

Refereed paper

The NHS Care Record Service (NHS CRS): recommendations from the literature on successful implementation and adoption

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ABSTRACT

The implementation of the National Health Service's Care Record Service (NHS CRS) is the most ambitious information technology innovation ever undertaken in healthcare. This electronic health record system represents the key component of the National Programme for Information Technology. Its implementation is however proving extremely challenging. Building on a recent systematic review of the eHealth literature, we

critically reflect on factors that can facilitate the implementation of the NHS CRS and suggest recommendations for a way forward to facilitate implementation efforts.

Keywords: adoption, electronic health record, implementation, NHS CRS

Introduction

The history of large-scale information technology (IT) projects is littered with examples of failure and this is unfortunately also true of healthcare settings.^{1–3} A central reason underpinning many of these failures is that IT initiatives are often politically rather than clinically motivated, resulting in disenfranchisement of healthcare professionals and other key stakeholders from the outset. Once a policy decision has been taken, the lack of appreciation of and attention to the socio-cultural implications of new developments on patterns of working and organisational processes is a further recipe for disaster.

Despite the fact that some critics have (repeatedly) called for a radical rethink of the UK government's National Programme for Information Technology, NHS Connecting for Health (NHS CFH) is pressing ahead with development and implementation of a range of

IT initiatives, including deployment of its flagship electronic health record – the NHS CRS – in English hospitals. Cognisant of the reality of the situation, and based on the findings of our recent systematic review of the international literature on the role of IT in health care,⁴ we reflect on key socio-technical issues that should, we believe, be considered in order to maximise the chances of realising the vision of successfully implementing an integrated and nationally used and useful electronic health record (EHR) into English hospitals at this crucial stage of the implementation story.^{5–7} This case study will, we hope, offer important insights for similar electronic health record implementations now actively being pursued in parts of North America, Western Europe, Australasia and the Middle East.

The National Programme for Information Technology, NHS CFH and the NHS CRS

The National Programme for Information Technology was formally established by the then Prime Minister Tony Blair in 2002 as a ten-year initiative to introduce a range of IT systems throughout the NHS. It is the most ambitious national civilian IT venture of its kind anywhere in the world and it is suggested that it will, if successfully implemented, result in significant improvements to the safety and quality of care, as well as substantial cost savings in the longer-term.⁸ In 2004 NHS CFH, an arms-length body of the Department of Health, took responsibility for delivering the programme.

Whilst the programme has made significant progress in some areas (e.g. the Picture Archiving and Communication System), a host of problems have beset other functionalities such as the Electronic Prescription Service and the Summary Care Record. These problems have included contractual difficulties with system suppliers, a significant underestimation of cost, delays in implementation schedules, changing scope, negative publicity and negative views from healthcare staff on the ground.⁸⁻¹⁰

The NHS CRS is made up of a complex range of interrelated IT applications aimed at facilitating data sharing and seamless clinical care (see Figure 1). It is in many ways the backbone of the programme and as such represents a fundamentally transformative initiative.

This is, however, also a potentially very disruptive organisational transformation as the current mixture of paper-based and local electronic record systems are systematically replaced by nationally shared electronic records.⁵

Several countries are planning widespread implementation of electronic health records and some healthcare systems have already developed and embedded EHRs in individual hospitals or in localised regions. Most activity in this respect is taking place in the USA (e.g. Kaiser Permanente), where this subject matter has been given a massive political boost following President Obama's recent announcement of a national electronic health record strategy. Other areas of activity include Canada, Australia, New Zealand, several countries in Western Europe (such as the Netherlands and the Scandinavian countries) and the Middle East (such as the Kingdom of Saudi Arabia and the United Arab Emirates).

The broader political vision is to achieve interoperable health records between different healthcare providers and settings and possibly also across different countries. In relation to the English venture – which is the first national implementation of an inpatient electronic health record in secondary care – it is important that every effort is made to minimise the possibility of high profile failure, not only because of the risks that this might pose to patient safety and the considerable expenditure, but also because the English experiment will almost certainly cause major ripples in other parts of the world.¹⁻³

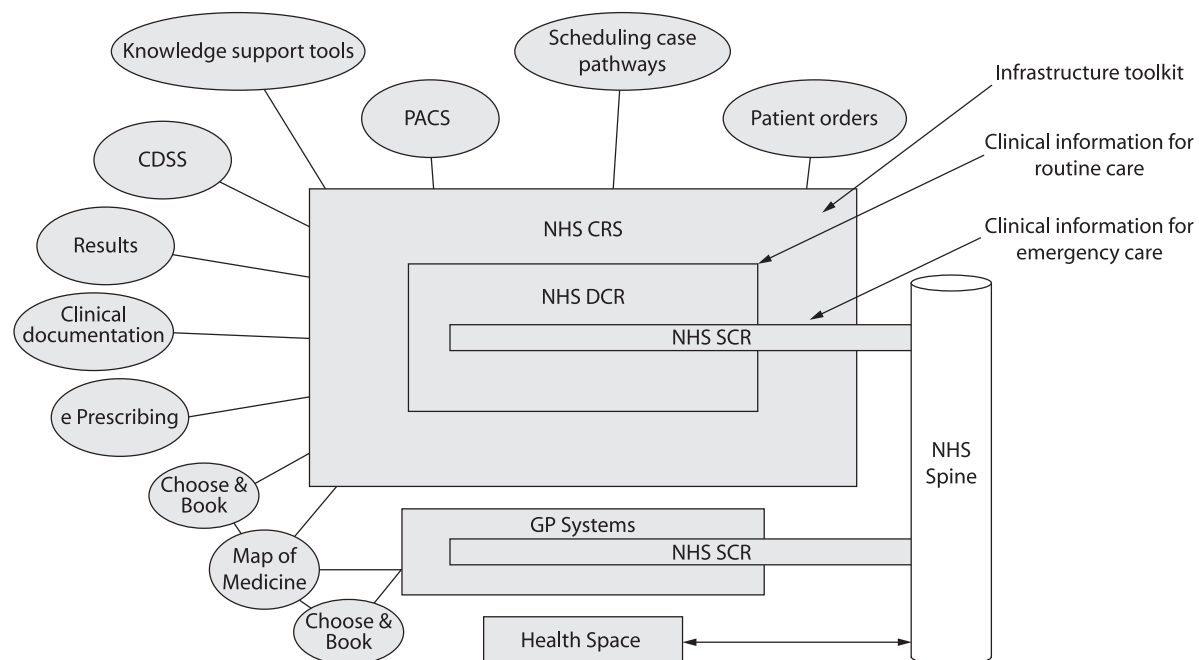


Figure 1 Schematic model of NHSCRS. CDSS, computerised decision support system; Prescribing, electronic prescribing; GP systems, general practice systems; NHS CRS, NHS Care Record Service; NHS DCR, NHS Detailed Care Record; NHS SCR, NHS Summary Care Record; PACS, Picture Archiving and Communication System

Lessons from the literature

Whilst the literature on implementation of EHRs is at present inevitably somewhat limited, there are nonetheless a number of salutary case studies. Sicotte and colleagues, for example, describe the introduction of electronic health records into four hospitals in the United States.² The cost of this introduction was considerable at \$45 million, but the project failed due to the system being rejected by healthcare staff as they found that the application did not fit in with existing care processes. This high-profile example brought into sharp focus the need for a socio-technical viewpoint, considering social and technical dimensions as closely interrelated when seeking to understand work processes or fitness-for-purpose. Concerns about the impact on work processes have already publicly been expressed in relation to pilot implementations of the NHS Care Records Service.¹¹

Figure 2 summarises factors that have been repeatedly found to be important for the successful implementation of EHRs across the world. Discussed below are some of the key lessons from the literature.

The need for realistic expectations

Sauer and Willcocks have helpfully noted that the transformational nature, complexity and sheer scale of the introduction of the NHS CRS will almost certainly result in certain problems that are common to most so-called 'mega-programmes'.¹⁰ These include factors relating to length, scale, unpredictability (often resulting

in uncertainty) and the need to interface and engage with a very large number and wide variety of stakeholders. They argue that such mega-programmes therefore need to be viewed through a lens very different from the one through which we typically view more circumscribed initiatives. The implications of this include the need for a considerable lowering of the bar of expectations, at least in the short- to medium-term, and the need for far more honesty and transparency in relation to, for example, mitigating actions taken when things (predictably) begin to go off course. It is therefore important, they argue, for all stakeholders to recognise that the significant transformations of health care expected to be brought about by the NHS CRS will only be able to be planned for to a certain extent. The need for periodic reconsideration of options and approaches, as well as attempts at reconciling different emerging viewpoints such as, for example, those between NHS CFH (the commissioners and politicians), local service providers (the technical designers), NHS trusts (the organisations) and clinicians on the ground (the end-users), is therefore only to be expected.¹⁰

Also relevant in this context is the discussion by Garside of theories of organisational change and how these can be applied to health care.¹² One of these is Dawson's model of imperatives for change, which introduces the idea that large-scale programmes should allow for and will have elements of both rationality and irrationality, this latter consideration being particularly important in the context of implementing complex and often unpredictable process change. The practical upshot of this is that planning and implementation should be an iterative process. This can,

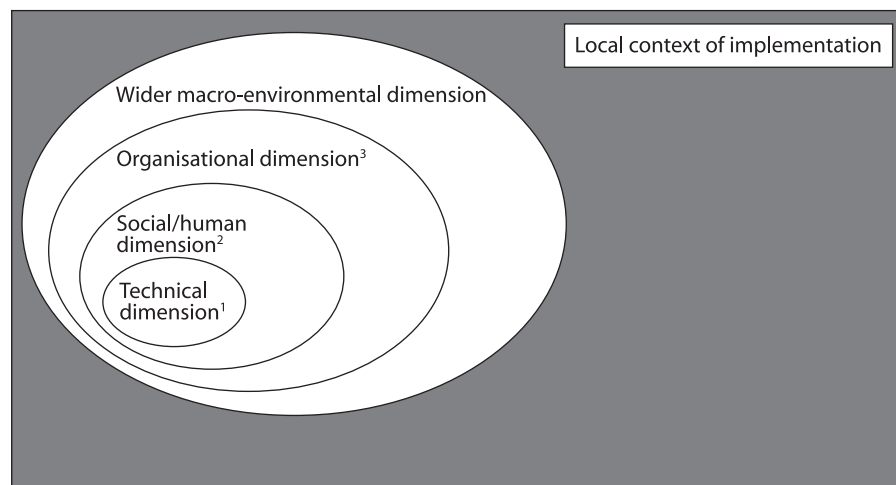


Figure 2 Factors important for the successful implementation of EHRs identified in the literature.¹ Includes usability, performance and integration, adaptability and flexibility;² includes attitudes, motivations, resistance and expectations, engagement and user input in design, training and support, champions, integration with existing work processes;³ includes getting the organisation ready for change, planning, leadership and management, teamwork and communication, learning and evaluation, realistic expectations

however, be disconcerting for those used to far more linear models of working, particularly when planning and implementation are being undertaken in the light of considerable political and public scrutiny (and at times frank hostility). Hence, it is important that every effort is made to engage with the various stakeholder groups to make clear that such changes to approach are very much the norm, rather than the exception.

Recognition of the need to plan for and, where necessary, make use of a more flexible approach is therefore important. This must not, however, be an excuse for poor planning and implementation decisions, one of the commonest of which is expanding the remit of the programme.

Avoiding mission creep

Whilst in large scale IT projects certain complications are to be expected, a particular problem seems to be their frequently changing scope and increasing breadth.¹³ For example, the National Programme for IT was originally planned to deliver the NHS CRS, the Electronic Prescription Service and Choose and Book. Later, it was expanded to include a number of other applications such as, for example, GP2GP, the Picture Archiving and Communication System and NHSmail. Despite the fact that implementation of aspects of these secondary applications is making better progress than that towards the primary outcomes, the difficulty with mission creep is that it inevitably takes policy-makers' and implementers' attention off the primary focus of the programme.

It also has to be kept in mind that the overall plan of creating nationally shared electronic health records was initially intended to emerge from local systems that would eventually be linked together. This has subsequently changed to a more ambitious approach driven in the main by national networking of systems and has led, many have argued, to a lack of sensitivity and responsiveness to local needs.⁸

Similarly, changes in cost estimations, overall implementation strategy and local implementers have led to a lack of public and professional belief in the programme and those delivering it. It has consequently been argued that what is needed is greater transparency of how policy decisions are made so that these can be scrutinised against the original plans.⁸ Although iteration is crucial, a careful balance needs to be achieved between wholesale change of direction and modification of plans (although admittedly under some circumstances a complete change of direction may be unavoidable). What appears crucial is that attention is not allowed to deflect off the main tasks at hand as a result of trying to deal with secondary considerations.

System usability and meaningful stakeholder engagement

The NHS CRS is likely to have a significant impact on working practices. For example, Berg discusses the active role of the medical record in the healthcare setting by considering three case studies, both in single physician–patient encounters and in multidisciplinary care teams, and the ways in which the medical record can mediate and influence social and professional relationships.¹⁴ Berg describes, for instance, how the record structures medical work through the processes of reading and writing, how it co-ordinates care across professional boundaries and also how it contributes to sustaining power relationships between healthcare professionals. Similarly, Berg and Bowker describe how the medical record can contribute to shaping patients' bodies and histories, how it impacts on social processes in health care and how it serves different functions for different actors, all of which need to come together for the record to function optimally.¹⁵ Although these analyses are based on paper records, they indicate the extent to which the introduction of the NHS CRS is likely to transform the experiences of both delivering and receiving care.¹⁶

Cultural change is best effected if users can be meaningfully engaged in design and deployment considerations. Above all, the NHS CRS needs to be perceived as useful and also user-friendly as these are essential prerequisites for effective use.^{17,18} The most important way of ensuring usability is through fostering close collaborations between the designers of applications and end-users, as it is this latter group that is most familiar with the context in which the new application will be deployed.^{5,19,20} Since it is important for designs to evolve during the establishment of a new application in an organisation,²¹ continuous testing of prototypes with different groups of end-users and redesign of initial and future releases of the NHS CRS will need to be carefully planned.^{22–24} The user informed design guidance, which is part of the NHS Common User Interface Programme, is a step in the right direction.²⁵

However, the need to engage meaningfully with end-users extends well beyond issues relating to design. Both individual and group resistance to change is a real threat to the success of the NHS CRS. Garside highlights areas that have been identified as to why individuals may resist change, these including parochial self interest (stakeholders may lose something with the change, e.g. professional status), resentment (can be with either individuals leading change or with change itself), different perceptions of change (this depends on the individual's position in the organisation), misunderstanding or lack of trust and a low tolerance for change.¹² Group and organisational resistance to change may stem from feeling threatened in the group structure (e.g. shift in

power balance) and/or disruption of social professional norms.^{12,26} A sensitive approach aware of potential sources of both individual and group resistance is therefore essential.

At present, there is still a lack of clarity amongst various stakeholders as to what exactly the NHS CRS is (in anything other than broad aspirational terms). This makes it difficult for end-users to begin to appreciate how the use of an EHRS will be integrated into day-to-day working practices. These uncertainties are impacting adversely on users' perceptions of the programme, contributing to negativity and an inability to see what is expected of users during the process of implementation and, equally importantly, what the personal or patient-level benefits of engagement might be.

What is therefore needed is far greater clarity on what it is that will be implemented, how this will fit into existing work practices and a realistic statement of timelines for implementation. Although NHS CFH has made a broad set of goals available, these now need to be refined and tailored to individual professions. Aligning goals with timelines and differentiating between short- and long-term outcomes may be a helpful way of conceptualising this. This process is, again, best informed by actual engagement with end-users themselves while actively seeking opinions and divergent viewpoints in order to promote collective decision making and increase individual autonomy.^{20,27,28} Only then can users be systematically targeted and motivated to use the application.

Utilising informal social peer networking in influencing end-user perceptions of a new application is likely to be important in this context.^{6,7} This may take the form of demonstrations given by colleagues from early adopter sites, workshops or meetings attended by enthusiasts from the same profession, or those who have knowledge of how to use the NHS CRS speaking about their experiences. Ideally, key players to be targeted are influential individuals (such as managers, consultants or senior nurses) who are similar to future users (e.g. from the same profession) and have experience of using NHS CRS prototypes. Although workshops demonstrating the new system to healthcare professionals exist, these are currently mainly led by system suppliers. Professional networking is beginning to occur, but this is often self-organised rather than facilitated by NHS CFH.

It has to be kept in mind, however, that a variety of social networks are likely to exist in the context of implementing the NHS CRS. These may be operating at both a micro (e.g. profession specific, departmental) and macro level (e.g. hospitals, NHS trusts, clusters). Each of these need to be targeted separately as different groups are likely to use the application in different ways. Non-clinical staff groups such as, for example,

administrative staff also have needs in this respect that are easily overlooked.

NHS CFH may also wish to consider setting up a social network around the NHS CRS in order to promote sharing of ideas and experiences. The appointment of clinical leads is a good start, but this is nationally led, rather than locally, which may pose difficulties in cultivating the local networking that appears particularly important.

Explaining exactly how an integrated electronic healthcare record may improve care and performance in a variety of different settings as well as hearing and then addressing end-user concerns is therefore crucial.²⁹ The focus here should be to build on existing values in the NHS, rather than any technical imperatives.¹⁶ There is the related urgent need to provide clinicians with quantitative data on how the NHS CRS is helping to enhance service delivery, rather than outcomes relating to numbers of users (as seems more typical at present).⁹ There is an opportunity to begin to generate such evidence from studying first-wave sites implementing the NHS CRS.

Local ownership and compatibility

A particular problem in the NHS CRS is that its implementation is top-down and it is therefore liable to be perceived as being imposed by the government. Implementation was (at least initially) planned as a 'big bang' strategy. This is, however, now changing towards so-called 'soft launches' of the NHS CRS, starting on particular wards and allowing for local adjustments to take place. Nevertheless, trusts are asked to purchase from a range of nationally accredited systems provided by a limited number of providers, restricting local input and choice.⁸ This often includes having to replace perfectly well functioning patient administration systems with those that are compatible with the systems purchased by NHS CFH.

Previous research has shown that top-down 'big bang' implementations can contribute to increased user resistance and therefore carry a high risk of failure.^{30,31} Smaller, locally developed projects, on the other hand, that work 'from the ground up,' may lead to increased end-user acceptance.¹³ Examples from within Scotland and Wales, and from overseas (e.g. Kaiser Permanente in the USA), of the success of locally developed EHRs support this view. In such scenarios, systems are developed organically on a locality basis and the governments' role is to pull these together rather than to drive implementation.³²

Incremental approaches to change, negotiating goals carefully along the way, may be more effective than 'big bang' approaches as these are likely to result in increased user acceptance. Negotiation is needed in

relation to design as well as the integration of technology into existing work processes.^{21,31,33} If users are allowed to identify individual benefits to them and their patients of using the new system (as opposed to organisational benefits only) this can prevent potential resistance.³⁴ Otherwise they may develop either 'partial use' (i.e. only using the parts that are useful to them) or 'workarounds' (i.e. avoiding using the system altogether).³⁵

Engagement needs to occur on a variety of levels to include stakeholders, NHS CFH and local NHS organisations and trusts. The latter have so far been somewhat neglected and their influence has not been sufficiently harnessed. It needs to be realised that local organisations can be instrumental in opening channels of communication between NHS CFH and individual stakeholders.

It is further important to clearly define both the role of NHS CFH as the external change agency and its relationship to adopters. However, although NHS CFH is now responsible for all aspects of implementation, there is still some confusion on the ground as to where exactly NHS CFH's responsibilities stop and local responsibilities begin to take over. The notion of the rather unfortunately termed National Local Ownership Partnership (NLOP) belies this confusion. This is further complicated by the increasing development of local systems and so-called 'interim' solutions.

Evaluation

The importance of appropriate and programme-tailored evaluation in IT innovation has been repeatedly highlighted in order to investigate reasons for failure and factors for success.^{36,37} Evaluation can be difficult in a complex programme such as the National Programme for IT. Specifically, the introduction of the NHS CRS is difficult to evaluate as it is so multifaceted (Figure 1) and impacts on so many aspects of care delivery and organisational processes. Evaluation activities will need to involve allocating designated staff and giving feedback to the public, individual staff, departments and hospital trusts. It will also involve a deliberate effort to investigate intended and unintended outcomes as well as unanticipated effects (e.g. such as those subtle impacts on changes in social relationships discussed earlier).

Several evaluations of components of the National Programme for IT (including the NHS CRS) have already been commissioned by the NHS CFH Evaluation Programme, although given the probable time needed for these interventions to infuse or embed within the NHS the timescales of these evaluations may need to be reconsidered.^{38,39} Promoting an increased awareness and involvement of key stakeholders in evaluation activities will be of primary

importance in this context. Efforts will in due course also need to focus on utilising and disseminating data from these effectively. This will mean concentrating not only on summative evaluation but, more importantly, also on formative evaluation that can help to address problems iteratively. The focus of existing evaluation projects (including the evaluation of the NHS CRS) has mainly been on qualitative methods, as these are well suited to investigate complex socio-technical issues that may differ across local settings.⁴⁰ Qualitative investigations also allow for more local input from trusts and staff on the ground, thereby facilitating formative evaluation and learning from their experiences.

Conclusions and recommendations

We acknowledge that the introduction of the NHS CRS is a complex venture that will involve a fundamental reorganisation of healthcare delivery structures. Whilst keeping in mind that the programme may ultimately bring important benefits, its nature and scale have brought significant challenges for all stakeholders and have led to discussions surrounding the adequacy of the implementation strategy. What is now needed are realistic expectations and transparent decision making by all involved, meaningful end-user engagement and usability testing, and an increased focus on promoting local ownership and formative evaluation.

During this process, tracking of occurring problems and an iterative refinement of the NHS CRS will be important. This will require negotiation with stakeholders, and careful consideration of how refinements will be handled and how much modification will be allowed locally. Acknowledging the inherent difficulties and complexities on the part of all stakeholders will be crucial in shifting the focus from blame to teamwork.

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CONFLICTS OF INTEREST

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