

Implementing scanned health records in NHS community and hospital services

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Abstract

The NHS in England has in the order of 150 million medical records but the problem of historical paper notes is outside the scope of the current National Programme for IT. An implementation of electronic document management for health records in community children's services is described, with emphasis on the lessons learned and how they are being applied in an acute hospital deployment.

Introduction

The NHS in England has in the order of 150 million paper medical records¹. Estimates of the total records management cost range from £250 million to £1 billion a year^{1,2}. Primary care is far ahead of acute hospitals in moving to paperless working – general practitioners have been permitted to practice without paper records since 2000³. Many UK hospitals have electronic patient records (EPRs) of some sort (particularly department or specialty based), most now have PACS for diagnostic images, some use digital archiving for inactive medical records, but all still use paper as the patient record. The lack of hospital record computerisation and the poor quality of information transmitted to general practice is seen as a major problem in primary care^{4,5}.

The National Programme for IT was established in 2002 with the aim of providing an electronic Integrated Care Records Service (ICRS) which would cover both the NHS and social care in England⁶. The aims of the national programme have changed over time and the problem of historical paper records is outside its core scope. The NHS in Portsmouth and South East Hampshire has been working in this field since 2005 to provide a clinically acceptable and financially justifiable solution to make existing paper health records available electronically.

Methods

Business case, procurement and implementation

Portsmouth Hospitals NHS Trust held initial clinical workshops in May 2005 to examine the advantages, disadvantages and operational changes arising from implementing electronic document management (EDM) for health records. In September 2005, the ICT Management Board for the local health community, which then comprised two NHS Trusts and four Primary Care Trusts (PCTs), approved an outline business case for an EDM strategy. It was

decided that the first implementation would be in a new PCT Children's Services centre in East Hampshire, to be followed by the acute Trust in Portsmouth. An output-based specification was then developed based on a series of user workshops. A framework contract was used to undertake a competitive procurement which resulted in full business case approval and contract award to IBM in January 2006. Implementation in Children's Services began in March 2006. In parallel with the Children's Services implementation, work continued on defining the acute Trust EDM requirements and developing the full business case for hospital implementation. The Office of Government Commerce (OGC) approach for programme management has been adopted, with constituent projects using PRINCE2 controls. The programme has a steering group comprising members from human resources, health records, finance, clinical groups, a Trust non-executive director and ICT.

Clinical engagement

The Trust commissioned a workflow analysis to determine how the electronic record should be presented and navigated, to identify all forms and charts in current use to prepare for developing bar-coded or electronic versions, to map out document flows and understand the impact on clinical and administrative processes. A clinical engagement group has been set up under the chairmanship of a clinical director. This group is used to test and challenge programme plans.

Technical

The EDM system takes its patient index from the shared hospital and community PAS. Although NHS numbers are used, they cannot yet be the primary identifier as the coverage is still less than total. In the Children's Services deployment, existing paper forms were retained with scanning on completion. In the hospital implementation, a mixture of pre-printed bar-coded forms and in-house developed electronic forms is planned. Additional interfaces for patient letters, laboratory results, radiology reports and discharge summaries are being developed using HL7 and XML web services.

Scanning logistics

In Children's Services all records were scanned in bulk as the numbers were relatively low. A phased deployment is planned for the acute Trust. Departmental records will be uplifted and scanned first, then a defined subset of active main health records. Following the bulk scanning phase, records will be scanned on demand. Where electronic forms are not used, temporary paper notes (using bar-coded forms) for inpatient admissions and outpatient attendances will be scanned on completion of the episode of care. A records destruction policy will be presented for Trust approval based on Department of Health retention guidelines.

Training

Training for Children's Services started with scheduled classroom sessions. However, the relatively small size of the site (less than a hundred users) meant that more intense one-to-one sessions and ad hoc training with users was feasible. The size of the acute Trust (about five thousand users) necessitates more formal and structured training activities. Training plans take into account the fact that a significant minority of staff lack any level of IT competency and that many staff will be unable – or unwilling – to attend even brief training sessions away from their department. Training will therefore be delivered using a virtual learning environment in parallel with more traditional classroom activities. It is anticipated that proficient computer users will opt to learn with a self-help guide, given that the application uses simple web browser presentation; one hour of training is generally sufficient for an IT literate staff member.

Results

Lessons learned from the Children's Services implementation

- The scanning workload for newly created or received paper was underestimated and not properly built into revised job specifications. Issues were found with non-standard paper sizes and identifying the optimal location of scanning stations.
- The first iteration of training was insufficient both for users and helpdesk staff as the EDM software had version changes after initial deployment.
- The initial clinical workshops did not elicit true functional requirements. This was largely because clinicians were unable to visualise the system or the implied workflow changes. Specifically the need for mobile working was not correctly identified; managers had a different perspective to clinicians on this question.
- Staff were experiencing too much concurrent change – PCT re-organisation, key management personnel changes and physical relocation into a new centre. The anticipated changes in inter-team working enabled by physical co-location were not properly planned or realised.
- Insufficient attention was given to agreeing standard working practices, consequently the system was used inconsistently by different teams and individuals.
- The administration workload for the EDM system was not properly sized or allocated.
- The file preparation and scanning validation workload were underestimated.

Consequent changes made to acute Trust deployment plans

The programme has worked with Human Resources to ensure that retained clerical staff in health records and other departments can be re-deployed to defined EDM scanning and administration roles. High-volume scanners have been specified which can deal with multiple paper sizes. The workflow analysis and subsequent work is determining scanning station placement.

The anglicization and re-development of the EDM application has resulted in a mature product now fit for NHS deployment. This provides a stable basis for building training materials.

A demonstrator system has been widely used to give clinicians a visual and practical grasp of what EDM will mean for them. An outpatient clinic in Ophthalmology will be operated with scanned records in advance of the live implementation to expose unanticipated problems or opportunities. Trial runs are also planned for a clinic and multi-disciplinary team meeting in an acute medical specialty where the notes tend to be more complex than for elective surgical cases.

EDM programme governance is integrated with the overall change management and service improvement agenda for the acute Trust and is coordinated through a central team and a Transformation Board chaired by the Chief Executive.

Standard working practices are being developed on the basis of the workflow analysis and experience in the initial specialty deployments. Policy and procedure changes are reviewed by the clinical engagement group before formal approval through the information governance committee.

File preparation and scan validation workload has been carefully analysed and allocated between the Trust and supplier teams working to agreed procedures.

Implementation progress in acute Trust

The EDM programme has focussed implementation activities by department to identify specific operational considerations. Meetings with more generic stakeholder groups (such as nursing staff, senior and junior doctors) are held, but these engagements have been more

valuable as general awareness sessions rather than identifying key implementation and operational issues.

As anticipated, there have been a number of vigorous objections to the EDM programme from some clinical groups. The use of a fully functional demonstrator of the application from an early stage of staff engagement has proved invaluable to help clinical and administrative groups address most of the fears about the overall EDM solution and as a platform to enable the programme team to develop solutions to any residual concerns.

The major remaining issues at the time of writing are mostly due to scale and logistics – converting all forms currently in use throughout the Trust into bar-coded forms or electronic forms and ensuring that sufficient IT infrastructure is in place to enable ubiquitous access to scanned health records at all hospitals and peripheral clinical sites.

Discussion

Business case

The financial justification for scanning historical medical records is robust². The acute Trust has achieved a business case which is broadly cost neutral over five years and delivers substantial recurring savings thereafter.

Clinical expectations

Rapidity of access is vital to the acceptability of a healthcare information system⁷. The acute Trust has separately procured a simplified sign-on (SSO) application which provides single patient selection. This means that clinicians will only have to log on once rather than on to multiple systems and that the patient selected in one application will be automatically selected in the other applications within the SSO environment. The initial suite of systems deployed using SSO will be PACS, EDM, local EPR and laboratory test requesting.

One surprising experience is the unexpectedly high level of clinical demand for direct entry electronic forms. The programme had anticipated that staff would prefer minimum change and therefore that bar-coded paper forms would be the default approach, with electronic forms being deployed in relatively few situations. However, many clinicians have pressed for the capability of electronic forms for direct data entry to achieve the additional benefits of legibility, structure, coding, avoidance of redundant content and, potentially, process and workflow simplification. Generally speaking it is consultants who are expressing this unanticipated interest in direct data entry. Time will tell whether the junior doctors who are likely to bear much of the input workload are equally positive about this approach.

Workflow

The programme expects the unexpected. Despite massive efforts to analyse working practice changes (including the attempt to understand how paper is actually used not just the formal purposes⁸), it is inevitable that there will be emergent change with both good and bad unintended consequences⁹. It remains to be seen whether the programme will have sufficient flexibility to adapt and manage such consequences as they begin to appear.

International experience

There is limited published evidence about the effects of scanned health records. One of the conclusions from UK primary care is that paperless practice does not produce cash-releasing cost savings because administrative staff time is re-invested in improved clinical coding¹⁰. The evidence from a series of studies about the removal of paper records from hospitals in Norway is that doctors and nurses express higher satisfaction with directly entered data than scanned images, that the majority of staff say that routine tasks are performed more easily

with the electronic health record, and that increased levels of usage are not necessarily associated with improved IT literacy¹¹⁻¹⁴. They also report that the removal of paper records has not stimulated new ways of working, suggesting that active innovation is required alongside technological change.

Standards

The huge workload required to prepare paper notes for scanning highlights the lack of proper standards in existing medical records¹⁵.

The programme is exploring future use of XDS-SD, the trial standard from Integrating the Healthcare Enterprise (IHE) for sharing of scanned images¹⁶ and the HL7 v3 Clinical Document Architecture¹⁷ for design of electronic forms.

Potential disadvantages of scanned records and electronic forms

There are simple features of a paper medical record that aid navigation such as colour, texture, paper size and shape, printed forms and pattern recognition of page layouts¹⁸. Most of these tacit signposts are lost when records are scanned. Over time the structured electronic record will grow to provide much more navigable content, but while dual information repositories exist (either paper and electronic or scanned and electronic) clinicians will be forced to use hybrid search strategies.

It has been suggested that direct keyboard input can cause a loss of implicit knowledge from handwriting; not just quick visual identification of who wrote what in a chronological progress note but some measure of psychological state (eg rushed and cursory or considered and thoughtful), and thereby an indication of whether the patient had received due attention¹⁹.

Another question that remains open is whether the transition away from traditional handwritten notes will affect the construction of clinical knowledge as a sociotechnical process²⁰.

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