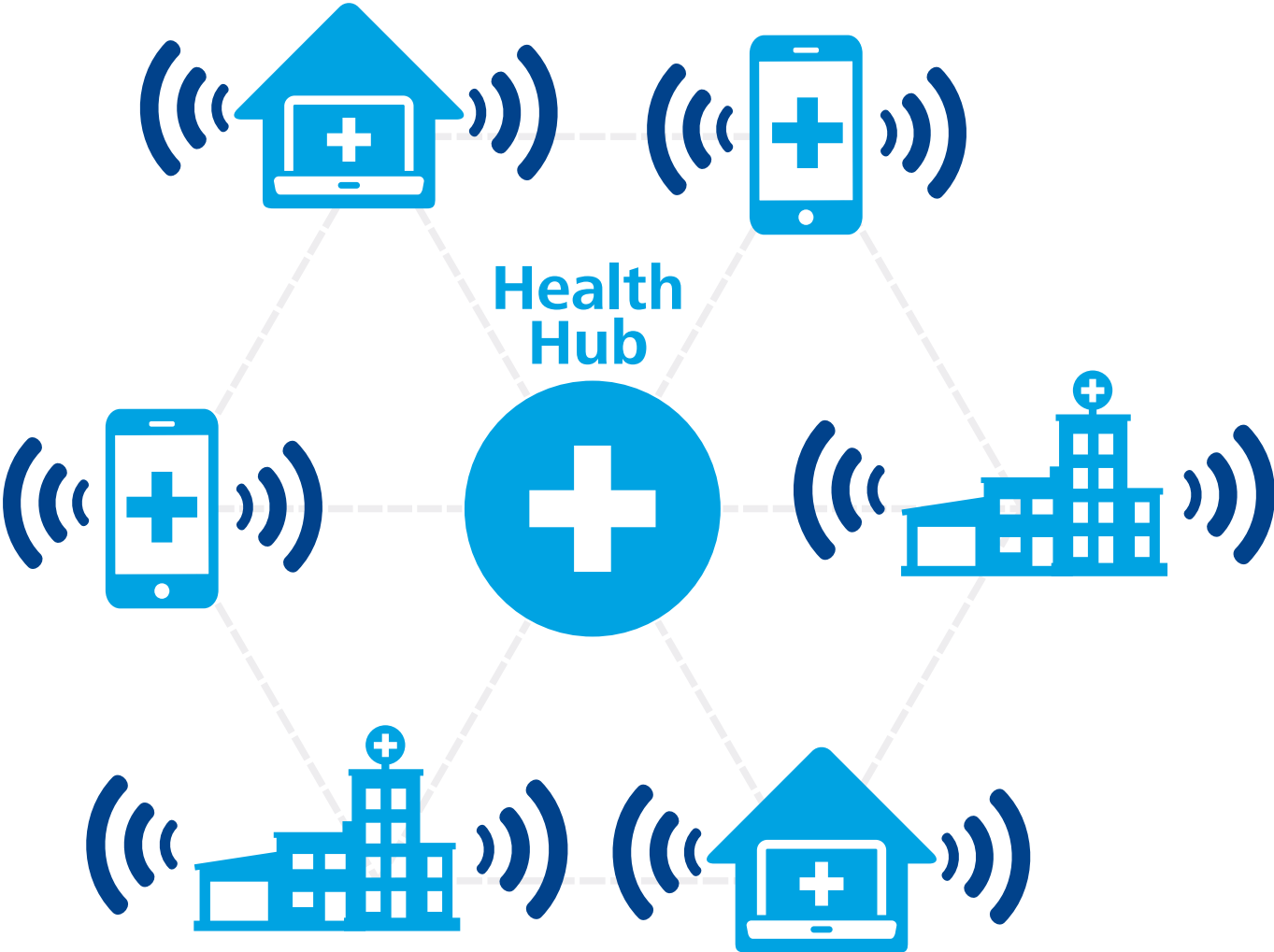


The Health Hub Transformation for the new normal



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Foreword

We have all heard of the adage: economic development results in higher standards of living. There is truth in that, of course, but the reality is always less clear-cut. While rapid progress has pulled millions out of poverty in Southeast Asia, it has also left a number of unique challenges in its wake. These issues span across a variety of disciplines but, arguably, one of its largest impacts has been on the health care sector.

As populations gain affluence, lifestyles become more sedentary, consumption of high-calorie foods increases and birth rate falls – all of which contribute to an ageing population that is more predisposed to chronic diseases. While this is not a new population health issue, it is the alarming rate at which chronic diseases are increasing in Southeast Asia – diabetes and obesity cases in Southeast Asia quadrupled between 1970 and 2005, twice the rate of the United States in the same time period¹ – and the region’s lack of access to quality and affordable health care that is worrisome. Solving these problems with traditional approaches is unlikely to yield meaningful results; these efforts will only result in a never-ending spiral of playing catch-up with ever-increasing health care demand.

A different strategy is needed – one that enables us to do more with less. The need to break seemingly immutable trade-offs naturally lends itself to disruptive innovation and, as we will see, the roots of many such innovations have already begun sprouting in Southeast Asia as alternative solutions to age-old challenges.

Harnessing these innovations for transformation will require looking through a different lens and we hope that this publication, with its Health Hub model, will provide you with a framework to put this new normal into perspective.

1 <http://www.irinnews.org/report/91723/in-brief-unprecedented-chronic-disease-growth-in-southeast-asia>

A revolution on the horizon

It has been said that patients are called as such because of the inordinate amount of patience that is required of them when waiting for their turn at the doctor's office. But if that is true, then perhaps today's patients might be better described as consumers.

Accustomed to constant connectivity and instantaneous access to information, they are engaged and seek to take ownership of their own health by leveraging on their tech-savviness to access novel solutions, which they then customise for their own needs.

Truly, without a doubt, a health care revolution is on the horizon. And with its unique challenges of access and affordability, many of its precursors can already be found in Southeast Asia. A number of local companies, technology start-ups and health organisations alike, have begun introducing innovative telehealth applications that provide consumers with the ability to communicate with their health providers over their mobile devices or even participate in remote consultations with their doctors in virtual consultation rooms, as well as smart home monitoring systems that closely track the vital indicators of consumers with chronic diseases or who require long-term care.

As health care delivery systems evolve to deliver a holistic, seamless and individualised experience for each and every consumer, hospitals, too, are working to integrate individual health records across the entire ecosystem into a single view of the consumer to ensure seamless health care experiences at every touch point, regardless which hospital, general practitioner or health care provider it may be. At the same time, they are leveraging on health analytics to unearth unexpected insights to increase the efficiency and efficacy of the system.

But our vision of the future health care ecosystem is so much more than that: it is preventive, not reactive; and cohesive, not episodic. In the following pages, we take a look at some of the driving forces in the Southeast Asia health care landscape, and present a model, the Health Hub, that seeks to address our current health care challenges and integrate health care delivery across the three pillars of Human, Home and Hospital. Finally, we envision some of the characteristics that we would like to see in this future health care ecosystem and conclude by addressing a few issues that will need to be tackled for its successful execution.

Below is a scenario describing a hypothetical patient's experience with the Health Hub.

Have you met Ed?

Ed, a 58-year-old sales manager, is back at work after a period of absence. He pours himself a cup of coffee as a colleague walks into the office kitchen.

"Welcome back, Ed! How are you feeling?" his colleague asks.

"Better now," Ed answers, "but it's been a long couple of years; I was pretty close to giving up hope on battling this thing."

Ed has chronic obstructive pulmonary disease and congestive heart failure. Two years ago, Ed couldn't seem to stay out of the hospital: Each check-in with his local primary care physician resulted in more visits to various specialists for repetitive, often contradictory, care. He had been to see at least four different care providers and was on so many different pills that he couldn't keep everything straight. Unable to work, Ed had to go on short-term disability, and he worried about losing his job altogether. He felt like a burden to his family.

"I was about to give up," Ed tells his colleague, "but then I got plugged into this community of patients, providers, and suppliers – they're from all over the globe, and everything is digitally integrated. I work with a coordinated care team that specialises in my specific profile, and my care is always personalised to my specific needs. It was such a relief to have a seamless health care experience. Everyone talks to each other. Every specialist I went to see was prepared with my information, so the visits were efficient. I never felt like I had to backtrack or worry that they might unknowingly recommend anything that conflicted with something I was already doing or taking."

Today, Ed's vitals are stable and he is back to being productive at work. Thanks to a new biometric monitoring device, Ed's care team sees a daily record of his weight, heart rate, oximetry, and sleeping patterns. Ed's digital diary helps him and his care team track patterns in his well-being. Recently, Ed began participating in a study group, and he is hopeful for future breakthroughs⁹.

⁹ <http://dupress.com/articles/future-of-us-health-care/?ind=73>

Driving forces in a changing landscape

Southeast Asia's health care landscape is a dynamic and heterogeneous one. The region consists of health markets at various stages of development, lying on a continuum between the nascent markets such as Cambodia and Lao PDR, and the advanced, state-of-art markets such as Singapore. Nevertheless, three key driving forces resonate across most— if not all – of its markets and are likely to continue shaping its changing landscape in the foreseeable future.

Chronic diseases

Southeast Asians are living longer than ever. In 1990, the average life expectancy at birth was 65.2 years; by 2012, it has risen to 72.9 years². Yet whether these extra years are spent in the pink of health is debatable. While rapid economic development tends to result in a reduction in the incidences of communicable diseases, the same cannot be said for non-communicable diseases. Indeed, chronic, non-communicable diseases often have a positive relationship with economic development, with the most developed countries generally losing more lives to such diseases (see **Figure 1**).

Driven by a host of factors including changing lifestyles and ageing populations, the list of chronic diseases is extremely long, but diabetes, it seems, is beginning to emerge as one of the biggest culprits. In Malaysia, for example, an alarming 3.6 million adults are estimated to be affected by diabetes, putting it in the number one spot amongst ASEAN countries and sixth in the western pacific region for having the highest number of diabetes³.

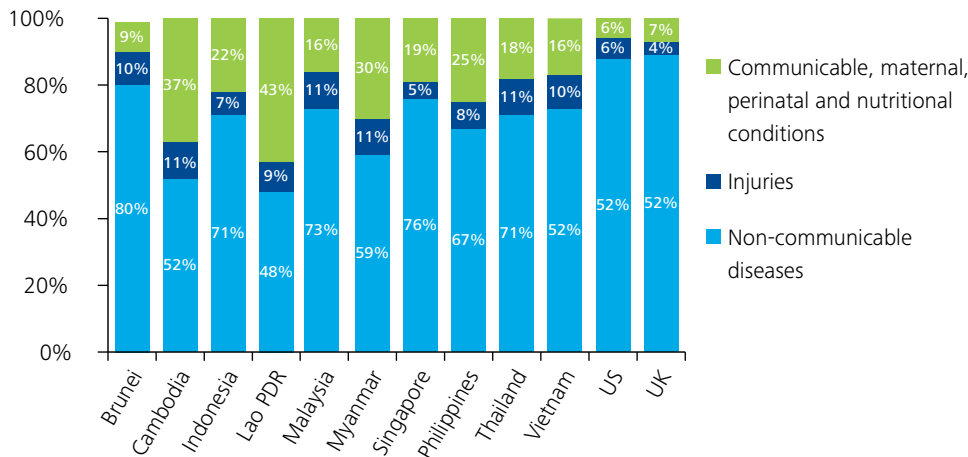
But with the emergence of remote monitoring technologies, managing chronic diseases and preventing the development of serious complications which require complex medical interventions and hospital admissions is becoming easier. For instance, people with diabetes often lose the sensation of pain and become unaware of developing foot ulcers that may result in foot or leg amputations. Imagine, then, having a pair of SmartSox or socks made from cutting-edge, intelligent textiles that use fiber optics and sensors to monitor temperature, pressure and joint angles in the feet. If it detects a developing problem, it will then alert medical professionals and wearers of the socks to take the necessary actions and thus avoid the need for an amputation⁴.

2 Global Health Observatory Data Repository, World Health Organisation <http://apps.who.int/gho/data/node.main.688>

3 <http://www.thestar.com.my/News/Nation/2013/06/14/Number-of-diabetics-in-Malaysia-alarming>

4 <http://uanews.org/story/ua-studies-use-of-smart-socks-to-prevent-amputations-in-diabetes-patients>

Figure 1: Causes of death in Southeast Asian countries, US and UK⁵



Access to health care

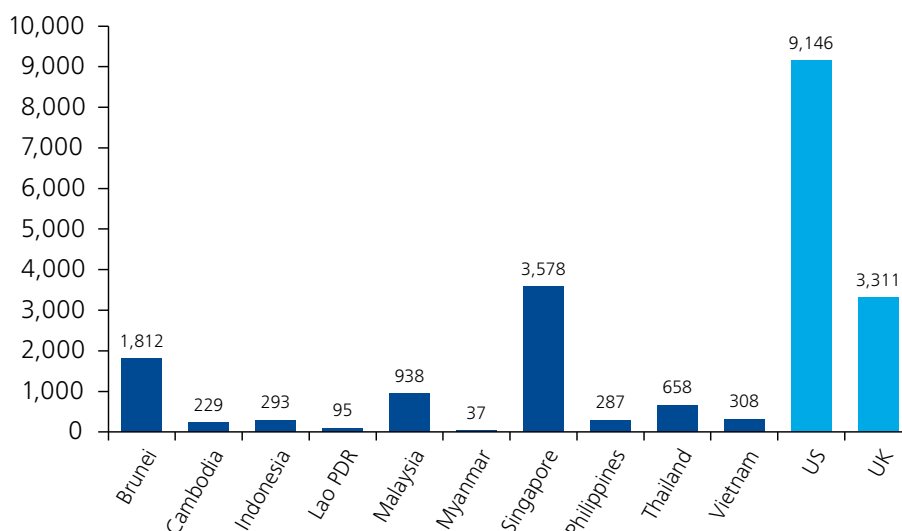
Despite the region's rapid economic development, millions of Southeast Asians today still lack access to affordable, quality healthcare. Indeed, many of the region's healthcare systems face an acute funding shortage: with the exception of the more developed health markets such as Brunei, Malaysia, Singapore and Thailand, per capita spending in most Southeast Asian countries averages less than \$250 annually, a stark contrast to developed markets in the US and UK, which ranges in the thousands (see **Figure 2**). This lack of funding means that much-needed investment in health care infrastructure, such as hospitals, equipment and technologies, will have to be foregone. In addition, the region also faces a shortage of skilled health care professionals. And while some of the more developed areas have sufficient numbers of doctors, nurses, and midwives, many fail to meet the World Health Organisation's most basic healthcare workforce standards.

Improving its health care delivery systems will require billions of dollars in investments and – if it can be done – is likely to require time. But as more people in the region begin to gain access to connected devices, many organisations are beginning to see the potential to improve health care delivery through web and mobile applications⁶. As a result, Southeast Asia is beginning to witness an explosion of eHealth apps, ranging from areas such as telehealth, to hospital information systems and medical education.

5 <http://www.who.int/nmh/countries/en/>

6 <http://www.forbes.com/sites/teconomy/2014/10/15/southeast-asias-health-app-explosion/>

Figure 2: Total expenditure on health per capita at Purchasing Power Parity, by country (2013)⁷



The new patient archetype

Outside the health care system, digital technology has enabled low-cost, rapid, often instantaneous access to products and services, and this has encouraged consumers to expect to have more power and influence in nearly every aspect of their lives. Today, consumers have access to a great deal of information and a plethora of products and services. For example, online vendors such as Amazon let consumers compare prices and quality ratings on products and services from all over the world and then easily purchase a product suited to their specific needs with a single click.

Consumers today can select delivery schedules to fit their needs, provide real-time feedback, share information about goods or services with their online networks, and receive personalised recommendations based on their purchase history. They expect to have the ability to configure products and services to specifically meet their personal needs around factors that include price, location, and timing. Accustomed to high levels of service and control in their relationships with other product and service providers, they are likely to demand a similar level of service and control from their relationships with health care providers and the organisations supporting them.

As consumers take on greater accountability for the total cost of their health care, there will likely be a shift in consumer mindset to expand the definition of health care away from just sick care. They are likely to expand their focus from treatment of disease to a broader wellness agenda and demand resources and tools of a kind not historically available to help them manage their newfound accountability and navigate the complexity of the health care system⁸.

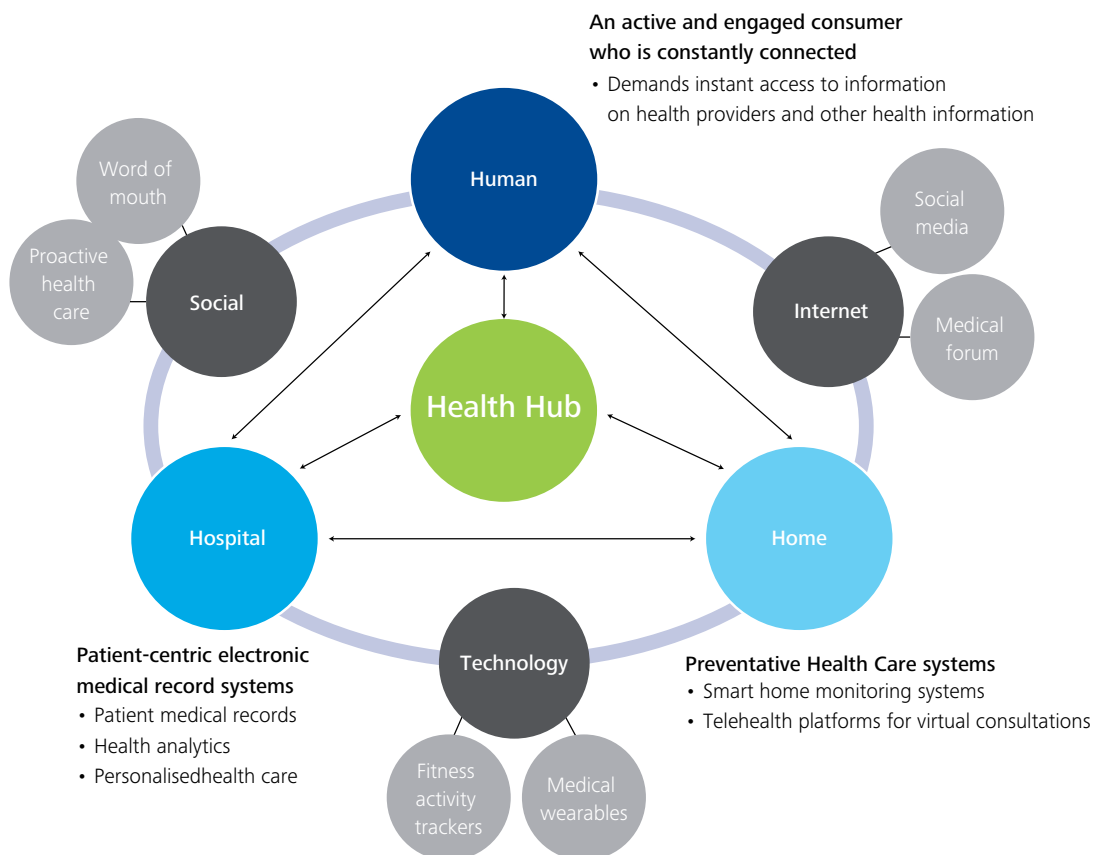
⁷ Global Health Expenditure Database <http://apps.who.int/nha/database/ViewData/Indicators/en>

⁸ <http://dupress.com/articles/future-of-us-health-care/?ind=73>

The Health Hub

The health care model of tomorrow is envisioned to be an open health care ecosystem. Known as the Health Hub, it is consumer-centric, leverages on technologies to overcome the barriers of access, and provides support for long-term, chronic disease treatment seamlessly from across its three pillars – Human, Home and Hospital – and beyond.

Figure 3: The Health Hub



The three pillars

The health care scenario on the previous page may come across as a little futuristic, perhaps even idealistic, but many of the elements that will enable it to come to fruition already exist today. In this section, we explore each of the three pillars in detail.

Human



An active and engaged consumer is at the core of the Health Hub. Seeking to curate and to take greater ownership of their own experiences, today's consumers now approach health care just as they do other services. Before making a decision, they do their research, read professional reviews and then get up-to-speed with word of mouth.



If this process sounds similar to booking a restaurant for a meal, it is because it is. DocDoc, an appointment-booking site with an interface not unlike that of restaurant reservation sites, enables consumers to search for doctors in Malaysia, Philippines, Singapore and Thailand by specialty, location, doctor's credentials, and book an appointment with them with just a few clicks.

But consumers living in one of Indonesia's big cities with their notorious traffic jams might be discouraged from even leaving the house at all, especially if their ailments are minor. On the TanyaDok site, tech-savvy consumers accustomed to asking questions on the Yahoo Answers community can similarly post their questions to doctors using its online forum. Its medical editorial team and hundreds of contributing doctors which consist of general physicians, dentists, and an array of experts, such as specialist doctors and senior consultants, strive to answer all questions as soon as possible, usually in less than one hour¹⁰.

This consumerism extends to more than times of illnesses. Increasingly, consumers understand that prevention is better than cure and are beginning to adopt the use of wearables and fitness activity trackers to monitor their food intake and assist with physical activity. The interactive Diet and Activity Tracker (iDAT) app, developed by Singapore's Health Promotion board even takes into consideration Asian body types and the Singaporean working lifestyle to help users count their calories, manage their health, and share their progress with their loved ones on Facebook¹¹.

¹⁰ <https://www.techinasia.com/tanyadok-patients-consultation-room-doctors-borders/>

¹¹ <http://www.hpb.gov.sg/HOPPortal/breathe-article/HPB-047446>

Book a DocDoc

DocDoc is an alternative solution for busy lines, missed calls, voicemails, 'place on hold', and other frustrations patients experience in their moment of need and at any time of day or night.

Created with the aim of transforming the healthcare experience in Asia Pacific's health care markets which can sometimes be difficult to navigate, DocDoc provides a free service that enables patients to find a nearby doctor or dentist, credibly research and understand their clinical interests and specialties, assess their academic credentials and achievements, and instantly book an appointment with their connected devices.

Throughout the continuum of care – from initial research, to time of care and post-treatment – DocDoc also educates patients with wellness tools, information on procedures or conditions, specific care guidelines, and offers them access to specialty information centres. In addition, DocDoc is able to suggest physicians and other providers based on the illness or condition that patients are researching.

DocDoc was founded by veteran professionals from both the Healthcare and Technology industries and funded by some of the most successful tech entrepreneurs such as 500 Startups (leading Silicon Valley venture capital firm led by Dave McClure, formerly with PayPal and Facebook), and Michael Brehm (Founder of Rebate Networks, Business Angel of DailyDeal which was acquired by Google, brands4friends acquired by eBay, and scoreloop acquired by RIM).

Other notable investors include William Hawkins (former CEO of Medtronic), Koh Boon Hwee (former Chairman of DBS bank, Singtel, and Singapore Airlines), Yoh-Chi Lu (Founder and Chairman of Biosensors International) and Hyder Ahmed (CEO of Broadpeak Investments)¹².

¹² <https://www.docdoc.sg>



Home



Affordable, quality health care is not always readily within reach for many Southeast Asians. In some developing economies within the region with remote, hard-to-reach geographies, treatable infectious diseases like malaria and dengue continue to needlessly claim lives in the absence of the most basic healthcare services.

As smartphone and other devices become increasingly commonplace, however, many companies – including start-ups and health organisations – are developing innovative mobile apps to address the problem of access. Some of these apps transform connected devices into portals for clinical care, allowing patients to communicate virtually with clinicians and receive health advice. These telehealth apps can streamline or even automate the consultation process, saving time and costs for everyone¹³.

Ring.MD, a Singapore-based telehealth startup that recently received fresh funding to grow its regional footprint, is one such example. An innovative online platform that allows patients to connect with expert doctors by video or phone, consumers can easily find a doctor for their needs, and schedule a call in just a few minutes – all at an affordable cost¹⁴. Other telehealth applications that focus on local markets, such as Indonesia's Dokita and Dokter Gratis, are also available.

For people who require long-term care, particularly those with chronic diseases, there are also smart home monitoring systems. These systems have the ability to monitor a range of indicators including blood sugar ratios in diabetics, international normalised ratios for patients on anticoagulant medicines, white cell counts for chemotherapy patients, or even telemetry for those with cardiac diseases, and then forward the results electronically to the patient's primary care provider as well as store the data in the patient's personal medical data e-docket. Additionally, the system could provide alerts to warn the patient and his or her caregiver to take specific actions¹⁵.

Nevertheless, telehealth and smart home monitoring systems, while gaining popularity in developed markets such as North America, continue to face issues in certain areas of Southeast Asia where bandwidth constraints, low smartphone penetration and lack of experience with digital services continue to inhibit their adoption¹⁶.

13 <http://www.forbes.com/sites/techonomy/2014/10/15/southeast-asias-health-app-explosion/>

14 <https://www.ring.md/>

15 https://www.ida.gov.sg/~media/Files/Archive/Collaboration%20Opportunities/Collaboration%20Opportunities_Level2/iN2015Healthcare.pdf

16 <http://www.forbes.com/sites/techonomy/2014/10/15/southeast-asias-health-app-explosion/>

App-ic Battle

Perhaps due to its massive traffic congestion in urban areas as well as other access issues, telehealth applications and websites are taking off in Indonesia. Here are three players to watch.

Dokita

Its name derived from the phrase “dokter kita”, meaning “our doctor”, Dokita provides users with health advice from doctors who are on stand-by in periods of 30 minutes to an hour on weekdays from 9am to 5pm. Under certain circumstances, the doctors are also able to give recommendations for medicines or prescriptions when asked by users. Dokita currently has about 10 doctors and 100 active users¹⁷.

Dokter Gratis

Working in shifts, Dokter Gratis currently has about 12 general practitioners responding to chats on a daily basis. The app has been downloaded about 130,000 times, with about 500 chats occurring each day¹⁸.

MeetDoctor

MeetDoctor features online health consultation, medical articles, as well as a health services directory. A team of doctors are available to answer questions posed by members, although other members can provide some answers too. In addition, members can look up hundreds of articles which have all been reviewed by doctors, and locate nearby hospitals, clinics and other health institutions. MeetDoctor also has plans to launch online private consultation services with the use of a virtual chatroom¹⁹.

¹⁷ <https://www.techinasia.com/indonesian-abilities-new-stats/>

¹⁸ <https://www.techinasia.com/dokter-gratis/>

¹⁹ <https://www.techinasia.com/meetdoctor/>



Hospital

With rapid advances in medical knowledge comes greater specialisation of healthcare professionals. It is not uncommon for patients, particularly those with chronic diseases to suffer from multiple medical conditions and to be under the care of several doctors from different disciplines all at once, each prescribing a different set of medications to deal with the conditions.



Herein lies the problem: there are currently few or no links among doctors from different specialties. Further, there is no central database containing all of the patient's medical records. As a result, no one doctor has a proper overview of a patient's health, greatly increasing the potential for poly-pharmacy and adverse drug interactions. It becomes even more complex when patients move across borders. For instance, they could have diagnostic or screening tests done in one country, have surgery in another and follow-up treatment in a third. Integration of relevant clinical information and coordination of care for such patients will become a greater challenge²⁰.

In the Philippines, Globe HealthCloud has been developed as a patient-centric electronic medical record system that connects various stakeholders in the health care system and increases operational efficiency while improving the quality of patient care. The system helps doctors, patients and health maintenance organisations store their data on the cloud. It recalls the likes of Dropbox and Google Drive, only that it is tailor-fit for the health care industry²¹. Doctors in Singapore, too, have started using the National Electronic Health Records (NEHR) a system which gives every person just one medical record accessible to all the health-care professionals treating him, whether in a hospital or general practitioner clinic²².

But this data allows for more than better, personalised health care. With health analytics, unexpected insights can be uncovered to increase the productivity of the system. Singapore's Khoo Teck Puat Hospital, for example, discovered that 20 percent of people admitted to the wards contributed to 80 percent of repeats, and only 10 percent of the cases were actually health related – the majority were social issues. In response, it then tailored in-home healthcare plans that aimed to cut hospital admissions. Four hundred patients were placed under the programme and the average admission rate fell from 3.5 times in six months to 1.3²³.

And it did not just stop there. Instead, the hospital extended its mining of patient information in the community extended to a larger programme. Screening 4,000 people in northern Singapore, aged 40 years and above, for conditions such as high cholesterol and diabetes, it then employed geospatial data technology to plot the patients on an area map to identify where more unhealthy members of the community lived. For the majority of cases, they were farthest from the hospital. This allowed the team to implement proactive solutions such as community pop-up clinics and health and wellbeing talks in strategically positioned locations to reach those deemed at risk²⁴.

20 https://www.ida.gov.sg/~media/Files/Archive/Collaboration%20Opportunities/Collaboration%20Opportunities_Level2/iN2015Healthcare.pdf

21 <https://www.techinasia.com/philippines-healthcare-ecosystem-lags-philippine-telco-globe>

22 <http://www.healthxchange.com.sg/News/Pages/Doctors-Can-Now-Access-National-e-record-System.aspx>

23 <https://www.edb.gov.sg/content/edb/en/news-and-events/news/singapore-business-news/Feature/how-big-data-can-drive-patient-behaviour-change.html>

24 <https://www.edb.gov.sg/content/edb/en/news-and-events/news/singapore-business-news/Feature/how-big-data-can-drive-patient-behaviour-change.html>

One Patient, One Health Record

Singapore's National Electronic Health Records (NEHR) is a data exchange system that stores the medical record of every person in Singapore who has seen a doctor in the public healthcare system since February 2011.

Through the NEHR, doctors have access to the medical history of patients to support them in decision-making. The goal of the NEHR is to ensure a seamless health care experience for each patient.

The NEHR is a key enabler of Singapore's strategic vision: "One Patient, One Health Record", a vision that focuses on providing customised and convenient care to patients. By providing a consolidated view of a patient's medical history, the NEHR ensures that health care professionals have the necessary information to help them make the best care decisions for the patient.

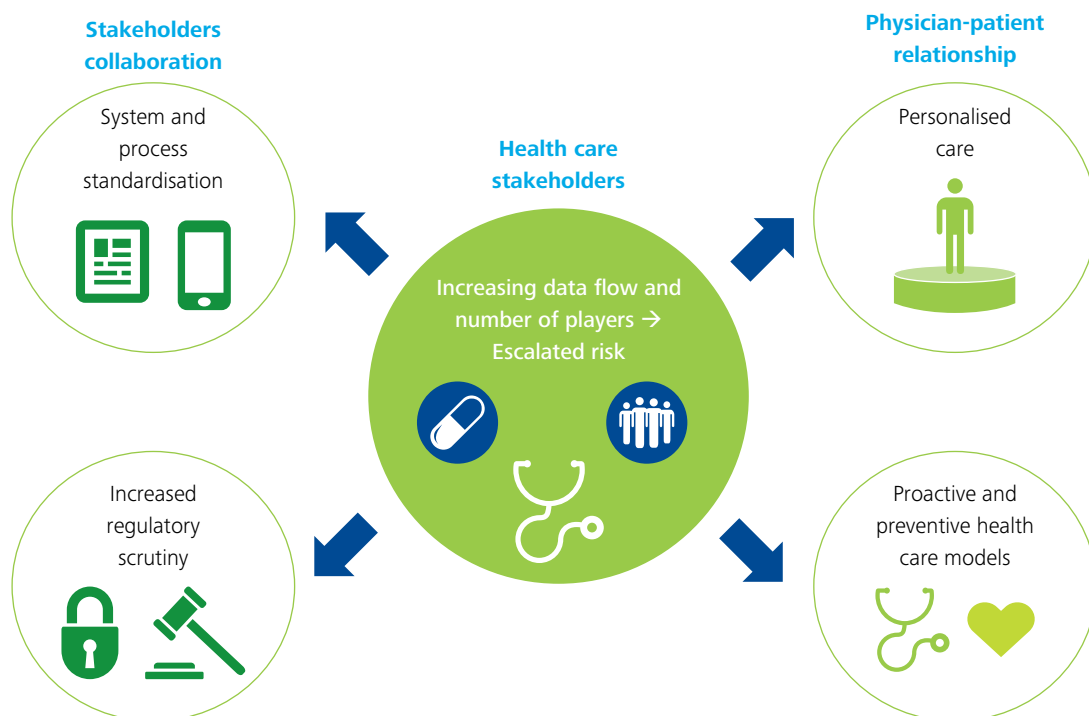
Information in the NEHR includes: admission and visit history; hospital inpatient discharge summaries; laboratory results; radiology results; medication history; history of past operations; allergies and adverse drug reactions; and immunisations²⁵.

²⁵ [https://www.moh.gov.sg/content/dam/moh_web/Publications/Information%20Papers/2014/NEHR/English%20Brochure%20\(Final\).jpg](https://www.moh.gov.sg/content/dam/moh_web/Publications/Information%20Papers/2014/NEHR/English%20Brochure%20(Final).jpg)

The future health care ecosystem

The hallmark of the Health Hub is an open and transparent ecosystem that delivers dramatic improvements in quality and efficiency by rewarding collaboration and innovation. Every participant can benefit, not only from the health outcomes, but also from the opportunities for growth and innovation generated from continuing efforts to enhance those outcomes.

Figure 4: The future health care ecosystem





Process standardisation

With the introduction of electronic health records, citizen's electronic personal health records and other pharmacy systems, there is likely to be greater development and standardisation of clinical operations. For example, health care professionals can utilise this data to support alternative clinical trial designs in real-world settings, compare multiple conditions and treatment options, and track longer-term outcomes across multiple user groups²⁶.



Personalised care

Even as processes become more standardised, health care delivery becomes more personalised. With personal health records, augmented by cost-effective screening that can be carried out in the home but with the results read remotely, health providers will be able to better tailor their diagnosis and care based on the patient's medical history, profile and other factors.



Greater collaboration amongst stakeholders

The collaboration and interaction between the Health Hub players extends to more than just the Human, Home and Hospital. In fact, pharmaceutical and medical device companies can leverage on this partnership to generate new drug compounds and develop drugs that are targeted and individualised for the population. The presence of well-defined populations and sub-populations of patients with different disease susceptibilities and medical conditions would be very useful for researchers and drug companies in carrying out clinical studies in more cost-efficient ways²⁷. This would help to propagate a virtuous, self-reinforcing cycle within the system.

Philippines' mClinica, for example, is a mobile platform that enables drug companies to reach pharmacies on a large scale using mobile phones and provide programmes to improve patients' health. Patients, too, can avail of discounts on medicines from pharmacies using the platform, allowing the pharmacies and the drug companies supplying them to, in turn, boost store sales and brand awareness through promotions. As information on patients' medicine purchases is stored on mClinica's platform, it also possesses a powerful database that pharmaceutical companies and their distributors, as well as pharmacies can access in real-time²⁸.

Then there are other community-wide collaborations such as InSTEDD and CommCare. From its office in Phnom Penh, Cambodia, InSTEDD organises community events such as Epihack, a series of hackathons dedicated to fighting infectious diseases in remote and under-resourced Southeast Asian areas. These events bring together the health care ecosystem to prototype solutions for collecting, tracking, and sharing data on emerging disease pandemics²⁹. CommCare, on the other hand, is an online open-source platform that supports field workers in a range of sectors, including healthcare, facilitates data collection, patient case management, and workforce mobilisation. The platform has been deployed in more than 40 countries, including Indonesia, Lao PDR, Myanmar and Thailand³⁰.

While ambitious, it is nevertheless within reach given the current momentum and trajectory of the driving forces and technological development. There remain, however, a number of outstanding issues that will need to be addressed in order to ensure a smooth transition from today to tomorrow.

26 http://www-03.ibm.com/industries/ca/fr/healthcare/files/Healthcare_2015_and_Care_Delivery_final.pdf

27 https://www.ida.gov.sg/~media/Files/Archive/Collaboration%20Opportunities/Collaboration%20Opportunities_Level2/IN2015Healthcare.pdf

28 <https://www.techinasia.com/mclinica-philippines-raises-funds/>

29 <http://www.forbes.com/sites/teconomy/2014/10/15/southeast-asias-health-app-explosion/>

30 <http://www.forbes.com/sites/teconomy/2014/10/15/southeast-asias-health-app-explosion/>

Preparing for the new normal

To enable the health care system to transform from one that is reactive and focused on administering treatments during times of need, to one that is proactive and focused on disease prevention, health care providers will need to go beyond the episodic touch points of traditional interfaces and develop an end-to-end view of their health consumer.

Interoperability standards

To facilitate the flow of electronic health information across the entire ecosystem, standards and mechanisms for the exchange must first be put in place to enable and secure this flow. These standards should not only be congruent within a local health care system but, in the long-run, also internationally as patients increasingly cross borders for medical treatments.

Privacy and cyber security

While an open ecosystem that enables collaboration between multiple parties will indisputably require the sharing of personal and confidential medical information between relevant parties, there remains the need for appropriate privacy and cyber security standards. With the use of data access protocols and controls, the system should enable the user to exercise control over which information is being shared, and with whom. Earning the necessary trust and confidence in the ecosystem will be crucial to ensuring its widespread usage and longevity.

Regulatory framework

With the increasing use of telemedicine, there will be the need to address physician liability and medico-legal issues, for example, in cases when clinicians prescribe treatment remotely through applications, without physically examining the patient³¹. Policies are also needed to address legal issues that currently impede the sharing of medical information and use of genetic information. These would include data privacy, protection and confidentiality.

Physician-patient relationship

As patients increasingly utilise telemedicine and take on more active roles in their own health care, for instance, by monitoring their own vital signs with the use of wearables, there may be some concern that this will be to the detriment of the traditional physician-patient relationship and interaction.

Yet, there might also be reasons to believe that such technology may actually improve the physician-patient relationship. To begin, these new tools do not replace the physician. Rather, they create physician-patient relationships where there was none to begin with, for example, in areas where access to health care is an issue. In addition, these tools enable patients to handle their minor complaints outside the physician's office, enabling doctors to spend more time with patients who need more help and better cultivate physician-patient relationships where it matters the most³².

31 https://www.ida.gov.sg/~media/Files/Archive/Collaboration%20Opportunities/Collaboration%20Opportunities_Level2/iN2015Healthcare.pdf

32 <http://scopeblog.stanford.edu/2015/02/11/why-technology-wont-destroy-the-doctor-patient-relationship/>

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