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Leading change: introducing an electronic medical record system to a paramedic service

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Abstract

Purpose – Leaders in health-care organizations introducing electronic medical records (EMRs) face implementation challenges. The adoption of EMR by the emergency medical and ambulance setting is expected to provide wide-ranging benefits, but there is little research into the processes of adoption in this sector. The purpose of this study is to examine the introduction of EMR in a small emergency care organization and identify factors that aided adoption.

Design/methodology/approach – Semi-structured interviews with selected paramedics were followed up with a survey issued to all paramedics in the company.

Findings – The user interfaces with the EMR, and perceived ease of use, were important factors affecting adoption. Individual paramedics were found to have strong and varied preferences about how and when they integrated the EMR into their practice. As company leadership introduced flexibility of use, this enhanced both individual and collective ability to make sense of the change and removed barriers to acceptance.

Research limitations/implications – This is a case study of one small organization. However, there may be useful lessons for other emergency care organizations adopting EMR.

Practical implications – Leaders introducing EMR in similar situations may benefit from considering a sense-making perspective and responding promptly to feedback.

Originality/value – The study contributes to a wider understanding of issues faced by leaders who seek to implement EMRs in emergency medical services, a sector in which there has been to date very little research on this issue.

Keywords Information systems, Health care, Emergency care, Leading change, Electronic medical records

Paper type Research paper

Introduction

Leaders in health-care are currently facing difficult decisions about how to introduce new information technology systems into their organizations. Innovative new electronic medical record (EMR) systems may have a positive impact on health outcomes (Car *et al.*, 2008) although a recent systematic review found that the empirical evidence for this is not strong (Black *et al.*, 2011). However, medical errors are the cause of tens of thousands of deaths in the USA each year (Kohn *et al.*, 2000), and calls for adoption of

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EMR as a tool to reduce medical errors have been heard from patient safety advocates and regulators (IOM, 2007; Martinez, 1996). In 2008, the Affordable Care Act effectively mandated EMR throughout the US health system. Reduction of medical errors, accurate documentation of patient condition and treatment, as well as the potential for data collection to make substantial contributions to medical research, are all driving the adoption of EMR throughout the health-care system (Car *et al.*, 2008).

Emergency medical service and advanced care provided out-of-hospital by paramedics are relatively new components of the US health-care system. Only in recent years have health systems recognized that care delivered by paramedics staffing ambulances makes a critical difference to patient morbidity and mortality (Björklund *et al.*, 2006). Paramedics respond to calls for medical help, perform physical examinations and initiate treatment, and they are expected to thoroughly document their patient encounters (Landman *et al.*, 2012). Until very recently, they have used traditional paper documents, written in the hospital immediately following the delivery of a patient.

There is a positive impact on the health system when ambulance services adopt EMR (Newgard *et al.*, 2012). In all, 89 per cent of hospital emergency department physicians surveyed in the USA reported that the paramedics' written medical chart was important or very important to their emergency department medical practice; those same physicians overwhelmingly preferred an electronic record to a hand written chart, 52 per cent versus 17 per cent (Bledsoe *et al.*, 2013). Within the emergency medical services field, there is, thus, evidence to support the benefits of adopting EMR systems, but there is little research on processes that leaders can use to support adoption.

This paper concerns research into the introduction of an EMR system within a small, privately owned emergency medical services and ambulance firm in the north-west of the USA. AMB Company (note: a pseudonym is used to protect confidentiality) made the use of a new EMR system mandatory for all its 34 paramedics. The EMR system comprised innovative electronic charting; the organization and its paramedics had been using a paper charting system for over 20 years before the change.

The leadership at AMB introduced the new system with clear policies and procedures about when, where and how the system was to be used. The change encountered resistance from paramedics, who reported a range of problems including, but not limited to, difficulties with the software, hardware and practical issues around timing of use. The company leadership was initially rigid in its expectation of how the system would be used, particularly in regard to the timing and hardware, or mode, of use. As the implementation period progressed, however, significant flexibility was added to the system, allowing for different individual patterns of access and use to develop.

This study was designed to answer the research question:

RQ1. How does permitting flexibility with timing and mode of use affect the acceptance of the adoption of an electronic medical record system by paramedics?

It is a case study of one small organization but with potential for learning for other paramedic services.

The study was carried out 20 months after the EMR system was first introduced. A mixed methods approach obtained both qualitative and quantitative data from the

paramedics employed at the company using semi-structured interviews and an electronic survey.

Changing systems and processes

Academic research and practitioner advice on how to bring about organizational change is extensive, and ranges from theories that put forward a series of stages that leaders of change should follow, through inspirational approaches (Kotter, 1995, 2012; Appelbaum *et al.*, 2012) or through project management phases (Hayes, 2014), to theories that regard the leadership of change as a matter too complex to be represented by linear stages and which advocate individualized context-sensitive approaches (Balogun and Hope Hailey, 2008; Balogun and Johnson, 2005).

It may be that the most effective approach to leading change depends on the specific situation, including the kind of change required, and the circumstances of those who are required to change their behaviour. A sudden change calls for a different approach than an incremental one (Balogun and Hope Hailey, 2008); a simple change may be successfully implemented by different methods than a complex change (Aitken and Higgs, 2010); a culture change requires a different approach from a change to processes and procedures (Christensen *et al.*, 2006). Changes have been described in terms of "hard" and "soft" changes (Paton and McAlman, 2007), where hard changes are specific technical changes and soft changes are more diffuse, organizational and cultural changes. Success in hard changes may be achieved by project planning and management; success in soft changes requires discussion and achieving agreement across different perspectives on the change (Senior and Swailes, 2010). However, some changes, such as medical innovations, may have at their core a change in technology – a "hard" change characteristic – but a "soft" periphery (Denis *et al.*, 2002).

It is widely recognized that a key task of leadership in introducing and implementing change is handling the reactions of other members of the organization who may be reluctant to adopt the change. Leaders need to deal with lack of commitment or opposition (Hayes, 2014). However, resistance can play a constructive role in improving both the process and result of a change (Burchell, 2011). Leaders of change may view resistance as a form of feedback and accept the challenge of putting that feedback to work constructively (Ford and Ford, 2009).

The term "electronic medical records" may be used to describe a wide variety of information technology applications, from files on single patients to national databases (Greenhalgh *et al.*, 2009). An EMR may be cross-organizational, designed to be implemented across a whole health-care system or it may be more fragmented, bottom-up, introduced within a single organization (Coiera, 2009). Issues concerning leading implementation may, realistically, be expected to vary, depending on the scale and scope of the proposed system. The example studied in this research was a relatively modest application, comprising reports on individual patients, introduced within a single organization.

Conceptual frameworks frequently used for analyzing the introduction of information technology into health-care settings are the technology adoption model (TAM) and the related the universal theory of acceptance and use of technology – UTAUT (Holden and Karsh, 2010). In the TAM, individuals' intention to use a new technology is thought to be primarily influenced by their perception of the usefulness of the technology and their perception of the ease of use (Davis, 1989). Bagozzi (2007)

criticizes the omission in TAM of social variables (such as social norms) and this is remedied in the UTAUT, which includes perceived social attitudes to the technology, along with perceptions of usefulness, perceptions of ease of use and perceived facilitating conditions (Venkatesh *et al.*, 2003).

There is evidence from studies that use the TAM or UTAUT (Maillet *et al.*, 2015; Money *et al.*, 2015), as well as from studies that do not (Boddy *et al.*, 2009; Lapointe and Rivard, 2005), that the introduction of EMR is better accepted when there is a strong perceived usefulness and no loss of clinician autonomy. Resistance, on the other hand, can take root where there are strong feelings that the EMR complicates the clinicians' work and makes workflow more difficult to manage (Hamid and Cline, 2013). When the change results in a net benefit for the clinician, such as through improved workflow, barriers will be diminished (Joshi, 1991).

In a systematic literature review of research into EMR implementation, McGinn *et al.* (2011) found that significant factors for health professionals other than physicians included not only perceived usefulness and perceived ease of use but also potential barriers in the form of workload pressures and design or technical concerns relating to the software or hardware. Hamid and Cline (2013) found a correlation with increasing age of users as a factor in resistance to acceptance of EMR by physicians. However, the same study failed to find such a correlation in the advanced nurse practitioner community.

Resistance to the adoption of information technology initiatives, including EMR, has been well documented in the physician community. As health-care systems adopt EMR, it has been possible to mandate nearly everyone to use it except physicians; thus, much of the research concerns factors influencing physicians' decisions about adoption (Audet *et al.*, 2014; Hamid and Cline, 2013; Hsieh, 2015). In these situations, models of the spread of innovations are applied to analyze how to gain willing adoption (Berwick, 2003; Rogers, 1995). However, it is questionable whether much of this research is directly applicable to situations where EMR use is mandatory (Rivard and Lapointe, 2012).

Management reaction to resistance is also likely to have an impact on the success of implementation. Lapointe and Rivard (2005) concluded that if managers are quick to recognize resistance and seek to find workable solutions, then barriers to acceptance may be overcome. Conversely, if managers themselves fail to respond quickly to resistance, then obstructive behaviour can become deeply entrenched (Rivard and Lapointe, 2012). Hamid and Cline (2013) also found that clinician acceptance was directly related to management resolving technical problems as promptly as possible. It is not only management, however, who can put feedback to good use. The process of disseminating innovation in a non-linear fashion by participant stakeholders at all levels may influence adoption. As various stakeholders individually and collectively assess new practices, they also accelerate or impede diffusion of innovations (Denis *et al.*, 2002). Encouraging early adopters to experiment and try local adaptation of health-care innovation can enhance dissemination and reduce resistance (Berwick, 2003).

Given the emphasis on user perception in the TAM, the UTAUT and other research approaches, a sense-making perspective may be a useful framework for interpreting reactions to the introduction of technological change (Jensen and Aanestad, 2007). Sense-making involves an ongoing effort to interpret actions, events and disruptions into a contextualized order that organization members find comprehensible (Weick,

1995; Weick *et al.*, 2005). Clinicians are not simply the "passive receivers" of an EMR system. Through contextualization of use and communication with peers, the clinicians themselves define what the system will be (Hennington *et al.*, 2009).

Two studies are particularly relevant in examining this. Wagner and Newell (2007) found that the use of off-the-shelf rather than custom software solutions provided a false promise of straightforward follow-the-recipe implementation. In reality, the process involved an ongoing cycle of configuration, customization and implementation based on user input. This is congruent with Berwick's (2003) more general observation that innovations in healthcare are more often adapted than adopted.

Hennington *et al.* (2009) found that the implementation and acceptance of mandatory EMR use by a group of hospital nurses led to a new multi-dimensional view of nurses' use of EMR technology. While the use of the system was mandatory, the study found that in practice, the nurses engaged with the system in many individualized ways, in relation to timing and mode of use. Factors such as case load, work flow and social influences of others affected choice of mode of use.

There is a paucity of research on EMR use in the emergency medical services and ambulance sector. Studies that have been undertaken focus on quantifiable specific effects such as the impact on the duration of ambulance calls (Kuisma *et al.*, 2009) and an increase in the total quantity of exam information documented (Katzer *et al.*, 2012). However, one small qualitative study of emergency medical service agency directors explored drivers and challenges of EMR implementation in the sector (Landman *et al.*, 2012).

Landman and colleagues interviewed 23 agency leaders from 20 emergency services organizations in the USA and Canada. Respondents reported that key drivers of using EMR were improved quality assurance, improved legibility of charts and improved systems for billing for work carried out. Challenges included financial factors (high cost of start-up), technical factors (user interface designs) organizational factors (complex structures and lack of leadership) and concerns over information security and patient privacy. Challenges specific to emergency services reported to Landman *et al.* (2012) were concerns about the amount of time it would take paramedics to complete electronic charts and the impact of this on ambulance response times. Respondents also reported frustration over difficulties integrating the EMR systems with those of the hospitals.

In summary, the literature indicates that the introduction of EMR into health-care organizations may face technical, organizational and individual barriers to success. Leaders planning change initiatives to implement mandatory EMR use would benefit from a good understanding of how users make sense of the system (Jensen and Aanestad, 2007, Hennington *et al.*, 2009).

There is little research on the processes of introducing EMR into emergency services organizations. The qualitative study by Landman *et al.* (2012) indicated some specific challenges to adoption in this setting, including issues that relate to leadership, to the technical interface and perceived ease of use. This study aims to further explore these issues in one organization.

Methodology

The research followed a pragmatic, inductive approach (Gray, 2014; Robson, 2011), gathering and analyzing both qualitative and quantitative information. The research

design was approved as compliant with the research ethics procedure of the university with which the researchers were associated.

In Phase 1, a qualitative semi-structured interview sought a deep view into the interpretation of and adaptation to the change process itself. In Phase 2, a quantitative survey administered to all 34 paramedics employed by AMB Company elicited detail about specific dimensions of use identified in the semi-structured interviews.

This approach provided opportunities for new information to emerge throughout the study, minimizing the risks of following too narrow a preconceived theory on how the subjects have made sense of the change (Gray, 2014; Robson, 2011).

Semi-structured interviews of 30 to 45 min duration were conducted face to face during January and February of 2014 with four paramedics who had been involved in the EMR implementation project at AMB Company. Interviewees represented leadership, mid-management, trainers and junior paramedics. All were licensed paramedics and had experience as end users of the new system.

Interview questions were drafted building upon previous research into the area of mandatory EMR use in healthcare and sense-making in EMR implementation (Jensen and Aanestad, 2007). A pilot interview was conducted with a paramedic from another ambulance company to test the relevance and effectiveness of the questions. Following the pilot interview, the questions were revised for clarity. Question began with reflection on the transition period to EMR with subjects asked to describe how they initially used the system. The interviews then moved to current use and concluded with discussion of leadership performance during the change process. The use of a semi-structured format assured that interviewees had opportunities to introduce new concepts about the change.

The interviews were audio recorded and professionally transcribed to aid in coding. Thematic analysis elicited patterns and major themes from the responses to the questions (Braun and Clarke, 2006). A manual approach was taken to coding, rather than using a software programme. With the small number of interviews, this was an appropriate method to keep close to the context and meaning of the information (Easterby-Smith *et al.*, 2012).

Key-coded phrases were grouped into themes. Themes were then formatted in a side-by-side comparison table to evaluate the interviewee responses regarding conditions at the beginning of the change process as contrasted to conditions at the time of interview, 20 months after implementation.

The interview process provided deep insight into how the system was being used and, thus, informed development of specific questions for the second phase of data collection, a structured survey of all 34 paramedics at AMB Company. Survey questions were primarily designed as closed response to allow for quantitative analysis of identified elements of system use. Two open-ended questions were included to provide those surveyed an opportunity to introduce new information and generate qualitative data that may support or refute findings of the semi-structured interviews.

The electronic survey was developed using QuickSurveys by Toluna Analytics, Inc. A pilot version of the survey was sent to two paramedics at firms other than AMB Company who had been through a similar transition to using EMR. The piloting identified several potential improvements; therefore, the survey was revised and sent out again. Following a second round of piloting, the survey tool was finalized. The 17 questions in the survey focused on attitudes and preferences about using the hardware

and software during both the initial transition and later, following the introduction of multiple modalities of use.

A web link was emailed to the 34 paramedics employed at AMB Company in March 2014, along with a cover letter explaining the nature of the research, the topic and a statement of confidentiality. The initial emailing resulted in 14 completed surveys returned within ten days. A follow up email request was sent in April 2014 and the survey closed after five weeks. In total, 30 responses were received. One response was rejected as incomplete resulting in a total response of 29 or 85 per cent.

Findings

The decision

The decision to adopt an EMR system was influenced by a desire to improve systems for billing for work carried out and to improved quality assurance (as found in Landman *et al.*, 2012). The particular EMR system was chosen as being compatible with the company's billing system. Close electronic integration with hospital systems was not possible, as Landman and colleagues also found, and the new EMR system transferred information to the hospitals by automated fax.

The implementation process

At the onset of the change, the mode of use was limited to a tablet computer with a touch screen and stylus. Paramedics were told that they should begin their charting in the ambulance as they responded to a call. They were expected to be able to enter information such as incident location on the way, then hold the tablet and chart at the patient's side throughout the contact, completing the chart in the ambulance while returning back to their station. This is referred to as the "initial design" of the EMR system in the text that follows.

Initial training on the system was limited. Each paramedic was required to enter a series of mock patients into the system to gain basic familiarity. Once those were complete, the paramedics were required to use the EMR for all actual patient encounters. They did have access at all times for help from a group of peer volunteers who had undergone a day-long intensive training programme provided by the software vendor.

Paramedic concerns about the difficulties of implementing EMR in this way were communicated to the company leadership a few weeks into the change process, and the system was redesigned. New hardware devices and points of access were added to the system enabling much greater flexibility in mode of access (Table I) and the protocol

Table I.
Modes of access

Modes of access	Initial design	Added later	Removed later
Tablet	x		
Touch screen	x		
Stylus	x		
Bluetooth keyboard		x	x
USB keyboard		x	
Desktop in station		x	
Mouse		x	
Private laptop		x	
Remote web access		x	

was revised to allow for the time of use to be determined by the paramedic, at any time during their 24-hour shift. Subsequently, access from home or other remote locations was added to further enhance flexibility. Software configuration was also modified as the change progressed to add flexibility of use. This is referred to as the "adjusted design" in the text that follows.

Reactions

Three of the four interviewees were experienced paramedics, with leadership roles in the company; the fourth had less than 5 years' experience. Of the 29 respondents to the survey, 13 had less than 5 years' experience, 7 had 5-10 years' and 9 had 11 years' experience or more.

The interviewees indicated that there were difficulties using the system at first. The process of actually using the tablet, while on a call was problematic for some. Interviewee KC said: "I hated it". However, interviewee EW said: "I'm a Millennial. We live on computers. It's very easy for me to adopt this system".

All interviewees said that during initial implementation, the process of documenting and completing a chart became much more complicated. Interviewee SF said: "I noticed that instead of doing patient care, I was too focused on trying to figure out what to put where in the computer". Some concerns that were raised were quite surprising. It was revealed that many paramedics became car sick while attempting to use the tablet computers, for example.

In the survey, ten respondents said that they found the adoption of EMR difficult or very difficult, while 11 said that they found it easy or very easy. Of the 11 who found it to some extent easy, 7 had less than 5 years' experience; only one respondent with less than 5 years' experience reported finding the change difficult or very difficult (Figure 1). During the initial design phase of EMR implementation, when only the tablet computer and stylus were available, 20 respondents (67 per cent) found the system frustrating or very frustrating, and the same number reported that using the system as initially designed by management was difficult or very difficult. All of the paramedics with 11 years' or more experience reported they had difficulty.

As more hardware tools were added, 25 survey respondents (86 per cent) said that the system became easier or much easier to use (Figure 2). After the different modes of access were made available, individual paramedics were able to choose how they used the system. Interviewee TG said:

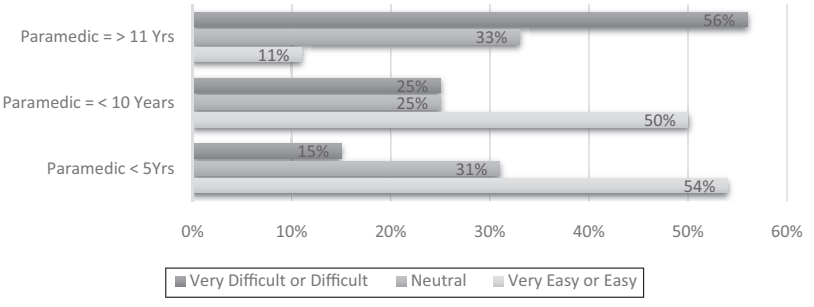

Figure 1. Degree of difficulty with transition cross-tabulated to years of experience

> Personally, I like to use the desktop, my own computer in my office, because I am used to that. I'm not comfortable using a stylus […] it's easier for me on a keyboard.

Interviewee SF said: "I use my laptop […] It's just mine". Interviewee KC preferred to:

> […] sit in the front passenger seat and I try to type in as much as I can on the tablet […] once we get to the narrative I usually just leave it, and then we get back to the station I bring the [USB] keyboard in and sit down and finish.

Interviewee EW, the self-described Millennial, said:

> I typically do everything except for the narrative […] on the touch screen [enroute back]. I upload it to the website where I am able to complete it with an actual keyboard [on a desktop].

Time of use also differed among all four interviewees. EW reported beginning his chart on the tablet before even arriving at the scene of a call. Others varied in time of use from on the way back to the station in the ambulance, to at the station but immediately upon return, to even waiting until many calls were run then charting several at the end of a shift.

Questionnaire responses indicated that 22 respondents (76 per cent) had developed a strong or very strong preference for how they accessed the system (Figure 3). Only three respondents said that they still accessed the system as originally intended, using the tablet and stylus. All the others used other hardware, as well as the tablet or, in three cases, without using the tablet at all. As well as new hardware, additional choices about software were introduced, and 22 respondents said that they had strong or very strong preferences about the software they used.

Commenting on the added flexibility provided in the adjusted design phase, interviewee EW summarized:

> […] being flexible with your requirements in terms of how people do their charts, I think is important, as long as they're [i.e. the recipients are] getting the information they need out of it.

Interviewee TG said:

> If you can take hurdles down, easy ones like adding more licenses, more hardware access, things like that to make it easier, it will benefit you with very little cost.

The interviewees all commented on the range of preferences for use they observed. SF said: "We have all found our own way of doing it that we find successful". EW commented that: "Everybody has their own different way of doing it".

All four interviewees said that additional formal training might have helped early acceptance, and this comment was also offered by 11 survey respondents. To supplement the minimal formal training, an informal system of peer-to-peer dialogue

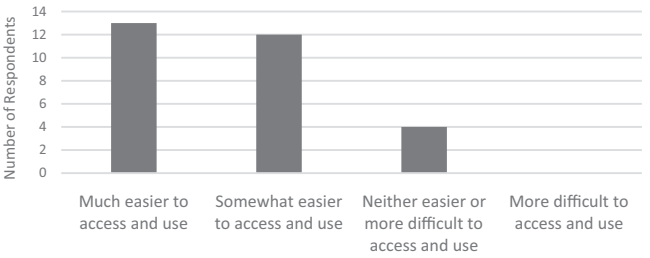

Figure 2.
As more hardware tools such as USB keyboards, desktops in quarters and remote laptops were added the electronic system has become:

developed to provide mutual help. Some paramedics offered assistance to colleagues who were having difficulty with the new system. These paramedics, according to interviewee TG, would "sit down with crews on shift and go through the software with them one on one". EW said:

> I actually volunteered to be one of the trainers to spur the other staff as we upgraded […] teaching the other team members how to correctly use the software […] where the short cuts are.

In the survey, 14 respondents (48 per cent) said that learning from peers had been very helpful and 9 (31 per cent) said it had been somewhat helpful.

This peer-to-peer dialogue extended beyond AMB Company employees. AMB Company paramedics frequently talk to paramedics from different agencies when they cross paths in the hospital emergency department. KC commented that:

> If you would talk to another agency in the hospital, they were sitting there with their tablet learning how to use their system […] [you could] see other people having the same frustrations.

The importance of user feedback loops and an ability to make modifications to the system was noted by interviewees as a key to successful implementation. EW said:

> I think the best thing for charting [EMR] is to continue to have feedback from the people who are using it. If you are consistently getting the same feedback […] that we would be able to quickly address it and change it [i.e. the system].

When asked if they found that there were any benefits to having undergone the change to an EMR system all four interviewees said that the quality of the chart was better under the EMR system. Comments included terms such as "more objective" and "significantly more accurate", as well as "it gives more opportunities to remember details and that sort of thing". Interviewee SF supported that position in her comment: "The data that we get from these electronic charts is priceless". Seven survey respondents (24 per cent) suggested that the company should now contemplate adopting paperless systems.

Discussion

The research question for this study was:

RQ1. How does permitting flexibility with timing and mode of use affect acceptance of the adoption of an electronic medical record system by paramedics?

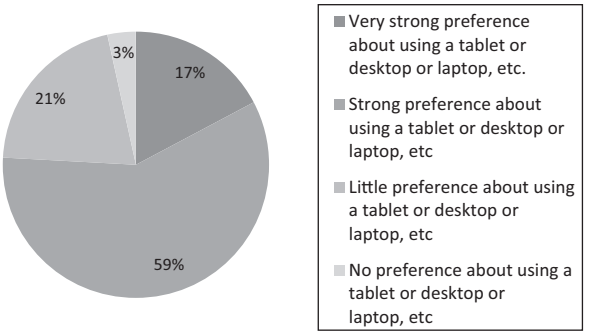

Figure 3.
I have a personal pereference about when and where I log on and use the hardware tools available for electronic charting. For example I have

The findings indicate that allowing individual flexibility of use significantly aided the acceptance of the EMR system in this company.

Other studies have found that the perceived ease of use of information technology is a factor influencing successful adoption by health-care professionals (Maillet *et al.*, 2015; Money *et al.*, 2015) and that the technology-user interface is an issue of concern (Landman *et al.*, 2012; McGinn *et al.*, 2011). This was the case in this study, which highlighted the differences in preferences for use of individual paramedics (as was the case of the nurses in Hennington *et al.*, 2009). Ease of use and the resolution of the technical problems were achieved in different ways for different users, and therefore, a key factor in successful implementation was arranging for flexibility of use. As Berwick (2003, p. 1971) said about implementing innovations generally, an effective leadership approach may be to allow for adaptation rather than insisting on "absolute replication".

Initially, the leadership approach was as though this change was a "hard" technological change (Paton and McAlman, 2007) calling for simple direction (Senior and Swailes, 2010). However, responding to critical feedback from users, the leadership approach became more participative (Hayes, 2014), allowing emergent, organic modification to the initial design, which made sense to users while still achieving the over-arching goal (Balogun and Johnson, 2005). The approach became more as Aitken and Higgs (2010) describe is suitable for complex changes – fostering a deep understanding of the change, attending to issues of resistance, encouraging the cycle of learning and empowering capacity for influence among peers.

An important factor was the constructive reaction of the company leaders to the critical feedback from the paramedics. This is congruent with the findings of Hamid and Cline (2013) regarding managers quickly resolving technical problems experienced by clinicians, and with the recommendations of Lapointe and Rivard (2005) that if managers find workable solutions to early EMR problems, resistance can be overcome.

Although in the initial stages, the new technology was perceived to make the paramedics' work more complicated and the workflow more difficult to manage (Hamid and Cline, 2013 and Landman *et al.*, 2012), these barriers were overcome as more flexible options were made available and as each paramedic learned how they could best use the system.

The findings indicate individual paramedics engaged in a sense-making process during the implementation phase (Jensen and Aanestad, 2007). In so doing, they were able to comprehend and adapt to a disruptive change. This process was aided by the social influences of more adept paramedics helping their colleagues and by active learning between peers. The paramedics themselves strived to share and develop their learning, to overcome perceived barriers and build a successful system. It could have been aided further by more formal training at the outset.

This study focused in particular on aspects of the ease of use of the new technology in a situation where the implementation of an EMR system was mandated. It has not, therefore, uncovered the range of facilitators and challenges that have been discussed in other studies. The research did not, for example, explore paramedic perceptions of usefulness of the technology at the start of the implementation process, so it is not possible to say whether this factor was influential in this case. However, the paramedics interviewed 20 months after implementation recognized the benefits the new EMR system brought to the service provided by the organization. These benefits correlate

with the findings of others (Katzer *et al.*, 2012; Landman *et al.*, 2012; Newgard *et al.*, 2012).

Conclusions

In this case, the successful implementation of an EMR system was achieved through the leaders of the emergency services company responding quickly to feedback about problems with the technological interface of the initial design and enabling individual flexibility of use of the system, as long as the desired outcome was achieved. A significant role was played by paramedics who voluntarily aided the learning of colleagues.

The initial approach of the company leaders was in keeping with a simple, "hard" (technological) change, but successful implementation was only achieved when a more responsive, supportive and flexible approach was adopted, which allowed individual users to adapt the change to their own preferences.

There is currently very little research into the adoption of EMR systems by emergency medical services; more inquiry into approaches that leaders have taken to achieve adoption would be valuable. It would be particularly interesting to see whether two findings of this study apply elsewhere:

(1) the variety of individual preferences for using the EMR system; and

(2) the relationship between years of experience as a paramedic and reluctance to change.

This is a case study of one small organization, and we must be very cautious about the extent to which findings can be taken as generalizable or likely to occur elsewhere. However, it seems likely that in such cases, it will benefit leaders to engage clinicians in a sense-making discourse at the outset and create opportunities for them to identify improvements to the system as it is being implemented. As inevitable unexpected barriers develop, leadership and users who communicate well and often, while seeking to find tangible solutions to problems, are likely to find the most success by developing an emergent change strategy.

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