

# ปัจจัยทำนายความตั้งใจที่จะรายงานความคลาดเคลื่อนทางยาของนักศึกษาพยาบาล Predictive Factors of Intention to Report Medication Errors among Nursing Students

นิพนธ์ต้นฉบับ

Original Article

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วารสารไทยเภสัชศาสตร์และวิทยาการสุขภาพ 2564;16(1):9-15.

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Thal Pharmaceutical and Health Science Journal 2021;16(1):9-15.

## บทคัดย่อ

**วัตถุประสงค์:** เพื่อศึกษาปัจจัยทำนายความตั้งใจที่จะรายงานความคลาดเคลื่อนทางยาของนักศึกษาพยาบาล **วิธีการศึกษา:** การวิจัยแบบความสัมพันธ์เชิงทำนาย มีกลุ่มตัวอย่างเป็นนักศึกษาพยาบาลระดับปริญญาตรี ชั้นปีที่ 4 จำนวน 92 คน ที่มีคุณสมบัติตามกำหนด และคัดเลือกเข้าร่วมการวิจัยวิธีการสุ่มอย่างง่ายแบบหลายขั้นตอน เก็บรวบรวมข้อมูลด้วยแบบสอบถามชนิดเลือกตอบ แบ่งเป็น 5 ส่วน ได้แก่ 1) แบบสอบถามข้อมูลส่วนบุคคล 2) แบบประเมินความรู้ด้านการรายงานความคลาดเคลื่อนทางยา 3) แบบประเมินทัศนคติด้านการรายงานความคลาดเคลื่อนทางยา 4) แบบประเมินอุปสรรคต่อการรายงานความคลาดเคลื่อนทางยา และ 5) แบบประเมินความตั้งใจที่จะรายงานความคลาดเคลื่อนทางยา วิเคราะห์ข้อมูลด้วยสถิติพรรณนา สถิติสัมพันธ์สหสัมพันธ์ของเพียร์สัน และวิเคราะห์ความถดถอยเชิงพหุคูณแบบขั้นตอน **ผลการศึกษา:** นักศึกษาพยาบาลมีความรู้ ทัศนคติ อุปสรรคต่อการรายงานความคลาดเคลื่อนทางยา และความตั้งใจที่จะรายงานอยู่ในระดับมาก (คะแนนเฉลี่ย = 11.88, 40.67, 57.98 และ 62.53 คะแนน ตามลำดับ) ทัศนคติสัมพันธ์ทางบวกกับความตั้งใจที่จะรายงานอย่างมีนัยสำคัญทางสถิติ ( $r = 0.316, P\text{-value} < 0.01$ ) ปัจจัยด้านความรู้ ทัศนคติ และอุปสรรคต่อการรายงานความคลาดเคลื่อนทางยาสามารถร่วมกันทำนายความตั้งใจที่จะรายงานได้ร้อยละ 13.50 ของความแปรปรวนของความตั้งใจ โดยทัศนคติต่อการรายงานเป็นปัจจัยสำคัญที่ทำนายความตั้งใจที่จะรายงานความคลาดเคลื่อนทางยาอย่างมีนัยสำคัญทางสถิติ ( $\beta = 0.296, P\text{-value} = 0.005$ ) **สรุป:** นักศึกษาพยาบาลมีความรู้ ทัศนคติ อุปสรรคต่อการรายงาน และความตั้งใจที่จะรายงานความคลาดเคลื่อนทางยาอยู่ในระดับมาก ทัศนคติสัมพันธ์ทางบวกกับความตั้งใจที่จะรายงาน ซึ่งอาจนำไปพัฒนาโปรแกรมเสริมสร้างความตั้งใจที่จะรายงานความคลาดเคลื่อนทางยาเพื่อนำมาสู่ความปลอดภัยของผู้ป่วย

**คำสำคัญ:** ความคลาดเคลื่อนทางยา, ความตั้งใจที่จะรายงานความคลาดเคลื่อนทางยา, นักศึกษาพยาบาล

### Editorial note

Manuscript received in original form: April 28, 2020;

Revised: May 12, 2020;

Accepted in final form: May 26, 2020;

Published online: March 30, 2021.

Journal website: <http://ejournals.swu.ac.th/index.php/pharm/index>

## Introduction

Patient safety is the important basis in patient care that reflects quality and standard of medical service. Medication errors are one of the unexpected events that can occur while the medication is under supervision of health care professionals, patient, or consumers. Medication errors are the most common type of errors of unsafe events in patients.<sup>1</sup> There are 4 types of medication errors, specifically prescription error, transcribing error, dispensing error, and

administration error. These errors can occur in every step of medication administration process either at medicine prescribing, communication of medication orders, labelling, packaging, transferral, distribution, administration, information provision and monitoring. The effect of medication errors to patients may range from no harm to transient damage, permanent damage, coma and death.<sup>2</sup> World Health Organization reported that medication errors costed about

42,000 million US dollars per year for unnecessary medical care.<sup>3</sup> Several factors may cause medication errors including inadequate drug knowledge and experience of health care professionals, uncovered risk assessment, fatigued health care professionals, complexity of clinical case, high-risk medications and inappropriate work environment including work overload, insufficient human resources, lack of standardized protocols, and insufficient resources.<sup>4</sup>

Although medication errors may be caused by health care personnel, the complexity and variety of health care services make responsibility of the errors belongs to organization. Learning from the previous data of error situations helps decrease error recurrence. The organization should use risk management systems as the tool for organizational development to promote patient safety. Root cause analysis (RCA) of medication errors is a process that is used for analyzing the errors and suggesting the solutions to prevent recurrence. RCA could lead to learning from the errors; however, some medication errors are not reported by health care personnel. The final step of medicine administration system in the inpatient department is mainly responded by nurses. About 40 percent of time of nursing practice is related to medicine administration. Thus, nurses have major roles in screening or detection of the risk before the errors occur, as well as in reporting the errors.<sup>5</sup>

Medication errors reporting is an important task to prevent error recurrence. One of several factors that influence accuracy of errors reporting was voluntariness of the reporter.<sup>5</sup> However, Vrbnjak et al found that nurses reported only 37.4 - 67.0% of medication errors. The barriers to report medication errors include an improper or underdeveloped organizational safety culture and reporting system which could be reflected as the improper management by head nurses and the fear of subsequent outcomes after reporting.<sup>6</sup> The study in nursing students found that the fear of subsequent outcomes after reporting, process of reporting and management of nursing teacher were the barriers to report medication errors.<sup>7</sup> The study of Yung et al found that the fear was a barrier to report the errors by nurses.<sup>8</sup> The study of Natan et al also found that fear was a barrier to report the errors among nursing students.<sup>9</sup>

Literature review on medication errors reporting by nurses found that nurses' attitude toward medication administration error reporting was the most prominent barrier contributing to underreporting. If nurses felt an error did not harm a patient, the error reporting might not be done. Furthermore, some

nurses would report the errors to head nurses only by verbal communication.<sup>8</sup> The reporters were often afraid of the consequence after the errors reporting. These concerns included distrust of patients and family members, disclosure of the errors by system administrator, being poorly evaluated for work performance, blame, punishment, and prosecution.<sup>8,10-12</sup> Attitude and practice or behavior of nursing students in reporting medication errors were found to be relatively similar to those among the practicing nurses. If medication errors occur, nursing students would report their nursing teachers, supervising nurses, and doctors. After the error reporting, nursing students were also afraid of blame, punishment, distrust of patients and family members, distrust of nurses, and pressure from workplace colleagues.<sup>9,13</sup>

Behavioural expression of person is affected by developmental process of intelligence and knowledge. This process originates recognition and memory which are used in decision making process. Mental process, emotion, feeling, attention, and value which are elements of the attitude could affect personal attributes and behaviour.<sup>14</sup> Therefore, intention of health care personnel to report the medication error may have been influenced by knowledge of and attitude toward the reporting process and consequences.

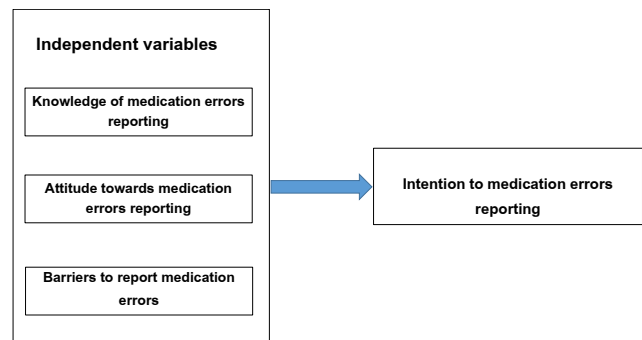
Patient safety is the issue that educational institution should cultivate in health care students. The purpose is to build knowledge and awareness in patient safety in the new generation of personnel. Patient safety can be applied in all health care professional activities of profession and all situations of healthcare.<sup>13</sup> Most medication errors are preventable in nature and reporting of the events could help alleviate the problems. The errors reporting can improve patient safety and quality of the organization. Not only practicing nurses, but nursing students should be prepared for the cultural and technical aspects of reporting medication errors. The 4<sup>th</sup> year nursing students have been equipped with theoretical and practical training. They have an experience of care for complicated patients. They also have experience of medication administrations and certain related errors. With their transitional stage, these nursing students should be cultivated for the patient safety especially medication errors. However, before such cultivation could be in place, level of intention to report medication errors and its predicting factors should be first understood. The findings could help improving nursing curriculum both didactic and practicum.

In our study, the intention to report medication errors was based on the Bloom's taxonomy where the person's behavior is based on the systematic linking process that consists of knowledge, attitude, and practice or KAP.<sup>14</sup> Knowledge is the process of intellectual development which is related to perception and memory of fact for decision. Attitude is the process of mind, mood, feeling, attention, liking and value which could mandate the the trend of personal action. Practice is the use of physical expression ability that needs knowledge and attitude. Practice is the final process that uses time and multi-step decision making. In this present study, the practice or behaviour component of the KAP concept was reflected as the intention to report medication errors. For empirical evidence, the studies of Mansouri et al<sup>10</sup>, Vrbnjak et al<sup>6</sup> and Koohestani et al<sup>7</sup> found that the barriers of nurses and nursing students to report medication errors were the fear of subsequent outcomes, perceived complicate process of reporting, and perceived unclear management of head nurses and teaching nurses.

The effort to promote patient safety culture among practicing nurse and nursing students thus seems to be problematic worldwide. These has been a growing concern on the difficulty promoting patient safety culture regarding medication errors reporting among nurses and nursing students. Therefore, there has been a need to understand the intention to report medications errors among nursing students which are the critical group for such cultivation. Factors associated with such intention were of great worthiness for promoting the intention. We therefore aimed to determine level of intention to report medication errors and associated factors. We aimed to study such attributes in the 4<sup>th</sup> year nursing students because they are at the last stage of education before entering the professional work. We hypothesized that intention to report medication errors as the practice or behavior part of the KAP concept (dependent variable) was associated with the independent variables including knowledge of medication erros reporting, attitude toward medication errors reporting, and barriers to report medication errors (Figure 1).

## Methods

In this predictive correlational study, the intention to report medication errors was considered the dependent variable and knowledge of, attitude toward, and barriers toward medication



**Figure 1** Conceptual frame of the study.

errors reporting were treated as independent variables. Study population was 194 4<sup>th</sup> year undergraduate nursing students in the academic year 2019 at the Faculty of Nursing of Burapha University, Thailand. Based on a convenience sample recruitment method, the study sample size consisted of individuals in the study population who agreed to participate in the study. No further specific inclusion and exclusion criteria were implemented.

Sample size was calculated by Cohen's table of power analysis for multiple regression analysis.<sup>15</sup> The predictive coefficient was estimated at a moderate effect size level because no studies in Thailand were similar to our study. With a confidence value of 95% ( $\alpha = 0.05$ ), a power of test of 0.80, and three independent variables, sample size of 76 persons was required. To compensate for an attrition rate of 20% , a final sample size of 92 participants was required.

### Research instruments

Data collection tool was a questionnaire consisting of 5 sections with a total of 60 questions, specifically, demographic information, knowledge of, attitude toward, barriers toward, and intention to report medications errors. The questionnaire was developed based on literature review relevant to the research question including the works of Koohestani et al<sup>7</sup>, Mansouri et al<sup>10</sup>, Schnall et al<sup>16</sup>, Alsafi et al<sup>17</sup>, Kang et al<sup>18</sup>, Walsh et al<sup>19</sup>, Welsh et al<sup>20</sup>, and Alsulami et al.<sup>21</sup>

The first section collected student's information of gender, age, gaining knowledge of risk management/medication error reporting, and experience of reporting medication errors. In the second section, the participants were assessed of their knowledge on medication errors reporting either from their study or experience, or both. Based on previous works<sup>16,17,21</sup>, we developed questions about nature and causes of medication errors, reporting the errors and organizational

safety culture. This section consisted of 15 questions with binary response of “true” or “false.” With one point for a correct answer and zero points for a wrong one, the possible total score was 15 points and could be categorized as low, medium, and high level (0 – 5, 6 – 10, and 11 – 15 points, respectively).

In the third section, attitude toward medication errors reporting among nursing students was assessed with 10 questions consisting of negative and positive questions of five each. Based on previous works<sup>16,21</sup>, the investigators developed questions to reflect student’s attitude toward their intention to report medication errors. The response was in the 5-point Likert-type scale ranging from 1-strongly disagree, to 2-disagree, 3-neither agree nor disagree, 4-agree, and 5-strongly agree. With scores for negative statement reversed, higher scores indicated more positive attitude. The total scores could be categorized into low, medium, and high level of positive attitude (10.00 – 23.33, 23.34 – 36.67, and 36.68 – 50.00 points, respectively).

The fourth section assessed barriers toward medication errors reporting. Based on previous works<sup>7,10,18,20</sup>, the investigators developed questions to reflect student’s perception toward barriers or obstacles to the intention to report medication errors including confidence in their capability to report medication errors, fear of reporting the incidents, and the organizational management. There were 15 questions with a response of 5-point Likert-type rating scale ranging from 1-strongly disagree, to 2-disagree, 3-neither agree nor disagree, 4-agree, and 5-strongly agree. With a total of 75 points, perceived barriers toward medication errors reporting could be categorized as low, medium, and high level (15 – 35, 36 – 56, and 57 – 75 points, respectively).

In the fifth section, the nursing student’s intention to report medication errors was assessed using 15 questions the investigators developed from previous works.<sup>17,19</sup> These questions reflected the decision making in reporting medication error incidents either caused directly by the reporting student or by others. The response was a 5-point Likert-type rating scale ranging from 1-strongly disagree, to 2-disagree, 3-neither agree nor disagree, 4-agree, and 5-strongly agree. With a total of 75 points, the intention to report medication errors could be categorized as low, medium, and high level (15 – 35, 36 – 56, and 57 – 75 points, respectively).

The questionnaire was tested for content validity by three experts including a physician, a nurse university instructor,

and a hospital head nurse. Content validity was at an acceptable level with a content validity index of 0.83. The internal consistency reliability of the knowledge section was acceptable with a Kuder-Richarson20 coefficient of 0.82. The internal consistency reliability of sections of attitude, barriers, and intention toward medication errors reporting were also at an acceptable level with Cronbach’s alpha coefficients of 0.71, 0.87 and 0.86, respectively.

#### **Ethical approval and data collection**

The data were collected from March to April, 2020. Permission to conduct the study was obtained from the Institutional Review Board (IRB) of Burapha University (ethical approval no. HS 002/2563). The researcher informed the participants about the objectives, data collection process, timeline, and rights to participate and discontinue the participation. If the participant agreed to join the research, written informed consent was obtained. The self-administered questionnaire took about 45 minutes to complete.

#### **Data analysis**

Descriptive statistics including frequency with percentage and mean with standard deviation, Pearson’s product moment coefficient and stepwise multiple regression were employed. The level of significance was set, a priori, at 0.01. Multicollinearity among the three independent variables (i.e., scores of knowledge, attitude, and barriers toward medication error reporting) was tested before stepwise regression analysis. With correlation coefficients of lower than 0.65 for all pairs of these independent variables, no correlation among these variables was found.<sup>16</sup> Data were analyzed by using a computer software package.

## **Results**

Of the 92 participants, the majority was female (91.30%). The mean age was 22.02 years. All participants had learned of risk management and medication errors reporting. Sixty-six participants (71.70%) never reported medication errors because they had never done medication errors.

It was found that participants had high levels of knowledge of, attitude toward, barriers to and intention to report medication errors (Table 1). In terms of barriers to intention to report medication errors, confidence in their abilities to report medication errors was with the highest score (mean = 3.95

points), followed by fear of judgment from colleagues (mean = 3.88 points) and fear of damaging their performance evaluation score (mean = 3.72 points).

**Table 1** Scores of knowledge of, attitude toward, barriers to and intention to report medication errors (N = 92).

Variable	Mean	S.D.	Level
Knowledge	11.88	1.91	high
Attitude	40.67	1.64	high
Barriers	57.98	1.66	high
- self confidence in ability to report	3.95	0.85	high
- fear of judgment from colleagues	3.88	1.11	high
- fear of damaging performance evaluation score	3.72	1.07	high
Intention to report medication errors	62.53	1.78	high

It was found that knowledge of, attitude toward, barriers to and intention to report medication errors had a trend of positive correlation with each other, except that between knowledge and barriers. The significant correlation was found only of attitude toward and intention to report medication errors ( $r = 0.316$ ,  $P$ -value < 0.01).

**Table 2** Pearson's product moment correlation coefficients (r) among knowledge of, attitude toward, barriers to and intention to report medication errors (N = 92).

Variables	1	2	3	4
1. Knowledge	1.000			
2. Attitude	0.203	1.000		
3. Barriers	-0.089	0.043	1.00	0.189
4. Intention to medication errors reporting	0.108	0.316*	0.182	1.000

\* P-value < 0.01

Knowledge of, attitude toward and barriers to report medication errors jointly predicted intention to report medication errors with statistical significance ( $F = 4.568$ ,  $P$ -value = 0.005) (Table 3). Only attitude toward the intention to report medication errors was significantly associated with the intention ( $\beta = 0.296$ ,  $P$ -value = 0.005). A low level of variance of intention to report medication errors (13.5%) was explained by the three factors ( $r^2 = 0.135$ ).

**Table 3** Multiple regression analysis of factors predicting the intention to report medication errors (N = 92).

Variables	B	SE	$\beta$	t	P-value
Knowledge	0.060	0.095	0.064	0.630	0.530
Attitude	0.322	0.111	0.296	2.914	*0.005
Barriers	0.195	0.107	0.182	1.821	0.072

F = 4.568, P-value = 0.005, R = 0.367, R<sup>2</sup> = 0.135.

## Discussions and Conclusion

Our study found that nursing students' level of knowledge of, attitude toward, barriers to and intention to report medication errors were all at a high level. These high levels of all aspects of reporting medication errors could be due to the fact that patient safety and risk management is incorporated in nursing curriculum of Burapha University. Nursing students have learned this patient safety concept both by theoretical and practical training. With practical training in medical wards with nursing instructors, patient safety, medication administration and medication errors reporting have been cultivated. As a result, nursing students could have had a high level of knowledge of, attitude toward and intention to report medication errors. Despite a high level of attitude toward reporting medication errors, students still perceived a high level of barriers to report.

Our study found that all select factors including knowledge of, attitude toward and barriers to the reporting were significantly medication errors reporting were simultaneously predicting the intention to report with a statistical significance at 0.01. However, these three predictors could explain only 13.5% of the variance of the intention to report. Attitude toward medication errors reporting was the only predictor with statistical significance. With the largest regression coefficient  $\beta$  of 0.296, the more the positive attitude, the higher the intention to report medication errors. Attitude is a feeling or opinion about certain matter which could influence the individual's behaviour toward the matter.<sup>14</sup> According to the study of Lapkin et al, attitude toward medication errors reporting is the most important predictive factor of health professional students' intention to report.<sup>16</sup> Attitude toward medication errors reporting is also an important factor in the errors reporting among nurses as reported by Dyab et al.<sup>17</sup>

Barrier of medication errors reporting was also positively correlated with the intention to report even though with no statistical significance. Barrier's regression coefficient was the second largest one ( $\beta = 0.182$ ). Overall barrier was found to be at a high level. It was further found that the three components of the barriers, namely, self confidence in ability to report, fear of judgment from colleagues and fear of damaging performance evaluation score were all at the high level. This could be attributable to the fact that most participants have never reported medication errors before. Hence, they could perceive that the errors reporting has many

obstacles. Patient safety is the accountability of nurses, so nursing students could feel guilty in their mistakes and the errors reporting could also cause the blame by their colleagues. According to study of Walsh et al, nursing students are feared of punishment, and being seen as inefficient and offending after reporting medication errors.<sup>19</sup> Mansouri et al also found that fear has been the major barrier of medication errors reporting among nurses.<sup>10</sup>

A positive relation between knowledge of and intention to report medication errors reporting was found despite no statistical significance in the multiple regression analysis. We speculated that nursing students with knowledge could be able to analyse and make a decision whether to report medication errors with confidence. Natal et al reported that nursing students who had more knowledge of medication errors reporting were more likely to report medication errors.<sup>9</sup>

With only attitude to be the only significant predictor of the intention to report medication errors, it could be proposed that the adoption of knowledge and barriers depends on the formation of the attitude. According to Bloom's theory, since attitude affects the practice, the knowledge will not be used or practiced until adequate attitude is formed.<sup>14</sup>

Our results suggested that more practice training especially with actual error incidents, solutions and decision making toward the incident should be instated. Once medication errors occur, nursing instructors should facilitate the student in identifying causes and possible solutions, and guide the student's decision making process. Determining the cause of the errors should focus on system, not personal errors. Blaming and punishment should not be done. These positive enforcements could help build positive attitude toward medication errors reporting and patient safety in general.

Findings from our study were somewhat conclusive to promote the proper attitude to adopt the knowledge and acknowledge barriers to report medication errors, and ultimately the intention to report the errors among nursing students. The study had certain limitations. Nursing students from only one university were recruited. To generalize the findings to other universities should be cautious. Students from more nursing schools should be included in future studies. Since nursing students had limited experience in the actual medication errors and the decision making in reporting them, more actual experience should be allowed in the training and such experience should be tested as an independent

variable in future studies on the intention of medication errors reporting.

In conclusion, attitude toward the intention to report medication errors was found to be significantly associated with the intention, while knowledge and barriers were not. Nursing education should focus on promoting positive attitude toward reporting medication errors and patient safety in general.

### Acknowledgement

The authors would like to express our gratitude to the Faculty of Nursing, Burapha University for support and to the executives, instructors, personnel, and nursing students for their invaluable time, facilitation and participation.

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