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SAN JOSE STATE UNIVERSITY SCHOOL OF NURSING

MASTER'S PROGRAM PROJECT OPTION (PLAN B) PROJECT SIGNATURE FORM

STUDENT NAME	Virginia M. Manimo
SEMESTER ENROLLED	Fall 2005
TITLE OF PROJECT	
Nurse's Peruptions	of Medication Errors
and barriers to	Reporting
NAME OF JOURNAL	Journal of Nousing Administration
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Nurse's Perceptions of Causes of Medication Errors and Barriers to Reporting Abstract

Objective: To describe medical-surgical nurses' perceptions of frequent causes of medication errors, of what constitutes a medication error, and of what are the barriers and empowerments to reporting. The study also explored the nurses' perceptions of the effect of physician order entry (POE) and barcode medication administration (BCMA) on medication errors.

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Method: A descriptive design was used to survey a convenience sample of 61 medical-surgical nurses at a Veterans Affairs Medical Center utilizing the Nurses' Perceptions of Medication Errors Modified Ulanimo 2005 tool.

Background: Causes of medication errors have been investigated by numerous

Results: The primary perceived cause of medication errors based on 25 responses was nurse's failure to correctly identify the patient before medication administration. Less than one third of medication errors are reported. Respondents' perception of their knowledge of medication errors does not correlate with their actual knowledge. All nurses surveyed perceived POE and BCMA decrease medication errors.

Conclusions: Medication errors continue to happen despite sophisticated IT systems available. Empowerment to reporting medication errors is critical to ensuring safe quality care.

Nurses' Perceptions of Causes of Medication Errors and Barriers to Reporting

A Paper

Presented to

The Faculty of the School of Nursing

San Jose State University

In Partial Fulfillment

Of the Requirement for the Class

NURS 297

By

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Conclusions: Medication errors continue to happen despite sophisticated IT systems available. Empowerment to reporting medication errors is critical to ensuring safe quality care.

One of the most important nursing functions is to administer medications safely. The process of administering medications is a multidisciplinary process but the final check to ensuring patient safety lies with the nurse. (1,2,3,4) Furthermore, the process of medication administration takes many steps and in any of the steps, the nurse may commit medication errors. Committing a medication error, even if only minor, can be psychologically devastating to the nurse and to the patient. (2,5) Studies have revealed that only serious or adverse events resulting from medication errors are being reported while medication errors that have not harmed the patients would go unreported. (1,2,5,6) A study by Mayo and Duncan (2) revealed that negative reactions from nurse manager and peers were barriers to reporting medication errors. A variety of information technology (IT) systems are available to improve safe medication administration. The purpose of this study was to describe medical-surgical nurses' perceptions of frequent causes of medication errors, of what constitutes a medication error, and of what are the barriers and empowerments to reporting. The study also explored the nurses' perceptions of the effect of physician order entry (POE) and barcode medication administration (BCMA) on medication errors.

Literature Review

Causes of Medication Errors

Causes of medication errors have been examined and investigated in previous studies in an attempt to find commonalities among the causes and offer solutions that may control potentially lethal, psychologically damaging, and costly errors. (1,2,5,6,) Benner, Sheets, Uris, Malloch, Schwed, and Jamison (3) analyzed 21 cases of nursing errors from 9 State Boards of Nursing and identified that lack of attentiveness, inappropriate judgment, missed or mistaken physician's orders were causes of errors. Leape, Epstein, and Hamel (7) cited 13 proximal causes of errors in use of medicines in their study. The identified causes were: (1) lack of knowledge of the drug, (2) lack of information about the patient, (3) rule violations, (4) slips and memory lapses, (5) transcription errors, (6) faulty drug identity checking, (7) faulty interaction with other services,

(8) faulty dose checking, (9) infusion pump and parenteral delivery problems, (10) inadequate monitoring, (11) drug stocking and delivery problems, (12) preparation errors, and (13) lack of standardization.

Medication errors are not necessarily caused by one individual but caused by many factors involving many people. (3,8) Medication errors maybe caused by the nurse (human error) by bypassing safety measures or caused by a system error which ultimately impact patient safety. Wakefield, Wakefield, and Uden-Holman (9) surveyed a convenience sample of 1,384 nurses from 24 Iowa acute care hospitals during the spring of 1994. Their study showed that physician, systems, pharmacy, individual nurse, and knowledge were variables that contributed to medication errors. In addition, Gladstone (1) interviewed 14 nurses in her study and revealed that workload, poor skill mix, interruptions, loss of concentration, lack of knowledge, tiredness, failure to follow protocol, poor drug chart, lack of assertiveness by nurses, inexperience of nurse, unknown patients/unknown conditions, and poor communication with other staff were factors that nurses thought contributed to medication errors.

Barriers to Reporting

Barriers to reporting medication errors hinder quality improvement measures. The study by Mayo and Duncan (2) of 983 registered nurses from across the country acknowledged that nurses know what constitutes a medication error and that they are more likely to inform the physician than the nurse manager because of fear of reprisal from the nurse manager. A part of Gladstone's qualitative study (1) which included 81 community hospital nurses found that a strong barrier to reporting medication errors was the nurses' fear of management reaction. Similar to Gladstone's study, Osborne, Blais, and Hayes's study (5) of 57 medical-surgical nurses revealed that nurses do not report medication errors because of fear of disciplinary action.

A very interesting discovery of how nurses adopt practices and exemplify logic to accomplish

daily nursing tasks in a very hectic and complex work environment was identified in a qualitative study done by Baker(10). One of the findings in this study was nurses use a criteria to redefine or reclassify medication errors. After reclassifying an error, the error could become "not" an error and thus not require being reported and no guilty feelings are attached to such error. For example, if a nurse found a medication was omitted and the nurse administered the medication as soon as he/she found the error, it is no longer an error because it was "put right" or corrected.

Technology

A variety of IT systems are now available to improve and enhance safe medication administration. IT utilization by hospitals to improve and enhance safe administration of medications to patients started when the Institute of Medicine (IOM) released a report in 1999 that stated introgenic events resulted in 44,000-98,000 deaths and 1.3 million injuries per year. (11). There were discussions about the number of death events but the study concluded that improvement of patient safety is necessary. Moreover, the report strongly recommended to hospitals and other health care organizations to implement POE systems.(12) The POE system not only generates eligible physician orders but also allows for physician orders to be entered electronically and it sends off the orders to appropriate departments or services. (13,14) BCMA is another IT system that enhances patient safety. BCMA is a system designed to electronically allow a nurse to give the right medication, the right dose, at the right time, through the right route, and to the right patient. The article by Johnson, Russell, Tucker, and Willette (15) reported that at Colmery-O'Neil VAMC, there was a 93.48% improvement in wrong patient errors, 87.41% improvement in wrong time errors, 75.47% improvement in wrong medication errors, 70.34% improvement in omission errors, and 61.97% improvement in wrong dose errors when BCMA was in use. BCMA drastically reduced medication errors in this VA facility. (15) In addition, the computerized patient record system (CPRS) increases caregivers' communication by creating fast access to electronic patient information for easier determination

or planning of patient care. Information is readily available to providers at point of care to make decisions for patient care so that better patient outcomes may ensue. (16)

Even with the advancement of IT, however, medication errors continue to happen daily. One cannot predict what IT systems are needed to provide maximum patient safety, but with IT and the healthcare system working together, hurdles can be overcome. (17)

Multiple studies identified frequent causes of medication errors, barriers to reporting and empowerments to report medication errors. Published articles on IT systems support their contributions to safe medication administration. However, no published research articles addressing nurse's perceptions of frequent causes of medication errors, barriers to reporting and empowerments to reporting in the setting of IT systems in place were found in the literature search.

Research Questions

The research questions for this study were:

- 1. What are nurses' perceptions of the frequent causes of medication errors?
- 2. What is the estimated percentage of medication errors reported to the nurse manager as perceived by the nurses?
- Which scenarios are perceived by nurses as having had a medication error occur and whether or not the error is needed to be reported to the physician and/or the nurse manager?
- 4. What are nurses' perceptions of some of the barriers to reporting and empowerments to reporting?
- 5. What are nurses' perceptions of the effect of POE and BCMA on medication errors?

Conceptual Definition

For the purpose of the study, a *medication error* was defined using The National Coordinating Council for Medication Error Reporting and Prevention definition: (5)

Any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the healthcare professional, patient, or consumer. Such events may be related to professional practice, prescribing; order communication; product labeling, packaging, and nomenclature; compounding; dispensing; distribution; administration; education; monitoring; and use.

Methodology

The investigator utilized a descriptive design for this study. The instrument used was the Nurses' Perceptions of Medication Errors Modified Ulanimo 2005. The instrument was distributed to a convenience sample of 61 licensed vocational nurses (LVNs) and registered nurses (RNs) in medical-surgical units in a VA hospital that utilizes POE, BCMA, and CPRS systems.

Instrument

A modified Gladstone survey instrument was adapted with permission from the original author and from the author who modified the tool. The Modified Gladstone instrument's content validity was determined as acceptable by previous researchers. (1,2,5) Reliability using the test-retest method was established at 0.78. (2) The original Modified Gladstone has five parts. Part 1 of the questionnaire asks the nurse to rank a list of ten possible causes of medication errors from #1 to #10, with #1 being the most frequent cause and #10 being the least cause of medication errors. Part 2 of the questionnaire is a one statement asking the nurse to put an X mark on the line that starts from 1% to 100% that indicates his/her perception of what percentage of all medication errors are reported to the nurse manager by the completion of an incident report. The Part 3 consists of six patient care scenarios and in each scenario, the nurse is asked to indicate (a) whether or not a medication error occurred, (b) whether or not the physician should be notified, and (c) whether or not an incident report should be completed, by answering "Yes", or "No" after each condition. Part 4 contains questions that ask about nurse's views on reporting medication errors and Part 5 contains demographic, training and experience information. A

section which asks the nurse to list his or her views and comments about medication errors that were not included in the survey was added. Two questions regarding the effect of POE and BCMA implementation on nursing practice were also added to the questionnaire.

Sample and Setting

The convenience sample for this study included 61 medical-surgical licensed vocational nurses and registered nurses of a Veterans Affairs Medical Center in Northern California who routinely administer medications to patients. Nurse Managers, clinical nurse specialists and nurse educators were excluded from this study. The study target population worked in three acute care inpatient units: telemetry and medical, oncology and hematology, and surgical. The nurse to patient ratio was 1:4 to 1:5 on all units.

Data Collection Procedures

The investigator met with the chief nurse for medical-surgical units and requested permission to conduct the study in her units. The IRB approvals from the study hospital and from the affiliated university were obtained prior to the start of the study. The investigator met with the nurse managers and with the staff and discussed the purpose of the study, possible subjects, benefits of the study, and asked permission to post advertising flyers in their units. At the staff meeting, it was reinforced that the survey was anonymous and confidentially of nurses was protected. When the primary investigator emphasized the importance of giving qualitative feedback about barriers to reporting and empowerments to reporting medication errors, nurses expressed concern that information would be traceable to individual nurses. The investigator reassured them of the confidentially of returned surveys.

Data Analysis

The primary investigator waited one month after the meeting with potential subjects for the return of all questionnaires. There were 61 staff nurses available and who had the opportunity to fill out the survey. The investigator received 27 questionnaires. Two of these were not used

because they were incomplete or left blank. A 44% return of survey rate was observed. Twenty five valid responses were analyzed to determine the results. The Statistical Package for the Social Science (SPSS) program was used to analyze the study. Qualitative data were sorted by themes and conclusions were drawn from them.

Findings

Demographic

Ninety-six percent of the nurses were female. Seventy-two percent of the nurses were Asians. Fifty-two percent of the nurses (n=13) were 40-49 years old, 24% (n=6) were 30-59 years old, 20% (n=5) were 30-39 years old, and 4% (n=1) was 60 or more years old. The majority of the respondents (68%, n=17) had a Bachelor in Science of Nursing, 12% (n=3) Associate Degree, 8% (n=2) Diploma, 4% (n=1) a Masters in Science of Nursing, and 8% (n=2) were LVNs. Most of the nurses (40%) had been practicing nurses for 21-30 years, 32% for 11-20 years, 20% for 5-10 years, and 4% for 40 years. Thirty-two percent (n=8) remembered making 1-2 errors, 24% (n=24) remembered making no error, 16% (n=4) remembered making 3-4 errors, and 12% (n=3) remembered making more than 5 errors in the course of their careers. Sixteen percent (n=4) did not answer this question. Eighty four percent (84%) worked full time and 16% worked part-time. Forty percent worked days, 40% worked evenings, and 20% worked night shift. Forty four percent of the nurses were surgical nurses, 32% medicine telemetry nurses, and 24% were oncology and hematology nurses.

Perceptions about Medication Errors

In response to the question "What are the nurses' perceptions of the frequent causes of medication errors?", the number one cause of medication errors identified in the study was when the nurse failed to check patient's name band with the patient's medication administration record (45.8%). The number two perceived cause of medication errors was when a nurse is tired and exhausted (33%). (Table 1)

The result of this research question was similar to a study by Osborne et al. (5). These researchers used a Modified Gladstone survey tool for their descriptive study of medical-surgical nurses and they identified the two frequent causes of medication errors are failure to check the patient's name band with the medication administration record and fatigue and exhaustion on the part of the nurse as well.

In response to research question "What is the estimated percentage of medication errors reported to the nurse manager as perceived by the nurses?", the nurses perceived that 1-80% (mean 28.9%) of medication errors are reported to the nurse manager by the completion of an incident report. Though Gladstone (1) reported in her study that nurses perceived that a large portion of medication errors are not reported to the nurse manager, she did not provide a specific percentage of how many nurses perceived it. In this study, nurses perceived that less than one-third of all medication errors are reported to the nurse manager. This result is of a great concern for quality and patient safety.

The research question "Which scenarios are perceived by nurses as having a medication error occurred and whether or not the error is needed to be reported to the physician and/or the nurse manager?", obtained divided answers among nurses. Interpretation of what constitutes medication errors varies amongst the nurses. They were divided whether a missed nebulizer treatment for a patient with Status Asthmaticus who was asleep constitutes a medication error or not (43% yes and 57% no). The nurses rarely see a patient with a diagnosis of Status Asthmaticus in their unit or because it is a common practice in this health care system not to give nebulizer treatments to patients who are sleeping could be the key why they are divided in their response. Alternatively, the patient's diagnosis indicates that the treatment is a critical component of a patient's recovery and that it is important to wake up the patient to administer the medication.

Infusion of total parental nutrition (TPN) at an incorrect rate is considered a medication error requiring a physician call and an incident report by 87-92% of the nurses. They were once again divided in their response whether to call the physician about a patient's Digoxin level that was high the day before, morning lab not back yet, and the nurse held the medication.

In addition, 92% of the nurses admitted that they usually are sure what constitutes a medication error and 88% are usually sure when an incident report is instituted as shown in Table 2. However, 36.4% of the nurses answered administering IV antibiotics four hours late because the unit was busy was not considered a medication error. One hundred percent (n=25) of the nurses stated that they will notify the physician but only 78.9% will fill out an incident report. This finding is similar to a phenomenon that Baker (10) noted in her study where nurses reclassified medication error to a non-error when nurses could justify why the error occurred or if they were able to correct the error. Overall, these findings clearly show that nurses do not have a clear understanding of what constitutes a medication error and when to report according to their hospital policy.

Views about Barriers and Empowerments to Reporting

The nurses believed some medication errors were not reported because of being afraid of the reaction they will receive from the nurse manager (60%) and from their peers (64%). Yet, most of them reported that they report medication errors even though the medication error is not a serious one (64%). A majority of them (84%) do not feel that they had failed to report a medication error because of being afraid of disciplinary action or even losing their jobs. This study finding is similar to Mayo and Duncan's study (2). In their study, 76.9% of nurses do not report medication errors because of manager's reactions and 61.4% because of coworker's reactions. In addition, 80.4% of nurses do not seem to be afraid of losing their jobs. Nurses feel comfortable with their job security but nurse manager's and their coworkers' perceptions of them after making an error are strong barriers to reporting.

The qualitative portion of the study asked nurses to list other barriers and empowerments to reporting that were not covered in the quantitative portion of the questionnaire. Nurses cited (1) lack of knowledge about policies, procedures and unit routines, (2) busy unit and not enough time to report, (3) nurse's negligence to report, (4) nurse's attitude, personality, and compliance as barriers to reporting medication errors. Empowerments to reporting were listed by the nurses as (1) understanding and supportive doctors and supervisors, (2) nurses and clinical nurse specialists be more involved in determining medication errors and promptly reporting them to the nurse manager, (3) having enough time to report, and (4) having nurse managers who will consistently follow through on disciplinary action if a nurse is constantly making errors will enhance and empower nurses to report. (Table 3)

Effect of POE and BCMA

Research question five, "What are nurses' perceptions of the effect of POE and BCMA on medication errors?" received very interesting answers. Eighty percent (n=20) remembered making no medication error, 12% (n=3) remembered making one error since the implementation of POE and BCMA in their units. Eight percent (n=2) did not answer this question. One hundred percent (n=25) of the nurses agreed that medication errors have decreased since the implementation of POE in 1999 and BCMA in 2001.

Limitations

There are several limitations of this study. The study was conducted in inpatient VA medical-surgical units that utilize BCMA, POE, and CPRS. Therefore, this study may not be generalized to medical-surgical nurses who do not use these three IT systems in their practice. Though the survey return rate was high (44%), the small sample size of 25 is a limitation. The convenience non-random sample might not be reflective of the actual population. The primary investigator was previously the nurse manager of the oncology and hematology unit and the qualitative portion of the study was not filled out by most of the nurses. This maybe because of concern that

the investigator might be able to decipher their handwriting even though anonymity and confidentiality protection were emphasized. Another limitation of the study is the survey tool did not include percentage of medication errors reported to the nurse manager verbally without filling out an incident report. The result of actual medication errors reported to the nurse manager might have been higher. In the survey questionnaire, the nurses were directed that they were free to decline to answer any questions they did not wish to answer so nurses who answered each question varied.

Conclusions

Human factors continue to be the frequent causes of medication errors. Bypassing safety measures during medication administration and unfit to work due to exhaustion are the two frequent causes of medication errors perceived by nurses in this study. The low percentage (mean of 28.9%) of estimated medication errors reported to the nurse manager is of great concern. Reactions from nurse managers and peers continue to contribute to nurses' failure to report medication errors. There is a gap between nurses' perceived knowledge and their actual knowledge of medication errors. IT systems are perceived to aid in the decrease of medication errors in this study.

Recommendations

This study surveyed a convenience sample of medical-surgical nurses in a VA facility in Northern California. The investigator recommends a large random sample of nurses from different specialty units to better understand nurse's perceptions on this important issue. Further studies to better understand and maximize IT systems' role in prevention of medication errors are warranted.

Nursing management must clearly educate nurses on what is considered a medication error according to National Coordinating Council for Medication Error Reporting and Prevention and according to their institutional policy. Furthermore, nursing management needs to educate

nurses on consequences when medication errors are redefined. Medication errors continue to occur despite sophisticated IT systems available. Empowerment to reporting medication errors is critical to ensuring safe quality care.

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Table 1
Inpatient Medical-Surgical VA Hospital Nurses' Perceptions of Frequent Causes of Medication Errors

Nurses' Perceptions of Frequent Causes of Medication Errors	% of Nurses
Nurse fails to check name band with MAR	45.8
Nurse is tired and exhausted	33.3
Physician prescribes wrong dose	30.4
Nurse miscalculates dose	29.2
Confusion between 2 drugs with similar names	
Physician's writing is illegible	28.0
Nurse distracted by patients, co-workers, and events in the unit	25.0
Nurse confused by different types and functions of infusion device	
Medication labels/packaging is poor quality/damage	
Nurse sets up/adjusts infusion device incorrectly	24.0

Table 2

Nurses Views about Reporting Medication Errors

	Yes % of N	No % of N
I am usually sure what constitutes a medication error	92	8
I am usually sure when a medication error should be reported using an incident report	88	12
Some medication errors are not reported because nurses are afraid of the reaction they will receive from their nurse manager	60	40
Some medication errors are not reported because nurses are afraid of the reaction they will receive from their coworkers	64	36
Have you ever failed to report a drug error because you did not think the error was serious to warrant reporting?	36	64
Have you ever failed to report a medication error because you were afraid that you might be subject to disciplinary action or even lose your job?	16	84

Table 3
Nurse's Perceptions of Barriers to Reporting and Measures that Empower Nurses to Report Medication Errors

Nurses' Perceptions of Barriers to Reporting	Measures that Empowers Nurses to Report
Unfamiliarity of Unit Routines	Supportive doctors/supervisors
Lack of Knowledge of unit policies/procedures	Nurses and Clinical Nurse Specialist
Nurse's compliance, attitudes and personality	involvement with clinical issues
Nurse negligence to report	Nurse manager to be more consistent with
Not enough time to report	administrative disciplinary action
Busy unit	Provide sufficient time to report

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Acknowledgement: The authors thank Marilyn (Marty) Douglas, DNSc, RN, FAAN, Associate Chief For Nursing Research, VAPAHCS, for sharing her knowledge and expertise in consulting on this research.



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