



Introduction

Across the developed world, public health systems are faced with a similar set of challenges: resources are limited following post-crisis budget cuts, while demands on these systems are mounting as citizens live longer and increasingly suffer from chronic illness. As our world becomes more connected through technology, patients come to expect more from healthcare providers and have new means through which to hold them to account. Fortunately, increased patient interaction and broader technological progress also provide valuable opportunities to greatly improve healthcare systems. Electronic health, or 'eHealth', is allowing healthcare operators to improve services and resource efficiency, to communicate with the public more effectively, and to drive innovation. Fortunately too, while challenges to healthcare systems are mounting, technological disruption is accelerating and health digitisation is becoming more cost-efficient.

Many of the current challenges to Ireland's health system mirror those at the global level. Healthcare spending in Ireland dipped abruptly after the financial crisis and there has been a lag in investment in key infrastructure. Ireland's population continues to grow and, while Ireland has a high fertility rate when compared with other developed economies, our population is aging. According to forecasts from the Central Statistics Office, Ireland's old-age dependency ratio (population aged 65 and over divided by the number of people aged 15-64) will rise from 17% in 2011 to at least 28% in 2031. With an aging population, chronic disease is also on the rise, with 60% of the over-65 population in Ireland suffering from chronic illnesses.

Health spends per capita for Ireland as a whole, as well as for government, are now above the OECD average. However, previous cuts and lagging investment have led to a steep increase in consultation and treatment waiting times for patients. Our healthcare structure, which historically promotes hospital admissions for less acute treatment, means that Irish hospitals are now operating near capacity (94% in Ireland vs. an OECD average of 77%). In short, our health system does not allow us to keep pace with our population's health challenges.

Thankfully, plans are underway for ambitious reform. The focus is on placing the patient at the centre of healthcare delivery, with an emphasis on preventative care and efficient, equitable access to services. Where medical treatment is required, this is to be devolved to primary care services insofar as possible.

A cornerstone of Irish health reform is eHealth. The HSE's "Knowledge and Information Plan" outlines key measures to develop a robust eHealth ecosystem for Ireland. Patients will be empowered with information and access to practitioners across different healthcare domains. eHealth plans will also complement broader health system reform to realise service efficiencies, including resourcing. Key eHealth initiatives are focused in the digital domain. HSE Chief Information Officer Richard Corbridge, has highlighted that digitisation is an enabler of "commonly shared capabilities and access to information throughout health and removes silos of information that exist today. It will ensure that excellence is shared..., enabled and encouraged to realise benefits to patients". Key digitalisation initiatives under the "Knowledge and Information Plan" include National Health Identifier Infrastructure, ePrescribing and eReferrals, tele-healthcare services with a focus on chronic illness, and the development of a national Electronic Health Record.

A number of factors will determine the successful creation of Ireland's new eHealth ecosystem. Improved and targeted investment outlay is critical - Ireland currently spends only 0.85% of its healthcare budget on IT (versus an EU average of 2-3%). In addition, stakeholder engagement across the entire healthcare supply chain is key. An important part of building robust business cases and driving stakeholder support for such initiatives is banishing misconceptions and learning from past. While Ireland lags behind other developed countries in the roll-out of eHealth services and systems, it stands to learn much from the successes and indeed failures of eHealth's early adopters.

Drawing on Deloitte's national and global experience in the domain of eHealth, we have identified six priorities to ensure Ireland can deliver on eHealth and, more specifically, digitisation successfully.



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Priority 1: Treat eHealth as a business project and not as an IT project

eHealth transformation can have far reaching impacts. Digitisation, in particular, provides opportunities to drive efficiencies (for example, by availing of best-in-class, cost efficient software-as-a-service), to improve standards of service (for instance, by improving diagnoses through patient record sharing between different physicians) and to improve patient autonomy (such as through monitoring chronic conditions via wearable technology).

In any organisation, digitisation should be viewed as an enabler of operational or service delivery transformation rather than as an end in itself. It is therefore advantageous that Ireland's eHealth programme is being rolled out in the context of broader reform.

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A Deloitte survey of global public sector technology leaders in 2015 pointed to five key factors driving digital transformation

in government: strategy, leadership, workforce skills, digital culture, and user focus. The survey found that government healthcare organisations show relative strengths compared to others in the field of strategy development and leadership's understanding of technology trends.

However, the sector lags behind in investment in workforce skills and its ability to drive digital culture (embracing user focus, functionality, and agile development principles). This lack of emphasis on the development of digital skills and culture may stem from the fact that healthcare practitioners traditionally place a higher value on professional judgment, subject-matter knowledge, and interpersonal skills rather than digital or change management capabilities. In addition, when resources are already strained, it is difficult to allocate working time to non-core activities.

To create a digital culture, leadership needs to engage with every level of the organisation and sell the benefits of digital strategy very clearly, placing it in the context of broader organisational strategy. In order to ensure continued alignment in the field of eHealth strategy and implementation, extensive stakeholder engagement, expertise and, ultimately, buy-in are required. Anyone who will be impacted by broader

organisational transformation needs to understand the value of incorporating digital into this transformation and should also have some influence on the design of digital services. In Ireland a very wide range of stakeholders in the healthcare ecosystem require consultation, given the national focus on improving primary care, illness prevention, and social and continuing care systems that maximise independence. In addition, stakeholders from outside the healthcare system, such as technology service providers, funding bodies, and data regulators, will play a vital role in delivering on eHealth.

Finally, operating model components, which need to change alongside digitisation typically include care pathways, workflow and policy planning, regulatory compliance, and staff performance management and training. In general, it is recommended that operating components are standardised across the health system insofar as possible to allow different organisations to collaborate most effectively. It's particularly important to take account of the potential burdens that extensive technological changes will place on different healthcare staff, who may struggle to adjust to new operating models alongside technological change.

Recommendations



Ensure there is a clear link between broader organisational strategies and initiatives and your eHealth strategy planning and implementation



Identify - and secure the continued engagement of - key stakeholders required for the development and implementation of your organisation's eHealth strategy



Establish robust business cases to communicate the value of each eHealth project



Ensure implementation projects are clinically led out of a dedicated project management office. Employ a clinical ambassador to advocate for change



Aim to standardise and not customise operations



Where appropriate, implement projects on a phased basis to reduce the overall burden on users



Plan for adequate training and resource coverage to help clinicians and administrative staff adapt to new digital programmes and operating methods

Priority 2: Manage expectations on going paperless

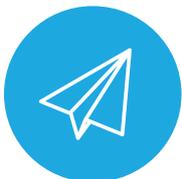
An entirely paperless hospital uses only digital patient charts and manages all information using electronic channels, systems and tools. Going paperless provides important opportunities to improve workflow efficiency, reduce errors, and reduce space required for storage. Digitisation of health information also provides opportunities to leverage new analytics tools and clinical decision support technologies. However, it is challenging and costly to move to an entirely paperless system and few hospitals achieve this in reality. In the United States (considered the most advanced country for clinical technology) less than 5% of hospitals are completely paperless, according to the Healthcare Information and Management Systems Society (HIMSS).

Paperless has been tricky to achieve for a number of reasons. Paper charts and tools are typically more practical for clinicians to capture patient information during consultation. Therefore, hospitals may need to invest in tools to allow paper-based records to be digitised and shared. In Ireland, it is foreseeable that sensitivities over treatment of patient health data will mean that some patients will wish to opt out of the new Electronic Health Record system. Legacy patient and administrative paper files, or those passed on from external organisations, may also prove difficult and costly to digitise. Healthcare providers should prepare for all such eventualities.

While digital readiness among citizens and within healthcare organisations will

change over time, we recommend aiming for a 'paper-light' hospital at the outset of digitisation. An example of a 'paper-light' system would be one which provides for the full digitisation of all internally-processed patient records within a hospital, coupled with an ability to accept paper files from external healthcare providers. Another example of a 'paper-light' system is one which houses legacy patient files in hard copy and provides for digitisation of new or updated records only. This vision does not imply that all information and services are delivered electronically, but rather that digitisation should be selectively driven in accordance with the strategic priorities that deliver the greatest benefit for patients, clinicians, and the organisation.

Recommendations



Make sure that your plans to go paperless are achievable and based on your organisation's strategic priorities



Provide for the completeness and availability of patient records which are filed electronically and in paper format



Take measures to ensure that paper ways don't become permanent work-arounds

Priority 3: Provide easy access to information needed to support clinical decisions

The benefits of shared patient health records are clear: patient safety is improved by more complete patient records and reduced errors from illegible handwriting; context-driven diagnostics and joined-up care opportunities are improved and accelerated; there are opportunities for preventative care and patient self-care through remote patient monitoring; clinical resources are freed up as duplication of record-taking and

paper-chasing requirements diminish; and opportunities for research and innovation are improved with new data availability. However, healthcare professionals are no strangers to the perils of information overload. Frequently operating in a pressurised environment, clinicians need access to relevant information quickly. Patients' clinical data should therefore be integrated and presented in such a way as to allow clinicians access

to pertinent subsets of information, in a user-friendly manner. The role of the clinician, as well as patient care settings and pathways, should also be taken into account in this respect. Interfaces should also be designed to highlight trends and correlations of data to support decision-making and to highlight the impact of a given therapy.

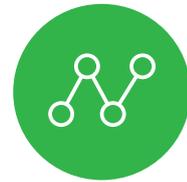
Recommendations



Take a user-centric approach (considering the clinical teams that will use the information) to the integration and presentation of patient data



Display information in the most comprehensible form for clinicians with easy access to relevant data subsets



Integrate patient data in a way that is easily trended or graphed (e.g. using grading scales and codified information)

Priority 4: Leverage the cloud to optimise digitisation

The cloud is a powerful enabler of centralised data management. It offers flexibility and cost savings in the shape of rapid scalability, on-demand availability, and an ability to shift from heavy capital expenditure on IT infrastructure to operating expenditure on IT services. In essence, the cloud provides attractive opportunities to go digital in a cost-effective, expedient manner.

Clouds come in various shapes and sizes: from private clouds (a cloud computing environment that is implemented within the corporate firewall, under the control of the IT department), through public clouds (a cloud computing environment that is shared transparently with a number of other consumers or tenants, under the control of a cloud service provider) to hybrid clouds (a mix of public and private clouds). Cloud services for health vary extensively across software-as-a-service, platform-as-a-service, and infrastructure-as-a-service offerings. Each cloud and service type has different security and privacy characteristics to be considered when assessing suitability for a digital health environment. It is important to recognise that cloud service providers take security and privacy very seriously as their business is dependent on maintaining

customers' trust. Through economies of scale, they can afford to invest in security infrastructure that would not typically be cost-effective for a single organisation. In addition, they will often provide customers with independent assurance of the security of their environment (e.g. via security certification and audit reports).

Sharing security standards and certifications with customers helps to build trust in cloud services. However the customer (e.g. hospital) is ultimately responsible for the data and its security. Healthcare providers need to take a risk-based approach when evaluating the suitability of utilising data into a cloud environment and should take a defence-in-depth approach when securing data in a cloud environment. Through a combination of cloud service provider assurance, implementation of a defence-in-depth approach to securing data, and ensuring adequate security testing of the cloud environment, healthcare providers will be much better positioned to reap the benefits of cloud computing.

Regulation is also often cited as a reason for not adopting cloud technology within hospitals and the broader health sector. Indeed, the Irish regulatory regime around

health data privacy is currently evolving. A national Health Information and Patient Safety Bill is intended to bring clarity to the treatment of patient data. This will need to be considered alongside data governance requirements in the EU's Data Protection Regulation, which will enter into force in 2018. To manage this regulatory ambiguity, it is recommended that healthcare operators plan to house their data in Ireland. To manage national data protection requirements and maximise security, healthcare providers should consider a hybrid cloud model – using a private cloud (this could be run by a hospital group) for the storage or processing of sensitive data, and storing non-sensitive or non-critical data on the public cloud. Fortunately the abundance of data centres and cloud service providers in Ireland provides for plenty of opportunity to pick and choose from a variety of options in this respect.

Beyond service, security and privacy requirements, cloud service uptake will be driven by budget and requirements for scalability. Hospitals should focus on cloud offerings that offer the required level of scalability, while also ensuring these services are not cost-prohibitive.

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Recommendations



Assess the relevance of the cloud to your hospital and where its impact can provide the most value. This requires building a strong business case with clear milestones and tracking of benefits, risks, and required mitigation



Monitor legislation and regulations to understand the implications for the use of cloud offerings in the health sector



Take stock of data privacy and security concerns upfront when designing and availing of cloud services

Priority 5: Integrate analytics and reporting upfront

As significant amounts of patient data become available electronically, healthcare providers and researchers should look to leverage the intelligence this data can provide to improve clinical decision-making, R&D, and hospital administration processes.

Any eHealth strategy must view analytics requirements as 'core' and develop a plan for creating relevant analytics tools. Requirements for data storage and data system integration should also be addressed. Finally, data quality and consistency should be accounted for.

The limited use of data analytics and reporting tools within healthcare

organisations is another challenge that providers must overcome. Maximising the utilisation and value of information depends on the ability of users to create their own reports and perform data queries with little support. Allowing clinicians to independently access ad hoc and structured reports on individual patient or cohort information promotes the leveraging of available data. Finally, while big data offers myriad innovation opportunities, when rolling out analytics solutions for the first time, healthcare operators should prioritise validated, repeatable and scalable solutions with high value use cases, over new solutions which ultimately may or may not yield value.

Ensuring data quality, particularly when integrating data from many different sources, can be difficult. Healthcare organisations in Ireland have traditionally established fragmented IT environments with differing approaches to data standardisation. The resultant inconsistencies in data classification and quality create a challenge for data integration. The adoption of data standards and governance are key mechanisms through which this challenge can be addressed.

Recommendations



Start by developing analytics and reporting solutions based on key/core information that can bring quick wins



Focus efforts on ensuring data consistency and quality when developing solutions



Involve clinicians in the design of analytics tools and data quality and consistency assurance programmes



Consider online query tools and dashboards that are easily understood by the clinicians and provide a means by which to export information for use

Priority 6: Provide for patient data mobility

Clinicians expect to have access to information when and where they need it, in a manner that is easy to access and view. In Ireland, where clinicians operate across multiple healthcare facilities simultaneously, healthcare organisations must be able to deliver patient information securely both within and outside of their facilities. Similarly,

paramedics will benefit from access to patient information to make critical response choices on the go. Clinicians also increasingly expect to be able to access information on their own personal mobile devices and incorporate information from the hospital into their own clinical information systems.

Healthcare providers in Ireland struggle with dispersed patient record information which is a challenge for mobility. As highlighted in the last section, divergent data formatting and record structures bring additional challenges. Ireland's new Electronic Health Record will play an important role in enhancing mobility with respect to all these challenges. Beyond this, succeeding with mobility requires a technology strategy that enables access to core hospital systems and information sources, stores and displays data in structured and standardised format, ensures ready access to appropriate devices, at the point of care, and delivers user-centric mobile applications. This strategy should also incorporate mechanisms to ensure end-to-end adherence to security policies and standards.

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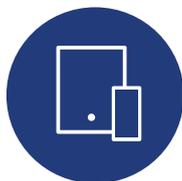
Recommendations



Develop an end user device strategy articulating what mobile and fixed device capabilities are required to support future models of care



Adopt appropriate eHealth standards wherever possible to ensure interoperability with external clinical information systems and mobile devices



Utilise your end user device strategy to inform ICT infrastructure and physical environment requirements



Build mobile device support into the information system from the ground up, rather than as an afterthought



Place appropriate focus on data privacy and security of the information system

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