

IT IN THE EMERGENCY DEPARTMENT

What is the Impact of Technology?

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Keywords: Emergency Department, information system, impact.

Abstract: Emergency Department Information Systems (EDIS) are commonly used to improve access to patient information at the point of care. While such systems hold great promise, there has been little research evaluating the impact of these systems. To investigate the Emergency Department (ED) staff perceptions of the impact of computerised information systems in this department, a qualitative study was conducted. In this study, data were collected using in-depth semi-structured interviews with the ED staff. In total, 34 interviews were conducted and data were analysed using framework analysis. The results showed that the impact of information systems could be categorised as individual impact, organisational impact, and impact on patient care. The impact of technology could be positive (e.g., improving the accessibility of information) or negative (e.g., interrupting staff workflow due to system downtime). The results suggest that although clinical information systems are designed to influence clinical practice positively, the likelihood of the negative impacts should not be underestimated. Evaluation studies are needed to investigate the impact of technology as a measure for system success or failure.

1 INTRODUCTION

In recent years the use of information technology in Emergency Departments (EDs) has increased, due to attempts to improve the accessibility of information, reduce errors in clinical practice, eliminate documentation errors, and to improve the completeness of data (Harper, 2001). However, the implementation of new technology into a complex environment, such as an ED, may result in unforeseen consequences, such as negative effects on clinical practice (Embi et al., 2004). For example, an increase in the amount of time that is spent on a computer and a reduction in the time spent on caring for patients, or a lack of fit between the system features and users' work may all have a negative impact on clinical practice (Rose et al., 2005).

A number of evaluation studies have been undertaken to explore the impact of information systems in different settings; however, little has been reported about the impact of using information

technology in the ED. Since the ED has special characteristics in terms of the variety of patients and the speed of work (Amouh et al, 2005), investigating users' perceptions of the impact of computerised information systems could help to identify factors that may influence the success or failure of systems. This can be also useful for developing and implementing information systems in the future. The aim of the present study was to investigate users' perceptions of, and interactions with EDIS. The objectives were to identify issues that might influence the use of EDIS, and to compare users' perspectives about these issues.

2 METHODS

This was a qualitative study conducted in March-April 2007. A qualitative approach was applied to gain a better, and in-depth, understanding of the context, and factors that might influence the use of information systems in the ED. The research setting

was an ED located in a large urban teaching hospital in northern England. The ED in this hospital is particularly busy as it is the only major one in the city responsible for providing emergency care for adult patients. In this department, paper-based records are used as the main source of information (e.g. medical records, patient notes, ED cards). However, the ED's electronic information systems include a Patient Focus Information System (PFIS), a patient tracking system, and a Radiology Information System, although these are not integrated with each other. The access level is different for different user groups.

In order to collect data, semi-structured interviews were chosen as the most appropriate method, as the aim of the study was to investigate users' perceptions. This would help to gather more in-depth data. In this study, convenience sampling was used to recruit the participants. However, in order to have a broader picture of users' perceptions, different members of staff who used the information systems were interviewed. The interviews were digitally recorded (with the participants' consent) and were transcribed verbatim. To analyse the interview data, the method of framework analysis was used (Ritchie and Spencer, 1994). In this study, data were analysed by one of the researchers (HA), and to facilitate coding data, computer software QSR NVIVO 7 was used. In order to check the validity of results, member checking was used and the interviewees asserted the accuracy of the results.

3 RESULTS

Thirty-four ED members of staff were interviewed in total. The interviews lasted between 20 and 70 minutes (mean = 43 minutes). The participants of the study were the ED staff (Doctors, Nurses, and Administrative staff) who used at least one of the information systems in the ED. Nine participants were male and 25 were female. The age range was 25 to 57 years old.

A key theme that emerged from the data analysis was the perceived impact of IT. The results suggested that the impact of IT could be sub-divided into individual impact, organisational impact, and impact on patient care.

3.1 Individual Impact

The results suggested that if the ED staff were asked to use a new computerised information system, some of them might experience feelings such as fear,

stress, and nervousness. Such feelings could mostly be experienced when a change happened in their work practices, for instance, when they had to enter data into the computer rather than writing it on paper. In relation to this, a doctor said:

'I have never used a fully computerised system, so I am still a little bit nervous about that, I think my nervousness, from the bits that I have used has gone' [Doctor 10].

Some interviewees mentioned that, not only in the early stages of introducing a new system, but also after getting used to using it, any problem with the system, such as system downtime could make them 'panic'.

'If the system goes down, you are absolutely lost because you can't look for anything. You know, you are hopeless' [Administrative staff 1].

From the users' perspectives, the positive impacts were mainly associated with having easier and quicker access to the information that they needed. This could help the clinicians to provide patients with a better care plan in a timely fashion. As a doctor noted:

'..., it would make the day run much more smoothly, so you go home without having to worry about you have tried to guess some' [Doctor 8].

In terms of the negative impacts, although most of the interviewees believed that the current ED systems were easy-to-use, some of them remembered that using these systems at the beginning affected their work negatively.

'The tracking system, when they first introduced it, you spent your time treating the tracking system and not treating patients' [Doctor 10].

'..., we didn't like it (patient tracking system) when we first started it, because we thought it was an extra job we weren't supposed to,...' [Administrative staff 8].

In fact, a lack of fit between the staff work flow and the way that the system worked could be a reason for this negative impact.

3.2 Organisational Impact

As some of the staff were responsible for managerial tasks in the department, using computerised information systems could also facilitate their jobs. The accessibility of information helped them to make better decisions at the departmental and organisational level. As a doctor noted:

'It has completely changed how we work really. I can pick up doctors who are failing for various reasons... you can look at the doctors who x-ray every single patient that they see' [Doctor 10].

The accessibility of information had, in turn, helped to increase efficiency in the department. The use of information systems had also improved data communication in the ED. For example, the ED staff could use the patient tracking system to add notes regarding a patient's status, and the rest of the ED staff could be informed about that by using the system. With reference to this, a nurse commented:

'That computer (patient tracking system) helps us to communicate by putting information on that' [Nurse 8].

However, most of the interviewees mentioned that system downtime had a significant negative impact on their work since they could not have access to information that they needed. This situation was a 'nightmare' and caused 'chaos', as mentioned by several interviewees.

3.3 Impact on Patient Care

This sub theme included the positive, neutral, and negative impact of using information systems on patient care. Most of the interviewees agreed that the use of information systems had a positive impact on patient care, mainly in terms of improving the speed of care and saving time for clinical tasks, reducing clinical error, increasing effectiveness, and improving patient safety.

'..., you would reduce the risk of things like one patient's x-ray being put in another patient's packet. So, it would reduce the risk of any incident and possibly it would reduce the negligence cases' [Nurse 5].

A number of participants indicated that information systems could improve the accessibility of information and the more information they had, the better and quicker were the clinical decisions made.

While most of the interviewees stated that using information systems had a positive impact on patient care and could improve it, a few of the interviewees asserted that using information technology had no effect on patient care:

'It usually speeds things up for beds and provides the methods of doing order, research and something, because you have got data available. But, it doesn't affect the individual patient care very much, I don't think' [Doctor 4].

Moreover, some of the interviewees were concerned about the negative impacts of information systems on patient care. From their point of view, system characteristics that might cause them to spend too much time on a computer rather than on

patient care, or the low quality information on the systems, could adversely affect patient care.

'If it (a computerised information system) is too time-consuming to put in the information, then that may be detrimental to the patient care' [Nurse 5].

These results suggest that not only the technical aspects of a system (e.g., hardware and software) should be taken into account, but also the non-technical aspects, such as data quality, need to receive adequate attention.

4 DISCUSSION

Clinical information systems are mainly designed and implemented to improve efficiency, effectiveness, and the quality of patient care in the healthcare settings. While these systems are expected to meet their targets, a number of technical and non-technical reasons may result in adverse effects.

Regardless of being positive or negative, the impact of computerisation has been categorised in several studies. For example, van der Meijden et al. (2003) focused on the individual and organisational impacts of computerisation. From their perspective, the individual impacts attributes included changed clinical work patterns, changed documentation habits, efficiency and effectiveness of work. The attributes of the organisational impact included communication and collaboration, impact on patient care and cost. Despont-Gros et al. (2005, p. 251) concentrated on the impact of computerisation from a user's point of view. The authors suggested that the impact of computerisation can be categorised either as 'real impacts', such as a change in communication patterns or workflow or as 'perceived impacts' such as a feeling of being controlled or stressed to work in a standardised way. Raitoharju (2005) focused on IT-related stress as one of the individual impacts of computerisation.

The results of the current study suggest that, in order to investigate the impact of clinical information systems, a combination of the above-mentioned areas should be taken into account. In terms of the individual impact of technology, it is notable that the nature of working in a healthcare setting, particularly in the ED, may be stressful for the staff (Raitoharju, 2005). Hence, it is important to understand how their IT-related stress can be reduced or eliminated, rather than adding to their work stress. According to the results, as introducing a system to a work environment may have a negative impact at the beginning, ongoing training in the use

of the system and more communication with users should be considered to improve their understanding of the system (Campbell et al., 2006).

The impact of using information systems on patient care seemed to be an arguable issue. However, it seems that a system that is able to meet clinicians' expectations can help them to make better decisions, and can help to improve patient care.

Overall, the results suggest that, from the user's perspective, the systems' benefits far outweighed any negative effects, and none wanted to give up the systems. In order to reduce the potentially negative impact of using technology, before designing and implementing information systems the current workflow should be investigated and re-designed if necessary.

5 LIMITATIONS OF THE STUDY

In this study, data were collected from only one Emergency Department where specific information systems were used. As a result, the findings may not be fully transferable to other settings in which other systems are in use. In addition, our sampling method was limited by the need to fit in with staff working patterns, so we had to use convenience, rather than purposive, sampling. However, the results could be useful for developing and implementing clinical information systems, particularly in the Emergency Department, in the future.

6 CONCLUSIONS

In this paper, we showed that the use of clinical information systems might affect three main aspects: the users, the organisation, and patient care. While the positive impact of technology suggests that a system has been successful in achieving its intended goals, the negative effects should be lessons learned for future developments. Care should be taken when designing and implementing such systems to avoid, or at least minimise, any potentially harmful effects. Further research is needed to assess the extent of the effects identified in this study among different user groups, and in other EDs or hospital departments with similar characteristics.

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