

KNOWLEDGE OF RATIONAL USE OF MEDICINE AMONG NURSING STUDENTS

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ABSTRACT

Introduction: Rational use of medicine (RUM) is critical for achieving therapeutic goals and avoiding unwanted effects. However, irrational medicine use is becoming a severe issue worldwide since it leads to increased medical costs and unwanted effects. Students as prospective professional nurses need to have knowledge that supports the rational use of medicine to ensure rational administration of the medicine for patients. **Methods:** This descriptive research was conducted to identify knowledge of rational use of medicine among nursing students of Faculty of Nursing Universitas Padjadjaran. Quantitative data was collected by asking respondents to fill out questionnaires. A total of 285 respondents had filled out an online research questionnaire (response rate=76.61%). The collected data were analyzed with descriptive analysis (frequency, percentage, and average). **Result:** The results of this study showed that there is some knowledge related to (RUM) which is not appropriate, such as assuming that over the counter medicines are safe to consume with prescribed medicines (53.3%); tablet medicines can be divided to be administered in child patients (57.9%). In addition, almost all respondents considered it unnecessary to be cautious in giving medication to pregnant and lactating mothers (41.1%) and the elderly (40.4%). **Conclusion:** Thus, nursing students are expected to gain RUM knowledge to obtain better RUM attitudes and behaviors in providing nursing interventions.

Keywords: Drug misuse, Knowledge, Rational use of medicine, Safety-based drug, Nursing student.

INTRODUCTION

Medicine has a positive effect in addressing the patient's health problems. Administering the medicine is rationally necessary to achieve therapeutic goals and prevent unwanted effects. Every stakeholder, including government, medicine producers, healthcare staff, and patients, is responsible for implementing rational use of medicines (World Health Organization, 2002). As health care team members, nurses play a crucial role in drug safety (Vaismoradi, Jordan, Vizcaya-Moreno, Friedl, & Glarcher, 2020).

Rational use of medicines (RUM) is crucial in attaining health care quality for patients and the community (Mahmood et al., 2016). RUM uses medicine based on the patient's clinical needs, in the appropriate dose, for the suitable period, and at the lowest possible cost (World Health Organization, 2002). Based on the definition, RUM focuses on four essential

aspects, including correct medication, correct dose, correct duration of treatment, and correct cost (Chaudhari, Mali, Dawari, & Nishandar, 2017)

Based on primary health research results (Riskesdas) 2013 showed that 35.2% of families in Indonesia provide medicines for self-treatment. The average of medicines that they keep was almost three kinds of medicines. Among families who provide medicines, 35.7% of them keep dangerous medicines, and 27.8% keep antibiotics. There is 81.9% of family keeps dangerous medicine, and 86.1% of family keeps antibiotics without a prescription. The absence of dangerous medicines and antibiotics for self-treatment indicates irrational medicine use (Ministry of Health of Republic of Indonesia, 2013).

Furthermore, irrational use of medicine is found among consumers and happens in health care facilities and performed by health care workers. The study conducted in one of a public health center in

Bali showed that polypharmacy and excessive antibiotic use were significant issues in the public health center (Dewi, Arimbawa, & Jaelani, 2018).

Irrational use of medicines is becoming a severe problem worldwide as it leads to increased medical costs, waste of resources, unwanted effects such as side effects, and anti-microbial resistance (Sontakke, Budania, Paranjape, & Pharmacology, 2013). According to the World Health Organization (WHO), more than half of drugs worldwide are prescribed, distributed, or sold improperly, and half of the patients fail to take them properly (World Health Organization, 2002). Irrational use of medicines can be a heavy burden for the economies of countries, especially in developing countries (Nayir et al., 2016)

As professional health workers, nurses become an integral part of the National health service. One of the nurse's most fundamental responsibilities is the administration of medicine. Nurses can successfully perform this responsibility by following rational use of medicine (RUM) principles. Rational use of medicines is considered one of the nurses' primary responsibilities in preparing and administering medicines to the patients. Nurses as health workers who do not have sufficient pharmacological knowledge are more likely to deal with mistakes during medicine administration (Ulupinar & Akici, 2015).

Nurses must obtain the necessary competencies in knowledge and skills within the regulatory, professional, legal, and ethical framework regarding the safe prescription, storage, administration, and disposal of medicines (Vaismoradi et al., 2020). Nurses are expected to understand and register the prescribed medicines and monitor patients' reactions. Therefore, nurses must know about the medicine (Aşiret et al., 2013).

To become professional nurses, nursing students as a future generation need to have appropriate and adequate RUM knowledge in administering medication for

patients to ensure the rational administration of medicine. So far, nursing students of Universitas Padjadjaran have generally studied pharmacology in tutorial cases. In the meantime, to use the medicine rationally, students need to know the correct dosage, the appropriate period, and at the lowest possible cost.

In addition, various studies have evaluated RUM in health workers and patients. Nevertheless, RUM-related research on nursing students has never been conducted in Indonesia. Therefore, this research was conducted to evaluate the RUM knowledge of nursing students.

METHODS

This research used the descriptive quantitative method. The variable in this study was knowledge of rational use of medicine (RUM) among nursing students. Data collection was conducted by asking the respondents to fill out the research questionnaires that contained standard questions related to the rational use of medicine. The questionnaire was developed and used in a previous study conducted by Sontakke et al. (2013).

The questionnaire was developed to attain data related to several issues concerned with RUM. This questionnaire was initially developed in the English version. Therefore, it was translated into Indonesian. The back-translation process was used to ensure an equivalent content between the original and translated versions of this instrument. Then, Cronbach's alpha coefficient showed the reliability results were 0.74 for the questionnaire. The responses were converted into true and false responses to each statement. The interpretation of "no" was considered an incorrect response. The level of awareness for each statement was mentioned in percentages.

The population in this study was all nursing students of Universitas Padjadjaran. The samples in this study were recruited using purposive sampling techniques by

setting inclusion criteria including students of the Faculty of Nursing Universitas Padjadjaran. They have obtained Medical-surgical Nursing and pharmacological subject. Non-active students were excluded from this study. All participants were approached to ascertain their willingness to participate in the study. Then, the researcher explained to the potential participants the purpose of the study, gained their informed consent and outlined the procedure, risks, benefits, and confidentiality. The participants had the right to refuse to participate in the study or to withdraw at any time without any negative consequences.

A total of 285 respondents had filled out an online research questionnaire with a response rate of 76.61%. Data collection was conducted after obtaining ethics approval from the Research Ethics Commission of Universitas Padjadjaran with the number 1094/UN6. KEP/EC/2019 and research license number 4005/UN6. L/LT/2019 from Faculty of Nursing Universitas Padjadjaran.

The data were analyzed using descriptive statistics. Descriptive statistics were used to describe knowledge of rational use of medicine among nursing students of Faculty of Nursing Universitas Padjadjaran using frequency, percentage, mean, and standard deviation.

RESULTS

Table 1. The target of student participation based on the study program at Faculty of Nursing Universitas Padjadjaran

Program	Total	Minimal Target	Response rate
Undergraduate	236	78	188
Ners program	136	45	97
Total	372	123	285

Based on table 1, we obtained results that 285 respondents from the undergraduate

and Ners program had filled out an online research questionnaire with a response rate of 76.61%. The characteristics of participating students are illustrated in Table 2 below.

Table 2. Characteristics of Active Students of The Faculty of Nursing Program of Universitas Padjadjaran (n=285)

Characteristics of Respondents	Frequency (f)	Percentage (%)
Age (range 20-36)	Mean=21.43	SD=1.22
Gender		
Male	53	18.6
Female	232	81.4
Study Program		
Undergraduate	188	66
Ners program	97	34

Based on Table 2 obtained results, the average age of respondents is 21.43 years (SD=1.22). The majority of respondents (81.4%) were female. 66% of undergraduate students and 34% of professional study students were involved.

Table 3. Overview of knowledge of rational use of medicine (RUM) in students of the Faculty of Nursing Universitas Padjadjaran (n=285)

Knowledge	Yes		No	
	f	%	f	%
Notice about OTC medicines	224	78.6	61	21.4
OTC prescription medicines	152	53.3	133	46.7
Notice about different names of the same generic content of medicines	202	70.9	83	29.1
Notice the disparity in prices of different brands of the same medicine	249	87.4	36	12.6
Notice about precautions to be followed during online purchase of	178	62.5	107	37.5

Knowledge	Yes		No	
	f	%	f	%
medicines				
Notice about precautions to be taken while using medicines in children	207	72.6	78	27.4
Notice about precautions to be taken while using medicines in pregnant and breastfeeding women	168	58.9	117	41.1
Notice about precautions to be taken while using medicines in elderly	170	59.6	115	40.4
Any tablet can be divided for use in pediatric patients	165	57.9	120	42.1
Notice about expiry period (expiry date) of medicines	258	90.5	27	9.5

Based on Table 3, most respondents have known almost all components of rational use of medicine (RUM). However, some respondents (53.3%) considered that over-the-counter (OTC) medicines were safe to be consumed with prescribed medicines, and 57.9% of respondents realized that medicine for adults could not be broken down into several small parts for pediatric patients (Sontakke et al., 2013).

In addition, almost half of respondents considered it unnecessary to be cautious in giving medication to pregnant and lactating mothers (41.1%) and in prescribing medicine to the elderly (40.4%).

DISCUSSION

This study revealed that most respondents were female with an average age of 21.43 years (SD=1.22). The study conducted by Nayir et al. (2016) also supported that the age range of 18 to 65 has the most significant association with consumption of unprescribed drugs, which is part of rational use of medicine (RUM). Rational medicine is defined as administering medicine based on patients'

medical requirements, in proper doses, in an adequate period, and at the lowest possible charge for patients and their societies. This definition considers four essential aspects of the RUM: correct medication, correct dose, correct duration of treatment, and correct cost (World Health Organization, 2002).

Rational use of medicines is considered one of the nurses' primary responsibilities in preparing and administering medicines to patients. Nurses as health workers who do not have sufficient pharmacological knowledge are more likely to make mistakes during the practice. Thus, the nurses can effectively accomplish their accountability by administering medicines in agreement with the rational use of medicine. During the medication administration practice, RUM principles consist of taking prescriptions or orders, keeping medicines, administering medicine, recording, monitoring, and managing medicine-waste issues perfectly (Ulupinar & Akici, 2015).

In this study, 66% of respondents were undergraduate students, and 34% of respondents were in the Ners program. Based on the cross-tabulation analysis, undergraduate students in this study have a higher unawareness percentage than Ners program students in most RUM components. Undergraduate students in this study were unaware of most of the RUM components such as knowing over the counter (OTC) medicines (25%); different names of the same generic content of medicines (32,9%); precautions to be followed during online purchase of medicines (40,9%); precautions to be taken while using medicines in children (30,8%), pregnant and breastfeeding women (44,1%), and elderly (45,2%). These results are in line with the study of Burki et al. (2020), which reported that insufficient knowledge of RUM was primarily found among respondents with higher levels of education.

In addition, the result of cross-tabulation in this study revealed that female students in this study have a higher unawareness percentage than male students

in most of the RUM components, such as unaware on using of OTC with prescription medicines (54,3%); precautions to be followed during online purchase of medicines (39,2%); precautions to be taken while using medicines in children (28,4%), pregnant and breastfeeding women (41,4%), and elderly (41,4%) and unaware about expiry period of medicines (9,55). In contrast, other studies reported insufficient knowledge, mainly among men (Burki et al., 2020), and knowledge of drug use was significantly associated with women (Dawood et al., 2017).

With its various methods, education has an important impact in promoting RUM. A previous study also reported that educational intervention resulted in notable development in knowledge about RUM. However, specific training related to RUM has never been conducted to promote knowledge of RUM for the respondents in this study. Nurses are expected to understand and register the prescribed medicines and monitor patients' reactions. Therefore, in addition to medicine administering skills, nurses must know about the medicine, including expected pharmacological effects, potential side effects, essential points in medicine administration, and interactions between medicine-disease, medicine-medicine, and medicine-food (Aşiret et al., 2013).

In the Indonesia Nursing curriculum, pharmacology is generally taught at the beginning of the undergraduate course (Musharyanti, Claramita, Haryanti, & Dwiprahasto, 2019). After finishing the undergraduate program, the Ners program should be pursued by graduate nursing students to earn ners degree and achieve competency as a professional nurse after they pass the General Registrar exam (Herliani, Harun, Setyawati, & Ibrahim, 2018). Ners program is defined as a professional clinical program in a bachelor's degree program, which aims to comprehensively improve students' abilities and attitudes to become professional nurses

through the field and clinical learning experiences.

The Professional Nursing Education Program (Ners Program) is part of the nursing education program. The students experience the learning process by undergoing clinical rotation in various health care facilities (Suba & Scruth, 2015). The Ners program is conducted for one year. Students get education and experience as professional nurses in various healthcare facilities such as hospitals, clinics, and public health centers or communities (Herliani et al., 2018).

Previous study found out that high school and university graduates are more likely to perform irrational use of medicine behaviors such as keep one or two boxes of expired medicines, and stopping to take drugs after complaints subside. At the same time, high school and university graduates are also more likely to take medication according to the doctor's advice compared to other groups (Tengilimoğlu, Tekin, Zekioğlu, & Kılıç, 2020).

The increasing case of irrational use of medicine is due to specific reasons that include; ambiguous/false beliefs, insufficient knowledge of the user, prescribing a burden on the doctor, attitudes driven by the advantages of receptors, advertising events by the pharmaceutical industry, and the absence of protocol application by regulatory authorities. Providing education to all concerned in the correct use of medicine is an effective strategy to gain knowledge and solve the problem of the irrational use of medicine (Burki et al., 2020).

The nursing students' knowledge regarding rational use of medicine (RUM) in this study showed that most respondents had known almost all components of rational use of medicine. Nevertheless, as prospective professional nurses, nursing students need to have the correct knowledge regarding all components of RUM. The present study reflected that majority of the respondent (78.6 %) were aware of over-the-counter (OTC) medicine, which is similar to the

study of Mahato and Bajracharya (2020), which showed that 91.2% of the respondents knew the definition of OTC medicines.

Furthermore, a similar study conducted among adults in the community reported that 52.9% of the participants had sufficient awareness of OTC medicines. The evaluation of antibiotic consumption knowledge describes several irrational uses of antibiotics, including correct dose and frequency, low compliance to antibiotic therapy, and drug choice for common symptoms. Most participants stated that common cold and fever as symptoms of viral diseases were mainly cured with antibiotics (Mahato & Bajracharya, 2020).

OTC medicines can be purchased without a physician's prescription (Mahato & Bajracharya, 2020). The previous study's findings reported that the percentage of medicines prescribed by generic was 93.8%, which is less than the requirement that all medicines should be prescribed in generic. More than half of respondents (53.3%) considered over-the-counter (OTC) medicines safe to be consumed with prescribed medicines in this study. Although OTC medicines are relatively harmless, their inappropriate use can impact serious problems. Therefore, using various media and rational medicine awareness programs is essential for community health (Mahato & Bajracharya, 2020).

Moreover, although some OTC medicines cannot be consumed with prescribed medications, this is not generally acceptable, especially in a country where almost all medicines can be obtained without a prescription. Indonesia is relatively easy to purchase any medicine with or without prescription as a developing country. Limited access to medical information, low drug monitoring system, high cost of health care, unwealthy, availability, unclear laws, and regulations are the essential factors of people to get OTC medicine quickly (Mahato & Bajracharya, 2020)

Nurses need to know that taking the medication without a prescription is not safe, especially if the patient is already treated

with some prescription medicines. Therefore, medicines can only be used after consultation with a doctor (Sontakke et al., 2013). In accordance, nursing students must have sufficient competence related to drug safety before working in the actual care situation, especially during clinical rotation. Nurses are the health professionals who spend most of their time with patients. Nurses have an essential role in providing safe medication. The nurses' role begins with patient assessment, medication preparation, and administration (Musharyanti et al., 2019).

Other related knowledge of RUM resulted in this study where 70.9% of respondents realized that similar content in generic medicines is available under different names. These results showed that nursing students' awareness regarding generic and branded medicine was quite satisfying. Even though there were still 29.1% of nursing students who ignored it. However, a previous study reported that a third of Fresh Bachelor of Medicine and Bachelor of Surgery graduates (FMGs) did not know the same general quality as branded drugs, and they considered them inferior to branded drugs (Chaudhari et al., 2017)

Various brands for the same pharmaceutical product are available, leading to further confusion among users. Generic drugs are medicine manufactured by a factor other than an original innovator company that holds patents for certain pharmaceutical products. Generic drugs are equally efficacious as branded drugs. Thus, the drug regulatory body suppresses receptors to prescribe generic drugs (Chaudhari et al., 2017).

A generic drug has similar active ingredients as the original products produced under patent, with similar dose, route of administration, and concentration. As an innovator product, generic drugs must have similar bioequivalence, quality, performance, and use intended for the same disease conditions. The name of the drug, appearance, and packaging may differ from

the original research products under brand names. Generally, generic drugs must be traded under the material's name (Bhattacharyya, 2019).

The study results conducted in Public Health Center, Kuta district, showed that 85.91% of generic drug prescribing still has 14.09 % of branded generic prescriptions. Branded generic medicine is a drug with the name trade containing active substances with composition, strength, form, route administration, and indication similar to the generic drug approved originators in Indonesia. Moreover, the study also reported that the percentage of antibiotic prescribing for non-Pneumonia ISPA was 29,94%, and 23,84% for non-specific diarrhea (Dewi et al., 2018)

Furthermore, 87.4% of respondents are concerned about variations in prices of different brands of the same medicine. The unbranded generics that are supposed to be cheaper should be traded and prescribed by the name of the active ingredients. The use of generic products is necessary to promote effectiveness in the cost of treatment and to optimize access to healthcare services. The high price of branded medicine is because of the high costs for research and development, clinical and marketing for the drug during the patents. After this exclusive rights period expires, companies will lower the prices with generic names (Bhattacharyya, 2019). The consideration related to price is part of essential aspects of the RUM where administering the medication should consider the correct cost (World Health Organization, 2002).

Another result of this study also presents that 62.5% of respondents realized awareness during online purchase of Medicines. Nowadays, purchasing drugs over the Internet is also a common practice. More and more people are buying drugs online because of the ease and convenience of this platform. However, regulations among countries related to online purchase medicine are varied. Drugs that can only be accessed on prescription in one country can be purchased online from other

circumstances where different drug regulations (Sumaila & Tabong, 2018).

There are two different sources for buying all kinds of drugs on the Internet. One is the dark web, and the other is a freely accessible surface web, which can be accessed through search engines such as Google or Yahoo. That buyers do not always realize the need to buy drugs online. For example, buyers don't always know if a prescription is needed or not and what type of website is allowed. Therefore, it is crucial to promote online customers' awareness of the potential risks by offering alternatives reliable websites and to protect them from these grey market problems (Koenraadt, van de Ven, & Policy, 2018).

Moreover, 72.6% of respondents realized awareness in administering medicines for children. More accessible drugs for children in the community could contribute to drug misuse, cause wasting of resources, and develop resistance to antibiotics. Antipyretics were the most commonly used drugs for self-treatment. It was reported that 5% of the children consumed unidentified crushed medicines mixed and crushed by the health worker and administered by the caregiver in powder form. This way of administering medicine is not clear on estimating the dose (Kalyango et al., 2012).

The previous study conducted among children with upper respiratory tract infections (URTIs) revealed that the patients received the average number of drugs was 3.1, higher than the WHO standard, requiring only one or two medicines prescribed per patient encounter. Out of the 142 URTIs diagnosed with the common cold, 77.4% were given antibiotics, and 68.9% of children under five received antibiotics. Although this condition is mainly because of viral infection and the use of antibiotics is inappropriate. Therefore, it is suggested that children with common cold should be managed with nasal decongestant, antihistamine, and zinc as this helps relieve symptoms leading to spontaneous recovery.

Other knowledge related to RUM that is still unclear is that some respondents divided adult tablets for child patients. Tablets cannot be broken down into parts for pediatric patients because a tablet medicine that breaks before use can lose effectiveness. The role of nursing students as prospective professional nurses is to provide health education for patients and the community related to RUM, especially not breakdown adult medicine into several small parts for children (Sontakke et al., 2013).

In addition, some respondents considered that unnecessary to be cautious in giving medication to pregnant and lactating mothers (41.1%) and the elderly (40.4%). Pregnant and lactating mothers and the elderly are among the groups most likely to get side effects from certain medications. Physiological changes during pregnancy result in pharmacokinetic and pharmacodynamic changes in pregnant women.

Meanwhile, in the elderly, there is a physiological aging process that requires attention in the administration of medicines to prevent the risk of adverse reactions. Due to lengthening lifespan, there is a rise in the number of older persons suffering from chronic diseases like cancer, diabetes, cardiovascular disorders, and chronic lung diseases. The higher frequency of chronic diseases requires pharmacological treatment and causes older persons to consume more medicine. Therefore, the elderly population is subscribed to many drugs. Polypharmacy is a common health problem at older ages. Polypharmacy is a combination of five or more drugs or administering more medicine than necessary or at least one unnecessary medicine in treatment. Polypharmacy increases the risk of side effects, complications, and maladaptation.

In a previous study on the irrational use of medicines among the elderly in Sweden, Morin et al. reported that 38% of the elderly are exposed to irrational medicine use (Morin, Fastbom, Laroche, & Johnell, 2015). In a study on potentially inappropriate medicines in India,

Kanagasanthosh et al. found inappropriate medicines among approximately 18.34 % of the elderly population (Kanagasanthosh, Topno, & Aravindkumar, 2015). Polypharmacy was common as prescriptions with five to six medicines per patient encounter was found. Some prescribers are not following the WHO or International Network for Rational Use of Drugs (INRUD) requirement of prescribing medicines in their generic and from the essential medicine list of the country

The main reason for the irrational use of medicine is lack of information, confusion, inadequate education and training of medical professionals, and communication between patients and fewer health professionals (Asfaan, 2014). Therefore, nursing students' knowledge of RUM in all components needs to be improved. Lack of knowledge of side effects and interactions of medicine can lead to iatrogenic diseases resulting in increased hospitalization rates and loss of resources (Dakhale, Pimpalkhute, Bajait, & Raghute, 2016).

This study also presents that 90.5% of respondents realized the expiry date of medicines. The expiration date was defined as the end day set by the manufacturer to guarantee the full effect and safety of a medication. Drug expiration dates are shown on most medication labels, including prescription, over-the-counter (OTC), and dietary (herbal) supplements. Loss of efficacy can be a vital health concern, especially when treating an infection with an antibiotic (Gikonyo, Gikonyo, Luvayo, & Ponoth, 2019). Based on a study conducted in Turkey in assessing the attitudes and behaviors of nurses using medicines rationally was revealed that 82.9% of nurses always follow the date of expiration of medicines (Uzuntarla & Cihangiroğlu, 2016).

Based on the results of previous researches, there are some methods to gain knowledge on the rational use of medication among nursing students. Shah et al. (2019) reported that using media approaches such

as TV programs, printed/internet news, radio, etc., was an effective way to disseminate the rational use of medicine to all medical and non-medical university students. In addition, the use of a simulated patient in a course on the rational use of medication proved effective to gain knowledge and skills and received positive feedback from the students to be used as a teaching method of the rational use of medication-related frequent pharmaceutical applications, dosage calculations, observation of adverse side effects and patient training (Unver et al., 2013).

The vast number of the sample becomes the strength of this study. However, the limitation of this study is the results that may have restricted the generalization. Although the sample reached 33% respondents from a population with the minimum acceptable response rates for online or web surveys, there was a bias in selecting the subjects since their participation was voluntary. Other students who have irrational use of medication may not have participated. Moreover, this study was only conducted in one set area that may have a different condition with nursing students in other institutions.

CONCLUSION

This study showed some knowledge related to RUM that is not appropriate such as assuming that over-the-counter medicines are safe to consume with prescribed medicine, tablet medicines can be divided to be administered in child patients. In addition, almost some respondents considered it unnecessary to be cautious in giving medication to pregnant and lactating mothers and the elderly. The results of this study can provide a positive reflection for nursing education. Moreover, it is recommended that media approaches, such as TV programs, printed/internet news, radio, and others, could effectively publicize knowledge on the rational use of medicine to all university students, both medical and non-medical students.

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