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Reducing Interruptions and Reducing Errors in the Inpatient Dispensary Pharmacy

Malini Subramoney
Information Management and Technology Systems Dept,
Auckland District Health Board
Greenlane Clinical Centre, Greenlane, Auckland
malini.subramoney@gmail.com

Abstract

Interruptions and distractions are significant factors in medication errors in the pharmacy environment. Although only a small percentage of these errors cause harm, medication errors need to be minimised in an effort to improve patient safety. In an attempt to reduce the number of interruptions, the inpatient pharmacy at Auckland District Health Board plans to implement an information system to provide an online status of prescription progress during the dispensing process. This prescription tracking system will allow pharmacy staff to enter the status of a prescription and update it as it moves along the dispensing process. The objective of implementing this system is to provide a shared tool for pharmacy and nurses to allow visibility of the status of a prescription at any point during the dispensing process. The secondary objectives of the implementation include improving patient care by reducing medication errors and using nursing and pharmacy staff time more productively.

1. Introduction

Errors in the clinical environment are commonplace. The Institute of Medicine's report "To err is human" [1] estimated that "up to 98 000 people die from medical errors each year in the USA" [1]. In addition, medication related errors occur often, however only a small percentage of these errors cause death or serious injury. Serious medication errors increase the cost of hospital admissions dramatically and are estimated in the report to amount to US $2.8 million per year for a 700 bed hospital. In a New Zealand study, Davis etal. calculated an estimated 6.3% of admissions to NZ public hospitals were associated with adverse events that were both preventable and occurred in hospital [2]. Davis etal. noted that while these adverse events had relatively minor effects on patients, there were large impacts on hospital workload and added costs to the health system [3].

The cause of errors as reported by the Institute of Medicine [1] were due to flawed systems, processes and conditions leading people to make mistakes or fail to prevent them. Since the release of the report, many initiatives have been implemented to reduce and prevent errors; however errors still occur regularly in the clinical environment. While New Zealand's rate of errors is significantly different to the USA, it still remains a big issue for patient safety. The healthcare industry needs to continue to implement strategies that improve systems, processes and working conditions.

Error reduction strategies are present in other fields where critical errors could lead to the loss of lives. Helmreich [4] discussed lessons that the health care industry could learn from aviation. This included strategies for managing errors in an effort to improving safety. The causes of errors included "fatigue, increased workload, cognitive overload, poor interpersonal communications, imperfect information processing and flawed decision making."

As aviation accidents are widely publicised and result in multiple lives being lost, the aviation industry has developed standardised ways for the investigation, documentation and dissemination of errors and their lessons. Thus, crew resource management training is an essential part of the error management strategy in aviation. This training considers limitations in human performance (being tired or stressed) and the nature of human error and incorporates behaviours to deal with errors [4]. This has proven to be effective in changing the way errors are viewed and in effect improved safety in aviation.

Anaesthesiology is another area that has addressed patient safety and achieved good results. In an effort to address patient safety, new advanced technologies, guidelines and standards as well as analysing and addressing the problems related to human factors and systems have been adopted [5].

Medication errors in the pharmacy environment are a major safety concern as these errors, as in aviation and anaesthesia, could result in fatal outcomes. While there are many reasons for medication errors, interruptions and distractions are significant factors in causing errors in the dispensing process. This paper explores the link between interruptions and distractions, and medication errors and will discuss the implementation of a prescription tracking system to reduce interruptions in the pharmacy dispensing environment.

The inpatient pharmacy dispensary under discussion in this paper is part of the Pharmacy Department at the Auckland District Health Board (ADHB) hospital. ADHB hospital is a 700 bed tertiary hospital in Auckland, New Zealand. The inpatient pharmacy dispensary services a full range of specialist medical and surgical wards, busy acute areas of the emergency department and admission and planning unit, and two off site wards within a 10km radius in the Auckland area.

2. Problems associated with interruptions and distractions

A review of the literature provides several articles showing interruptions and distractions as a cause of errors during the dispensing process [6-12]. In the literature, distractions are defined as situations where the dispensing task was not stopped completely but a degree of multi-tasking occurred while dispensing. Interruptions were defined as situations resulting in the dispensing task being stopped and resumed after dealing with the interruption [6]. Interruptions and distractions can be causes of errors in all clinical settings however this paper focuses on the interruptions in the pharmacy environment only.

The major source of interruptions in the inpatient dispensary at ADHB is due to nurses telephoning the pharmacy to request the status of a prescription. There is a prioritisation of all prescriptions that arrive in the pharmacy. Urgent drug requests are fast tracked and the nurse is called when the dispensed drug is ready for pick up by an orderly. Non-urgent drug requests are put through in the order that they are received in pharmacy. These are then sent to the wards on one of the regular ward deliveries made by pharmacy staff. Nurses are not always aware of the priority given to urgent drug requests. Therefore they phone the dispensary to find out the status of the particular request they have sent through.

Figure 1 describes an overview of the workflow in the inpatient dispensary at ADHB (for non-urgent drug requests). In answering a telephone call requesting the status of prescription, the person has to stop what they are doing and find out where in the process the prescription may be. An interruption of any of the tasks in Figure 1 may result in the incorrect drug being selected, incorrect label placed on a container, checking an incorrect drug order against a prescription and eventually sending the wrong drug to the wrong patient.

The types of dispensing errors caused by being distracted or interrupted often leads to a series of other events.

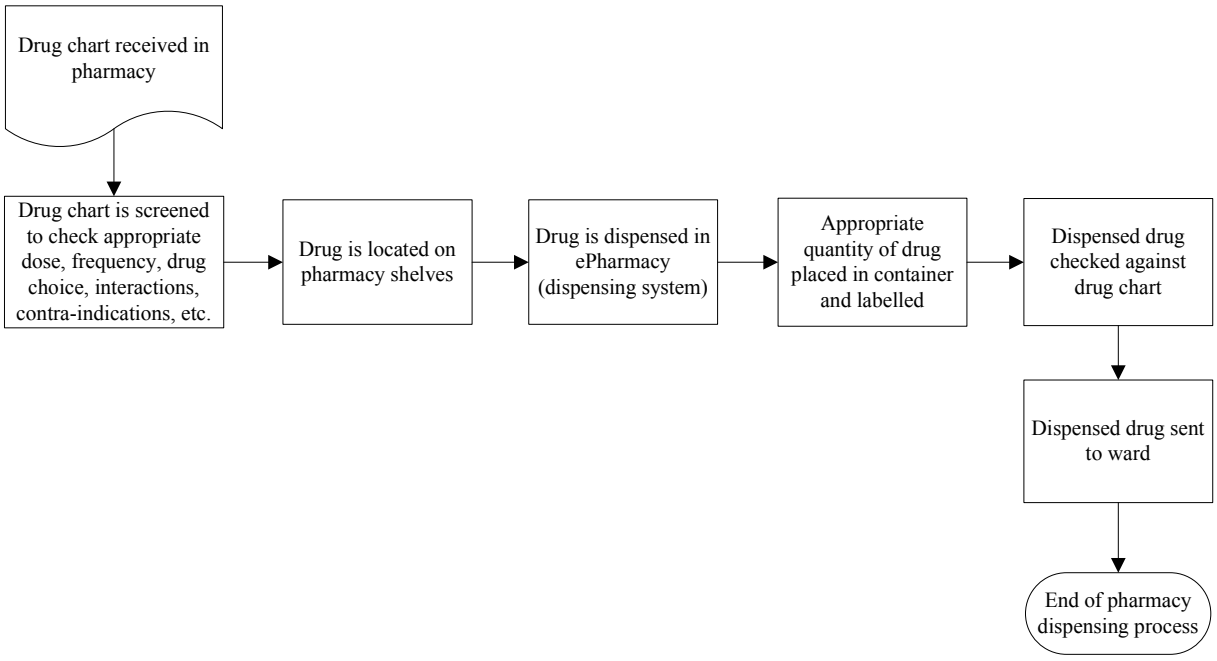

Figure 1 - Inpatient Pharmacy dispensary workflow

Scenario

A nurse sends a request for four drug items to the pharmacy. The drug chart is screened and the pharmacist assigns a non-urgent number to the prescription to allow tracking in the dispensary logging system (a written log of all items being dispensed). The drugs are located and retrieved from the pharmacy shelves and the dispenser issues them in the dispensing system to the relevant patient. The decanted items are labelled and sent to the checking bench to be checked before being sent to the ward. Midway through checking the items and noticing that item 3 has fewer doses than required, the pharmacist answers a telephone call requesting the status of another prescription. The checker leaves her station and moves over to the prescription log to check if the prescription has been entered in the log. She finds the prescription was logged in an hour ago, so then continues to check in the dispensing trays to locate the item. After finding the item is being labelled at that point, she informs the nurse where in the process the item is and the approximate time the item can be expected on the ward. The checker then returns to the checking station and proceeds to check item 4 having now forgotten that item 3 had fewer doses than required. The drugs are then sent to the ward on the usual delivery. The nurse receiving the order opens up item 3 and calculates that the number of doses dispensed will not suffice for the next administration.

The nurse calls the pharmacy and requests for further doses to be supplied against the original prescription.

The scenario above highlights a number of problems. While the checking pharmacist discovered a dispensing error (that too few doses had been dispensed), she was interrupted before getting it corrected. The incorrect number of doses was sent to the ward, the nurse had to reorder more doses, and the pharmacy dispensing process would be repeated to send the additional doses to the ward.

This example shows how interruptions cause errors, and add to the already time pressured workload of both nursing and pharmacy staff. The end result is that the patient may receive a late dose. This scenario could be further complicated if the drug involved was required for a life threatening situation. In addition to causing errors, distractions and interruptions increase the time taken to dispense an item. Yet despite this, interruptions are still a normal part of the dispensing process. From the nurse's point of view, it is a necessary disruption as their duty of care requires them to administer medicines in a timely manner as prescribed on a patient's medical chart.

Studies by Beso et al [6] and Hiom et al [8] discussed high volumes of telephone calls received in the dispensary for the same reason as is described for ADHB. While these studies did not draw direct links to the rate of errors, another study by Kistner et al [7] suggested that minimal interruptions during dispensing were an important factor in error avoidance. A similar finding was made by Nichols et al [12] where most errors were due to distraction caused by slips in attention during routine tasks.

2.1. Imperative need for the inpatient pharmacy dispensary

The key problems identified are that the pharmacy lacks an efficient system to track prescriptions through the dispensing process, and nurses have insufficient visibility of the status of their patients' medication orders. The time spent tracking the status of a medication order could be used more productively by both pharmacy staff and nursing staff. Productivity could also be increased by reducing the amount of time spent on correcting errors.

ADHB is still a few years away from implementing electronic prescribing and ordering systems. This situation presents an immediate need for an information system that will provide an online status on prescription progress and be available to nursing and other clinicians on wards. The aim of this implementation would be to address medication safety issues arising from interruptions and distractions by reducing the number of telephone calls in the dispensary.

Working in an already time pressured and stressful environment does not allow the provision of the best possible care to patients. One of ADHB's goals is to improve performance and create new ways of learning and working [13].

The result of a system to show the updated status of a prescription during the dispensing process can create a new way of health care providers working together to be able to provide better patient care.

2.2. Proposed prescription tracking system for the inpatient pharmacy dispensary

The information system proposed for the dispensary could serve as a solution to improve medication safety and increase productivity for pharmacy and nursing staff. The prescription tracking system should allow pharmacy staff to enter, store and share information regarding the status of a prescription from a location accessible from the organisation's intranet. The amount of data entry involved would need to be minimised and one way to achieve this could be by using the patient's bar-coded medication label as well as bar-coded labels at each stage of the process. Once the patient's details are entered in the prescription tracking system, the person at each stage of the process should be able to scan a

ADHB Inpatient Pharmacy Dispensary Prescription Log													10:05am	Monday, 24 November 2008 Welcome Ward 24B
#	Time	NHI	Surname	First name	Ward	Priority	No. of items	Status	Time out	Delivery details	Collected by	Comments		
1	08:15	ABC1234	Bloggs	Joe	62	Standard	1	Checked	09:15	09:30 delivery run		Contains fridge item		
2	08:22	DEF2345	System	Andy	48	Urgent	3	Checked	08:45	Nurse collected	Lisa Smith			
3	09:25	GHI3456	Child	Liz	24B	Standard	4	Dispensing						
												> Next Page		

Figure 2 - Proposed Prescription log screen view

bar-coded label to update the status of a given prescription. The updated status of the prescription should then be visible to nurses or any other clinician involved in the patient's care.

Implementing such a system would primarily reduce the number of telephone calls as nurses would be able to log on to a shared site on the hospital's intranet to view the status of a prescription. A secondary objective of implementing such a system would be improving patient care by increasing the productivity of pharmacy and nursing staff. Figure 2 shows a mock up of the screen that a nurse would be able to view on the ward. For example, a nurse on ward 24B could view the prescription log via the ADHB intranet site. She would be able to ascertain from this screen that at 10:05am, the prescription for Liz Child containing 4 items is being dispensed.

Interestingly, Coiera and Tombs [14] identified in their study of communication behaviour in a hospital setting that staff preferred interruptive methods of communication. The authors also noted "the telephone is a part of a human information system and may often be preferred because it is better suited to many clinical tasks and settings than computer based solutions." An interesting challenge for the implementation of the proposed pharmacy tracking system will be to change to a less interruptive way of communicating.

3. Implementation challenges

Although pharmacy and nursing staff agree that the current way of working is not ideal, their adoption of an electronic system may not concur. Studies show that there are benefits to health information systems, but there also factors preventing the adoption of these systems [15-19]. Furthermore, the implementation of health information systems are plagued by a high failure rate [19].

It has been highlighted by Heeks et al [17,18] that the key factor for implementation success is the amount of change between where an organisation is at currently, and where the health information system can get them to. This is referred to as the design-reality gap. The authors discuss a seven dimension model of the design-reality gap in the implementation of health information systems. Implementation projects can easily be abandoned or closed when the design-reality gap is too large. Suggestions for improving implementation using the methods, techniques and roles found in successful health information system implementation include delivering health information system projects in a piloted fashion rather than the big bang approach that often leads to failure. This is because a smaller amount of change over time will be more acceptable to the organisation.

Applying Heeks' design-reality gap model to the proposed solution for the pharmacy shows that there are small gaps that exist between the solution's design and the users' expectations. Users will be able to access the information they require through a system which will use simply technology. This simple technology and process that enhances the way users work means positive change with the new system. The small design-reality gap for this system indicates the higher probability of implementation success.

In the same light, Berg [19] described that a successful implementation process was one where the health information system changed the primary work processes (e.g. the time delivery of medicines to patients) and changed the secondary work tasks (e.g. using nursing and pharmacy staff time more productively). These primary and secondary work processes should eventually be aligned via the implementation of the health information system.

4. Conclusions

In this paper, the issues of safety in the pharmacy environment were highlighted. Medication error is a major safety concern. The link between medication errors and interruptions during the dispensing processes exist, but there is little quantifiable evidence. Telephone interruptions during the dispensing processes are a significant factor in causing

medication error. The inpatient dispensary receives a large number of phone calls requesting the status of prescriptions. Dealing with high prescription volumes in an environment that is interruptive is not ideal and can lead to dispensing errors. The proposed prescription tracking system is a simple solution with important consequences for pharmacy, nursing and other medical staff. Health care can gain from improved processes and the use of technology to reduce and prevent medication errors. In December 2008, the implementation of a prescription tracking system that would provide an up to date online status of prescriptions was initiated with an expected finish date of February 2009. The system will be piloted in one ward before being rolled out to the rest of the hospital. By the time this article is published, the rest of ADHB will be eagerly awaiting the implementation of the prescription tracking system in their wards.

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