# Chapter 15

## Healthcare

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# Introduction

This chapter focuses on healthcare in the context of development strategy. In particular, we discuss the roles of information and communication technologies (ICTs) in healthcare – their uses, benefits, and challenges, which are critical in the 'third unbundling' as discussed in chapter 1, and provide key areas for consideration in developing a digital healthcare strategy towards improvements in productivity and the next stage in socio-economic growth.

The Association of Southeast Asian Nations (ASEAN) and East Asia countries are currently, at different rates, undergoing a remarkable demographic transition which will result in an unprecedented increase in the numbers and proportion of older people. As a region, the United Nations projected that Asia would be home to more than 937 million people who are 65 years or older by 2050 (UN, 2017). The ageing of our population raises important sustainability issues for societies, notably the pressure placed on health systems and more generally, on social care. Inevitably, the demand for long-term care will increase. Along with this, there will be a need to build capacity in the long-term care workforce and facilities. To this end, the Economic Research Institute for ASEAN and East Asia (ERIA) prepared a report to address these issues and made recommendations for greater bilateral and regional cooperation and support to meet the challenges (Hayashi, 2019).

Under the current demographic situation, it is perhaps more important than ever now to develop new models of care in the health field, such as an integrative approach to healthcare services and delivery, which can more efficiently and effectively accommodate the healthcare needs of a growing ageing population. To achieve this purpose, many countries have increasingly turned to ICTs, which provide opportunities and serve as enabling tools to solve their healthcare problems. Indeed, ICTs have become a critical catalyst for improving healthcare efficiencies and productivity. The successful transition towards healthcare digitalisation is, however, a challenging process that requires good vision, strategic planning, policies, and governance, which we discuss in the last section.

# Healthcare Digitalisation as an Enabler

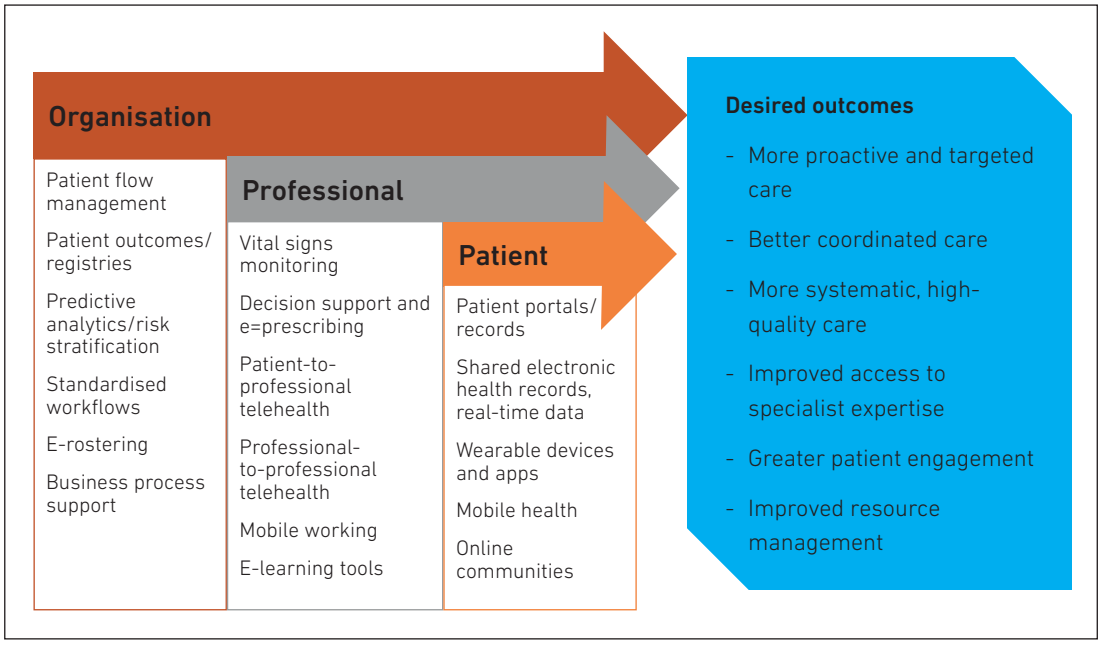
ICT for health, also referred to as 'eHealth', represents one of the key instruments for healthcare delivery and public health today. Healthcare digitalisation plays an important role towards achieving universal health coverage for sustainable development. As defined by the World Health Organization (WHO, 2016), universal health coverage means all people and communities can use the promotive, preventive, curative, rehabilitative and palliative health services they need, of sufficient quality to be effective, while also ensuring that the use of these services does not expose the user to financial hardship. In a nutshell, it is the triple concurrent objectives of (i) accessibility, (ii) affordability, and (iii) quality of care in healthcare delivery. Digital healthcare enables these three aspects and supports achieving universal health coverage, which is a target in meeting the goal to 'ensure healthy lives and promote well-being for all at all ages' (Goal 3, Target 8) in the Sustainable Development Goals adopted by the United Nations (UN) General Assembly in September 2015. The appropriate utilisation of digital tools in healthcare could thus provide opportunities for improving the accessibility, affordability, and quality of care, thereby contributing to sustainable development.

ICT comprises two interrelated aspects: (i) the information component, where new and innovative methods of data use (e.g. in gathering, processing, analysing, and integrating), enabled by technology, produce greater efficiencies in power and speed; and (ii) the communication component, where the growing widespread access to and use of low-cost internet and smartphone devices mitigate challenges in the delivery of healthcare services across distances and rising healthcare costs.

It has generally been acknowledged in the health community that we are at least a decade behind other industries in the use of ICT for healthcare, and are further behind in realising the productivity and value improvements that have been seen elsewhere as a result of ICT use. Nevertheless, the situation is changing. Since the 1990s, the initial approach in extracting productivity improvements followed that of other industries – one that is focused on improving transactions, removing duplication, increasing back-office efficiency, and streamlining certain processes. These are still important today and there is still more to do, particularly in newly developed and developing countries. From the 2000s onwards, some countries have progressively developed and trialled information technology (IT) systems for specific applications which, while useful and serve their function, are typically 'silos' and require better integration. More recent developments involve efforts in the integration of IT systems and using data-driven predictive analytics (e.g. artificial intelligence (AI)) to enable medical advancements in areas such as diagnostics, robotics, and genomics.

Over the span of a few short decades, a wide range of digital technologies has been developed to support health and medicine. A non-exhaustive list of ICT uses in healthcare includes electronic health records; telehealth; mobile health; decision support systems; chronic diseases management services; practice, patient, and clinical management systems; electronic medical services; health knowledge resources; distance learning for health professionals; and health information systems. Figure 15.1 shows some of their applications at the patient, healthcare professional, and organisation levels; and the desired outcomes.

**Figure 15.1 Information and Communication Technology Uses in Healthcare and the Desired Outcomes**




Source: Author's compilation

We briefly describe below a few salient examples that have potential for widespread adoption in today's context, particularly for newly developed and developing countries.

## Telehealth

Telehealth, encompassing telemedicine and telecare, supports the provision of healthcare services at a distance, i.e. the individual and healthcare providers need not be in the same location. Telehealth enables the delivery of safe and quality care to individuals living in areas with limited access to services. Some countries have already adopted electronic store-and-forward services such as those that involve acquiring medical data (e.g. images) and transmission to a healthcare provider (e.g. doctor or medical specialist) for offline assessment and treatment recommendation (e.g. teleradiology and telepathology). The use of remote monitoring services also enables healthcare providers to monitor an individual's condition remotely, using technologies such as implanted devices and sensors with wireless or wired connections. In addition, digital interactive services enable real-time interaction between individuals and their healthcare providers through means such as mobile phones, video conferences, and other forms of online and remote communication. Classic examples are psychiatry and mental health services.

With the growth of smartphones use, a subcategory of telehealth has also emerged. Mobile health, commonly known as 'mHealth', refers to services and information provided through mobile technology such as smartphones and handheld computers. mHealth has emerged rapidly in developing countries as a result of the large penetration of mobile phones and the lack of other modern health infrastructure. The mobile devices can be used for real-time monitoring of an individual's health; diagnostic and treatment support, health advice, and medication compliance; health information for practitioners, researchers, and patients; and health education and awareness programmes. For older persons and those with special needs, telehealth services such as remote alerts (e.g. in domestic accidents such as falls) and remote monitoring (e.g. vital signs, blood glucose, and weight) may enable them to remain independent in their homes as well as increase their sense of connectivity with the broader community.

## Decision Support Systems

Decision support systems (DSSs) assist healthcare providers in making diagnosis and treatment decisions. These systems combine an individual's current and historical health information with the healthcare provider's knowledge, to provide advice intended to result in better quality care and outcomes for the individual. For example, in the area of medication management, decision support tools draw on electronic knowledge sources such as clinical practice guidelines and knowledge bases, and apply this knowledge to local patient and clinical data through expert rules to guide medications decision-making. DSSs, when coupled with a comprehensive and accurate base of patient information, are

able to identify potential drug interactions, dosing inaccuracies, and prescribing errors that could lead to serious adverse events. These technologies, which aid clinical decision-making and help clinicians to manage the exponential growth in medical knowledge and evidence, offer substantial opportunities to reduce variation and improve the quality of care. There is strong evidence that they can improve the quality of clinical decision-making (Jaspers et al., 2011) and some evidence that they can lower costs (Fillmore, Bray, and Kawamoto, 2013).

### Practice, Patient, and Clinical Management Systems

Practice, patient, and clinical management systems refer to the computer systems that healthcare organisations use to manage the delivery of care to individuals. These systems provide the ability to capture, store, access, and share health information for patients during their care episode. They can also provide a broad range of healthcare management and delivery functions for a healthcare entity, such as diagnostics management, scheduling and resourcing management, clinical care management, and reporting. Practice, patient, and clinical management systems form one of the foundations required for collecting, recording, and sharing electronic information across a country's health sector.

The use of a range of digital technologies provides opportunities to improve healthcare services and delivery. Imison et al. (2016) discussed some of the benefits in detail, which are summarised as follows:

(a) **More proactive and targeted care.** Use of real-time patient monitoring and powerful analytics to deliver more proactive and targeted care.
(b) **Better coordinated care.** Reduce the costs and harms that come from poor communication and fragmented care by developing IT systems to integrate and coordinate care and support providers in collaborating more effectively.
(c) **More systematic,** high-quality care. Use of clinical information decision support and knowledge management tools, integrated into standardised workflows, to deliver more systematic, high-quality care.
(d) **Improved access to specialist expertise.** Use of telehealth to reduce costly referrals, avoid admissions and unnecessary appointments, and improve the ability of professionals to get things right the first time by providing access to specialist expertise and advice easily and in real time.
(e) **Greater patient engagement.** Reduce the transaction costs and rewrite the relationship with patients and carers by providing tools for patient engagement and self-management that allow more meaningful participation in care and more opportunities for self-service.
(f) **Improved resource management.** Adapt the tools used in other sectors for improved resource management to plan staff rosters and patient flow, match capacity to demand, and improve scheduling.

Notwithstanding the tremendous benefits that healthcare digitalisation offers, there are often large, though not insurmountable, challenges present. The obstacles in the successful development and application of ICT are usually multifaceted in nature and would likely require concerted efforts by multiple stakeholders who have the appropriate resources to overcome them. With opportunities for technology transfers, the challenges are not limited to the unavailability of technology (Ariani, Koesoema, and Soegijoko, 2017), but include a wide range of factors such as financial feasibility and funding; infrastructure, access, equity, and quality; knowledge, expertise, and research evidence; leadership and governance; interoperability and security issues; and sociocultural and technological environments.

Notably, we highlight the challenge of accessibility for some subgroups of the population, such as older persons. Digitalisation and the rapid use of ICT could marginalise some older persons who may be less savvy about technology or have less access to digital resources. For instance, recent national surveys conducted by ERIA in the Philippines (Ogena, 2019) and Viet Nam (Tran, Dang, and Vu, 2020) found that internet access and mobile phone ownership amongst older persons remained relatively low. Measures may need to be taken to provide better accessibility and learning support to older persons to narrow the digital divide.

Existing and potential challenges should be thoroughly considered at the onset of the conceptualisation and design stage and adequately addressed, for higher chances of successful implementation and adoption, and to minimise the risks of costly mistakes.

## Development Strategy in Healthcare Digitalisation

At the core of developing a digitalised healthcare strategy, or any development strategy, is building strong capacities and capabilities in both hard and soft infrastructure. We offer some pertinent considerations towards achieving the positive outcomes of healthcare digitalisation. These considerations are drawn from our knowledge of and experience in the health sector, particularly and importantly, from insights gleaned in discussions with a range of stakeholders at multiple levels who are currently operating in an evolving digital healthcare ecosystem. We single out five key areas to take note of when developing a digital healthcare strategy.

1. The first and most fundamental aspect for successful healthcare digitalisation lies less in the technologies themselves but in people and new ways of thinking and doing. Technology is, after all, a means to an end, and not the end in itself, to augment productivity and achieve development and growth. Moreover, failures in technology

projects are more often than not a result of weak conceptualisation and poorly executed implementation plans rather than the technology itself. Therefore, in the first instance, it is critical that leaders and decision-makers, who are knowledgeable in both the clinical and technology thought-spheres, are able to envision and embrace new ways of working and reimagine current work processes. Alongside the digital transformation, leaders need to build a culture that is receptive to change and put in place a change management process. The success rate of technology adoption increases significantly when organisations and individuals are receptive to change and are adequately equipped with the necessary mindset, tools, skills, and expertise to use new technologies. To this end, many countries have developed comprehensive 'Smart Nation' plans to serve as a road map for broad-level digital transformation and change, not only for the health sector but also across all sectors.

2. Second, the technologies that have provided the greatest immediate benefits have been carefully designed to make people's jobs or patient interactions easier, with considerable investment in the design process. Where technological interventions have failed miserably, insufficient attention has been given to the design of the system or the technological interventions were simply layered on without careful consideration, on top of existing structures and work patterns, resulting in additional workload and frustrations for users. For example, poorly designed systems have led to significant increases in the time spent on data entry and multiple unhelpful alerts. This can be mitigated by system designs that automate data entry, such as direct feeds from equipment that monitors vital signs.

   For technology systems to meet the needs and solve the problems of the people who are going to use them, be they patients or professionals, a deep understanding of the work as well as the needs of the worker is required. Despite this, the worker is often simply a recipient of the end product and is not involved in the development of the systems' architecture or user interfaces. It would be much more fruitful to involve the end-user in the development process and collect feedback in the process for a product that is meant for their use. When systems meet clinical needs, they are much more likely to succeed.

   Increasingly, organisations also need to consider a balance between implementing an off-the-shelf package solution (which could be customised) and 'knitting together' existing clinical systems in their organisation. The combination of a core package solution with a small number of specialist clinical systems is emerging as the norm in top-performing digital hospitals.

3. Third, while healthcare digitalisation offers opportunities to generate and store massive data with relative ease in comparison to analogue medical and health records, the optimal usage of these data will be vastly limited without the capacity and capability for sophisticated data management and data analytics. Improving productivity requires extensive redesign of work processes; the use of predictive models to reduce variation, allocate resources, anticipate demand, and intervene early; and the ability to learn and adapt. None of these is achievable without data analytical tools and expertise available in real time for advanced support in planning, management, and improvement.

   Successful healthcare digitalisations have made significant investments in developing data analytics capacities to enable generating insights from the data collected within both clinical and non-clinical systems. Appropriate data mining, supported by sophisticated search tools and hyper-indexing, is used across all data systems simultaneously. Investing in and developing strong data analytics capacities and capabilities in a trained and skilled workforce can drive improvement in many areas, including operational and clinical processes as well as population health management and the optimisation of medical treatment.

4. Fourth, issues of interoperability and the safeguarding of shared data need to be taken into account from the start. Data sharing across multiple settings is essential to supporting coordinated care and realising the full benefits of digital technology in healthcare. However, up until more recently, there has generally been an inability to share and combine data between different IT systems. Whole health economy benefits can be realised if healthcare providers are able to share the same instance of clinical information systems that comply with national data and interoperability standards.

   The sharing of data would necessarily require robust security protection tools and data governance in the form of privacy legislation and enforcement policies, particularly in the face of growing threats from cyberattacks and data leaks. Data governance mechanisms must be put in place to give patients the confidence to share their data across care settings, and to assure healthcare professionals as they move away from paper-based systems. Actions are required at the national and local levels to help organisations hold and share data safely and to protect sensitive medical and health records.

5. Finally, it is a truism that technology does not stand still and will almost certainly become obsolete with the passage of time. Therefore, continuous iterations and 'upgrading' are needed alongside developing new innovations in both processes and products. Conceptualising and implementing digital technologies are an ongoing transformational change. Even with careful designs, a number of iterations may be needed in the design of systems before a tipping point is reached where all the investments pay off. The fact that digital technologies are in a constant state of evolution and adaptation is a double-edged sword, as it also allows for their full potential to be realised.

   Some important developments for applications in healthcare include natural language processing to allow free text to be structured and analysed; the growth of AI, decision support, and cognitive computing, which offer opportunities for more automation and improved decision-making; the increasing intelligence and reach of devices supported by the internet of things (IoT) and sensor technology, which will open up new possibilities for better resource management, patient self-care, improved prevention, and remote monitoring; and distributed ledger technology (DLT), which may revolutionise the way in which we manage and share data. DLT uses blockchain technology, which provides a means of creating a secure digital identity and allowing multiple users to work from a shared central database, potentially alleviating problems with interoperability.

## Conclusion

Countries at varying stages of socio-economic development will, undoubtedly, have different rates of progression towards healthcare digitalisation. Extending the discussion in chapter 1, the digital progressions will have to adopt a step-by-step tiered approach. For instance, at the most basic first tier, developing countries could simply convert analogue medical and health records to digital data, i.e. the digitisation of data. The middle tiers of progression offer possibilities of improved healthcare vis-à-vis better health monitoring, healthcare services delivery, and holistic integrated healthcare, supported by the interoperability of digital systems. At higher tiers, developed countries could harness sophisticated data-driven predictive analytics for the advancement of breakthroughs in medicine, such as genomics medicine.

In the healthcare industry, it would be rather challenging to skip tiers. There is also a common misconception that countries can leapfrog to more advanced digital technologies. However, without a parallel focus on creating an enabling environment, innovations in ICT will remain isolated and have only a limited impact on health. A national digital healthcare plan in this context should focus on making the case for digitalisation, creating awareness and establishing a strong foundation for investment, providing workforce education and skills training, and adopting digitalisation in priority systems and services.

Clearly, the successful digitalisation of a country's healthcare is a mammoth task – one that cannot be achieved alone – and active collaboration is crucial. In this regard, public–private partnerships, coupled with academic research and development, are often one of the cornerstones of many digital solutions, with digital technology providers spearheading technological innovation within a national enabling policy and technological infrastructure. Such public–private sector collaborations extend to sustainable funding for ICT investments both within and beyond national borders. ASEAN and East Asian policymakers and ICT solution stakeholders can leverage each other's expertise, and bilateral and regional cooperation remain critical for the building of consensus on policies, sharing of knowledge, and facilitating better use of resources.

To conclude, the road to healthcare digitalisation is a long, arduous, and relatively expensive endeavour at all development stages, one that is not without pitfalls and challenges along the journey. Nonetheless, through active collaboration with partners, careful design, and systematic implementation, there is high potential to reap efficiencies and to achieve the triple aim of universal healthcare services delivery – accessible, affordable, and high-quality care.

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