Improving Hospital Workflow: As Simple As Introducing New Systems

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Abstract

This paper reports on work in progress in an investigation of the role of IS in achieving more effective management of work-flow processes - where such improvement is only one of many goals of stakeholders in the hospital system. The investigation has two parts. The first part, now completed, is reported on briefly before the ongoing second part is introduced - a work-flow analysis of a newly automated hospital process. The work is founded on theoretical concepts of ‘strategy’ and how relevant those concepts are to the hospital context and to those hospital stakeholders with a commitment to better health outcomes.

Keywords: Health, strategy, benefits, information systems research, work-flow.

1. Introduction

This research-in-progress paper investigates the potential for work-flow and efficiency benefits arising from technological advances in the area of high resolution scanning and sensing. These potential benefits demand that hospitals more closely examine the purpose of information technology and information systems (IT&IS) beyond an improved record keeping perspective and focus on the possibility of using technology to improve work-flow. We need to consider whether improved work-flow will ultimately lead to speedier and more effective patient care, diagnosis and treatment and facilitate improved patient outcomes.

Research so far has suggested that the current state of many hospital information systems work against the fulfilment of objectives by stakeholders such as improved work processes, despite the availability of systems which may have the potential to bring significant improvements. There is a cost in poor information flow in hospitals and in information management failure. Studies of adverse events in hospitals identify a number of contributing factors all of which impact on work-flow and include communication problems, misread documentation, poor continuity and inadequate knowledge (Lombardi, 2001) without fully considering the role that I.S. can contribute to these issues. All of these factors could be addressed at least partially by better systems.

Buffone, Moreau and Beck (1995) claim that a focus on work-flow “will enable (hospitals) to better co-ordinate the use of resources for diagnosis, treatment, and clinical management, allowing (hospitals) to preserve quality and control costs”. Additionally, studies that examine the digital distribution of medical images have found higher levels of efficiency leading to better patient care (Lederman and Morrison, 2001) as a result of changing work processes that reduce the need for manual searching for data. Such research recognises the ability of digital medical image systems to more speedily deliver medical images to physicians and
other health-care professionals. It suggests that if prompt action improves a patient’s outcome, a positive effect on patient care will result from the immediate availability of radiographic images or any other images required for diagnosis.

These earlier studies have not however attempted to make a connection between improvements in workflow processes resulting from higher quality information flow, and improvements in patient care. This research suggests that this is an area worthy of specific investigation. It is suggested that the use of a digitised database that transfers information more efficiently can alter work-flow and work practises in the hospital environment. This occurs as a result of the work-flow improvement that develops through all images and radiological reports being freely available, much reduced opportunities for data loss and reduced occurrence of the asynchronous receipt of multi-modal data (such as when a doctor orders a PET scan, an MRI and a CT simultaneously).

There is a cost in poor information flow and information management failure (Lederman and Parkes, 2002), while inadequate information management has been seen to be one of the causes of poor treatment decisions in hospitals leading to adverse consequences for patients. Wilson, Runciman, Gibberd, Harrison, Newby, and Hamilton (1995) and Wilson, Harrison, Gibberd and Hamilton (1999) found that 16.6% of admissions to public hospitals result in an “adverse event” resulting in disability or a longer hospital stay for patients. 51% of the adverse events researched were considered preventable. Particularly noteworthy is the high number of adverse events associated with failures in record keeping, communication and information flow.

To a large extent these adverse events result from the massive volume of information generated in modern hospitals (Pereira et al, 2002). For example, the first stage of this research in a neurology ward found patients undergoing extensive testing regimes, PET scans, MRI scans, CT scans, blood testing etc with the various information items being delivered largely non-digitally from a number of sources both within and outside the hospital. All of this calls for high standards of information management and a significant commitment by hospital management to the implementation of effective systems. Recent evidence suggests that in many modern hospitals this commitment is not fully evidenced (Bates, 2001) leading to significant opportunities for errors-with the healthcare industry being slow to adopt technologies that would improve practice management (Goldberg & Wickramasinghe, 2003). Additionally, information systems in hospitals are often controlled by disparate groups of doctors, I.T. professionals and community members on voluntary boards often with competing objectives leading to serious governance issues.

Other unintended outcomes of continuing to use paper-based information systems in hospital environments with large volumes of data is that the nurses’ station remains the main hub for information which is frequently sought by clinicians from nurses. This oral tradition of nurses providing clinicians with patient updates is no longer considered appropriate as nurses object to the disruption of the duties for which they are educated (reference withheld under review) and the effect on their work-flow that results.

As a result of these issues we are undertaking a two-stage research project with this research in progress paper giving an overview of the first stage and a description of the plan for the second stage. Our overall research objectives are to understand the role of information systems in achieving the goals of all stakeholders in the hospital system.
2. Findings from Stage One

The first stage of the research examined the extent to which poor delivery of information in hospitals had effected the ability of those hospitals to fulfil their objectives. This research examined a system in a large public hospital for the delivery of neurological data. In this particular hospital a semi automated process for the delivery of neurological data was used where digitized scans were delivered manually around the hospital and often went missing or were delayed. We examined the extent to which this type of system had an impact both on the work-flow of relevant clinicians and the hospital’s operational strategy.

In this research we interviewed hospital staff and conducted a patient survey to examine a specific problem in relation to the delivery of patient information. We measured the impact of the data loss that results from inadequate data delivery processes and finally considered the impact of this data loss on the ability of health care workers to administer adequate patient care. Our findings suggested that semi-automated systems had an impact both on the strategic objectives of the hospital in that they lengthened hospital stay and increased patient queues (Lederman, 2002) and on the provision of adequate patient care (Lederman and Parkes, 2005).

The interviews and the patient data survey illustrated the possible contribution of the semi-automated process in delaying data return where workflow was interrupted and information flow and patient flow failed to intersect as planned, and, consequently both decision making with regard to patient care and patient throughput were impeded.

The research suggested that wards that did not have fully automated data delivery would find it difficult to fulfil key operational and strategic objectives.

As a result of these findings we have decided to proceed with a second stage in the research where we examine an intensive care ward in a second large public hospital which also deals with the distribution of neurological data. Both the hospitals (from Stage one and Stage two) are large, general teaching hospitals with similar management structures. In the second ward that we examine, however, the distribution of data is fully automated and our research seeks to examine whether the anticipated positive outcomes will result.

3. Research Question for Stage Two

The research question for this second stage is: Can the implementation of fully automated data delivery systems for neurology patients assist in the improvement of hospital work-flow? Will this have a concomitant effect on operational efficiency and patient care?

While not having fully automated systems may have been found to have negative impacts, the converse may not necessarily be true. The complex environment of a large public hospital can sometimes produce outcomes and research findings that are counter intuitive. So it seems most valuable to examine an environment where information systems have been automated, and attempt to measure the value of the changes in terms of work-flow specifically as well as more general operational and strategic goals.
4. Theoretical framework

According to Liedtka (1992) because hospitals have multiple goals they require a fuller concept of strategy than the popular corporate strategy concept based on Porter (1980). While the treatment of that strategy concept differs between authors, it relates to how corporates position themselves in the market place with customers and competitors. McFarlan, McKenney and Pyburn (1983) identify three fundamental strategies for competitive advantage: low cost; product differentiation; and niche marketing. Later, Willcocks, Petherbridge and Olson (2001) expanded these to 6 strategic uses of IT: breakthrough unit costs for customers; service-based differentiation; micromarketing management, shorter time to market; transfer of experience; and new level of partnership. In her study of hospital strategy, Liedtka (1992) found that a market-driven strategy, which emphasises efficiency and profitability, is not appropriate in a hospital environment. This is partly due to the fact that hospitals, unlike corporate organisations, are social and philanthropic institutions. Moreover, unlike employees in other industry sectors, hospital clinicians are empowered, independent and autonomous individuals. Many clinicians select their career path due to strong value systems that are geared towards care and concern for patients. This, rather than factors such as efficient work-flow, cost minimisation, efficiency and administrative requirements, becomes the overriding factor in their practice. Liedtka therefore asserts that the traditional concept of strategy needs to be revised to incorporate the institutional responsibilities and professional values of practitioners in the hospital.

Liedtka suggests Andrew’s 1971 framework in which there are four elements of strategy: what the market demands, what the organization has the capability to do; what the CEO prefers to do; and what the organization feels it should do for society. While conventional concepts of strategy focus on the first of these, it appears the latter two may be very important determinants of much hospital activity. This is especially the case if we replace CEO preference with ‘leading decision making stake holders’ preferences’. In the case of hospitals this largely implies clinicians’ preferences (Porter 2002) which are strongly related to issues such as patient care which we are examining here. Clinical goals and professional practice protocols are consistent with ‘what the CEO/clinician prefers to do’ and ‘what the organization feels it should do for society’. Because the bifurcated clinical and efficiency goals are not inseparable we see that ‘what the market demands’ is both low cost (McFarlan et al. 1983) and good clinical outcomes. Therefore, we use Andrew’s four part concept of strategy.

5. Method for Stage Two

We are collecting qualitative data by interviews and through focus groups to identify the expected and realized outcomes of the upgrade to the automated data delivery system. We are inviting clinicians from a range of professions (nurses, specialists, allied health) and administrative staff directly involved with and affected by the changes to comment on changes in work-flow that they may have expected, what has eventuated and how that impacts on patient care.

We are working with two related flow concepts – the patient clinical journey and the information flow related to the work flow. The approach is to identify six typical patient clinical journeys into and out of the neuro/ICU ward, and to match those journeys with ideal workflow in servicing these patients and information flow maps. Key staff members on the ward are advising on 6 typical journeys. The ideal workflow and information flows are mapped from focus groups. Individual interviews are then used to augment this material with insights into particular events and nuances and evaluate whether apparent and expected improvements in work-flow are achievable.
No patients will be interviewed in this study due to ethical and access restrictions.

6. Preliminary Results from Stage Two

The preliminary results are organised here along three lines: social implications, time implications, and workflow implications. These are, of course not independent. For brevity each finding has been presented only once even though they may be relevant to more than one category.

6.1 Social implications

- The system has changed the ways that clinical staff interact. They no longer go to radiology in order to discuss a diagnosis – they now telephone; they no longer ring to check the status of an order – it is now available through PACS. This may improve workflow, but may disrupt learning and social engagements that have been essential to hospital culture.
- Other clinicians (e.g. nurses and physiotherapists) feel empowered and that their value in the clinical journey has been enhanced by the fact that they can now look up an x-ray and form an opinion without waiting for a doctor.
- Simultaneous availability to many was considered to be the key factor in not only improving the workflow, but also in reducing tension between departments over who had the greater need for the film.
- Limited off-site access was considered to be a barrier to lifestyle – especially to registrars.

6.2 Time implications

- Although PACS has the potential to increase the speed of service to the patient (in terms of shortening the duration of the patient’s clinical journey), there are no data to support this.
- Staff indicate that the instant availability of images does save a small amount of time that may be important to the quality of the clinical journey.
- The report turn around time is reduced, but that this depends on many factors other factors relating to staff availability such as staff absence. Overall, staff indicate that there is no reduction in the time to get the written report. The main improvements are in the time that it takes to get the film to the doctor.

6.3 Workflow implications

- Radiologists have changed the way that they schedule their work. They now rely less on batch processing of images.
- Workflow is more agile because tasks can be completed anywhere any time. This is particularly important to sections that have multiple locations.
- Workflow has become simplified with fewer disruptions – previously due to missing diagnostic information, and searching for x-ray bags. This makes the flow of the clinical journey smoother.
- Workflow has become more transparent making it less necessary to check whether an order has been made and its status.
- Slow downloads at peak times were considered to be a source of frustration even though access to images is improved. While there has been an improvement relative to the recent past practice, there is still frustration and anticipation of future improvement.
- Because PACS requires fewer phone calls and less paper work, it is seen to enhance the overall ability of St V’s IS/IT to enable efficient work processes and reduce staff tasks.
7. Conclusion

This research has provided some initial findings on the implications of PACS on hospital processes. These findings are significant for all stakeholders in the hospital system where they indicate genuine process improvements and time savings. However, further work needs to be done to more exactly quantify the workflow benefits and particularly to consider how time gains have been reallocated across the system. This will provide valuable insights to all stakeholders in the health system and allow us to consider how much workflow improvements through PACS make a genuine contribution to patient care.

8. References


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