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Teaching case

Tick a box, any box: a case study on the unintended consequences of system misuse in a hospital emergency department

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Abstract
Long patient waiting periods and a high administrative load plagued the Emergency Department of a major Australian hospital. In response, the department installed a new information system. Technically, the new system worked perfectly. Yet, within 9 months the department suffered a catastrophic loss of patient revenue. The financial disaster led to senior doctors being forced to abandon their medical duties in order to correct complex administrative problems. It triggered a complete review of training, task and role prioritisation. This case study describes a major and costly error resulting from the use of the newly implemented hospital IS. It traces how the error came about, how the hospital responded and what hospitals could do when deploying new systems to prevent such errors. We examine hospitals as hierarchical organisations with financial and organisational goals that sometimes conflict. The case presented explores the cultural setting of the IS roll-out, where medical professionals are accustomed to autonomy over their work practices and are disinclined to engage in activities that they see as interfering with patient care. The case highlights issues in respect to deployment and adoption. These include user training and consideration for the existing organisational culture and stakeholder practices when implementing large systems that cause significant organisational change. The discussion can be structured around stakeholders' behaviour, user resistance, goal conflicts, power shifts, training, division of labour and work flow management. In addition the case raises governance questions: What mechanisms can be used in IT projects to prevent errors like this from arising?
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Introduction: setting the scene

Its 10 pm on a Friday night in the Sir William McMahon Hospital and two junior doctors are finishing their shift in the busy Emergency department. 'Let's go I'm starving', says Monica as she takes off her white coat and grabs her bag. 'Hang on, it's got three patients moving on to the wards, I just have to fill out this on-line documentation' says John.

'Why are you filling out forms?'

'What do you mean Monica? I can't get through my patients. I'm spending more time on-line filling in admission information than treating people'.

'That's silly. Just tick "not admitted" and you don't have to do anything else. The orderly still has the patient on the ward list – they'll come and collect them anyway and take them to the ward.' 'Great! Done! Let's go'.

Problem summary

In 2011 the Sir William McMahon Hospital (SWM),[1] Victoria, Australia, introduced a new information system in its Emergency Department (ED). Soon the medical staff were all complaining about the high levels of online documentation that doctors now had to fill in, for which they felt they had had no pre-warning.

One of the unfamiliar documentation tasks junior doctors encountered was the classification of admission status for each patient case. Since the Emergency Department Information System (EDIS) deployment, the responsibility for classifying the admission status of patient cases was distributed to all ED medical staff members, including the junior doctors.

The lack of sufficient admission classification knowledge and training prevented the junior doctors from accurately assessing the status of patient cases. As a result, in the beginning, non-admitted cases were often classified as admitted. However, since all admitted cases have to be double checked by the medical records department, all mistakes were picked up and complaints were made against the junior doctors. In response to this negative feedback, the junior doctors adopted the 'just tick the easiest box' attitude. They found that it was much easier to just tick 'no' to classify all cases as non-admitted and had seen senior doctors doing this as well. Since non-admitted cases did not require verification by the medical records department, the junior doctors were able to complete this task faster without any immediate repercussions.

Such practices went on for months and were only picked up through a random audit 8 months after the introduction of the EDIS. As a result of this workaround, the ED's admission data became seriously corrupted. The audit showed that over 10% of the data was inaccurate as compared with the error rate of about 1% in the pre-EDIS era.

Because of the increased funding given to admitted patients, it was estimated that over 6 million Australian dollars in funding was lost through these incorrect classifications. In order to rectify the issue and recuperate some of the lost revenue, the ED applied for data resubmission and was granted 14 days to resubmit 2 months' worth of data. In order to meet the deadline, overtime was paid to all senior medical staff members to reclassify over 6000 patient records. The normal activities of the department were severely disrupted during this time. Despite their efforts, only 1 million dollars in revenue was recovered.

> While reading the details of the case study that follows, students should consider what factors led to this loss of revenue and how the deployment of this system could have been managed differently to reduce the possibility of such errors.

The case study

Case study background

Since the global financial crisis in 2008, there has been continued slow progress with respect to the adoption of health information technology in hospitals with IT investment in the hospital sector worldwide comparing poorly with other sectors (Romanow, 2012). This disparity is largely a result of a general reluctance to spend by cash-strapped government funded bodies. In addition, in organisations such as hospitals, where cost reductions are usually a significant goal of introducing any new IS, examples of systemic failings such as described above would understandably make decision makers extra wary of investment. Consequently it is important for Hospital IS managers to understand how such costly errors occur and what can be done to prevent them.

The Australian health-care system

The public hospital network is the backbone of the Australian health-care system. It is responsible for the delivery of health-care services to the majority of Australian residents. In Victoria, where the study site is located, public hospitals are managed by the Victorian government, Department of Health. Hospitals receive 55% of their funding from the state government while the commonwealth contributes another 45% under the new national health reform agreement signed in 2011. In Victoria, the aging population has caused a significant increase in health-care service demand and consequently is stretching the public hospital system to the limit. ED presentations increase continually (Lowthian *et al.*, 2012) every year. Over the period 2010–2015 presentations at the SWM ED are expected to rise from 55,000 annually to 64,000 in 2015.

At the last state election before the EDIS installation, the performance of EDs in Victoria became a hot political issue. ED waiting time blowouts attracted widespread media attention and were regarded as a sign of deteriorating public health-care service in Victoria.

The SWM was under constant pressure at the time to reduce waiting times. The ED was also facing other challenges including limited funding and a shortage of qualified medical professionals. The pressure to reduce waiting time without increasing departmental capacity put the SWM ED in a difficult position in balancing quality of care with improved departmental throughput.

In addition to the increased clinical workload, the SWM ED was also required by the government to provide a significantly more extensive performance data set according to the new performance monitoring framework. This caused further operational pressure as additional time and resources needed to be diverted from the already over stretched department. In order to cope with the ever growing service demand, IT solutions were considered to boost the clinical as well as clerical operation efficiency.

Operational processes in the ED-SWM

Figure 1 summarises the operational processes in the ED-SWM. All ED patients are assessed on arrival, usually by a triage nurse, to determine the urgency of the case. A triage category of 1–5 is assigned to the patient that determines his/her treatment priority in the department, as shown in Table 1. A desirable timeframe for each category was developed by the Australasian College of Emergency Medicine, while the government sets targets to encourage achievement of national standards of care in ED. The ED's ability to meet these targets is monitored by the government to promote timely treatment of patients and doctors are made conscious of these targets, feeling pressured to ensure timely patient throughput.

Each category is associated with a desirable treatment window (see Table 1) before which an admission or discharge

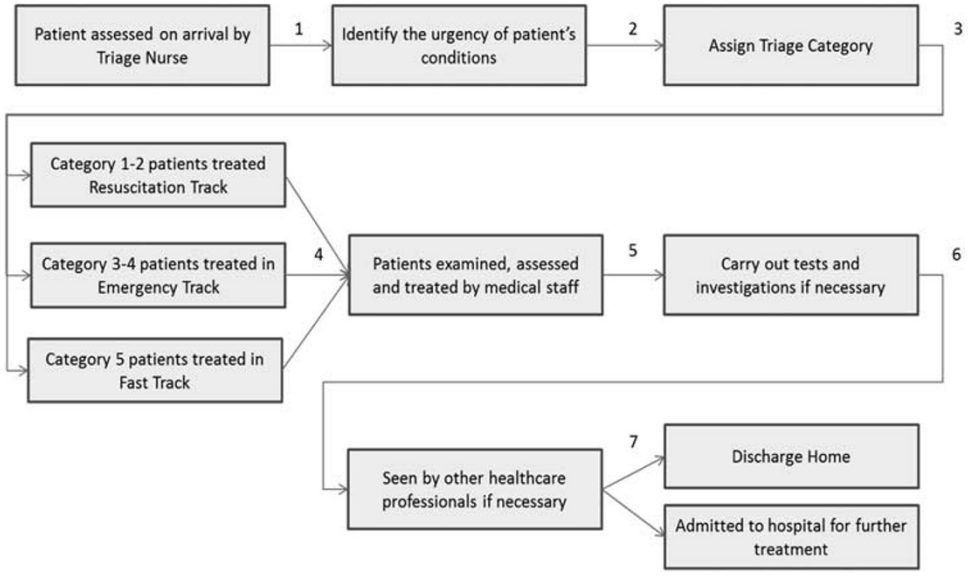

Figure 1 Process of medical care delivery in the ED.

Table 1 ED Triage Categories, Desirable Treatment Times and National Targets

Triage categories	*Desirable treatment times*	*Government targets*
1 – Resuscitation (patient unconscious)	Seen immediately	100% seen within desirable time
2 – Emergency	Seen within 10 min	80% seen within desirable time
3 – Urgent	Seen within 30 min	75% seen within desirable time
4 – Semi-urgent	Seen within 1 h	No target set
5 – Non-urgent	Seen within 2 h	No target set

decision should be made. The resuscitation track treats Category 1–2 patients in the resuscitation area; patients assigned with a triage category of 3 or 4 are seen in the emergency track, each occupying a standard patient cubicle. The non-urgent track sees Category 5 patients with non-urgent and simple medical conditions in consultation rooms. The overlapping of categories between different tracks allows the optimisation of operational efficiency given the different attendance rate at different tracks. Each of these tracks are staffed with a team of doctors and nurses but the doctors are free to move between different tracks to see other patients if their designated track is free. In each track, the patient is examined and assessed by the medical staff.

On the basis of the recovery condition of the patient and recommendations of the treating doctors, patients are then either discharged home or admitted to the hospital for further treatments outside of ED. Either way, there is pressure as the 2-h point looms for the patient episode to conclude, either with admission to another ward or discharge home.

The pre-EDIS operations and systems of ED-SWM

Before the introduction of new EDIS, the ED at SWM operated largely on a paper-based system with the assistance of a few separate computer systems. These systems included the hospital admission system, test result retrieval system and a Picture Archiving and Communication System (PACS) for storing and viewing radiology results as depicted in Figure 2. The hospital admission system was responsible for registering patient details during triage and tracking the movement of patients in the department (Arrow 1). After registration, all patient details were printed out in paper form and delivered into the clinical area waiting to be picked up by the medical staff (Arrow 2). All documentation and test ordering was done manually through paper forms (Arrows 3, 4 and 8). The patient status was manually updated in the system, which in turn (Arrow 8) provided a departmental overview of all patients to the medical staff in charge that could be accessed from computer terminals at the control area. These status documents were used to provide a snapshot or overview of the department.

The test results and radiology images on the other hand were digitalised and stored in separate systems for retrieval by a medical team through computer terminals (Arrows 5 and 6). There was little integration between these systems, different passwords were issued for each system and different programmes need to be launched to access different types of test results (Arrow 7). Overall, IS played a minimal role in the operation of the ED before the introduction of EDIS.

The Emergency Department Information System

Introduction of the EDIS

With the aim of building a more efficient, accurate and safer emergency department in mind, an advanced suite of EDIS was

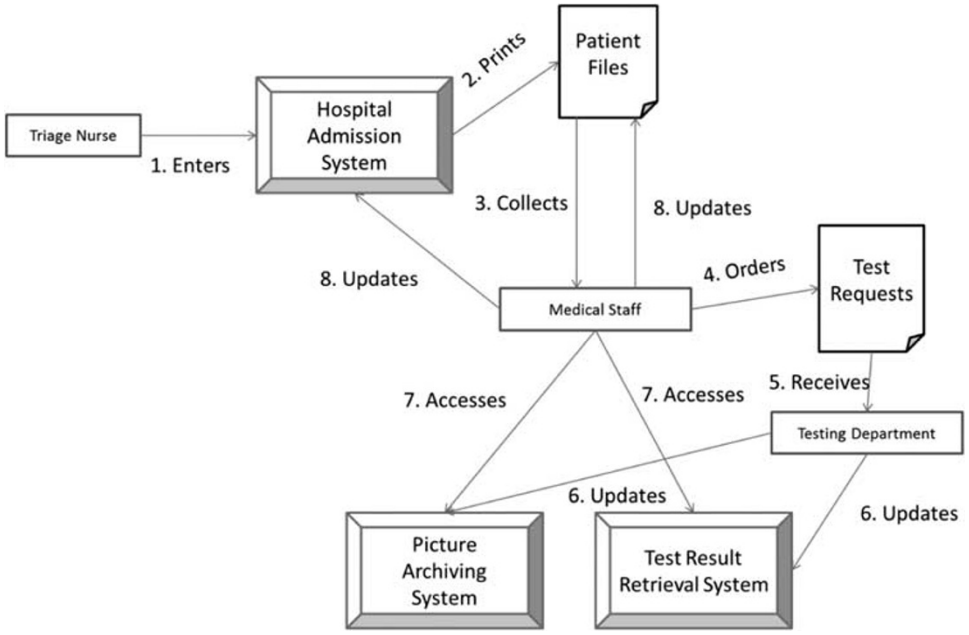

Figure 2 Pre-EDIS patient record system at the ED.

introduced to the department. As a large-scale IT project that would have far-reaching impact on the daily operations of the department, official tenders were invited from different vendors and the new system was selected in consultation with representatives from the medical team. The selection criteria included the ability to integrate with some of the existing IT systems, offer integrated workflow solutions, enable performance data collection as per government requirements and improve information accessibility and storage.

Three main system modules are included in the EDIS suite. At its heart is an electronic medical record (EMR) system that supports clinical, administrative and clerical operations in the ED by enabling information collection and accessing at the point of care. Its main functionalities include 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, the original results tracking system and PACS are also integrated into EDIS.

Under the new EDIS, patient administration, triage and tracking are carried out through a whiteboard style tracking grid that integrates each patient's clinical data on one screen. It enables ready identification of patient status by presenting the patient details, location, treatments, waiting time, test progress, medical notes and treating doctor details together. It was designed to enable integrated information access by medical team members and facilitate easy information auditing by the management. Progress notes, clinical outcomes and nursing notes are integrated with the patient status tracking grid. Information entered into the note taking system is viewable from the tracking screen and is designed to help produce discharge documentation (Figure 3).

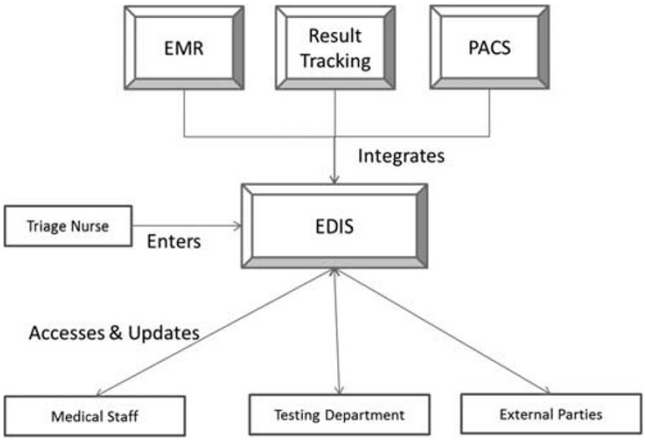

Figure 3 EDIS patient record system at the ED.

Deployment and use

ED management worked closely with the system vendor to customise the system according to the specific requirements of the department with some participation from medical and nursing groups. On roll-out, training was offered to the users in workshops, where users were given between half and one day of generic system overview and training, not necessarily related to their specific roles. While the use of the system to admit and discharge patients was discussed in training along with many other functions, the administrative burden of these activities was not fully explored or specifically dealt with.

A phased approach was adopted for the deployment of the EDIS. The computer infrastructure was first implemented and the software modules started to be rolled out around 3 months later. As with other IS projects, the deployment of EDIS was hit with delays and the system's initial rollout did not start until several weeks after the user training, allowing many users to forget at least some of what they had learnt, although some ongoing support from the vendor was provided. On the go-live day, all users were required to conduct their work using the new system implemented and the old manual systems were kept as a

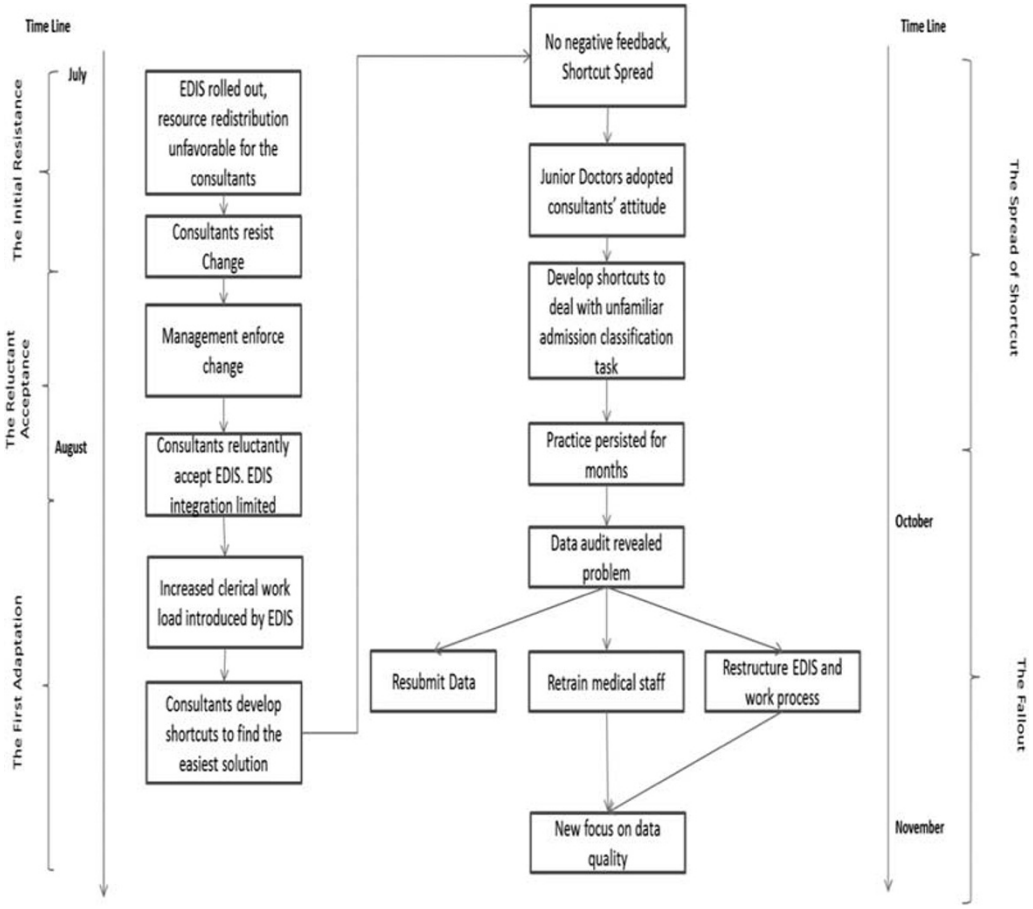

Figure 4 The stages and timeline for the data error incident.

backup in case of EDIS failure. The initial rollout included the majority of main system functions such as the administration, triage and tracking, clinical notes, test ordering and condition related data collection. The EDIS had the biggest immediate impact on the doctors' work routines as they were required to start fully completing all documentation related work tasks electronically immediately. The resulting confusion and dissatisfaction caused a significant drop in the ED's operational efficiency, which lasted for a number of months.

The admission data error incident

The background explained above sets the scene for the narrative at the beginning of this case study, which describes the development and fallout of a major data error incident caused by the EDIS introduction. The key players of this event include Senior doctors (Duty Consultants and Resuscitation Consultants) and the Junior Doctors.

Despite the many benefits promised by the EDIS introduction, a number of issues were encountered by both senior and junior doctors that effected appropriate uptake of the EDIS. The most significant of these was the length of time it now took to do documentation tasks. As a result, various unexpected behaviours developed that eventually led to a major problem associated with the patient admission data. The admission data error incident can be classified into five main development stages, namely the initial resistance; the reluctant acceptance; the first adaptation; the spread of the shortcut and finally the fallout, as summarised in Figure 4. These five stages vividly highlight the dynamic nature of the development of IS consequences and the importance of managing user adaptations.

As illustrated in Figure 4, the admission data error incident can be traced to the senior doctors' dissatisfaction with the EDIS. The introduction of EDIS increased their clerical workload and changed their traditional work focus and their task prioritisation work routine. Typical responses to the new system by senior doctors were as follows:

> … looking after the patient is a lot more difficult, the department is a lot more risky...The ability to easily see problems … with patients, like on the list in the department, is much harder …. It is much harder to see which patients are waiting to be seen by a doctor, it is harder to see which of those are a priority … The list goes on and on and most of that is EDIS. … EDIS obviously is not a perfect program. Also importantly, it is very hard for anyone else who has not had lots of practice on EDIS to actually use it …. … it takes longer to interact with the computer. On the other hand, we have not got more time or more staff, you then have less time. As a result, you have to take shortcuts. For an individual patient, you have to take more shortcuts, because you have not got as much time to do the same job. So when the EDIS first came in I was working about a fifth of the normal rate that I was able

> to work at before. Now I was at about half the rate I was at before.
>
> – Dr. F

In order to adapt to the increased clerical work demand, the senior doctors developed shortcuts to reduce their clerical workload at the expense of data quality. Following this example, the junior doctors gradually introduced significant errors into the admission data. This in turn led to a multi-million dollar loss in revenue for the ED. As a result, all medical staff members were retrained and the EDIS was restructured to prevent the reoccurrence of similar problems. Each of the five stages that led to this incident are set out in Figure 4 and explained below.

The initial resistance

User feedback was actively sought during the deployment period to iron out system bugs and useability problems but the workarounds that developed were not identified as problems by the doctors performing them, although there were many comments about the general lack of usability that led to these workarounds (*'It was a huge change. The work is a lot slower, a lot less efficient' – Dr. M*) and a general feeling that the system was introduced without appropriate supports:

> A guide to EDIS needs to be available. Something sitting by a computer or on the side of the screen that says, if you want to do this, do that …. Little easy guides would be useful. Again, more feedback, someone just saying this is a better way of doing it, this is a better workflow pattern.
>
> – Dr. M

In the lead up to the discovery of the problem with the admission data, a number of different responses to the system rollout occurred starting with an initial resistance to the system, moving through a number of stages post deployment.

The EDIS introduction was perceived negatively by the majority of senior consultants for two main reasons. First, the introduction of EDIS and accompanying changes in the work environment made it difficult for the consultants to work effectively.

The computer-based new working procedures were challenging for the majority of the senior consultants due to their lack of computer knowledge. Instead of being the source of knowledge, supervising and guiding junior staff, EDIS forced consultants to seek instructions from nurses and junior medical staff members regarding EDIS operations and procedures. This change in capability was widely recognised and acknowledged. Senior consultants interviewed were quoted as regarding the junior doctors to be *much better at the new system.* This created a change in the culture and power relationships in the hospital that the senior consultants were not used to. They preferred to just try and circumvent the system however they were able to, rather than seek help.

Management enforcement leads to reluctant acceptance

Despite this initial resistance management held firm. Under pressure from the management, the consultants ultimately were not able to effect any significant changes in departmental processes or the EDIS. The consultants were experts in their medical domain, but they did not have the power over how the ED systems were deployed and managed. As a result, the consultants started to accept the fact that they would have to work with the EDIS in the long term, resulting in begrudging, gradual and selective adoption. Despite being senior consultants within the ED, they expressed their feelings of powerlessness. Comments such as 'you just do it' and 'we were never given an option' were frequently uttered during interviews with consultants.

Increased clerical workload

In some ways consultant reluctance was understandable. The redistribution of work tasks contradicted the consultants' traditional work focus and task prioritisation routine and the skills for which doctors are traditionally rewarded. EDIS brought with it a new set of work processes where the consultants were required to shoulder a significantly heavier clerical workload. The consultants found themselves frequently forced to change work focus and prioritise tasks in a way they were not comfortable with. They believe that their main job is to deliver medical care as Dr. V put it:

> The clerical workload is definitely heavier. It was difficult because we are doctors, our main job is to save lives.

Medical staff felt the system reduced their personal interactions with patients:

> You check what has been done and what hasn't been done in front of computers, instead of going to them to ask how they are doing.
>
> – Dr. R

Lastly, the redistribution of information and change in information presentation impacted consultants' ability to understand what is going on. Traditionally, consultants obtain oversight of the department by surveying the department personally or studying digital graphical displays. EDIS, however, completely changed the sources and types of information they can rely on. EDIS replaced the original presentation of the department with abstract figures and statistics. This change posed significant challenges for the majority of senior consultants. They found it difficult to evaluate their environment and prioritise their work tasks. As revealed in the following quotes:

> The ability to have oversight of the department and what's going on with the patient is markedly decreased than what it was in the past. (Dr. F) and
>
> It is not easy to get a snapshot of what an individual has done over the course of a shift. (Dr. J)

These challenges brought by EDIS were certainly not well received by the senior consultants. Given the highly intensive nature of ED work, the consultants soon became frustrated and became resistive of EDIS. As a result, the departmental performance suffered. As the ED director put it:

> I don't know that many of us have coped, I think the slowdown has influenced the speed with which the department can work all together.

By effectively reducing the key performance standard of the department, some consultants tried to change EDIS. As one of the interviewee heatedly declared during interview:

> I'm happy to do it in terms of accuracy and transparency. But don't expect us to perform at our current level … The whole system has to change …
>
> (Dr. M)

Implementation of shortcuts

Two months after adoption, consultants seemed to only use the system when there was no alternative. When they encountered operational difficulties, they quickly gave up if it was not a critical task and hoped the problem will resolve itself or it was possible to return to it later. Their usage of the system could be considered superficial since few of them bothered to explore the advanced functionalities embedded in the EDIS and had had no training beyond basic use.

One of the key challenges consultants faced was the change in who was responsible for documentation. Some documentation tasks that were originally completed by clerical staff were now the responsibility of the consultants, who were not used to doing what they saw as low level work. For example, they now had the additional responsibility of classifying each patient case into different government-specified condition categories. Despite them being senior medical consultants, they were not all familiar with the formal government classification scheme. Often, instead of examining the options and finding the most appropriate category to assign each case to, the consultants were observed to choose the one that was the most broadly applicable. The consultants regarded data collection as a non-significant or trivial task because it was not in their primary work domain of diagnosis and treatment of medical conditions. By comparison with the fast-paced decision-making climate of an ED, the data collection was also slow moving and seemingly had no immediate real world impact compared to providing medical care. Hence, data collection tasks were also prioritised accordingly. The quality of non-medical data collected was not given much thought. These shortcuts and adaptations received no negative feedback from administration, which had just instructed the doctors to 'do it' when it came to accepting the new IT system. The lack of negative feedback reinforced this set of work practices in the ED, which promoted the further spread of the behaviour. A typical approach by senior consultants was as follows:

> One thing is try and cut corners, to use, to write less notes, to put less information on things, to be less accurate across all fields. So you know for data entry just enter the easiest thing that will be the quickest to process, that is one way of saving time. Which is obviously wrong, but that is what you have to do. Yeah, short cuts, just take the quickest way around.
>
> – (Dr. V)

Without any negative feedback, the idea that you could take shortcuts in the system spread among the consultants and became a commonly accepted practice. Due to consultants' supervisory and educational role in the department, this practice was then picked up by the junior doctors, who were accustomed by the hospital culture and hierarchical structure to model consultants' behaviours. The attitude of 'just tick the easiest box' became a widely accepted workaround when faced with unfamiliar documentation tasks introduced by EDIS. These shortcuts seemed logical to hard-working, time-poor junior doctors. Thus, the shortcuts seemed to doctors to be a rational decision to make.

Like the senior doctors, one of the unfamiliar documentation tasks junior doctors encountered was the classification of admission status for each patient case. In the post-EDIS department, the responsibility of classifying the admission status of patient cases was distributed to all ED medical staff members including the junior doctors. By ticking a simple yes or no tick box at the bottom of the patient discharge screen, the computerised process directly lodges the data without requiring any input from the staff member. No one thought much about this change in responsibility for the doctors, which was regarded as 'just more paperwork'.

Since non-admitted cases do not require verification by the medical records department, the junior doctors were able to complete this task faster without any immediate repercussions. As recounted by one of the consultants during the interview about this incident:

> Very few people understand the DHS government admission criteria. In the old system, at the end of the day before the history went down, it still relies on the consultant to manually check the histories to ensure that the patient will fulfil admission criteria or not. We require a manual check because the information is hard to know. We've now moved away from the manual check. It's now completely automated, so if the doctors don't understand or don't care about the admission criteria, they just hit no.
>
> (Dr. M)

Eventually these workarounds led to the $6 million dollar loss described at the beginning of this case study. The problem occurred in an environment where senior consultants expect to have control over their work domain and the opportunity to pursue patient related goals in the manner in which they see fit. Furthermore, it is likely that in the initial deployment stages, when documentation tasks were reassigned from clerical to medical staff, there was a lack of understanding about how unwelcome these work changes would be and the impositions they would cause. No one could have anticipated, however, that these issues would create a culture in the ED that would lead to such a damaging result.

The fallout from the huge financial loss caused another round of work routine changes in the ED. Because of the seriousness of the incident the documentation routine was completely changed to prevent the future occurrence of similar events. The shortcuts developed by both senior consultants and junior doctors were identified and they were counselled against such behaviour. A series of training and education sessions were used to ensure that ED staff members knew how to use the EDIS and classify cases properly. Meanwhile, the task prioritisation processes were also changed to reflect the increased focus on documentation tasks.

As a result of this incident, the department management were penalised for the loss of control on the quality of key data. The severely negative feedback changed the work norm of 'choosing the easiest option' to 'focus on data quality'.

Table 2 The Stages of Change, Changes in Doctors Task Priorities and Impact of These Changes on the EDIS.

Stage post-deployment	*Task prioritisation of doctors*	*Impact on the EDIS*
The initial resistance	Doctors did not prioritise IS related activities. Drs resisted IS related tasks	Initial pressure to change EDIS through lack of acceptance
The reluctant acceptance	IS related tasks performed reluctantly. Senior doctors regarded data collection as a low	Strong management support for the EDIS: EDIS remained unchanged
The first adaptation	priority task and sacrificed data quality to minimise clerical tasks	No change to EDIS as unsanctioned usage went undetected
The spread of the shortcut	Attitude spread to junior doctors who regarded data collection as a low priority task and sacrificed data quality to minimise clerical tasks	
The fallout	Increased focus by all medical staff on data quality and performance data	System redeveloped to prevent future misuse. Users retrained

Table 3 Categories of Change to the System over Time (Observed July to Following March)

Change category	*Change details*	*Change time*
Management	Discourage personal interaction with patients (just use computer data)	July
	Encourage personal interaction	February
	Unofficially sanctioned rationalised documentation	February
	Reprimand system misuse	Throughout the observation period
	Re-educate about and promote data quality	February
Software	Introduce double checking functionality	February
Hardware	More work stations installed in the ED	September–October

Preventing data errors of all kinds became one of the major concerns of senior medical consultants whereas, pre-EDIS, it would have been a relatively low focus. As the ED director revealed during interview:

> We need to wait for the audit. I'm now a bit concerned with what the audit will actually show which I didn't used to think about much. With respect to the data being recorded in the non-mandatory fields … I'm concerned about that.

Overall, this incident effectively demonstrated the dynamic and unpredictable relationship between information systems, work routine and the organisational actors. A simple user adaptation can have consequences that are unanticipated by the organisation. It shows that an information system's impact on an organisation is far from direct and deterministic.

Post-deployment changes

The four stages of change post-deployment, their impact on the ways doctors prioritise tasks and the changes resulting in the IS are summarised in Table 2.

Interestingly, if we examine the changes that occurred in the EDIS during the 9-month study period and including the period in which the error took place, we can see that only small changes were made to the actual software and hardware. The cost and difficulties involved in changing the system coding prevented significant modification of EDIS functionality. Consequently software changes were only made in response to major incidents such as the Admission Data Error incident. In direct response to the incident, the EDIS software codes were rewritten to highlight the importance of government admission classification checks; double check functionality was also introduced to ensure that all entries are checked by the newly employed clerical staff. To further promote the importance of data quality within the department, new usage policies were put in place to ensure the system was used as specified. However, most of the changes that occurred in the course of the deployment were in fact to do with how the system was managed, users' ability and proactivity in negotiating their roles and how directions were given by management to staff.

Throughout the process of transformation, EDIS management was the most flexible and responsive IS component. The majority of EDIS transformations were carried out through a change in its management approach such as by re-education of ED staff and promoting the importance of data quality as shown in Table 3. By developing a greater understanding of the needs of medical staff in balancing personal interactions with patients against getting data from the system, EDIS management was able to actively influence how EDIS was evaluated, interpreted and used by the ED staff members. Processes such as official reprimands for the continued use of paper records were also implemented.

The ability of management to dynamically change in response to the immediate work environment and practices

is critical in ensuring that the consequences of an IS deployment are positive and constructive. Given it is practically impossible to predict the organisational impact of IS from the beginning, the ongoing management of IS plays a significant role in fostering the achievement of favourable outcomes.

What can we learn from this case?

This case study shows how the problem described above evolved as a response by users to features of a system that they felt interfered with their primary work tasks. It provides lessons for deployment on the importance of considering the requirements of all system stakeholders (Donaldson and Preston, 1995) and how they will be impacted by the system, and developing a deeper understanding of both the work the system supports and its context of use. It provides food for thought on the need for careful I.T. deployments in hospitals to take account of competing individual goals. Research has shown that individuals within an organisation may have different self-interests and goals that may not be entirely aligned with the goals of the organisation (Milgrom and Roberts, 1992). For organisations to function effectively, organisational systems need to be implemented with appropriate training – not just to train users in how to operate the system but also to educate users about the potential of the new system to bring about positive organisational outcomes and thus maximise the alignment between individual and organisational goals (Table 4).

This case demonstrates that what appears to users as a simple user adaptation can have serious consequences that are unanticipated by the organisation. The incident shows that entrenched power structures in organisations can provide significant interference in the effective roll out of a system. It is important that existent work structures and cultures be given significant weight when planning the manner in which the roll-out will occur. New capabilities, such as those embedded in the EDIS, make it vital that, during the deployment stage, management carefully map and manage the new work flow and work activities that result from a significant new IT deployment. All users need to be trained in these new activities and possible power shifts between stakeholders need to be managed to ensure willing adoption. Suitable reward systems need to be introduced to encourage learning and changed behaviours and the appropriate use of all aspects of the system.

This case is useful for MIS courses related to Enterprise Systems, Organisational Change, Organisational Processes and Project Management. Students can explore issues related to implementing and managing a large scale system within an organisation that potentially impacts many aspects of the organisational processes.

Table 4 Task Categories

Categories	*Subcategories*
Clinical care	In cubicle with patient (Trauma)
	In cubicle with patient (Normal)
	Outside cubicle
	Reviewing patient file
	Thoughtful contemplation
	Others
Transiting	Walking between sites
Documentation	Handwriting/Computer
	Medical record
	Discharge letter
	Sick certificate
	Other
Computer use	Other inc personal
	Synapse (radiology)
	Symphony
	CIS (Pathology/ Radiology)
	2nd Screen (Test results)
	eKnowledge
	Mimms
	Clinicians Health Cha
	Google
	Other
	Riskman (incident reporting)
Communication – Incoming / Outgoing	
	Phone call
	Paging out
	Speaking to patients' family
	To other carers
	To other doctors
	To nurses
	To clerical staff
	To other staff
	To students
	To MAS
	To police
Non-clinical tasks	
	Bathroom
	Meals and breaks (off the floor)
	Drinks (on the floor)
	Snacks (on the floor)
	Smoking
	Left ED (unspecified)

Questions for relection (teaching notes to support these questions are available)

Question 1

What were the main failure points in the system? Why?

Question 2

What different approach could have been taken at the time of the deployment that would have changed the outcomes?

Question 3

What were the original goals of the new IT system at SWM? If you were evaluating this system, post-deployment, would you say it had fulfilled these goals?

Question 4

What theories about organisational structure might explain why the junior doctors used (misued) the system in the way they did?

Question 5

In considering the problems that are described in the case study, it could be useful to look at the star model of organisation design (Galbraith and Kates, 2007). In doing this, think about your answer to question 3 (What goals did the system designers have when implementing the new system at SWM?) How could the five factors in Kate and Galbraith's star

model (people, capabilities, rewards, structures and processes) have been managed better at the time of deployment in order to support these goals?

Debate topic: Argue the case for or against the following statement in light of this case study. Consider what your argument means for cultural awareness about system users, system training and documentation:

'Skilled professionals, like doctors, can't be expected to follow time-wasting and seemingly irrelevant rules if no one tells them why those rules might be important'.

Note

1 The name of the hospital has been changed to protect the privacy of staff but all other events represented here are true.

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