MEDICINES PLANNING AND PROCUREMENT MANAGEMENT AN ACADEMIC HOSPITAL IN YOGYAKARTA, INDONESIA: A QUALITATIVE STUDY

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ABSTRACT

Inventory management remains a critical issue for hospital pharmacies. Thus, there is a need for pharmaceuticals to meet economic resources. Moreover, the decision to make drug requests available should be considered, and the complexity of the problem lies in the random nature of and the various constraints that must be considered in any decision. This study aimed to analyze drug management during the planning and procurement stages of medicine in a teaching hospital in Yogyakarta. The qualitative method was used to his type of research is descriptive-analytical with a case study design of one of the public, academic hospitals in the Yogyakarta area. Data collection was conducted through interviews using a content analysis approach. The analysis technique was carried out by reducing data, analyzing data, identifying themes, and extracting data interpretation with the help of NVIVO 12 software. Overall, interviews were conducted with six participants to obtain information on drug management during the planning and procurement stages in the hospital, following the standards of home pharmacy services. The stages also included budget allocation by volume of services, increasing the competence of human resources, which supports the improvement of drug management performance, implementation of e-prescribing to facilitate monitoring evaluation, and availability of complete standard operating procedures. However, the accuracy of drug planning still needs to be improved so that an integrated management information system can support optimal drug management in a teaching hospital pharmacy installation.

Keywords: *Drug management, drug planning, drug procurement, public academic hospital*

INTRODUCTION

Drug supplies are a type of pharmaceutical supply needed by the hospital. Medicines and health supplies constitute an arrangement that involves various efforts to guarantee the availability, equity, and quality of medicines and health supplies in an integrated and mutually supportive manner to achieve the highest degree of health. Activities in the management of medicinal preparations and consumable medical materials cover the entire cycle of the drug supply chain in hospitals, from the selection of drugs to their use, all of which are complex and interrelated (Kementerian Kesehatan RI, 2019). Inefficient drug management causes a decrease in the availability of drugs, drug vacancies, the number of drugs that accumulate due to inadequate drug planning, and the large number of medications that expire or are damaged due to a poor distribution system, which results in inefficiency in the use of budgets or costs (Pramukantoro, 2018; Iskaputri et al., 2020).

Inventory management is an essential issue in hospital pharmacy departments. Pharmaceutical clinical needs must be met with limited staffing, while minimizing the use of financial resources. The problem is compounded by the randomness of drug requests and various constraints to consider when making decisions. The flexibility of the predictive control model allows it to explicitly describe many goals and conditions associated with a problem, and the use of probabilistic constraints provides a trade-off between conservatism and efficiency (Jurado et al., 2016).

The results of previous studies at Panti Wilasa Citarum Hospital, which is a type C hospital, a level 2 referral hospital for patients with the Health Insurance Provider Board (BPJS), show that drug planning according to the hospital formulary and national formulary, planning and procurement based on the drug procurement plan, in pharmaceutical installations do not make drug procurement plans and do not manage inventory by VEN-ABC. BPJS drugs have a longer lead time than regular drugs; therefore, the Reorder Point (ROP) calculation for BPJS and common drugs must be separated. Administration of BPJS drugs at the Citarum Wilasa Panti Hospital according to the national formulary. The Board of Directors determines the administration of medicines outside the national formula prescribed by doctors by considering whether the patient needs these drugs, whether alternative substitute drugs are included in the BPJS, and drug prices. Hospitals overcome differences in drug prices by saving in other parts, namely by streamlining treatment and consumables, and using cheaper medical devices (Mendrofa and Suryawati, 2016).

The Sheikh Yusuf Gowa Regional General Hospital findings show that managing drug supplies is adequate; however, several factors can affect the supply of drugs. This can be seen from several input components (facilities, especially storage warehouses that are less representative), processes (inconsistency in the use of supplies, inaccurate planning, changing room temperatures affecting existing stocks, delays in reporting empty stores, and negligence of staff, which result in preparations becoming damaged and expired) (Satrianegera et al., 2018).

Based on research in China, data were obtained from 20 antidiabetic drugs, and 70.6% had drug availability below 50%. Higher total drug availability has been found in secondary and tertiary hospitals than in primary hospitals (Gong et al., 2018). Research on the availability and affordability of medicines in various health facilities in Rwanda also shows that drug availability still needs to reach the target of 80% set by WHO. However, the percentage of drug availability in these data is better than that reported in many other developing countries. The highest availability of medicines was in the private sector (71.3%) and was slightly lower in the religion-based industry (62.8%) and the public sector (59.6%). A system must regularly monitor the availability, price, and affordability of essential medicines in public and private facilities (Bizimana et al., 2020). Findings at Kenyan Public hospitals revealed that most of the essential medicines, including general antibiotics, general analgesics, antihypertensives, and emergency and pediatric medicines, were out of stock. Out-of-stock is caused by poor distribution (91.2%), funding problems (58%), improper selection (58%), and irrational use of essential medicines (56%) (Wangu and Osuga, 2014). A review of previous studies showed that there are still significant variations in drug availability, and there are still many problems with drug availability, both in Indonesia and other countries.

In density visualization mapping using VOSViewer (**Figure 1**), the level of popularity is indicated by the frequent occurrence of keywords and marked with yellow areas, such as drug management and management strategy. Rooms in green, such as tertiary hospitals, indicate that these keywords are often used. The management of drugs in an academic hospital setting is rarely studied, as seen in keywords that do not appear in the visuals, so further studies are still needed, and at the same time, it is a **novelty value** in this study. Based on the background described, the researcher aimed to analyze drug management in the planning and procurement stages of medicine in a teaching hospital in Yogyakarta using a qualitative approach.
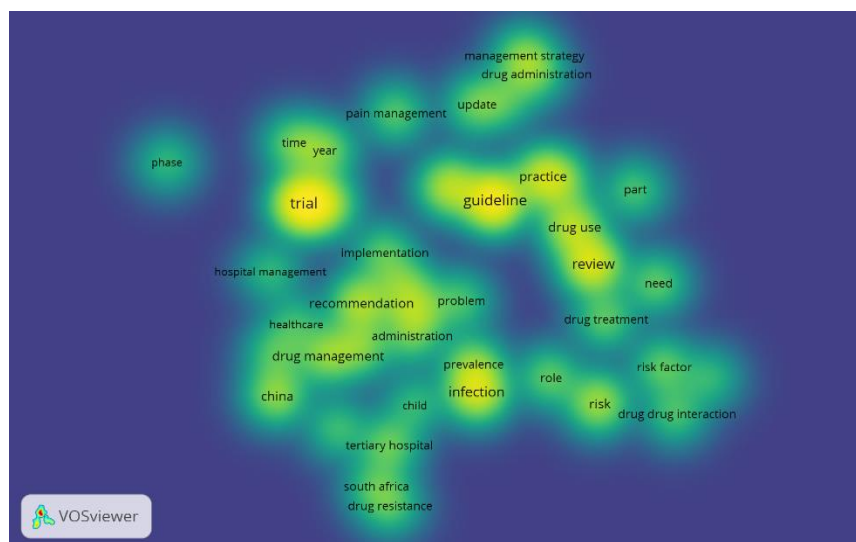
Figure 1. Density Visualization of Several Drug Management Research Domains in Hospitals Based on the Google Scholar Database from 2013-2023

RESEARCH METHODS

This type of research is descriptive-analytical, with a case study design of a government-owned teaching hospital in the Yogyakarta area. The research method used in this stage is qualitative. The data were collected through interviews. In-depth interviews were conducted through open face-to-face interactions to obtain respondents' knowledge and opinions regarding the factors that influence drug management. In this study, data were collected using a content analysis approach.

Research Instruments

The instruments used in this study were interview guidelines adopted and developed from the theory of Health Management Science (Clark, 2012) and Hospital Pharmacy Service Standards (Kementerian Kesehatan RI, 2019), with informants Head of Pharmacy Installation, Medical Committee, Pharmacist and Therapy Committee, Director Hospitals, Commitment Making Officers, and Drug Procurement Teams who have work experience in their division for at least two years. The collected information included variables in the drug management cycle during the planning and drug procurement stages, which were explored as key informants.

Research Procedure

In the first stage of the research, an interview guide was compiled based on the indicators that had been developed. Subsequently, a daily schedule was prepared in the field according to the informants' willingness, whose agreement had previously been implemented. Suppose the informant is unwilling to conduct an interview. In this case, substitution is made with another informant in the same division, who can provide the same information according to the researcher's needs. Before conducting the interview, the researcher asked for the informant's willingness to complete a research participation consent form as proof that the informant was willing to be a research respondent.

The next step was data collection by conducting interviews with informants according to predetermined inclusion criteria. All discussions were recorded using voice recorder. In one day, the maximum will be conducting interviews with three informants each for 30-60 minutes. If, within 60 minutes, the information has not been completed, the discussion is continued at the time and place agreed upon at the next meeting. Before ending the interview, the researcher rechecked the guide to check whether any questions needed to be included.

After completing the interviews, the discussion results were documented in the form of transcripts. The researcher wrote down all informants' answers, which had previously been recorded during the interview. All additional notes not requested by the interview guide but useful for analysis are still written on blank pages using an asterisk (*) during the documentation process.

To ensure the validity of the data, the researcher carried out a validation procedure was performed using the source triangulation method. Source triangulation is carried out by comparing and re-examining the degree of trust in information obtained from different sources, either from different informants or based on a review of secondary documents (such as hospital formulary review documents, drug planning and procurement documents, and quality assurance evaluation monitoring documents in hospitals), and the results of observations in the field. Another technique to ensure credibility in this research is to confirm and clarify the data obtained through participant/member checks (returning to participants after data analysis). The research procedure for ensuring reliability in this study was to ask various identical questions from an informant at different times and analyze the consistency of the resulting answers.

Data Analysis
The analysis technique is carried out by reducing data, analyzing data, identifying themes, and extracting data interpretations. In conducting the analysis, the author used NVIVO 12 software in the following stages:

1. Verbatim transcripts, copies, or complete notes are made from all the data, which is the result of the interview. Six participants were 6: The head of pharmacy installation, the medical committee, the pharmacist and therapy committee, the director of hospitals, commitment-making officers, and drug procurement teams. Interviews were conducted by EL researchers, assisted by two pharmacist-qualified research assistants outside the study setting. Information extraction was stopped if the data obtained were saturated with informants.
2. Coding involves converting data into smaller units (code) in the form of words or sentences from parts of the data that have meaning. At this stage, three stages of coding were conducted: open coding, the process of comparing and categorizing data, and finding key phrases on the research topic. The next step is axial coding, which combines data into groups based on relationships and patterns in each data category. The final stage is selective coding, namely, identifying and describing the main types or phenomena that appear in the research. This process was performed by two researchers (EL and PP).
3. Arrange interpretations (interpreting and assembling facts or data into a single unit) so that conclusions can be drawn.
4. The analysis results obtained from the informants were then triangulated with the sources to obtain comprehensive data and maintain credibility.
5. Presentation of data. The data production at this research stage was in the form of a project map, which is a graphical representation of the various items used in this study. The researcher made an analysis map of the coding, case, and related source data to display the data process flow and the relationship between each piece of data carried out by the researcher from the beginning to the end of the process. Data at this research stage is also presented narratively, extracted, and synthesized from key informant data sources.

Data collection was continued until data saturation was reached.

RESULTS AND DISCUSSION
The research was conducted at a public teaching hospital in Yogyakarta, involved vital informants which had mastered the management of pharmaceutical supplies with a minimum of two years of experience. Overall, six respondents participated in this study, all of whom were from the pharmacy department. Drug management performance will be assessed based

on selection, planning, and procurement. The codes and categories were mapped to two themes from the existing frameworks. The themes were drug selection, planning, and procurement.

Drug Selection

Based on interviews and observations of supporting secondary documents, drug selection was conducted based on the national formulary. The suitability of drugs in the federal formula is prioritized primarily for patients with national health insurance. In contrast, regular patients can be given medications with trademarks outside the national formulary, according to a doctor's prescription included in the hospital formulary. Drug selection standards are shown in **Figure 2**.
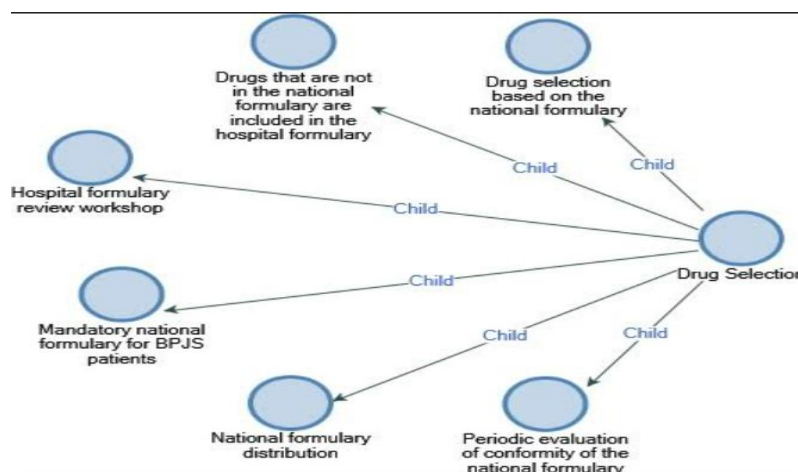

Figure 2. Project Map of NVIVO 12 Stages of Drug Selection

In this academic hospital, the Pharmacy and Therapy Committee has carried out its role by following its duties, principles, and functions in the drug selection process. Hospital formulary preparation workshop activities are carried out regularly, and are attended by representatives of installations and Medical Staff Groups to discuss hospital formularies that contain a set of drugs that are accepted or approved by the Pharmacy and Therapeutic Committee and can be revised at any specified time limit; however, some limitations were noted. Common hindrances occurred when doctors prescribed drugs from the drug formulary. At the same time, the director's policy must follow the National Formulary for patients with National Health Insurance. The role of the pharmacy and therapy committee in bridging the medical and pharmaceutical parties is vast in this situation, so that drugs can be available properly, entirely, and in sufficient quantities while taking into account efficacy and cost.

"…. *If the medicine is needed, but not in the National Formulary, then we will have inserts and updates. Every year we will write to each division whether there are additions or changes; we will evaluate that one year. The pharmacy and therapy committee will provide drug recommendations for a particular procurement. The basis for giving suggestions is also based on a randomized controlled trial of the drug "*(**Pharmaceutical and Therapeutic Committee**).

Drug selection criteria are needed by the majority of the population, based on disease prevalence patterns, are safe and productive, supported by scientific evidence, and have maximum benefits with minimal risks, including having an excellent benefit-cost ratio, guaranteed quality, and being a single preparation. Drug selection is the first step that must be performed in a drug management cycle, where the first step is the most decisive step. Officers responsible for procurement in hospitals sometimes make inappropriate drug selections and

do not always follow the WHO Essential Medicines List (EML) rational drug selection process. Therefore, it is advisable to strictly use WHO EML and involve users in the selection process. Drug and therapy committees should also be empowered and engaged in drug selection (Wangu and Osuga, 2014).

Drug Planning

Drug planning is based on hospital formularies, national formularies, drug needs or stock, budgets, consumption planning methods, epidemiology, and a combination of consumption and epidemiology. Drug planning in the hospital is carried out by pharmaceutical installation following the input of drug needs from the Medical Staff Group, where drug planning is carried out while taking into account the formulary and the availability of drugs in the e-catalog in the procurement process. The informants' primary focus on rational drug use lies in prescriber compliance with the form; this is also to anticipate the occurrence of prescription patterns outside the national formulary, so that it can affect drug availability. This policy on the obligation to comply with the national formula applies primarily to patients with national health insurance.

"………from the hospital side, drug planning affects the occurrence of stockouts, dead stocks, and the availability of existing drugs. Planning relates to the accuracy of forecasting. Apart from that, because there are accidental variations like certain medicines that need to increase, maybe there's an epidemic or something like that. Usually, it can be performed using donated medicines. However, what sometimes causes a shortage of medicine stock is the growth in services because currently, hospitals are very progressive in developing their services. So that sometimes-historical data is based on long-term use, and now changes and changes are very significant which sometimes causes difficulties and stock outs occur" (**Commitment Making Officials**).

One of the obstacles in drug management at the drug planning stage is the accuracy of drug planning, variations in drug demand, and service growth, as shown in **Figure 3**. An inaccurate demand plan will result in pharmaceutical companies being unable to make production plans and drug quantities that are not the right amount and time and are unavailable when needed. This affects the problem of drug supply instability (Satibi et al., 2019). National drug availability can run optimally if it is driven by planning for drug needs in hospitals and efforts to control drug supplies, so that there are no vacancies or excessive drug availability. Planning for drug needs is an activity to determine the amount and period of procurement according to the results of selection activities to ensure the fulfillment of the criteria for the right type, right amount, timeliness, and efficiency. **Figure 3** also shows that the management information system factor that has not been integrated is an obstacle to the accuracy of drug planning in this teaching hospital, where the hospital already has a complete drug logistics management supporting information system, but has not integrated drug planning, drug procurement, and financial information systems.

"... There is no integrated SIM yet; it is still manual, but a SIM has assisted it like min max, absorption data that we can take from inventory and manage manually" (**Head of Pharmacy Installation**).

Conventional processes have many weaknesses that cause reporting errors, resulting in decision-making errors (Topan and Najoan, 2015). Planning has not gone well because no hospital information system can cause data on the drug needs to be suboptimal, so there is often a delay in the pharmacy making proposals for drug needs, which results in the planning process for drug needs to constantly change. Conventional operations still have many weaknesses that cause errors in reporting, resulting in decision-making errors. Data availability is an essential factor that affects the quality of planning. Carrying out periodic planning reviews and updating procurement data can help implementers focus on using

existing resources; therefore, efforts to improve information systems and logistics performance are needed.
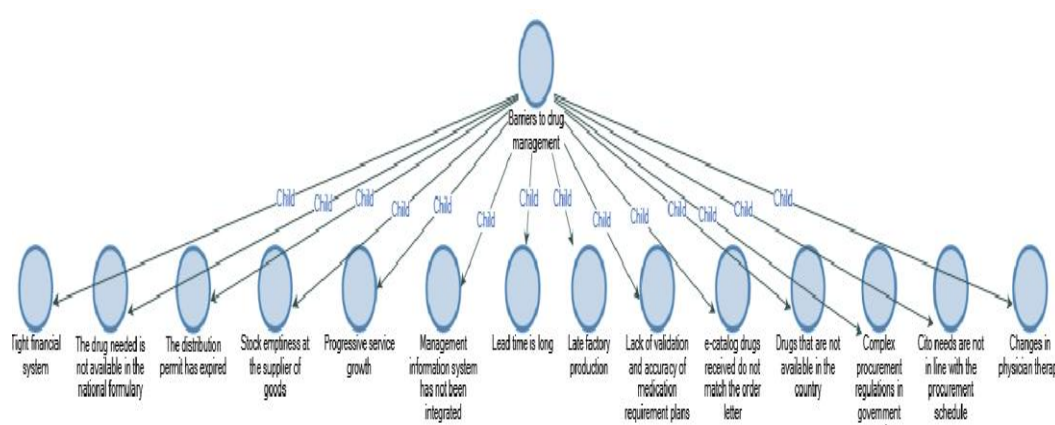

Figure 3. NVIVO Project Map 12 Barriers to Drug Management

Drug Procurement

The procurement of drugs is based on the standards of pharmaceutical services in hospitals. Procurement is an activity that aims to make pharmaceutical preparations available in quantity and type according to service needs. Procurement was performed to obtain the results of the plan. The availability of affordable, evidence-based, and high-quality medicines depends on drug procurement procedures, making them essential for healthcare delivery (Shrestha et al., 2018). This academic hospital procured drugs through e-purchasing based on e-catalogs through applicable laws and regulations.

Based on the project map in **Figure 3**, the obstacles related to drug procurement are drug vacancies at distributors, distribution permits that have expired, lead times that are too long, production delays in the industry, drug procurement regulations, drug availability in e-catalogs, and unspecified cito requirements according to the procurement schedule. Suppose that there are problems with the e-catalog system at the hospital. In that case, procurement is carried out manually according to applicable regulations, and several alternative drug procurement methods that the hospital has carried out are listed in **Figure 4**. In addition, the hospital's internal policy regarding the problem of drug shortages supports drug availability; if there are problems in procuring e-purchased drugs, it is permitted to procure outside the e-catalog under predetermined conditions.

Figure 4. Items Clustered by Coding Similarity of Drug Procurement Methods

" …. *In principle, e-catalog drugs are used as frequently as possible. However, if they are not included in the e-catalog, the focus is on a particular procurement scheme, perhaps by tender or direct appointment. Usually, providers have little variety for certain drugs. Sometimes, the medicine contracted for cannot procure; for example, he does not have stock*

*himself or what we do not know. Then we are forced to buy outside the partner, and more than one partner because the one we contracted with turns out to be unable to, so we are forced to believe outside the contract that has been stipulated through a distributor whom we did not appoint as the winner of the tende*r " (**Commitment Making Official**).

Regulation of the Minister of Health No. 5 of 2019 mentions that drug procurement should be based on electronic catalogs; however, it may be manual when the web is not working properly. Manual procurement is carried out directly by the pharmaceutical industry listed in the electronic record; however, drug shortages occur when electronic application errors occur. Failure to procure drugs may lead to an inability to fulfill orders.

Therefore, the government must address this issue. A public-private partnership strategy was implemented in Tanzania to increase the accessibility of medications, and one private pharmaceutical supplier served as the leading supplier of complementary therapies required by Tanzanian public health facilities. The suppliers are tendered and contracted based on good procurement practices. Standard operating procedures guide and constantly monitor the pilot implementation process. A 12-step method for nationwide implementation was implemented, including multilayer training from the federal to facility level. Each vendor signs a contract with their respective regional authority. The pilot area saw an increase in the accessibility of medications, from 69% in 2014 to 94% in 2018. The supply from the top vendor is of guaranteed quality and the average costs are comparable to those in Medical Department Stores (Wiedenmayer et al., 2019).

Based on the study findings, hospitals are yet to be involved in improving the accuracy of drug availability. It can commence from drug demand plans to mitigate drug shortages. The optimalization between consumption and procurement is prioritized, while the expired drug still exists. In contrast, a drug shortage harms patient health and reduces patient satisfaction and trust, thus affecting the hospital business (Binsar and Mauritsius, 2020). The government has developed a follow-up plan based on the monitoring and evaluation results of the 2017 e-catalog, including the implementation of multi-winner and multi-year e-catalogs, early detection of potential drug shortages, and optimization of the implementation of an evaluation monitoring system.
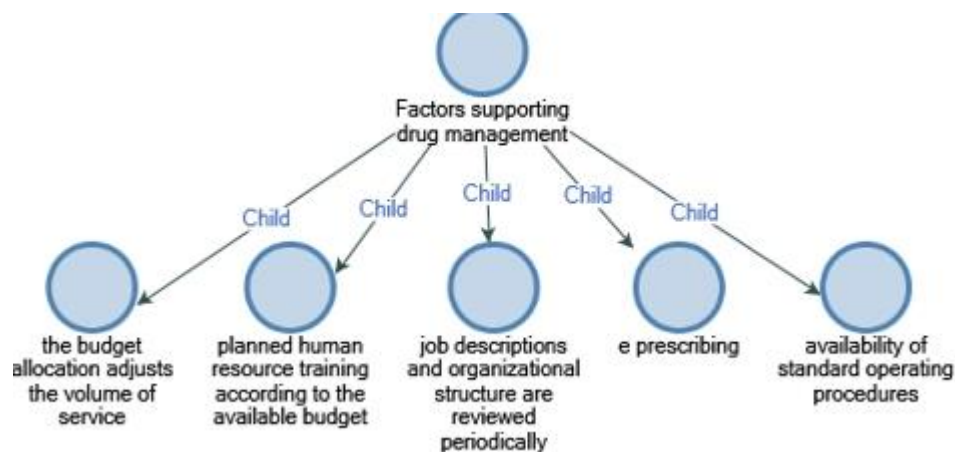

Figure 5. **Project Map NVIVO 12 Supporting Factors for Drug Management**

Overall, the management of drug management in the planning and procurement stages of medicine at this teaching hospital follows the hospital pharmacy service standards, which is also supported by management support, including budget allocation according to the volume of services, increased competence of human resources that supports improved performance drug management, and implementation of e-prescribing to facilitate monitoring evaluation and availability of complete standard operating procedures, as shown in **Figure 5**. Human resources, as one of the supports, are relevant to previous research where training has a significant effect on the performance of human resources (Fatihin and Rokhman, 2014);

therefore, a training needs analysis is needed and implemented on a schedule. The results of other studies also show a positive effect of training and work motivation on employee work productivity, training on employee motivation, training on employee work productivity, and work motivation on employee work productivity (Budiartha et al., 2015). The flexibility of budget allocation under the volume of services is also consistent with earlier studies, which found that several complex underlying factors, including insufficient funding, poor facility management, regulatory issues, drawn-out procurement processes, and inadequate logistics, affect the availability of essential medicines in low-income and middle-income countries. Innovative financing strategies have the potential to increase drug availability (Pronyk et al., 2016). The limitations of this study include the research scope, which is limited to the variables of drug selection, planning, and procurement; thus, it has the potential to be developed in further research with other variables in the drug management cycle, such as drug distribution and use.

CONCLUSION

Overall, the management of drug management in the planning and procurement stages of medicine at this teaching hospital follows the hospital pharmacy service standards, which is also supported by management support, including budget allocation according to the volume of services, increased competence of human resources that supports improved performance medication management, and implementation of e-prescribing to facilitate monitoring evaluation and availability of complete standard operating procedures. However, the accuracy of drug planning still needs to be improved so that an integrated management information system can support optimal drug management in a teaching hospital pharmacy installation.

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