such as up-to-date clinical notes and lab results, thanks to mobile connections to the cloud.

To solve the issue of outpatient flow and turnaround times, bookings are made online now. Turnaround times improved within six months of using the new system. Patients are more satisfied as well.



Source: Telstra

And finally, the cloud has made a difference to nurses who used to key in data manually. Today, using a barcoding system to identify patients means accuracy has improved by 60 per cent. Nurses also spend less time on day-to-day documentation.

Source: Thanks to Telstra for providing this case study.^{xvii}

(F) SCALING UP FOR PHARMACEUTICAL R&D

Data is key to the pharmaceutical industry, particularly in the R&D sector where new treatments require many years of field trials to discover. Cloud technologies, with the scalability, reliability and compliance they provide, enable more sophisticated management and analysis of such large data sets. They are making a difference in how fast results are delivered.

Global Clinical Trials Improve with Cloud Solution

In their quest to develop new medicine, pharmaceutical companies spend over half of the US\$130 billion they invest in R&D each year on clinical trials. These take between 10 and 15 years as well, so there is an urgent need to improve processes to bring new treatments to the market more quickly.

A start-up company, Promeditec, aims to do just that, by using a cloud-based solution that is secure, stable and compliant to accelerate data capture and enhance collaboration between key parties. These include sponsors, hospitals, laboratories and others involved in a trial.

The Promeditec AppClinical Trial app provides an online environment for setting up and managing clinical trials from Phase I to Phase IV, including virtual monitoring visits. Being able to be deployed quickly, it provides access to trial testers and enables pharmaceutical companies to scale up the trials more rapidly than before.

The app is a scalable Software-as-a-Service offering. It relied on a cloud-based system from Verizon, which provided the infrastructure required. From case report forms to document and image management, the key features of the app demand scalable and reliable network resources.

Working with a partner with a global footprint, Promeditec can support trials that are set up around the world. Tapping into Verizon's global data centres, it finds it easier to expand its geographic reach and widen its portfolio of services.

Security is a topmost concern as well. While the cloud has enabled many businesses, the pharmaceutical industry requires that higher standards be met in terms of compliance.

The safety of participants must be protected and the integrity clinical trial data must be assured. The Virtual Private Cloud offered by Verizon meets the necessary governance and risk and compliance requirements from the industry.

Today, the Promeditec platform is compliant with the United States Food and Drug Administration, the European Medicines Agency and Good Clinical Practice, an international quality standard. Delivering the app with a cloud partner that understands the pharmaceutical industry has not only enabled the company to swiftly bring in results from trials, but also enhanced its reliability and security.

Source: Thanks to Verizon for providing this case study.^{xviii}

Indian Lab Diagnostics gets on Fast Path

Whenever a patient goes for a test or scan at a lab, he often has to go home and return later to collect his results. What if he could simply log in to a portal and get the results online instead?

That is what Dr Lal Pathlabs in India is doing with a new online service. Besides providing convenience for patients, the data stored on the cloud can be used to analyse trends and provide new insights for the provider of diagnostic healthcare services.

Dr Lal Pathlabs runs a National Reference Laboratory, along with 163 other clinical laboratories, 1,340 patient service centres and more than 5,000 pickup points across India, according to mphRx, a healthcare technology company that provided the cloud solution.

Today, patients who have done tests at one of Dr Lal Pathlabs' facilities will be able to log in securely and access their test results. This account is tied to a person's mobile number so it is easy to remember. He can also grant access to his family members, if they have also visited Dr Lal Pathlabs and have their own accounts.



At the same time, a patient could have all his tests linked and see how his health is changing over time. The online system also saves him time to maintain records of his own tests.

With a digital database in place, Dr Lal Pathlabs can do a lot more. It can remind a patient to go for a regular test if he has not done so in a while. With patients' approval, Dr Lal Pathlabs can also offer information on special offers, discounts and loyalty benefits.

This means the lab has a stronger relationship with a customer than a one-off transactional connection. It enables Dr Lal Pathlabs to reach out to customers better in future.

And instead of an expensive outlay to deploy a customised system, the lab went for a cloud-based product that was ready to plug into its existing infrastructure.

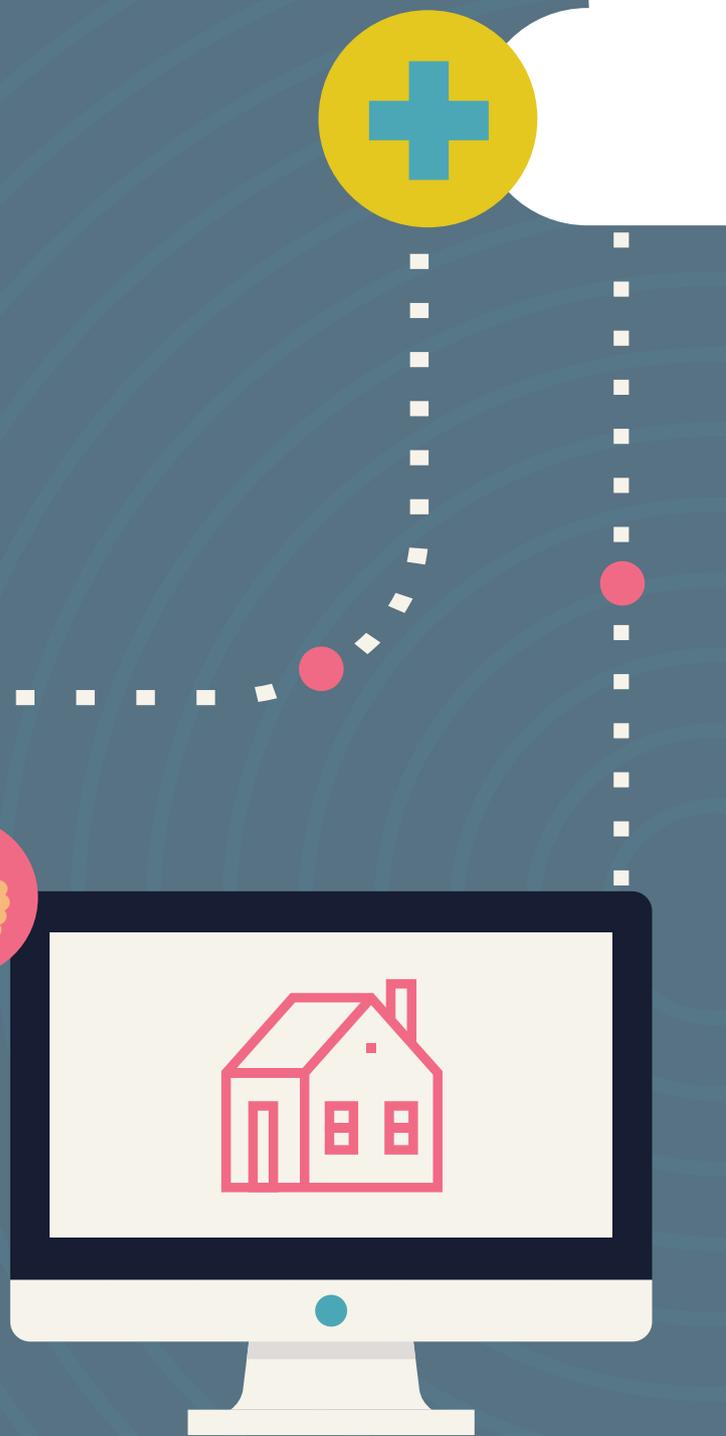
It was based on an "out of the box" product developed by mphRx and called Minerva Patient Engage. It overlays the existing lab information system used at Dr Lal Pathlabs to access labs reports and present them securely to customers.

Source: Publicly-available information.^{xix}

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The ACCA is a leading industry association comprising the stakeholders of the cloud computing ecosystem in Asia. The ACCA works to ensure that the interests of the cloud computing community are effectively represented in the public policy debate. Our primary mission is to accelerate the growth of the cloud market in Asia, where we promote the growth and development of cloud computing in Asia Pacific through dialogue, training, and public education. Through regular meetings, we also provide a platform for members to discuss implementation and growth strategies, share ideas, and establish policies and best practices relating to the cloud computing ecosystem.

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