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Attitudes of Health Professionals to Electronic Data Sharing within an Integrated Care Electronic Health Record (ICEHR)

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Abstract

It is estimated that 98,000 people die in hospitals yearly in the USA as a result of medical errors (Agency for Healthcare Research and Quality, 2009). Electronic Health Records (EHR) can offer improved patient safety. EHRs are being implemented by many countries, however, not all health professionals have welcomed them (MORI Social Research Institute, 2006). As outlined in the National Health Information Strategy (NHIS) document, Ireland has plans to introduce an EHR. Attitudes of health professionals are a significant factor for the successful implementation and adoption of a new clinical information system.

This study aimed to gauge the attitude of health professionals in Ireland to electronic data sharing within an integrated care electronic health record (ICEHR). A questionnaire identified attitudes of health professionals in Ireland to EHRs. This resulted in the majority supporting the introduction of an ICEHR system and indicating patient care and safety as the reasons for their support. They believed patient care, communications, data quality and work practices would be improved as a result. Most were in favour of the introduction of a Unique Health Identifier (UHI). Many respondents indicated that they believe patient confidentiality could be jeopardised due to electronically sharing detailed patient clinical information. Internal threats to the organisation, staff inappropriately accessing patient information, and external threats, such as hackers or insurance companies, were a concern. Many respondents reported that they would use the clinical information from an ICEHR system. Their experiences with similar recently implemented systems have left them with a very positive attitude.

Introduction

The Institute of Medicine (IOM) noted that "*many of the errors in health care result from a culture and system that is fragmented, and that improving health care needs to be a team sport*" (Agency for Healthcare Research and Quality, 2009). An Electronic Health Record (EHR), an interoperable clinical information system supporting integrated care and improved patient safety, can do much to promote team based healthcare provision. EHRs offer many advantages, such as improved patient care, improved patient safety, improved communications between health professionals, improved access to information, reduction in duplication and delay of tests and they underpin population health and research (Zandieh, Yoon-Flannery et al., 2008; Conexix, 2007). However not all health professionals have welcomed them (Mori Social Research Institute, 2006).

The terms electronic patient record (EPR), electronic medical record (EMR) and electronic health record are in many instances treated as *'synonymous and applicable to any comprehensive, longitudinal record with no specified user community, functionality or delineated-scope information capture* (Nagel, 2007). There are however important distinctions between these terms. Nagel describes how the three terms can be distinguished from each other on the basis of access, scope of informational components and custodianship (Nagel 2007). In general, an EMR refers to an electronic record managed by private clinic such as a general practitioner and an EPR refers to a record maintained by a healthcare organisation such as a hospital. In most cases management and control of these records is governed by the organisation and access is limited to healthcare providers working within that organisation. An EHR is distinguished from an EMR and EPR in that it provides access to a comprehensive record for an individual from healthcare encounters across organisations. In contrast to an EMR and EPR there is no paper precursor of an EHR. An EHR will provide access to data maintained in various EMRs and EPRs for the patient (Nagel 2007).

There are many definitions for the EHR in the literature. An Integrated Care Electronic Health Record (ICEHR) as per ISO TC215 document TR20514 is defined as

'a repository of information regarding the health status of a subject of care in computer processable form, stored and transmitted securely, and accessible by multiple authorised users. It has a standardised or commonly agreed logical information model which is independent of EHR systems. Its primary purpose is the support of continuing, efficient and quality integrated health care and it contains information which is retrospective, concurrent, and prospective'.

This is the primary definition of an Electronic Health Record (EHR) according to the ISO TC215/TR20514 document. In this study when the author refers to an Electronic Health Record (EHR) it is the ICEHR that is being referred to. All references and comparisons to EHRs in other countries referenced in this study for the most part conform to this definition. The term ICEHR was also used in the questionnaire in preference to EHR to avoid confusion with the EPR and EMR and to emphasise the definition of the EHR as used in this study.

Electronic Health Records have been implemented in many countries and there are plans for Ireland to implement an EHR according to the National Health Information Strategy (NHIS) (Department of Health and Children, 2002). However the development of a national EHR system is a significant project. It is important then that EHR implementation does not become one of the nearly 75% of all large health information technology projects that fail (Wears and Berg, 2005).

Achieving the goal of a countrywide EHR for Ireland is a task that is fraught with many technical, cultural and legislative challenges (EU EHR Implement Project, 2010). Projects such as the EHRland project are underway in Ireland to investigate the use of standards for an EHR (EHRland, 2009). A number of successful Irish projects to provide record support for care services within organisations have been underway for a number of years, including the Beaumont Hospital epilepsy 'EPR' system and St. John of God Hospital Stillorgan 'local EHR' system. Laying the foundations via EMRs and EPRs in this way and building information sharing links across organisations is an important step towards the EHR. The attitudes of health professionals are a significant factor for the successful implementation and adoption of a new clinical information system (Ward, Stevens et al, 2008). This study aims to gauge the attitude of health professionals in Ireland to electronic data sharing within an ICEHR prior any implementation.

Public support in Ireland for sharing clinical information about patients was illustrated in a poll by RedC Research on behalf of the Health Information and Quality Authority (HIQA) (HIQA 2009). In this poll 86% of respondents believed that health information should be shared between different care providers to improve care and patient safety. The results of a survey by Hanrahan (2008) regarding patient confidentiality and EHRs in Ireland, found that the majority of respondents would be in favour of the introduction of an EHR if the highest level of security was in place and 73% of respondents believed that electronic records are more secure than paper based records. These findings illustrate that the public are in support of EHRs but what about health professionals in Ireland? Do they support the introduction of EHRs? By means of a questionnaire this study aims to understand this phenomenon, both to quantify it and to explain it.

Background

Understanding why information systems are accepted or rejected has been a key part of Information Systems (IS) research for years. The Technology Acceptance Model (TAM) is one of the key studies in this area (Chau and Hu, 2001, 2002). The Technology Acceptance Model (TAM) has proved successful in explaining the theory of acceptance of information systems. In support of the TAM, Davis et al. (1989) demonstrated that 'perceived usefulness' was a major factor in determining an individual's intention to use a system. He showed also that 'perceived ease of use', while not the primary determining factor, was also a significant factor. 'Intention to use' was confirmed in this study to be an accurate predictor of computer system usage. It was illustrated that external variables affect a user's acceptance of a new information system by influencing the key constructs 'perceived usefulness' and 'perceived ease of use' of the TAM. The following relevant external variables were found to be relevant in previous related work, and are categorised here under the headings individual and contextual characteristics (Morton, 2008), see tables 1 and 2 below.

Individual User Characteristics
Age
Gender
Professional Group
Computer Experience

Table 1 Individual User Characteristics (Morton, 2008)

Contextual Factors
Management Support
Health Professional Involvement
Professional Issues
Workload / Efficiency
Perceptions of Training

Table 2 Contextual Factors (Morton, 2008)

Clinical information systems such as clinical decision support systems and computerised order entry systems have been implemented in many hospitals. Organisational issues, clinical and professional issues, issues with training and support and workflow and productivity issues affected user satisfaction with these systems (Morton, 2008; Georgiou, Ampt et al, 2009). Doolan, Bates et al. (2003) found five main organisational factors that were associated with the successful implementation CPOE systems at five US hospitals systems, namely, organisational leadership, commitment and vision, improving clinical processes and care, involving clinicians in the design of the system, maintaining or improving clinical productivity and building momentum and support amongst clinicians. Hospital subcultures, in particular groupings along the professional line vary in their acceptance of clinical information systems (Callen, Braithwaite et al., 2008).
The value of pre-implementation studies (Mori Social Research Institute, 2006; Harris Interactive, 2006; Royal College of Nursing 2004) is widely recognised. Evaluating pre-existing barriers and obstacles is important for the introduction of new computer systems. (Georgiou, Ampt et al., 2009).
The results of pre-implementation studies have shown that prior to implementation, the majority of doctors agree that the introduction of an EHR would improve clinical care and result in the better planning of care across services (Mori Social Research Institute, 2006; Harris Interactive, 2006). These studies also report that nurses see the benefits. For instance, 66% of nurses believe the NPfIT programme in the UK, which would see the introduction of EHRs to the NHS, would result in improved clinical care. In addition, 76% of doctors and also 76% of nurses, in these studies, believe that the NPfIT programme would improve daily working life (Mori Social Research Institute, 2006).
The majority of doctors, surveyed by MORI, believe that staff would have the appropriate skills to use the new technology, however slightly more than 50% of nurses surveyed by MORI believe staff would not have the appropriate skills to use the new technology. In these surveys, 96% and 97% of doctors and nurses, respectively, believe that it is essential that the NHS starts using new technology. In the USA a survey of physicians by Harris Interactive (2006) demonstrated that the majority of physicians believe that an EHR would help prevent errors and adverse effects, make the delivery of

healthcare more efficient, make management of chronic conditions easier, improve adherence to clinical guidelines, improve clinical decision making and save physicians time. A survey, regarding nurses and NHS IT developments, carried out by the Royal College of Surgeons in the UK in 2004 identified an integrated electronic patient record as the single thing respondents most want in their day-to-day working life. Nurses also reported the involvement of clinical staff in the development of systems as important. The availability of workstations was highlighted as an issue as was the provision of adequate and appropriate training.

As discussed above there are plans to adopt an EHR in Ireland (DOHC, 2004). Positive attitudes to EHRs by health professionals in Ireland will play an integral part in the successful implementation of such a system. For this reason, amongst others, it is important that health professionals, who will be the users, are given a voice. Their concerns need to be taken into account from the start. Attitudes of health professionals may be governed by many factors such as professional grouping, computer experience, years in practice, presence of high-level leadership, amongst others. Drawing on previous studies of health professional's experiences of other clinical information systems, the questionnaire, introduced in the next section, attempts to probe the attitudes of health professionals in Ireland to an EHR.

Results

The survey questions covered the following topics:

- Demographic Details
- Computer Skills
- How Patient Clinical Information is Recorded
- Expected Impact of Electronically Sharing Clinical Information
- Access to Patient Clinical Information
- Unique Health Identifiers
- Patient Confidentiality
- Trusting Shared Data
- Experience of a New Clinical Information System

• Support for an ICEHR System

The questionnaire was circulated either as an attachment or as an online questionnaire link to potential contacts, doctors and nurses working in Ireland, in July 2009 and August 2009, to the Health Informatics Society of Ireland (HISI) distribution list and to students in the health informatics classes at Trinity College Dublin. Members of the classes were also asked to forward the link to their colleagues. The questionnaire was also posted to contacts and colleagues of the author who were author employed as nurses and doctors in Ireland. Complete responses were obtained from 23 doctors and 52 nurses. The following results were obtained from the respondents.

Expected impact on care provision and patient safety

87% of doctors and 90% of nurses who responded, supported the introduction of an ICEHR system, and the majority indicated patient care and patient safety as the reasons for their support. A clear majority of respondents taken as a whole believed that there would be improvements in ability to make patient care decisions (92%), reduction in repetition of questions to patients (90%), enhanced timeliness of service provision (92%) and improved patient safety (96%) as a result of electronically sharing more detailed patient clinical information.

Expected impact on communications

The majority of survey respondents believed that an ICEHR would improve communication in a number of ways.

Expected impact on data quality

There was also broad agreement about the impact on data quality. 100% of respondents were of the opinion that the introduction of an ICEHR would improve the legibility and clarity of patient care orders while 93 believed that the timeliness with which patient related data would be available would be improved or much improved.

Expected impact on work practices

The study showed an interesting mix of opinions in relation to the expected impact on work practices (see pie charts in figure 1 to figure 4 below). The quoted benefits could be attributed to the introduction of both a local electronic patient record system or a cross institution integrated care electronic health record system. Broadly speaking, the respondents believed that the introduction of an electronic health record system would have a positive impact on different aspects of healthcare practice.

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Figure 1: Expected impact of the introduction of an EHR-S on the efficiency of work practices.

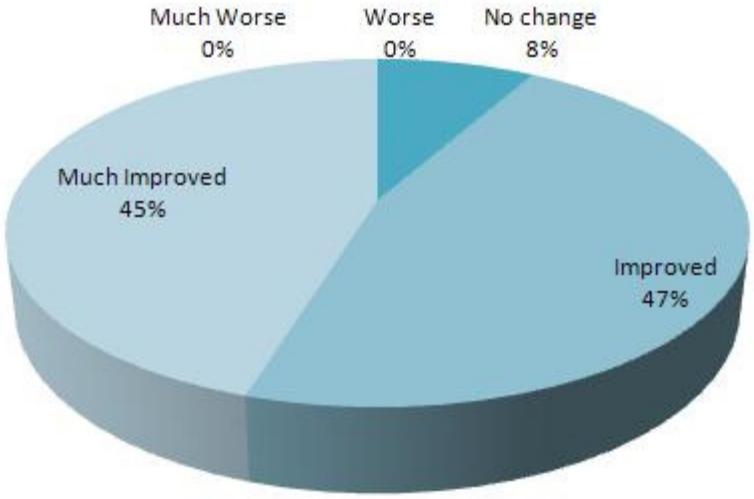

Figure 2: Expected impact of introduction of an EHR-S on the number of duplicate tests ordered.

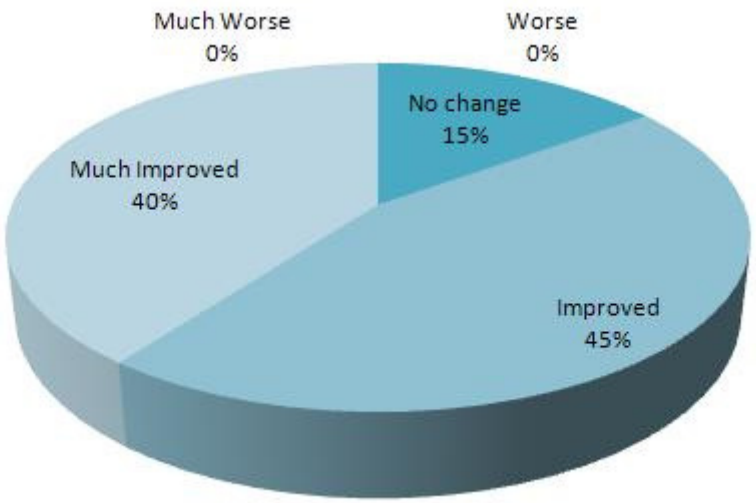

Figure 3: Expected impact of introduction of an EHR-S on the number of superfluous tests ordered.

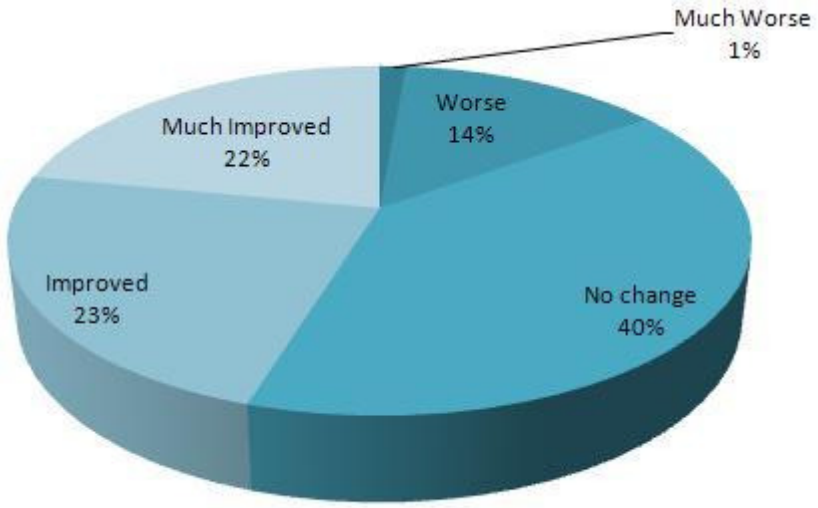

Figure 4 Expected impact of the introduction of an EHR-S on time spent documenting.

Access to Clinical Data

Survey participants were asked which information they would like to have more detailed access to. The majority of respondents indicated that they would like to have access to more detailed information for Patient Past Medical History, Patient Family Medical History, Clinical notes, Physical Examination Results, Observations, Prescribed Medications, Laboratory Results, Radiography Images, Diagnosis, Discharge Summary.

Unique Health Identifier (UHI)

All nurses, and all but two doctors surveyed, agreed with the introduction of unique health identifiers (UHI) for patients.

Patient Confidentiality

49% of Nurses and 61% of doctors thought that the introduction of an integrated care electronic health record might compromise the confidentiality of personal health data.

Trusting shared data

The respondents also expressed concern about the reliability of health information that is transferred between organisations.

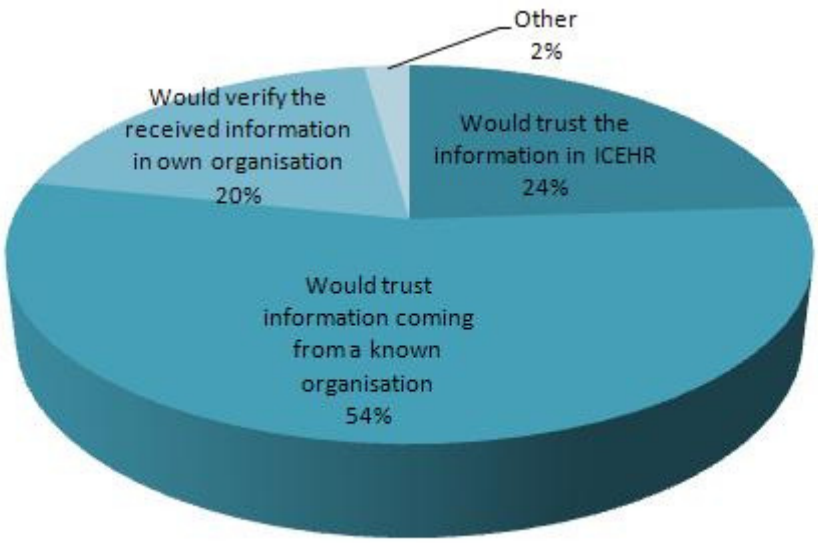

Figure 5: Extent to which nurses would trust data that has been shared by another health provider organisation as part an ICEHR.

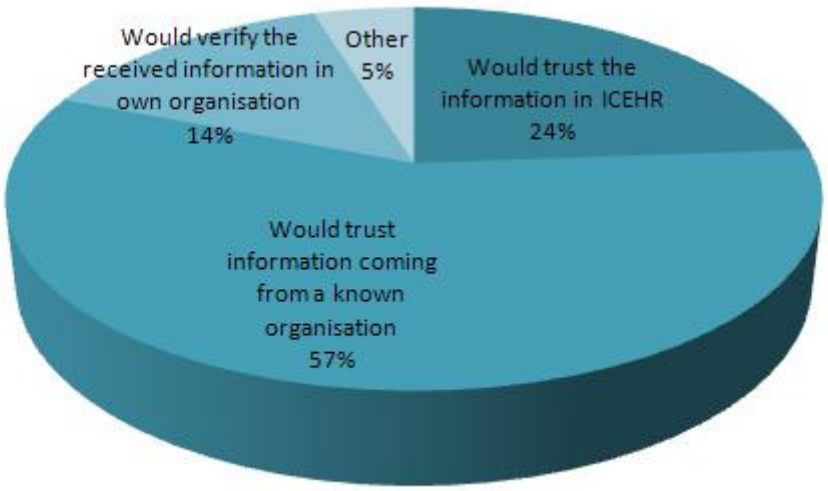

Figure 5: Extent to which doctors would trust data that has been shared by another health provider organisation as part of an ICEHR.

Attitudes to introduction of the ICEHR

Despite their concerns about these two issues, the respondents believed that, the ICEHR should be introduced.

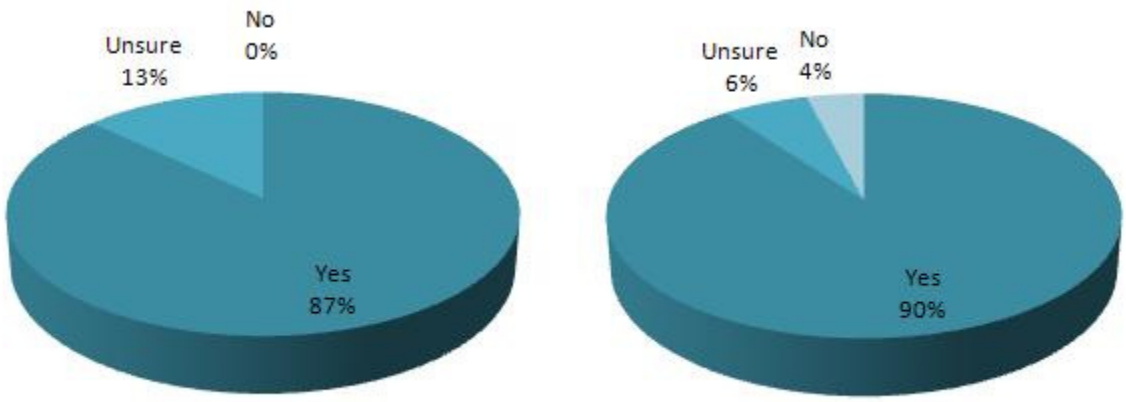

Figure 6: Attitudes of Nurses and Doctors in the study to the introduction of the ICEHR.

A comment from of one of the respondents neatly sum up the results of the survey as follows "*...It (the ICEHR) would be extremely useful in a variety of ways and would save significant amounts of time. Because of the all inclusive nature (of the ICEHR), it is likely to result in improved patient care. Must be balanced with the risks of breaches of confidentiality and deal appropriately with sensitive information...*"

So it appears that attitudes of individual Irish healthcare professionals who would be another set of key stakeholders in the health information gathering process, does not present a serious barrier to the introduction of an integrated care electronic record.

Experiences gained from national implementations in other countries suggest that the answers to some of the questions suggest a need for continued dissemination of and discussion about some of the issues and problems that surround the EHR.

Discussion

While a survey of the attitudes of health professionals in Ireland to EHRs was not found in the literature review, studies have been conducted in other countries to assess clinicians' attitudes prior to implementation of an EHR (Mori Social Research Institute, 2006; Harris Interactive, 2006; Royal College of Nursing 2004). These other studies differ to this study in that the design of the system was finalised in all three cases. In the case of the studies carried out in the UK (Mori Social Research Institute, 2006; Royal College of Nursing 2004) the implementation was in the early stages and had been rolled out to some users / respondents.

The survey, in this study, demonstrated overwhelming support for the introduction of an ICEHR system. 87% of doctors surveyed and 90% of nurses surveyed supported the introduction of an ICEHR system. The sample size for doctors in this study was small (23 respondents). While the results for doctors are indicative of the trends mentioned the results for doctors, taken on their own, may not be statistically valid.

A significant portion of respondents, 30% (7) of doctors and 37% (19) of nurses, are either graduates of a health informatics course or members of the Health Informatics

Society of Ireland (HISI). 44 nurses in total and 20 doctors in total indicated their support for an ICEHR system. 5 of the doctors indicating support and 18 of the nurses indicating support are members of HISI or graduates of a health informatics course. These figures alone, however, do not account for the majority of respondents opting in favour of the introduction of an ICEHR but it is to be expected that these respondents would be more favourable to the introduction of an ICEHR. The results may therefore reflect a more positive view than would be the case with health professionals in general.

'Number of years since qualifying' did not have any impact on the support shown for an ICEHR system in this study. This variable has a close collation to the age of the respondent that has been shown in many studies not to be a significant factor in attitude to clinical information systems (Ward, Stevens et al., 2008).

It has been established in other studies that computer skills affect clinicians' attitudes to information systems (Hobbs, 2002; Moody et al., 2004). In these studies clinicians with computer expertise were shown to have a more positive attitude towards clinical information systems. The majority of respondents to this survey reported their computer skills as good or excellent. The positive outcome in support of an ICEHR could be attributed in some way to the high computer literacy of respondents. The survey was undertaken in printed format and online. Almost 50% of the respondents replied in printed format therefore the high level of computer literacy reported cannot be attributed to a bias in selection of respondents. In a study carried out in the UK at the start of the implementation of the NPfIT programme, 41% of doctors and 51% of nurses agreed that staff would not have the necessary skills to use the technology being introduced in the programme. This sentiment is not echoed in this study as most respondents indicated their computer skills are good or excellent and clinicians' lack of computer skills were not mentioned in any of the free text fields by any of the respondents.

Improved patient care is cited as one of the advantages of EHRs (U.S. Department of Health and Human Services, 2009). The vast majority of respondents in this study were in agreement with this. This supports a finding in the UK where 68% of doctors and 66% of nurses agreed that the NPfIT programme, a programme that sees the introduction of EHRs to the NHS, will result in improved clinical care. A study carried out in the USA

prior to the introduction of an EHR established that 64% of physicians believed the EHR would enhance the quality of care (Harris Interactive, 2006).

In the USA a pre-implementation study of attitudes to an EHR found that 80% of physicians believed that an EHR would result in better coordination of care across settings (Harris Interactive, 2006). All nurses in this study, with the exception of one, found that internal communications in the hospital environment would be improved or much improved by electronically sharing more detailed patient clinical information. All doctors with the exception of 3 also found that internal communications between hospital staff would be improved or much improved. The majority of respondents also felt that communications between GPs, hospital staff and other community healthcare staff, and communications when patients are transferred to other facilities, would be improved or much improved by electronically sharing more detailed patient clinical information.

There was unanimous agreement from all respondents that legibility and clarity of patient care orders would be improved or much improved by electronically sharing more detailed patient clinical information. The majority of respondents also agreed that the timeliness with which patient related data would be available would be improved or much improved.

Opinion was mixed in this study regarding the amount of time spent documenting patient care. Some respondents indicated that the amount of time spent documenting patient care would be better, quite a large proportion indicated that it would be unchanged and some respondents indicated that it would be worse or much worse.

In this study the majority of clinicians believed that work processes would become more efficient. The reduction in duplicated tests is cited as an advantage of electronic sharing of patient clinical information (Jones, 2006). Respondents see this as an advantage of electronic sharing of more detailed patient clinical information and the majority find that the number of duplicate tests ordered and the number of superfluous tests ordered would be much improved or improved.

HIQA published its recommendation regarding Unique Health Identifiers (UHI) in March 2009. A group was subsequently set up by the Department for Health and Children to work on the introduction of UHIs in preparation for the Health Information Bill in 2010. There was a unanimous vote of support among nurse respondents for the introduction of a

Unique Health Identifier (UHI). 91% of doctors were also in favour of the introduction of a UHI. This is in stark contrast to the situation in the USA where privacy and security concerns over electronically sharing patient information have sidetracked the development of standards for a UHI (Hillestad, Bigelow et al., 2008).

Patient confidentiality is cited as a concern of clinicians when electronically sharing data (Jones, 2006). A large proportion of respondents, 61% of doctors and 49% of nurses indicated that they believe patient confidentiality could be jeopardised as a result of electronically sharing more detailed patient clinical information. Doctors were for the most part concerned with threats that were internal to the organisation, namely staff inappropriately accessing records or not logging out of computers properly. Nurses were also concerned about threats from inside the organisation. External threats such as insurance companies gaining access to the system or 'hackers' gaining access to the system also featured as examples of how respondents felt patient confidentiality could be jeopardised. Health Infoway Canada and The Office of the Privacy Commissioner of Canada co-sponsored research to explore the Canadian publics' attitudes towards electronic health information and their privacy (EKOS, 2007). They found strong and increasing comfort levels with the EHR and measures that could be taken to further increase comfort levels with the EHR were identified. Of the 2300 people surveyed 77% indicated that they would be more comfortable with the EHR if they knew they would be able to find out who accessed their health records and when. 74% would be more comfortable with the EHR knowing they would be informed of any privacy and security breaches and 70% indicated that the ability to access, verify and report corrections to their health records would increase their comfort levels (EKOS, 2007).

A major benefit of electronic data sharing is the reduction in duplicate tests (Jones, 2006). This will not be realised unless clinicians trust and use the information from an EHR (Jones 2006). Will clinicians trust electronically shared patient clinical information? The majority of doctors, 57%, indicated that they 'would trust and use the clinical information from an ICEHR system if it was coming from a known organisation only'. 24% of doctors indicated that they 'would trust and use the clinical information obtained from an ICEHR system'. 14% indicated that they would verify the information in their own organisation. The majority of nurses indicated that they would trust and use the clinical

information from an ICEHR system if it was coming from a known organisation only, with 54% of respondents choosing this option. 24% of respondents indicated that they would trust and use the clinical information obtained from an ICEHR system. 20% of respondents reported that they would verify the clinical information in their own environment. The acceptance of a clinical information system has been shown to increase with time so although the majority of clinicians have indicated that they would use the information from an ICEHR system it is expected that this figure would increase as acceptance increases (Ward, Stevens et al., 2008).

Respondents were asked if a new clinical information system had been implemented in their work environment in the past five years and they were asked of their experiences with this/ these systems. Respondents took the opportunity to praise the new systems that had been implemented and illustrated how they saw the benefits of clinical information systems and the resulting improvements in clinical processes and outcomes. During the course of the study a few clinicians raised the issue of a lack of access to IT equipment.

The introduction of an EHR for Ireland is a project involving many technical, cultural and legislative challenges. An EHR requires collaboration and team work from health professionals within organisational boundaries and across organisational boundaries. An EHR will involve changes to well established workflows which will require an effective change management strategy. The literature on the introduction of new clinical information systems illustrates the importance of clinician involvement and leadership and in the case of an EHR this is imperative. The EU EHR implement report describes how in the United Kingdom clinicians were not sufficiently involved in the procurement phase of the EHR and how this remains a critical issue for the NPfIT project (EU EHR Implement Project, 2010). This report also details issues that were encountered in France due to lack of clinician involvement. Communication between stakeholders and involvement of stakeholders were identified in the EU EHR implement report as key factors for a successful EHR implementation (EU EHR Implement Project, 2010).

Conclusion

This study has found the attitude of health professionals in Ireland to electronic data sharing, within an ICEHR, to be very positive. The overwhelming majority voted in favour of the introduction of an ICEHR system. 87% of doctors surveyed and 90% of nurses surveyed supported the introduction of an ICEHR system, citing improved patient care and improved patient safety as the primary reasons for their support. The vast majority of health professionals are in agreement with the potential for improved communications, improved data quality and improved efficiencies in work practices that the system can offer. This vote of support is however, appended with a concern about patient confidentiality and the treatment of sensitive data. This is not surprising, as in many EHR implementations in other countries the issue of confidentiality has been a source of considerable concern (Jones, 2006). Nonetheless, clinicians in this survey have expressed a need for more detailed access to patient clinical data and the vast majority have voted in favour of a system such as an ICEHR that can provide this. Studies have shown the importance of clinician involvement and communication with all stakeholders in the implementation of an EHR (EU EHR Implement Project, 2010). The attitude of health professionals in Ireland was shown to be extremely positive however this enthusiasm needs to be maintained by involving and communicating with clinicians at all stages of the implementation process.

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