

Connected Health Cities

End of Project Report

Qualitative Research (NWC Pathways Team):

How does current health information
technology impact on patients and staff within
urgent hospital care pathways?

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ABSTRACT:

BACKGROUND

The NHS Five Year Forward View sets the target that “by 2020, all care records will be digital, real-time and interoperable,” predicated on the belief that by combining and sharing key patient and service use data, health services can provide more timely, rational and integrated care. However, the anticipated benefits of health information technology (HIT) remain largely unproven, with the mechanisms by which health systems can realise the gains yet to be fully described. To allow the potential benefits of HIT to be better visualised, we conducted a qualitative study exploring views of NHS clinical staff on the impact of current HIT in the context of unscheduled hospital care and follow-up for three different chronic ambulatory care sensitive conditions; chronic obstructive pulmonary disease (COPD), epilepsy, and alcohol dependency.

METHOD

The study was conducted primarily within four NHS acute trusts in the North West Coast region of England; two of which used mainly hand-written case notes supported by various HIT packages, while the other two used mainly digital health records within an integrated HIT package. Semi-structured interviews were conducted with 33 clinicians within the ambulance service, A&E units, medical assessment wards, outpatient clinics, specialist nursing services, Regional Neuroscience Centres and GP practices.

FINDINGS

Participants at sites with primarily hand-written case notes and poorly integrated HIT packages expressed frustration at what they saw as unnecessary time spent searching for internal information, logging in and out of different HIT packages, and recording the same information on multiple systems. Occasionally, information could not be found when needed, or was illegible, potentially impacting on patient care. In contrast, participants at sites with integrated digital health records were happier with the way the systems functioned internally. Participants at all sites described problems in obtaining timely access to parts of the patient health record held by other organisations. This included unnecessary time spent requesting and providing information, duplication of diagnostic tests, negative impacts on patient care,

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and missed opportunities to intervene to improve health. Examples of impacts on patients included:

- People with exacerbations of COPD being inappropriately treated with high-flow oxygen, worsening their condition
- People with alcohol-related liver disease being admitted to hospital on the basis of a single blood test when access to previous results would have shown that the condition was stable
- Discussions about end of life or ceilings of care being had more than once, or inappropriate treatment given because this information is not available
- People with multiple alcohol-related A&E attendances across different hospitals not identified and therefore not targeted for intervention

Participants at two sites had limited direct access to GP summaries, which they described as very useful, especially in A&E. Referral processes between providers varied widely and were often described as time-consuming, potentially unreliable, and ineffective in optimising the information transferred. The processes viewed as most efficient and effective used a structured form sent via a digital link directly from the patient record system and were available only to specific services within sites that used mainly digitised health records.

IMPLICATIONS

Our findings confirm that within a hospital, introducing fully digitised health records and well-integrated HIT can have positive impacts on health service quality and staff satisfaction. These capabilities also appear to be the foundation on which a more connected, integrated health system can be created. However, effective communication and data-sharing across organisations remains a major challenge even in the presence of the necessary digital technology, and it will take time to identify priorities, forge agreements between providers, design systems and processes, and overcome continuing problems with interoperability.

INTRODUCTION:

When a person receives health or social care, key information about them is collected as data by different care organisations.

Whilst a range of **health information technologies (HIT)** is used across the NHS and GP practices typically have fully digitised records, many hospitals still rely on hand-written case notes, unstructured records and/or a range of fragmentary IT systems from different vendors.

Potential challenges exist in recording, retrieving and sharing health-related information. The NHS five year forward view included priorities for HIT, with the target being set that “by 2020, all care records will be digital, real-time and interoperable.”

Different hospitals across the NHS are further along this transformation process than others. The move towards digitisation and interoperability is predicated on the belief that combining key patient and service use data health services can deliver better individual care, reduce costs, and offer more timely, rational and integrated care. Historically the health and care systems in the UK have been characterized by ‘silo working’ and with health and social care split across the NHS and local authorities.

One headline benefit that is frequently cited as potentially coming from digitised, interoperable and sharable health records is reducing unplanned hospital admissions.

Since 2000, Accident and Emergency (A&E) department attendances and unscheduled hospital admissions in the UK have increased year-on-year. However, the anticipated benefits of digitisation remain largely unproven and the mechanisms by which health systems can realise the wins from what is often referred to as the “digital utopia” are yet to be fully described.

To begin to redress the knowledge gap and allow for the potential benefits of HIT to be better visualised, we conducted a qualitative study with NHS clinical staff from hospital sites at different points along the digital transformation process.

We explored their experience and views of on the impact of current HITs on service quality and staff experience in the context of unscheduled hospital care for three different chronic

ambulatory care sensitive (ACS) conditions. These are conditions where unplanned hospital attendance can often be prevented with adequate and effective primary, community and hospital outpatient care.

The ACSs were: chronic obstructive pulmonary disease (COPD), epilepsy, and alcohol dependence (including a particular focus on alcohol-related liver disease, ARLD). These conditions are common, together account for over 10% of unplanned admissions, and are associated with health inequalities being more common in the most deprived areas and those in more deprived areas having worst outcomes.

Our study focussed on the entire patient journey from attendance at an emergency department (ED), any inpatient care they received, to subsequent ambulatory follow-up.

METHODS:

AIM

To explore the views of clinical staff on the impact of health record systems and health information technology on service quality and staff experience within unscheduled hospital care pathways.

OBJECTIVES

To describe:

- Perceived issues relating to ‘sub-optimal’ systems or HIT, that might be alleviated with effective use of HIT
- Examples of perceived good practice, where HIT or systems using HIT have been implemented to improve service quality or staff experience

Perceived barriers and facilitators to effective use of HIT within unscheduled hospital care pathways

METHODS

Design

We undertook a semi-structured interview study of clinical staff providing care at any point in the care pathway for people who have emergency hospital admissions due to COPD, epilepsy/seizures or an alcohol-related condition.

A topic guide was generated covering a number of areas for discussion. For the present report, we focus on the views and experiences expressed by staff on how their current IT systems impact on their role and delivery of care. The data was analysed inductively, using the method of thematic analysis.

Context

The study was conducted in the North West coast region of England which has a population of ~4M people and a mixed geography of large urban areas, smaller cities and towns, and rural areas. It is served by 19 Clinical Commissioning Groups, 12 District General Hospitals (DGHs) with adult Emergency Departments (EDs), two Regional Neuroscience Centres (RCNs), various specialist hospitals, and one regional ambulance service.

Recruitment and data collection

We purposely selected clinical staff with knowledge and experience of the unscheduled care pathways and how the health information systems function within the pathways, across different points in the care pathways and across a range of sites.

To identify the main sampling points in the care pathway, we generated flow diagrams of theoretical patient journeys from the point of deciding to seek urgent medical care to follow-up after discharge, for people receiving unscheduled hospital care for each of the three different conditions.

The main points of contact were identified as: the regional ambulance service; the ED, short-stay wards/medical assessment units (MAUs), inpatient wards and outpatient clinics of DGHs; hospital alcohol specialist nursing services, specialist COPD or respiratory specialist nursing services within community health services; visiting neurologists, outpatient clinics, and specialist nursing services of RNCs; GP practices; and community-based alcohol treatment services.

As the care pathways centred on DGHs, these comprised our primary research sites. Four were purposely selected to maximise variation by geography (covering large urban areas, smaller cities and towns, and more rural areas) and use of digital health records and HIT, based on the informal knowledge of research team.

One of the DGH sites included (Site B) was also an RNC. A further RNC (Site E) was included in the study because it was within the care pathway for people with seizures who attended two of the included DGHs. The regional ambulance trust was the final recruitment site (Site F).

Participants were initially contacted through the Principal Investigator of each research site, following discussions with the research team as to the type of jobs roles that were priorities

for inclusion. Interested potential participants then contacted the research team for further information or to arrange to meet for the interview.

Interviews were arranged at a time and place to suit the participants, with the option to meet face-to-face or by telephone. Most chose to be interviewed at their workplace and in person, the exception was one who chose to participate by telephone. Each interview lasted around 40 to 60 minutes. Two interviews had more than one participant, as close colleagues requested to be interviewed together.

Following interviews, participants were asked, where appropriate, to suggest colleagues who might be willing to be interviewed about other points in the care pathway and to contact them on our behalf.

With the permission of the participants, all interviews were audio-recorded using portable digital devices. The recordings were transcribed verbatim by a professional transcriber, then checked word for word, and corrected where necessary, by the researchers. The checked and finalised transcripts were then transferred into Nvivo for analysis.

ANALYSIS

The transcripts were analysed using inductive thematic analysis. The analysis commenced as soon as transcripts became available, and consisted of six phases: familiarisation with the data by repeated reading of the transcripts, generating initial codes in Nvivo, searching for themes, reviewing themes, defining and naming themes and producing the final results.

To ensure reliability and validity, KA and RWA independently coded the transcripts and met regularly to discuss the identification of themes. Initial themes were discussed with the wider research team, and those discussions informed the ongoing development of the topic guide.

Final themes were reviewed by all research team members to confirm the interpretation. The findings are illustrated with the direct quotes; some of these have been edited to preserve anonymity and ensure clarity of meaning.

RESULTS:

PROVIDER ORGANISATIONS AND STUDY PARTICIPANTS

Table 1 summarises the main provider organisations from which staff were selected to be study participants. This included five hospitals across the North West coast (four acute Trusts and one specialist centre) and the ambulance service. **Table 2** describes the main areas of practice and job titles of the recruited staff.

Table 1 Provider organisations

Site	Provider type	Digital Maturity Score 2016 (NHS England, 2019)			Clinical record systems
		Readiness	Capability	Infrastructure	
A	Acute NHS Trust	72	40	68	Mainly computerised
B	Acute NHS Trust	83	38	70	Mainly paper-based
C	Acute NHS Trust	87	79	89	Mainly computerised
D	Acute NHS Trust	86	59	98	Mainly paper-based
E	Acute NHS Trust	98	58	82	Mainly paper-based
F	Ambulance Trust	N/A	N/A	N/A	Mainly paper-based

Table 2 NHS Staff recruited into the study

Specialty area of work	Role	Number of participants
Emergency medicine or acute general (internal) medicine	Consultant in emergency medicine or acute medical specialties	6
	A&E Nurse	1
	Clinical Nurse Specialist (frequent attenders)	1
	Respiratory medicine	4
	Clinical Nurse Specialist	3
Alcohol-related conditions	Consultant hepatologist	3
	Alcohol specialist nurse	4
Neurology	Consultant neurologist	3
	Epilepsy or neurology Specialist nurse	4
Ambulance Trust	Senior Paramedic	1
General Practice	GP	2
Other	Community Matron	1

FINDINGS

In relation to the limitations of current systems, our thematic analysis identified three main themes:

- A. Fragmentation of the health record *within* organisations
- B. Fragmentation of the health record *between* organisations
- C. Sub-optimal referral and communication processes between different providers

These are expanded on in turn, with further illustrative quotes provided in supplementary Tables.

Theme A: Levels of fragmentation of health records *within* organisations

Participants at Hospitals A and C, which had both recently implemented a comprehensive multi-modular computerised clinical information system, reported minimal fragmentation and were generally satisfied with the system, finding it useful and convenient to have information held within their own trusts' records "at their fingertips" from wherever they were in the hospital (QA11,QA12). They also reported that they had quickly adapted to the new system after it was introduced.

"Within the Trust it's brilliant... if I'm worried about my patients I can have a look, I know what their temperature is, who's been to see them today, what have they received... then I can just phone... my junior doctor and go, 'Right you haven't prescribed this', or, 'Will you go and have a look at patient X?..'" (Hospital C, Consultant 2)

Participants at Hospitals B, D & E, and those from F who provided 'visiting neurologists' for those hospitals, in contrast, described how patients' hospital records were fragmented across multiple systems, making it difficult to find the information they needed. These systems did not connect effectively with each other, and therefore often had to be accessed separately (QA1). This was time consuming, and not user friendly:

"The amount of time it takes to click between things, every one of these, the scan system has a different log-in password, the notes system has a different log-in password, [Tertiary Centre] has a different log-in password. At any given point in time I can be sat in front of my [DGH] computer with eight windows open, three of [DGH] and the other five of [Tertiary Centre] (Hospital F, Consultant 1)"

Most (4/6) of the study sites did not have fully digitised health records and, instead, handwritten notes and letters were scanned into the system and accessed via a PDF viewer. It was reported this meant there could be delays in the availability of these records for others and created opportunity for filing errors:

“You’ve got to write the notes yourself, you’ve got to then somebody to... collect the notes... then it’s put through the scanner... then it’s got to be catalogued... a lot of times you find...things are not in the right place... you’ve just got folders of information.... it’s hard to pull out the... information you need (Hospital B, Consultant 5)

A result of this fragmentation and poor navigability was that information could be difficult and time-consuming to find and frustrating for staff (QA1-5). Some expressed concern that it reduced the time available to spend on clinical decision-making and that ‘things could be missed’ (QA6, QA7).

“Consultants are spending less time making decisions and more time battling with different electronic systems to find the information that they need to address the problems of the patients” (Hospital F Consultant 1)

Occasionally, even after dedicated time being spent searching for items of information, it was not feasible to access information when needed, leading to unnecessary internal referrals (QA2) and further outpatient clinic appointments as decisions needed to be deferred until the information was available (QA13). At a broader level, it could sometimes be difficult to find the information to update relatives who on how patients were (QA10), causing anxiety to the relatives.

Patients were described as sometimes getting frustrated at having to repeat the same information to several different health care professional along their clinical journey. However, many participants stressed that this could never be completely avoided, as some repetition and checking of information was essential to the care process (QA14-16).

“The patient...might be feeling as though they're replicating information they're giving to different healthcare professionals, they might convey a feeling that they are fed up of having to repeat the story for instance, but... therein lies an important clinical exercise of confirming that there's consistency in the information that's being reported. (Hospital B, Consultant 1)

Some participants, including most of those working in specialist nursing roles, reported spending unnecessary time recording duplicate information onto different systems. In some instances, this meant staff had to work beyond their official working hours (QA6).

There was a suggestion that the lack of a digital EHR contributed to the development of multiple separate spreadsheets and databases within the trust, as this functionality was not available within a central system. These separate systems were a positive development, in that they were useful and necessary, but participants expressed concern that in the long-term they risk further fragmenting the patient record (QA8).

Theme B: Fragmentation of the health record *between* organisations

A lack of direct and timely access to parts of the patient health record held by other service providers was the most frequent concern raised by participants at each of the participating sites and was the concern with the greatest reported impacts.

There were some direct information-sharing systems in place between different providers, but these were very limited. All participating hospital trusts could share some diagnostic images with some other local trusts via a PACS system, but this did not work between all trusts.

At least two of the participating DGHs were able to access the GP-ordered blood test results of many, but not all of their patients because the hospital laboratory-processed them.

One trust had access to GP summary records for the majority of local patients, available to specific staff members under specific circumstances. One had developed a specific database based around a local disease register for respiratory disease, shared with community services. All four participating DGHs had specific protocols and systems in place to share safety alerts, advanced care decisions and disease management plans with other local providers, but these did not always function

The specific information needed, and the urgency with which it was needed, varied by condition, presentation and location in the care pathway.

Table 4 shows the information participants reported needing by condition and location in the care pathway. Information-sharing needs also varied with geography and how local services were organised. For example, hospitals in large urban areas, which were close to other hospitals, had more need to access each other's records than those that were the only DGH for a defined population (QB1).

Participants described ways in which the lack of access/fragmentation had negative repercussions for the efficiency and quality care offered in all parts of the health pathway (e.g., Q.26, 27).

In the emergency and urgent health setting, a frequent difficulty was that, without access to background medical information held by other services, clinicians had reduced ability to evaluate with confidence what was and was not normal for a patient in terms of their presentation. They might not also be able to deliver care that respected advance end of life care decisions or that was appropriate to their condition.

"...some patients with COPD will retain CO2 off very high flow oxygen... the only way for us to know that is they have a...card.. that says "Don't give high-flow oxygen"...if they don't bring that... we don't know... if the ambulance don't know they tend to give high flow oxygen... that actually makes the condition worse.... by not having access to that information right there at the start of the journey, you're adding not only time onto the urgent care section, but potentially adding to length of stay..." (QB22)

"If you see a patient with alcohol liver disease, you might not know what their last bloods were like and so you don't know if what you're seeing is brand new or old. So it may lead to somebody being admitted unnecessarily..." (QB25)

Outside of the emergency care setting, the fragmentation and limited sharing of the health record was reported to lead to potential omissions in care across the care pathway, as different providers assumed that aspects of care had already been undertaken by others, or that others were already aware of a problem.

Participants reported how ambulatory care services were often not informed of deteriorations in the patients' condition or contacts with the emergency services which meant services could not respond and offer additional support:

“Somewhere like one of the big cities, somebody could be going 2 or 3 times to each A&E and not being recognised to have that dependence on urgent care, because the dots aren’t joined together” QB31

“we’re not telepathic... we don’t know that the person has had the worsening of their epilepsy unless we’re told” (QB34)

In the emergency and inpatient setting, patients were often too unwell to provide the information required about their medical history. Even when they could, there were concerns about solely relying on it due to possible inaccuracy (e.g., QB18, QB20):

“The patient’s recall might not be fantastic. So I might ask them how many exacerbations they’ve had in the last 12 months, they might tell me two, but when they’ve actually had six... that patient would be in a different prognostic category if they’ve had six exacerbations versus two exacerbations in the last 12 months” (QB10)

Thus, time-consuming efforts with varying levels of success were undertaken to try to work around the fragmentation and source the missing information:

“... there’s a lot of ringing round to get as much information as you can, and you can’t always get an answer... you’re trying to get through to a GPs surgery... you’re in A&E, you’re busy and you’re in a queue, and then you can’t always get that information anyway” (QB3)

Requesting the information required the health professional though to know who held it and that other organisation being open and able to respond when needed. (e.g., QB17).

Participants throughout the care pathways, therefore, said that what was often quickest and easiest was repeating examination, discussions and tests. As well as having negative cost implications, the approach had the potential to frustrate, inconvenience and distress patients and families (QB12).

“...we can end up unnecessarily duplicating things. So we might end up doing the same sort of testing that was done, maybe at [another hospital] a month or 2 ago, because we don’t know [that hospital] did it” (QB19)

“Community... Do Not Resuscitate orders, they’re currently paper-based, so sometimes...it doesn’t come into hospital with them.... also decisions around ceilings of treatment... because we don’t have all that information at our fingertips, we end up having these conversations again and again, which can be distressing for patients sometimes” (QB14)

Failures to access safeguarding information also occasionally meant patients and staff could be placed in dangerous, but avoidable situations.

“...social services could be aware that this person’s being financially abused, but it’s not on [our] system unless it’s happened in the hospital... so if the patient doesn’t tell you, you might be discharging them home, thinking they’re safe...it is a risk (QB32)

“...we did have one gentleman... he was very inappropriate to the nurse that went, and then she phoned the GP surgery and said “Has this been an issue before?” and was told “Yes, yes we never send a female” (QB32)

Table 3 Examples of how information can be held in unconnected silos and is not always accessible to those who need to deliver acute care

Condition	Information	Who currently holds it?	Who needs it?
COPD	CO2 retention	GPs	Ambulance, ED
	Clinical care received	GPs, community-based smoking cessation or pulmonary rehab	ED, ward, outpatients
	Support packages and care plans	GPs, Community nursing services	Ambulance, ED, ward, outpatients
	Advanced decisions/ end of life care plans	GPs, NHS community trusts, DGHs	Ambulance, ED, ward, outpatients
Epilepsy	Known epilepsy or non-epilepsy attack disorder	GPs, RNCs	Ambulance, ED

	Medication previously tried	GPs, RCNs	RCN visiting neurologist and outpatients, GP
	Seizure frequency, specific diagnosis, diagnostic test results	GPs, RCNs, DGH	ED, ward, RNC visiting neurologist and outpatients, GP
Alcohol/ ARLD	Known by community alcohol services, current treatment	Community alcohol services	Hospital alcohol service
	Engagement with mental health services	Mental health trusts	Hospital alcohol service
	Attendance at other A&E departments	DGHs	Hospital alcohol service
	Advanced decisions/ end of life care plans	GPs, NHS community trusts, DGHs	ED, ward, outpatients
General	Blood test results	GPs	EDs, ward, outpatients
	Current medication	GPs	All
	Major diagnoses	GPs	All
	Safeguarding alerts	All	All
	Home situation	GPs, social services, community nurses	All
	Personal information	Phone number of family members, carer responsibilities	All

Theme C: Sub-optimal referral and communication processes between different providers

Participants discussed the role of HIT in facilitating appropriate referrals, the transfer of appropriate information with the referral, and maximising the efficiency and reliability of the process.

A frequent complaint (among those who had access to digital health records rather than handwritten records) was that there was no digital automation in the referral process. This meant clinicians needed to copy information from a patient's notes or EPR into a referral letter, rather than copying selected information across automatically, which felt like a waste of time. Where patient records were handwritten, the process could be even slower, with information being less easy to find and copy. The workload of referrals could mount up causing a delay, especially if administrative support was not available (QC1).

Another frequent problem was lack of a direct electronic link to other services, usually meaning that referrals must be faxed. This took time to do and, in the busy hospital environment, created multiple points where the referral could fail (QC2). It also meant that it was not possible to keep an audit trail of the referral, or to automatically check whether the patient had received and attended their appointment; facilities that were valued where available (QC4, QC5).

"It's a faxed letter to the single point of access... 'Choose and Book'... the problem is that that does take time...somebody has to write a letter, and then has to take it from an area that's really busy, to take it to the reception, and the reception will then need to fax it. And there are so many reasons that that might fail."

These complicated and time-consuming referral systems might also have the effect of disincentivising appropriate referrals; one community nursing service reported having recently increased the number of inward referrals by creating a streamlined electronic referral system from GP practices (QC3).

Another frequent complaint was the appropriateness of the information sent with referrals; sometimes there was too much information, making it difficult to find what was needed (QC10, QC11), sometimes there was too little information to adequately inform decision-making, including deciding whether the referral was actually appropriate, leading to some

wasted consultations (QC12). Often there was inconsistency in the format of referrals coming from different organisations, even where the receiving organisation had requested a specific proforma be used (QC6), again making it more difficult to identify the relevant information.

Where referrals were handwritten and faxed, they were not always fully legible (QC7) and, where they came from other hospitals, important GP-held information was often absent (QC8).

Information needs to be varied widely between care pathways and also between patients, depending on the complexity of their condition, and it was often important that clinicians shared not only aspects of the patient's history, but their own concerns and thinking processes (QC13).

Improving this information exchange would require not only more structured and automated referral processes, but ongoing communication and feedback between providers and referrers to agree on what sort of information is helpful to receive and feasible to provide.

Sometimes patients did not receive an appropriate onward referral because clinicians working in busy, generalist parts of the hospital (ED, MAU, general medicine wards, etc) found it impossible to remember every referral pathway for every situation, including 'first fit' referrals to RNCs (QC9).

Participants did not relate this to a limitation of their health information systems, but to the nature of the work and the high staff turnover of those areas. However, it seems feasible that alerts could be generated within electronic EHR systems signalling a patient's potential eligibility for a particular referral pathway, helping to overcome this problem.

It was important for the patient's ongoing care that GPs and other referrers to receive timely and good quality communication in the form of discharge summaries and clinic letters. In some areas, use of HIT to automatically generate discharge summaries from EHRs was thought to have led to a decrease in their quality some hospitals in recent years, as they were not always checked for sense or accuracy (QC14).

The most informative discharge summaries were those produced not by computers, but by humans with the knowledge and foresight to identify what information could be useful and relevant (QC15). However, human beings could also produce poor quality discharge summaries without the assistance of technology, again pointing to the importance of good communication and feedback between referrers and providers in relation to their respective information needs.

None of the participants identified a problem with the quality of clinic letters, but sometimes clinic letters arrived later than needed or got lost altogether, especially if sent by mail, necessitating a telephone call to request the information (QC16). Participants suggested that electronic transfer for correspondence and test results might prevent some of these problems.

IMPACT:

These findings support the theorised advantages for hospitals of using digital clinical record systems, well-integrated with other HIT (such as systems for requesting and reporting diagnostic test results), as opposed to the common alternative of paper-based case notes supplemented by various fragmented HITs.

Participants with access to integrated digital record systems reported easy access to patients' internal hospital records at the point of need. In contrast, those working at sites with mainly paper-based clinical records and fragmented HITs described frustrating and time-consuming processes to access essential parts of the patients' hospital record, especially where they needed more than one 'log-in' to access the information.

Participants were also concerned that fragmented records within the hospital impacted on service quality, as 'things could be missed', patient experience could be affected, or clinical consultations unnecessarily duplicated.

Participants who had experienced both mainly paper-based and mainly-digital record systems reported quickly adapting to new digital systems and being very satisfied with the change.

Our findings, therefore, suggest that, where it has not already occurred, the change from paper-based case notes to digital clinical records should be a high priority, and that newly-introduced clinical record systems should ideally either include or fully-integrate with other HITs used by the hospital.

While fragmentation of records within the hospital was described as problematic at three of the five hospital sites, fragmentation of records between different organisations was problematic at all participating sites and gave rise to more serious service quality concerns.

Some participants suggested that, ideally, it should be possible to access all of the patient's record at all points in the care pathway, while others thought this would be unnecessary or overwhelming, making it difficult to identify the information needed at that point.

Participants with different roles at different points in the care pathway had different shared information needs, with some common factors.

The need for easily accessible shared information was particularly acute in situations where time was limited or the patients' ability to communicate might be lowered, such as the ED. For example, if information could not be accessed during a short outpatient appointment, decisions might have to be deferred, whereas staff on the wards have longer to plan and to request the information they need.

The RNCs, as tertiary referral centres, reported particular problems associated with fragmentation of their patients' records across a number of organisations, often including GP, DGH and community services. Patients seen by hospital alcohol services also often had essential clinical records in non-NHS alcohol or drug treatment services.

Across the whole sample, the main priorities for improved direct information-sharing included:

- Making recorded clinical 'alerts' easily available to ambulance services and EDs to prevent patients receiving inappropriate treatment at the point of crisis. Examples include information about a patient that their COPD is made worse by high-flow oxygen, or that they do not routinely need to be conveyed to hospital following a seizure.
- Making selected personal information available to ambulance services and EDs, such as telephone numbers of the patient's nominated contact person and whether they have caring responsibilities for a person who should not be left alone.
- Making information on end-of-life care plans, including advance 'do not resuscitate' decisions or ceilings of care, easily available at all points in the care pathway. This could enable more people to have their end of life care wishes met, prevent futile treatment, and prevent potential distress to patients of having these conversations multiple times.
- Making diagnostic results and images, including historical information, available at all points in the pathway. Some sites already had blood test result records for their patients, due to the testing laboratory being hosted by the Trust, and diagnostic images for some or most of their patients, through image-viewing software shared

with some other Trusts. Access to diagnostic test results did/could reduce staff time spent requesting and transferring information, reduce unnecessary duplication of diagnostic tests (especially blood tests), and improve clinical decision-making by enabling clinicians to see what is normal for that patient. For example, if a patient with liver disease has worrying blood tests results, a history of previous blood tests results might indicate either that their disease is stable, and hospital admission is not required, or confirm the need for admission. In the case of COPD, it could also help to identify the subtype or 'phenotype' of a person's condition, so that treatment could be optimised to that.

- Making current prescription records available at all points in the care pathway. Medicines reconciliation systems do already operate for inpatients, but the process is not instant, and not always available in the ED or outpatients. Access to current prescription lists could often alert clinicians to the conditions the patient has, speeding up decision-making processes, could save time currently spent asking patients what medication they are on, and improve safety, for example by quickly alerting staff if a patient is taking warfarin.
- Making GP summary care records, listing the patients' main health conditions, available to ambulance services, EDs and elsewhere in the hospital where needed (for example if the patient is unable to communicate). This would facilitate decision-making in situations where it was not possible to obtain this information any other way, and reduce staff time spent requesting information from GPs (and GP staff time sending the information). At least one of the study sites already had this facility for the majority of its patients, and participants reported finding it useful.
- Making administrative records of health service contacts available where needed. This would enable clinicians to identify patterns of frequent attendance at the ED and other urgent care settings, indicate whether patients were currently receiving appropriate health service support in the community (e.g. from respiratory nurses), and determine whether patients were attending their planned outpatient appointments. It could also be used to identify patterns in service use e.g. increased service probably due to worsening of the condition.
- Making risk assessments and safeguarding information available across the care pathway, including non-NHS services that may be involved (e.g. social services or probation services), to prevent unnecessary risk to patients and staff.

In addition to increased direct sharing of information, participants also expressed a need to improve referral and communication processes between providers.

The ideal was a structured electronic referral form, where selected information could be automatically transferred from an electronic patient record and electronically transferred, and where progress with the referral could be tracked. This process was time-efficient, facilitated the transfer of appropriate information, and was more secure and reliable than faxed or posted referrals.

However, only a few participants reported having access to such a system, and not all referral situations suited completely structured information template. Participants working in the ED and, to a lesser extent, the MAU reported difficulties in remembering all the different onward referral pathways, or in finding time to do referrals, meaning that opportunities for follow-up were missed. This could be a priority area for semi-automated, electronic referrals, and for automated 'alerts' or reminders that a referral might be appropriate.

It is worth noting that the sites that had more of these facilities (e.g. limited access to GP summary care records or semi-automated referring systems) were also the sites that had electronic clinical records integrated with other HITs, probably because it facilitated the effective transfer of data.

Therefore having a digital, integrated hospital clinical record system appears to be a necessary foundation on which to build improved direct information-sharing and communication systems. However, improved HIT alone will not be able to solve all these problems. For example, participants also described receiving communications with too much, too little, or wrongly-targeted information, which appeared to relate more to human and organisational communication issues than with use or non-use of HITs.

Potential impacts – key themes to be shared with CCIOs, Clinical teams, BI Networks – a final report to stakeholders.

CONCLUSION/DISCUSSION:

Our findings confirm that within a hospital, introducing fully digitised health records and well-integrated HIT can have positive impacts on health service quality and staff satisfaction.

These capabilities also appear to be the foundation on which a more connected, integrated health system can be created.

However, effective communication and data-sharing across organisations remain a major challenge even in the presence of the necessary digital technology, and it will take time to identify priorities, forge agreements between providers, design systems and processes, and overcome continuing problems with interoperability.

Persisting immaturity and fragmentation of systems continues to have negative impacts on staff satisfaction, reducing efficiency of acute care delivery and threatening safety.

Immature, outdated and/or fragmented HIT systems lead to perceived inequalities in care delivery and safety risks for patients.

Our rich corpus of staff insights is being used to highlight priority areas for HIT-enabled improvements to care delivery for the three pathways.

FUTURE PLANS/SUSTAINABILITY:

There was a large corpus of data relating to staff insights generated by this work. These are only reported in part here.

This repository of staff views provides a rich resource for our ongoing qualitative analysis and will yield subsequent reports to guide local efforts intended to drive digital solutions to enhance care pathways for emergency care.

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