

## **Electronic Health Records:**

The transfer of Electronic Health Record Systems  
from the US market to the UK market



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## Background

Electronic health records (EHR) have become increasingly popular all around the world as governments, hospitals and healthcare professionals look to capitalize on the cost savings and streamlined health services that they promise. Amongst developed countries there is a marked discrepancy between the use, adoption and implementation of EHR's. There is also a marked difference in the success that each nation has witnessed when adopting these systems with some being extremely successful while others have failed.

Implementing EHR's particularly in hospital-wide systems is a complex undertaking. It involves a range of organizational and technical factors including human skills, organizational structure, culture, technical infrastructure, financial resources, and coordination [7].

Many countries have experienced a lot of challenges and obstacles while implementing EHR systems into their existing healthcare infrastructure -particularly the United States. It is hoped that lessons can be learned from their experiences and mistakes fixed before other nations like the UK embark on their own journey to integrate EHR's into their own healthcare landscape –especially if it is the second time around.

## The US experience of adopting Electronic Health Records

In 2009, the United States government passed legislation known as the *Health Information Technology for Economic and Clinical Health Act* (HITECH) which allocated \$26 billion dollars to incentivize eligible health care professionals across the country to adopt electronic health record systems in their practices [9].

Five years after that implementation began it is clear that the adoption of EHR technology has not been a smooth one and has instead been met with a lot of pushback from healthcare professionals. There are many reasons that large segments of the healthcare community have not embraced EHR technology but the primary causes appear to be that physicians are finding EHR systems time consuming and not user-friendly. Additionally, doctors are having to address an increased workload that EHRs are imposing upon them and healthcare costs that are increasing.

Below is a summary of the problems that the healthcare industry faced with EHR systems in the US market:

## Issues encountered with EHR systems in the United States

Issue identified	Summary of problem
<b>Interoperability</b>	<p>Considered one of the largest issues. The industry did not agree on set data standards. This means that different systems cannot 'talk' to each other and the exchange and transfer of information is difficult, cumbersome and sometimes impossible. This disrupted workflow and increased costs.</p> <p>Regulators were initially asked to demand unified standards from the industry but up until now that was largely left to the vendors, who declined to cooperate – However vendors do not have a monetary incentive to comply and have not taken any steps to help solve the problem on their own.</p>
<b>Data exchange</b>	<p>There were additional costs associated with data exchange that in many cases physicians were not made aware of <i>prior</i> to purchasing EHR systems.</p> <p><i>[Note: These costs are likely not relevant to individual physicians in the UK]</i></p>
<b>Cost</b>	<p>Physicians had to incur significant expenses to update their EHRs, purchase additional software to share data, or perform other basic functions that many believed were included in the initial price of the system.</p> <p>In addition, many physicians reported <i>negative</i> effects on total operating costs and said they had yet to overcome productivity challenges</p>
<b>Additional support staff had to be hired</b>	<p>Some practices had to resort to employing scribes (writers/typists) to address the increased data entry requirements</p>
<b>Workflow issues</b>	<p>Many complaints stemmed from the requirement that only licensed medical professionals and credentialed medical assistants are permitted on the system to enter certain orders prompting physicians to frequently interrupt what they were doing</p>
<b>Design issues</b>	<p>The American Medical Association (AMA) was of the belief that EHRs needed to undergo better testing and all EHR systems should adopt a <i>User Centered Design (UCD)</i> model</p>
<b>Design issues</b>	<p>EHRs should enhance the ability for automatic tracking of referrals/consultations to ensure that the referring physician does not lose track of their patient. The same approach is needed for tracking whether lab order results are reported and, where possible, that prescriptions are filled. Current EHRs are not yet capable of providing this information seamlessly to physicians.</p>
<b>Other noted issues</b>	<p>Poor use-ability, time consuming data entry, Degradation of clinical documentation</p>

# Issues encountered with the implementation of EHR systems in the United States

Issue identified	Summary of problems with Meaningful Use (MU) – all given from the perspective of the American Medical Association [20]
<p>Meaningful use (MU) regulations</p>	<p><b>NOTE:</b> Meaningful Use is the step by step EHR implementation process as mandated by the federal government</p> <ul style="list-style-type: none"> <li>• The government stipulates how EHRs are developed and does not require that systems have the ability to easily transfer patient data. MU Stage 2 required physicians to meet information exchange objectives that are deemed to be either out of their control or not supported by current technology. Stage 3 requirements are felt will only exacerbate the problem.</li> <li>• The AMA believes that EHR design focuses on meeting MU objectives, instead of creating a tool that supports patient care. Therefore, the functionality of EHRs primarily measures MU compliance and meets billing requirements. MU regulations don't prioritize useful tools doctors need so vendors haven't focused on them[20].</li> <li>• MU's Stage 2 was established under the assumption EHRs were well-designed and could meet demanding requirements, which many physicians feel is not the case.</li> <li>• Many caregivers see MU as a roadblock to innovation because there's a significant lag between federal regulation, EHR system design and national health priorities.</li> <li>• The focus of EHRs is misplaced; it perpetuates product development heavily influenced by federal requirements, rather than by the high-value needs of patients and physicians.</li> <li>• Federal mandates continue to evolve and push deadlines without taking the time to incorporate lessons learned from the past.</li> </ul>

## Possible solutions to EHR implementation problems

In 2014, researchers at a prominent Netherlands university partnered with Deloitte to undertake a systematic review of EHR implementations in the USA and Europe. They attempted to understand the complexity of the implementation process and presented a framework of 19 interventions that can help overcome typical problems in EHR implementation [7]. The framework the authors came up with is meant to function as a reference for implementers in developing effective EHR implementation strategies for hospitals.

**A selection of their strategies are listed below [7]:**

1) EHR implementation requires the selection of a mature vendor who is committed to providing a system that fits the hospital's specific needs. A hospital selecting its own vendor can ensure that the system will match the specific needs of that hospital and furthermore, it is important to deal with a vendor that has proven itself on the EHR market with mature and successful products. With this in mind, the initial price of the system should not be the overriding consideration: the organization should be willing to avoid purely cost-oriented vendors as costs soon mount if problems arise.

2) An organizational culture that supports collaboration and teamwork fosters EHR implementation success because trust between employees is higher. Other studies (Ash et al. [23, 24] and Scott et al. [35]) highlight that a strong culture with a history of collaboration, teamwork, and trust between different stakeholder groups minimizes resistance to change.

3) EHR implementation is most likely in an organization with little bureaucracy and considerable flexibility as changes can be rapidly made. A highly bureaucratic organizational structure hampers change: it slows the process and often leads to inter-departmental conflict. Specifically, appointing a multidisciplinary team to deal with EHR-related issues can prevent conflict and stimulate collaboration.

4) EHR system implementation is difficult because cure and care activities must be ensured at all times. During the process of implementing an EHR system, it is of the utmost importance that all relevant information is always available. Ensuring the continuity of quality care while implementing an EHR system is difficult and is an important distinction from many other IT implementations.

5) To ensure EHR implementation, the software needs to be user-friendly with regard to ease of use, efficiency in use, and functionality. If a system fails to do this, staff will not use the system and will stick to their old ways of working.

**6)** EHR implementation requires a vendor who is willing to adapt its product to hospital work processes. A vendor must be responsive and enable the hospital to develop its product to ensure a good and usable EHR system. By so doing, dependence on the vendor decreases and concerns that arise within the hospital can be addressed.

**7)** A comprehensive implementation strategy, offering both clear guidance and room for emergent change, is needed for implementing an EHR system. A good strategy facilitates EHR implementation and consists of careful planning and preparation, a sustainable business plan, effective communication and mandatory implementation.

**8)** Resistance of clinical staff, in particular of physicians, is a major barrier to EHR implementation, but can be reduced by addressing their concerns. Clinical staff's attitude is a crucial factor in EHR implementation. Particularly, the physicians constitute an important group in hospitals. As such, their possible resistance to EHR implementation will form a major barrier and may lead to workarounds. Whether physicians accept or reject an EHR implementation depends on their acceptance of their work practices being transformed. The likelihood of acceptance will be increased if implementers address the concerns of physicians but also of other members of clinical staff.



## Will issues affecting American EHR systems occur in other countries?

Many issues plagued the roll-out and implementation of the EHR systems in the US but the major problems appeared to be centered around two areas in particular: The specific steps of the rollout (as mandated by the government) and the EHR software itself.

As outlined above, the process of implementation was heavily criticized for its short timeline which did not give healthcare providers enough time to implement the systems into their own healthcare practice. Additionally, the software behind EHR systems was a huge source of frustration because the systems themselves were generally not seen as a time saving or resource-sparing undertaking. Other problems with interoperability (systems not being able to 'talk' to one another) and additional, unexpected vendor fees were also problematic.

With regards to the US experience, some of the mistakes that were made with the implementation and roll-out of EHR systems ([seen here](#)) may be overcome by some of the solutions ([found here](#)). Transferring an EHR system from the American market to a British market is extremely feasible and has already been done with varying levels of success. Migrating the relevant technical functionality of the system will not on its own have many culture or social challenges, however it seems the challenges the US market faced (ie. ease of use, implementation, roll-out strategy, agreed technology standards) are the same challenges that would be met in the UK market especially if lessons are not learned from others that have gone down the same route.

## Unique challenges

### Culture challenges

In countries with healthcare systems that deliver medical services to patients in a similar fashion (ie. OECD countries) there would be no major cultural challenges in transferring the functional components of an EHR system from one country to another. However things like familiarity with technology, willingness to work in new ways, openness to change or centralized vs. de-centralized healthcare systems might change the way that EHR systems are greeted in each country.

### Single-payer systems or tax-payer funded healthcare systems

Healthcare systems organized in this fashion will have an easier task of managing the financial aspect of implementing EHR systems. In the US, many private practitioners and GP clinics had to shoulder the financial burden of implementing EHR systems themselves (although some subsidies were provided) but in single payer or tax-payer funded systems, the government almost exclusively deals with the financial burden of healthcare.

# Areas of EHR functionality that can be transferred

Given the differences in healthcare systems around the world especially with respect to financial structures, systems of reimbursement, the presence or absence of medical fees and the level of government integration, it is not unexpected that some aspects of an EHR system may work in one country while not necessarily reflecting the needs of another. However all medical communities work in a similar fashion with similar goals in mind therefore much of the functionality of EHR systems is still relevant when transferring it across borders. The following are examples of some of those transferable functions that require few modifications.

## Practice Management systems

- Scheduling – ie. patient appointments, check-ups, vaccinations
- Medical billing management - Submit claims electronically
- Financial Reporting

**Patient portals** - Giving patients 24/7 access to their medical information so patients can:

- Request appointments - Request a new appointment and view upcoming appointments
- Messaging - Send/receive messages to/from doctor's office.
- Update their demographics
- Review their personal health records (PHR)

## Laboratory and Imaging

- Doctors can request lab investigations, review and examine the results
- Patients can view the results of their investigations

## E-prescription

- Request prescriptions and re-fills

## Referral Management

- Doctors can electronically share patient information such as referrals, summary of care records, etc. with other providers.

## Population health

- Features like community analytics, and patient satisfaction surveys

# The UK and the implementation of EHR's

## Past attempts at EHR implementation

When it comes to the adoption of EHR systems in the primary care sector, approximately 96% of primary care doctors currently use electronic medical records [11] but the NHS has struggled to create a hospital system and to link inpatient and outpatient care electronically.

In 2002, the UK government enlisted the help of four US-based IT companies and embarked on one of the largest and most ambitious health IT projects in the country's history. The project was known as the National Programme for IT in the NHS (Npfit) and attempted to create a national EHR system for the entire country and the goal was to finish implementation in four years. Unfortunately this proved to be overly ambitious and the project unraveled a few years later with cost over-runs, missed deadlines and little to no product to show for it. In total the UK government spent 12.7 billion pounds for an IT health program that was eventually scrapped [12].

There were many avenues of blame that were looked at for the failure of the Npfit but a study carried out by Sheikh *et al.* in 2014 which looked at the adoption of electronic health records in UK hospitals claimed that a key factor in that failure is the UK 'pursued a top-down implementation strategy, in which central Government signed substantial contracts with a handful of EHR vendors. This is in contrast to pursuing a more bottom-up strategy as they did in the US which allows hospitals and healthcare professionals to choose which EHR system to use' [4].

**The authors go on to postulate that the UK might learn the following lessons from the US experience when next attempting to introduce EHR systems [4]:**

- The UK needs a detailed strategy with clearly defined milestones for promoting the adoption of high quality, safe, and interoperable EHRs into NHS hospitals. This strategy needs four key components:
  - First, devolve much of the decision making process about which health IT systems to procure to the front line in hospitals; trusting hospital management and health professionals will help achieve buy-in, promote engagement, and charge them with the responsibility to succeed.
  - Second, the UK central government can promote this transition through moderate financial incentives of the kind recently started through NHS England's Integrated Digital Care Technology Fund.
  - Third, the UK Government needs to play a part in setting the wider rules of engagement--for example, establishing certification criteria and standards for interoperability--to ensure that the information technology meets basic safety thresholds and that data can be shared across NHS providers.

-Lastly, there needs to be the equivalent of the US Office of the National Coordinator for Health Information Technology that is charged with spearheading this agenda at the national level to ensure that it remains atop the policy agenda.

The authors continue by stating that financing such a strategy is obviously challenging, but the return on investment is likely to justify it in the long run. The up-front costs will be substantial and wild promises--like those made previously by UK politicians about achieving improvements in life expectancy or dramatic cost savings early on--should be avoided.

- Having a comprehensive cradle-to-grave EHR infrastructure would substantially increase the appeal of the UK to industry, since such research cannot easily be undertaken at scale in the fragmented delivery model that characterizes the USA
- Another lesson should be that implementation of EHRs can only happen when appropriate, well tested EHR systems actually exist.

## The new healthcare IT strategy

Currently the NHS has a centralized computerized system that gives every patient a unique NHS number (unique identifier) and UK hospitals and GP practices use a 'Summary Care Record' which is shared electronic patient information between providers (this is not an EHR in the traditional sense. Summary Care Record only provides a few pertinent pieces of patient information).

In January 2014, the U.S. Department of Health and Human Services (HHS) secretary Kathleen Sebelius and the U.K. Secretary of State for Health Jeremy Hunt, signed a bi-lateral agreement for the use and sharing of health IT information and tools between the two countries [3]. The agreement was meant to strengthen efforts to cultivate and increase the use of health IT tools in a collaborative manner and although it focuses on a few key areas of health IT, it also includes adopting digital health record systems [3].

Just a year prior to that in May 2013, Jeremy Hunt and Professor Sir Bruce Keogh, Medical Director of NHS England, launched the *Safer Hospitals, Safer Wards Technology Fund* (later renamed the Integrated Digital Care Fund) to support the rapid progression from paper-based clinical record-keeping to integrated digital care records (IDCRs) [14]. Additionally, the secretary of health also called for a paperless NHS by 2018 [13]. All of these initiatives demonstrate a renewed desire for the NHS to try and digitize healthcare (once again).

Below is an overview of specific examples of EHRs currently in use in the NHS.

## Examples of EHR systems in current use in the UK and their success to date

A September 2015 Deloitte report found that only 50% of hospital trusts in the UK were using some kind of Electronic Health Record [14]. Many trusts in the country are currently without an EHR system and those that have them pick and choose vendors on an individual basis. Because there is no single accepted IT framework or standard that trusts must adhere to it leaves a patchwork of systems all across the country.

### The following are IT health programs and systems that are currently in use across the NHS:

**Cerner** - A US-based company, Cerner has been working with the NHS for more than two decades and its flagship EHR system, Cerner Millennium, has been installed across 16 trusts and more than 70 hospitals since being launched in 2004, as part of The National Programme for IT software (NPfIT) [6].

**CSC healthcare group (formerly iSoft)** - is the second major firm offering EHR systems to the NHS. Its software known as Lorenzo is in trusts primarily across the north, Midlands and east of England. Much of this was also done under NPfIT [6].

**Emis - (Egton Medical Information Systems)** - has been central to implementing EHRs in the NHS, ever since it started operations in the 1980s. Today, the company claims that more than half of GP practices across the UK use Emis software, with more than 35 million patient records being handled by the technology. In 2009-10, the firm was the sixth biggest supplier to *NHS Connecting for Health*, which spent £27.5m with the company in that financial year [6].

**Open source** -Some leading NHS trusts have developed their own open source software. For example Moorfields Eye Hospital has its own *OpenEyes* EHR system that has been designed for ophthalmology. It has been adopted by NHS Wales for use across its health boards as well as by a few other English trusts [8].

**Portals**- Many NHS organisations have a collection of software applications – some trusts have hundreds – and prefer to link them up than replace them. The answer is often a portal, which joins up existing systems and allows staff to see all parts of a patient’s record, even as the data remains fragmented [8].

Portals tend to be a relatively cheap option both in terms of spending and training, and can also help to establish joint-working with other organisations or in knitting together units after a merger [8].

## Current example: A new EHR system in the UK

### Case example

Cambridge University Hospitals NHS Foundation Trust installs Epic™ system in October 2014 [8]

**Cost:** USD 214 million

**Implementation:** 18 months preparing, building and testing the system

**Summary:** This is an example of an NHS trust that (at the time of contract signing in 2012) had a lot of money to spend and a set of systems that it wanted to replace wholesale. The route that Cambridge University Hospitals NHSFT took was not an easy route and required a lot of faith and commitment to the process. Part of Cambridge's £200m eHospital project, included a massive hardware upgrade, the introduction of the system took 18 months, more than 100 of the trust's staff took exams to qualify as application analysts (allowing them to adapt Epic's software to Cambridge's processes) and work involved around 1,000 staff in total – before general staff training [8].

**Outcome:** The trust went live with the Epic system in October 2014. They faced a few teething problems which for the most part were not unexpected [8].

In July 2015 however, the foundation trust regulator, known as **Monitor** launched an investigation into Cambridge's finances, including its handling of eHospital, as a performance report from the trust said it had a deficit of £20.6m, with £8.6m of it due to the IT project [16].

A few months later the CEO and CFO of the trust resigned and Monitor put the trust into "special measures" in order to develop a plan to deal with their budget deficit. Monitor said the trust "underestimated the scale and challenges of implementing its new electronic patient record system, eHospital, and the impact this would have on its provision of healthcare for its patients"[16].

Shortly after that, the Care Quality Commission published a critical report of the trust, rating it "inadequate". Its reasons included "introducing the Epic IT system for clinical records had affected the trust's ability to report, highlight and take action on data collected on the system" and that "medicines were not always prescribed correctly due to limitations of Epic" [16].

**Conclusion:** Overall this EHR roll-out has faced many obstacles which were made worse by the financial position that the trust found itself in just a year after its implementation. At present it may be too soon to draw firm conclusions about the success of this implementation but given the investment that was put into the project it is not off to a good start.

## Conclusions

It appears that although the government and the NHS in general are keen to start implementing electronic health records and speed up the digitization of the NHS (particularly in hospitals), success so far had mixed results.

Looking at the US example it is clear that there are many pitfalls in EHR implementation and rollout and feedback on how to best avoid them should be given due attention.

It stands to reason that many of the problems encountered in the US would also be felt in the UK if steps are not taken to mitigate them beforehand. With regards to EHR functionality, transferring the systems from one place to another should not pose much of a challenge but just as it has in the US market, problems may arise with choosing the right software and vendor, paying close attention to the implementation timeline, getting input from stakeholders, ensuring interoperability between systems and providing adequate training.

One of the other hurdles that EHR's in America have faced is the general dissatisfaction from the healthcare community at large about what constitutes a 'good' EHR system. If more time had been taken to address their concerns prior to implementation then many of the problems may have been dealt with early in the process.

It is inevitable that all transitions will be filled with some obstacles, teething problems and difficulties at least for the first few months. However, if lessons are learned from the US experience then anticipation of these problems can be taken into account and disturbances kept to a minimum.



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