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ORIGINAL RESEARCH

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## CONTRIBUTING FACTORS TO MEDICATION ERRORS AS PERCEIVED BY NURSING STUDENTS IN ILIGAN CITY, PHILIPPINES

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### Abstract

**Background:** Nursing students are allowed to give medication with clinical supervision to enhance skills in medication administration. However, studies suggest that some students commit medication errors due to knowledge, personal, administrative and environmental factors.

**Objective:** This study will identify factors that cause student nurses to commit medication errors and correlate it to the number of perceived medication errors committed.

**Methods:** A correlational design was used to correlate the factors contributing to medication administration and the number of medication errors committed by the students. 388 randomly selected nursing students were asked to answer Modified Medication Error Questionnaire which measures the knowledge, administrative, personal and environmental factors which may contribute to medication administration errors. Medication administration errors are measured according to the number of times a student commits as perceived by them.

**Results:** Lack of knowledge of the drug and equipment to be used for administration, decrease in confidence, poor clinical assessment of patients' conditions, and poor follow ups from clinical instructor are identified concerns under knowledge factor. Poor positive feedback, inadequate supervision and belittling ways of clinical instructors are identified under the administrative factor. Fear of administering an injection or giving medications is a common problem under personal factor. Inappropriate labelling of medications, unfavorable room temperature, lack of space, inadequate lighting, disorganized medication administration schedule and noise are problems found under environmental factor. A minority of 17.3% claimed that they have encountered a medication error in any of their clinical duties.

**Conclusion:** Knowledge, administrative, personal and environmental factors have no effect towards medication errors. However, the relationship between age and the number of perceived medications errors is established. More in-depth investigation is recommended to determine the type of medication errors committed and its detrimental effects towards patient safety.

**Keywords:** medication errors; medication administration; nursing student; clinical instructor; patient safety

### INTRODUCTION

In the health care profession, patient safety is a top most priority as it is an important indicator of quality health care. In 1999, a published

article entitled "To Err is Human: Building a Safer Health System" surprised the world about the rising incidences of patient injuries

brought about medical errors, one of which is medication errors ([Donaldson, Corrigan, & Kohn, 2000](#)). Health care personnel including student nurses must be prudent and conscientious in all aspects of care including medication administration where errors usually happen especially when hospital census is high.

According to the National Coordinating Council for Medication Error Reporting and Prevention, a medication error is any preventable event that may lead to inappropriate medication use or cause patient harm where the control is in the health care provider ([National Coordinating Council for Medication Error Reporting and Prevention, 2006](#)). In the Philippines, there are limited published articles about medication errors because unlike other countries, medication error incidences are not openly expose ([Dumo, 2012](#); [Hartigan-Go, 2007](#)). In a study conducted by Ateneo de Manila University, Health Science Department, reporting system for medication errors are not strongly implemented so data available is not well-documented ([Dumo, 2012](#)). Despite of it, various factors are identified that may cause a student to commit medication errors. A retrospective study ([Wolf, Hicks, & Serembus, 2006](#)), inexperience and distractions were leading contributing factors which may be acceptable as a student but unacceptable to patient care. Errors committed were omission errors and giving the wrong dose of a drug. In another study ([Koohestani & Baghcheghi, 2009](#)), among 240 nursing students, 19.88% did not report their medication errors to their clinical instructors due to administrative barrier (mean=4.31) and fear (mean=4.24). An estimated 3% of student-made errors was noted in a study conducted by the United States Pharmacopeia which results to patient harm ([Wolf et al., 2006](#)). Such findings may have various implication not only to the nursing curriculum but to patient nursing care as well.

Medication errors unintentionally committed by nursing students has been a major concern among nursing schools and health care

facilities in the Philippines. Nursing schools may have documented medication errors committed by students but have not been divulged for unknown reasons. Hence, this study is geared toward identifying contributing factors that may cause nursing students to commit medication errors.

## METHODS

### *Study design*

A descriptive quantitative design was used to describe the variable of the study. A correlational approach was also used to correlate the contributing factors to the perceived number of medication errors committed. 388 randomly selected third year and fourth year nursing students in all four nursing schools in Iligan City – 3 private schools and 1 public school. Letters for approval were sent to the college deans and letters of consent along with the questionnaire were given to the students. Confidentiality and privacy of the students' information were assured.

### *Instrument*

Questionnaire used is divided into three (3) sections. Section 1 is the demographic profile which consists of sex, year level, Nursing Care Management (NCM) subject currently enrolled and school currently enrolled. Section 2 is the Modified Medication Error Questionnaire adopted from the previous study ([Koohestani & Baghcheghi, 2009](#)). The questionnaire was not translated into local language but was evaluated for content validity by eight (8) nursing faculty, all of which are members of the College Research, Extension and Ethics Committee. It has twenty-four (24) statements categorized into Knowledge Factor, Administrative Factor, Personal Factor, and Environmental Factor, six (6) statements fall under each factor. Statements were answerable with strongly agree, agree, undecided, disagree and strongly disagree. Last section includes the perceived number of medication errors made by the respondents during their entire hospital exposure.

*Data analysis*

Respondent characteristics and contributing factors for medication errors were analyzed using mean and frequency distributions. The contributing factors to medication errors were determined using the Five-point Likert Scale; 1-strongly agree (I highly accept that the statement is true), 2-agree (I accept that the statement is true), 3-undecided (I am not sure whether to agree to disagree), 4-disagree (I do not accept the statement to be true in some cases), 5-strongly disagree (I do not accept the statement to be true at all). It was analyzed using mean scoring. Correlation between contributing factors to medication

administration and perceived number of medication errors were analyzed using Chi-Square test.

**RESULTS**

Demographic profile of the respondents revealed that 71% were females and majority of the population are ages 19-21 years old. 50% of the respondents are level three (3) nursing students and the remaining 50% are level four (4) students. 74.8% came from private schools and only 25.3% came from a public school.

**Table 1** Respondents' Responses on Right Drug Administration in Terms of Knowledge Factor

Knowledge Factor	SA Freq. /%	A Freq. /%	U Freq. /%	D Freq./ %	SD Freq./ %	Mean	Remarks
I have enough knowledge about drug information.	76/ 19.6	203/ 52.0	81/ 20.9	24/ 6.2	4/ 1.0	2.17	D
I have enough skill in administering medications.	81/ 20.9	217/ 56	64/ 16.5	24/ 6.2	2/ 0.50	2.10	D
I make enough assessment about the patient's condition.	86/ 22.2	223/ 57.5	53/ 13.7	22/ 5.7	4/ 1.0	2.06	D
I have enough knowledge on the use of different equipment in drug administration.	74/ 19.1	194/ 50.0	89/ 22.9	27/ 7.0	4/ 1.0	2.21	D
I am provided with effective demonstrations and return demonstrations regarding drug administration.	157/ 40.5	180/ 46.4	26/ 6.7	19/ 4.9	6/ 1.5	1.81	D
I am asked with questions by my Clinical Instructor regarding the medications before I am tasked to administer the medications.	242/ 62.4	102/ 26.3	19/ 4.9	12/ 3.1	13/ 3.4	1.59	SD
<b>Over-all mean</b>						<b>1.988</b>	<b>D</b>
SD-Strongly Disagree 1-1.80 SD	D-Disagree 1.81-2.60 D	U-Undecided 2.61-3.40 U	A-Agree 3.41-4.20 A	SA-Strongly Agree 4.21-5.0 SA			

**Table 1** reveals that nursing students lack knowledge of the drug and equipment to be used for administration, decrease in confidence level, poor clinical assessment of their assigned patients' conditions, and poor follow ups from the clinical instructor prior to the administration of medications.

**Table 2** shows that nursing students do not obtain positive feedback and enough supervision and belittling words from their clinical instructors. Though they do not feel any form of anxiety whenever the clinical instructor becomes too strict, they find staff nurses unapproachable.

**Table 2** Respondents' Responses on Right Drug Administration in terms of Administrative Factor

Administrative Factor	SA Freq. /%	A Freq. /%	U Freq. /%	D Freq. /%	SD Freq. /%	Mean	Remarks
I am afraid of my Clinical Instructor.	40/ 10.3	102/ 26.3	118/ 30.4	84/ 21.6	44/ 11.3	2.97	U
I find the Staff Nurses approachable.	87/ 22.4	174/ 44.8	99/ 25.5	20/ 5.2	8/ 2.1	2.20	D
I receive positive feedback from my Clinical Instructor.	47/ 12.1	212/ 54.6	100/ 25.8	24/ 6.2	5/ 1.3	2.30	D
I get enough supervision from my Clinical Instructor.	182/ 46.9	159/ 41	30/ 7.7	7/ 1.8	10/ 2.6	1.72	SD
I am anxious whenever my Clinical Instructor becomes too strict.	130/ 33.5	143/ 36.9	63/ 16.2	29/ 7.5	23/ 5.9	2.15	D
I receive belittling words from my Clinical Instructor.	20/ 5.2	69/ 17.8	123/ 31.7	85/ 21.9	91/ 23.5	3.41	A
<b>Over-all mean</b>						<b>2.4588</b>	<b>D</b>
SD–Strongly Disagree 1-1.80 SD	D–Disagree 1.81-2.60 D	U–Undecided 2.61–3.40 U	A–Agree 3.41–4.20 A	SA–Strongly Agree 4.21–5.0 SA			

**Table 3** Respondents' Responses on Right Drug Administration in terms of Personal Factor

Personal Factor	SA Freq. /%	A Freq. /%	U Freq. /%	D Freq. /%	SD Freq. /%	Mean	Remarks
I get adequate sleep before going on duty.	39/ 10.1	82/ 21.1	87/ 22.4	98/ 25.3	82/ 21.2	3.26	U
I am bothered with a lot of personal problems.	27/ 7.0	95/ 24.5	90/ 23.2	118/ 30.4	58/ 14.9	3.22	U
I become too stressed in the duty shift.	62/ 16	119/ 30.7	106/ 27.3	73/ 18.8	28/ 7.2	2.71	U
I become anxious to the possibility of harming the patients.	67/ 17.3	142/ 36.6	90/ 23.2	59/ 15.2	30/ 7.7	2.60	D
I am afraid of holding the syringe/giving medications.	26/ 6.7	66/ 17.0	83/ 21.4	130/ 33.5	83/ 2.4	3.45	A
My hand trembles whenever I prepare/give medications	24/ 6.2	81/ 20.9	86/ 22.2	115/ 29.6	82/ 21.1	3.39	U
<b>Over-all mean</b>						<b>3.1038</b>	<b>U</b>
SD–Strongly Disagree 1-1.80 SD	D–Disagree 1.81-2.60 D	U–Undecided 2.61–3.40 U	A–Agree 3.41–4.20 A	SA–Strongly Agree 4.21–5.0 SA			

As reflected on **Table 3**, though anxiety is not a concern among nursing students, fear of

holding syringes or giving medications is a common problem.

**Table 4** Respondents' Responses on Right Drug Administration in terms of the Environmental Factor

<b>Environmental Factor</b>	<b>SA Freq. /%</b>	<b>A Freq. /%</b>	<b>U Freq. /%</b>	<b>D Freq. /%</b>	<b>SD Freq. /%</b>	<b>Mean</b>	<b>Remarks</b>
There is appropriate labeling of the drug (name, dose, route, frequency).	184/47.4	141/36.3	38/9.8	14/3.6	11/2.8	1.78	D
The room temperature in the nurses' station is conducive for preparing medications.	132/34	158/40.7	64/16.5	24/6.2	10/2.6	2.03	D
There is ample space in preparing medications in the nurses' station.	111/28.6	155/39.9	76/19.6	35/9	11/2.8	2.18	D
There is adequate lighting in the nurses' station for preparing the medications	145/37.4	165/42.5	41/10.6	26/6.7	11/2.8	1.95	D
There is an organized schedule for the giving of medications.	184/47.4	155/39.9	29/7.5	15/3.9	5/1.3	1.72	SD
The noise in the nurses' station distracts me whenever I prepare the medications.	29/7.5	94/24.2	113/29.1	94/24.2	58/14.9	3.15	U
<b>Over-all mean</b>						<b>2.1332</b>	<b>D</b>
SD–Strongly Disagree 1-1.80 SD	D–Disagree 1.81-2.60 D	U–Undecided 2.61 – 3.40 U	A–Agree 3.41 – 4.20 A	SA–Strongly Agree 4.21 – 5.0 SA			

**Table 4** presents shows that problems under environmental factor are inappropriate labelling of medications, unfavorable room temperature, lack of space, inadequate lighting, disorganized medication administration schedule and noise.

Though majority of nursing students were not able to commit medication errors, 17.3% claimed that they have committed at least one (1) to four (4) medication errors during their clinical exposures (See **Table 5**).

**Table 5** Number of Medication Errors Perceived by Student Nurses

<b>Number of Medication Errors Perceived</b>	<b>Frequency</b>	<b>Percentage</b>
0	321	82.7
1	40	10.30
2	15	3.90
3	10	2.60
4	1	.30
5	1	.30
<b>Total</b>	<b>388</b>	<b>100</b>

**Table 6** Relationship between Contributing Factors on Medication Errors to Perceived Number of Medication Errors

Factors on Drug Administration	Chi-Square values/Likelihood Ratio	Probability values	Remarks
Knowledge factor	13.44	.858	Not significant at .05 level
Administrative Factor	16.321	.696	Not significant at .05 level
Personal Factor	24.752	.211	Not significant at .05 level
Environmental Factor	16.603	.679	Not significant at .05 level

Using Chi-square test, all factors categorized as knowledge, administrative, personal and environmental factors are found not significant towards the perceived number of medication errors committed by nursing students (See

**Table 6).** **Table 7** shows that only age has been found to be significant to the perceived number of medication errors.

**Table 7** Relationship between the Demographic Profile to the Perceived Number of Medication Errors

Demographic Profile	Chi-Square Values (CS) /Likelihood Ratio	Probability values	Remarks
Gender	6.434	.266	Not significant at .05 level
Age	21.186	.048	Significant at .05 level
NCM Subjects Enrolled	24.752	.211	Not significant at .05 level
School Currently Enrolled	23.878	.067	Not significant at .05 level
Year Level	10.378	.065	Not significant at .05 level

## DISCUSSION

Medication administration is a skill where nurses including nursing students must have mastery. The study identified four factors that may contribute to medication errors. Under the knowledge factor, problems encountered are lack knowledge of the drug and equipment to be used for administration, decrease in confidence level, poor clinical assessment of patients' conditions, and poor follow ups from clinical instructors prior to administration. These problems are considerable since they are still learning and developing that is why students must be followed up by a clinical instructor pursuant to Commission on Higher Education (CHED) Memorandum Order No. 14 Series of 2016. Prior to clinical exposure, students have been expected to have studied the medications and memorize all the Rights to Drug Administration ([Berman & Snyder, 2012](#)) to avoid committing medication errors. Medication errors usually committed due to knowledge deficit are omission, wrong dose, and extra dose ([Wolf et al., 2006](#)). This

indicates that knowledge of medication administration is important to achieve mastery of the skill.

As for the administrative factor, poor positive feedback, inadequate supervision and belittling ways of clinical instructors have been identified. Positive feedback and adequate supervision are all necessary to enhance the skill ([Clark, 2008](#); [Corbett & Bent, 2005](#)). Demeaning and belittling ways may have negative impact to them because some students will perceive them as an insult or put-down ([Hutchinson & Jackson, 2013](#)), making them powerless, helpless, traumatized and upset ([Clark, 2008](#)). Such actions may instill fear and intimidation in them which hinders their learning ([LaFauci, 2009](#)). Despite of such actions, students maintain civility towards their clinical instructors ([Clark, 2008](#)). The unapproachability of staff nurses is also crucial to the mastery of the skill. Stress experienced by staff nurses is an identified factor which makes them unapproachable ([Burrows, 1997](#)). This signifies that positive feedback, adequate

supervision, and constructive mentoring may enhance the skill of medication administration.

Anxiety is not a major concern among nursing students but fear of holding syringes or giving medications is a common problem. Fear of administering an injection is associated with lack of practice and mastery ([Deglin & Vallerand, 2006](#)). Previous study stressed out that the needle is a source of fear to some individuals that provokes a frightening reaction ([Emmanuelson, 1997](#)). Moreover, student performance can also be a source of fear since errors are strictly discouraged in an actual clinical setting ([Durham & Alden, 2008](#)). This implies that fear may affect the performance of the student as to medication administration is concern.

Inappropriate labeling of medications, unfavorable room temperature, lack of space, inadequate lighting, disorganized medication administration schedule and noise are among the concerns under environmental factor. Such problems may cause distractions and interruption during medication preparation ([Alanko & Nyholm, 2007](#); [Mazer, 2005](#)). Study ([Greenberg, 2000](#)) suggests that nurse stations have to do with easy access and improved traffic flow so clinically related functions such as medication preparation may be performed correctly. Though exposure to such environment may be advantageous to staff nurses, it is found disadvantageous to nursing students due to inexperience and knowledge deficit ([Durham & Alden, 2008](#)). Therefore, the performance of the student may be dependent to the type of environment he or she is exposed to.

17.3% of the nursing students claimed that they have done a medication error in any of their clinical duties. Unintentionally made, such errors have an impact to patient safety ([Hartigan-Go, 2007](#)). Medication errors were reportedly a cause of morbidity and mortality ([Donaldson et al., 2000](#)). Wrong technique, omission, wrong drug, wrong prescription, wrong amount and wrong administration route are among the identified medication errors in the Philippines ([Dumo, 2012](#)). Therefore,

regardless of the gravity of the medication error, it is still very important to take note the smaller percentage of errors committed.

Insignificant relationship between the knowledge, administrative, personal and environmental factors and the number of perceived medical errors may be crucial to the performance of a nursing student. Though knowledge deficit (Table 1), belittling ways of clinical instructors (Table 2), fear of holding syringes and giving medications (Table 3) and an unfavorable working environment (Table 4) are present, these has no effect to the perceived number of medication errors since majority of the students did not commit such errors. This implies that student nurses may have been trained not just to adjust to poor working environments since most hospitals in the Philippines do not have a perfect learning environment for medication administration, but also endure the hardships and challenges of a beginner nurse.

Age has been found to significantly affect the perceived number of medication errors. According to policies, standards and guidelines formulated for the Bachelor of Nursing Curriculum (CHED Memo Order Series of 2016), competencies are more advanced in the higher levels and students are assigned to more than one patient which may be challenging to the student. Mastery is expected at this level and confidence are strongly encouraged to promote independence in the performance of nursing care. Studies also suggest that there is a direct relationship between higher education and medication errors. It is expected that as the level of knowledge among nursing students goes higher, medication errors may be controlled ([Charkhat-GorgichEnaam-Al-Hagh, Maryam, H., Ali, & Masoud, 2014](#)). An irony of this matter has also been identified by ([Green, 2004](#)), where he found out that medical errors are prominent among the most experienced compared to the less experienced. One common type of error is during the post medication administration where the error cannot be identified for some reasons ([Green, 2004](#)). This signifies that as a nursing student



is exposed to a higher level of learning, the higher is the risk of committing medication errors.

## CONCLUSION

Knowledge deficit, belittling ways of clinical instructors, fear of holding syringes and giving medication, and an unfavorable working environment are among the identified contributing factors to medication errors. These concerns however are not significant to the number of perceived medication errors committed. However, age is found to be a factor why nursing students commit such errors. An in-depth investigation is recommended to determine the type of medication errors committed by nursing students and its effects towards patient safety.

### Declaration of Conflicting Interest

None declared.

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### Author Contribution

All authors equally contributed in this study.

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