Summary of "Digital Health Transformation in China" Consultation Meeting

28 January 2021

Introduction

Amid the COVID-19 pandemic, China's digital healthcare ecosystem has emerged as an approach to enable governments to prevent and contain the spread of disease with the adoption of cutting-edge technologies. The digital health landscape in China has been shaped by a mix of governmental, healthcare, and industrial/commercial actors for over a decade, but its construction was largely built in a silo. This changed in 2020, when digitalisation was considered a necessary response to protect public health.

Since then, the ecosystem in China is becoming increasingly outward-looking, as shown in the national government's digital and health silk road initiatives, along with the development and deployment of 5G network, artificial intelligence for health, surveillance system (i.e. the health code), and other novel digital technologies. In view of these developments, external observers are asking if the fast adoption and experience of digitalisation in healthcare from China can contribute to the global digital transformation of health, and what the appropriate balance is between public beneficence and individual data privacy.

On 28 January 2021, The Lancet & Financial Times Commission *Governing health futures 2030: Growing up in a digital world* and the WHO Representative Office in China convened national experts to discuss the rapidly digitalising health landscape in China. The aim of this event was to leverage Chinese experiences to explore digital solutions that address public health needs as well as facilitate greater connection across all aspects of healthcare.

Recommendations

- In order to pave the way for digital transformation, there should be 1) a rich technology stack, including everything from the technologies themselves to the companies providing it; 2) flexible policy makers who are willing to adapt to those technologies; 3) high acceptance level among the population towards digital applications.
- Invest in the construction of a stable and reliable information system as the prerequisite for running a digitised health system. The digital health model should be a patient-centred care model that can provide better support for healthcare provision.
- Governments should provide guidance and set regulations to guide medical institutions and the private sector actors who gather big data on how to share the health data effectively and responsibly.
- As echoed in the WHO Global Strategy on Digital Health, standards of interoperability should be established to ensure the connectivity, consistency, and unity of all relevant government policies at all administrative levels.

- Safeguards need to be built into applications in the digital health system to narrow instead of widening the digital divide.
- An innovative governance model must be regulatory and supportive. The governance of data should not just be how governments control the companies on their use of data but it should be about how all relevant stakeholders apply ideas of public domain, open source, and participation in the digital world. We need to have the platforms, investment, and policies that promote the continuous advancement of technologies while clear and enabling legislation should be made on how personal data is collected and used.
- The World Health Organization (WHO) should act as a convening body and strengthen its role in the digital health transformation by bringing together a wide range of actors, not just governments, and take the lead to set common minimal standards on vaccine credentials in particular.

Discussion

China's digital landscape

Even before the COVID-19 outbreak, digital health transformation in China was advanced, from its use of health information systems and electronic medical records to its deployment of 5G, blockchain, cloud computing, AI, and even robots in clinical healthcare application. According to discussants, China already possesses rich technology stacks and coordinate private public partnership to develop, design, operate, and promote digital health solutions for public services. The widespread use of e-payment, social networking, and public service apps is not new.

However, the pandemic has brought digital heath to the fore as attention for digitalizing health care services has increased due to the challenges posed by measures such as movement restrictions to control the spread of SARS-CoV-2, and the demand of infectious disease forecasting for early allocation of medical resources. In China, throughout the COVID-19 pandemic, there has been an increased application of digital technologies to health care, facilitated by China's existing ICT infrastructure for health.

While not the main contributor in combating COVID-19, digital technologies definitely play a supporting role in related control and prevention. Technologists have contributed significantly to the emergency response in China through their distinct engagement in the provision of clinical services and non-pharmaceutical interventions, becoming a model for other countries. For example, the AI and big data communities demonstrated early results in detecting COVID-19 via imaging studies, and social media platforms engaged in the fight against the infodemic. Healthcare practitioners experienced a rapid digital revolution in their care-giving activities, and experts also observed new ways of matching supply and demand sides of healthcare services.

Policy environment

The application of the existing technology stack to a wide range of public health needs could not have happened without policy enablers in China. Since the start of the COVID-19 epidemic, there has been a call to use digital technology in ways that strengthen public health interventions from the Politburo Standing Committee; priority areas for digital health interventions have been defined by both the Committee and the National Health Commission. Government directives were

not set only at the national level but all the way down to the local level, and they are expansive and mutually complimentary in nature, which has facilitated relevant activities of technology companies and health providers.

A policy-enabling environment for the growth of digital health also existed in China before the COVID-19 pandemic. Since 2009, information infrastructure and health service digitalization had already gained importance in China's decade of health system reform, and policies had been developed as well as government institutions established to support the implementation of electronic health records, telemedicine, and more. This includes the development of internet-based hospitals and scaling-up of non-state investment. Further, provider-to-provider telemedicine was an integral part of China's 10-year health system reform to improve access to quality healthcare in rural areas and primary care settings.

In China, policy incentives stimulate the utilisation of telemedicine; for example, health authorities introduced flexibilities such as fee-waving as well as early profit-sharing for hospitals in health insurance policies. Policies have also been made less restrictive to pave the way for the growth of telemedicine. For example, during the COVID-19 pandemic, the ban was lifted on private providers and public hospitals with internet hospital credentials to provide initial consultations online, enabling the provision of full service (initial consultation and follow-up consultations) to clients, especially to those who are denied access to routine services.

The aforementioned points were summed up by discussants in the meeting:

- The design of the digital healthcare system should involve the government, private sector, and civil society. The major roles of the government are to design and provide public platforms to access funding. The healthcare institutions, including hospitals, are like recipients of the policies; they can develop themselves based on the demands, and they can also create demands in response to the government's requests. In this process, digital solution suppliers and manufacturers need to determine what demands or government requests on which they based their commercial products and offer solutions to the healthcare institutions, which could also be understood as the end-users of digital health. In other words, digital health administrators play the role of harmonising user-experience demand side knowledge with government policy demand side responses.
- In consultation with the government, the private sector holds the role of guaranteeing the safety and effectiveness of their products, and developing relevant protocols covering the whole life cycle of their products. The main regulatory body in the central government is the Center for Medical Device Evaluation under the National Medical Products Administration (equivalent to the FDA) in China. The Center not only acts as a regulator to manage and supervise the companies – whether they fulfil their responsibilities by, for example, establishing regulations and conducting product launch review – it also supports the development of the sector by providing special supporting services to facilitate and fast-track the registration of innovative products as well as products for emergency usage.

In short, the government establishes regulations, healthcare institutions undertake requests, and product developers provide the corresponding solutions to healthcare institutions. This works to establish a planned digital health ecosystem whereby the private sector holds guiding stakes in its

development while the government works to nudge stakeholders towards common goals to benefit population health. Experts claim that this kind of relationship allows the development of a digital healthcare ecosystem that better matches people's needs, though the experiences and outcomes of a private-sector-led approach require further investigation.

Data sharing: The Shanghai Linked Healthcare project

At the onset of COVID-19, China set an example for genome sequence data sharing on a global public database, with the aim of allowing subsequent development of vaccines and diagnostics. The Linked Healthcare project in Shanghai is an impressive example of the realisation of data-sharing and co-recognition of data across hospitals. It highlighted how digital solutions, big data in particular, could help to overcome information silos across hospitals' health information system by sharing and integrating all desensitised clinical information of patients through standardised electronic medical records that could improve diagnostic decision-making capabilities of participating hospitals at the same time. Also, Shanghai Linked Healthcare has transformed the form of healthcare service provision in the province by making all originally offline services available on the online platform constructed under the project.

Patient experience and hospital management have also been improved using the big data platform, as it can help to avoid unnecessary repeated testing of patients who changed hospitals, saving health insurance expenses that could then be used as incentives for the digital healthcare service providers. There are currently 70 performance indicators built into the platform. In addition, health big data collected through the online platform has been utilised to support and improve clinical research as well as facilitate the transformation of knowledge generated into actual clinical practices. In fact, the Shanghai Linked Healthcare project is established under the Shanghai government's leadership with the active participation of local medical institutions, and the AI enterprises have provided technical as well as equipment support to allow people to utilise their medical records for better and more convenient health services.

This is a useful example to illustrate the co-participation of governments, companies, hospitals, and even patients in the new services and supply formats put forth by the ongoing digital health transformation. However, it is noteworthy that the success of Shanghai Linked Healthcare project is not a representative example in China. Shanghai, as one of the major and highly urbanised cities in China, has a relatively rich resource base that could provide a good testing ground for digital health innovations and, ultimately, for realising such digital health transformation like the case of Linked Healthcare.

Expanded care delivery: The China-Japan Friendship Hospital and China Mobile

The China-Japan Friendship Hospital also provided examples on teleconsultation, tele-diagnosis such as online prescription, and how information systems can facilitate drug delivery to patients' doors. These were highlighted as good care services to the elderly who have chronic diseases and are affected by movement restrictions during the pandemic. Patients with severe diseases but undergoing isolation in county hospitals with inadequate ability to treat those diseases could also benefit from utilising the teleconsultation and tele-diagnosis services provided by the Hospital. The Hospital expresses the potential of medical knowledge/skill exchange and transfer in remote

and isolated areas, thus paving the way for the attainment of healthcare provision for all, including rural citizens and elderly.

In relation to the construction of the 5G network in China, China Mobile talked about its support of full 5G digital health internet coverage in the country. The company also provided IT infrastructure support to the government's tele-eye surgery initiative in Africa.

As mentioned in the discussion, more affordable and higher quality healthcare solutions are now being offered through digital means, though portions of rural populations in China may still be missed. Nonetheless, it is still believed that the digital divide is narrowing in China though elderly are still challenged by the intelligent usage of mobile applications. More and more tailor-made as well as community enabled solutions have been created to address this issue, particularly due to the needs derived from China's COVID-19 response, ensuring basically everyone is digitally connected to manage their own health records or and the records of their family members. One private sector stakeholder at the meeting stated that, to further include older people within digital technology, they are exploring options to authorise intergenerational data sharing among families so younger generations can manage the health records, appointments, and payments of their kin.

Building the future on analogue systems

It was said that, when China started to construct its technological infrastructure, the long-established off-line hospital management systems and legal systems were used as the basis. Therefore, the current management and legal bases of the digital health infrastructure might contain some components that cannot be applied to the scenarios derived from digital health applications. It is important that the legal and regulatory bases for health systems implement models of adaptive governance to enable quick responses to the rapidly changing digital health space, particularly in respect to concerns over patient privacy and rights. There are ongoing efforts to unify offline and online hospital management methods in the hope of providing a better legal basis for regulators to carry out their duties and for ensuring new digital innovations not to cross the legal line. For instance, it has been clarified that medial institutions in new models are required to apply for permission to enter the market to provide telemedicine service.

It was also noted that the health system needs better capacities to exploit digital technologies, including improved standardisation and interoperability. While some participants felt that interoperability and digital health standards are areas where China can make a big contribution, it was also mentioned that interoperability among hospitals' healthcare big data remains a challenge. The current data standards and enforcement systems in China are not well-connected to each other, and thus not interoperable. For instance, it was mentioned that, in 2020, the information systems of hospitals in China are supported by more than 600 different providers and they have different data standards. Nonetheless, significant efforts are being made to realise hospitals in China have a unform quality, standard, and level on their 5G network establishments in the earlier stage to avoid subsequent adjustment costs and to support them to develop applications of 5G technologies.

Challenges to China's digital transformation

There are still many issues ranging from data and algorithmic bias in AI to the lack of connection between models and real-world effects (in other words, the lack of research on the monitoring and evaluation of the digital health interventions' effectiveness), as well as concerns of human rights infringements and population surveillance. Telemedicine might not be able to overcome upfront costs without engaging stakeholders beyond the health sector and there are still many supply chain challenges. Social media has become a source for both health information and disinformation, leading to growing concerns about infodemics.

COVID-19 has also brought to the fore tensions between data privacy and utilising patient data for broader public health purposes. Participants were of the opinion that the sharing of health data for the purposes of the public interest should be encouraged with patient consent, built upon trust, and safeguards to protect patient privacy. On this topic, it is important to be aware that the use of health code apps in China, which have now been integrated into the dominant multi-purpose platforms such as WeChat, did not require the formulation of a new social contract. This could go along with the stated perception that Chinese people are very willing to share their individual information when it serves the purpose of maintaining public safety. Still, the participants are aware of the existence of ethical and data security issues behind the collection of big data. Populations still need to be protected from the risks posed by digital technology, from data security to algorithm bias, while allowing public health to benefit from data sharing, data commons, and efforts to align interests of digital technology providers with the principles and practices of public health. Regarding whom should bear the responsibility of protecting the rights of people who participate in those healthcare e-platforms, one participant said it is on the actors who have the upper hand and possess the big data. Another said that the responsibilities derived from online medical services are to be owned by each medical institution that provided the services.

No standout measures apart from obtaining informed consent for data collection and respecting the principle of confidentiality were proposed in the consultation. One participant mentioned that there is a legal document on individual privacy protection, but later it was admitted that no guidance has been officially released specifically for data sharing in the form of big data in healthcare at the national level in China. The rating system of electronic medical history kept by hospitals is not consistently set across relevant government departments. This explained the calls during the meeting to set new and perfect existing legal regulations. Chinese private sector actors voiced their hope for specific guidelines to be issued by the national and local governments to guide both the medical institutions and the commercial/industrial actors who gather health big data on how to effectively conduct data-sharing. On this point, it is noteworthy that one participant said that such government documents will be released in China in the coming one to two years, which reflects China is indeed catching up with the development of the governance system while adopting technology applications.

Finally, it was highlighted that there is the need to enhance the connectivity as well as unity of the policies across the relevant government departments and at all administrative level within China since many of the companies reported that they are being challenged by the implementation of inconsistent policies. In other words, there needs to be increased attention given to vertical and horizontal coordination in policy making. Examples were given on these points and participants

proposed the exploration of developing cutting-edge digital solutions that could protect patient privacy while allowing medical practitioners to share and use data.

There was the opinion that China has done well on the data security of ICT technologies at the national level, ranging from having strict data security requirements, to accreditation, to the regular monitoring of information systems. Patients' data verification is important to identify if there is false or exaggerating information as well as any other tensions in data but no government measures was mentioned. To resolve this type of security issue, for example, the Shanghai Linked Healthcare project uses real-name authentication. More importantly, there was the recognition of data security and patient security as equally important in digital health, and the need of standard unification across platforms as set by the private sector and hospitals.

It was also mentioned by medical practitioners in the meeting that, when China is developing its digital health system, they are fully aware that their individual hospitals' offline data management methods have to be adapted to consider the unstable factors on the digital platform and guard hospitals as well as patients from potential risks. On the other hand, some medical practitioners were conscious of the new demands for data security protection due to the fact that data could be easily copied and disseminated on those digital platforms as well as its implication for the efforts and investments hospitals need to make to address the issue. For the fight against the infodemic, Tenecet introduced their DXY initiative, in which a group of physicians are striving to disseminate understandable, credible, and evidence-based knowledge to compete with disinformation by providing online education to the Chinese public, including vulnerable groups such as the young and old.

Lastly, in the meeting, there was an appeal for innovative governance models. It was highlighted that the governance of data is not just about how governments control companies on their use of data, but also about how relevant stakeholders apply ideas of public goods, open source, and participation in the digital world. It is important to create the room, the platforms, investment, and flexible policies that promote the continuous advancement of technologies while enabling clear legislation to be made on how personal data is collected and used.