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Using the case method for an undergraduate IS subject: Encouraging participation in culturally mixed classes

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Testing technology: Can it bring the benefits we hope for?

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Abstract

This paper reports on work in progress on an investigation of the role of IS in achieving the 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. 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

INTRODUCTION

Hospitals worldwide grapple constantly with the need to evaluate planned and recent investments in information systems. They do so against a range of operational objectives, and they often have difficulty identifying the improvements most likely to satisfy their goals. To some extent this is because those goals are bifurcated with the hospital administration pursuing efficiency goals with a focus on issues such as bed usage and patient throughput, and the medical staff pursuing clinical goals that relate more directly to patient care. That bifurcation does not imply that the goals are distinct and separable. Rather, patient care depends on the quality, relevance and timeliness of information flow within the administrative domain as well as in the clinical domain. Studies of hospital records systems, for example, have identified that both efficiency (Pereira, Castro, Ronda, Arcay and Pazos 2002) and patient care (Chabrais, Aubry, Balleyguier, Todd-Pokrppek and Menu 2000) benefits are realized.

This research-in-progress paper investigates the potential for clinical 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 efficiency perspective and focus on the possibility of using technology to assist diagnosis and treatment and facilitate improved patient outcomes. Many hospitals are not yet using or fully capitalizing on appropriate systems and are asking how using technology to automate processes such as scan delivery can assist in patient care.

Research so far has suggested that the current state of many hospital information systems work against the fulfilment of objectives by stakeholders 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 including 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.

Sintcheko (2001, page 91) suggests that "many strategies for providing clinical decision support have failed because they have not provided timely and easy access to information that is current and relevant to specific clinical questions." Additionally, there has tended to be a low level of support in general for I.S. expenditure within the health industry (England, 2001) leaving information needs insufficiently addressed (Vincent, 1998) Research suggests that paper-based information is an inadequate alternative to digitised information in providing support for clinical decision making. "Textbooks, journals and other existing information tools are not adequate for answering the questions that arise: Textbooks are out of date, and the "signal to noise" ratio of journals is too low for them to be useful in daily practice (England, 2001, p.31)".

There is a cost in poor information flow and information management failure (Lederman and Parkes, 2002) and inadequate information management has been seen to be one of the causes of poor treatment decisions in hospitals and leads 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 (Rogers et al, 2003).

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, 2004).

OUR CURRENT PROJECT

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.

Overall Research Objectives:
To understand the role of information systems in achieving the goals of all stakeholders in the hospital system.

Findings from Stage One

The first stage of the research examined the extent to which poor delivery of information in hospitals which have not taken advantage of advances in IS had effected the ability of those hospitals to full fill 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 patient care goals and the hospitals 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 (reference withheld while this paper is under review, 2002) and on the provision of adequate patient care (reference withheld while this paper is under review, 2004).

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.

Plan for Stage Two

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.

Research Question

The research question for this second stage is: Can the implementation of fully automated data delivery systems for neurology patients assist in the fulfilment of hospital operational efficiency and treatment goals?

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 fulfilment of operational and strategic goals

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 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 (Roy Porter 2002). 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.

METHOD

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 what they expected, what has eventuated and how that impacts on costs and 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 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 that suggest that apparent and expected outcomes may not be real. An example of this might be that it was expected that automated data delivery system would reduce the patient stay in the neuro/ICU ward, but this is not always realized because patients are moved to general wards only from 8-5pm office hours. So, there is a lag overnight that destroys any potential benefit.

No patients will be interviewed in this study due to ethical and access restrictions.

CONCLUSION

We anticipate that this research in progress will identify those areas where improved information systems contribute to the fulfillment of hospital goals and provide valuable insights to all stakeholders in the health system.

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