**Implementing electronic records in NHS secondary care organisations in England: policy and progress since 1998**

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**Short title:** Implementing electronic records in the NHS

**ABSTRACT**

**Background:** A number of different policies have aimed to introduce electronic records into National Health Service secondary care organisations in England over recent years. There has been little formal attempt to explore the overall impact of these policies (as opposed to evaluations of individual initiatives) and how they have developed and progressed over time.

**Sources of data:** National NHS IT policy documents and evaluations of national NHS IT policy between 1998 and 2015.

**Areas of agreement:** There has been limited progress in implementing integrated electronic records in secondary organisations since 1998.

**Areas of controversy:** The management and execution of NHS IT policy has been poor, with over ambitious aims contributing to the limited success.

**Growing points:** Detailed guidance on how to implement electronic records in secondary care organisations is required. The ambitions of current policy should be revisited.

**Areas timely for developing further research:** Research exploring the costs and benefits of different approaches to introducing electronic records is needed.

**Key words:** Electronic records, NHS, policy, IT, England, secondary care.

**INTRODUCTION**In 2014, the Secretary of State for Health commissioned an independent report to examine the productivity and efficiency of NHS acute hospitals in England [[1](#_ENREF_1)]. ‘The Carter Report’ concluded that there is ‘significant variation across the main resource areas’ and equated this variation to a £5bn efficiency opportunity. The report recommended that the NHS should invest in interoperable IT systems, to enable information sharing across the NHS [[1](#_ENREF_1)]. There has also been a recent financial commitment to NHS IT, with the government announcing in 2015 that £1billion would be invested in new technology over the next five years [[2](#_ENREF_2)], and NHS England committing £100million to support the delivery of comprehensive Electronic Patient Records (EPRs); information sharing across the local health and care system and robust data security [[3](#_ENREF_3)].

Globally, there has been significant pressure to implement electronic records, partly due to the successful digitisation of other industries (e.g. banking) and the pressures associated with an ageing population; which require a more efficient approach to healthcare delivery [[4](#_ENREF_4)]. Significant advancements have been made in the US where most hospitals have implemented an electronic record [[5](#_ENREF_5)]. However, there is still variation in the maturity of the systems that have been implemented, with a number of hospitals now having to transition to different types of electronic record to obtain higher levels of sophistication and integration [[5](#_ENREF_5)]. Whilst there are undoubtedly lessons that could be learned from other countries, the idiosyncratic nature and different economic, social and political foundations of different health services make this challenging. For example, in the US, clinicians and hospitals received incentive payments which were funded largely by the health insurer Medicare according to the maturity of the EPR that were implemented [[5](#_ENREF_5)].

Since the 1990’s there have been a number of policies that have aimed for, but failed to introduce integrated electronic records into NHS secondary care organisations in England (see below). There has been no attempt to evaluate the progress of NHS IT policy over time. Existing evidence consists of academic [[6-11](#_ENREF_6)] and government commissioned reviews of individual policies (table 1) which fail to consider whether lessons have been learned or consider the extent of progress over time. This study aimed to evaluate whether progress has been made by national NHS IT policy in implementing electronic records into NHS secondary care organisations, by evaluating NHS IT policy documents and evaluations of national NHS IT policy. Given the articles focus on secondary care, the implementation of electronic records in primary care is not discussed. **A SHORT HISTORY OF ELECTRONIC RECORDS (1968-2015)**

‘The NHS Experimental Computer Program’ (1968) resulted in the wide-spread use of computers throughout the NHS [[12](#_ENREF_12)] and led to the introduction of what is now considered the forerunner to the EPR in a London hospital along with the creation of the first databases [[12](#_ENREF_12)]. Between 1980 and 1990, the number of NHS IT policies increased through the publication of: The Korner Report (1982), The Griffiths Report (1984) and the Resource Management Initiative (RMI) (1986). A primary focus of the RMI was to provide clinicians and hospital managers with information by introducing new technology and as a result required hospital staff to provide government and regional authorities with large amounts of cost and performance data [[12-14](#_ENREF_12)]. Due to the demanding nature of the RMI, hospitals were encouraged to develop their own organisation-wide computerised information systems; which aggregated basic patient activity from a Patient Administration System (PAS) [[13](#_ENREF_13)]. The PAS systems made a range of additional information available (e.g. resource usage for theatres) and so in 1987 the Hospital Episode Statistics (HES) databases, which are still used by the Department of Health (DoH) for in-patient analysis, were developed [[15](#_ENREF_15)]. The RMI’s failure to produce integrated departmental systems led to the development of the Hospital Information Support System (HISS) which aimed for fully integrated PAS’ that would allow IT applications to communicate and share information by 2000 [[15](#_ENREF_15)].

In 1992, the DoH outlined its Information Management and Technology (IM&T) policy, which proposed that: information will be person based; derived from operational systems; secure and confidential; shared across the NHS and that systems may be integrated. The policy was based on the RMI having been perceived to be a success, despite the fact that the review of the RMI had not been published and a consensus at the time that such a large investment was unjustified given the lack of progress made by previous policies [[13](#_ENREF_13)]. In 1998, the IM&T policy was updated, withInformation for Health (IfH) retaining many of its predecessors’ aims, but emphasising that systems *will* be integrated [[16](#_ENREF_16)]. IfHalsooutlined ambitions for all patients to have lifelong Electronic Health Records (EHRs) and for acute hospitals to have: an EPR; 24 hour emergency care access to patient records, electronic transfer of patient records between GPs and EHRs by 2005 [[16](#_ENREF_16)]. ‘Building the Information Core’ (2001), furthered the aims of IfHcommitting approximately £500million to realising ambitions in three priority areas: information services (e.g. electronic library for Health), Electronic records (within and between organisations) and National or Local applications [[17](#_ENREF_17)].

The limited success of IfH in introducing electronic records through a localised approach, led to the publication of one of the world’s most ambitious and expensive government IT programmes, ‘The National Programme for IT ‘(NPfIT*)* in 2002[[18](#_ENREF_18)]*;* which aimed to deliver a single EHR for every patient in England by 2010 via a centrally selected and procured electronic record system using national infrastructure [[18](#_ENREF_18)]. However, issues with the delivery of electronic records meant that in 2010 the policy adopted a ‘connect all’ approach that gave local autonomy to NHS trusts in delivering electronic records but reduced the number of systems to be delivered [[19](#_ENREF_19)].

In response to criticisms that previous policies had proposed overly ambitious timescales, ‘The Power of Information’ (2012) outlined a ten-year framework for transforming the use of information throughout health and social care using national standards to aid: implementation, planning and flow through localised approaches to funding, responsibility, market based solutions leadership decisions and priorities [[20](#_ENREF_20)].

In 2013, NPfIT was dismantled after a review by the Major Projects Authority [21] concluded that the program was unable to deliver its aims. The Secretary of State for Health challenged the NHS to become paperless by 2018 [[2](#_ENREF_21)2]. Following this announcement, the ‘Safer Hospitals Safer Wards’ policy was published and proposed NHS England’s vision for an Integrated Digital Care Record (IDCR) and a pathway that would see NHS trusts progress from paper to paper-light and finally paperless record keeping[[23](#_ENREF_22)]. To facilitate these ambitions, the policy also committed £500mn via its ‘Safer Hospitals Safer Wards technology fund’ [[2](#_ENREF_22)3].

Most recently, Personalised Health and Care 2020’ was published in 2014 and similarly to the ‘Power of Information’ did not seek to outline a detailed plan, but rather provided a framework to support NHS staff to ‘take better advantage of the digital opportunity’. Reflecting the Secretary of State for Health’s revised target for all NHS organisation to be paperless by 2020, the policy aimed for NHS staff to have access to digital records in real time by 2020 [[24](#_ENREF_23)].

Between 1968 and 1992, the NHS succeeded in implementing various pieces of infrastructure and developed databases and frameworks including: PAS, HES, NHS number, NHSnet, national standards and security and confidentiality frameworks. However, policies were criticised for being too visionary, containing insufficient guidance and emphasising the technological aspects of implementation, whilst ignoring social factors (e.g. change management) [[13](#_ENREF_13)]. In contradiction to the ambition for integrated electronic records, the lack of guidance and localised approach adopted by the 1992, IM&T policy left the NHS with a number of fragmented systems that had been developed and introduced according to the priorities of individual organisations [[13](#_ENREF_13)].

**SOURCES OF DATA**

This study was conducted between November 2013 and August 2015 and explored progress in implementing electronic records into NHS secondary care organisations. An electronic search to identify NHS IT policy documents and evaluations of NHS IT policy was conducted using Google Scholar and the Gov.UK database. Policy documents and evaluations of NHS IT policy were also identified by checking the bibliographies of included documents.

**INCLUSION CRITERIA:**

* National NHS IT policies that outlined decisions, plans and actions specifically for NHS IT throughout the NHS published by the Department of Health (DoH) or NHS England.
* Evaluations of national NHS IT policy commissioned by government, DoH or House of commons (including independent academic evaluations of NPfITthat were commissioned by the DoH [[6](#_ENREF_6), [7](#_ENREF_7)].
* Information relating to the implementation of electronic records in NHS secondary care organisations.

**EXCLUSION CRITERIA:**

* Policies or evaluations for specific IT projects (e.g. electronic prescribing)
* Evaluations or NHS IT policies of the NHS as a whole (e.g. ‘The Wanless Report’) [[2](#_ENREF_24)5]
* Policy evaluations not commissioned by the government, DoH or House of commons
* Documents and/or information relating specifically to primary care
* Information relating to infrastructure or systems that were not directly relevant to the implementation of electronic records (e.g. NHS mail)

Descriptive information for the 6 policy documents and 10 evaluations of NHS IT policy that met the study’s inclusion criteria can be found in table 1.

***ANALYSIS AND RESULTS:***

Documents were analysed thematically, following guidance adapted from Braun and Clarke [[34](#_ENREF_25)]. The analysis consisted of three main stages: familiarisation, code and theme development and data reporting. The analysis focused on identifying the factors influencing progress in implementing electronic records, eight themes emerged. We support our findings with direct quotations from NHS IT policy and evaluations of NHS IT policy where appropriate.

**PROGRESS IN IMPLEMENTING ELECTRONIC RECORDS (1998-2015)**

***Local versus centralised approach:***

IfH published no guidance as to how electronic record systems should be implemented. As this had not been attempted previously within the NHS, the decision to adopt a centralised approach by NPfIT was based on the success of doing so in other industries. In addition, other NHS IT projects which had taken a local approach had resulted in a fragmented number of systems that could not share information being delivered and therefore had suffered limited success. Despite these justifications, evaluations of IfH and NPfIT criticised the centralised approach taken to implementing electronic records as contributing to its lack of success.Evaluations of IfH and NPfIT provided little guidance for future policy as to how electronic records should be implemented. This may account for the limited guidance within current policy, which has identified two potential routes to implementing electronic records.

*The technology stack of a hospital IDCR system ranges from a fully functional single end-to-end, integrated system that covers every clinical function to a patchwork quilt of individual, functionally rich modules, stitched together to allow data to transfer between systems with lots of varying combinations between. These can be referred to as single solution and best of breed.*

 *Safer Hospitals, Safer wards (2013, p.16)*

***Contract management:***

The management of electronic record contracts and suppliers during NPfIT was also attributed to the limited success that was achieved. During NPfIT, there were significant delays to the delivery of electronic records due to defects with delivered systems and trusts tailoring the centrally procured systems to local needs. As a result, the policy’s original ambition for a national system was revised to ‘a connect all’ approach[[1]](#footnote-1)’ that gave local NHS organisations autonomy regarding the functionality and costs of electronic records. Delays to delivering electronic records during NPfIT also led to contracts between the DoH and electronic record suppliers being renegotiated. However, whilst the number of systems to be delivered was reduced, there was no reduction in cost. Additionally, the policy’s decision to contract three main suppliers for electronic records was originally commended as it was perceived to have contained costs, increased the potential for benefits realisation and guaranteed competition. However, later evaluations of NPfIT reported that it constrained the development of next generation systems, hindered the supplier market and increased costs. Table 2, displays the number of systems delivered during NPfIT and the associated costs.

Electronic record contracts during NPfIT were criticised for being too ‘risky’, largely because when contracts were agreed the electronic record systems had not been developed. To offset initial risks, the following mechanisms were put in place to ensure that suppliers: undertook due diligence tests to test their capacity; were obligated to pay the government £50-500million in the event that they defaulted; received payment once working systems were delivered; incurred performance deductions if monthly targets were not met and ensured change control mechanisms were in place to prevent the DoH incurring charges if contracts were changed. However, in some cases the mechanisms which aimed to incentivise suppliers rewarded poor performance.

*If a supplier rectifies its failure for the following three months, the performance deductions are refunded with interest. Otherwise NHS Connecting for Health is entitled to keep the money.*

*NAO: NPfIT session 2005-2006 (2006, p.36)*

***Policy:***

Evaluations criticised NHS IT policy for being overly ambitious and for proposing numerous targets that were not always in line with the aims of the NHS. An evaluation of NPfIT also questioned the feasibility of the current target of ‘a paperless NHS’ and suggested that for the ambition to be achieved more realistic timescales, a budgeted and costed plan, NHS-wide standards and paperless GPs are required.

*After the sorry history of the National Programme, we are sceptical that the department can deliver its vision of a paperless NHS by 2018.*

 *The Dismantled NPfIT, (2013, p.6)*

The future of NPfIT was put into question, firstly when the re-organisation of the NHS was proposed in 2010 and secondly when evaluations of NPfIT suggested that the programme should be ‘dismantled’. However, following the decision to dismantle NPfIT, electronic record contracts were still honoured and projects continued. The reason for this was not explicitly stated within evaluation documents. However as projects were scheduled to run until one year after the programme was dismantled it can be inferred that contracts were upheld to avoid large exit costs. The re-organisation (2011) [[35](#_ENREF_26)] placed EPR contract management in jeopardy as contracts became the responsibility of individual NHS organisations, with the contracts due to expire at the same time as the reform was proposed. NHS trusts were therefore left without any knowledge as to whether NPfIT would continue or how to manage on-going initiatives.

*The re-organisation of the NHS announced in July 2010, which involves major changes to the role of the Department and many parts of the NHS, has a number of implications for the future of the programme.*

 *(NPfIT: an update on the delivery of care records systems, (2011, p.41-42).*

***Funding, costs and benefits:***

The NHS has consistently committed large amounts of funding to the implementation of electronic records (table 1). However, with the exception of Safer Hospitals, Safer Wards, which made £500mn available through its ‘technology fund’ policies have failed to be transparent about the funding that would support their ambitions. Additionally, the monitoring of costs and benefits during policy has been poor. Examples of this include: funding intended for Safer Hospitals Safer Wards was unallocated because trusts were unable to demonstrate benefits; IfH diverted funding to other sources and the final costs of NPfIT are still unknown. Particular issues surrounding the total costs associated with NPfIT were reported, with evaluations criticising the department’s failure to submit consistent, complete and reliable information regarding the costs of each system, contract changes and the number of electronic records delivered. Determining final costs of NPfIT was made more challenging as after the contracts for electronic records were re-negotiated a reduced number of systems that had limited functionality were delivered. Consequently, there was uncertainty regarding the costs of on-going disputes with suppliers and the ability of the remaining systems required to bring future benefits. The evaluation of benefits during NPfIT was also considered inadequate largely due to a lack of baseline for monitoring progress and the failure of trusts and strategic health authorities to systematically accumulate benefits; despite a method for doing so being available.

*For three programmes nearly all (98%) of the total estimated benefits were still to be realised at March 2012, and for a fourth programme 86% of benefits remained to be realised. There are considerable potential risks to the realisation of future benefits, for example systems may not be deployed as planned, meaning that benefits may be realised later than expected or may not be realised at all.*

*Review of the final benefits statement (2013. p.17)*

***Management of policy implementation:***

Poor management and leadership were perceived to have limited the progress in implementing electronic records. For both IfH and NPfIT, evaluations reported that there was uncertainty as to who was accountable and responsible for the numerous initiatives proposed by policies. For NPfIT, poor management and weak leadership were directly attributed to the policy’s limited progress.

***Patient access to records:***

The Protti Report was the only evaluation to discuss patient access to and the security and confidentiality of electronic records. The Protti Report highlighted the importance of ensuring that the public trust the way that their data is used and cited health professionals’ reluctance to inform patients of what data is available as a barrier to achieving this aim. The lack of legislative guidance regarding security and confidentiality was also cited, with the report highlighting the financial consequences of litigation, but failing to discuss the potential damage to the NHS’ reputation.

*Many of these organisations may be unaware of their duties and obligations under the law in respect of patient records. They may also not fully appreciate the implications of breeching them.*

 *The Protti Report (2002, p.7-8).*

***Infrastructure:***

NHS IT policy has made significant progress in implementing infrastructure that is essential to the implementation of electronic records (table 3)*.*  Evaluations of NPfIT, emphasised the successful implementation of Choose and Book [[36](#_ENREF_27)] and the Picture Archiving and Communication System (PACS) into all acute trusts. Although these applications were fully implemented, their usage at that time was poor and was reported ambiguously. For example, evaluations of NPfIT reported the number of times a system was used, but no comparisons to expected figures or context was provided. Considering PACS and Choose and Book key successes of NPfIT may also be considered misleading as both systems were not within the policy’s original scope and PACS had already been implemented into a third of acute trusts prior to NPfIT.

*By 3rd April 2006 245218 bookings had been made*

*NAO: NPfIT session 2005-2006, (2006, p.17)*

***Organisational learning, change management and staff ‘buy-in’:***

The importance of organisational learning, change management and staff buy-in were considered critical to the success of implementing electronic records by both NHS IT policy and evaluations of policy. However, evaluations reported that these issues had been underestimated by policy.

***DISCUSSION***With the exception of key pieces of infrastructure that have provided the foundations for integrated electronic records, there has been limited progress in introducing electronic records since 1998; the reasons for which are multifaceted and complex (table 3).

The local (IfH) and centralised (NPfIT) approaches to implementing electronic records were poorly executed and resulted in fragmented systems throughout the NHS (table 2). NPfIT demonstrated that a single approach to introducing electronic records is unlikely to be effective because of the variation between different NHS organisations. However, neither approach appears to have been managed, implemented or evaluated as intended making it difficult to know the true value of these approaches. If the NHS is to achieve its ambition for integrated electronic records throughout the health and social care system, detailed guidance that is underpinned by research evaluating the different costs and benefits associated with different approaches to implementing these systems is required. In 2015, a further £1.1bn was committed to support NHS IT over the next five years [[1](#_ENREF_1), [3](#_ENREF_3)]. Previous attempts to evaluate the costs and benefits of NHS IT policy have been poor. Additionally, evaluations of policy have been published a few months prior to, or following the publication of a new policy, making their contribution to learning and policy development questionable. Given the amount of previous financial wastage, current and future investments should be rigorously monitored and evaluations of policy should be conducted and published in a timely fashion to ensure that they can influence future policy development.

The Wachter Review (September 2016)[[2]](#footnote-2), provides an opportunity for the aims of NHS IT policy to be revisited. The review has made a number of recommendations to support the NHS in implementing electronic records including: the need for realistic timescales and expectations; clarity regarding the funding available to support digitisation and the need for 'technical and adaptive change’, which requires ’sustained engagement of frontline users’ [43]. The Wachter review also calls for a phased approach to electronic record implementation that would delay the ambition for a paperless NHS from 2020-2023. However, to achieve the ambition for a paperless NHS, there is also a need to clarify what the phrase ‘paperless’ NHS means in practical terms and for the ambition to be more clearly defined, to ensure that NHS organisations are working towards the same end point.

***LIMITATIONS***

Progress in implementing electronic records was determined by analysing whether the aims of national policy were achieved and by identifying areas of limited progress as identified by evaluation documents. Although this may be considered a subjective way of measuring progress, it enabled progress of NHS IT policy to be explored over time. Evaluations of policy before *IfH* and after *NPfIT* were not available or had not been conducted and so the conclusions drawn may not be transferable to recent policy.

**ACKNOWLEDGEMENTS**

The authors would like to thank Professor John Wright, Dr Laura Sheard and Dr Paul Cairns for their advice and support during earlier versions of this project. The review has been adapted from a PhD chapter, which is available online: <http://etheses.whiterose.ac.uk/13012/>

**FUNDING**

This project was part of a PhD studentship funded by the University of York and The Bradford Institute for Health Research.

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1. Different systems would be interconnected and interoperable across the NHS national infrastructure MPA review of NPfiT, 2013 p.11 [↑](#footnote-ref-1)
2. The Wachter Review was published after the review was completed. [↑](#footnote-ref-2)