The Impact of Information Systems Use on Work Tasks and Work Practices in an Emergency Department

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Abstract. This paper describes the plan for the third stage of a longitudinal assessment of the progressive implementation of IS in an emergency department. The assessment adopts a case study approach with nested mixed methods where quantitative data will be collected through observations and qualitative data will be collected through focus group interviews. The findings from the study can inform the design of IS that is well aligned with the intended strategic outcomes of IS implementation in emergency medicine.

Keywords. Information systems, emergency departments, work tasks, work practices

Introduction

Emergency Departments (ED) are faced with issues such as overcrowding and delays to treatment of patients which are associated with poor patient, ED and hospital service outcomes across the world [1]. These issues are a consequence of the growing population of older people who may require complex care [2]; limited access to primary care, convenience of ED access and perceived urgency of health conditions by patients [3]. Other ED challenges arise from the need to manage ED capacity, adherence to ED waiting times as well as ED length of stay [4].

To overcome issues facing EDs, health information technologies (HIT) are often deployed in emergency departments with the expected benefits of improved patient care quality, improved patient safety and reduced costs [5]. These improvements arise from improving communication amongst caregivers, improving access to information sources and facilitating decision support [6]. In emergency departments, HIT capabilities have been reported as contributing to reduced waiting times and improved turnaround times when ordering tests and medications [7]. However, implementing such systems into a field of practice changes the way in which work is performed, which leads to changes in the way the technology is used [8], leading to further work changes. This cycle of

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reciprocal causation often produces gaps between technologies and work practices thus affecting the expected benefits of the health IT implementation.

This paper outlines a study aimed at assessing the interplay between progressive information systems (IS) implementation and the resulting impact on the organisation in terms of work practices and work tasks. It provides potential insights into how the changes resulting from progressive IS implementation can be best managed to enable effective implementation.

1. Literature Review

The implementation of information systems in organisations is a complex process due to a slow implementation process and integration issues between the system and work place practices [9]; technological issues resulting from the design of the systems; behavioural issues stemming from the shift from paper to an electronic environment; financial issues caused by funding and time frame adherence; and organisational issues due to personnel training and organisational resistance [10]. In healthcare settings, issues reported often stem from the complexity of medical work which is highly cognitive, requires multitasking, collaboration and cooperation. Emergency departments in particular are often faced with unpredictable workloads and time critical tasks [11]. The outcomes of IS implementation in healthcare are discussed below.

1.1 IS impact on Work Practices

The application of IS in healthcare has allowed easy access to patient information and facilitates decision making as well as supporting administrative tasks such as appointments scheduling, registration and discharge of patients [7]. IS has the potential to benefit EDs by decreasing practice variability, ensuring legible communication and also facilitating retrieval of past information such as physician notes and diagnostic studies [12]. Information system studies in regard to workflow have shown that users often experience difficulty in integrating the technology into their routine clinical practices [13] because of significant data entry demands which are often seen as contributing to workflow disruptions. IS implementation also changes patient care processes. This according to Vartak et al [14], is because the aim of such systems implementations is to promote efficiency. The authors evaluated the implementation of three systems, the electronic health record, computerised provider order entry (CPOE), and emergency room (ER) event tracking systems. The findings revealed that care processes changed, and the outcomes of the systems resulted in an increase in length of stay for patients. Such innovations affect clinical processes for diagnosing and treating patients due to a modification of data flows, task sequences, and creation of new roles and responsibilities [15].

In EDs, workflow is often fragmented [16, 17]. IS implementation is perceived as disruptive to work routines and workflow, since “emergency departments (EDs) workflows require robust coordination between resources for treatment, referral, admission and discharge purposes in order to maintain a swift and accurate patient flow through the different stages during their ED visit” [18, p. 88].
1.2 IS impact on Work Tasks

Doctors in EDs are faced with managing competing demands, dealing with a high patient volume and, interruptive communication is the norm [19]. Studies on doctors work tasks have revealed that the introduction of such systems affect the distribution of time on clinical care and non-clinical care tasks, with more time being spent on the computer [19]. This amount of computer time has been attributed to the demands of data entry such as typing clinical notes and navigating dropdown hierarchies or checkboxes [13].

Communication plays a major role in patient care. Effective communication is essential in supporting the coordination of health care teams involved in patient care. Often challenges in communication arise directly from the significant and increasing contextual complexity of the emergency department environment which leads to physicians experiencing higher communication loads [20]. Additionally, the design of interfaces often lacks a comprehensive understanding of the information and communication needs of ED clinicians [21]. A study involving 20 ED practitioners for nearly 40 hours [22], provided insight into the frequency of communication events and the communication links between the practitioners. It revealed that a total of 1,665 communication events were recorded. This is useful when quantifying the duration of communication tasks and how computerised support is likely to affect the frequency of communication tasks. In another study, nurses were observed for a period of 20 hours. During the 18 observation periods 2,019 communication events were noted and it was revealed that 78% of the communication was face to face communication and also the majority of all the communication was in relation to patient management [23]. Studying communication in such detail identifies the tasks involved in communication as a measure of communication load and an evaluation of the effectiveness of information systems as a platform for supporting communication.

It is evident from the literature that there are both benefits and challenges to IS implementation in healthcare settings, in particular in emergency departments. However, most of the studies are focused on adoption of IS at one point in time. Such an analysis is limited as it lacks an in-depth analysis of how both the IS and the organisation evolve and what the resulting impact is. The literature lacks analysis on the issue of the progressive implementation of IS and its impact on healthcare settings. To overcome this limitation, the intended study adopts a longitudinal approach to studying the interplay between IS and the organisation and the resulting impact over time. Studying progressive implementation allows insights into how work practices evolve in the presence of the new system, how the work tasks evolve and also a measurement and assessment of the integration of IS.

2. Background to the Current Study

This study is the 3rd stage of a longitudinal study building upon previous studies conducted in the years 2008 and 2012 in the emergency department of a public teaching hospital in Australia.

2.1 Results of the First Two Stages

The 2008 study involved observations that were carried out over a period of two months with the aim of evaluating how consultants spend time on various tasks based on a list of pre-determined task categories. These categories are clinical care, transiting,
documentation, computer use, communication, pharmacy, non-clinical tasks and communication; a total of over 130 hours of observations were recorded. It was noted that a total of 101 tasks were performed by the consultants per hour, on average. When this study was conducted, paper-based patient records were still in use and the EDIS (Emergency Department Information System) was used to document the patient pathway from arrival till consultation [24].

The 2012 study was conducted over a period of 59 days with a total of 400 hours of recorded observations [25]. The study quantified the time spent on activities that are involved in direct care of patients and also activities that involved indirect patient care. This study was conducted four months after the rollout of an advanced EDIS which included a new hardware infrastructure and software systems. The main aspect of the EDIS was the electronic medical record (EMR) system which supported clinical, administrative and clerical operations in the ED by enabling information collection and accessing at the point of care. The EMR had functionalities that included patient administration, triage and tracking; clinical documentation and nursing notes; electronic ordering and prescribing; decision support and conditional data collection and electronic discharge summary and patient advice letters. In addition to the EMR system, a hospital administration system, results tracking system and picture archiving and communication system are also working concurrently with the EMR to facilitate the operation of the department.

During both study periods, IS introduction in the ED was aimed at innovative ways of enabling task support. In terms of the amount of time spent on clinical care and non-clinical work, it was established that more time was spent on indirect clinical work; there was a lot of multitasking; communication consumed the majority of the consultant’s time. The introduction of the EDIS caused several unexpected negative organisational consequences such as decreased operational efficiency, higher workload and decreased clinical time. The system in use is about to be replaced as it is no longer supported in Australia, and a new IS is to be implemented. With this new implementation, there is an expectation of integrating some functions and an opportunity for more flexibility in improving the workflows and information exchange as it captures real-time patient data [26, 27]. We intend to analyse its impact compared to collected data from the previous work. These two previous studies inform the next phase of this longitudinal study in the same setting which is discussed below.

3. Methodology

The 3rd part of the study will be carried out in 3 stages; preliminary observations of the ED doctors to examine the hospital process (completed) and in-depth observations to test the theoretical model and focus groups as discussed below:

3.1 Preliminary Observations

The rationale behind the preliminary observations was to investigate the issues raised in the literature regarding the outcomes of IS uptake in healthcare settings as well as the issues noted by the first two studies. The observations were carried out for a month on evenings on random days for about three hours during each observation session. The observations involved three triage nurses, a senior doctor and six other doctors that were working with him during his shift and a floor coordinator. During each observation
session, the observation time was split between an hour of triage observations in the waiting area; and two hours following the doctors around the ED ward.

3.1.1 Initial Results

- The consultation process was about evenly divided between attending to the patient and documenting the information on the system.
- The doctors used the system to track patients, view results and update patient notes.
- System use by doctors differed for the different patients; for admitted patients (patients who are kept in the ED for observation) the doctors updated the patient notes during consultation, for trauma patients, the doctors worked as a team and a scribe took down notes, later transferred into the system.
- Most of the communication between the doctors and the nurses was verbal and was done constantly. This was not recorded.

The preliminary observations revealed problems such as the challenge of integrating the IS into routine work practices and producing complete records and also the problem of misalignment between IS tool design and work task support. These issues will be investigated further in the future stages of the study.

3.2 Second Stage Observations

The second stage of observations will be conducted using the shadowing technique for time/motion studies which was adopted in the healthcare industry to assess inefficiencies and promote cost reduction [28]. The technique has been applied in healthcare settings such as emergency department, general medicine and surgical environment to assess if the implementation of IS improves efficiency in terms of the amount of time clinicians spent on patient care in an IS supported environment. The observations will be based on a list of predetermined task categories that are common to key stakeholders in the ED, the categories are reflective of the work activities and tasks performed in ED and they include clinical care, communication, computer use, non-clinical care tasks and documentation. The observations will be carried out using a tablet that has a time stamp software that allows for recording of the multi-tasking of consultants’ work activities, with identical work categories to the previous studies. The specially developed task logging software will be used to record every task performed in real time showing the start and finish times.

3.3 Focus Groups

Focus groups will be conducted with a sample from the clinicians that participated in the observations. The focus group will allow more insights into how the IS and the organisation have both evolved by looking at issues such as staff tasks (quality and speed); staff acceptance (or rejection) of the IT intervention; and the impact of IS in terms of unintended consequences such as work arounds.

4. Conclusion

Assessments or evaluations of information systems in healthcare allows measurement and prediction of outcomes of IS implementations. It also enables the examination of
intended effects such as reduced costs and improved patient care quality which are often the drivers of IS implementation in most healthcare settings [9]. With increased investment in information systems deployment in healthcare, it is imperative that the uptake of such systems is well aligned with patient care tasks to achieve the desired outcomes. In emergency medicine, the alignment can be facilitated by a thorough understanding of the context of the environment. Therefore, an understanding of tasks performed by key stakeholders will enable alignment in IS implementation in the ED and ensure efficiency in the provision of care as well as providing quality care that ensures patient safety. The final stages of the study will enable an assessment of how IS evolve over time when they are introduced in stages and when changes are brought to the work of the ED as a result of such implementation.

References


