

THE DATA REVOLUTION

Are health systems making the most of increased data flows?



Policymakers and the technology industry have long trumpeted the potential for big data to transform healthcare, from making healthcare services and finances more efficient and reducing the scope for errors to providing the basis for the holy grail of personalised medicine. Most countries, however, remain in the earliest stages of realising the possibilities.

The ability of healthcare professionals to store information on electronic health records (EHRs) and access them from multiple sites is already a reality in many developed countries. Yet the process of moving to a stage at which data can be seamlessly exchanged, integrated and analysed will require healthcare systems to navigate a range of challenges, including privacy and security concerns and interoperability.

BUILDING A DATA INFRASTRUCTURE

Over the past decade, the main policy focus has been the digitisation of healthcare data through the creation of individual EHRs. The scope of these early-stage programmes has ranged significantly from basic electronic identification systems to more comprehensive electronic files integrating treatment history and diagnostic test results.

Early adopters of the technology include New Zealand, which has had IT systems in place in primary care for 20 years, backed by early government and financial incentives,¹ resulting in the country's 1,100 general practices using EHR systems that communicate with laboratories and hospitals. Other leaders include Denmark, where the

non-profit MedCom system allows general practitioners to exchange clinical data with other health practitioners.

EHR adoption in the US has lagged that of other mature economies, with the number of practice-based physicians using the technology still below 50% in much of the country, although that number rises to 60% for hospitals and 90% for pharmacies, according to data from the Office of the National Coordinator for Health Information Technology (ONC). The US government has used a carrot-and-stick approach, with financial incentives rewarding health practitioners and hospitals for installing EHR systems and fines penalising them for not doing so.

But so far, despite the continuing digitisation of health records, there is little comprehensive evidence that EHRs improve health outcomes, although some research has suggested a correlation, including a recent study showing a possible connection between the use of EHRs and a fall in the number of emergency department visits and hospitalisations among diabetes patients in a northern California health plan.²

In an effort to improve the value of electronic records, the architects of health data systems are building more links between clinicians, according to Dr Graham Hughes, chief medical officer at SAS Institute's Healthcare & Life Sciences Center for Health Analytics and Insights in North Carolina. "Now that we have that level of digitisation, we have huge amounts of mineable information, and we are now ready to start looking for insight using the data we already have," he says.

CREATING HEALTH NETWORKS

Moving from a rudimentary electronic health infrastructure to systems that can effectively extract and exchange data is the next focus for healthcare and technology policymakers.

In the US, the ONC has moved from focusing on data capture to promoting electronic health information exchanges, according to Jodi Daniel, director of the ONC's Office of Policy and Planning; 49 states currently have exchange services designed to allow safer transition of care, while 30 states make services available to allow healthcare providers to look up patients' health information. "You need to capture data and move them to see a more complete picture of the patient, and then you can talk about improving outcomes," explains Ms Daniel.

The EU-sponsored neuGRID programme, a grid-based research e-infrastructure system that allows neuroscientists studying degenerative brain diseases to exchange and archive large volumes of imaging data, is one example of how future health networks might

SPONSORED BY:

PHILIPS

work. Although the project has finished, the system remains available to users.

At this level, where data are likely to be aggregated increasingly across both regional and potentially national borders, the issues of privacy and security remain a top priority. "Data protection, privacy and security protection vary at a legal or policy level from country to country," notes Dr Hughes. "That's a challenge both for EHR vendors and analytics vendors, as job number one is establishing a trustworthy data platform."

A broader challenge is making health systems talk to one another. While some countries have seen significant investment in connectivity, there is still a great deal of variation in the extent to which even the most advanced economies allow clinicians to move health data between different levels of the healthcare system.

"To a certain extent, we have allowed for regional- or national-level aggregation of statistics and metrics around patient quality measures," says Dr Hughes. "But heterogeneity makes it difficult to draw inferences across large amounts of data. The idea of an interoperable health record for you and me is still a pipedream."

IMPROVING OUTCOMES

With governments looking to improve healthcare performance, the future of health data aggregation lies in using it in a more predictive and analytical way.

"We are getting inundated with healthcare organisations trying to pivot from a rear-view analysis to future-based analysis as part of the global move towards value-based healthcare models," Dr Hughes observes.

As the ability of electronic healthcare systems to exchange and integrate information improves, clinicians will aim to analyse enormous volumes of data in order to learn more about disease management and treatment and engage with patients.

The most lucrative prospects for big data are in the evolving field of personal medicine, which offers the possibility of predicting medical outcomes based on data from unimaginably large patient samples. Dr Hughes explains: "How many people are getting readmitted, how many are suffering from post-op infections, how many in this age group on this medication develop this complication? It's using what is called real-world data to essentially run clinical trials."

IBM is working alongside the Union for International Cancer Control to build cancer registries in developing nations, beginning in Sub-Saharan Africa, with the aim of creating the largest and most comprehensive clinical data set of cancer patients in the world.³

Researchers also see opportunities to use new data flows to better communicate with patients. Dr Hughes notes that an analogy can be made between retailers such as Amazon, which try to understand customer shopping patterns to encourage loyalty, and healthcare providers seeking to create targeted outreach programmes to engage with patients suffering from chronic conditions such as diabetes or high blood pressure. Future health data miners may look to enhance existing patient data with broader data from social networking sites and socioeconomic research, he adds.

"We will see more of that as more risk is pushed to provider organisations," Dr Hughes explains, noting that chronic illnesses currently account for around 60-70% of healthcare spending. "Big data will help you figure out who is at risk, what types of risks there are, and what is the propensity of different patients to respond to different forms of intervention."

¹ Bradford H Gray, Thomas Bowden, Ib Johansen and Sabine Koch, "Electronic Health Records: An International Perspective on Meaningful Use", Issues in International Health Policy, The Commonwealth Fund, November 2011, page 4.

² Mary Reed, Jie Huang, Richard Brand, Ilana Graetz, Romain Neugebauer, Bruce Fireman, Marc Jaffe, Dustin Ballard, John Hsu, "Implementation of an Outpatient Electronic Health Record and Emergency Department Visits, Hospitalizations, and Office Visits among Patients with Diabetes", Journal of the American Medical Association, September 11th 2013, Vol. 310, No. 10.

³ "IBM partners with the UICC to use Big Data to build cancer registries in developing nations", eHealthNews.eu, November 20th 2013.