ROOT CAUSES OF MEDICATION ERRORS IN THE PHARMACY UNIT OF A MENTAL HOSPITAL IN INDONESIA

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Abstract

Background: In the period 2016-2017, incidents of medication error happening at the dispensing stage was 66% of the overall patients' safety incidents in the Pharmacy Unit of Hospital X. Evidently, medication errors can be prevented by taking appropriate actions.

Objective: This study aims to minimize medication error at the dispensing stage by applying the Problem Solving Cycle as a research tool.

Methods: The research design is based on action research because the researcher intervened with the stages of the Problem Solving Cycle of the Pharmacy Unit of Hospital X. This research uses the 5 Whys Method to examine the root cause of the problem. Each problem was explored objectively before an alternative solution can be determined. Identification of the medication error incidents at the dispensing stage was based on six indicators.

Results: Patient safety is paramount in any hospital but the overall report of medication error incidents occurring at the Pharmacy Unit of Hospital X between June 2017-January 2018was 89 incidents. At the dispensing stage alone, there was a total of 22 incidents. A total of 73% of these incidents were reported according to the reporting time procedure, <48 hours while the highest number of medication errors involved the wrong medicine (40%), and labels on drug (27%). All were attributed to the LASA (Look Alike Sound Alike) medications.

Conclusion: The root analysis of the medication error incidents at the dispensing stage used the 5 Whys method. Focus was given to policies, SOP (Standard Operating Procedures), monitoring and evaluation, supervision, service flow, communication between staff, and communication between staff and patients. A total of 16 root problems manifested.

Keywords: *Dispensing Stage, Medication Error, Problem Solving Analysis*.

Introduction

Based on the National Report of Patient Safety Incidents, errors in administering medications were found to rank first, at 24.8%. These errors had emerged during the process of prescribing, transcribing, dispensing, and administering medications. Of the process, the dispensing stage was observed to be ranked first (4).

On an average of four semesters in the period 2016-2017, incidents of medication errors at Hospital X was ranked second at 21.3%after the aggressiveness of patients at 21.8%. When compared to the National Report on Patient Safety Incidents presented at the PERSI Congress in September 2007, incidents of medication error was the highest among others (6).

The Minister of Health Regulation No.129/Menkes/SK/II/2008 which concerns Minimum Service Standards (MSS) had stated that medication errors should not occur in hospitals. Nonetheless, it continued to prevail. It was suggested that incidents of medication errors in Hospital X were due to the staff not adhering to the standards of the MMS accordingly. Medication errors can occur at all stages of the medication process which include prescribing errors, transcribing errors, dispensing errors (with the correct recipe), and administering errors (7).

Table 1 shows an increase in the incidents of medication errors at the dispensing stage in 2017, with as many as two incidents, as compared to 2016. The types of reportable circumtance incidents and adverse events also increased in 2017. Fortunately, there was no-harm incident for 2016 and 2017. However, there was high of dispensing medication error incidents occurring at Hospital X Pharmacy Unit in 2016-2017 was 66%. This study aims to identify the causes of medication error incidents. It uses the Problem Solving Cycle a research tool to detect the causes.

Table 1: Types of medication error incidents in dispensing stage

Type incident Medication Error	2016			2017			Information
	Sem 1	Sem 2	Σ	Sem 1	Sem 2	Σ	
Reportable Circumtance incident	-	-	-	1	1	2	↑
Near Miss incident	2	16	18	6	8	14	↓
No harm incident	-	4	4	4	-	4	=
Adverse event	1	4	5	6	3	9	↑
Sentinel event	-	-	-	-	-	-	-
Total	3	25	27	17	12	29	↑

Data source: Patient Safety Incident Report of Hospital X 2016-2017 (June)

Methods

This study design is based on action research because the researcher intervened with the stages of the Problem Solving Cycle. The research site was Hospital X, a special type of Hospital holding an A grade in its Pharmacy Unit. The respondents involved as the source of information were the hospital and pharmacy staff involved at the dispensing stage (Pharmacists, pharmaceutical technical personnel, and administrative officers) including the Head of the Pharmacy Unit of Hospital X and the dispensing unit coordinator. In total there were six respondents. This research was assigned ethical approval by the Menur Hospital Ethics Committee (KEPK No. 072/929/305/2018).

Statistical analysis was carried out descriptively with the 5-Whys method. This method was performed by the researcher together with the head and the coordinator of the IFRS dispensing services. The dispensing stage applied by this hospital include a review

of the prescriptions, preparation or compounding of the recipes, labeling, reviewing of the medication, delivery of medication, andeducation. Data analysis aims to determine the root cause of the medication error incident, in particular, the sub-types of the incidents which have been generated at the incident identification stage. Analysis focused on policy, Standard Operating Procedures, service flow, supervision, monitoring and evaluation, communication between staff and communication between staff and patients, and/or families. Following the identification of the root cause of the problem a discussion was held with the two personnel involved. The aim was to validatethe root cause of the problem and to formulate an alternative solution. The medication error reports were collected by the hospital's informations system. The medication error recapitulation was included as patients' safety incident. The limitation of this research lies in the fact that it only examined the policies and the SPOs. This research excludes the FGD, which was an alternative solution because it was determined by the hospital.

Results

Medication Error Incidents at the Dispensing Stage

Medication error incidents are part of the patients' safety incidentsfor the said hospital. The number of patients' safety incidents reported between June 2017-January 2018 was 89 incidents. The number of medication error incidents that occurred at the dispensing stage in the Pharmacy Unit of Hospital X for the period of June 2017-January 2018 totaled 22 incidents. The identification of the medication error incidents at the dispensing stage was based on six indicators: reporting time, incident sub-types, types of incident, place, impact, and grading. Incidents of medication errors occurring at the dispensing stage, based on reporting time was 22 incidents with 73% of them reported according to the reporting time procedure, which is <48 hours. The incidents of medication errors were based on the sub-types of incidents such as: medication errors, labels, patients, dosages and time, with some related to medication. Wrong medications and labels occurred between 27% to 40%.

Incidents of medication errors at the dispensing stage was based on the type of medication errors: a potential injury event, an injury event, or an undesirable event. The most common type of incident was reportable circumstance incident, which amounted to 59%. Fortunately, these errors had not reached the patients, due to some barriers. In that regard, patients were not exposed to the incidents. Based on location, it appears that the medication error incidents which occurred at the dispensing stage was the highest, as much as 64%, at the Inpatient Installation, 36% at the Pharmacy Unit, and none was found at the emergency room. The medication errors occurring at the dispensing stage in the Pharmacy Unit were all regarded as outpatients.

Problem Cause Analysis

Data analysis focusing on medication errors are presented in Table 2. Table 2 shows 28 of the 5 sub-types of incidents. Some of the root causes were the same, hence the total number of root causes was only 16.

Table 3 shows the distribution for the root causes. Only one root cause was linked to policy, five root causes linked to SPO, seven root causes due to monitoring and evaluation, one root cause linked to supervision, and two root causes due to communication between staff.

The total of 16 roots cause were derived from the discussion held with the Head of the Pharmacy Unit and the dispensing service Coordinator. Their input helped to determine other alternatives as priority solutions for the next step.

Table 2: The root cause of the medication error in dispensing stage is based on the sub-type of incident

No	Sub Type of Medication Error Incident in Dispensing Stage	The root cause of the medication error in dispensing stage	Total
1	Wrong medication	a. Not yet implementing e-prescribing; b. The dispensing service has not yet been monitored and evaluated; c. Drug storage for dispensing services has not been monitored and evaluated; d. SOP High alert medication management has not been conducted; e. SOP Preparation and labelling is lacking in socialization; f. Monitoring and evaluation of drug preparation services has not been carried out; g. No SOP Study medicine; h. The implementation of drug delivery and education has not been carried out monitoring and evaluation; i. SOP Submission of drugs and education has not been socialized.	9
2	Wrong patient	a. SOP socialization Accuracy Identification is lacking in socialization; b. The accuracy of identification when the drug is handed over by the pharmaceutical technical personnel has never been supervised; c. SOP The accuracy of identification when delivering drugs has never been evaluated; d. Queue machine maintenance has not been carried out; e. Shift SOP is not easy to understand.	5
3	Wrong dosage	a. Not yet implementing e-prescribing; b. The dispensing service has not yet been monitored and evaluated; c. Drug storage for dispensing services has not been monitored and evaluated; d. SOP High alert medication management has not been conducted; e. SOP Preparation and labelling is lacking in socialization; f. Monitoring and evaluation of drug preparation services has not been carried out; g. No SOP Study medicine; h. The implementation of drug delivery and education has not been carried out monitoring and evaluation; i. SOP Submission of drugs and education has not been socialized.	9
4	Wrong label/etiquette	a. There is no monitoring and evaluation of planning and procurement of label paper/drug labels; b. There is no work organizational structure monitoring and evaluation and job description of dispensing services at the Hospital Pharmacy Unit X; c. Monitoring and evaluation of service at the dispensing stage has not been done.	3
5	Lack of medication	a. Preparation and Labelling SOP is not carried out socialization; b. Monitoring and evaluation of drug preparation services has not been carried out.	2
Total			28

Table 3: The root causes of the medication error incidents in dispensing stage based on policy, standard operating procedures, supervision, monitoring and evaluation, communication between staffs, and communication between staffs and patients and/or families.

Variable	Root Causes of Sub Type Medication Error Incidents in Dispensing Stage in Hospital X Pharmacy Unit
Policy	Not e-prescribing yet
Standart operating procedures	1. SOP of The management of high alert drugs has not been socialized; 2. SOP of Preparation and labeling of drugs is lacking in socialization; 3. SOP of Drug review does not exist; 4. SOP of Submission of drugs and education has not been socialized 5. SOP of Accuracy Identification is lacking in socialization
Monitoring Evaluating	1. Drug storage for dispensing services has not been carried out monitoring and evaluation 2. Drug preparation services have not been carried out monitoring and evaluation; 3. The implementation of drug delivery and education has not been carried out monitoring and evaluation 4. The accuracy of identification when drug delivery has not been carried out monitoring and evaluation; 5. Planning and procurement of etiquette paper have not been conducted monitoring and evaluation 6. The dispensing service phase has not been carried out money 7. There is no monitoring and evaluation of work organizational structureand job description for dispensing service in the Hospital X Pharmacy Unit
Supervision	The accuracy of identification when the drug was handed over by pharmaceutical technical personnel had never been supervised
Communication between staff	1. Shift SOP is not easy to understand; 2. Queue machine maintenance has not been carried out

Discussion

The problem analysis of this research was done by identifying the error incidents, and then analyzing the causes of the medication errors which had occurred at the dispensing stage. The medication errors were identified based on reporting time, sub type, type, impact, place of discovery, and incident grading. It was found that 73% were on time. Based on the sub-types of the incidents, wrong medication ranked first at 40%. This is in accordance with previous research (Aldwaihi, Schifano, Pezzolesi, & Umaru, 2016) which noted that wrong medication most often occurred followed by wrong dosage and formulation (1). Out of the nine incidents of wrong medications observed at the Hospital X Pharmacy Unit, majority had occurred due to the LASA medications. Two wrong dosage incidents were also attributed to the LASA medications. Undoubtedly, medications that looked the same or sounded the same by name, were the potential cause of medication error (10). This research had shown that the errors caused by the LASA medications had not only occurred at the dispensing stage, but also throughout the entire medical process, from prescribing, transcribing, dispensing to administering. Factors that influenced the error incidents

caused by LASA was due to the dispensing services. Packing and labelling of medications were similar due to dosages leveling. It was difficult to see the different dosages required because these were not written in capital letters. In addition, the storage of the medications did not follow the set procedure (11).

It was apparent that Hospital X's Pharmacy Unit does not practice using capital letters for LASA medications. This became the potential cause for medication errors. In this regard, it is imperative that the management of LASA medications focus on legibility by using capital letters. LASA was included in the high alert medicine class and Hospital X's Pharmacy Unit has a High Alert Drug Management Guide and a High Alert Standard Operating Procedure (SOP) Drug Management. This procedure was evidently overlooked by the dispensary staff. Therefore, it is necessary that socialization, supervision, monitoring, and evaluation in the management of high alert drugs give their concerns about their respective dispensing services.

Based on the discussions held with the Head and the Coordinator of the dispensing services, alternative solutions can be implemented to enhance the management of drugs in Hospital X's Pharmaceutical Unit. These solutions include: (1) sorting medications based on fast moving or not; (2) putting a separate fast moving medication in place so that it can be accessed easily by officers, but still adhering to high alert drug storage guidelines; (3) using capital letters; (4) double checking on high alert drugs conducted by pharmacists and documenting these steps clearly. These alternative solutions are expected to reduce the incidents of medication errors occurring at the dispensing stage where it involved sub-types of the wrong medication incidents.

Based on the type of incidents detected, the highest reportable circumstance incident was 59%. There were no incidents of sentinel and near miss incidents. The results obtained in this study were consistent with the outcome obtained from the Department of Cardiology at the Namakkal District tertiary care hospital, Tamil Nadu, India. It was also found that the highest incidence which was an error that had not yet reached the patient was 51.88% (8).

The role of the Pharmacist in preventing medication errors in outpatients is by providing education about treatment during medication delivery or by providing Drug Information Services which is one of the tasks of the Clinical Pharmacy (5). By involving patients and or their families, responsibility and awareness of the treatment process that is being undertaken can be fostered.

Looking at the grading level, the outcome showed that 5% (1/22) of the medication errors held low grading, 86% (19/22) carried moderate grading, and 9% (2/22) held high grading. There was no incident with extreme grading. Low and moderate grading showed that settlement of these incidents can be done in work units by conducting simple investigations led by the head of the work unit. High and extreme grading can be managed with RCA (Root Cause Analysis) led by the top management (6).

Grading is a risk assessment based on impact and probability. As much as 86% of the incidents was with moderate grading, with 100% of the impact value being 1, and the probability value being 5. There was no impact on the patient, but the frequency of the repeated incidents was on a weekly or monthly basis. Some factors that could be causing the recurring incidents every week or month include the lack of management on the process, the process was managed but not the root cause, or the root cause was managed but there were other root causes not managed (2). These incidents were determined by identifying the causes based on discussions. The incidents were then assessed via incident grading rather than risk matrix. In this research, the highest grading incident was not the determinant of the analysis of the cause of the incident. Determination of the incidents to be analyzed for causes were based on the sub-types of the incidents.

Out of 22 medication error incidents that had occurred at the dispensing stage, six were sub-type incidents such as: wrong medication, wrong patient, wrong time, wrong dosage, mis-labeling/etiquette, and the lack of medication. However, after the causes of the incidents were identified during the discussions, only five sub-types of the incidents remained. They encompass: wrong medication, wrong patient, wrong dosage, mis-labeling/etiquette, and lack of medication. The sub-type of wrong time had occurred at the prescribing stage. In this regard, problem analysis is an important first step in the problemsolving cycle. If not addressed, other errors will prevail at the subsequent stage.

A total of five sub-types of medication error incidents occurring at the dispensing stage were then analyzed for the causes. The 5 Whys method was applied. This involved the Head and the dispensing service coordinator of the Pharmacy Unit. The analysis of the causes focused on the policy, SOP, service pattern, supervision, monitoring and evaluation, communication between staff, and communication between staff with patients and/or families.

The 5 Whys method is easy to teach, do and work with a team, but it has some disadvantages. The 5 Whys uses linear thinking, for example, Problem A is caused by B, B causes C, and this ends with a single cause. In comparison, incidents of patients' safety are actually not a linear problem (3).

Of the 5 sub-types of incidents detected, there were 28 root causes found. Some of these overlapped with each other, and thus the final analysis involved 16 root causes contributing to the medication error incidents occurring at the dispensing stage. The details observed indicated that there was one root cause of policy, five root causes of SOP, one root cause of supervision, seven root causes of monitoring and evaluation, and two root cause of communication between staff.

Hospital X had fully passed the KARS 2012 Version accreditation in 2015. In this regard, all areas of policy, and SOP should have been fulfilled. However, the one root cause of policy was traced to e-prescribing, which could not be implemented in Hospital X yet. E-prescribing not only reduces the incidents of medication errors in terms of illegible writing, it would also reduce incidents of medication errors attributed to patients' history. This is because laboratory results are easily accessible to be used for verification (9).

The stipulated regulation can only be carried out after the implementation is organized and supervision before it is then monitored and evaluated. Most regulations in the Hospital X's Pharmacy Unit already exist, in the form of policies, guidelines, and SOPs. Perhaps, more intensive socialization and controlling about these should be considered for improvement.

The lack of control at the dispensing service had resulted in an absence of evaluation of the services tendered. Without these, no improvement could be made to the services that do not meet the standards. Moreover, the staff at the pharmacy unit tended to do what is usually done, instead of doing their jobs properly. Therefore, the monitoring of the Hospital X's Pharmacy Unit in this research is the variable under study. If monitoring was not performed according to regulations, they unit would be unable to detect what had caused the medication error incidents. Thus, it was imperative for the analysis to be conducted so that the evaluation results can serve as input for the respective parties to use when making their future plannings so that they adhere to the standards recommended.

The activity of monitoring and evaluation of the pharmacy unit had not been conducted at Hospital X. No such moves were conducted to detect the obstacles hindering staff from working efficiently, customer complaints, both externally and internally, and whether the staff at the dispensing service of the Hospital Pharmacy Unit had operated according to the standards or not. The role of the Unit Head and the Coordinator of the dispensing service of Hospital X's Pharmacy Unit is to monitor and evaluate.

The root cause of the sub-types of incidents (16) was further analyzed to uncover any alternative solutions. At the stage of strategy design, prioritization of the root causes was not determined for two reasons. First, it was a learning tool for the Pharmacy Unit to find out the root causes of the medication error incidents. Second, the more root causes are made to determine alternative solutions, the more alternative solution would be generated. Not all alternative solutions would be implemented. Nonetheless, alternative solutions that have been found may be considered for implementations so that efforts to improve the incidence of medication errors can be carried out continuously.

Conclusions

The problem analysis of this research had revealed the medication errors which occurred at the dispensing stage in Hospital X's Pharmacy Unit. They were derived from the timely reporting of the incidents. The highest sub-type of the incidents was wrong medication (59%) and the highest root cause with moderate grading was 86%. The results of the root analysis of the medication error incidents occurring at the dispensing stage implied that there was a need to focus on: policies, standard operating procedures, monitoring and evaluation supervision, service patterns, communications between staff and communication between staffs and patients. A total of 16 root problems were uncovered. This study recommends that there should be regular meetings between the doctors, pharmacists, and nurses as a step towards preventing incidences of repeated medication errors, Quality control in dispensing services must be carried out by adhering to standards and implementing best practices.

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