



Singapore



Describe a successful or challenging e-health initiative your country has taken.

In 1999, acute care hospitals, specialty centres, and primary care clinics in Singapore were restructured into two vertically integrated clusters: the National Healthcare Group (NHG) and Singapore Health Services (SingHealth). Both are owned by the government and partially funded through subventions. By 2003, both clusters had implemented extensive clinical IT systems. For example, Singhealth has a cluster-wide single-instance Electronic Medical Record (EMR) system that allows a clinician in any Singhealth institution to access the EMRs of their patients that have been generated from any other Singhealth institution. Although NHG institutions have different EMR systems, they were linked through a Cluster Patient Record Sharing system. However, both clusters were unable to share information across clusters.

To enable interoperability between clusters, the Ministry of Health implemented an EMR Exchange (EMRX) system in 2004 for clinicians in the public sector to secure health information. Since its inception, EMRX has been continually enhanced with the sharing of an expanding list of clinical information: hospital inpatient discharge summaries, laboratory and radiology reports, medications, immunization records, school health records, operating theatre reports, endoscopy reports and cardiac and emergency department reports.

In addition to the exchange of electronic documents, a national database was developed in 2006 as a repository of critical patient information such as medical alerts and drug allergies.

This system allows direct reporting by doctors of their patients' drug allergies and key alerts (e.g. patient on anti-coagulation therapy, etc.) and can be integrated to the e-prescription systems of the respective hospitals/clusters for automated alerts. Adverse drug reaction reports are also generated and routed to the pharmacovigilance unit of our national drug regulatory agency.

To achieve our vision of "One Patient, One Medical Record" EMRX was extended beyond the public sector to one of the community hospitals in November 2007. Doctors at the community hospital can now access the electronic medical records of patients referred by public hospitals, polyclinics or specialist centres, and vice versa. This would help to facilitate national efforts to promote integrated care.

Further steps to share medical information across the private and public healthcare sectors are envisioned under Singapore's 10-year Intelligent Nation 2015 master plan.

What were the financial challenges and costs associated with implementation of this programme?

A key challenge is the significant investment in infrastructure and ongoing operating costs by healthcare providers. While the Ministry funded the startup costs of the project, the healthcare providers needed to fund the operating costs and enhancement costs to their systems. As this is a shared system, the appropriate proportion of costs that should be borne by different stakeholders needed to be worked out. Sectors such as community hospitals and nursing homes also face human resource constraints in driving e-health implementation.

What have been the main technological challenges to implementing e-health in your country?

The central infrastructure needed to be architected in a robust and scalable manner such that healthcare providers coming onboard the EMRX do not need to incur high upfront costs and existing providers do not need much additional rework.

The timeliness of information is another key consideration. Clinical information shared with other institutions could become outdated if stored in a repository and not refreshed each time an update is made. This could have significant impact on clinical decision-making. Therefore, EMRX adopted a pull-on-demand – rather than pre-delivery – model. Clinical information from EMRs will only be pulled at the request of clinicians and discarded after use. Storage is prohibited.

Have any ethical issues been raised during the design and implementation of e-health programmes?

Questions relating to data privacy and confidentiality were raised during the design and implementation of these e-health initiatives. Safeguards that were put in place included excluding sensitive information such as HIV and STD status from being shared through the EMRX. Only healthcare professionals who are directly involved in the care and treatment of the patient are allowed to access the patients' electronic medical records using their personal passwords. Stringent audit mechanisms were also put in place to detect unauthorized use.

Has the implementation of e-health programmes required any legal or regulatory changes?

The Computer Misuse Act (CMA) was enacted in 1993 to tackle computer misuse in general. This was necessary because of the widespread use of info communications technology in Singapore. The Act criminalises unauthorised access to computers, unauthorised modification of computer programmes and data, unauthorised interception of a computer service and computer-assisted crime. E-health initiatives benefit, in part, from the protection that the CMA confers.

What have been the outcomes of your e-health initiatives?

The sharing of electronic medical records through EMRX assists clinicians with up-to-date information on patients' medical records. This facilitates faster and better clinical decision making and treatment, especially in emergency settings where the doctors are unfamiliar with the patient's medical history. EMRX has also facilitated more integrated care.

E-health initiatives and e-health contacts:

e-health initiatives

- ✦ Electronic Medical Records Exchange (EMRX)
- ✦ Student Health Assessment Programme (SHAPE) and Integrated Dental Electronic Assessment for Students (IDEAS)
- ✦ MediClaim system
- ✦ Integrated Clinic Management System (CMS)
- ✦ Healthcare Messaging System (HMS)

e-health contacts

LIM Bee Kwan, Deputy Director, Infocomm Division, Ministry of Health
Email: lim_bee_kwan@moh.gov.sg

Sarah Muttitt, Chief Information Officer, Ministry of Health Holdings
Email: sarah.muttitt@mohh.com.sg