



Taibah University

Journal of Taibah University Medical Sciences

www.sciencedirect.com



Original Article

Why do nursing students make medication errors? A qualitative study in Indonesia



Lisa Musharyanti, M.Med.Ed.^{a,*}, Mora Claramita, Ph.D.^b, Fitri Haryanti, Ph.D.^c and Iwan Dwiprahasto, Ph.D.^d

^a School of Nursing, Faculty of Medicine and Health Sciences, Universitas Muhammadiyah Yogyakarta, Indonesia

^b Department of Medical Education, Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada, Indonesia

^c Department of Pediatric and Maternity Nursing, Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada, Indonesia

^d Department of Pharmacology and Therapy, Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada, Indonesia

Received 30 January 2019; revised 18 April 2019; accepted 21 April 2019; Available online 16 May 2019

المخلص

أهداف البحث: تهدف هذه الدراسة إلى استكشاف لتصورات طالبات التمريض الإندونيسيات عن أنواع وأسباب الأخطاء الدوائية في الدورات السريرية. **طرق البحث:** تم إجراء هذا البحث الوصفي النوعي على ٢٦ من طالبات التمريض اللاتي أنهين الدورات السريرية النهائية. تم جمع البيانات بواسطة أربع نقاشات لمجموعات تركيز وتم تحليل البيانات بطرق كوالزي.

النتائج: تم الحصول على ثلاثة مجالات من تحليل البيانات؛ دور الممرضات في سلامة الدواء، وأنواع الأخطاء الدوائية (أو قرب الخطأ) ارتكبتها طالبات التمريض، وأسباب الأخطاء الدوائية خلال الدورة السريرية.

الاستنتاجات: تلعب الممرضات دورا حيويا في توزيع الأدوية على المرضى وسلامتهم، ولكن الأخطاء الدوائية (أو قرب الخطأ) لا يزال يتم الإبلاغ عنها خلال الدورات السريرية لطالبات التمريض. نقص المعرفة والمهارات، وعدم وجود الإشراف والقوة المناسبة خلال الدورات السريرية يؤثر على حدوث الأخطاء الدوائية من طالبات التمريض. القوة المناسبة والإشراف الكافي أثناء مرحلة التعليم السريري يعد مهما لدعم تحقيق كفاءات سلامة الدواء.

الكلمات المفتاحية: سلامة الدواء؛ طالبات التمريض؛ الدورات السريرية؛ الإشراف؛ القوة

Abstract

Objectives: This study aimed to explore Indonesian nursing students' perceptions of the types and causes of medication errors in clinical rotations.

Methods: This descriptive qualitative study was conducted with 26 nursing students who had completed their final clinical rotations. Data were collected through four focus group discussions and analysed by Colaizzi's method.

Results: Three themes were obtained from the data analysis: important role played by nurses in medication safety, types of medication errors (near misses) committed by nursing students, and the causes of medication errors during clinical rotations.

Conclusion: Nurses play a vital role in dispensing medication and ensuring patient safety, but near misses are still reported during clinical rotations. Lack of knowledge, skills, proper supervision, and appropriate role models during clinical rotations lead to medication errors by nursing students. Appropriate role models and adequate supervision in the clinical education stage are necessary to ensure the achievement of medication safety competencies.

Keywords: Clinical rotation; Medication safety; Nursing students; Role model; Supervision

* Corresponding address: School of Nursing, Faculty of Medicine and Health Sciences, Universitas Muhammadiyah Yogyakarta, Jalan Brawijaya, Tamantirto, Kasihan, Bantul, Indonesia.

E-mail: lisa.musharyanti@umy.ac.id (L. Musharyanti)

Peer review under responsibility of Taibah University.



Production and hosting by Elsevier

© 2019 The Authors.

Production and hosting by Elsevier Ltd on behalf of Taibah University. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Introduction

Medication errors are one of the patient safety problems with a high prevalence in several countries, and often involve a lack of collaborative communication between health professionals, including doctors, pharmacists, and nurses.^{1–4} In global nursing education, patient safety is becoming increasingly integrated into the curricula based on actual health care.⁵ Nurses play an important role in preventing medication errors and in administering safe drugs.⁶ Accordingly, before they work in real situations of care, nursing students should have adequate competencies regarding medication safety.⁷ However, research shows that nursing students are still at risk of making medication errors, especially during clinical rotations.^{6,7}

The conditions that contribute to these medication errors arise when nursing students do not get sufficient supervision from senior nurses in the hospital and have not been equipped with proper medication safety education.⁸ Nursing students also need appropriate role models who can inspire them to perform medication safety effectively.^{8,9}

Nurses are the medical professionals who interact most with patients and they are the last safeguard in preventing medication errors.¹⁰ However, existing research has found that many new nurse graduates are unsure of their competence with regard to the safe administration of drugs owing to limited knowledge of pharmacology, side effects, and other aspects of medication safety.¹¹

There are many studies on the factors affecting medication errors in nursing education and the majority are from developed countries.¹² Research on the types and causes of medication errors by nursing students in developing countries is limited.^{12,13} According to an Indonesian study, medication errors by nursing students during clinical rotations reached 44.8%; these errors ranked second among all medical errors.¹⁴

In the Indonesian nursing curriculum, pharmacology education is generally provided at the beginning of the undergraduate course. The fact that medication safety education does not continue throughout the course is problematic. Pharmacological knowledge that is not associated with patient safety makes it difficult for nursing students to apply drug safety principles, leaving them vulnerable to making medication errors.⁹ Research on medication errors by nursing students and their perceptions of their causes is important as a basis for formulating better nursing education policies, primarily with regard to medication safety.¹⁵ Therefore, this study aimed to explore Indonesian nursing students' perceptions of nurses' role in medication safety and the types and causes of medication errors during clinical rotations.

Materials and Methods

Context

In Indonesia, the topic of patient safety was included in the revised nursing education curriculum in 2015.¹⁶ Several topics included in this curriculum were adopted from the World Health Organization (WHO) multi-professional safety curriculum guide.⁶ However, the implementation of this curriculum has not yet been optimal because patient safety learning is in the form of lectures more than methods that use student-centred learning. Specifically, regarding the topic of drug safety, although drug administration skills are taught from the second semester, there is little effort to link them to the principles of patient safety. These conditions make it difficult for students to understand patient safety in the safe administration of drugs, which affects their readiness in the practice of providing safe drugs during clinical rotations.

During clinical education and rotations, students get the opportunity to apply their skills and knowledge to patients in real settings. However, because the clinical environment is still new to students, this responsibility can be a challenge if they do not understand the principles of safe drug delivery. During clinical rotations, students are placed in a variety of hospitals, some private and some regional, with several differences in settings, such as the availability of resources, variations in patient safety policies, and diverse medical facilities that may not be adequate in today's world with its expectations of higher standards.

Research design

This was a descriptive qualitative study. This design was chosen to describe daily events and phenomena.¹⁷

Participants

This study focused on a nursing study programme in Indonesia. Twenty-six students in their final clinical rotations were selected by purposive sampling. These respondents were chosen by the students' coordinator based on inclusion criteria.

The inclusion criteria were students who: 1) had completed over a year of clinical rotation, and 2) who were not on academic leave. The students were undergoing clinical rotations in four hospitals in two provinces: Central Java Province and Yogyakarta Special Region Province.

Data collection methods

The data were collected through focus group discussions (FGDs). We interviewed students when they had completed their daily shift at the hospital. The student coordinator divided the 26 participants into four groups of six-seven students each. According to Harding, the ideal number of participants in an FGD is six-eight.¹⁸

Before the FGD began, the main researcher explained that as his role was just to observe, the students could openly

express their perceptions and experiences. The moderators explained that the information provided by the students would not affect their academic assessment. The FGD lasted 50–60 min. A moderator assisted by a research assistant helped record the FGD process using an audio recorder while observing the non-verbal responses and interactions. The FGD process was conducted in a closed discussion room.

The major explorative questions used were as follows:

- 1) What do you think about the role of nurses in patient and medication safety?
- 2) What sort of medication errors have you seen nursing students make during clinical rotations?
- 3) What are the causes of medication errors by nursing students?

Rigour and trustworthiness

The researchers also conducted interviews with five lecturers and four clinical instructors as part of the triangulation method to compare and confirm the validity of the study findings. To validate the findings, peer debriefing was conducted between the researchers, experienced colleagues, and supervisor.

Data analysis

Colaizzi's method was used to analyse the data.¹⁷ We transcribed all recordings into verbatim transcripts, which the research team repeatedly read to determine the unit meanings of the data. Meaning units were condensed into general thematic units and became codes. Several codes were grouped into categories, and several categories were grouped into specific themes. Non-verbal responses were also used to explain the results. The first author discussed the results with the other authors and two experienced colleagues.

Results

Three themes were identified from this study, which included the: 1) important role played by nurses in medication safety, 2) types of medication errors by nursing students, and 3) causes of medication errors in clinical rotations.

Theme 1: Important role played by nurses in medication safety

The data obtained from this study showed that most nursing students agree that nurses play an important role in providing safe medication. The nurses' role begins from patient identification, continuing on to medication preparation and administration. Nurses are the health professionals who interact with patients round the clock. Students stated that nurses who follow the standard operating procedures in the preparation and administration of medicine are the 'good nurses'.

In their clinical rotations, the nurses who became their clinical instructors also taught the students about the correct administration of medicines. The majority of the clinical

instructors explained medication administration in the inpatient wards on the students' first day. Participants shared these experiences through the following statements:

'Nurses play an important role in patient safety because they must check patients' data thoroughly before performing nursing procedures in order to avoid mistakes' (FGD 2).

'Some nurses invite students to prepare the medication with them to learn how to do it correctly. Also, they remind us to crosscheck the identity of patients' (FGD 1).

'The first day students come to our rooms, we explain the role of nurses in patient safety and the standard operational procedures in place. I also explain what medications are widely used in this ward and what to do during the preparation and administration of drugs, such as confirming that the right drug is going to the right patient' (CI 1).

Theme 2: Types of medication errors committed by nursing students

When we discussed the medication errors they had seen or made in their clinical rotations, most students looked very sorry. This was evident from the bowed heads, low tones, and sad facial expressions when describing such incidents.

Timing-related errors

Sometimes while practising, some students noticed others failing to properly implement patients' medication schedules. In situations where the number of patients far exceeds that of nurses, the students stated that drugs could be administered at inappropriate times so as to save time and get the task over with. This type of medication error was mentioned by a student at a district hospital.

'Actually, drug administration is scheduled for 12 am, but sometimes the medication has already been given at 10 pm' (FGD 1).

Most students realised that it was the wrong practice and felt guilty about it. After completing the first year of clinical rotation, they claimed to have a better understanding of the correct procedures with regard to drug administration and mentioned that they did not want to violate the schedule.

Error in patient identification

Most participants agreed that another error in medication safety was the incorrect identification of patients. They said there were some students who did not perform patient identification correctly. For instance, students could ask a patient a closed question instead of determining the patient's full name and date of birth with the appropriate open-ended questions before administering medication. One participant made the following statement:

'Sometimes we see a student failing to ask the patient his/her full name, or just asking, for example, "Are you Miss Desi?" and then directly injecting the medicine' (FGD 1).

At the time of administering the scheduled medication, students said that they should identify the patient correctly

by asking their name and date of birth and checking the identification bracelet. Some students reported that they had learned about the patient identification technique in pre-clinical education but were not confident about applying it in actual clinical settings. Owing to their high workloads, they often forgot to use the patient identification technique at the time of administering medication. Students also said that nurses did not always supervise them during medication administration, which is why they did not receive the necessary feedback in this practice of proper patient identification.

Improper drug preparation

The next error identified in clinical rotations was improper medicine preparation, such as inappropriate labelling of medication. In some wards, nursing students only wrote the patient's bed number on the syringe, increasing the possibility of patient identification errors. The participants realised that patients' names and medical record numbers must both be present on syringes but in actual practice sometimes these were not being written. One student's concerns regarding this matter were as follows:

'There is a certain ward where the nurse and students only write the bed number on syringes, and the drugs are placed next to other patients' medicine' (FGD 2).

These situations arose in hospitals with an imbalance in the number of patients and nurses, leading to a high workload. In these situations, the implementation of standard operating procedures in drug administration is sometimes neglected even though most students are aware of the fact that this problem has the potential to become a serious medication error.

Theme 3: Causes of medication errors in clinical rotation

Lack of knowledge and skills

Most participants stated that a lack of knowledge and skills in medication safety could cause medication errors. Participants explained that lessons in nursing skills related to medication safety, such as hand washing and preparation of medicines, have been given earlier since in the first year of preclinical education. However, they were taught about the concept of patient safety only in the last year of preclinical education or towards the end of the bachelor of nursing programme. They did not undergo any additional sessions about patient and medication safety until their clinical rotations, which would have helped them connect theory with actual practice.

These conditions created barriers to the implementation of patient safety principles, and students felt underprepared. Additionally, although they received information on patient safety on their first day at the hospital, the session was focused more on the implementation of hand washing than medication safety. Three participants made the following statements reflecting their feelings of inadequacy and confusion:

'Medication training related not only to pharmacology but also the role of nurses in the process of drug delivery is required' (FGD 2).

'Our knowledge of medication safety has been inadequate right from the academic phase, because especially at the beginning of clinical rotation, I felt I did not know much about medicine and drug administration' (FGD 3).

'We only got one lecture about patient safety, which, in my opinion, is insufficient for a comprehensive understanding of medication safety and drug administration' (FGD 4).

Lack of good role models

In addition to the lack of knowledge and practical skills, students expressed that they were confused by the differences between the actions taken by some nurses at the hospital and what they had been taught during their pre-clinical education. According to the students, if there was a nurse who did not follow safe medication administration practices, they too tended to follow the pattern of neglect of best practices.

Nursing students reported that they sometimes experienced barriers to safe practice because of the lack of good role models. Nursing students expect to be able to look up to senior nurses who can set the right examples with regard to safe medicine storage in the inpatient room, checking the accuracy of the medicines being administered, and engaging in safe medicine preparation and storage until its administration.

Lack of proper supervision

The hospitals at which the nursing students were doing their clinical rotations were all different in terms of environment and conditions. In one district hospital, the students did not always get adequate supervision during medication administration. This happened when the nurses had high workloads, leading them to focus more on their responsibilities toward their patients than the students in their charge. Two nursing students shared the following experiences:

'Sometimes we have to administer drugs to patients without the supervision of a clinical instructor or nurse' (FGD 1).

'The nurse just gave us the medicine at the nurse's station; we had to administer it to patients alone' (FGD 2).

Discussion

Medication administration is a set of skills over which nurses and nursing students must have mastery. Unfortunately, however, nursing students frequently make medication errors. The results of the FGDs indicate that the participants were aware of nurses' importance in patient and medication safety. However, in line with the results of this study, recent research has showed that nursing students enrolled in clinical rotations have not been optimally prepared to be able to fulfil their role in medication safety.^{18,19} This gap was evidenced by the existence of errors such as those related to patient identification, timing, and drug preparation. Other studies have also reported medication errors commonly made by nurses in training.^{8,14}

This study indicated that the lack of appropriate role models and proper supervision during clinical rotations were among the factors contributing to medication errors (Figure 1). In Indonesia, there are often limitations in the number of nursing staff, increasing nurses' workload. The high workload leads to the possibility of nurses paying insufficient attention to patient safety principles in medication delivery, ultimately increasing the risk of medication errors.^{20,21} Staffing problems also influence the availability of appropriate role models for students in their clinical rotations.²² As a result, busy nurses' lack of attention to medication safety has the potential to be passed on to nursing students.^{22,23}

Furthermore, nurses' high workload can affect the quality and quantity of the supervision students receive.²⁴ The lack of supervision for nursing students, particularly those who have just begun their clinical rotations, leaves them vulnerable to making medication errors.²⁰ This may become one of the causes of medication errors committed by nursing students.⁸

The other most common factors associated with medical errors and patient safety were the lack of safety knowledge and its application in nursing education.²⁵ The findings of the present study are in line with other studies in several countries. A factor influencing these errors was the lack of training on medication safety in the preclinical phase, which meant that students had not fully comprehended their role in medication safety.¹¹ Nursing students were not well prepared to make a connection between patient safety in theoretical courses and its application in nursing procedural skills and practice. This finding is similar to a study in Iran, which found that patient safety training was

only given in the first semester, with no additional sessions later.¹⁰ Suggestions to enhance preclinical education included more training on drug indications, side effects, and contraindications and additional drug rounds during clinical placements.¹²

The mismatch between theoretical teaching during preclinical education and the application of knowledge in clinical placement means that many nursing students struggle to consolidate their clinical skills in practice.²⁶ In line with the present results, in previous studies, nursing students have suggested that there were disparities between what they were taught in the university and what they practised in clinical settings in relation to the patient safety agenda.²⁷ Patient safety learning also needs to be linked to real cases in clinical settings. Exposure to actual cases demonstrating best practices will better prepare students to recognise clinical practices that endanger patient safety and strengthen their ability to resolve patient safety threats.¹⁰ Patient and medication safety are difficult to implement if these lessons are not directly related to case studies or applications in actual medical services. This challenge makes student understanding superficial, and as a result, they cannot see the actual benefits of medication safety, which causes the achievement of competence in medication safety to be less than optimal.

The design of patient safety learning has also not been optimal in terms of the mode of instruction, which generally employs the conventional lecture method.^{10,28} In the context of this study, the patient safety class is generally only conducted in the third year with one lecture course, not continuously. The conventional method—lectures—used to convey the principles of patient safety has not been shown

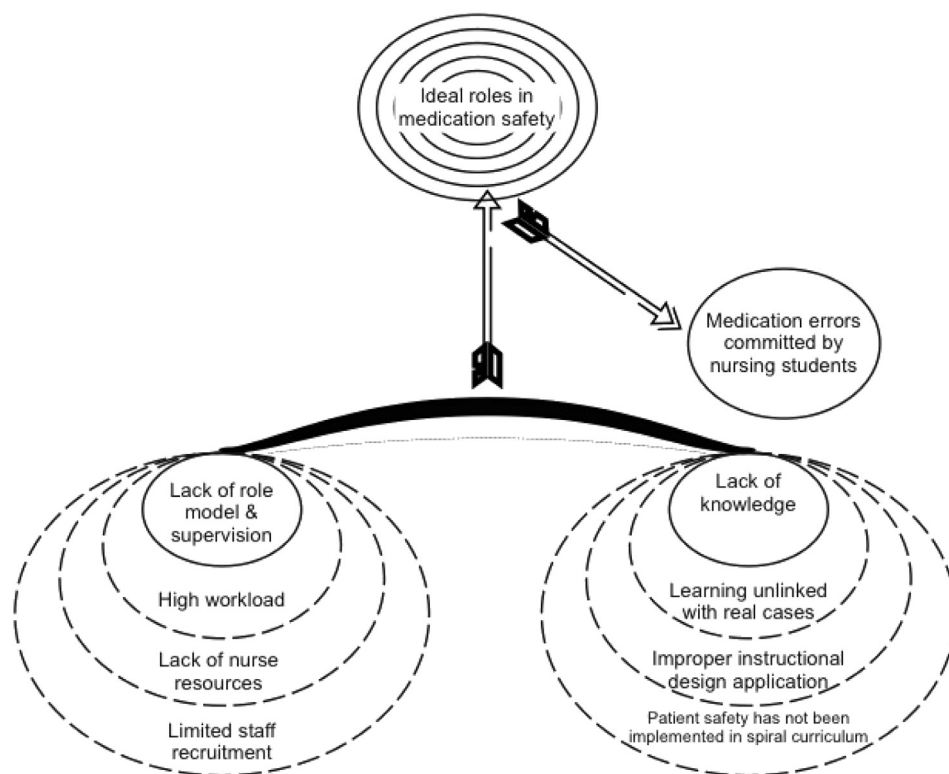


Figure 1: Causes of medication errors by nursing students.

to be completely effective. Adding to this dilemma, the learning methods also continue to be teacher-centred more than student-centred.

Research on patient safety learning offers a variety of learning methods, such as case-based learning, role play, simulation, demonstration, and conceptualising, with lectures as the basis for student understanding in combination with other methods.^{29,30} This combination approach requires nursing educators to pay attention to patient safety training, in addition to a wide range of goals, which need to be designed keeping in mind the core principles of learning. Medical educators need to consider not only the various learning methods but also the instructional design used, because patient safety is a complex competency.^{31,32}

This complex competency requires a learning strategy and instructional design that can combine the attainment of correct knowledge, attitudes, and skills. This finding indicates that simple to complex learning (spiral approach) in the curriculum can be another option in overcoming this problem. The spiral curriculum approach has several advantages, which includes the opportunity to review topics throughout lessons; topics are returned to with different difficulty levels and become increasingly complex so that student competences gradually increase.³³ Some improvements that can be made to medication safety learning include: 1) early exposure to real cases in the learning process, 2) the use of appropriate instructional design with a scaffolded approach, that is, using 4C-ID methods,^{31,32} and 3) the application of a spiral curriculum. These are expected to improve the effectiveness of patient and medication safety training by increasing the number of opportunities to apply best practices.

Reflexivity of study

Students in clinical rotations need to be given the opportunity to conduct regular FGDs and reflections. This will enable them to reflect on what they have already done well and what can be improved. Accordingly, at the end of their clinical rotations, they will be able to minimise behaviours or actions that can lead to medication errors.

Limitations

One of the limitations of this study was that all the participants belonged to a single institution. However, the hospitals the 26 respondents were undertaking their clinical rotations at differed (four hospitals with six departments in each hospital), providing a representative sample. Although nurses were found to make medication errors, this study did not dwell on them because the focus was on the reflections of the students who were undergoing clinical rotations.

Conclusion

This study found that in a developing country such as Indonesia, the lack of knowledge, skills, effective role models, and proper supervision were the main factors influencing medication errors by nursing students. Nursing educators should properly prepare their students in the undergraduate nursing programme using a variety of

learning strategies. The implementation of medication safety by nurses in clinical settings is essential for the achievement of professional competencies in future nursing practice. The results of this study can provide positive reflections for nursing education.

Source of funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sector.

Conflict of interest

The authors have no conflict of interest to declare.

Ethical approval

Ethical approval was obtained from the research ethics committee of the medical faculty where the study was conducted (No. 231/EP-FKIK-UMY/VI/2016). The research objectives and methods were explained to respondents and they signed an informed consent form to participate in this study. Participants were made aware of the fact that they could withdraw from the study at any time and a researcher guaranteed the privacy and confidentiality of their data. A researcher also guaranteed that the results of this study would not affect the students' academic evaluations.

Authors' contributions

LM was responsible for the study conception and design and performed the data collection and analysis. LM wrote the initial and final drafts of this paper. MC, FH, and ID provided advice on the study design, methodology, data interpretation, and writing. All authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript.

Acknowledgment

We would like to thank the nursing students who participated in this study, and also the staff of Klinik Bahasa for the English review of this paper.

References

1. World Health Organization. *Medication errors: technical series on safer primary care*. Geneva: World Health Organization; 2016.
2. Rothschild JM, Churchill W, Erickson A, Munz K, Schuur JD, Salzberg CA. Medication errors recovered by emergency department pharmacists. *Ann Emerg Med* 2010; 55(6): 513–521. Available from: <https://doi.org/10.1016/j.annemergmed.2009.10.012>.
3. Salmasi S, Khan TM, Hong YH, Ming LC, Wong TW. Medication errors in southeast asian countries: a systematic review. *PLoS One* 2015; 10(9):e0136545.
4. Nguyen HT, Nguyen TD, van den Hauvel ER, Haijeer-Ruskamp FM, Taxis K. Medication errors in Vietnamese hospitals: prevalence, potential outcome and associated factors.

- PLoS One 2015; 10(9):e0138284. <https://doi.org/10.1371/journal.pone.0138284>.
5. Kiersma ME, Plake KS, Darbshire PL. Patient safety instruction in US health professions education. *Am J Pharm Educ* 2011; 75(8).
 6. World Health Organization. *WHO patient safety curriculum guide multiprofessional*; 2011. pp. 241–250.
 7. Chenot TM, Daniel LG. Frameworks for patient safety in the nursing curriculum. *J Nurs Educ* 2010; 49(10): 559–568. Available from: <http://www.slackinc.com/doi/resolver.asp?doi=10.3928/01484834-20100730-02>.
 8. Reid-Searl K, Moxham L, Happell B. Enhancing patient safety: the importance of direct supervision for avoiding medication errors and near misses by undergraduate nursing students. *Int J Nurs Pract* 2010; 16(3): 225–232.
 9. Vaismoradi M, Salsali M, Marck P. Patient safety: nursing students' perspectives and the role of nursing education to provide safe care. *Int Nurs Rev* 2011; 58(4): 434–442.
 10. Sulosaari V, Kajander S, Hupli M, Huupponen R, Leino-Kilpi H. Nurse students' medication competence - an integrative review of the associated factors. *Nurse Educ Today* 2012; 32(4): 399–405. Available from: <https://doi.org/10.1016/j.nedt.2011.05.016>.
 11. Adhikari R, Tocher J, Smith P, Corcoran J, MacArthur J. A multi-disciplinary approach to medication safety and the implication for nursing education and practice. *Nurse Educ Today* 2014; 34(2): 185–190. Available from: <https://doi.org/10.1016/j.nedt.2013.10.008>.
 12. Khasanah U. Nursing procedural error: types and causing factor in nursing students of clinical rotation in Nursing Study Program UIN Syarif Hidayatullah. *J Unair* 2012; 7(2): 186–195.
 13. Mansour M. Examining patient safety education in pre-registration nursing curriculum: qualitative study. *J Nurs Educ Pract* 2013; 3(12): 157–167. Available from: <http://www.sciedu.ca/journal/index.php/jnep/article/view/2912>.
 14. AINEC. *The core curriculum of nurse's education*; 2015. pp. 108–111.
 15. Saldelowski M. Whatever happened to qualitative description? *Res Nurs Health* 2000; 23: 334–340.
 16. Harding J. *Qualitative data analysis from start to finish*. London: Sage Publication; 2013.
 17. Wirihana L, Welch A, Williamson M, Christensen M, Bakon S, Craft J. Using Colaizzi's method of data analysis to explore the experiences of nurse academics teaching on satellite campuses. *Nurse Res* 2018 Mar 16; 25(4): 30–34. <https://doi.org/10.7748/nr.2018.e1516>.
 18. Vaismoradi M, Jordan S, Turunen H, Bondas T. Nursing students' perspectives of the cause of medication errors. *Nurse Educ Today* 2014; 34(3): 434–440. Available from: <https://doi.org/10.1016/j.nedt.2013.04.015>.
 19. Lorraine K, Apsay G, Geselle G. Nursing medication errors as perceived by nursing students in Iligan City. *Belitung Nurs J* 2018; 4(6): 537–544.
 20. Reid-Searl K, Moxham L, Walker S, Happell B. Internal conflict: undergraduate nursing students' response to inadequate supervision during the administration of medication. *Collegian* 2009; 16(2): 71–77.
 21. Aljadhey H, Alkhani S, Khan TM. Medication safety officer preparatory course: outcomes and experiences. *Saudi Pharm J [Internet]* 2017; 25(7): 1011–1014. Available from: <https://doi.org/10.1016/j.jsps.2017.03.002>.
 22. Gibbs SS, Kulig JC. “We definitely are role models”: exploring how clinical instructors' influence nursing students' attitudes towards older adults. *Nurse Educ Pract* 2017; 26: 74–81. Available from: <https://doi.org/10.1016/j.nepr.2017.07.006>.
 23. Drach-Zahavy A, Somech A, Admi H, Peterfreund I, Peker H, Priente O. (How) do we learn from errors? A prospective study of the link between the ward's learning practices and medication administration errors. *Int J Nurs Stud* 2014; 51(3): 448–457. Available from: <https://doi.org/10.1016/j.ijnurstu.2013.06.010>.
 24. Ramani S, Leinster SAM. AMEE Guide no . 34: teaching in the clinical environment. *Med Teach* 2008; 30(4): 347–364.
 25. Christiansen A, Prescott T, Ball J. Learning in action: developing safety improvement capabilities through action learning. *Nurse Educ Today* 2014; 34(2): 243–247. Available from: <https://doi.org/10.1016/j.nedt.2013.07.008>.
 26. Mariani B, Ross JG, Paparella S, Allen LR. Medication safety simulation to assess student knowledge and competence. *Clin Simul Nurs* 2017; 13(5): 210–216. Available from: <https://doi.org/10.1016/j.ecns.2017.01.003>.
 27. Mansour M. Factor analysis of nursing students' perception of patient safety education. *Nurse Educ Today [Internet]* 2015; 35(1): 32–37. Available from: <https://doi.org/10.1016/j.nedt.2014.04.020>.
 28. Maeda S, Kamishiraki E, Starkey J, Ehara K. Patient safety education at Japanese nursing schools: results of a nationwide survey. *BMC Res Notes* 2011; 4(1): 416. Available from: <http://www.biomedcentral.com/1756-0500/4/416>.
 29. Steven A, Magnusson C, Smith P, Pearson PH. Patient safety in nursing education : contexts , tensions and feeling safe to learn. *Nurse Educ Today* 2014; 34(2): 277–284. Available from: <https://doi.org/10.1016/j.nedt.2013.04.025>.
 30. Tella S, Liukka M, Jamookeah D, Smith N-J, Partanen P, Turunen H. What do nursing students learn about patient safety? An integrative literature review. *J Nurs Educ* 2013; 53(1). Available from: <http://www.healio.com/doiresolver?doi=10.3928/01484834-20131209-04>.
 31. Susilo AP, van Merriënboer J, van Dalen J, Claramita M, Scherpbier A. From lecture to learning tasks: use of the 4C/ID model in a communication skills course in a continuing professional education context. *J Contin Educ Nurs* 2013; 44(6): 278–284. Available from: <http://www.healio.com/doiresolver?doi=10.3928/00220124-20130501-78>.
 32. Van Merriënboer JJG, Clark RE, de Croock MBM. Blueprints for complex learning: the 4C/ID-model. *Educ Technol Res Dev* 2002; 50(2): 39–64.
 33. Harden R. Curriculum planning and development. In: Dent JA, Harden R, editors. *A practical guide for medical teachers*. 4th ed. London: Churchill Livingstone Elsevier; 2013. p. 10.

How to cite this article: Musharyanti L, Claramita M, Haryanti F, Dwiprahasto I. Why do nursing students make medication errors? A qualitative study in Indonesia. *J Taibah Univ Med Sc* 2019;14(3):282–288.