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Pharmacy Students' Over-the-counter Recommendations for Primary Dysmenorrhea and Childhood Fever Cases in an Indonesian University

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ABSTRACT

Background: The quality of pharmacy education is stated in the literature to be one of the factors influencing the quality of self-medication services in pharmacies. However, research describing the ability of pharmacy students to handle self-medication cases is limited.

Objectives: This study aims to describe pharmacy students' recommendations for two vignette cases involving analgesic-antipyretics (i.e., primary dysmenorrhea and childhood fever cases) in an Indonesian university and to identify factors related to the appropriateness of their recommendations.

Methods: Apothecary students were asked to provide recommendations and their reasoning for primary dysmenorrhea and childhood fever cases using a structured telephone interview.

Results: Of the 86 participants, appropriate recommendations were provided by 86% and 78% for a case of primary dysmenorrhea and for childhood fever respectively. One-quarter of students did not identify referral criteria in the case of childhood fever and thus made inappropriate recommendations. Age and study period were factors significantly related to providing appropriate recommendations, in which students who were younger and completed their study program within 5 to 6 years were significantly able to provide appropriate recommendations compared to students who were older and whose study period exceeded 6 years.

Conclusion: A considerable number of apothecary students in an Indonesian university were able to properly manage cases related to analgesic-antipyretic recommendations. Further qualitative research is needed to identify factors underlying the knowledge of Indonesian pharmacy students in identifying major and minor patient presentations.

Keyword: analgesics-antipyretics; Indonesia; pharmacy students; self-medications

INTRODUCTION

Self-medication is defined by the World Health Organization as "the selection and use of medicines by individuals to treat self-recognized illnesses or symptoms".[1] Self-medication is widely practiced worldwide with a prevalence ranging from 8% to 98% across both developed and developing countries.[2] In Indonesia, the prevalence of self-medication is reported to be 75% in 2022.[3] However, the appropriateness of the use of medicines for self-medication is of concern. In 1997, Sclafer et al. reported that self-medication used to treat acute simple illness in urban Indonesia was considered appropriate in only 16% of the 965 cases surveyed.[4] Newer research published in 2017, conducted in Panyabungan North Sumatra Indonesia, reported higher

appropriate use of medicines for self-medication compared to Sclafer's study; the reported percentage of rational drug use was 59% of 342 respondents surveyed.[5] The medicines commonly used for self-medication are usually called non-prescription medicines and are available without a doctor's prescription. Non-prescription medicines usually have a good safety profile and are usually approved to treat minor illnesses.

Research has shown that antipyretic analgesics are among the top ten medicines used for self-medication, mainly to treat pain or fever; which are common symptoms for which most people seek self-medication.[6-8] People often visit community pharmacies to obtain these medicines and often seek advice from the pharmacist.[6,9] Therefore, pharmacists have a pivotal position to provide quality counseling for their patients choosing medication with antipyretic analgesics.

Studies related to the provision of antipyretic analgesics for self-medication from community pharmacies have reported that the comprehensiveness of the information gathered, the appropriateness of the recommendations provided, and/or the adequacy of the counseling provided were sub-optimal.[10-13] In Indonesia, Lestari et al. reported that only 9% of the 45 pharmacies in Lamongan district, East Java performed a patient assessment and only less than 10% of pharmacies provided medicine information related to the indication, how to use the medicines, and side effects when handling patients' request for mefenamic acid.[14] A study in Pekanbaru, Riau also showed similar results, in which only 24% of pharmacy staff performed patient assessment when responding to patients with toothache.[15] Furthermore, Roseno et al. in Bandung, West Java also stated low quality of patient assessment, since only 43%, 14%, and 11% of 232 pharmacy staff asked about the signs and symptoms, efforts to treat signs and symptoms, and medical conditions respectively.[16] Counselling related to lifestyle modification was only performed by 10% of 232 pharmacies, and less than 37% of pharmacies provided medicine information on dosage, duration of treatment, precaution, and side effects.[16]

Several factors may have influenced the quality of self-medication counseling at pharmacies in developing countries including the quality of pharmacy education.[17,18] Lack of relevance between the topic as provided at university and the application in practice, as well as commercialization of educational organizations placing more attention on the number of graduated students rather than the quality of the education and training, have been proposed as problems faced by pharmacy educators at universities in developing countries.[17-19]

In Indonesia, pharmacists are required to complete a four-year Bachelor of Pharmacy (BPharm) degree, followed by a one-year pre-registration training program (apothecary program). The curriculum of a four-year BPharm degree is expected to be mainly focused on basic knowledge, and the curriculum for an apothecary program accentuates applied practice.[20] Abilities to provide quality self-medication services have been stated as a competence required in both the Indonesian BPharm degree and the apothecary program by the Indonesian Association of Higher Education in Pharmacy; as stated in their 2013 Academic Competence and Curriculum document – APTFI document.[20] While the curriculum related to self-medication services was proposed almost 10 years ago, published research related to Indonesian pharmacy students' recommendations and clinical reasoning in managing cases of minor ailments, particularly concerning the use of antipyretic analgesics, is limited.

Currently, only a few Indonesian studies examining the ability of pharmacy students to handle self-medication cases have been conducted. Brevmana et al. found that the ability of 14 BPharm students to provide appropriate recommendations for self-medication cases of tension headache, diarrhea, dyspepsia, migraine, and cough differed according to the cases, ranging from 0% to 86%.[21] Another study showed that approximately only 55% of 183 third-year BPharm students participating in the research were able to provide appropriate recommendations in the case of cough due to asthma worsening.[22] Furthermore, a study from a faculty of pharmacy in Surabaya found that 71% of 86 apothecary students were able to provide appropriate recommendations in a case of low back pain.[23] While few studies related to the ability of pharmacy students to handle self-medication cases have been conducted, the results were varied. In addition, no studies have been undertaken to identify factors associated with students' providing appropriate recommendations for self-medication cases that can be crucial to develop and implement strategies for improvement. To have a complete picture of the ability of Indonesian pharmacy students to handle self-medication cases, more studies using different cases are needed. This study aims to (1) describe Indonesian pharmacy students' recommendations and the reasoning when managing vignette cases of childhood fever and primary dysmenorrhea, (2) determine the appropriateness of the recommendations when handling vignette cases of childhood fever and primary dysmenorrhea, and (3) identify factors related to the appropriateness of the recommendations when handling vignette cases of childhood fever and primary dysmenorrhea.

METHODS

Study design and ethical approval

This study was a cross-sectional study conducted in a private Indonesian pharmacy university located in an urban city of East Java. Ethics approval was obtained from the Ethical Committee University of Surabaya, Indonesia (No: 074/KE/V/2019). To protect the identity of the participants, any identifying information was not published.

Study instrument

A questionnaire consisting of 2 parts: (1) pharmacy students' characteristics and (2) two vignette cases: a case of primary dysmenorrhea and a case of childhood fever that did not respond to paracetamol were developed (Table I). The case of primary dysmenorrhea was adapted from Blenkinsopp et al. and was designed as a minor ailment case.[24] The case of childhood fever was adapted from Patel et al. and was designed as a case that contained warning symptoms requiring a direct medical referral.[25] Participants were asked to provide their recommendations and reasons for the recommendations for these 2 vignette cases. The two vignette cases were assessed by four Indonesian academics who were lecturers in pharmacy practice (CB, YIW, ES, SVH) for content validity to adjust to the local context. These validators are experienced in developing questionnaires and conducting research related to pharmacy practice. Two of them (CB and SV) also had work experience in community pharmacies. The cases were provided to the validators with written instructions. They were specifically asked to review the content of the questionnaire about (1) whether sufficient information regarding warning symptoms (referral criteria) has been provided so that participants could identify whether medical referral was needed or self-medication could be undertaken; (2) whether sufficient information related to symptoms, patient identity, and patient medical and medication history has been provided to help participants provide appropriate recommendations; and (3) whether the story in the cases, the wording and the language were understandable and appropriate to the Indonesian context. The questionnaire was then piloted for face validity on 11 apothecary students in the research setting. Students involved in the pilot were asked to not inform their friends regarding the content of the questionnaire. Data from the pilot was included in the analysis since no significant changes were made to the questionnaire after the pilot. The vignettes are provided in Table I.

Sampling, participant recruitment, and data collection

All apothecary students in batch 2020 of this research setting were eligible for recruitment (n=104). This cohort was chosen because this is the graduating cohort at the time of data collection. The minimum sample requirement was calculated using Slovin's formula using the population size of 104 and an acceptable margin of error of 0.05 was 83 participants. Total sampling was used, in which all 104 students in this cohort were invited to participate in this study.

The data collection was conducted when the apothecary students were about to graduate (after they finished all the final examinations required). Two final-year undergraduate students (KS and PAN) acted as data collectors. Before data collection started, all data collectors were trained on the procedure of the survey, how to communicate with the apothecary students, and how to conduct a phone interview. The training was provided by two academics (CB and SV) who are experienced in conducting community pharmacy surveys. The data collectors contacted all students on the list by sending them a WhatsApp message about the research and permission to conduct a phone interview at a time that suited them. The invitation letter contained information that the interviews would be confidential, the participants would be asked to provide their recommendations regarding self-medication vignette cases, and the results of the interview would not affect participants' marks or graduation. If the participant agreed, the data collectors called the participant, re-explained the study, and asked for their consent to participate and to audio-record the interview. Before the interview began, the participant was told to answer according to their current knowledge without having to look at the book or search the internet since no mark would be undertaken. The data collectors conducted a structured telephone interview by reading the questions in the questionnaire for participants who volunteered to participate. After the interviews finished, participants who had participated in the interview were asked to not inform their classmates about the scenarios provided in the questionnaire.

Table I. Vignette cases

Topic	Vignette cases	Appropriate recommendation
Primary dysmenorrhea	A young woman aged about 18 years old asks for a medicine for period pain. She said that she always has pain on the first day of his period and she usually cannot carry out her normal activities when having the pain. Her periods are regular (every 28 days). The bleeding is normal and not heavy. The pain only occurred on the first day of her period and she has never had any pain during other parts of the cycle. She also does not experience any pain in other parts of the body such as in the back or in the leg. This patient does not have any medical history, is not pregnant, and does not consume any medicines, supplements, or herbals routinely. What would you advise this woman? Why do you recommend the advice?	Recommending a non-prescription analgesic (i.e., NSAIDs or paracetamol) and/or non-pharmacological advice (i.e., topical heat such as menstrual heat patch or warm/hot compress)[#]
Childhood fever	A woman comes to the pharmacy and asks if you can recommend something for her baby's fever. The baby is 7 months old and weighs 7 kg. The baby has been irritable and the axillary temperatures have ranged from 38°C to 39°C over the past 5 days. The mother has been giving the baby Tempra® drops 0.8 ml about three to four times a day for 5 days. The mother asks you if there are any medicines that are better for reducing fever. She said that her friend recommended her to use Proris®* for better fever control. What would you advise this woman? Why do you recommend the advice?	Direct medical referral

^Tempra drop is a brand name medicine that contains paracetamol (in each 0.8ml contains 80mg paracetamol); *Proris is a brand name medicine that contains ibuprofen; # Recommending NSAIDs or paracetamol were considered appropriate based on the literature[26]

Data analysis

Descriptive statistics were used to analyze data from the first part of the questionnaire (participants' characteristics). Open-ended data about pharmacists' recommendations and reasons for the recommendations were transcribed verbatim from the audio-recorder and entered into an Excel database. Content analysis as described by Elo and Kyngas was used.[27] The analysis was done inductively by firstly reading participants' statements several times to familiarize them with the data. Then, initial codes were generated from participants' statements. The initial codes were then clustered into categories. The process of generating categories was reviewed and refined by going back and forth between the categories, the initial codes, and the original participant statements. The data analysis process was done by two coders (CB and KS for primary dysmenorrhea case, and CB and PAN for childhood fever). If there were disagreements between the two coders, the third coder (YIW) was consulted, and the disagreement was resolved by consensus or by voting. Lastly, the number of participants corresponding to the categories was counted.

Participants' recommendations provided for the 2 vignette cases were assessed for appropriateness. The appropriateness of the recommendation for these 2 cases was determined based on the literature and was confirmed by consensus of a panel of 3 academics in pharmacy practice. Recommendations considered appropriate for the case of primary dysmenorrhea included recommending analgesics such as NSAIDs or paracetamol and/ or recommending local applications (i.e., topical heat such as menstruation heat patch, hot compress).[24,26,28] Further, NSAIDs particularly ibuprofen, were considered the first choice; paracetamol may be recommended [based on the Handbook of Nonprescription Drugs: An Interactive Approach to Self-Care].[26] The appropriate recommendation for the case of childhood fever was direct medical referral (Table I).[25]

A chi-square test was used to identify factors associated with the appropriateness of recommendations provided by pharmacy students when handling these 2 vignette cases. The variables tested were pharmacy students' demographic characteristics: gender, age, GPA, and course majoring during BPharm and apothecary study, time taken for studying undergraduate and pre-pharmacy registration (apothecary) courses, and having work experience in community pharmacies. Participants' ages and GPAs were categorized based on the median. A Fisher's exact test was used if the cell count was less than 5. IBM SPSS Statistics for Windows version 26 (Armonk, NY: IBM Corp) was used for the analysis. A p-value of ≤0.05 was considered significant.

RESULTS AND DISCUSSION

Participants' characteristics

The total population of the apothecary student cohort was 104. Of these, 86 agreed to participate, leading to a response rate of 83%. Non-participation was owing to several reasons (Figure 1). Of the 86 participants, most (84%) were female, had never had any experience working in community pharmacies before entering pharmacy school (86%), and had a mean age of 24 years. Most (80%) took 5 to 6 years to complete the BPharm and apothecary programs with a mean GPA average of 2.84 (on a scale of 4) for their BPharm degree (Table II).

The type of recommendation most commonly stated by participants was recommending a nonprescription analgesic without nonallopathic advice (53 of the 86 participants, 62%), followed by recommending a nonprescription analgesic with nonallopathic advice (13 of the 86 participants, 15%) (Table III). The type of analgesic mostly chosen was either paracetamol, ibuprofen, or mefenamic acid. According to primary dysmenorrhea treatment guidelines, providing an analgesic with NSAID (such as ibuprofen or mefenamic acid) as the first line therapy for primary dysmenorrhea is recommended.[29] A small number of participants (3 of the 86 participants, 3%), however, recommended methampirone with antispasmodic (i.e., papaverine, hyoscine butylbromide) which was considered a prescription medicine.[30] The reasons for recommending an analgesic were varied. The most common reason stated (55 of the 86 participants) was to treat the symptoms, and/or that the patient's condition was minor and could be self-medicated with an analgesic, and/or the pain is disturbing their normal activities and therefore an analgesic was needed, and/or choosing an analgesic based on the legal requirement and/or the literature.

A smaller percentage of participants (12 of the 86 participants) recommended non-allopathic advice or herbal products without recommending an analgesic in the case of primary dysmenorrhea. This included using pads or warm water or recommending a product containing turmeric and tamarind that is believed can ease the pain without recommending an analgesic. The most common reason for recommending a non-allopathic approach was mainly because these participants concluded that the pain was minor and did not warrant the use of mainstream medicines (stated by 9 participants) (Table III).

In the case of primary dysmenorrhea, an appropriate recommendation was defined as providing a non-prescription analgesic and/or non-pharmacological advice such as a menstrual heat patch or warm/hot compress.[24,26,28] Providing an herbal product containing turmeric and/or tamarind was considered inappropriate because the efficacy evidence is lacking. Not recommending anything or stating do not know the answer was considered inappropriate. Of the 86 participants, 66 recommended a nonprescription analgesic with or without non-pharmacological advice, and 8 recommended non-allopathic advice (either menstrual patch or hot compress). Therefore, an appropriate recommendation was provided by 74 of 86 participants (86%).

The non-allopathic advice, which is using topical heat (such as a hot compress/patch), is effective in relieving the pain, particularly if this is combined with an analgesic (i.e., ibuprofen).[28,31] Although some pharmacy textbooks on non-prescription medicines have not stated topical heat as a stand-alone therapy for primary dysmenorrhea,[24,32] this approach was considered appropriate in this study. This was based upon literature reports which have indicated that topical heat was effective for the relief of dysmenorrhea and could be comparable to ibuprofen.[26,28,31,33-35] However, only a small number of participants (20 participants, 23% of the total 86 participants) provided such advice. Since topical heat, such as a hot compress, is effective in relieving pain and relatively easy and cheap to prepare, students should be encouraged to include such advice for patients with primary dysmenorrhea, as part of the class learning process.

The types, reasons, and appropriateness of the recommendations for the case of childhood fever

In the case of childhood fever, 67 of the 86 (78%) participants recommended direct medical referral, of which 60 participants recommended direct medical referral without recommending products and 7 recommended direct medical referral and a product for fever (either ibuprofen or paracetamol) (Table IV).

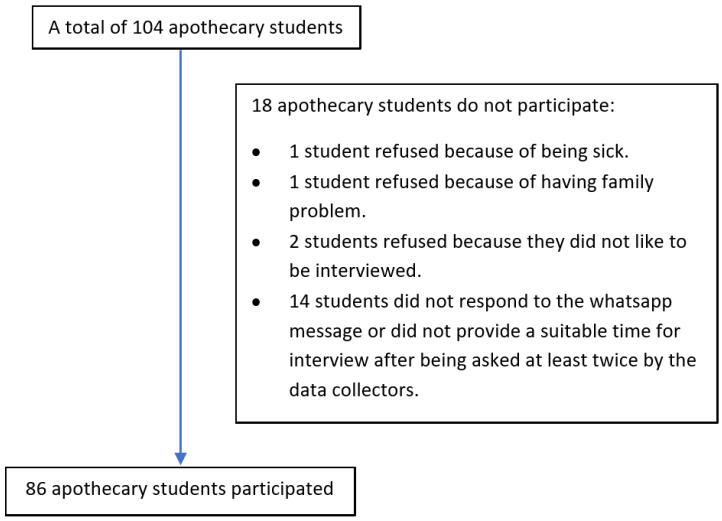

Figure 1. Participant recruitment

Table II. Participant's demographic characteristics (n=86)

Participants' characteristics	n (%)
Gender	
Male	14 (16%)
Female	72 (84%)
Age (years) mean ± SD	24 ± 1.005
Time taken for studying undergraduate and pre-pharmacy registration (apothecary) course	
5 to 6 years	69 (80%)
>6 years	17 (20%)
Majoring during undergraduate pharmacy course	
Clinical	48 (56%)
Industrial	38 (44%)
Majoring during pre-pharmacy registration program (apothecary program)	
Clinical	47 (55%)
Industrial	39 (45%)
GPA undergraduate pharmacy courses (on a 4 scale)	
≥ 3	28 (33%)
<3,00	58 (67%)
Mean ± SD	2.84 ± 0.431
Having working experience in pharmacy	
Yes	12 (14%)
No	74 (86%)

The most common reason stated by these 67 participants for recommending direct medical referral was that they identified warning symptoms in the case. The other 19 participants recommended antipyretics (either ibuprofen or paracetamol) or did not know the answer and therefore did not provide any recommendations. According to the Indonesian pharmacist profession standard, the ability to differentiate between minor illness and the condition needing a medical referral is a competence that should be mastered by a pharmacist.[36] However, when analyzing the reasons for our students' recommendations, we found that students who did not recommend direct medical referral, since mostly they could not identify that there were warning symptoms or referral criteria for this case (Table IV). This was despite obvious warning symptoms (i.e., a 7-month-old baby that had a persisting fever for 5 days and did not respond to paracetamol) had been provided. Therefore, increased emphasis on identifying conditions that can be self-medicated and/or need a medical referral is needed during the class learning process.

Table III. Types and reasons of the recommendations in the primary dysmenorrhea cases (n=86)

Type of recommendations	Reasons of the recommendations	n (%)
Recommending medicines with or without non-pharmacological advice and/or follow up* (n=69) • Recommending nonprescription analgesic without nonpharmacological advice = 53 • Recommending nonprescription analgesic with nonpharmacological advice (i.e. hot compress, resting) = 13 • Recommending prescription medicines without non-pharmacological advice = 2 • Recommending prescription medicines with nonpharmacological advice (i.e. hot compress) = 1	Recommending / choosing medicines based on safety reasons	5 (6%)
	Recommending/choosing medicines based on the indication to treat the symptoms and/or legal requirement and/or the condition of the patient (ie the pain disturbing patients' activity, the patient's pain or condition is minor) and/or the literature	55 (64%)
	The analgesic chosen is believed to be more effective than other analgesics	2 (2%)
	The analgesic chosen is believed to be more effective than other analgesics and is viewed as safe	1 (1%)
	Recommending/choosing medicines based on the indication and/or the condition of the patients (the patients' pain or condition is minor) and safety	3 (3%)
	During menstruation, the body is alkali and therefore need acid such as mefenamic acid to balance it	1 (1%)
	No reasons were provided	2 (2%)
Recommending non-pharmacological advice and/or herbal products with or without advice related to follow up* (n=12) • Menstrual patch or warm/hot compress (n=6) • Warm/hot compress and Kiranti (n=2) • Kiranti (a herbal product containing turmeric and tamarind)(n=3) • Rest (n=1)	The patient has not consumed anything for the pain and therefore try non-pharmacological approach first	1 (1%)
	Recommending herbal product for the pain	1 (1%)
	Concluding that the condition of the pain is minor and therefore no modern medication is needed	9 (10%)
	Using herbal product first because it is natural	1 (1%)
Not recommending anything for now, only follow up advice* if the pain is not getting better (n=2)	Concluding that the condition is minor and therefore no need to recommend anything for now	2 (2%)
Do not know the recommendation (n=3)	Still need to ask more questions	1 (1%)
	No reasons	2 (2%)

*follow up advice means advising the patient to contact a doctor if symptom persist or worsen after trying the first advice (i.e., product or non-pharmacological advice)

Consistent with this finding, two Indonesian studies examining pharmacists' recommendations in cases of dyspepsia and headache also showed that appropriate recommendations were lower in cases that needed a medical referral compared to other minor ailment cases.[37,38] Sub-optimal pharmacists' recommendations in cases requiring prompt medical referral have also been reported in other international studies.[39,40] Furthermore, pharmacists' difficulties in differentiating minor symptoms that can be self-medicated and conditions that require medical referral have been previously reported.[41,42] Considering that approximately one-quarter of this student cohort could not identify warning symptoms in the case of childhood fever, there is a need for interventions to improve the ability of pharmacy students and also pharmacists to recognize red flag referral criteria for patient consultations. The use of a standardized protocol has been reported to have improved pharmacist referrals;[43] however, further research is still needed to identify appropriate strategies in improving the knowledge of Indonesian pharmacy students and possibly pharmacists in identifying conditions that require medical referral and conditions that can be self-medicated.

Theoretically, to be able to provide appropriate advice in the vignette cases, students need to have good skills in problem-solving, clinical reasoning, and clinical decision-making. A foundation to master these skills is good critical thinking skills.[44] For students to learn critical thinking skills, four factors need to be addressed by the

Table IV. Types and reasons of the recommendations in the childhood fever case (n=86)

Type of recommendations	Reasons of the recommendations	n (%)
Recommending direct medical referral and/or non-pharmacological advice without providing any products (n=60)	Identify warning symptoms^	48 (56%)
	Identify warning symptoms^ and suspect the cause of the symptoms	12 (14%)
Recommending direct medical referral and providing a product with or without non-pharmacological advice (n = 7)	Identify warning symptoms^	4 (5%)
	Direct medical referral because identifying warning symptoms^ and providing antipyretic for the fever	2 (2%)
	Direct medical referral because identifying warning symptoms^ and suspecting the cause of the symptoms. Providing the requested product (ibuprofen) to calm the mother	1 (1%)
Recommending the product that is requested (i.e., ibuprofen) with or without non-pharmacological and/or follow up advice*. Direct medical referral was not recommended (n= 8)	Ibuprofen is more effective than paracetamol	3 (3%)
	Ibuprofen is considered safe	2 (2%)
	The temperature is still 38 to 39°C	1 (1%)
	Has been using paracetamol but not effective and therefore can considered using other drugs like ibuprofen	1 (1%)
	Fulfilling the wish of the mother who wants to buy ibuprofen and have a thought that Proris (the brand name of the product requested) has paracetamol as the main ingredient	1 (1%)
Recommending the product that has been used (i.e., paracetamol) with or without non-pharmacological and/or follow up advice*. Direct medical referral was not recommended (n=7)	Recommending paracetamol with adjustment of the dose or rechecking the appropriateness of the dose given	2 (2%)
	The age of the baby is still 7-month-old	1 (1%)
	Recommending paracetamol because it has not showed the effectiveness yet	1 (1%)
	Recommending paracetamol based on the personal experience during work training and ibuprofen is more expensive than paracetamol	1 (1%)
	Recommending paracetamol because ibuprofen is viewed as contraindicated with the patient (i.e., ibuprofen is not suitable for the patient's age, suspecting the patient might contracted covid and viewed that ibuprofen cannot be used for covid	2 (2%)
Not providing any recommendation (n=4)	Do not remember whether it is ok to use the requested product (ibuprofen) for 7-month-old baby	1 (1%)
	No reason provided	3 (3%)

^Warning symptoms include: long duration of fever (5 days), persisting fever despite paracetamol has been given, the patient's age is only 7 months, and the temperature is 38 to 39°C; *Follow up advice means advising the patient to contact a doctor if symptom persist or worsen after trying the first advice (i.e., product or non-pharmacological advice)

lecturers, including (1) creating a learning environment that lets the students integrate their knowledge, (2) modeling expert thinking, (3) providing guidance and supporting until students can perform on their own, and (4) challenging students' assumption by prompting to question what students have known.[44] Furthermore, appropriate delivery methods that help with students' critical thinking should be chosen. A finding from a systematic review reported that case-based learning can increase the capacity of medical and pharmacy students to analyze cases compared to other techniques,[45] and therefore this approach can be considered by clinical and community pharmacy lecturers in Indonesia.

The appropriate recommendation in this case of childhood fever was defined as direct medical referral with or without providing antipyretics.[25] Recommending products and/or non-pharmacology without direct medical referral was considered inappropriate. Not recommending anything or not knowing the answer was also considered inappropriate. Of the 86 participants, appropriate recommendation was provided by 67 participants (78%).

Although 78% of students in this setting were able to provide the appropriate recommendation in this childhood fever case, this number is lower than findings reported in an Australian study;[46] the percentage of

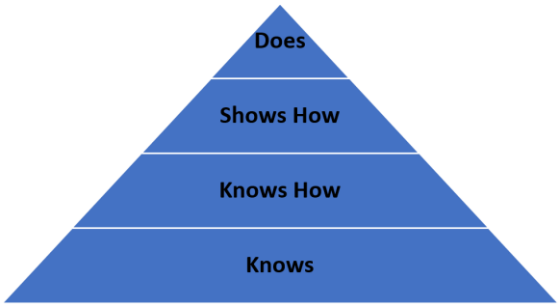

Figure 2. Miller's pyramid of competence

final-year Australian students who were able to provide appropriate advice in the childhood fever case was 92%. Differences in the curriculum, learning process method, and assessment method may contribute to this difference. Comparing these results with Miller's pyramid model of clinical competence (Figure 2),[47] the competence of students in this setting might be lower than the competence of students reported in the Australian study.[46] Miller's pyramid model divides competence into four hierarchical processes.[47-49] The lowest level of the pyramid is "knows", representing knowledge, and this can be assessed using written exams or multiple-choice questions (MCQs). The second tier is "knows how", which is the application of knowledge. This level can be tested using essays, clinical problem-solving or clinical context-based tests, and extended MCQs. Next, the third tier is "shows how" and this represents clinical skills competency. This level can be assessed by standardized patient-based tests or Objective Structured Clinical Examination (OSCE). Finally, on the top of the pyramid is "does" which represents clinical performance. This can be assessed by direct observation in real clinical settings.[48,49] The assessment method used in this study was clinical vignette cases, which can be classified as the "knows how" level. Meanwhile. the assessment method used in the Australian study is the simulated patient method and this can be classified as a "shows how" level. Therefore, based on Miller's pyramid model, the assessment of students in the Australian study represented a higher competency ("shows how" level) than students in this study ("knows how" level). Further research might be needed to explore these differences.

Overall, the competence of this apothecary student cohort to manage a minor ailment case requiring a simple analgesic (such as in the primary dysmenorrhea case) and to identify warning symptoms leading to direct medical referral (such as in the childhood fever case) was quite good. A considerable number were able to provide appropriate recommendations; 86% in the case of primary dysmenorrhea and 78% in the case of childhood fever. The number of pharmacy students who were able to provide appropriate recommendations was higher in this cohort compared with another Indonesian study.[22] Differences in the students' grade level (final year vs third year), the scenario used (analgesic-antipyretic cases vs cough case), and the assessment method (case vignette vs simulated patient) might be factors causing the differences between the two studies. This may indicate that their university teaching and learning processes have equipped them quite well to manage analgesic-antipyretic self-medication cases. This may also indicate that changes made in the Indonesian pharmacy curriculum that incorporated self-medication courses as stated in the APTFI document almost 10 years ago may have provided some positive effects.[20]

Factors associated with the provision of appropriate recommendations

In the case of childhood fever, chi-square analysis identified that students who completed the B.Pharm and apothecary qualifications within 5 to 6 years were significantly able to provide an appropriate recommendation compared to students whose study period extended more than 6 years (Table V). This could indicate higher academic competency, in which they were more proficient in understanding the course material related to self-medication and thus appropriate recommendations.[50] Furthermore, students whose age was equal to or less than 24 years old (younger students) were significantly able to provide an appropriate recommendation compared to students who were more than 24 years old (older students). Older students may have a negative association with their extended study period thus providing less appropriate recommendations. While there is existing evidence of relative age effects in education for primary school students, in which older pupils usually perform better than younger ones;[51] research related to the association between age and academic performance in university students was inconsistent. Pellizarry et al. found that younger students of

Table V. Factors associated with the provision of appropriate recommendation

Factors	The appropriateness of the recommendations provided in the case of primary dysmenorrhea				The appropriateness of the recommendations provided in the case of childhood fever			
	Appropriate (n= 77)	Not appropriate (n=9)	Total (n=86)	p value*	Appropriate (n= 67)	Not appropriate (n=19)	Total (n=86)	p value*
Gender								
Male	11	3	14	0.40	12	2	14	0,72
Female	63	9	72		55	17	72	
Age								
24 years old or less	55	8	63	0.73	53	10	63	0.02
More than 24 years old	19	4	23		14	9	23	
GPA (on a 4 scale)								
More than 2.7	38	3	41	0.09	34	7	41	0.28
2.7 or less	36	9	45		33	12	45	
Choice of major during BPharm								
Clinical	41	7	48	0.85	38	10	48	0.75
Industrial	33	5	38		29	9	38	
Choice of major during Apothecary program								
Clinical	40	7	47	0.78	36	11	47	0.75
Industrial	34	5	39		31	8	39	
Time taken for studying undergraduate and pre-pharmacy registration (apothecary) course								
5 to 6 years	59	10	47	0.78	57	12	69	0.03
More than 6 years	15	2	39		10	7	17	
Having work experience in community pharmacies								
Yes	12	0	12	0.20	12	0	12	0.06
No	62	12	74		55	19	74	

Bold letter indicates significant p value; *chi square test was used; two-sided fisher Exact was used when the cell value is less than 5

Bocconi University in Italia perform better in almost all subjects compared to the older ones.[52] Similarly, Jacobparayil reported that younger medical students perform better on the clinical knowledge examination of USMLE (United States Medical Licensing Examination) than older students.[53] A study on medical students in Japan also found that the average number of years required to graduate was slightly higher in the older than younger group and the younger students scored significantly higher in the clinical clerkship integrative test.[54]The author, however, argued that there were no significant differences in the remaining tests between older and younger groups, and therefore, in general, no inferiority of older medical students in most clinical skills and competencies compared to the young ones.[54] A study by Wambugu et al. showed a different result, in which no significant relationship between age and academic performance in science students at the University of Nairobi, Kenya; the author proposed that better academic performance might be more influenced by personal determination than age.[55] Gender, choice of major, GPA, and working experience were not associated with the provision of

appropriate recommendations. No factors related to participants' demographic characteristics were associated with the provision of appropriate recommendations in the case of primary dysmenorrhea. A further qualitative study is needed to explore factors influencing students' performance in providing self-medication services in pharmacy so that appropriate strategies to improve student competence in this topic can be designed and implemented.

Study Limitations

We informed the participants in advance about this research, and therefore there was a possibility that the participants studied the topic before the agreed interview schedule. Furthermore, this was a phone interview and therefore participants could search the internet, or open the textbook to answer the case. However, to minimize this bias, we have stated in the invitation letter that the interviews would be confidential and the results of the interview would not affect participants' marks or graduation. In addition, the participants were told that they would be asked to provide recommendations for self-medication cases in the invitation letter, but no specific symptoms/cases were told to the participants before the interview. Furthermore, before the interview started, we also told the participants to answer according to their current knowledge without having to look at the book or search the internet since no mark would be taken.

This study only used two analgesic-antipyretic cases and therefore limited the generalizability of the findings to other scenarios. Moreover, this study was conducted only in one Indonesian pharmacy university. Since the quality of Indonesian pharmacy education institutions is variable across the country, these findings cannot be generalized to graduates from other Indonesian universities.[20] However, this study may provide evidence of the competence of pharmacy students in an Indonesian university in handling analgesic-antipyretic cases, in which knowledge related to this topic is limited. Further research using different cases conducted in different places of Indonesian universities might be needed to confirm these findings. Further qualitative research is needed to identify factors related to the ability of Indonesian pharmacy students in the provision of self-medication services particularly in differentiating between minor and major conditions, and therefore intervention strategies can be designed and implemented.

CONCLUSION

A considerable number of apothecary students in an Indonesian university were able to properly manage cases related to an analgesic-antipyretic recommendation. However, improvement is still needed in the knowledge of pharmacy students to differentiate between minor conditions that can be self-medicated and conditions that require medical referral.

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CONFLICT OF INTEREST

None to declare.

STATEMENT OF ETHICS

Ethics approval was obtained from the Ethical Committee University of Surabaya, Indonesia (No: 074/KE/V/2019).

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Effective Communication in Providing Medication Information and Patient Satisfaction: A Cross-sectional Survey in Denpasar

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ABSTRACT

Background: Pharmacy personnel should provide pharmaceutical care concerning the applicable standards. Furthermore, pharmacy management must consider patient satisfaction to ensure business continuity. Patient subjective factors strongly influence satisfaction. Meanwhile, patient perceptions of pharmaceutical services will change as their experience increases. The pharmacy must improve its services effectively and efficiently. Factors that affect patient satisfaction can assist pharmacies in improving service quality. Effective communication does not require additional resources to improve service quality. The same information can have different effects when presented in different ways.

Objectives: Predict the domain of effective communication that influences patient satisfaction.

Methods: The cross-sectional survey using a valid and reliable questionnaire was conducted in Denpasar. The research involved 100 pharmacy consumers and was taken with a convenience sampling technique. Data were analyzed descriptively, followed by a Chi-square test and multivariate analysis using logistic regression. The research involved four independent variables: pharmacy atmosphere, pharmacist performance, pharmaceutical technical competence, and interpersonal communication competence. Patient satisfaction is the dependent variable in this study.

Results: Communication factors generally affect patient satisfaction in providing drug information. Among all the independent variables tested, interpersonal communication competence plays a significant role in predicting patient satisfaction with a p-value of 0.043 (Logistic regression with 95% confidence level).

Conclusion: Patients who perceive pharmacists as having good interpersonal communication competence are 3,133 times more likely to be satisfied. Thus, pharmaceutical staff must train interpersonal communication skills to provide drug information to achieve patient satisfaction outcomes in pharmaceutical services.

Keywords: Interpersonal communication; pharmacist competency; patient satisfaction

INTRODUCTION

Patient-centered care shows a very high potential for the future improvement of health services.[1–4] Patient involvement in health management is essential as the need for prevention and management of chronic diseases and lifestyle management increases. Providing drug information with effective communication can increase patient involvement in treatment management.

Effective communication between pharmacy personnel and patients in pharmacies is crucial because pharmacy personnel are the most accessible health workers to the public.[5] Effective communication can produce the same understanding between the informant (pharmacy personnel) and the recipient of information (patient).

Effective communication also can inspire patients to obey the health provider's instructions. With a trusting relationship, patients can tell their complaints honestly and clearly to assist pharmaceutical personnel in deciding the treatment.[6] In addition to improving patient health, effective communication can also make patients have a better acceptance of the services provided. The perceived competence of pharmacy personnel and good interaction with pharmacy personnel are related to patient satisfaction.[7]

Communication to provide drug information in drug dispensing/delivery activities is the most common interaction between pharmacy personnel and patients. Patients will feel satisfied if health workers can build good relationships with them through communication techniques and attitudes while serving them. [8] Haverfield et al. stated that the relationship between patients and health workers is the core of health services. [2] Thus, the factors related to the development of pharmaceutical service quality must be studied in more depth so that the quality of pharmaceutical services can be optimized.[7,9]

Patient satisfaction is an indicator of success in maintaining the quality of health services. However, many factors affect patient satisfaction, some of which are subjective and challenging to assess.[5] Patient satisfaction with pharmaceutical services is subjective because it reflects the preferences, expectations, and reality of the services received by patients.[5,7] The quality of pharmaceutical services can affect omzet[10] because satisfied patients will be loyal to service providers, tend to reuse the same services, and recommend the service provider to others.[11] Information received by patients, experience in the use of similar services, and the patient's impression of the organization that provides these services can affect the mindset and patient's response to pharmaceutical services.[12] Patients will continuously form new perceptions of their previous experiences. So, pharmacy service providers must continuously improve their services to form perceptions that exceed patients' expectations. Adding more types of service to improve patient perception will require additional resources. In contrast, effective communication can make a positive impression without increasing the type of task in the pharmacy.

Many studies have proven the benefits of effective communication in pharmaceutical services.[2] The quality of service shown by health workers correlates with patient loyalty, and satisfaction mediates the correlation.[13] Accordingly, pharmacists need to improve the quality of communication in pharmaceutical services.[14] Effective communication in the provision of drug information has a significant effect on patient satisfaction.[15,16] Thus, effective communication in providing drug information is essential. The effect of factors that support effective communication to produce outcomes in patient satisfaction needs to be analyzed further. Ayele, 2020 stated that a comprehensive understanding of patient satisfaction and its determining factors is crucial in improving the quality of service.[17] Thus, researchers want to know the effective communication factors that predict patient satisfaction. The study was conducted in the city of Denpasar because, in line with the results of research carried out before,[18,19] 9% of pharmacies in the city of Denpasar still need to improve the quality of their services.

METHODS

Study design

This study uses a cross-sectional design involving four independent and one dependent variable. The four independent variables are factors supporting effective communication. Independent variables of the study consisted of pharmacy atmosphere, pharmacy personnel appearance, pharmacy technical competence, and interpersonal communication competence of pharmacy personnel. The dependent variable in this study is patient satisfaction.

Population and samples

The study population was all patients who had received drug information in pharmacies in Denpasar, the number of samples determined by the formula.[20] ;

$$n = \frac{Z_1^2 - \frac{\alpha}{2}.p(1-p)}{d^2}$$

$$\text{n} = \frac{(1.96)^2 \text{ x } 0.5 \text{ x } 0.5}{(0.1)^2} = 96.04$$

Description: n: minimum sample quantity; $Z_1^2 - \frac{\alpha}{2}$: degree of confidence95% (1,96); p: proportion of population50% (0,5); d: precision/deviation rate against population 10% (0,10)

The minimum sample based on the formula is 96 respondents. Respondents were taken from 4 districts in Denpasar City evenly. Respondents must meet the following inclusion and exclusion criteria. Respondents are at least 18 years old, have been to the pharmacy more than once before the study, are willing to complete a questionnaire, and have good communication. Respondents were excluded if they did not fill out the questionnaire completely.

Study instruments

A closed questionnaire with a Likert scale was prepared based on the results of qualitative research carried out previously by the researcher.[21] combined with similar questionnaires from literature studies.[22,23–27] Some experts, specifically researchers with experience preparing questionnaires and pharmacist practitioners, reviewed the questionnaire. The expert ensures the instrument's face and logical validity so the questionnaire can retrieve the data according to the purpose of the study. Questionnaires were distributed to 40 respondents besides the study sample to ensure statistical validity and reliability. The statistical validity of the questionnaire was analyzed using Pearson's product-moment correlation technique by comparing "r count" and "r table." Reliability measurement is done by the one-shot method and determined by the Cronbach alpha value.

Data collection

The data was collected using questionnaires distributed by contacting prospective respondents through social media (WhatsApp). The researcher explained the study before prospective respondents expressed their approval. The respondents that meet the inclusion criteria fill out the questionnaire in a G-form. The study was conducted from December 2022 to May 2023.

Data Analysis

The phenomenon of ceiling effect often occurs in the measurement of patient experience that is self-reported. The phenomenon occurs when respondents 'answers are collected around the answer choices with maximum scores, and the data is gathered at the tail of the Gaussian curve.[28] To overcome the possibility of false positive effects, the researchers gave a choice of five options.[29] and performed data grouping using a binary scale.

The effective communication factor is coded as "supportive" if the patient assesses the environmental conditions and services of the pharmacy above the average score; on the contrary (below the average score), it is coded as "not supportive." Satisfaction is coded as "satisfied " if the respondent's score exceeds the average. Conversely, satisfaction is coded as "dissatisfied" if the respondent scores below average.

The correlation between each independent and dependent variable was analyzed using the Chi-square test. Bivariate analysis (Chi-square) is also beneficial as a preliminary test multivariate analysis of logistic regression. Multivariate analysis simultaneously tests the relationship between all independent and dependent variables. Researchers used a multivariate predictive model test. All independent variables are placed equally without considering the presence of confounding variables. SPSS 21 software performs statistical tests at 95% confidence intervals in this study.

RESULTS AND DISCUSSION

The questionnaire's validity and reliability analysis and respondents' characteristics

A preliminary questionnaire draft comprised thirty-two statements to assess effective communication factors and six statements to assess patient satisfaction. The statements are valid if they have an r count > 0.321 (the r table for 40 test respondents). Twenty-four statements of effective communication factors and six statements of patient satisfaction remain in this section. The reliability test showed Crobach's alpha value of the communication factors questionnaire was 0.921 (excellent reliability[30]) and patient satisfaction was 0.832 (high reliability[30]). Thus, the instrument met the requirements of validity and reliability and can be used to retrieve research data.

The research involves twenty-five respondents from each district in Denpasar. A total of 100 respondents from four Denpasar districts participated in this study. There were six characteristics of respondents collected in this study (Table I).

Table I. Characteristics of research respondents

Characteristics based on demographics		Number of respondents	Percentage (%)
Age	Adult (19-44 years old)	86	86
	Pre-elderly (45-59 years old)	14	14
Gender	Men	28	28
	Female	72	72
	Occupation		
	Non-Health Workers	54	54
	Health Workers	46	46
Visits to the pharmacy in the past month	Yes	90	90
	No	10	10
Cultural Background	Born in Bali	91	91
	Not Born in Bali	9	9
Relationship with drug informants	Unknown	81	81
	Familiar Enough	10	10
	Very Familiar	9	9

Distribution of the assessment results of the factors of effective communication and satisfaction

Communication theory[30] state that several factors can be a disruptor (noise) in the communication process. Therefore, various factors work on the occurrence of effective communication.[31] Factors of effective communication in this study are the conditions of pharmacy and services related to effective communication. This study did not measure effective communication as a mediating factor during the interaction. The effect of effective communication factors is measured directly on patient satisfaction.

There are four factors/domains of effective communication assessed. The first domain is the atmosphere of the pharmacy. More than 50% of respondents assessed that the pharmacy atmosphere supported effective communication (Table II). However, the results showed that pharmacies in Denpasar can still improve environmental conditions to support effective communication. Supporting this statement, other researchers stated that 48.5% of pharmacy services in Denpasar City are still below the average.[18] An unfavorable pharmacy environment can hinder pharmaceutical personnel in counseling[32,33] and interfere with effective communication processes.[4] Patient-health worker interaction, physical environment, and internal management processes are the most influential factors in patient satisfaction.[34] Waiting times can also affect patient comfort. The time spent in the waiting room results in patients needing more time to communicate with health workers regarding their illness and treatment; it can also reduce satisfaction rates.[11,35] Some patients sometimes refuse to consult after waiting too long in the queue. They may feel reluctant because counseling will prolong the waiting time of others in queue.[32]

The second domain assessed in this study is the appearance of pharmaceutical personnel. More than 50% of respondents stated that the appearance of pharmacy personnel has supported effective communication (Table II). However, the appearance of pharmacy personnel can still be improved, especially in the use of cosmetics and accessories. Arumsari, 2017 stated that health workers who ignore appearance in conveying information to patients can experience role conflicts due to their psychological and physical condition.[36] The appearance of a communicator becomes one of the supporting factors in communication.[37] Appearance when conveying information to the patient affects the confidence of pharmaceutical personnel and the impression received by the patient. Health workers should be able to give an appearance that supports their profession. Lawan, 2022 states that pharmaceutical personnel with a neat and polite appearance can support patient satisfaction.[38]

The third domain assessed in this study is the competence of pharmaceutical personnel related to their authority in performing pharmaceutical work. According to Indonesian Government Regulations, pharmaceutical work must be done by people with expertise and authority.[39] The results showed two indicators that some surveyed did not consider supportive (Table II). As many as 60% of respondents stated that pharmaceutical personnel have not been able to convey the problems that patients may face related to drug use. Only 50% of respondents stated that pharmacy personnel can provide reliable information.

The involvement of pharmaceutical personnel in health services will provide many benefits. However, pharmaceutical workers have yet to play an optimal role in health services. Misunderstanding the duties and

Table II. Descriptive analysis of effective communication factors

No	Indicator	Category	
		Support	Not Support
	Pharmacy atmosphere		
1.	Sound intensity in pharmacies	63	37
2.	Health Information Facilities (brochures/posters) are available in sufficient quantities	64	36
3.	Waiting time to get service	55	45
	Appearance of Pharmacy personnel		
4.	Outfit of Pharmacy personnel	82	18
5.	Pharmacy personnel's hairdressing/shaving	74	26
6.	Cosmetics and accessories used by Pharmacy personnel	55	45
	Pharmaceutical Technical Competence		
7.	Pharmaceutical personnel can provide solutions related to drug use problems	53	47
8.	Pharmaceutical personnel can explain the drug well	52	48
9.	Pharmacy personnel can help choose the drugs	60	40
10.	Pharmacy personnel inform problems that may occur during treatment	40	60
11.	Pharmaceutical personnel provide reliable information	50	50
12.	Pharmaceutical personnel are meticulous in handing over drugs to avert drug delivery errors	63	37
	Interpersonal Communication Competence		
13.	Pharmacy personnel show hospitality by smiling and greeting patients	52	48
14.	Pharmacy personnel to be polite and professional	60	40
15.	Pharmacy personnel involve patients to find solutions to health problems experienced	67	33
16.	Pharmacy personnel consider the patients about the drug's price.	56	44
17.	17. Explanation of pharmaceutical personnel is easy to understand	43	57
18.	Pharmacy personnel ensure patients understand the explanation given	37	63
19.	Pharmacy personnel speak with confidence	51	49
20.	Pharmacy personnel listen attentively and respond to patient questions	45	55
21.	Pharmacy personnel can make patients feel safe using the drug	45	55
22.	Explanation of pharmaceutical personnel does not take time	41	59
23.	The counseling can maintain the patient's privacy	40	60
24.	Pharmacy personnel quickly understand patients' explanation	47	53

authority of pharmaceutical workers resulted in their needing help to demonstrate their role in health services optimally.[33] Some patients state that health treatment is the task of the doctor and not the pharmaceutical personnel, especially concerning prescribed drugs.[40]

Contrary to the results of this study, Amanah, 2016 stated that 85% of respondents felt that the information obtained from pharmaceutical personnel was correct and accurate.[41] Pharmacy personnel must apply standards of pharmaceutical service in pharmacies when carrying out their duties. Pharmacists need pharmaceutical competence to run the practice according to the standard. The basic science of pharmacy mastered by pharmacy personnel will affect their confidence. Pharmacy basic science competency also influences the pharmacy personnel's ability to arrange patient drug information. Pharmacists have to make sure patients understand how to use their medicines.[42]

The fourth domain assessed in this study is the competence of pharmaceutical personnel in interpersonal communication. The results showed that only five among the[11] interpersonal communication indicators expressed "supportive" by most patients. Several competencies are considered not optimal, including the ability of pharmaceutical personnel to provide easy-to-understand explanations, the ability of pharmaceutical personnel to ensure patients have understood the explanations given, the ability of pharmaceutical personnel to listen attentively and respond to patient questions, the ability of pharmaceutical personnel to provide a sense of secure in the use of drugs, the ability of pharmaceutical personnel to provide concise explanations, and the ability of pharmaceutical personnel to understand patients and maintain patient privacy.

In line with the study's results, other studies also show that the communication skills of pharmacy staff with consumers still need to be improved. The friendliness indicator gets the lowest rating from patients.[43] Pharmaceutical workers with empathy for patients will support effective communication, and unfriendly attitudes can hinder effective communication.[36] Several other studies suggest empathy can reduce the likelihood of conflict and increase patient trust in doctors.[3,44,45] The attitude of pharmaceutical personnel, simple language, speech intonation with a pleasant communicative tone, and clear drug information can affect patient satisfaction.[46]

The provision of pharmaceutical counseling require relational skills and communication skills.[47] Lack of communication skills hinders effective communication because the patient will find it challenging to understand the message conveyed; even the patient from the beginning will not be interested in communicating, so they will not give full attention to the information submitted by pharmaceutical personnel. Kaae, 2014 stated that patients needed to understand the benefits of drug information.[40] There are still differences in perception between pharmacy personnel and patients regarding information that patients must understand when using medication.[42] Patients sometimes do not get what they need, but if communication is comfortable, they will still feel satisfied even though the service does not meet their needs.

The patient will be satisfied if a service provider can fulfill the patient's needs, desires, and expectations. Satisfied patients will be willing to use the same services in the future and recommend them to others. The results showed that most respondents were unsatisfied with pharmaceutical services on all assessment indicators (Table III). Other research states that satisfaction with the services provided can occur if the performance of health workers is according to service standards, they have a friendly attitude, and they show empathy for patients.[48] The friendliness of employees or pharmacy personnel is an essential factor in forming patient loyalty to pharmacies. When the patient is not sensitive to the drug's price, the employees' friendliness determines the patient's loyalty. The close interaction between employees and customers can make pharmacy personnel better understand customer expectations and determine how to deliver services.

The study's results contradicted those of other studies that stated 83.5% of patients were satisfied with pharmaceutical services at.[49] Patient satisfaction is assumed to be the value of the services provided by pharmaceutical personnel, so this will increase the willingness of patients to recommend and improve the use and loyalty to the service.[50] Thus, the better the quality of services provided, the higher the level of patient satisfaction, and vice versa. If the quality of services is not good, patient satisfaction will decrease.[51]

Bivariate analysis

The bivariate test determines the influence of effective communication factors on patient satisfaction. The overall test of effective communication factors showed that effective communication factors affect patient satisfaction with a P value < 0.001 (CI 95%). Suppose respondents assess the environmental conditions and services provided to support effective communication. In that case, they will 5,538 (min 2,342 max 13,100) times to feel satisfied when compared with respondents who assess the environmental conditions and services in pharmacies do not support effective communication.

The chi-square test on each factor (domain) showed that pharmacy personnel's appearance, technical competence, and interpersonal communication competence significantly affected patient satisfaction (Table IV). The atmosphere of the pharmacy did not show a significant effect on patient satisfaction. Table IV exhibits the effect of each independent variable on the dependent variable. Although the pharmacy atmosphere does not significantly affect patient satisfaction, variables with a P-value<0.25 are eligible for multivariate analysis. Therefore, all independent variables are eligible to be included in the Logistic Regression Test.

Multivariate tests exert a predictive model logistic regression test. The logistic regression examines the effect of all independent variables on the dependent variable simultaneously. The analysis be solved using a backward method with a 95% confidence level. The output showed that interpersonal communication skills significantly affect patient satisfaction (table V). Only one factor among the four tested factors significantly

Table III. Descriptive analysis of patient satisfaction

No	Indicator	Category	
		Satisfied	Not satisfied
1.	Satisfaction with pharmaceutical services provided	32	68
2.	Willingness to recommend related pharmacies to others	40	60
3.	Return to the same pharmacy if anything is needed	48	52
4.	Satisfaction with the overall service provided at the pharmacy	41	59
5.	The patient is happy to consult with pharmaceutical staff at the relevant pharmacy	31	69
6.	Ask the pharmacist when the patient has questions about the drug	37	63

Table IV. Output of Chi-square analysis on indicators of effective communication factors toward patient satisfaction

Variable	Satisfied		Not satisfied		Total	P-value	OR	CI (95%)	
	n	n / ∑ (%)	n	n / ∑ (%)				Min	Max
A. Pharmacy Atmosphere									
Satisfied	22	62.9%	13	37.1%	100	0.126	2.101	.905	4.877
Not Satisfied	29	44.6%	36	55.4%					
B. Appearance of Pharmacy Personal									
Satisfied	42	58.3%	30	41.7%	100	0.033	2.956	1.176	7.425
Not Satisfied	9	32.1%	19	67.9%					
C. Pharmaceutical Technical Competence									
Satisfied	36	69.2%	16	30.8%	100	<0.001	4.950	2.120	11.559
Not Satisfied	15	31.3%	33	68.8%					
D. Interpersonal Communication Competence									
Satisfied	33	73.3%	12	26.7%	100	<0.001	5.653	2.373	13.468
Not Satisfied	18	32.7%	37	67.3%					
E. Overall effective communication faktors									
Satisfied	34	72%	13	28%	100	<0.001	5.536	2.342	13.100
Not Satisfied	17	32%	36	68%					

affects patient satisfaction. Opinions supporting the study's results stated that clinical skills alone are insufficient to develop a closer relationship with patients. These competencies have no central effect in reducing conflicts with patients.[3] The pharmacy personnel must balance the relational skills and pharmaceutical competence.[52]

The appearance of pharmacy personnel and pharmaceutical technical competence showed a significant effect on the bivariate test but did not show a significant effect on the multivariate test. In The Chi-Square test, the appearance of pharmaceutical workers has a P-value of 0.033, CI 0.95, and OR 2.956, the pharmaceutical technical competence has a P-value <0.001, CI 0.95, and OR 4.950. The bivariate test only tests one independent variable without considering the existence of other independent variables. In contrast, the multivariate test considers the existence of other independent variables. Therefore, each of the analyzed variables adapts to the other variables tested. In the presence of four independent variables simultaneously, the influence of several variables can become insignificant. In the multivariate test, interpersonal communication competence significantly affects patient satisfaction (P-value = 0.043, CI 0.95, adjusted OR 3.133) by considering the presence of other independent variables. The multivariate test showed that the interpersonal communication competence factor is the most prominent in estimating patient satisfaction. Patients being satisfied are 3,133 (min 1,037; max 9,470) times higher if the pharmacy staff shows interpersonal communication competence than if the pharmacy staff cannot show interpersonal communication competence. The model obtained from the logistic regression test can explain 24.0% (Nagelkerke R2) of the variation in patient satisfaction. The model was able to classify 69.0% of cases correctly.

In line with the study's results, several other studies also stated that interpersonal communication influenced patient satisfaction.[7,53] Interpersonal communication between pharmacy personnel and patients is essential. The ailment expressed by patients is constructive for pharmacy personnel to take further action, such as determining the necessary therapy. Interpersonal relationships are established within the pharmaceutical

Table V. Result of Multivariate test

Variable	Coefficient	Standard Error	Wald	df	P-value	OR	CI (95%)	
							Min	Max
Pharmacy Atmosphere	0.098	0.500	0.039	1	0.844	1.103	0.414	2.942
Appearance of Pharmacy Personal	0.365	0.547	0.446	1	0.504	1.440	0.493	4.205
Pharmaceutical Technical Competence	0.733	0.582	1.588	1	0.208	2.082	0.665	6.516
Interpersonal Communication Competence	1.142	0.564	4.095	1	0.043	3.133	1.037	9.470

service and can occur outside it. Policymakers should consider interpersonal interventions because they have the potential to have multiple impacts.[2] Interpersonal skills have a more significant impact on patient satisfaction than the provision of new services.[5]

The study involved pharmacies representing each district in the city of Denpasar. Researchers expect the samples taken to be able to reflect the condition of the population well. The researcher prepared the questionnaire using many research libraries, one of which took samples in Denpasar. Some weaknesses also offset some of the strengths of such research. The method used in this study (cross-sectional) cannot adequately explain cause and effect. The self-reported questionnaire also complies with some assumptions to get a valid result. The obtained prediction model was able to classify 69.0% of cases correctly, so further studies on a broader population are still needed.

CONCLUSION

Interpersonal communication competence of pharmaceutical workers can predict patient satisfaction (P-value <0.043, CI 0.95, Adjusted OR 3.133). The better the interpersonal communication of pharmaceutical workers, the higher the patient satisfaction in pharmacies Denpasar. However, pharmacy personnel must also consider their appearance and pharmaceutical technical competence in providing drug information. Both factors significantly affected patient satisfaction in bivariate analysis using the Chi-Square Test, even though it was insignificant in the logistic regression test.

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CONFLICT OF INTEREST

None to declare.

STATEMENT OF ETHICS

The study obtained Ethical clearance No. 2089 / UN14.2.2.VII.14 / LT/2022, published on 3rd August 2022 by the Research Ethics Committee of the Faculty of Medicine, Universitas Udayana.

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Evaluation of Medication Planning with ABC-VEN Analysis at Indriati Solo Baru Hospital

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ABSTRACT

Background: Implementation of ABC-VEN drug planning evaluation can improve the efficiency of drug stockpiles, reduce the risk of vacuum, and ensure optimal drug availability for patient care.

Objectives: In this study, an evaluation of the 2021 drug plan was carried out at Indriati Solo Baru Hospital using ABC-VEN combination analysis to know the percentage proportions of each group as well as the characteristics of the drug.

Methods: The type of research is descriptive analysis using quantitative data performed retrospectively. Primary data was used from direct interviews with the head of the pharmacy and logistics unit, as well as secondary information in terms of drug planning activities. Samples are data on drug planning, acquisition, and use in 2021. The data are then analyzed using the ABC-VEN method.

Results: The results of the study show the percentage of drug items in groups A, B, and C at 13.28%, 20.68%, and 66.04%, with investment values of 69.99%, 19.99%, and 10.02%. Whereas in groups V, E, and N, there are 18.55%, 71.18%, and 10.28% with an investment value of 23.92%, 65.51%, and 10.57%. The evaluation results using the combination method ABC-VEN obtained drugs from the categories Priority (P), Main (M), and Supplementary (S), which are 148 items, 568 items, and 82 items.

Conclusion: The use of ABC-VEN methods in drug stock evaluation is essential to accurately identify PMS medicines so that drug supply planning and management are more efficient and effective, as well as ensuring the availability of medicines that are optimally tailored to patient needs.

Keywords: ABC-VEN Analysis; Drug; Planning

INTRODUCTION

A hospital is a healthcare facility that can provide hospital care, street care, as well as emergency services for comprehensive individual healthcare.[1] In developing countries, including Indonesia, the largest component of hospital spending is the budget for medicines, which absorbs about 40–50% of the total cost.[2] However, the funds available do not always meet the needs, so the procurement of medicines needs to be kept low to minimize spending. Therefore, efficient and cost-effective budgeting is needed to balance supply expenditures against drug requirements.[3-4]

It is in accordance with research by Lisni[5], who conducted a direct observation in October-December 2018 in one of the private hospitals in Bandung city, that there is a dead drug stock of 3.81% as well as expired and damaged medicines of 0.085% of the total medicines found in the hospital pharmacy facility unit, with a loss of IDR3,316,200. Halawa and Rusmana[6] in research conducted in January–March 2021 in the private public hospital of the city of Bandung revealed that the total hospital losses due to damaged medicine or due to the expiry can reach IDR15,789,173. One of the causes is inaccuracies in planning or a lack of control over inventory. Husna et al[7], also revealed that, in addition to storage errors, expired medicines were also caused by excessive quantities of medicines planned and purchases that did not take into account the quantities to be ordered.

At the planning stage, analysis is needed to ensure the availability of medicines and budget efficiency. The analysis used is a combination of the ABC-VEN method as well as the revision of the drug needs plan.[3] The ABC-VEN method can be understood as a method with an approach through fund and drug needs adjustment that combines the ABC analysis and the VEN analysis.[8] ABC analysis has a more restrictive limitation on the value of use and does not look at the essence of drugs, whereas the weakness of VEN analysis is that essential drugs will not be able to be bought despite fast movement. The limitations of the ABC and VEN methods are due to a variety of factors, including price changes, unexpected demand changes (clinical cases), and budget constraints. Therefore, the combination of the ABC-VEN matrix is used to overcome these constraints by grouping drugs according to the importance and value of their use.[9] Drug control using the ABC and VEN methods can improve drug management to be effective and efficient.[10]

Indriati Solo Baru Hospital is a private-owned public hospital of type C located in Sukoharjo district. The hospital has four centers of excellence: cancer, heart, nerves, and spine, as well as an orthopedic facility with a total of 525 beds. Evaluation of drug planning is one of the things that can be done. The evaluation of drug procurement planning in Indriati Solo Baru Hospital is still using minimum-maximum stock level and consumption-based methods and has never undertaken drug planning evaluation, either with ABC analysis, VEN analysis, or ABC-VEN combination analysis. Therefore, this study aims to know the percentage proportions of each group as well as the characteristics of the drug in the Indriati Solo Baru hospital so that it is expected that the hospital can determine drug priorities to maximize the amount of budget available so that drug management becomes more effective and efficient.

ABC-VEN analysis, which stands for "Always, Better, Control-Vital, Essential, Non-Essential," provides a deep understanding of drug management by identifying essential drugs, measuring consumption, and controlling supply effectively.

METHODS

Study Design

This research is a type of non-experimental research with descriptive analysis. The data used is quantitative data that is done retrospectively, including primary and secondary data. Primary data is: 1) Drug procurement process; 2) Stock handling; and 3) Logistic arrangements, obtained from interviews with the Head of Pharmacy Installation and Head of Procurement and Logistics of Indriati Solo Baru Hospital. Secondary data is obtained from the inventory management system database at Indriati Solo Baru Hospital, which is related to drug planning activities in 2021.

Populations and samples

The population in this analysis is the entire drug that was procured in 2021, so the method of sample determination uses the total sampling technique by involving all populations in the sample category used. The inclusion and exclusion criteria for the sample of this study are:

Inclusion criteria

All the drugs in the Indriati Solo Baru Hospital have known names, quantities required, and the purchase price of the medicine unit.

Exclusion criteria

All drugs that are not allowed or confidential and drugs with data that are inaccessible for regulatory and internal policy reasons as well as business strategies.

Data Collection

Data collection is done with a retrospective method of secondary data supported by primary data. Secondary data is obtained from drug list data, data on planned quantities of drugs, unit drug price data, and drug classification data based on the level of urgency (vital, essential, and non-essential) of the 2021 period. The primary data was obtained from interviews with the Head of Pharmacy Installation and the Head of Procurement and Logistics at Indriati Solo Baru Hospital.

Data Analysis

Data analysis is done with the following steps:

1. Collect drug planning data that includes the name of the drug, the number of proposed drugs, and the purchase price of the unit. All drug data collected includes drugs distributed to both BPJS and non-BPJS patients, as well as generic drugs and patents.
2. Multiply the amount of medication by the price of the medication obtained from the supplier to calculate the funds required for each medication.
3. Sort the funds from the largest to the smallest.
4. Summarize the total budget of all medicines without adjusting the price of medicines in the year of purchase and year of research.
5. Calculate the percentage of funds required for each drug.
6. Calculate the cumulative percentage of each drug.
7. Group each drug with the following provisions:
   a. Group A drugs have an investment value of 70% of the total drug investment (accumulated up to 70%).
   b. Drugs of group B have an investment value of 20% of the total drug investment (accumulation of 71–90%).
   c. Drugs of group C have an investment value of 10% of the total drug investment (accumulation 91–100%).
8. Classification of medicines based on VEN classification (vital, esensial, non-esensial).
9. Grouping drugs according to the ABC-VEN analysis matrix:
   a. Medicines in the AV, BV, and CV categories are priority medicines (P).
   b. Medicines in the AE, BE, and CE categories are the primary medicines (M).
   c. Medicines in the AN, BN, and CN categories are complementary medicines (S).
10. Data was analyzed using Microsoft Excel software version 2021

RESULTS AND DISCUSSION

ABC Analysis

The data presented in Table I provide information on the distribution of use and cost of drugs in three groups, with Group A having relatively higher usage and cost compared to Groups B and C. Group A consists of 106 types of drugs with the lowest percentage of drugs, which is 13.28% of all types of medicines used in the Indriati Solo Baru hospital by 2021.

The results of the study listed in Table 1 differ from the results of a study conducted by Kheder et al[11], which shows that the number of drugs in group A is higher than in groups B and C, with the percentage values of drugs in group A of 9.2%, group B of 23.5%, and group C of 67.3%, whereas when compared to the study by Deressa et al[4], the results are only slightly different: the percent of drugs in group A was 13.74%, group B was 18.18%, and group C was 68.08%. The difference is due to a variety of factors, including the different methods of data collection used, the difference in time and place of research, as well as differences in definition and classification. The results are consistent with the statement by Kemenkes[3], that the rate of consumption per year is represented only by a relatively small number of items and also in line with the Pareto Law, where a small group has a large value, and a large group has a small value.

The most widely used drug use data, as shown in Table II, shows that in group A, lansoprazole belongs to the group of proton pump inhibitors. (PPI). Research carried out by Ghezala et al[12], shows that the use of PPI has been widely adopted among primary healthcare providers. People with esophagitis, NERD, PUD, Zollinger-Ellison syndrome (ZES), functional dyspepsia, and ulcers that happen when someone takes non-steroidal anti-inflammatory drugs (NSAIDs) usually choose this drug as their first choice for treatment.

Proton pump inhibitors are one type of medication that is generally prescribed to patients with stomach disorders. The drug known as PPI has been known since the late 1980s and has been shown to inhibit gastric acid secretion better than H2 histamine receptor inhibitors. Proton pump inhibitors belong to drugs that have lower side effects and interactions with other drugs compared to H2 blockers, antacids, cytoprotective agents, and prostaglandin analogs, so long-term use is also considered safe.[13] Lansoprazole is a drug whose rapid rotation is commonly called fast-moving. In addition, metformin and amlodipine are also included as fast-moving drugs because they are both medicines for chronic diseases at the Indriati Solo Baru Hospital. Whereas metformin and amlodipine are drugs for the treatment of chronic illnesses that require patients to regularly take medications for a lifetime to keep their blood sugar levels or blood pressure normal.[14] This is because chronic diseases such as diabetes and hypertension cannot be cured but can be controlled.[15] Therefore, it has been appropriate when the drugs in the PPI, antidiabetic, and CCB groups are the ones with the most use in each group.

In group B, the most frequently used drug is metformin, with a cumulative percentage of 85.88%, which is an antidiabetic drug given to patients with diabetes mellitus (DM) at Indriati Solo Baru Hospital. Diabetes

Table I. Quantity and Cost of Medicine in the Indriati Solo Baru Hospital

Group	Drug Item	Percentage (%)	Cost (IDR)	Percentage (%)
A	106	13.28	15,969,981,207	69.99
B	165	20.68	4,560,312,433	19.99
C	527	66.04	2,285,676,089	10.02
Total	798	100	22,815,969,729	100

IDR = Indonesian Rupiahs

Table II. Classes of Drugs by Use in Category ABC

A	B	C
PPI	Antidiabetic	Calcium Antagonist
Antiplatelet	Antilipid	Vitamins, Minerals
Nootropic, Neurotonic	Diuretic	Analgesic, Antipyretic
Antiangina	Beta blocker Antiangina	Antipsychotic
Antibiotic	Angiotensin II Antagonist	Antiplatelet

PPI = Proton Pump Inhibitor

mellitus is one of the diseases suffered by many people, so it is a health problem with an increasing prevalence every year. The increase in the number of people with DM in Indonesia is predicted by the WHO to reach 21.3 million by 2030, up from 8.4 million in 2000. The treatment used today is biguanid drugs such as metformin as a first-line therapy for type 2 DM patients supported by lifestyle changes. The combination of metformin with other antidiabetic drugs will be a further step in treatment when therapy fails.[16]

In group C, amlodipine is an antihypertensive drug in the calcium antagonist or calcium channel blocker group (CCB). According to Gultom[17], hypertension in Indonesia has a very large number of cases, with a prevailing prevalence of 34.1%. The use of CCB is more widely used because it can provide a significant reduction in blood pressure in patients with hypertension without serious side effects.[18] In addition, CCB can reduce the incidence of stroke and coronary heart disease in hypertensive patients, making it an increasingly popular choice.[19-20] People who have high blood pressure are more likely to accept and use CCB as a treatment option than ACEI or ARB groups because of results that show it works better and is more beneficial.

VEN Analysis

The VEN method is used to group drugs by considering the level of criticism of the drug. Group V is a group of life-saving medicines; Group E is the group of medicines that work on the source of the disease and is widely used in the treatment of most diseases; and Group N is a supportive drug that is a drug whose action is mild and commonly used to bring comfort or to deal with mild complaints. Based on samples of 798 types of drugs, they were then analyzed based on the level of criticism.

In Table III, the results of the VEN analysis were obtained with group V of 148 items of medicines (18.55%), group E of 568 items of drugs (71.18%), and group N of 82 items of medicine (10.28%). Based on the results of the study, the drug group with the highest investment value is group E (65.51%), followed by group V (23.92%), and the smallest is group N (10.57%). The result differs from the study by Deressa et al[4], which stated that as much as a third of the drug items (35.61%) is in group V, with costs spending more than half the budget (51.59%). However, the results are not much different from the research of Kheder et al[11], which showed that the drugs in group E have the largest number of items, and the drug value of the investment is 68.3% of items with an investment value of 45.1%. Then followed group V, with an investment worth 41.6% and an amount of drugs of 17.4%. Whereas the drugs in group N use the lowest budget of 13.3%, with a total of 14.2% of drug items. The similarity of research results is due to comparable research methods and representative samples, while the differences in research results are due to factors such as different data collection procedures used, different times and locations of research, and differences in definition and classification.

Classification of medicines based on VEN should be based on criteria on clinical aspects, consumption, target condition, and cost. VENs can be used in the adjustment of drug requirements plans with the allocation of funds available based on the level of drug needs in hospitals, with the percentage ratio of each category being V (20–30%), E (50–60%), and N (10–20%).[21] According to Satibi[8], the drug item that falls into group V has very

Table III. Quantity and Cost of Medicines Based on VEN Analysis

Group	Drug Item	Percentage (%)	Cost (IDR)	Percentage (%)
V	148	18.54	5,456,736,756	23.92
E	568	71.18	14,947,623,811	65.51
N	82	10.28	2,411,609,162	10.57
Total	798	100	22,815,969,729	100

V = Vital; E = Essential; N = Non-Essential; IDR = Indonesian Rupiahs

important availability in basic health care. These drugs are life-saving drugs, so they must always be available and procured regularly so that there is no empty stock. According to Deressa et al[4], if there is a budget shortage to buy all the drugs needed, then group V drugs should get priority in new procurement, followed by group E, and lastly, N.

Category-V medicines are essential to supporting the lives of patients and are used in the treatment of urgent medical conditions. Examples of medicines in this category include antiplatelets (medicines that inhibit the formation of blood clots to prevent heart attacks and strokes), diuretics (drugs that help reduce blood pressure by removing excess fluid from the body), beta-blockers, and antiangina (medications used to control blood pressure and treat angina), as well as corticosteroids (a powerful anti-inflammatory drug that can support the functioning of vital organs in critical conditions).

Category-E medicines are essential for the treatment of chronic diseases or more general medical conditions. These include drugs such as PPI (used to reduce the production of gastric acid), antidiabetics (medicines to control blood sugar levels in diabetic patients), antilipids (drugs that help reduce blood cholesterol levels), and calcium antagonists (drugs used in the treatment of high blood pressure or heart disorders). Category N contains drugs that may have a limited role in treating patients or be used for rare conditions. Examples include supplements (vitamin and mineral supplements), vitamins and minerals (nootropics), neurotonics (drugs used to enhance cognitive or nerve function), and electrolytes (additional minerals are essential for electrolyte balance in the body).

The most widely used type of drug in Group V is clopidogrel, which is an antiplatelet drug with a cumulative percentage of 50.78% prescribed to stroke patients. Antiplatelet is used as one of the therapies for stroke disease, so it includes life-saving drugs and belongs to group V drugs. A stroke is defined as a sudden decline in the central nervous system that is suspected to be caused by a blood vessel. Every year, there are estimated to be about 800–1,000 strokes in Indonesia. In fact, 7.6 million people are estimated to die from stroke by 2020.[22]

In group E, the most frequently used medication is lansoprazole, which belongs to the PPI group. This drug is also the most commonly used in Group A on ABC analysis. PPI drugs belong to the E group because of their use in the treatment of various gastric acid disorders, as well as because PPI drugs have lower side effects and interact with other drugs. In the N group, the most frequently used drug type is Fitbon, which belongs to the group of supplements. Fitbon contains glucosamine (HCl) to help maintain bone and joint health. According to BPOM[23], a supplement is a product containing vitamins, amino acids, minerals, or other substances combined with plants and intended to improve, or maintain health, supplement nutritional values, or have physiological effects. In medicine, the supplement only serves as a suppressant, so it belongs to the N group of drugs.

Combination Analysis ABC-VEN (Priority, Main, Supplementary/PMS)

The results of this study are similar to the research by Wulandari and Sugiarto[24], which stated that the drug items of the AV group amounted to 2% with an investment value of 4%, the BV group as 4.2% with an investment rate of 5.4%, and the CV group as 1.8% with an investment worth of 0.02%. Then in the AE group, there were medicinal items of 17.6% with an investment value of 65%, the BE group of 35% with an investment worth of 21%, and the CE group of 37% with an investment value of 2%. The drug items in the AN group amounted to 0.3%, with an investment value of 0.3%. The BN group was 1.2% with an investment value of 1.6%, and the CN group was 1.8% with an investment value of 0.003%.

ABC-VEN analysis results grouped into categories P (AV, BV, CV), M (AE, BE, CE), and S (AN, BN, CN) can be used for reference in the efficiency and effectiveness of drug procurement. The CE group has the largest number of drug items. These results are in line with a study conducted by Wulandari and Sugiarto[24], that showed that the CE drug group had the largest number of items among all drug groups in X Semarang Hospital. However,

Table IV. Classes of Drugs by Use in Category VEN

V	E	N
Antiplatelet	PPI	Supplement
Diuretic	Antidiabetic	Vitamins, Minerals
Beta blocker, Antiangina	Nootropic, neurotonic	
Electrolytes	Antilipid	
Corticosteroid	Calcium Antagonists	

PPI = Proton Pump Inhibitor

Table V. PMS Analysis Based on ABC-VEN Groups

Analysis	Groups	Drugs Item	%	Cost (IDR)	%
P	AV	30	3.76	4,295,175,750	18.83
	BV	28	3.51	809,097,147	3.55
	CV	90	11.28	352,463,859	1.54
	Amount	148	18.55	5,456,736,756	23.92
U	AE	64	8.02	10,128,098,285	44.39
	BE	118	14.79	3,196,860,627	14.01
	CE	386	48.37	1,622,664,899	7.11
	Amount	568	71.18	14,947,623,811	65.51
T	AN	12	1.50	1,546,707,172	6.78
	BN	19	2.38	554,354,659	2.43
	CN	51	6.39	310,547,331	1.36
	Amount	82	10.28	2,411,609,162	10.57
Total		798	100	22,815,969,729	100

P = Priority; M = Main; S = Supplementary; IDR = Indonesian Rupiahs

the CE drug group does not absorb much of the cost, possibly because the drugs included in it are generic drugs, drugs borne by the Social Security Organizer Agency (BPJS), or both. The CE group can be controlled with a current level of supply by an analyst based on past usage and the current safety stock suitable for this category.[23] The drug group that absorbs the most costs is the AE group, due to its high budget absorption, high usage, and falling into the fast-moving category.[25] These results are in line with a study conducted by Annizha et al[26], which showed that the drug group AE absorbed the highest funds among all drug groups. An essential medicine of high value can be stored at a low level of supply but is more frequently purchased.[27]

The results of this analysis can be used to determine the priority of drug choices that will be reduced when planning. Thus, the medicines that are being procured can be in line with the budget provided by the hospital. The reduction of drugs can be done in category S, i.e., starting from the groups AN, BN, and then CN. The group of drugs is not harmful when there is a vacuum and no procurement is carried out. This is because the drugs are used to deal with mild complaints or diseases that can cure themselves. If the budget remains insufficient, reductions can be made in some M categories, i.e., AE, BE, and CE groups. However, if it is not sufficient, no reductions should be made in category P because the drugs included in it are a group of vital drugs that function as life-saving drugs that must always be available and be a priority in procurement.

Based on the results of Wulandari and Sugiarto[24], there was a financial efficiency in the expenditure of the budget in X Semarang Hospital after ABC-VEN analysis. The budget issued before the ABC-VEN analysis amounted to IDR6,188,185,555, while after the analysis it was IDR5,833,042,547. The difference between the budget expenditure before and after the analysis was IDR355,089,998 or 6.08% of the total cost of medication. This study did not compare budget expenditures before and after the ABC-VEN analysis.

According to Fahriati et al[28], drug items in group A need to be intensively controlled by conducting more frequent and detailed records, as well as regular monitoring, as this group of drugs has the highest investment value. Drug items in group B also need to be monitored and recorded periodically, although not as strictly as in group A. Drug controls in group C that absorb the smallest budget can be tracked and recorded without being too strict compared to groups A and B. According to Satibi[8], ABC analysis is used in the drug management system by determining the frequency and priority of ordering. The use of ABC analysis in this case is done by increasing

the vigilance and intensity of ordering items belonging to group A with a smaller number of items to reduce the cost of procurement. Meanwhile, the control of items that belong to group B is done in a way that optimizes the frequency and quantity of purchases, and in group C, it remains controlled, although with a more flexible approach aimed at regulating the supply of drugs in this group more carefully without having to apply too strict controls. According to Fatimah et al[29], ABC analysis is inefficiently applied in hospital pharmacy facilities when standing alone because not only budget issues are a priority, but vital, essential, and nonessential medicines also have to be classified. VEN analysis is an analysis that is used to prioritize drug purchases and determine safe stock levels and selling prices. The combination of ABC-VEN analysis will make drug procurement and pharmaceutical supplies more effective and efficient.

The results of this research can be a reference for the management of Indriati Solo Baru Hospital in conducting drug procurement planning that makes financial efficiency more effective and efficient.

CONCLUSION

The ABC and VEN analysis of drug availability in Indriati Solo Baru Hospital are in line with the relevant theory based on the value of investment in each group: A (69.99%), B (19.99%), C (10.02%), V (23.92%), E (65.51%), and N (10.57%). Assessment of the ABC-VEN combination method showed that there were 148 items of drugs in category P, 568 items of medicines in category M, and 82 items of medicine in category S. The use of ABC-VEN methods in drug stock evaluation is essential to accurately identify PMS medicines so that drug supply planning and management are more efficient and effective, as well as ensuring the availability of medicines that are optimally tailored to patient needs.

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CONFLICT OF INTEREST

None to declare.

STATEMENT OF ETHICS

The research uses secondary data, therefore ethical approval is not applicable.

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Customer Satisfaction with Community Pharmacy Services and Its Determinant in Indonesia: A Cross-sectional Survey

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ABSTRACT

Background: Assessing customer satisfaction and its determinants are important for evaluating the quality of pharmaceutical services and identifying areas for improvement.

Objectives: This study aims to evaluate the level of customer satisfaction and identify key factors associated with it.

Methods: A cross-sectional study was conducted in 10 pharmacies located in Yogyakarta, Surakarta, and Magelang cities, involving a total of 1,200 customers. Data was collected using a validated patient satisfaction questionnaire from previous study and analyzed using SPSS 20 software. It was interviewed questionnaire that consists of three domains: sociodemographic characteristics, patient satisfaction, and opinions on service improvement in the community pharmacies. The inclusion criteria were customer who received services at community pharmacies between July and August 2021. Customers who were sick and unable to participate in an interview were eliminated from the study.

Results: The average overall satisfaction score obtained was 3.46 (SD ±0.34). The average customer satisfaction scores were as follows: facilities (3.92 ± 0.45), waiting time (3.76 ± 0.59), medicine stocks (3.54 ± 0.61), staff availability (3.25 ± 0.53), and counseling hours (3.18 ± 0.54).

Conclusion: Overall, customers are quite satisfied with the community pharmacy services. There is a relationship between age, residence, education level, type of medicine, payment method, and experience in using pharmacy with customer satisfaction level. Community pharmacists should prioritize improving service quality by focusing on enhancing customer counseling and pharmacists' skills in communication.

Keywords: community pharmacy; customer satisfaction; pharmaceutical services; service quality

INTRODUCTION

Customer satisfaction is influenced by the provider's ability to meet or exceed their expectations. Customers are delighted when their expectations are fulfilled, and they are excited when their expectations are surpassed. Satisfied customers tend to be more loyal, make frequent purchases, exhibit less sensitivity to price changes, and speak positively about the business. The quality of service provided plays a crucial role in determining customer satisfaction as it affects all aspects involved in understanding customer needs and fulfilling them collaboratively.[1] Positive emotions have an impact on patient loyalty. Furthermore, good feelings, pleasure, and trust all play a part in fully mediating the situation. Satisfaction acts as a mediator between pharmaceutical services and trust while trust moderates the relationship between patient loyalty and overall satisfaction with these services. Additionally, pharmaceutical services indirectly influence patient loyalty.[2]

Patient satisfaction is influenced by various factors, including the services provided by the pharmacy. Age, education, frequency of visits, self-perceived health state, and pharmacist general knowledge were found to strongly impact patient satisfaction.[3] Interpersonal skills in terms of courtesy and respect from healthcare professionals and communication, explanation, and information skills have proven to be more important and have a clear impact on help satisfaction than other technical skills.[4] It is important to consider demographic variables when evaluating satisfaction statistics for different populations in pharmacies[5]. As community pharmacy services continue to evolve over time, it is necessary to update parameters related to patient satisfaction.[3]

Evaluating patient satisfaction is crucial for improving the quality of care and understanding patient's needs, expectations, preferences, and opinions.[6] Conducting satisfaction surveys can help assess the gaps between patient expectations and perceptions of pharmacy services.[7] Patient satisfaction surveys have assisted organizational leaders or decision-makers in incorporating patient opinions into the system. This is an essential step in fostering a culture in which patient/customer satisfaction is seen as a critical strategic aim for providing better pharmaceutical care facilities.[8]

In 2020, similar studies in Yogyakarta, Indonesia showed a high level of patient satisfaction with community pharmacies even though there were several aspects that needed to be improved.[9] There were areas such as communication effectiveness, professionalism, and treatment management where satisfaction levels were lower. This highlights the importance for pharmacists to fully utilize their expertise and knowledge to deliver optimal service to patient. Previous studies primarily examined pharmacy communication, professionalism, and therapy management, without thoroughly exploring aspect to improve overall customer satisfaction.[9] This study aims to investigate customer satisfaction by adding customer point of view on the availability, price, location and access while also assessing customer opinions and overall satisfaction about the pharmacy services as part of efforts to enhance pharmacy services with a bigger area coverage and bigger samples. The study of customer satisfaction and the determinant of satisfaction is very important for evaluating pharmaceutical services and considering the required improvement solutions.

METHODS

Study Design

Observational research with cross-sectional approach was performed to assess customer satisfaction with community pharmacy services, especially in Central Java and Yogyakarta Special Region (*Daerah Istimewa Yogyakarta*, DIY) province, in Indonesia. This research is conducted from July to August 2021 in community pharmacies located in Magelang, Surakarta, and Yogyakarta cities. Data is taken from respondents who are considered to meet the inclusion criteria and want to fill out the questionnaire.

Population and Samples

The population of the study was all customer who come to the pharmacies in Magelang, Surakarta, and Yogyakarta cities. There was a total of 96 pharmacies in these areas and 5 pharmacies from each city which represent the rural and urban areas were selected. From a total of 15 pharmacies used as samples, 80 respondents were taken from each pharmacy. The inclusion criteria were customers who received services at the selected pharmacies between July and August 2021. Customers who were sick, mentally ill, visited the pharmacy on behalf of others and unable or refused to give consent were eliminated from the study.

Study Instruments

The questionnaire used in this study was adopted from patient satisfaction questionnaire from previous study.[10,11] It was translated into Indonesian for interview purposes and then back-translated into English to maintain consistency. Content validity of the questionnaire has been conducted by experts in pharmacy practices and has been piloted on 20 non-sample respondents. It was interviewed questionnaire that consists of three parts: sociodemographic characteristics (7 items), customer satisfaction (6 items), and opinions on service improvement in the community pharmacies (5 items). The questionnaire was assessed using a 5-point Likert scale.[12] Point 5: very satisfied, point 4: relatively satisfied, point 3: quite satisfied, point 2: relatively dissatisfied, and point 1: very dissatisfied.

Data Collection

Data collection was carried out using non-probability accidental sampling. Respondents who are considered to meet the inclusion criteria will be explained about the research and offered to take part in this research. Respondents who agree to join were used as samples in this study. The total sample obtained from the three cities was 1200 respondents.

Data analysis

The data collected using the 5-point Likert scale is then averaged for each respondent. Satisfaction classification is based on the average data that has been determined. If the average score is below the mean score, the respondents are considered dissatisfied (low level of satisfaction); if it is higher, the respondents are classified as satisfied with the services at community pharmacies (high level of satisfaction). Data were analyzed using SPSS 2.0 in the form of mean and standard deviation. Ordinal logistic regression is used to determine the relationship between the sociodemographic characteristics and level satisfaction. AOR (Adjusted Odd Ratio) and 95 percent CI (Confidence Interval) were used to describe the strength of the relationship. If the AOR is >1, respondents in this category are more likely to be highly satisfied compared to the reference and if the AOR is <below 1, respondents in this category are less likely to be highly satisfied compared to the reference. For CI, if it does not include 1, the result is statistically significant, signaling a likely true effect while if it includes 1, the result is not statistically significant, implying we can't be sure of an effect.[13,14]

RESULTS AND DISCUSSION

Characteristics of Respondents

A total of 1,200 questionnaires have been completed by respondents. No respondents were excluded from this study. Several sociodemographic variables were taken into account in this study including age, gender, residence education level, type of medicine used, payment method, and experience using the pharmacy. Some studies include additional factors such as first language, income, type of disease, nationality, and occupation.[15–19] Based on the data in Table I, it was found that a large portion of customers who visited the pharmacy were aged <30 years (385; 32.08%), with females outnumbering males at 688 to 512 (57.33%). A significant number of participants (745; 62.08%) resided in rural areas. In terms of education level, respondents were asked about the last level of education they had completed. It was observed that the majority (532; 44.33%) have completed their high school education and there are no respondents lower than junior high school graduates. The most commonly sought type of medication was self-medication (542; 45.17%), and the majority of customers (73.25%) paid out of pocket for their medications. Furthermore, more than half of the participants (745; 62.08%) were visiting the pharmacy for the first time.

Customer Satisfaction with Pharmacy Services

Table II presents customer satisfaction scores for pharmacy services, including drug availability, competitive pricing, patient counseling, communication with pharmacists, location and access. Overall satisfaction with the service and suggestions for improvement are also included. Based on six service domains above, the average customer satisfaction score was 3.21 (SD ± 0.46). This indicates that customers generally reported a quite high level of satisfaction with the services provided at community pharmacies. The previous study from Yogyakarta, Indonesia also found that most customers were satisfied with the services provided, particularly in terms of medication usage instructions given by pharmacists and the professional relationship established with them.[9] A similar result also shown by study from Bandung, Indonesia, where the respondents were generally very satisfied with the services provided by the community pharmacies. The results indicated high levels of satisfaction across various dimensions of pharmacy service, including reliability, assurance, tangibles, empathy, and responsiveness. The study revealed that the pharmacies were meeting or exceeding patient expectations in most areas assessed.[20] In comparison to studies conducted in Punjab, Pakistan and the Kingdom of Saudi Arabia, the overall customer satisfaction rating in our study was relatively higher. These findings suggest that patients in Riyadh, Saudi Arabia are generally satisfied with ambulatory care pharmacy services.[18,19] However, the overall customer satisfaction score is lower compared to similar studies conducted in the United Arab Emirates and community pharmacies in Yogyakarta, Indonesia.[9,16]

This study shows that the highest average satisfaction lies in location and access domain (3.56 (SD ± 0.21)) while the lowest lies in customer counseling (3.05 (SD ± 0.42)). This could be because this study was conducted in city areas where the number of pharmacies in each city is quite large so that people tend to find it

Table I. Sociodemographic characteristics of customers in community pharmacies (N=1,200)

Variable	Category	N	%
Age	<30	385	32.1
	31-40	295	24.6
	41-50	284	23.7
	>50	236	19.7
Gender	Male	512	42.7
	Female	688	57.3
Residence	Rural	745	62.1
	Urban	455	37.9
Education level	Junior high school	512	42.7
	Senior high school	532	44.3
	University	156	13.0
Type of medicine	Self-medication	542	45.2
	New prescription	365	30.4
	Refill prescription	293	24.4
Payment method	Out of pocket	879	73.3
	Paid by insurance	321	26.8
Experience in using the pharmacy	First visit	745	62.1
	Routine visit	455	37.9

easy to reach these pharmacies.[21,22] In a study conducted by Khalaf Ahmad et al,[23] it was found that accessibility got the highest score and had a significant positive correlation in influencing patient satisfaction.[23] The location and easy access to the pharmacy are the main factors for customers to be able to transact and get services at the pharmacy. The easier it is for the customer to access the pharmacy, the higher the level of customer satisfaction.[24] On the other side, prioritizing patient care, counseling, and home pharmacy services is essential for effective clinical pharmacy practice. However, in some cases in Indonesia, conflicts between managerial and clinical duties often lead to this responsibility being disregarded or forgotten. Lack of time have been reported as a barrier in fully engaging with patients for these services.[25] Patient counseling is commonly used as a domain to measure customer satisfaction. Another study that assessed patient satisfaction with pharmaceutical services in public hospitals in Eastern Ethiopia also found that the counseling domain was the domain with the most patient satisfaction scores in the study.[26] Medication counseling is an important part of pharmaceutical treatment because it ensures that drugs are used safely and effectively and that therapeutic results are maximized. The satisfaction of patients with medication counseling services might be one of the most important indicators of pharmacy service quality.[27]

Assessment of customer satisfaction with medicine availability was 3.46/5.00 (SD ± 0.34) in which customers were quite satisfied with drug availability at community pharmacists. The unavailability of drugs causes patient dissatisfaction.[28,29] The availability of drugs is an important factor in customer satisfaction because customers who come to the pharmacy want to get drugs for medication. Competitive prices are also the domain of customer satisfaction assessment 3.25/5.00 (SD ± 0.32) because some customers want to get the desired quality medicine at the desired price. For some customers, pricing was a significant factor for evaluation. Affordable prices at pharmacies enhance customer satisfaction. Thus, every effort should be undertaken to ensure that customers remain loyal to the pharmacy even amidst price fluctuations.[30] Pharmacist communication skills are one of the important domains to support customer satisfaction 3.13/5.00 (SD ± 0.25), especially in accommodating medical problems. Research conducted in the United Arab Emirates on pharmaceutical services showed that respondents were satisfied with their time with pharmacists because they were very helpful (31.5%). Furthermore, participants used terms such as experienced, trustworthy, and confident to characterize their pharmacists; these attributes were mentioned by 27.7%, 22.9%, and 17% of respondents respectively.[31] Patients will feel comfortable and helped if the pharmacist has good communication skills. Effective communication skill is important for pharmacists to convey and advise related to patient treatment so that productive communication is formed and improves social relations between patients and pharmacists. In contrast, poor communication skills can lead to misunderstandings that make patient dissatisfied.[32] The findings suggesting that there is a need for pharmacies to invest in training programs that enhance pharmacists'

communication and patient interaction skills. Improving their ability to engage in meaningful consultations could lead to greater patient satisfaction.

Customers' Opinions on Improving the Services

In addition to customer satisfaction, Table II also represents opinions on what services need to be improved. The most frequently mentioned areas for improvement by customers are facility improvements at the pharmacy resulting in 3.92 (SD ± 0.45). Facilities support the comfort of customers in getting treatment services. Another opinion 3.76 (SD ± 0.59) agrees to reduce service waiting time. The longer waiting time for services can raise customers' doubts about their abilities and reduce the level of customer trust. The previous study, which was to determine patient satisfaction and perception of care, found that 77% of patient assessed that a good waiting time of about ten minutes allows for the highest patient satisfaction.[33] Other services that need to be improved are the increase in medicine stocks, adding the number of staff, and adding counseling hours. The demand for more medicine stocks could reflect a need for better patient education on medication availability and alternatives. This could involve developing educational materials or sessions to discuss common medication issues and outline what patients can do if their medication is not in stock. The need for increased staff, as indicated by the patients, suggests that pharmacies may need to revisit staffing levels and consider additional hires, more efficient task delegation, or investing in training existing staff to handle multiple roles efficiently. The desire for more counseling hours means pharmacies should consider extending their service hours specifically for patient counseling, possibly offering dedicated timeslots or booking systems for patients needing in-depth consultations. By evaluating these domains, the pharmacist could identify which service domains need attention as they will significantly contribute towards enhancing service quality while simultaneously ensuring higher levels of customer satisfaction.

Determinant of satisfaction with pharmacy services in community pharmacy

Based on Table III, it shows that there is a significant relationship between the variables of age, residence, education level, type of medicine, payment method, and experience in using the pharmacy with the level of customer satisfaction. In a study that aimed to find factors related to patient satisfaction, it was found that age, education, and frequency of visits were significantly related factors.[3] But in this study, there is no relationship between gender and customer satisfaction with pharmacy services as indicated by the CI value crossing 1. Several similar studies have found the same thing that there is no relationship between gender and the level of patient satisfaction.[34,35]

The group of customers older than 50 years was 1.2 times (AOR = 1.2; 95% CI = 1.1-2.1) more likely to be satisfied than those under 30 years. Previous research has shown that older customers tend to be more content with pharmaceutical services.[36] Soeiro et al[36] found a rise in average satisfaction scores as the age group increased. However, our results are in contrast to earlier research that indicated increasing age was significantly associated with lower level of customer satisfaction. Older individuals are at greater risk and have higher care expectations to address their medication needs because they tend to have more chronic illnesses than younger people.[37]

A significant relationship was shown in the residence variable where customers living in urban areas were 40% less likely to feel satisfied than people living in rural areas (AOR = 0.6, 95%; CI = 0.2-0.8). Similar research also states that people in the rural areas are more satisfied with pharmacy services.[26] Rural areas have limited access to primary medical care facilities. Besides, rural areas also have a limited information due to a lack of health literacy.[38] Compared to urban, rural clients are more likely to seek help and talk to a pharmacist for a longer period. Due to this, rural require more pharmacy services than well-educated urbanites. In addition, the location of community pharmacies in rural areas can be another factor for the higher satisfaction of rural communities.[39]

This study shows that education level also affects customer satisfaction significantly. Several studies have also found that education level is a significant factor.[3,6,34,40] Customers with the university level of education were less likely to be satisfied than customers with education levels below (AOR = 0.7; 95% CI = 0.5-0.9), which was in accordance with the finding of the previous study.[3] Customers with no formal education had a high level of satisfaction due to their lack of knowledge about typical pharmacy services. A higher level of education typically results in increased awareness and attentiveness among patients.[19,41]

A relationship was also found in the type of medicine with customer satisfaction where customers with refill prescriptions were two times more satisfied than self-medication and new prescriptions (AOR = 2; 95% CI = 1.5-3.1). Similarly, customers who visited routinely had 1.9 times greater satisfaction than the

Table II. Customer satisfaction toward pharmacy service and opinion on improving the service (N=1,200)

Services domain	Mean	SD
Customer satisfaction		
Medicine availability	3.46	0.34
Competitive price	3.25	0.32
Patient counseling	3.05	0.42
Pharmacists' skills in communication	3.13	0.25
Location and access	3.56	0.21
Overall satisfaction	3.21	0.45
Customers' opinions on improving the service		
Reduce waiting time	3.76	0.59
Increase medicine stocks	3.54	0.61
Add the number of staff	3.25	0.53
Add counseling hours	3.18	0.54
Improve facilities	3.92	0.45

Table III. Determinant of satisfaction with pharmacy services in community pharmacy (N=1,200)

Variable	Category	Level of satisfaction		AOR*	95% CI
		High (%)	Low (%)		
Age	<30	143 (25.91)	242 (37.35)	1	
	31-40	121 (21.92)	174 (26.85)	0.8	0.8-1.3
	41-50	132 (23.91)	152 (23.46)	0.9	0.7-1.2
	>50	156 (28.26)	80 (12.35)	1.2	1.1-2.1*
Gender	Male	321 (60.11)	191 (29.48)	1	
	Female	213 (39.89)	475 (73.30)	0.8	0.6-1.1
Residence	Rural	435 (77.82)	310 (47.84)	1	
	Urban	124 (22.18)	331 (51.08)	0.6	0.2-0.8*
Education level	Junior high school	342 (61.18)	170 (26.23)	1	
	Senior high school	352 (62.97)	180 (27.78)	0.9	0.7-1.1
	University	57 (10.20)	99 (15.28)	0.7	0.5-0.9*
Type of medicine	Self-medication	143 (31.43)	399 (53.56)	1	
	New prescription	123 (27.03)	242 (32.48)	0.9	0.8-1.3
	Refill prescription	189 (41.54)	104 (13.96)	2	1.5-3.1*
Payment method	Out of pocket	229 (49.78)	650 (87.84)	1	
	Paid by insurance	231 (50.22)	90 (12.16)	3	1.8-5.2*
Experience in using the pharmacy	First visit	253 (48.84)	492 (72.14)	1	
	Routine visit	265 (51.16)	190 (27.86)	1.9	1.4-2.3*

AOR : Adjusted odds ratio; *Significant relationship

first visit (AOR = 1.9; 95% CI = 1.4-2.3). A higher number of pharmacy visits was found to be linked with increased patient satisfaction.[3] An analysis of customer feedback on pharmacy services revealed a positive correlation between the frequency of counseling and monitoring and overall satisfaction.[3]

Payment methods paid for by insurance are also three times more likely to be satisfied than out-of-pocket (AOR = 3; 95% CI = 1.8-5.2). Previous results also indicate that patient satisfaction may have been heavily influenced by health insurance status and its coverage.[42,43] Limited health financing may lead to high out-of-pocket healthcare expenses for patient, restricting access to care and indirectly impacting people's health and productivity. Although most patients expressed contentment with their insurance coverage, a majority also believed that insurance should cover a greater portion of medication costs.[44]

Finally, patients who visited routinely had 1.9 times greater satisfaction than the first visit (AOR = 1.9; 95% CI = 1.4-2.3). This aligns with prior studies, which found that patients who had made multiple visits to the pharmacy in the last three months tended to believe they were in better health and possessed a more accurate general understanding of pharmacists, leading to higher average satisfaction scores.[3]

Our study presented some limitations. First, the form of a community pharmacy that has a doctor's practice service makes customer satisfaction also influenced by the results of doctor's services. Second, this study did not collect data on customer admission information, so the relationship between household finances and customer satisfaction could not be determined.

CONCLUSIONS

This study examining customer contentment with pharmaceutical services at community pharmacies in Yogyakarta, Surakarta, and Magelang found that overall, customers expressed a high level of satisfaction. The research revealed a correlation between customer sociodemographic factors and satisfaction levels, with the exception of gender. Moreover, improvements in customer counseling and pharmacists' skills in communication are necessary for community pharmacies to enhance their satisfaction.

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CONFLICT OF INTEREST

None to declare.

STATEMENT OF ETHICS

This study protocol was approved by Universitas Gadjah Mada Medical and Health Research Ethics Committee with approval number KE/FK/11422/EC/2021.

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Factor Determining Consumers' Decisions to Purchase Topical Analgesic for Musculoskeletal Disorders in Indonesia

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ABSTRACT

Background: Various choices of topical analgesic to treat musculoskeletal disorders are available on the market

Objectives: This study aims to determine the influence of psychological, cultural, social, and personal factors on purchasing decisions for topical analgesic drugs among consumers who need medication for musculoskeletal disorders

Methods: This is cross-sectional quantitative research with an inferential statistics analysis approach. A convenience sampling technique was used to collect data during January 2023 using a questionnaire that was distributed online with a Likert scale via Google Form. A total of 318 respondents from 30 provinces in Indonesia who purchased topical analgesic drugs with complaints of musculoskeletal disorders and aged 18-60 years participated in this study. The data was analyzed using multiple linear regression to determine the relationship of psychological, cultural, social, and personal factors associated with purchasing decisions

Results: The study showed that the majority of respondents were male (50.6%), domiciled in Central Java (20.1%), aged 21-25 years (29.9%), worked as private employees (37.1%) with a working duration of 6-8 hours (59.4%), and had an income of IDR 2,500,000-3,499,000/month (40.6%). The product most frequently purchased was the cream dosage form (60.1%), with locations in pharmacies (74.5%). The results of partial and simultaneous hypothesis testing show that psychological, cultural, social, and personal factors have a significant positive influence ($p < 0.05$) on the decision to purchase topical analgesic drugs among consumers who need medication for musculoskeletal disorders

Conclusion: Given that psychological, cultural, social and personal factors influence decisions, it is recommended that marketers understand these factors.

Keywords: musculoskeletal disorders; purchase decision; topical analgesics

INTRODUCTION

Musculoskeletal pain is a challenging condition for patients and physicians. Many people have experienced one or more episodes of musculoskeletal pain at some time in their lives, regardless of age, gender, or economic status.[1] The largest prevalence of musculoskeletal disorders in Indonesia is Central Java which reaches 18.9%.[2] Musculoskeletal pain is acute or chronic pain affecting bones, muscles, ligaments, tendons, and even nerves, and pain associated with musculoskeletal disorders.[3] The most common musculoskeletal disorder in adults is low back pain (30-40%); followed by neck and shoulder pain (15-20%); knee pain (10-15%,) and fibromyalgia and rheumatoid arthritis around 2%.[1] Analgesic drugs are the most common choice for treatment to relieve pain due to musculoskeletal disorders.

One dosage form that is easy to use and easy for consumers to obtain is a topical analgesic. Topical analgesic drugs from the Nonsteroidal Anti-Inflammatory (NSAID) group can effectively reduce

musculoskeletal pain and can be given to consumers who experience chronic pain. The use of topical analgesics is popular, especially among consumers who complain of pain.[4] Topical dermatology products are dosage forms that are easy to administer and easy to use in treating various diseases and are available in various dosage forms such as ointments, gels, creams, lotions, solutions, suspensions, etc.[5] Satisfaction with topical medication appears to be a major determinant of adherence[6] as it relates to consumers' acceptability. Furthermore, Shariff[7] stated that developing appropriate drug designs requires a holistic and patient-centric approach to improve acceptance and compliance. One of the challenges facing pharmaceutical companies is patient acceptance and continued use of their products. Therefore, drug product development must begin with a clear understanding of patient needs and provide solutions that meet these needs. There is still limited research examining consumer decisions to purchase topical dosage forms. Various existing studies tend to relate to consumer preferences regarding routes of administration and drug formulations[8;9;10;11;12] or drug purchasing decisions,[13;14;15] which are not specific to certain dosage forms.

Purchasing decisions can be influenced by a series of psychological processes and consumer characteristics, which are strongly influenced by psychological, cultural, social and personal factors.[16] Therefore, to find out the factors that can influence someone in deciding to buy a product, it is necessary to understand consumers' behavior. With the variety of analgesic products[17] as well as the increasing use of topical analgesics in Indonesian society, business actors need to be able to understand consumer behavior in making decisions to purchase topical analgesic products that are currently available on the market. There is still little research regarding consumer behavior in selecting, purchasing, and using topical analgesics. Therefore, this research was conducted to determine the psychological, cultural, social, and personal factors that influence consumer decisions in purchasing topical analgesic products for musculoskeletal disorders.

METHODS

Study design

The current study is an observational study with a cross-sectional approach which aims to determine and study the relationship between dependent and independent variables.

Population and samples

Purposive samples were selected conveniently based on the inclusion criteria including Indonesian citizens who currently reside in Indonesia; aged 18-60 years; and have purchased topical analgesics for musculoskeletal disorders in the last 3 months was used to collect the samples. The exclusion criteria were consumers of national health insurance, so that respondents' decisions in choosing drugs were not limited by the drugs provided by the insurance company. Incomplete data were not included in the analysis. Due to the exact number and size of the population were not known (prevalence of people with musculoskeletal disorders and using topical analgesic drugs during the last 3 months), the sample size was calculated using the Cochran formula, and the minimum sample size was 97.

Study instruments

A questionnaire was developed after a preliminary review of the literature. A comprehensive literature review on predictors of consumers' decisions and behavior[18,19,20,21] was conducted before questions were generated and discussed with experts. There was one invalid question deleted/not used with the consideration that the information obtained in this question can still be represented by other questions from the same domain. The validation test results showed that of the 30 questions, 29 of them were valid with a correlation value greater than 0.05 and showed a calculated r value >0.4-0.8 compared to the r table. The results of the reliability test show that all research variables provide Cronbach's Alpha > 0.675 so they are reliable.

The instrument used for data collection was a structured questionnaire with close-ended questions. The first section collected the demographic information of the participants in multiple choices. The second section contained questions regarding the topical analgesic purchase history in multiple choices. The third section concerned the factor determining consumers' decision.

Data collection

The participants were asked to answer close-ended questions regarding their tendency to make purchases topical analgesic for musculoskeletal disorders, on a five-level Likert-type scale ("score 1 for Totally Disagree" to "score 5 for Totally Agree"), their agreement with statements regarding the degree of certain factors

(psychological, cultural, social and personal) affect their topical analgesic purchasing decisions. The questionnaire in Google Form was distributed online through social media such as WhatsApp, Facebook and Instagram to all Indonesian who met the inclusion criteria during data collection (1-31 January 2023).

Data Analysis

Univariate analysis was carried out to determine the distribution of sociodemographic characteristics (gender, domicile, age, highest level of education, occupation, estimated duration of work in a day, and income) and history of purchasing topical analgesic drugs for musculoskeletal disorders. Multiple linear regression model was used to examine the association between the independent variables on the dependent variable. Psychological, cultural, social, and personal factors were used as independent variables, while purchasing decision was used as dependent variable. An alpha value of $p < 0.05$ was considered significant.

RESULTS AND DISCUSSION

A total of 318 respondents spread across various regions of Indonesia who met the inclusion criteria participated in this study. Table I shows data on sociodemographic characteristics resulting from the data collection via online questionnaires using various social media platforms.

The study showed that 161 (50.6%) males and 157 (49.4%) females participated in this research. Most of the respondents involved in this study live in Central Java, 64 (20.1%) respondents, followed by the D.I. Yogyakarta with 45 (14.2%) respondents and East Java with 36 (11.3%) respondents. The highest age group of respondents who participated in this research was 21-25 years old, 95 (29.9%) respondents, and the age group of 26-30 years 89 (28%) respondents. High School (SMA) graduates or equivalent were the largest number of respondents, 46.5% of those involved in this study. The majority of types of work were private employees 118 (37.1%), while the longest 189 (59.4%) work duration per day was 6-8 hours. The majority of respondents 126 (40.6%) had an income of IDR 2,500,000-3,499,000/month.

The results of the history of purchasing topical analgesic drugs can be seen in Table II. This data provides an overview of the location and when the drug was last purchased, as well as the dosage form of the drug chosen. The majority of 111 (34.9%) respondents purchased within 1 month, which was calculated from the time they filled out the questionnaire. The most frequently purchased dosage form was cream with 190 (59.7%) respondents, followed by the patch dosage form with 164 (51.6%) respondents. In addition, respondents who had a history of purchasing gel dosage forms were 135 (42.5%) respondents and sprays were 103 (32.4%) respondents. The most popular places to purchase topical analgesics were pharmacies with 236 (74.2%) respondents and supermarkets with 148 (46.5%) respondents.

The current study shows that respondents generally preferred the topical cream form, compared to delivering drugs through the skin with other dosage forms. This is likely due to the cream dosage form for topical pain relievers being the most widely available on the market, as well as topical dosage forms being cheaper compared to transdermal, patch, spray, or other forms. There are various ways of delivering drugs through the skin, including three important ways such as topical, regional, and transdermal.[22] Semi-solid dosage forms of drugs can be topical or transdermal. Topical semi-solid dosage forms are applied to the surface of the skin and remain there. Topical dosage forms are preferred over other dosage forms because they provide local therapeutic activity when applied on the skin or mucous membranes.[22] Topical forms are typically used to treat dermatological conditions such as acne vulgaris, infections, wounds to the skin, and eczema, while transdermal dosages are typically used to treat conditions that require ongoing medication, such as pain management.[23] Topical dosage forms could be classified into three major categories such as solid (dusting powder), liquid (lotion, liniment), and semi-liquid (ointment, paste, cream, and gel). The most common topical vehicles include ointments, creams, gels, and lotions, among others.[23] The current study shows that most topically applied dosage forms were semi-solid. Since the property of semisolids can stick to the application surface for a long time helps prolong drug delivery application site.[23] The definitions of lotions, gels, creams, and ointments vary depending on literature source, market history, or traditional use.[24] Cream is a semisolid emulsion formulation for application to the skin or mucous membranes. Creams are homogeneous, semi-solid preparations consisting of opaque emulsion systems.[25] Creams have several advantages like easy to apply, and more effective compared to other avoiding risks. The function of skin creams is to protect the skin against harshness from the environment and any dry conditions of the skin. The cream chosen in this study can be interpreted as a dosage form of all types of semi-solid dosage forms such as ointment or unguent, this is because the terms cream, unguent, or

Table I. Sociodemographic characteristics of respondents (n: 318)

Category	Total (N)	Percentage (%)
Gender		
Male	161	50.6
Female	157	49.4
Domicile region		
N. Aceh Darussalam	1	0.3
North Sumatera	1	0.3
South Sumatera	4	1.3
West Sumatera	3	0.9
Bengkulu	3	0.9
Riau	6	1.9
Kepulauan Riau	3	0.9
Jambi	9	2.8
Lampung	12	3.8
Bangka Belitung	4	1.3
West Kalimantan	5	1.6
East Kalimantan	4	1.3
South Kalimantan	7	2.2
Central Kalimantan	2	0.6
North Kalimantan	4	1.3
Banten	15	4.7
Jakarta	27	8.5
West Java	31	9.7
Central Java	64	20.1
Yogyakarta	45	14.2
East Java	36	11.3
Bali	5	1.6
East Nusa Tenggara	4	1.3
West Nusa Tenggara	3	0.9
Gorontalo	7	2.2
West Sulawesi	2	0.6
Central Sulawesi	4	1.3
North Sulawesi	2	0.6
Maluku	4	1.3
North Maluku	1	0.3
Age (years)		
18-20	26	8.2
21-25	95	29.9
26-30	89	28.0
31-35	45	14.2
36-40	36	11.3
41-45	14	4.4
46-50	4	1.3
51-55	8	2.5
56-60	1	0.3
Level of education		
Elementary school	1	0.3
Junior high school	6	1.9
High school	148	46.5
Bachelor's degree	141	44.3
Master's degree	22	6.9

ointment are often interchangeable for general consumers outside the pharmacist profession, as the terms used to represent the semi-solid form in the questionnaire was cream.

Over-the-counter medicines and medicines purchased without a prescription are widely available in pharmacies, supermarkets, the internet, and drug stores. Its availability means that customers can choose to purchase it without pharmacist involvement. The study shows that consumers prefer to buy topical analgesic

Table I. (Continued)

Category	Total (N)	Percentage (%)
Jobs/activities		
Private employee	**118**	**37.1**
Government employee	23	7.2
Student	80	25.2
Self-employed	71	22.3
Retired	3	0.9
Housewife	23	7.2
Working duration/day		
3-5	63	19.8
6-8	189	59.4
>8	66	20.8
Income per month		
<Rp1.500.000	58	18.2
Rp1.500.000-2.499.000	53	16.7
Rp2.500.000-3.499.000	129	40.6
≥Rp3.500.000	78	24.5

Table II. Topical Analgesic Drug Purchase History

Category		Total (N)	Percentage (%)
Last time topical analgesic medication was purchased	< last 1 month	81	25.5
	Last 1 month	111	34.9
	Last 2 month	92	28.9
	Last 3 month	34	10.7
	Total	**318**	**100**
Dosage form of topical analgesic medication purchased*	Cream	190	59.7
	Patch	164	51.6
	Gel	135	42.5
	Spray	103	32.4
	Total	**592**	**100**
Place of purchase of topical analgesic*	Pharmacy	236	74.2
	Supermarket	148	46.5
	Drug Store	106	33.3
	e-Commerce	124	39.0
	Total	**614**	**100**

* Respondents can answer more than 1 answer, so that the number of answers can be more than the total number of respondents.

medication for musculoskeletal disorders at pharmacies compared to other places. This is most likely due to consumer trust in the product as well as advice that can be obtained from the pharmacist at the pharmacy. This research supports the study by Chan & Tran (2016)[26] about purchasing over-the-counter medicines in Australia. Chan & Tran (2016)[26] concluded that a high level of trust, confidence, and sense of altruism and care were key factors for customers buying drugs without a prescription at the pharmacy. In addition, consumers often consider medications available in pharmacies to be more effective and safe than those available in supermarkets, or health food stores.[27]

Evaluation of the relationship independent variable (psychological, cultural, social, and personal factors) and dependent variable (purchasing decision) using multiple regression resulted in the following equation:

$$Y = 3.567+0.197X1+0.105X2+0.248X3+0.336X.$$

The results of multiple linear regression analysis show that the personal factor variable (X4) has the highest coefficient value compared to other variables, so it can be concluded that personal factors have the highest influence compared to the influence of psychological, cultural, and social factors.

To find out how much relationship each independent variable has on the dependent variable with a confidence level of 95%, use the t-test which is based on a comparison between t-count and t-table, presented in Table III. The results show that each independent variable provided a t-calculated value greater than the t table ($p < 0.05$), which means it shows the influence of these variables on purchasing decisions.

Table III. The Correlation Between Variables

Variable	Coefficient	Sig.	Remarks
Constant Value	3.567	0.006	
Psychological Factors (X1)	0.197	0.000	Significant
Cultural Factors (X2)	0.105	0.021	Significant
Social Factors (X3)	0.248	0.000	Significant
Personal Factors (X4)	0.336	0.000	Significant

Analysis using F Test is a test carried out to determine the relationship between independent variables and the dependent variable simultaneously which is based on a comparison between F-calculated and F-table, presented in Table IV. The calculation results give an F-calculated of 92.43, higher than the F-table of 2.42 ($p< 0.05$). It can be concluded that all together independent variables have a significant influence on the decision to purchase topical analgesic drugs for musculoskeletal disorders. To determine how much variation occurs in the dependent variable by the independent variable, the R coefficient of determination test was carried out, and the resulting coefficient of determination value was Adjusted R-squared (R2) of 0.536 or 53.6%.

Table IV. The Partial Correlation Between Variables

Variable	t-calculated	p-value
Constant Value	2.783	0.006*
Psychological Factors (X1)	5.728	0.000*
Cultural Factors (X2)	2.315	0.021*
Social Factors (X3)	6.408	0.000*
Personal Factors (X4)	5.752	0.000*

*Significant at $p<0.05$

Individual consumer behavior includes selecting, purchasing, and consuming goods to meet certain needs. There are some factors on cultural, social, personal and psychological to customer purchase decisions. The study shows there are significant influences partially and simultaneously of cultural, social, personal, and psychological factors on consumer purchase decision of topical analgesic medication for musculoskeletal disorders. This study also shows that apart from other variables, the variables in this current study (psychological, cultural, social, and personal factors) contributed 53.6% to determining the decision to purchase topical analgesic drugs for sufferers of musculoskeletal disorders. The results obtained in this study are in line with research conducted by Saputri & Yuliani (2020)[28] which used the same variables as factors with the decision to purchase vitamin C supplement drugs.

Consumer behavior is often unpredictable. Understanding the complexities of consumer behavior is essential to developing effective marketing strategies.[29] Various theories have been developed and introduced to understand consumer behavior.[30,18,31] Based on existing theories/models, consumer behavior in decision making can be a quick and easy or a lengthy and complicated process. Marketer must fully understand both the theory and reality of consumer behavior. Various factors can determine and change consumer behavior, including actions that consumers do or do not take due to internal or external influences.[32] The present study was based on Kotler & Keller,[16] consumer purchasing behavior was influenced by cultural, social and personal factors. The study shows that personal factors were the most influential factors among the cultural, social, personal, and psychological in purchasing decisions. The personal factors in this study were finances and personal perceptions of product quality and price. Personal perception plays a vital role in consumer behavior.[33] Perception is the way that individuals select and organize to develop their meaningful sense of the world. Generally, the most important personal factors marketers consider are age, occupation, finances, lifestyle, and self-concept. The study shows that apart from perception, finances were the most important factor in purchasing decisions. Other factors that are part of the personal factors were not detected in the results, since these factors were not part of the questions analyzed. Even though the number of participants was sufficient according to calculations, because the questionnaire was distributed online, the variety of participants was dominated by young people. Most of the distribution locations were still concentrated in Central Java, not evenly distributed throughout all regions in Indonesia. The questionnaire used was still far from perfect and still needs to be developed further to provide a clearer picture of the parts that determine purchasing decisions.

CONCLUSION

It can be concluded that psychological, cultural, social, and personal factors have a significant positive influence ($p < 0.05$) on the decision to purchase topical analgesic drugs among consumers who need medication for musculoskeletal disorders. Personal factors were the most influential factors in purchasing. By considering personal factors, such as financial and personal perceptions of quality product and prices, marketers can adjust their offerings to align with consumer preferences.

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CONFLICT OF INTEREST

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article

STATEMENT OF ETHICS

This research has received approval from the Faculty Ethics Committee Medicine, Public Health and Nursing (FKKMK) Universitas Gadjah Mada with Number KE/FK/0068/EC/2023. A brief definitions and types of musculoskeletal disorders were provided to ensure that each respondent understood the study. Respondents were asked to state approval before filling out the questionnaire. Respondents' data was not included in the results to guarantee confidentiality.

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Development and Evaluation of Drug Management Information System in Mijen Community Health Center Demak

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ABSTRACT

Background: Drug management information systems can serve as tools for decision-making. The effectiveness of such a system can be assessed through evaluation. One of the evaluation methods used is the PIECES method.

Objectives: This research aims to evaluate and develop a drug management information system using the PIECES method.

Methods: The research conducted was a qualitative descriptive study with inductive analysis. Sampling for this research was conducted purposive sampling. System development in this study utilized the prototype method, with interviews conducted for Management Information System (MIS) evaluation using the PIECES Framework. The design of the MIS system was created using Data Flow Diagrams and Entity Relationship Diagrams. The designed MIS system development was evaluated using the same method. Data processing in qualitative research consists of valid, clear, and accountable word descriptions, sentences, or narratives provided by the researchers, followed by data validation using triangulation techniques and Nvivo 12 Plus software.

Results: Evaluation results using the PIECES Framework indicate that the implemented MIS system benefits and aids staff performance in daily drug dispensing. However, there are still manual tasks and lacking features such as distribution, drug expiration warnings, and minimum stock on the dashboard. The proposed design for MIS system development includes several features such as stock in, stock out, and distribution, complemented with drug expiration warnings, minimum stock alerts on the dashboard, and reports for each feature.

Conclusion: Implementing the proposed MIS system design can assist and streamline work processes by providing comprehensive information, thus serving as a decision-making tool.

Keywords: Drug Management; Management Information System; PIECES

INTRODUCTION

The current technological advancements have made computers an indispensable tool for organizations to expedite data management and administration performance, thereby generating relevant, timely, and accurate information.[1] Meanwhile, a Management Information System (MIS) is a process of data processing, analysis, and presentation that facilitates decision-making and aids management in enhancing the quality of decisions made.[2]

The effectiveness of a system can be assessed through evaluation. Information system evaluation serves to identify the strengths and weaknesses of an application and to ascertain whether the information presented within the application is accurate, reliable, and timely.[3] One method that can be used in evaluating MIS is the PIECES Framework. The PIECES method is employed to identify system weaknesses, which will subsequently serve as recommendations for improvements in the system under development.[4]

The community health center information system (SIMPUS) is a system that provides information to assist in the decision-making process in implementing community health center management to achieve all of its

activities' objectives.[5] All community health centers in Mijen Subdistrict, Demak District, have implemented the community health center information system (SIMPUS). In contrast, community health centers in other districts have not fully utilized the MIS. From the researcher's observation, it is evident that the implementation of MIS in the Mijen Subdistrict Community Health Center has not undergone evaluation. The Mijen Subdistrict Community Health Center comprises two community health centers: Mijen I and Mijen II. Medication management at Mijen I Health Center, which is an inpatient health center, involves two medication management processes: outpatient services, which already utilize the community health center information system application in the pharmacy for medication management, but the application can only operate features such as incoming medication and medication dispensed to patients. However, MIS usage has not been implemented in the inpatient department due to system malfunctions. Meanwhile, the utilization of MIS in the outpatient department of Mijen II Community Health Center is limited to incoming and outgoing medications, and manual recording is still conducted using stock cards due to frequent MIS issues and inadequate human resources to update stocks actively. The features within the system have not yet assisted pharmacy personnel in managing pharmaceutical supplies up to monthly reporting; thus, this is deemed ineffective in medication management and may lead to errors in monthly reporting. It is hoped that pharmacy personnel's effective and efficient performance can be enhanced with improvements in the development of management information systems in community health centers. Based on previous research conducted by Fauziyah et al.,[6] the optimal utilization of MIS Puskesmas (SIMPUS) in medication management at Batang District Community Health Centers has not been achieved. Hence, improvements are necessary to enhance service quality, system performance, and effectiveness, thereby increasing the benefits for community health centers.[6]

Based on the above description, the researcher is interested in researching the evaluation and development of the Management Information System (MIS) for medication management at Mijen Subdistrict Community Health Centers, with the hope that the MIS implementation will be more optimal to support the existing services at community health centers and can be utilized as a tool for decision-making in medication management.

METHODS

Study design

The research conducted was a qualitative descriptive study with inductive analysis. The object under investigation was the drug management information system (MIS) in the Community Health Center (Puskesmas) of Mijen Subdistrict, Demak. The MIS possessed by the Mijen Subdistrict Community Health Center had the same type and was from the same developer. The evaluation was conducted before and after development. Design development was carried out after obtaining initial evaluation results. The MIS design was created using Data Flow Diagrams (DFD) and Entity Relationship Diagrams (ERD). The developed MIS design was then re-evaluated using the same method.

Population and samples

The subjects of this study were personnel in the Pharmacy Unit of the Mijen Subdistrict Community Health Center, including 1 Pharmacist from Mijen I, 1 Pharmacy Technical Personnel (PTP) from Mijen I, 1 Pharmacy Technical Personnel (PTP) from Mijen II, and other health personnel, namely 1 midwife and 1 nurse from Mijen II. Sampling in this study was done through purposive sampling. The population in this study consisted of personnel in the pharmacy unit of the Mijen Subdistrict Community Health Center. The sample in this study consisted of personnel operating the Pharmacy Unit MIS in the Mijen Subdistrict Community Health Center. Inclusion criteria were personnel qualified in drug management, both pharmacists and health personnel, who had worked in the community health center for at least three months. Exclusion criteria were personnel with a maximum high school diploma education level and personnel unwilling to become informants.

Study instruments

The tools used in this study were writing utensils, voice recorders, observation guidelines, documentation guidelines, and interview guidelines prepared based on the PIECES Framework method covering six variables: Performance, Information, Economy, Control, Efficiency, and Service, as seen in Table I. The material used in this study was the drug inventory list in all Community Health Centers in Mijen Subdistrict, Demak.

Table I. Research Instrument

No	Variable	Indicator	Descriptor
1	Performance	Number of tasks or outputs	1. Do you use the MIS to manage drug supplies? 2. Does the MIS used greatly assist the performance of pharmaceutical personnel at the puskesmas? 3. Are there any obstacles in operating the MIS? 4. Can all tasks be performed using the MIS?
		Response Time	1. Does the MIS at the puskesmas respond quickly when used? 2. Does the process of searching for data in the MIS occur quickly?
2	Information and Data	Output or Results	1. Can the MIS provide accurate information? 2. Can the MIS provide complete information? 3. Can the MIS provide accurate information? 4. Is the information generated when using the MIS suitable for the needs of pharmaceutical personnel?
		Input	1. Is the data input process in the MIS relatively easy? 2. Is the MIS easy to learn? 3. Are the available menus in the MIS suitable for the needs? 4. Do the available menus facilitate the use of the MIS? 5. Is a cancellation menu available in the MIS during its usage?
		Stored Data	1. Is data stored in a database or storage media? 2. Is there too much data stored in the database? 3. Is the stored data accurate? 4. Is the data easily accessible? 5. Can the data be stored in a structured manner? 6. Is the data stored in the MIS complete?
3	Economics	Cost	1. Does the implementation of MIS result in cost escalation? 2. Does implementing MIS save or reduce costs compared to conventional methods?
		Benefits	1. Is the implementation of MIS carried out smoothly without any obstacles? 2. Is the MIS beneficial to the puskesmas? 3. Does the implementation of MIS help tasks to be done more easily and quickly?
4	Control and Security	Low security or control	1. Is security implemented using a single user's username and password? 2. Can all personnel access the MIS using the same username and password? 3. Are processing errors common when using the MIS? 4. Are there any ethical violations regarding the data or information within the MIS?

Data collection

Data was collected prospectively through direct field observations, interviews, and documentation. The interview guidelines were developed using the PIECES Framework method. The research was conducted in September 2022 at the Community Health Centers in the Mijen Subdistrict, which comprised Mijen I and Mijen II Community Health Centers.

Table I. (Continued)

No	Variable	Indicator	Descriptor
4	Control and Security	High security or control	1. Is security implemented using individual usernames and passwords for each user? 2. Do all pharmacy personnel have access to log in with their own username and password? 3. Does security within the MIS effectively safeguard stored data and information? 4. Is the storage media safe from damage and accidents? 5. Is the security system functioning well?
5	Efficiency	Time efficiency	1. Do tasks become more accessible and promptly completed with implementing the MIS? 2. Does user performance improve with the implementation of the MIS? 3. Is information generated quickly? 4. Does the generated information aid decision-making, and is it easily retrievable? 5. Does searching for information in the MIS take a long time?
		Resource efficiency	1. Does the MIS provide benefits to its users? 6. Can the MIS be effectively used to support work?
		Required efforts	1. Is MIS development necessary to support better performance? 7. Are additional features needed to make it more comprehensive?
		Required resources	1. Are additional computers with better specifications needed? 3. Is network improvement necessary to enhance user performance?
6	Service	The system produces inaccurate results	1. Does the MIS provide accurate results? 2. Does the MIS provide information as per the needs?
		The system produces inconsistent results	1. Is the information generated by the MIS consistent? 2. Does the obtained information always differ even when accessed with a slight time difference?
		The system produces unreliable results	1. Is the generated information reliable? 2. Does the generated information aid the decision-making process?
		The system is not easy to learn	1. Is the existing MIS easy to understand? 2. Is the existing MIS easy to learn?
		The system is not easy to use	1. Is the MIS user-friendly, requiring training? 2. Are MIS errors common during use?
		The system is rigid or inflexible to use	1. Is the MIS equipped with data updating features? 2. Are there features for data correction when data entry errors occur? 3. Can data updating and correction be easily done?
		The system is inflexible to new situations	1. Is the MIS easily adaptable when faced with new situations? 2. Can the MIS be developed with flexible features?
		The system is inflexible to change	1. Can the MIS be developed further? 2. Is it possible to make improvements to the existing MIS? 3. Can new features be added to the existing MIS?

Table I. (Continued)

No	Variable	Indicator	Descriptor
6	Service	The system is not compatible with other systems	1. Is the MIS integrated with MISs in other units? 2. Is the MIS integrated with the District Health Office?

Data Analysis

Data analysis in qualitative research consisted of word descriptions, sentences, or narratives from the researcher that were valid, clear, and accountable. Data validity in this study was ensured through triangulation validity techniques using NVivo 12 plus software.

RESULTS AND DISCUSSION

The researchers evaluated the Management Information System (MIS) based on interviews, observations, and documentation with 1 pharmacist, 1 midwife, 1 nurse, and 2 pharmacy technical personnel. The MIS evaluation was carried out using the PIECES Framework method with six variables, starting from the performance variable, the first variable in the PIECES analysis method. This variable plays a crucial role in assessing whether the existing processes or procedures can still improve their performance and assessing to what extent and how reliable an information system is in processing data to achieve the desired objectives.[7] The results of the evaluation of Mijen Community Health Center's MIS align with Tarigan and Maksum[7] that e-community health centers, in terms of performance with the available menu options and navigation, facilitate health workers in operating the community health center management information system, thus, from a performance aspect, it falls into the good category.[7] The implemented MIS also assists personnel in faster information retrieval, consistent with research indicating that the application of MIS can expedite information retrieval.[8] The MIS evaluation results at Mijen Community Health Centers I and II can be seen in Table II.

The "Information and Data" variable is utilized to determine the quantity and clarity of information generated for a single search.[9] As explained in Table II, the presence of the MIS has not yet facilitated monthly reporting, but the information produced by the MIS is already entirely accurate. Information is vital in communication. Thus, accuracy and relevance are crucial in any information dissemination.[10]

The "Economics" variable is an analysis conducted to ascertain whether a system is appropriately implemented within an institution, considering financial aspects and the expenses incurred. This is highly important as a system is also influenced by the magnitude of expenses.[9] The results in Table II align with Pratitis's study, indicating cost savings perceived by users, such as reduced paper consumption and office supplies expenditure.[10]

A system's "Control and Security" variable must be implemented effectively to function well.[9] The security and confidentiality of patient data are essential considerations to maintain patient trust in healthcare providers.[11] As stated in Table II, the security system is not functioning well. Limiting access rights aims to safeguard patient data confidentiality in accordance with (PERMENKES RI No 269/MENKES/PER/III/2008) Article 14, which states that "Health service facility leaders are responsible for the loss, damage, forgery, and unauthorized use of medical records." Therefore, security at community health centers needs to be enhanced through access rights restrictions for users.

The "Efficiency" variable is an analysis conducted to determine whether a system is efficient or not, where minimal data input should result in satisfactory output.[9] The results in Table II indicate that the Mijen Community Health Center MIS cannot yet be used as a decision-making tool.

The "Service" variable is an analysis conducted to understand existing issues related to service provision.[9] From the results in Table II, implementing the MIS provides ease for users in daily drug dispensing data entry. Still, it cannot be fully utilized due to limitations of infrastructure, facilities, and human resources.

The interview transcripts in this study underwent data analysis using the NVivo 12 Plus software. This software allows qualitative researchers to conduct analytical data coding efficiently and effectively. Researchers create codes to interpret the meaning of each data for analytical purposes.[13] To assist the coding process in NVivo, nodes, and cases are utilized.[14] Nodes serve as variables to facilitate the coding process of research findings, while cases are broader, encompassing participants, demographics, and research locations.[10] The NVivo 12 Plus software also aids in data exploration through the use of Matrix Coding Query. Matrix Coding Query is a process in the analysis query stage. Researchers process data with a flexible approach to understand what is happening in the data from a more focused perspective and discover specific data patterns by identifying

Table II. Evaluation of Drug Management Information System at Mijen Community Health Center, Demak

Analysis	Before MIS Development
Performance	The MIS provides benefits and assists staff in daily drug dispensing; however, some tasks are performed manually, so the MIS implementation is not yet fully optimal. Staff feel faster and more effective with the implementation of MIS.
Information And Data	Information and data storage in the existing MIS is complete and accurate. The information and data the system provides are only used as supporting data in daily drug dispensing to patients; monthly reporting is still done manually.
Economics	The MIS does not cause cost escalation. Costs are only incurred during the initial purchase of the application and during maintenance if there is damage.
Control And Security	The MIS is still poorly implemented to maintain data confidentiality because usernames and passwords can be accessed by all staff in the community health center.
Efficiency	With the MIS, work becomes faster and easier in daily tasks, but the existing MIS cannot yet be used as a decision-making tool.
Service	The MIS at the community health center is capable of providing consistent and reliable information. Implementing MIS provides users convenience in drug data entry and can be operated easily without training. The MIS at Mijen Community Health Centers I and II is already integrated with other units but not yet integrated with the District Health Office (DKK).

combinations of nodes and attributes, displaying the results in a table.[15] This is aimed at understanding the relationship between nodes and cases. The interview guidelines in this study employ deductive techniques, whereby codes or nodes have been predetermined, and variables have been identified in advance. The Percentage Coverage values can be seen in Table III.

Based on Table III, it is evident that all variables have percentage coverage values, and all informants discussed all variables. The indicator "number of tasks" shows the highest percentage coverage result at 25.70%, while the lowest variable is the service variable at 0.75%. This indicates that the "number of tasks" indicator in the performance variable is frequently mentioned in the interview process. According to Aulia and Jasilah,[16] the higher the percentage coverage value of a variable, the more frequently it is mentioned in the interview process, and it is the most influential variable in system development.[16] Further analysis using Matrix Coding Query was conducted on nodes and cases. This analysis aims to determine how many statements from informants are used as references in nodes or as coding references. The results of the Matrix Coding Query analysis (Nodes and Cases) can be seen in Table IV.

Based on Table IV, the variable "Performance" has the highest number of references obtained from informant D. The variable "Information and Data" has the highest number of references generated from informant E. The variable "Economics" has the same number of references across informants A to E. The variable "Control and Security" has the highest number of references from informants A and B. The variable "Efficiency" has the highest number of references indicated by informant C. The variable "Service" has the highest number of references, indicated by informant C. These analysis results are also presented in chart form, as shown in Figure 1.

Understanding the Drug Management Information System (MIS) at Mijen Subdistrict Community Health Center in Demak appears to be good, particularly with informant D regarding the performance variable. Based on Figure 1, informants B and E have a more positive view of the Information and Data variable than others. They both mentioned that the current MIS does not fully provide complete and accurate information, suggesting additional features are needed. All informants share the same understanding regarding the Economics variable, acknowledging that the MIS helps minimize costs and provides benefits in daily use. Regarding Control and Security, informants A, B, and E express concerns about the lack of security since all community health center staff can access the MIS. Informant C demonstrates a better understanding of the Efficiency variable, noting that the MIS cannot yet be used as a decision-making tool and is only utilized for daily drug dispensing, with stock and expiration date information not included in the system. Informant C also exhibits a good understanding of the Service variable compared to others. In this study, informant C emerges as a critical informant due to their comprehensive understanding of the existing MIS. Evaluation results from data reduction and NVivo analysis

Table III. Percentage Coverage Values of Mijen Community Health Center MIS, Demak

Variable	Indicator	Files	References	Percentage Coverage (%)
Performance	Number of tasks or outputs	5	29	25.70
	Response Time	5	10	3.50
Information and Data	Output or Results	5	21	16.56
	Input	5	20	9.60
	Stored Data	5	19	9.02
Economics	Cost	5	9	6.05
	Benefits	5	16	8.06
Control and Security	Low security or control	5	21	10.15
	High security or control	5	18	7.38
Efficiency	Time efficiency	5	26	9.37
	Resource efficiency	5	9	1.44
	Required efforts	5	9	2.14
	Required resources	5	9	1.60
Service	The system produces inaccurate results	5	10	4.33
	The system produces inefficiency	5	11	2.53
	The system produces inconsistent results	5	11	2.97
	The system produces unreliable results	5	5	0.75
	The system is not easy to learn	5	11	3.56
	The system is not easy to use	5	14	1.99
	The system is rigid or inflexible to use	5	10	3.48
	The system is inflexible to new situations	5	16	4.91
	The system is inflexible to change	5	12	2.44

Table IV. Matrix Coding Query (Nodes and Cases)

	Informant				
	A	B	C	D	E
Performance	8	7	8	9	7
Information and data	14	15	9	8	18
Economics	5	5	5	5	5
Control and Security	9	9	6	8	7
Efficiency	11	10	12	11	9
Service	19	18	23	19	20

indicate that the implemented MIS at Mijen Community Health Center benefits daily drug dispensing tasks; however, some manual work is still required, and the system lacks certain features such as distribution, expiration date alerts, and minimal stock features.

Based on the results obtained after the evaluation, it is evident that there is a need for the development of the MIS. Through the development of the MIS, it is hoped that it can assist and simplify the work of pharmacy personnel in managing drugs and make their work more effective and efficient. The design of the MIS development is presented in several diagrams, including Data Flow Diagrams (DFD) and Entity Relationship Diagrams (ERD). The development begins with DFD and continues with ERD.

Based on the proposed Data Flow Diagram (DFD) for the development of the drug management information system, the system begins with the receipt of drugs by the Health Department according to the report on drug usage and drug requisition forms (LPLPO) from the previous month. The items are received and input into the system with the warehouse location. Drugs are distributed to subunits according to the requests of each unit. Pharmacy personnel input the list of drug requests into the MIS according to the subunit locations so that everything is well-documented. Drugs that the subunits have received are given to patients, which are then input into the system, ensuring that all transaction activities are recorded in the system.

An Entity Relationship Diagram (ERD) is a model that describes data in the form of entities, attributes, and relationships between entities.[17] The proposed design for the development of the drug management MIS

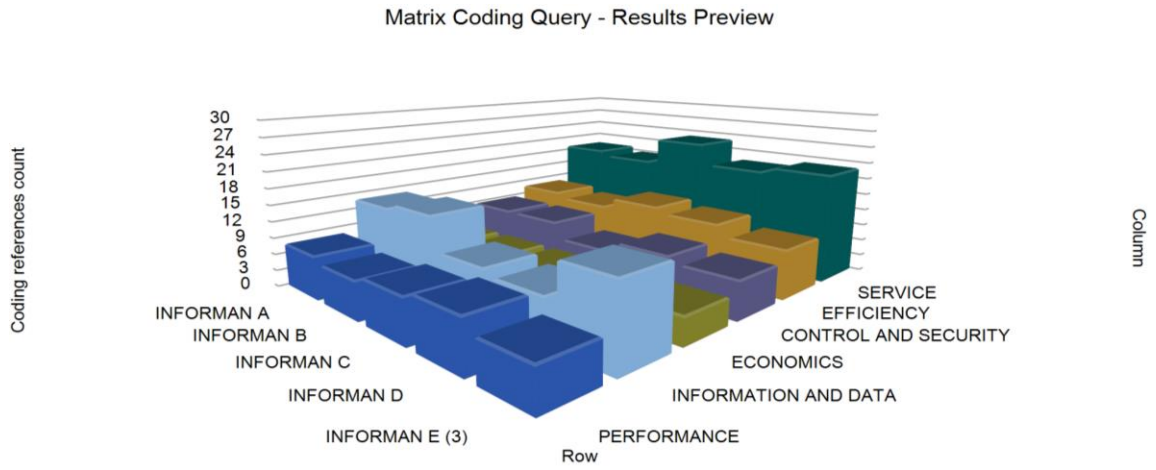

Figure 1. Matrix Coding Query (Nodes and Cases)

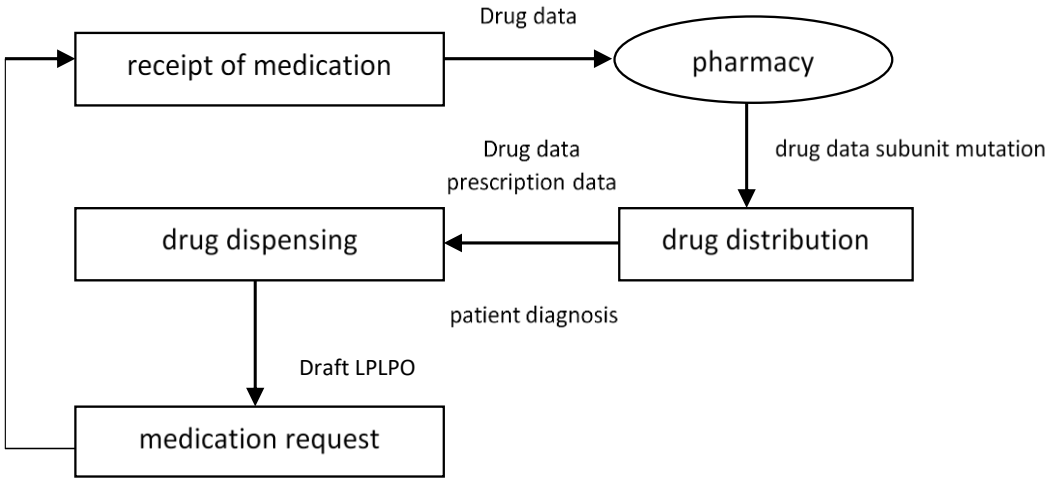

Figure 2. Data Flow Diagram

involves the receipt of drugs from the District Health Office (Dinas Kesehatan Kabupaten, DKK) to the drug warehouse at the community health center by inputting data such as the origin of drug receipt, drug code, drug name, quantity of drugs received, expiration date, unit of drug, batch number, location, unit, date of entry, and drug price. Drugs received by the community health center pharmacy warehouse are then subject to mutation or distribution to subunits such as outpatient care, inpatient care, Village Health Posts (Posyandu), and sub-health centers (Pustu). The mutation or distribution process is carried out to meet the drug needs in subunits according to the requests of their respective unit supervisors.

The data to be inputted in the drug mutation or distribution menu consists of drug code, drug name, quantity of drug, expiration date, drug unit, batch number, and location. Drugs that have been distributed to subunits can be dispensed. The drug dispensing menu includes the patient's name, doctor's name, quantity of drug, drug name, dispensing date, expiration date, batch number, and drug location. Each menu has a report providing information regarding drug reception, mutation or distribution of drugs, and drug dispensing.

The development design of the MIS that has been planned and further developed is then re-evaluated with five informants. The results of the evaluation can be seen in Table V.

Based on the table above, the performance variable indicates that the developed MIS design can be used to assist drug management at the Mijen Subdistrict Community Health Center. The new design is tailored to produce a system that meets user needs. The operation of the developed MIS provides quick response and fast data retrieval processes. Table V shows results that are consistent with Sholehah's study,[18] which states that the performance of the outpatient registration information system for BPJS patients at the Regional General Hospital

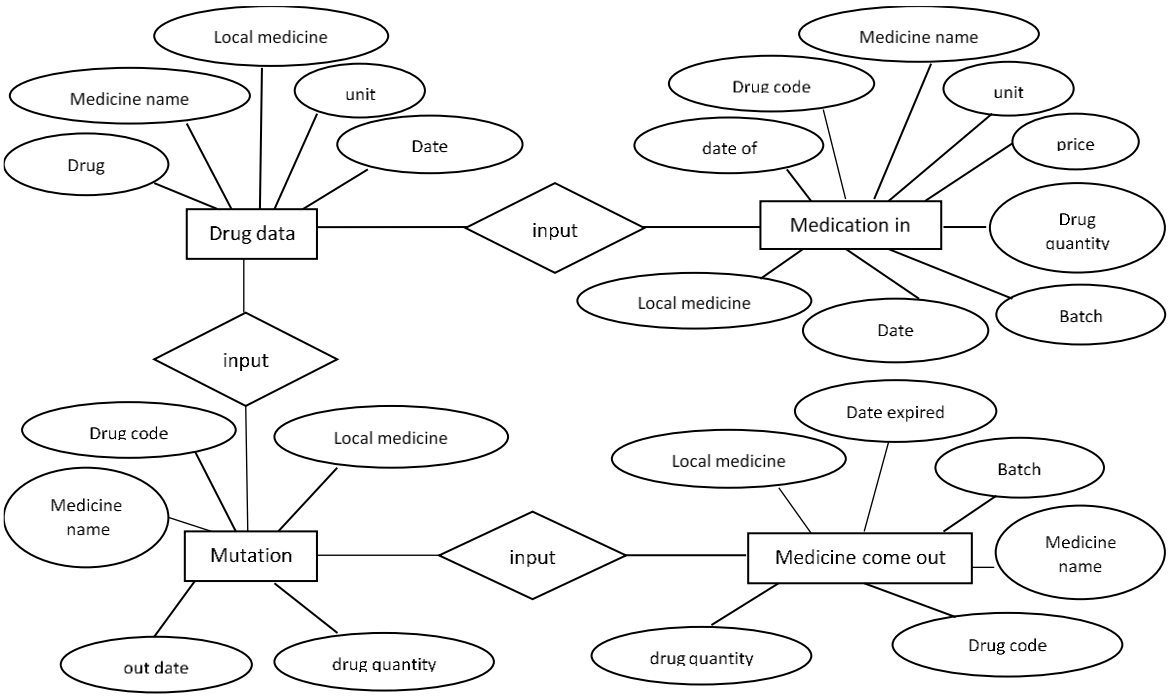

Figure 3. Entity Relationship Diagram

Table V. Evaluation of Drug Management MIS Development Design

Analysis	After MIS Development
Performance	The MIS provides benefits and assists staff in daily to monthly drug dispensing. The new MIS is equipped with alerts for drugs approaching ED and alerts for drugs with dwindling stock. The operation of the developed MIS provides quick response and fast data retrieval processes.
Information And Data	The design of the MIS development can provide fast, complete, and relevant information. The MIS development design can provide accurate information. The information generated can be used to aid decision-making.
Economics	The MIS does not cause cost escalation; costs are incurred only during maintenance.
Control And Security	The developed MIS uses the same username and password specifically for pharmacy unit staff and staff assigned to input drugs.
Efficiency	The design of the MIS development can help improve staff performance to be more effective and efficient. The information generated by the MIS can be used as a tool for decision-making.
Service	The information generated by the system is accurate and meets the needs of staff. The MIS development design provides consistent, reliable information and can be used as a decision-making tool. The MIS is not yet integrated with other units and the DKK.

of Sidoarjo District, based on the performance aspect can already generate information according to what is needed with a reasonably stable response time.[18]

The information and data variable shows results in Table V. The term "improved information quality" refers to information that becomes more relevant, accurate, and complete, presented in a timely manner.[7] In this study, the quality of the generated information has improved. The development design of the MIS can provide accurate information if users input data correctly. The generated information can be used to aid decision-making processes, from drug requests to the District Health Office (DKK) to the disposal of expired drugs and to facilitate LPLPO reporting. Users also find that data input can be quickly done, which aligns with the findings of Tarigan and Maksum, indicating that in terms of information aspect, the implementation of e-health centers at the West City Health Center falls into the good category, being easy to use, easy to learn, and producing easily readable outputs.[7]

The economic variable in implementing the MIS does not cause cost escalation; costs are incurred only during maintenance. This is consistent with the research by Yuli Prasetyo, which states that economic considerations are made by assessing the extent of the benefits provided by a system.[19] The development design of the MIS is tailored to user needs, with the expectation of being able to complete tasks more effectively and efficiently.

Table V shows that the Control and Security variable already utilizes a security system. The purpose of restricting user access rights is to ensure data security, prevent data leakage, and avoid misunderstandings in case of data input errors. Salam's study states that the data storage process using a database will guarantee data confidentiality and security. Each user accessing it is provided with a username and password, and data can be stored in large quantities.[20]

The Efficiency variable shown in Table V indicates that the development design of the MIS can help improve staff performance to be more effective and efficient. The information generated by the MIS can be used as a tool for decision-making. This is consistent with Sudjiman's study, which states that the information generated by the MIS benefits organizational needs and decision-making.[21].

The Service variable in Table V indicates that the information generated by the system is accurate and meets the needs of the staff. The development design of the MIS is considered to provide consistent, reliable information and can be used as a decision-making tool. This aligns with Setyawan's study[22], which states that Hospital Management Information Systems (HMIS) greatly assist in identifying issues that occur. Work is done using computerization and manual methods, making it easier to identify problems or errors, such as in reports, thus facilitating decision-making.[22]

The interview transcript from the evaluation of the MIS development design was coded using NVivo software. Table VI presents the percentage coverage values based on the coding results.

Table VI shows that all variables have a percentage coverage value, and all informants discussed all variables. Based on the results, the highest percentage coverage is shown in the performance variable by the indicator of the number of tasks at 40.35%. In comparison, the lowest variable is the service variable with the indicator "MIS is not easy to learn" at 1.33%. The indicator of tasks is frequently discussed, whereas the indicator "MIS is not easy to learn" is rarely discussed because MIS is easy to learn, and there are no difficulties in learning it.

Table VII shows that in the performance variable, the most references are obtained from informant D. The most references for the information and data variable are generated from informants C and E. The economics variable has the highest number of references from informants C and E. The control and security variable has the highest number of references from informant D.

The most references for the Efficiency variable are indicated by informant D. The most references for the Service variable are indicated by informant E. These analysis results are also presented in the form of a chart, which can be viewed in Figure 4.

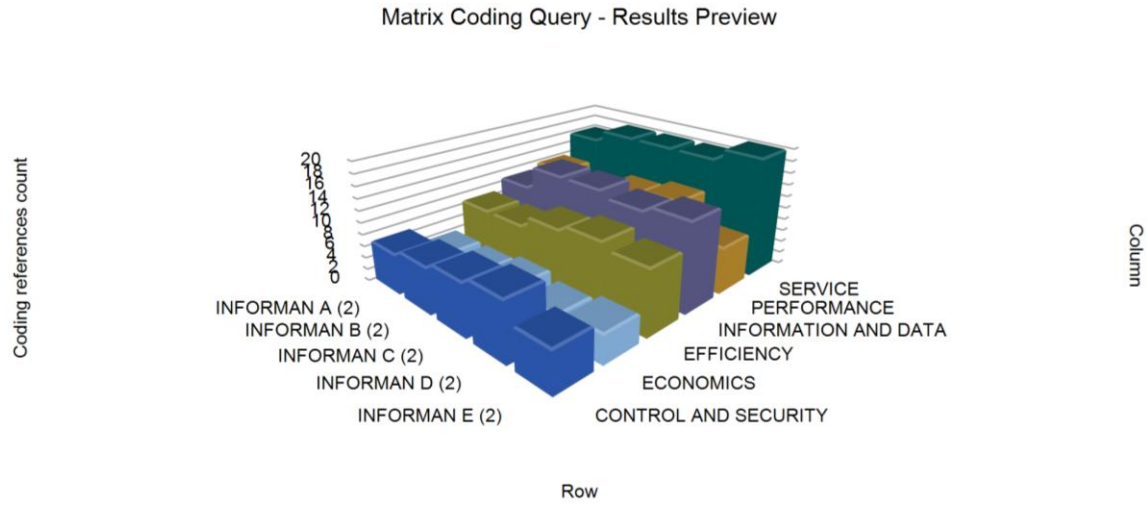

Figure 4. Matrix Coding Query (Nodes and cases)

Understanding related to the Drug Management Information System (MIS) at the Mijen Subdistrict Community Health Center appears to be better in informant D compared to other informants, who understand

Table VI. Percentage Coverage Values of Drug Management MIS Development Design

Variable	Indicator	Files	References	Percentage coverage (%)
Performance	Number of tasks or outputs	5	33	40.35
	Response Time	5	24	14.36
Information and Data	Output or Results	5	21	17.33
	Input	5	23	13.37
	Stored Data	5	27	15.16
Economics	Cost	5	10	6.83
	Benefits	5	13	8.99
Control and Security	Low security or control	5	20	7.21
	High security or control	5	21	7.08
Efficiency	Time efficiency	5	22	22.04
	Resource efficiency	5	11	4.19
	Required efforts	5	10	5.93
	Required resources	5	10	6.44
Service	The system produces inaccurate results	5	8	1.92
	The system produces inefficiency	5	10	3.92
	The system produces inconsistent results	5	9	4.88
	The system produces unreliable results	5	5	1.33
	The system is not easy to learn	5	10	4.43
	The system is not easy to use	5	14	2.74
	The system is rigid or inflexible to use	5	9	2.46
	The system is inflexible to new situations	5	15	3.03
	The system is inflexible to change	5	10	1.50

Table VII. Matrix Coding Query (Nodes and cases)

	Informant				
	A	B	C	D	E
Performance	12	7	12	13	8
Information and data	11	15	15	14	15
Economics	4	4	5	4	5
Control and Security	7	8	9	10	7
Efficiency	9	9	11	12	11
Service	16	18	18	18	20

the performance variable sufficiently. Informant D stated that the performance of the MIS Puskesmas (SIMPUS) has been helpful for the staff's tasks. Figure 4 shows that informants C and E have a more positive view of the information and data variable. They stated that the existing MIS can provide comprehensive and accurate information. Informants C and E have a better view of the economic variables. The new MIS does not cause cost escalation, but there are maintenance costs. Regarding the control and security variable, informant D has a better view of the MIS's usernames and passwords for a specific pharmacy section that can be accessed. In terms of efficiency, informant D has a better understanding. Informant D believes that the MIS can be used as a decision-making tool. For the service variable, informant E has a good understanding. In this study, informant D has a good understanding of the MIS development design and understands it better because informant D is a staff member who inputs data daily.

CONCLUSION

Implementing the MIS Puskesmas (SIMPUS) in the Mijen Subdistrict can assist and facilitate pharmacists in carrying out their duties; however, it has not yet been fully utilized as a decision-making tool. The design of the MIS development was created using Data Flow Diagrams (DFD) and Entity Relationship Diagrams (ERD), comprising several features including stock in (Medicine Receipt), stock out (Medicine Dispensation), and mutations or distributions supplemented with drug expiration date warnings, minimum stock alerts on the

dashboard, and accompanied by reports for each feature. Implementing the new MIS development design can assist and facilitate users by providing comprehensive information, thus enabling it to be utilized as a decision-making tool.

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STATEMENT OF ETHICS

This research met the ethical requirements of research No.446/XI/2022/Ethical Commission issued by the Medical/Health Research Bioethics Commission, Faculty of Medicine, Islamic University of Sultan Agung Semarang on November 30, 2022.

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Healthcare Professionals' Attitudes towards Adverse Drug Reactions Reporting in Primary Healthcare Settings: A Cross-sectional Survey

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ABSTRACT

Background: Spontaneous Adverse Drug Reactions (ADRs) reporting is a key to improving the post-marketing safety of medicines. The important factor of under-reporting is lack of awareness for the purpose of ADRs monitoring and reporting. Spontaneous reporting is performed by the patients or consumer to the healthcare professionals and/or industry, then the healthcare facilities and industry should report the suspected ADRs to the National Agency of Drugs and Food Control (NADFC). To date, there is a lack information and study about attitudes on ADRs reporting by healthcare professionals (HCPs), especially in primary healthcare settings.
Objectives: The aim of this study was to identify the attitudes towards ADRs reporting by healthcare professionals (HCP).
Methods: This research was survey study with cross-sectional design, from November 2022-March 2023. The questionnaire, that have been validated and reliable, was distributed to 3 primary healthcare facilities. demographic data questions (6 items), experiences (3 items), knowledge (4 items), and motives for reporting (1 item).
Results: Total 39 HCPs completed the survey, including 14 nurses, 9 midwifes, 3 general physicians, 3 pharmacists, and 10 other professions. Most of respondents were women (84.6%), and mostly the HCPs have been working for ≥5 years (74.3%). Among 39 respondents, only 1 pharmacist have a good attitude about ADRs reporting. The other HCPs had a lack of knowledge and safety awareness. The dominant motives for reporting the ADRs was serious or severe ADRs (39.4%) and the assurance of causality assessment by suspected drugs (15.4%).
Conclusion: In conclusion, the HCPs in primary healthcare settings had poor attitudes towards ADRs reporting.
Keywords: ADRs reporting; attitude; healthcare professionals; primary healthcare

INTRODUCTION

Adverse drug reactions are defined as a response to a drug that is noxious and unintended and occurs at doses normally used in man for the prophylaxis, diagnosis or therapy of disease, or for modification of physiological function, based on WHO definition term.[1] The adverse drug reactions (ADRs) are natural of all drug therapy and inflected by several factors, including dose and frequency of administration, genotype, and pharmacokinetic characteristics of special populations, such as paediatric and geriatric patients and those with hepatic or renal impairment. ADRs would lead to hospital admission, prolonged-hospitalization, and emergency department visits.[2] In 2016, the ADRs report involving older adults (>65 years old) is 5367 reports in Germany, which the highest report in age groups 76–84 and 70–79.[3]

The early detection of signals, rare, or serious ADRs will be obtained from spontaneous reporting.[4] Spontaneous ADRs reporting is key to improving the post-marketing safety of medicines.[5] One systematic review across 12 countries showed that the median under-reporting rate was 94%.[6] The important factor of under-reporting is lack of awareness for the purpose of ADRs monitoring and reporting.[5]

In Indonesia, the ADRs report (paper based/website) voluntarily reported by healthcare professionals (HCPs) to the National Agency of Drug and Food Control (NADFC) using special form, called yellow form (paper based) or the digital form in the government website.[7] Along with that, healthcare professionals have an important role to monitor and report the ADRs. Spontaneous reportings are performed by the patients or consumer to the healthcare professionals and/or industry, then the healthcare facilities and industry should report the suspected ADRs to the NADFC. Study from Musdar et al. showed that pharmacists in Indonesia had a good knowledge about the objective of ADRs reporting but only 46.9% pharmacists known about how to report the suspected ADRs to the NADFC.[8]

Primary healthcare facilities or locally called Puskesmas have an important role to serve the first healthcare services in national healthcare coverage program. To date, there was a lack information and study about ADRs reporting in primary healthcare facilities, especially about the attitude of HCPs. The aim of this study was to identify the attitudes of healthcare professionals on ADRs monitoring and reporting.

METHODS

Study settings

The study was a cross-sectional design using questionnaire, from November 2022 – March 2023. The questionnaire distributed online using Zoho® form in Puskesmas Ibrahim Adjie, Puskesmas Padasuka, and Puskesmas Garuda in Bandung area, Indonesia.

Population and Sample

The purposive sampling technique was applied to this study through population in three Puskesmas. The general physician, specialist physician, dentist, pharmacist, nurse, midwife, and other HCPs such as nutritionist or radiologist, were eligible to participate in the study. Inclusive criteria were men or women with age ≥ 18 years old and have been practiced for at least six months. The uncomplete data in questionnaire would lead to exclusion.

Study Instrument

The data was collected using a self-administered questionnaire, consists of demographic data questions (6 items), experiences (3 items), knowledge (4 items), and motives for reporting (1 item). The outcome measure of this study was responders' attitudes for ADRs reporting. The item surveys were discussed between researcher after study literature using Indonesian version and validated to 30 HCP respondents before study. The validity and reliability test were conducted using Pearson Product Moment, Kuder Richardson-20 (KR-20) and Cronbach's Alpha test. All the questions were valid ($r>0.553$), acceptable (KR-20 score=0.803), and reliable ($\alpha=0.718$).

Data Analysis

The data collected through Zoho® form were recorded and retrieved in .xlsx format. Descriptive data and chi-square statistical analysis have been completed by IBM SPSS v.26.

RESULTS AND DISCUSSION

Demographic data

A total of 56 valid questionnaire were distributed and only 39 respondents (69.6%) agreed to filled out that completely. More than half of respondents were women (85%) and nurse (36%). As shown in Table I, about 33% respondents have been working for more than 20 years.

Experiences on ADRs handling

Overall, 17 respondents (43.6%) claimed to have experience on handling ADRs reported spontaneously by patient. Only 1 general physician had an experience on handling ADRs, but almost the ADRs case received by nurse (29.4%) and midwife (35.3%) in primary healthcare facilities. These results similar with the study in Pakistan that showed the ADRs reporting usually sent by patients to nurse.[9] The characteristics of healthcare professionals in this study slightly different with other study about ADRs reporting, because of different clinical settings.[10,11,12]

Table I. Demographic data

Characteristics	N (%)
Gender	
Male	6 (15.4)
Female	33 (84.6)
Profession	
Nurse	14 (35.9)
Pharmacist	3 (8)
General physician	3 (8)
Midwife	9 (23.1)
Other medical staff	10 (25.6)
Working experiences (years)	
<5	10 (25.6)
5 – 10	10 (25.6)
10 – 20	6 (15.4)
>20	13 (33.3)
Experiences on ADRs handling	
Yes	17 (43.6)
No	22 (56.4)

The ADRs monitoring and reporting more familiar in hospital setting than primary healthcare. A scoping review in Australia showed the ADRs mostly reported by hospital pharmacist compared with physician. Community pharmacists also received the ADRs report by the patients but only 40% of patients satisfied with the warning card in community pharmacists.[13] Study in Sri Lanka showed although most HCP selected the correct definitions of ADRs and pharmacovigilance, the majority of HCP did not aware of the types of ADRs, banned drugs due to ADRs and ADRs reporting centers.[14]

Attitudes on ADRs reporting

The HCPs attitudes on ADRs reporting assessed by five item questions about reporting system applied in Indonesia by NADFC. The questions were a 2-point scale (yes/no), and the positive attitude expressed by the total score more than two. Among 39 respondents, only one pharmacist showed a positive attitude on ADRs reporting (Table II). The pharmacist usually had a good knowledge and attitude about ADRs.[10,11] Different result showed in study held in Thailand that the physician had the highest score of attitudes, followed by pharmacist and nurse. But the overall mean attitude scores were not significantly different between physician, pharmacist, and nurse.[15]

Most respondents had a poor attitude towards ADRs monitoring or reporting. Study in Thailand showed that around 40% of all HCPs have a positive attitude towards severe ADRs monitoring, which is a lower proportion than the previous studies.[11,16–18] The HCPs agreed that the management of severe ADRs could improve patient compliance, confirming a previous study that found that ADRs influence medication adherence.[15] In the current study, the HCP respondents agreed that it can be difficult to differentiate between severe ADRs and adverse events with other causes, as found in the previous studies.[17,18] Underreporting has been a global problem even in countries with more organized pharmacovigilance systems. The most common reasons for underreporting were being lack of time, uncertainty about ADRs diagnosis, what and where to report, difficulty in handling report forms, and lack of awareness of the reporting system requirements.[19]

Awareness among healthcare professionals, collaboration among other healthcare professionals and training for healthcare professionals were the highly suggested ways to improve ADRs reporting. Healthcare professionals believed that making ADRs reporting, a professional obligation and involved pharmacists for ADRs reporting can also improve ADRs reporting.[20]

The healthcare professionals in Indonesia more familiar with the paper reporting method using yellow form than website or mobile app for ADRs reporting. This method is preferable because of the easier access to report the incidence immediately without electronic devices, such as handphone or computer, and internet connection. In the other hand, the paper method was applied as preliminary data before the clinical judgement and causality assessment in the facilities.

Most of the physicians and pharmacists were more concerned about ADRs, which are serious, including hospitalization, causing death or disability or reactions to newly marketed products, while nurses were even concerned about the reporting of both the minor and major types of reactions to drugs.[21] This perception could be due to the reason that usual or minor ADRs are inevitable and do not cause much harm. However, serious, or life-threatening reactions may endanger the life of patient, and thus should be reported.

Table II. Attitudes on ADRs reporting by HCPs

Statement (Attitude on…)	N				
	Physician	Pharmacist	Nurse	Midwife	Other
Using yellow form for ADRs reporting	2	1	9	5	4
Using E-Meso website for ADRs reporting	0	0	0	0	0
Using Mobile app e-Meso for ADRs reporting	0	0	0	0	0
Reporting ADRs to quality committee in healthcare facility	1	2	5	4	6

The current study has some limitations. It was conducted only in the northeastern region of Bandung area. Hence, our findings may not be generalized to all HCPs in Bandung or Indonesia. Moreover, the gathered findings were obtained from self-administered questionnaire, which may be subject to recall and social desirability biases.

CONCLUSION

The HCPs in primary healthcare settings had poor attitudes towards ADRs reporting. The paper method using yellow form were more familiar for HCPs then website and mobile app for ADRs reporting. The intervention to increase ADRs reporting by healthcare professionals is needed.

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CONFLICT OF INTEREST

None to declare.

STATEMENT OF ETHICS

Approval for the study was obtained from Institutional Review Board, Fakultas Kedokteran, Universitas Padjadjaran, Bandung, No. 912/UN6.KEP/EC/2022 on September 16, 2022. Each respondent was informed about the study on the first page of the forms and continued to fill in the questions if they agreed to participate in the study.

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Relationship between Patients' Knowledge and Medication Adherence of Tuberculosis at Islamic Hospital Pondok Kopi Jakarta

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ABSTRACT
Background: Tuberculosis (TB) remains a health problem in Indonesia. Currently, the number of new TB cases in Indonesia ranks second after India. Patient compliance in using antituberculosis drugs is critical in achieving successful treatment outcomes, prevent further spread of the bacteria that cause TB and the development of drug resistance. Adherence to taking medication can be influenced by various factors, one of which is the level of knowledge.
Objectives: This study was aimed to determine the relationship between the level of knowledge about TB and medication adherence of TB patients at the Jakarta Islamic Hospital Pondok Kopi.
Methods: This study was conducted from May to June 2022 with a cross sectional design. The inclusion criteria in this study were TB patients who were over 18 years old, willing to become respondents, and had used antituberculosis drugs for at least one month. The level of knowledge about TB was assessed using a questionnaire and medication adherence was assessed using the MARS-5 questionnaire.
Results: The number of respondents in this study was 83 patients. Most patients were male (57.83%), less than 60 years old (83.13%), and had a high school education (53.01%). The results showed that most patients (73.47%) had a good level of knowledge and were compliant with taking medication (77.11%). The level of patient knowledge about TB has a significantly moderate and positive correlation with the level of adherence in taking medication (p 0.001; r 0.517).
Conclusion: increasing patients' knowledge about TB can lead to better patients' adherence, which may lead to better treatment outcome.
Keywords: Adherence; MARS-5; Knowledge; Tuberculosis

INTRODUCTION

Tuberculosis (TB) is an infectious disease caused by *Mycobacterium tuberculosis*. This bacteria is often found infecting the lung parenchyma and causes pulmonary TB, but it can also infect other body organs such as lymph nodes, bones, and other organs.[1] Tuberculosis is one of the main causes of death worldwide. Geographically, in 2021, the largest number of TB cases was in the Southeast Asia region, namely 45%, where Indonesia (9.2%) ranked second with the highest number of TB cases after India (28%).[2] The estimated TB incidence in Indonesia in 2021 is 969.000 or 354 per 100,000 population. However, based on TB incidence figures in Indonesia, only 443,235 cases were notified in 2021.[3] Meanwhile, the number of TB cases in DKI Jakarta in 2021 was 26,854 cases.[4]

Most TB patients can be cured with first-line drug administration for 6 months and timely diagnosis.[5] In Indonesia, all patients who have not been previously treated and do not have risk factors for resistance must receive first-line drugs approved by the WHO. This first-line treatment includes administering Isoniazid, Rifampicin, Pyrazinamide, and Ethambutol for two months, followed by administering Isoniazid and Rifampicin for 4 months. The success rate for TB treatment in Indonesia in 2021 was 85.9%. This still did not reach the target set by the Indonesian Ministry of Health, namely at least 90%. Meanwhile, in DKI Jakarta the success rate for TB

treatment was only 79.2%.[3]

One of the factors that can influence the success of treatment in TB patients is patient non-adherence with the use of Anti-Tuberculosis Drugs (OAT).[1] The results of previous research conducted in several regions in Indonesia show that there are still TB patients who are not adherent to medication use. The results of research conducted at the Cengkareng District Health Center showed that 32.2% of TB patients were non-adherent in using medication.[6] Research conducted at the Jakarta Harbor Hospital also showed that 24.7% of patients were non-adherent in using medication.[7] The results of another study conducted at one of the Bandar Lampung City Health Centers showed that only 74.4% of TB patients had a high level of drug use adherence.[8]

Patients' lack of knowledge about TB can affect their adherence to drug use. Patients with a good level of knowledge tend to be adherent in using medication[910]. However, the results of previous research show that many TB patients still have poor knowledge concerning this matter. The results of research conducted at the Kota Timur Community Health Center show that 34.4% of patients had a poor level of knowledge.[9] These results are in line with research conducted at the Andalas Health Center, Padang City, which found that 30.8% of patients had a poor level of knowledge.[10]

Factors that can influence adherence in TB patients must be evaluated so that they can support the success of patient therapy. Therefore, this study aims to determine the relationship between the level of patient knowledge about TB and the patients' adherence at the Jakarta Islamic Hospital Pondok Kopi.

METHODS

Study design

This research was non-experimental research with a cross-sectional research design. This research was conducted at the Jakarta Islamic Hospital (RSIJ) Pondok Kopi. The research was conducted from May to June 2022. This research has been approved by the Medical and Health Research Ethics Committee of Muhammadiyah University, Prof. DR. HAMKA (KEPKK-UHAMKA) with ethical approval No. 03/22.04/01694 dated April 13th, 2022.

Population and samples

The population in this study were all patients diagnosed with pulmonary TB. The inclusion criteria in this study were patients who were over 18 years old, willing to become respondents by signing informed consent, and had used OAT for at least 1 month. The exclusion criteria for this study were patients with communication disorders and those who did not fill out the questionnaire completely. The sampling technique used was total sampling.

Study instruments

In this study, patient knowledge about TB and patient adherence were obtained from primary data in the form of questionnaires. The knowledge questionnaire consisted of 21 questions related to TB including 3 questions about the causes of TB, 5 questions about the risk factors, 4 questions about the transmission methods, 5 questions about the signs and symptoms, and 4 questions about the treatment. The answer choices on the knowledge questionnaire consisted of yes and no. The correct answer was given a score of 1, while the wrong answer was given a score of 0. The minimum and maximum score range that a patient could obtain was 0 to 21. The knowledge questionnaire used was valid and reliable with a Cronbach's alpha value of 0.774.[11] The total knowledge score obtained by each respondent was tested for normality using the Kolmogorov Smirnov test and it was found that the data was not normally distributed with a median value of 15. Therefore, in this study, the median value was used as the cut-off point for the level of patient knowledge, where the level of knowledge was good if the score was ≥ 15 and poor if the score was < 15.[12]

Adherence in this study was assessed using the Medication Adherence Rating Scale-5 (MARS-5) questionnaire.[13] The MARS-5 questionnaire used in Bahasa Indonesia was valid and reliable with a Cronbach's alpha value of 0.940.[14] The MARS-5 questionnaire consisted of 5 questions with answer options always, often, sometimes, rarely, and never. The respondents' level of adherence was assessed from the total score obtained, where the patient is adherent if the score is 25 and non-adherent if the score is < 25.

Data collection

All TB patients who met the inclusion criteria and consented to participate in the study were asked to complete a sociodemographic questionnaire, knowledge questionnaire and MARS-5. Next, the researcher

collected the questionnaires completed by the patients and rechecked the patients' clinical and treatment data in the medical record.

Data Analysis

Univariate analysis was carried out to obtain the frequency distribution of demographic characteristics, level of knowledge, and adherence. Bivariate analysis with the chi-square test was carried out to analyze the relationship between respondent characteristics and level of knowledge and adherence, while the Spearman Rho test was carried out to analyze the relationship between level of knowledge and adherence to taking medication. Two variables were concluded to have a significant relationship if the p-value < 0.05.

RESULTS AND DISCUSSION

The number of TB patients at the RSIJ Pondok Kopi pulmonary TB clinic for the period May to June 2022 was 88 patients. A total of 5 patients were excluded because they were patients with communication disorders. Therefore, only 83 patients met the inclusion criteria. The majority of TB patients in this study were younger than 60 years old (83.13%) and male (57.83%). The most recent level of education of patients was Senior High School (53.01%). In this study, the percentage of patients who worked was only 48.19%. The majority of patients had suffered from TB for more than 2 months and were undergoing 2-drug fixed-dose combinations (2FDC) therapy (55.42%). The majority of patients did not suffer from comorbidities and did not take routine medications other than OAT (80.72%) (Table I).

The results of this study showed that the majority of patients have good knowledge about TB (73.49%) (Table II). The average knowledge score of 83 patients was 15 $\pm$ 2.64. These results are in line with previous research conducted in several regions in Indonesia, where the majority of patients had a good level of knowledge.[9,10,15] The percentage of patients who had a good level of knowledge in this study was higher than the research conducted at the Kota Timur Health Center and the Andalas Health Center, Padang City.[9,10] However, this result is lower than the results of previous research at a hospital in West Java[15]. This variation can be caused by various factors, including the characteristics of the respondents and the cut-off point for knowledge scores in this study, which are different from previous studies.

The results of this study showed that the majority of patients were adherent in using medication (77.11%) (Table III). These results are in line with the previous research at a hospital in West Java and Jakarta Harbor Hospital which showed that the majority of patients were adherent to using medication.[15,7] However, several previous studies also found that the majority of patients were adherent in using medication, but the percentage was lower than the findings in this study.[9,16,17] This variation can be caused by differences in research instruments, respondent characteristics, and cut-off points for adherence scores between this study and the previous studies.

The results of the data analysis show that age and education are significantly related to the level of knowledge ($p<0.05$). However, no significant relationship was found between gender, occupation, duration of suffering from TB, type of FDC drug used, comorbidities and other routine drugs consumed, and level of knowledge ($p>0.05$). (Table IV). In this study, patients aged younger than 60 years old mostly had good knowledge (79.71%), while patients aged 60 years and over mostly had poor knowledge (57.14%). These results are in line with the previous research at the Respira Special Lung Hospital in Yogyakarta which concluded that there was a relationship between age and knowledge of TB patients.[18] These results are supported by previous research which shows that working memory capacity in elderly people is 3.15 times lower than in younger people. Working memory capacity is a measure of the brain's ability to store information for a short time and process it actively so that it can influence a person's ability to plan, process information, and solve problems.[19]

The results of the data analysis also show that education is significantly related to the level of knowledge (Table IV). The majority of patients with a tertiary education had a good level of knowledge (96%), while the majority of patients with an elementary-middle school education had poor knowledge (71.43%). These results are also in line with the previous research at the Respira Special Lung Hospital in Yogyakarta which concluded that there was a relationship between age and knowledge of TB patients.[18] The results of this research are also consistent with Notoatmojo's theory which states that education is one of the factors that influence human behavior. Someone with a high level of education can provide more rational feedback on the information received.[20]

In this study, the results of data analysis showed that there was no significant relationship between gender, age, education, occupation, duration of suffering from TB, type of FDC, comorbidities and other routine medications consumed, and the level of patient adherence. These results are in line with several previous

studies which also concluded that gender, age, education, occupation, length of time suffering from TB, type of

Table I. Respondent Characteristics

Characteristics	Total (n=83)	Percentage (%)
Sex		
Male	48	57.83
Female	35	42.17
Age (year old)		
< 60	69	83.13
≥ 60	14	16.87
Last Education		
Elementary-Middle School	14	16.87
Senior High School	44	53.01
Tertiary	25	30.12
Working status		
Working	40	48.19
Not working	43	51.81
TB Duration (month)		
≤ 2	37	44.58
> 2	46	55.42
Type of OAT consumed		
2FDC	46	55.42
4FDC	37	44.58
Comorbidities		
Existent	16	19.28
Nonexistent	67	80.72
Other routine medications consumed		
Existent	16	19.28
Nonexistent	67	80.72

Table II. Distribution of Patients Based on Level of Knowledge about Tuberculosis

Category	Total (n=83)	Percentage (%)
Good	61	73.49
Poor	22	26.51

Table III. Distribution of Patients based on Adherence Level

Category	Total (n=83)	Percentage (%)
Adherent	64	77.11
Non-adherent	19	22.89

FDC, comorbidities and other routine medications consumed by patients do not have a significant relationship with TB patient adherence.[21,22]

The World Health Organization (WHO) concluded that patient adherence can be influenced by 5 factors or dimensions, namely socio-economic factors, health service system/team factors, condition factors, patient factors, and used therapy factors. One of the patient factors that influences adherence is patient knowledge.[23] The results of the Spearman-Rho test show that there is a significant relationship between the level of knowledge and patient adherence in taking medication (p 0.001) with a strong correlation strength (r 0.517) and a positive correlation direction, which means that the higher the level of knowledge, the higher the level of adherence (Table V). The results of this research are supported by previous research in Indonesia which concluded that there is a significant relationship between knowledge and adherence.[24,25,9] Based on the results of this research, various efforts need to be made to provide education for TB patients to increase knowledge about TB. Good patient knowledge is expected to increase adherence in undergoing treatment so that successful therapy for TB patients can be achieved.

Table IV. Relationship between Respondent Characteristics and Level of Knowledge and Adherence

Characteristics	Level of Knowledge				*p value*	Adherence				*p-value*
	Good		Poor			Adherent		Non-adherent		
	n	%	n	%		n	%	n	%	
Sex										
Male	32	66.67	16	33.33	0.099	35	72.91	13	27.08	0.287
Female	29	82.86	6	17.14		29	82.86	6	17.14	
Age (year old)										
< 60	55	79.71	14	20.29	0,004*	55	79.71	14	20.28	0.210
≥ 60	6	42.86	8	57.14		9	64.28	5	35.71	
Last Education										
Elementary-Middle School	4	28.57	10	71.43	0,001*	9	64.28	5	35.71	0.213
Senior High School	33	75.00	11	25.00		33	75.00	11	25.00	
Tertiary	24	96.00	1	4.00		22	88.00	3	12.00	
Working status										
Working	32	80.00	8	20.00	0.194	33	82.50	7	17.50	0.259
Not working	29	67.44	14	32.56		31	72.09	12	27.90	
TB Duration (month)										
≤ 2	26	70.27	11	29.73	0.551	27	72.97	10	27.03	0.421
> 2	35	76.09	11	23.91		37	80.43	9	19.57	
Type of OAT consumed										
4FDC	26	70.27	11	29.73	0.551	27	72.97	10	27.03	0.421
2FDC	35	76.09	11	23.91		37	80.43	9	19.57	
Comorbidities										
Existent	11	68.75	5	31.25	0.632	15	93.75	1	6.25	0.078
Nonexistent	50	74.63	17	25.37		49	73.13	18	26.87	
Other Routine Medications										
Existent	11	68.75	5	31.25	0.632	15	93.75	1	6.25	0.078
Nonexistent	50	74.63	17	25.37		49	73.13	18	26.87	

Information: *statistically significant with chi-square test ($p<0.05$)

Table V. Correlation Test Results of Respondents' Level of Knowledge and Adherence

Level of Knowledge	Adherence Level		*p-value*	Correlation Coefficient
	Adherent (%)	Non-adherent (%)		
Good	55	6	0.001	0.517
Poor	9	13		

CONCLUSION

From the results of this study, it can be concluded that the majority of patients have a good level of knowledge (73.49%) and adherence to taking medication (77.11%). The level of patient knowledge about TB has a significant relationship with the level of adherence to taking medication (p 0.001).

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CONFLICT OF INTEREST

None to declare.

STATEMENT OF ETHICS

This research has been approved by the Medical and Health Research Ethics Committee of Muhammadiyah University, Prof. DR. HAMKA (KEPKK-UHAMKA) with ethical approval No. 03/22.04/01694 dated April 13th, 2022.

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