The costs, benefits and challenges of implementing virtual patient record systems

A review of the academic literature
Introduction

The National Health Service, like the health systems of all OECD countries, is experiencing intense pressure to achieve significant economic savings in the context of rising patient demand and fiscal pressure. The increase in patient demand is the result of demographic pressures such as an ageing population and an increasing prevalence of chronic conditions and severe co-morbidities. Continuous improvement and innovation in health care delivery has resulted in an increase in expenditure on medical devices and pharmaceuticals. Patients rightly expect timely access to high quality care.

Most systems are responding with a variety of solutions, including payment reform to incentivise improvements in efficiency and quality, patient education programmes to improve health literacy and promote healthy behaviours, and system reform to achieve better integration of care across health and social care settings to ensure that care is delivered in the right place, at the right time for the best cost. Underpinning all of these solutions is the expectation that health information technologies, that enable the rapid transfer of health-related data within and across health and social care systems, can support system improvements.

This paper provides a high-level summary of the findings from a recent review of the published academic literature on the costs, benefits and challenges of one of these technologies: electronic health records (EHR), and in particular virtual patient records (VPR). We found evidence of potential for a significant, positive return on investment if implementation occurs within the context of an overarching information technology strategy that addresses stakeholder concerns of start-up costs and data governance.

Acknowledgements

The evidence review that informed this work was funded by Lewisham Healthcare NHS Trust. As one of the first integrated Trusts, Lewisham is at the forefront of innovation in the NHS. Lewisham is committed to improving the patient journey by using health information technology to enable better connected care.

1 Equity and Excellence: Liberating the NHS (Department of Health, 2010)
2 See, for example: Equity and Excellence: Liberating the NHS (Department of Health, 2010) or the Patient Protection and Affordable Care Act (United States Congress, 2010)
3 The power of information: putting all of us in control of the health and care information we need (Department of Health, May 2012)

Contents

- Who benefits from Electronic Health Records? 2
- What are the benefits of Electronic Health Records? 3
- Quantifying the benefits of Electronic Health Records 4
- Conclusions 4
- Appendix A 5
- Appendix B 6
## Who benefits from Electronic Health Records?

<table>
<thead>
<tr>
<th>Patients</th>
<th>Commissioners</th>
<th>Researchers</th>
<th>Taxpayers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients experience improved clinical outcomes, a reduction in the probability of exacerbation of conditions, and a decrease in long-term disease burden. Where EHR implementation is successful, studies show an improved patient experience, an increase in confidence in the system and increased emotional well-being.</td>
<td>For commissioners, the benefits of successful EHR implementation include greater patient engagement, improved health outcomes and value for money, better management of financial performance, improved corporate clinical governance, and a more data driven approach to strategy, planning, engagement and monitoring.</td>
<td>The EHR provide researchers with access to information about different patient populations, different models of care, and different treatment regimes to support research into effective practice, including translational research across organisational boundaries.</td>
<td>The benefits that are accrued within the health system as a result of implementing an EHR system should be of benefit to the taxpayer. To date, published research has not focused on the public purse as a beneficiary. Better value delivered by VPR is evidenced in improvements to the quality, effectiveness and safety of care; higher levels of productivity and efficiency in care delivery and higher quality research and innovation. Better value for money in healthcare should translate to a better return on investment for taxpayer’s contributions to the operation of the NHS.</td>
</tr>
</tbody>
</table>
What are the benefits of Electronic Health Records?

The benefits offered by EHR can be grouped according to the following themes:

1) improvements in the quality, effectiveness and safety of care;
2) higher levels of productivity and efficiency in care delivery; and
3) higher quality research and innovation.

**Improvements in the quality, effectiveness and safety of care**

The evidence suggests that VPR can deliver improvements in the quality, effectiveness and safety of care across care settings – for example lowering hospitalisation rates and lengths of stay for patients with chronic conditions, improving communication and coordination in regional systems, and improving the care planning process for patients leaving hospital. Improved access to imaging can improve clinicians’ diagnostic capabilities and selection of the therapeutic components of care.

**Higher levels of productivity and efficiency in care delivery**

The literature on the implementation of electronic patient care records indicates that implementation can deliver efficiency savings and productivity gains in the delivery of care. Evaluations of the use of VPR for chronic conditions have shown a reduction in the number of diagnostic tests procedures ordered and laboratory tests required. Improved organisational communication and team-working has been shown to reduce labour costs. Other studies have shown improved use of staff resources and increased clinical capacity.

**Higher quality research and innovation**

EHR are able to provide researchers with access to real-time data and insight into the application of therapies and treatments in real-time settings. Longitudinal studies are cheaper and more complete, and the quality of datasets has improved.

However the challenges of implementing health technology programmes successfully in order to realise these benefits are well documented. Our review of the literature led us to summarise these challenges under the following four groupings

1) data protection 2) data accuracy
3) implementation barriers and 4) system variations.

**Data Protection**

Concerns about data security can be a barrier to integration of systems and the spread of IT adoption. However integrative systems have been found to improve data security where account roles and permissions are implemented to ensure confidentiality and security of patient data.

**Data accuracy**

The ability to create an integrated record system depends on the development of a ‘universal person index’ as well as considerations for standardising and integrating other aspects of the electronic record. Even more difficult is the task of establishing a means of identifying and linking patient records across all health care settings. Primary efforts to establish these linkages will depend on standardisation across multiple master patient index files, linkage protocols, data protection and patient consent.

**Implementation barriers**

Start-up costs and the resources required to implement a system can present barriers to adoption. However technical assistance and financial incentives can positively influence clinician take-up. Other risks to implementation include the need to achieve buy-in towards a shared vision and ensure that investment requirements are sustainable.

**System variations**

System variations, such as password requirements, variations in diagnostic coding, and pathways to the required information within a system can impact negatively on the clinician experience to the detriment of efficiency savings and clinician take-up.
Conclusions

Difficult experiences across the NHS Health IT landscape over the past 10 years have illustrated many of the challenges associated with efforts to use technology to support system improvement efforts. However, global experiences of implementation of numerous systems in different settings have also provided many transferable lessons for mitigating the risks and maximising the potential benefits of EHR. Success depends upon managing numerous technical, organisational and cultural factors. Implementation requires cross-organisational buy-in from managers, clinicians, patients and partners. This requires communication of the impact that new systems will have on resource allocation (e.g. changes in work-flows, care pathways, clinical record-keeping etc.) as well as a shared vision of the expected benefits and timeframe for realisation.

As numerous studies across OECD countries show, these benefits are real and quantifiable and include improvements in efficiency, integration and clinical quality.

Quantifying the benefits of Electronic Health Records

Where available, evidence of the achieved economic benefit of EHR is positive, but estimates of achieved return on investment vary considerably because benefits are dependent on the local context within which the EHR is being implemented, and costs depend on the type of EHR solution.
Appendix A

Methodology

The objective of the rapid evidence review was to identify articles measuring the impact of electronic records on the design and delivery of health care. A number of websites and databases were searched including: EBSCO, CIHAHL, EconLit, MEDLINE and SocIndex. The search strategy required searching for English language studies published in the year 2000 onwards. The initial search terms were "data linkage OR electronic data interchange OR record linkage OR health information interchange OR electronic patient records and all related words". This initial search identified 6,460 studies. We filtered these by selecting journal articles only, and applied the following subject filters: electronic health records, computerised patient records, medical record linkage or electronic data interchange. This refined the results to 1,392 articles. Our team of trained researchers screened the abstracts of these articles and identified 40 for detailed review, and an additional four recommended papers from expert advisors on our project team.
Appendix B

Sources


Disclaimer
This review is based on assumptions and interpretation of the academic literature by Matrix. Matrix takes no responsibility for actions or decisions taken as a result of this paper.