

Digital Healthcare solutions- South Korea

Introduction

The Korean healthcare system is run by the Ministry of Health and Welfare (MoHW) and is funded by a compulsory National Health Insurance Scheme (NHIS) that covers 97% of the population. Government of Korea has implemented various measures aimed at expanding its digital health industry, i.e., Digital healthcare for Korea. Since 2017 digital healthcare has become a top priority in the country with increased investment and deregulation where appropriate to spur innovation. Digital health is one of the four pillars of the current administration's plan for the fourth industrial revolution, with emphasis placed on areas such as healthcare related Big Data, Health IT (HIT) and artificial intelligence (AI). The Korean healthcare market majorly focuses on IT related solutions to be provided to the patients and as a result, they have recently started heavily investing in AI and Block-chain implementable solutions to create a total digital healthcare system that will enable sharing of accountable patient data via secure means in real-time. Korea envisions creating more IT enables solutions and customer centric products designed and customisable for different patients according to their need basis their medical records. In South Korea, 5G coverage is already relatively widespread which serves as a backbone for the digital health infrastructures, with approximately 80% population coverage, and demand for 5G services from consumers is higher than in most other countries.

Key Stakeholders

Government Institutions

- Provides regulations and developmental plan for other players

Medical Centers

- Korea's Big 5 hospitals
- Asan Medical Center, Severance Hospital, Samsung Medical Centre, Seoul National University Hospital, Seoul St. Mary's Hospital

Large Corporations

- Major Conglomerates in Digital Health
- Samsung Electronics, LG Electronics, KT Corp, SK Telecom etc.

Start-ups

- Notable Digital Healthcare Start-ups/Scale-up
- Insung Information, H3 Systems, Biospace, Vuno etc.

Implementation of the practice

Most of the digital health care projects in South Korea are based on the following digital areas:

Digital areas	Highlights
Health IT	Wide-spread prevalence of clinical IT systems, growing investment in patient monitoring accessories, EMR/EHR, etc; Growing trend of fully digitizing the hospital operations
Big Data	Strong government support for precision medicine & genomics, AI-based health products and services, etc
Blockchain	Growing investment in Blockchain-based medical record database, disease prediction services, etc;
Telemedicine	Currently blocked by regulation, but active pilot programs in patient monitoring systems, chronic disease management systems, etc;

Consumer Health Electronics	Currently dominated by health activity monitoring applications from major smartphone companies
-----------------------------	--

Image: Key Highlights of South Korea Digital Health Care



South Korea

- ▶ Digital healthcare market in South Korea is expected to double in size to \$5.7bn by 2020.
- ▶ Investment in digital health is seen a way to combat Korea's quickly growing medical expenses that is growing at 6.8% annually versus the 2.1% average in OECD countries.
- ▶ The government is supporting digital healthcare through key projects, investment and deregulation. Adoption rates of Electronic Medical Records (EMR) systems in Korea were 93.6% in hospitals and 91.6% in clinics in 2017.

Key Features

- ▶ **FEEDER-NET** project launched in 2018, encourages hospitals to share information across healthcare providers
- ▶ **Bio database** is being built by collecting the genetic and biometric data of 10 million patients to assist in the development of new solutions and products.
- ▶ **Dr. Answer** an AI based system is implemented that analyses patients' medical data to offer personalised diagnostics and treatment plans
- ▶ **KOREN** a blockchain-based medical data network that collects medical information on a decentralised system and allows the transfer of health data between hospitals

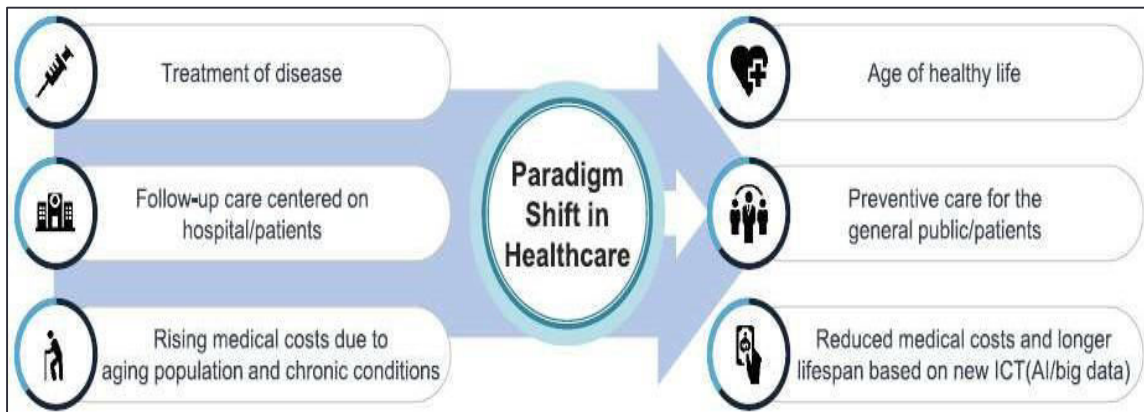
Key Learnings

- ▶ **Common Data module (CDM)** to enable an open research platform can be facilitated by converting participant hospitals Electronic Health Records (EHR) data into a cloud based open platform that works on a CDM.
- ▶ **Deep learning** applied to X-ray, CT, MRI scans to the analysis of biological signals forming a commercial AI product that can be used to improve IT related competencies among healthcare workers
- ▶ **Block-chain** to enable secure, accountable and integrated electronic health records systems, safe data sharing platforms, medical supply chains, payment methodologies, insurance claims, research capabilities, Health Information Technologies (HIT) and data

The Key Feature and services in South Korean include:

1. Korean Health Insurance Review and Assessment Service (HIRA) is a value-based purchasing system that guarantees medical service quality improvement and cost appropriateness through efficient resource distribution. HIRA system creates synergistic effects by combining various healthcare purchasing activities and roles. It is based on 3 components:
 - Rule Making - Benefit standard (Treatment, Drug, Medical material) management,
 - Monitoring & Feedback – Medical claims & review, quality assessment, drug utilisation review, on-site investigation, medical fee verification,
 - Infrastructure Management - Healthcare resources management, Korea Pharmaceutical Information Service, Patient classification system, Health Insurance System education, Healthcare big data analysis.
2. Excellence of Korean Healthcare relies on its Advanced Health Technology (HT). Health Technology (HT) translates into healthy living for all people around the world with prevention, treatment and diagnosis of diseases, promotion of health, improvement in rehabilitation, and long-term care. HT comprises of 5 components – Biotech, Material Tech, Mechatronics, Nanotech and Information & Electronics.
3. EMR systems in Korea have sophisticated functionalities such as clinical decision support and warnings for drug-drug contradictions and age restrictions. Focus is given on Health Information exchange (HIE) rates between external organisations. Korea utilise Digital healthcare using IT to help distribute medical resources efficiently.
4. As part of the government policy to encourage hospitals to share information across healthcare providers, the Korean government announced a three-year project in 2018 called FEEDER-NET. The projects ultimatum is to create a sustainable bio-health big data ecosystem for research, industry and policy making

5. South Korea uses Big data for medicine - The Korean Bio-Information Center (KOBIC) operates the National DNA Management System which can provide customized diagnosis and medical treatment for patients by integrating big data on various types of medical patient information. Desktop virtualisation, mobile EMR, dashboard, animation based patient education, mobile e-consent, smart patient guide, smart bedside station and some of wireless device & systems are used.
6. Paradigm shift in healthcare: Information & Communication Technology has been a game - changer in healthcare, shifting the focus from treatment to prevention and management.



7. Korea government's direction for healthcare is supporting innovative growth in healthcare through DNA-P: Data – Network – Artificial Intelligence + Platform. Key Features:
 - OUR (On-Time Universal Reference) hospital that stays with patients every step of the care pathway.
 - AI-powered smart emergency medical system – securing golden hour during an emergency and seamless integration of the emergency system. AI-based precision medicine services “Dr. Answer” where AI doctor answers all questions and offers medical diagnosis and treatments using medical big data. Targeting 8 major diseases relating to cardio, cancer and brain, it provides solution like prevention, diagnosis, treatment and prognosis.
 - Post, precision, personalised hospital information system (P-HIS) – balance between large and small hospitals with cloud service efficiency. P-HIS – Develop a cloud HIS for Precision medicine to apply/ deploy to primary/ secondary and tertiary hospitals across the country. Cloud HIS is integrated with extensive additional features and analytics services for P-HIS expandability.
 - Intelligent SW Technology Development for medical data analysis – personalised treatment based on integrated data and activation of ICT industry (AI, Big Data).
 - AI-based smart emergency medical system – develop a seamless integrated emergency medical system to secure patients' golden hours and to reduce medical expenses.

Results of the practice

South Korea is a forerunner in all the health care performance metrics and the country try to improve those metrics with technology and innovation. Most of the performance metrics are better than US and many European countries. Few metrics as follows in 2017:

- Life expectancy at birth was 82.7 years
- Colorectal cancer survival rate at 72.8% - (OECD highest)
- Cervical cancer survival rate at 76.8% - (OECD 2nd highest)
- Overall cancer survival rate at 66.9%

Lesson Learnt

Data security and privacy become major concerns for Digital Health initiatives. Several laws and acts in Korea regulate the personal and medical information required to provide medical and healthcare services. Experts describe the regulations surrounding the sharing of patient data, which is important for the development of health IT and big data (AI, deep learning)-based technologies as well as precision medicine platforms, as being both complicated and vague. The guidelines surrounding deidentified data, as well, is unclear, and therefore leaves healthcare providers and companies at risk if they were to interpret the guidelines incorrectly. The current administration has committed to removing excessive regulations on the data industry to boost the growth of the sector, especially relating to the healthcare. The major data privacy regulations act in South Korea are

- **Personal Information Protection Act (PIPA):** Enacted on September 30, 2011, Korea's Personal Information Protection Act (PIPA) is considered as one of the strictest data protection regimes in the world. According to the Act, any information that, if revealed, may considerably infringe on the data subject's privacy, such as information related to an individual's health or medical treatment, genetic profile, sexual orientation, criminal records, ideology and faith is considered sensitive data.
- **Medical Services Act:** The Medical Services Act regulates matters related to quality of medical services, requirements for hospitals and medical records as well as prohibition against disclosure of confidential patient information such as treatment options and drugs prescribed.

Conclusion

South Korea uses the vast amounts of health data to which it has access to assess the consumption of health services and improve efficiency and cost-effectiveness. When it comes to public health policy, notably a collaborative governing approach and rich data infrastructure, the country stays ways ahead than the rest of the world.

Further reading

- https://www.ohdsi-europe.org/images/symposium-2019/posters/17_Seongwon_Lee.pdf
- <https://stlpartners.com/digital-health-telecoms/digital-health-in-south-korea-five-examples-of-digital-health-beyond-telemedicine/>
- <https://stlpartners.com/research/5gs-healthcare-impact-1-billion-patients-with-improved-access-in-2030/>
- https://www.intralinkgroup.com/getmedia/3153c79b-463d-47c7-84e6-56848c98aab7/Intralink-Report_Life-Sciences_June2019