RESEARCH ARTICLE

Analysis of drug-related problems in the home medication review practice by the master of pharmacy students

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Abstract

Background: Master's students are required to perform community service (CS), so a strategy is needed to merge CS into a course and make it a learning method that can be sustainably evaluated. **Objective:** This study aimed to analyse patients' problems in using, storing, and disposing of drugs through home medication review (HMR) by master's students of pharmacy. Subjective self-assessment assesses students' performance in fulfilling the relevant competencies. **Method:** This cross-sectional study was conducted for four months involving 225 patients living near the students' residences. Semi-structured interviews collected data on subject characteristics and how the patients/family members managed drugs at home. **Result:** Nine master's students practised HMR to achieve the learning outcomes of the pharmaceutical care course. The most commonly identified drug-related problems (DRPs) were inappropriate timing or dosing interval (41.2%) and medication nonadherence (25%). Some patients (31.6%) stored drugs without adherence to the provisions, and 70.2% disposed of drugs directly in the trash can. Meanwhile, 88.9% of students strongly agreed that HMR could improve their ability to gather patient data and information. **Conclusion:** HMR is an excellent patient-oriented practice for master's students to strengthen and refine their awareness of community needs regarding drug use and management by patients at home.

Introduction

The obligation to perform Community Service (CS) in higher education is still enforced in Indonesia. This is stated in the Minister of Education and Culture Regulation of the Republic of Indonesia concerning the National Standards for Higher Education. In addition, this regulation requires CS implementation to be assessable, directable, and well-programmed (Mendikbud RI, 2020). A pharmacy's responsibility to improve community health may be better understood with a public health perspective integrated into all pharmacy competency domains (Warren *et al.*, 2021). However, most of the community services in the academic community of higher education, particularly at the master's and doctoral levels, are implemented incidentally, unstructured and lack guidance and evaluation. This is especially true because this activity is not converted into semester credit units, unlike the student CS at the bachelor's level. The CS implementation at the master's level also needs to be managed seriously to make it optimally beneficial in developing learning. Variations of CS in terms of topics, knowledge contribution, and technology at the master's level are undoubtedly better, considering that students already have sufficient prior knowledge and skills.

One form of home visit developed by the Pharmaceutical Society of Australia (PSA) since 2011 is

the Home Medication Review (HMR), which accredited pharmacists provide in collaboration with general practitioners (GPs). The International Pharmaceutical Federation (FIP) has also published a toolkit for pharmacists to practice HMR (International Pharmaceutical Federation (FIP), 2022). However, HMR has yet to be widely practised in many countries, including Indonesia. This is not only due to the limited human resources but also because the model of well-programmed, directable, sustainable home health services and reviews of CS programmes are rarely found in the curriculum of pharmacy master's programmes in Indonesia. In addition, limited research has been conducted on community service practice in the learning model and the classification of DRPs based on PCNE v9.1. Therefore, this pharmacy education research combines HMR practice with a course in the curriculum of a pharmacy master's programme to achieve the learning objectives related to the ability to analyse drug-related problems (DRPs) and drug management by patients/family members at home.

Methods

Design

This study used a cross-sectional design involving patients who lived around the residence of the students in Yogyakarta province in the period March–July 2023. These student pharmacists have obtained a Pharmacist Registration Certificate and Pharmacist Practice License (SIPA) from the Indonesian Ministry of Health. Therefore, they met the academic qualifications and had the authority to provide clinical reasoning without supervision when practising HMR. The patients who received HMR services in this study should have met the criteria established by the PSA (Pharmaceutical Society of Australia, 2020). Meanwhile, patients who experienced an acute or emergency condition for any reason during the HMR practice were excluded from the study.

Assessment

Semi-structured interviews were conducted to collect data on the subject characteristics, drugs and how to use them, as well as the drug disposed of stored by the patients/family members at home. In analysing drug-related problems (DRPs), the researchers used the DRP classification from PCNE version 9.1. (Pharmaceutical Care Network Europe Association, 2020). Student self-reflection on the performance of practising HMR and evaluation was done after completing HMR using a semi-structured questionnaire.

Ethical consideration

This study followed the semester learning plan determined for the pharmaceutical care course. Research ethics approval was obtained for the learning model research submitted by the curriculum team of the Department of Pharmacy, Universitas Islam Indonesia, with the number Akbidyoi54/lX12023. The students were informed that responding to the electronic form (subjective self-assessment) was considered equal to written informed consent, and a written cover letter told them that their responses would be used anonymously for research purposes. Likewise, the patients involved in HMR practice, who were the neighbours living near the students' domicile, already acknowledged that these students are pharmacists who are pursuing their master's degrees, have been certified, and have practice licenses. Completing the informed consent form described the patients' consent and stated that the patient's responses would be used anonymously for the study.

Results

Home Medication Review (HMR)

Nine master's students conducted HMR on 225 patients as part of a strategy to achieve some learning outcomes in the pharmaceutical care course. Figure 1 shows the distribution of patient criteria to be selected for HMR services.
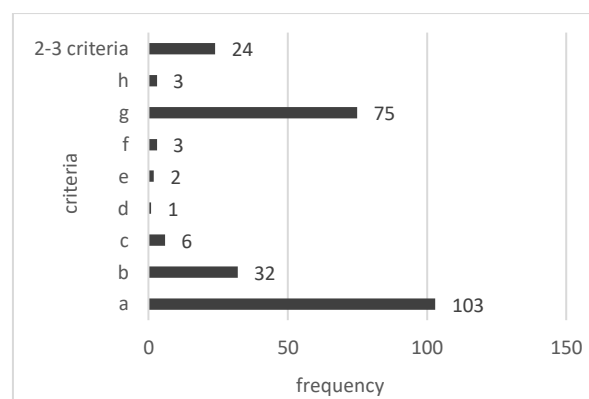
a) taking more than five regular medicines, 12 doses of medicine per day or being treated for three medical conditions; b) discharged from hospital in the last four weeks; c) significant changes to their medication regimen in the past three months; d) taking a medicine with the narrow therapeutic index or requiring therapeutic drug monitoring, e) symptoms suggestive of adverse drug reaction (ADR); f) sub-therapeutic response to treatment; g) suspected non-compliance/problems managing medication-related therapeutic devices; h) risk due to language/literacy difficulties, i) dexterity problems, impaired sight, or cognitive difficulties; j) increasing frailty

**Figure 1: Criteria of patients receiving HMR**

Twenty-four patients had 2 to 3 criteria (n patient): The combination of criteria b-g (6), a-g (4), a-b (3), a-d (d), a-c, a-e, b-c, c-d, c-e, c-f each one patient and three criteria a-d-e and b-c-g which are also one patient each. The results of the DRP identification according to the PCNE classification version 9.1 and drug managed by the patients/family members at home are presented in Table I.

Subjective-self assessment by the master's students providing HMR

The self-reflection was related to assessing the student's ability in the pharmaceutical care cycle and the role of pharmacists in the nine-stars of pharmacist concept that they perceived to be trainable through HMR practice. All these findings are presented in Figure 2.

Table I: Types of DRPs and appropriateness of drug storage and disposal

Category of DRPs	PCNE Code V9.1	Total (%)
Inappropriate timing or dosing interval	C7.7	28 (41.2)
Patient non-adherence	C7.1	17 (25.0)
Potential drug interactions	C9.2	16 (23.5)
Unnecessary drug use	C7.4	5 (7.4)
Adverse drug reactions	P2.1	2 (2.9)
Drug management at home		
Storage		
Appropriate		154 (68.4)
Inappropriate		71 (31.6)
Disposal		
Appropriate		14 (6.2)
Inappropriate		158 (70.2)
Never disposing of drugs.		53 (23.6)
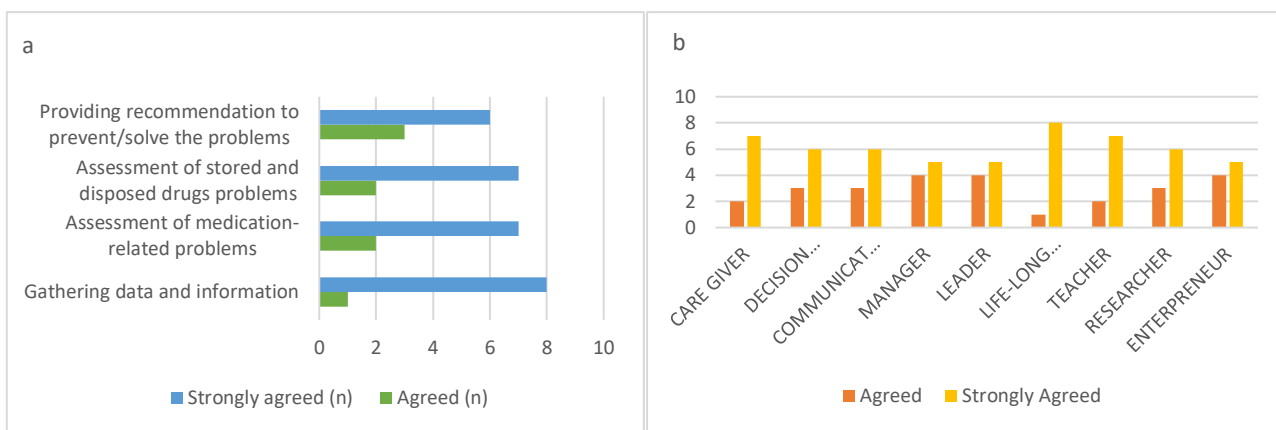
Figure 2: Student perceptions of clinical skills in the pharmaceutical care cycle (a) and the role of pharmacists in the nine-stars of pharmacist concept that can be trained through HMR (b)

Discussion

The practice of HMR merged into a course was a learning design applied for the first time to learning at the pharmacy master's level. This innovation is different from several previous studies that incorporated this service practice into the learning for bachelor's students in their third or fourth year or while undergoing internships (Boyatzis & Batty, 2004; Basheti *et al.*, 2013; Kaae *et al.*, 2014; Adams *et al.*, 2015; Westerholm *et al.*, 2023). Master's students with prior experience in undergraduate programmes and pharmacist professions have a better understanding and skills in pharmacovigilance (Kurniawati *et al.*, 2023). This initiative becomes an option for developing

the capacity of pharmacists in Indonesia, considering that a previous study in three provinces representing the western, central, and eastern parts of Indonesia found that the majority of the community pharmacists in Indonesia are not ready to provide patient-oriented services (Herman & Handayani, 2015).

Figure 1 shows the three major criteria of patients who received HMR services, including those receiving five types of routine drugs or 12 doses of drugs or currently being treated for three medical conditions, suspected non-adherence/non-compliance to treatment/experiencing problems in the technique of using drugs with special preparation, and recently being discharged from hospital in the last four weeks in

descending order. Meanwhile, antihypertensive drugs and antidiabetic drugs are the top three classes of drugs, together with analgesics, used by the patients receiving HMR. In addition, after directly observing the drugs used by the patients at home, the students then conducted in-depth interviews related to patients' drug use to analyse the possibility of drug-related problems. Meanwhile, In line with the findings of several previous studies, instead of storing drugs, the majority of the patients/family members (>70%) disposed of drugs in a way that was not in accordance with the guidelines (Table I).

The use of more than five types of drugs, which is categorised as polypharmacy in some studies, has the potential to cause clinically significant drug interactions (Khandeparkar & Rataboli, 2017; Hermann *et al.*, 2021; Sheikh-Taha & Asmar, 2021). In general, this study found 68 DRP events. The incidence of DRP-associated ADRs was infrequent (2.9%). On the other hand, the most common DRP was inappropriate timing and/or administration intervals in 28 patients. In contrast to the findings of several HMR studies, an HMR study involving 96 patients demonstrated the problems of unnecessary prescription drug use, drug discontinuation, and dose adjustments. The majority of these studies, more than 75%, involved elderly patients with 9-12 chronic medical conditions, which might be the reason for the difference (Monzón-Kenneke *et al.*, 2021). Differences in the physiology of elderly patients and the patients in this study with an average age of 49±19.3 years have led to changes in the pharmacokinetics and pharmacodynamics of the drugs that ultimately cause different drug-related problems (Drenth-van Maanen *et al.*, 2020).

As expected, the proportion of patients with appropriate drug storage was higher compared to the results of interviews with the patients/family members about the method of drug disposal (11-fold higher). This finding correlates with our previous study of the level of public knowledge of DAGUSIBU (Obtain, Use, Store, and Dispose of Drugs) and the slogan GKSO (Family Awareness of Medicines) designed by the Indonesian Pharmacist Association to improve awareness of appropriate behaviour towards drug management in the family. The study showed that knowledge of drug storage is an aspect of DAGUSIBU, with the highest proportion of good knowledge compared to the others (Yulianto *et al.*, 2022). This is similar to a survey study of 809 neighbourhood units in the city of Gondar in Eutopia, where the majority of the family members have a university education (Teni *et al.*, 2017) with the most common place to store drugs being cupboards or drawers (Wondimu *et al.*, 2015), as is the case in the findings of this study.

Several interventions in education based on the findings of the DRPs in this study have been carried out during HMR services. The intervention is in the form of education on the appropriate use of drugs, the importance of compliance, and the appropriate management of ADRs. This intervention can be provided by students who are already pharmacists and certified. This study has limitations in that it only made one home visit, thus preventing the intervention implementation from being assessed. Technology such as smart devices and medical applications can expand access to and intensify these services (Subeh *et al.*, 2017). HMRs that involve GPs, according to the guidelines published by PSA and FIP, significantly affect the acceptance of the recommendations, especially among elderly patients in primary healthcare facilities (Kwint *et al.*, 2013). In addition to interprofessional learning in the curriculum (Zachariah *et al.*, 2022), pharmacist and GPs training must be carried out based on patients' understanding and expectations of HMR, benefits experienced by patients, and difficulties faced by patients to improve clinical outcomes. This aligns with the answers in the subjective self-assessment of two students who stated (cited verbatim).

First student, a male pharmacist in a primary healthcare facility, "*It is better if HMR can get two perspectives, not only from students but also from the community who receive the service, in the form of feedback, so that students can assess whether the patients can understand the information provided*".

The second student, a male hospital pharmacist, said, "*Perhaps a column can be added to collect patients' opinions about the pharmacist visits to their homes. The opinions can be in the form of opinions (qualitative) and/or on a Likert scale*".

In addition, Figure 2 shows that among the options of strongly agree, agree, disagree, and strongly disagree in the subjective self-assessment form, the student perceptions related to HMR are only in the agree and strongly agree categories. The perceptions of the nine students who provided HMR services were also explored through this study, which included perceptions related to the ability to participate in the pharmaceutical care cycle and the role of pharmacists, according to the WHO. Collecting data and information from patients/family members is a type of ability that, according to the students, can be best trained through HMR activities. This finding is expected because the data source in HMR services is only from the patients/family members. In addition, life-long learners, caregivers, and teachers have the three highest roles in the nine stars of the pharmacist concept, and students strongly agree that they can be trained through HMR practice. In contrast to the

findings of several HMR studies, an HMR study involving 96 patients demonstrated the problems of unnecessary prescription drug use, drug discontinuation, and dose adjustments. This study can serve as an evaluation for curriculum improvement, particularly in the pharmacy master's programme. Along with national policies and prioritisation of pharmaceutical service needs, curriculum adjustments need to be made at every level of pharmaceutical higher education (Abusham *et al*., 2022).

Conclusion

HMR is an excellent patient-oriented practice that can be given to master's students of clinical pharmacy concentration to strengthen and sharpen their awareness of community needs regarding drug use and management at home. Learning innovation in the form of CS through HMR shows a strongly positive response from students.

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