

Assessment of the Benefits and Effectiveness of Information Systems for Drug Use as an Effort to Improve Pharmaceutical Services

Anis Febri Nilansari^{1,*} and Puji Handayani Putri²

¹*Department of Pharmacy, Faculty of Science and Technology, Universitas PGRI Yogyakarta, Yogyakarta, Indonesia*

²*Department of Informatics, Faculty of Science and Technology, Universitas PGRI Yogyakarta, Yogyakarta, Indonesia*

Abstract: Drug Information Service is the duty and responsibility of a pharmacy in providing pharmaceutical services. There is 8 drug information that must be conveyed by pharmacists to patients, but based on reference data that information has not been conveyed completely. Therefore, in this study, a drug use information system was created. The purpose of this study was to assess the benefits and effectiveness of information systems in improving pharmaceutical services. The method of making the system in this study uses the prototype method. System analysis was carried out using a descriptive survey research method. The population used in this study were patients in one of the clinics in Yogyakarta in December 2021. The results of the study on 1250 respondents to assess the benefits of information systems, obtained an average score of 67% on giving information on drug use manually, and an average score of 86% on providing information on drug use along with using information systems. Information on drug use that pharmacists rarely convey in the form of information on how to store, side effects, and drug interactions. Assessment of the effectiveness of the information system shows that respondents feel helped by the existence of an information system with good assessment criteria (4 questions) and sufficient (1 question), while the average score is 88%. This study concludes that providing information on drug use accompanied by using an information system can make it easier for patients to understand the information provided to improve pharmaceutical services.

Keywords: Information Systems, Drug Use, Pharmaceutical Service, Assessment Systems, Effectiveness Systems.

INTRODUCTION

Drug Information Service is the main duty and responsibility of a pharmacist in providing pharmaceutical services [1, 2]. Pharmacists are responsible for the drugs received by patients by treatment instructions accompanied by the provision of information and education on drug use so that the therapy that the patient undergoes can run well [3, 4].

Providing information on drug use in pharmaceutical services has an important role in improving the quality of life of patients and providing quality services for patients [5, 6]. Information on drug use that the pharmacist conveys to the patient is the name of the drug, drug indication, rules for using the drug, how to use the drug, how to store the drug, side effects of the drug, duration of drug use and drug interactions [7].

Based on several studies, it is shown that the provision of drug information in outpatient prescription services has been carried out, but the information has not been conveyed completely [8]. The information that

the patient lacks is in the form of storage methods and side effects of drugs, while the information that the patient does not get is in the form of contraindications and drug interactions [9]. A similar study conducted by Rina (2016) also stated that information services on drug use in outpatients were carried out with the realization that there was a negative gap of (-1.05%), so that realization had not yet reached the desired target [10]. In addition, based on cases in the field, there are still many patients who ask for a re-explanation of information on drug use that has been submitted by pharmacists. This shows that patients do not fully understand the treatment instructions they have to take. Not a few patients also forget the instructions for using drugs that have been delivered by the pharmacy when they return home [11, 12].

Meanwhile, the Director-General of Health Services at the Ministry of Health of the Republic of Indonesia issued a circular in the form of an appeal for health workers to develop remote services and or online applications in providing services to patients and their families. This is intended as a reference so that health workers, one of which is pharmacists, utilize the use of information and communication technology in providing health services [13].

*Address correspondence to this author at the Department of Pharmacy, Faculty of Science and Technology, Universitas PGRI Yogyakarta, Yogyakarta, 55182, Indonesia; E-mail: anis@upy.ac.id

Yasser's research in 2017 that the use of information technology in health services can improve patient safety by reducing medication errors, reducing adverse drug reactions, and increasing patient compliance with drug use [14, 15].

Therefore, based on the above background, in this study, a drug use information system was created. The system is made based on the website by entering the medical record number and the patient's name, so that with the use of the system the patient can read and re-understand the drug use information completely, precisely, and easily. The system is then analyzed to assess the benefits and effectiveness of the system in improving pharmaceutical services.

METHODS

The manufacture of drug use information systems in this study used the prototype method starting from system requirements analysis, system design, and system implementation. Meanwhile, the analysis of the benefits and effectiveness of the system was carried out using a descriptive survey research method.

The data collection method is carried out prospectively in the form of system requirements analysis by conducting interviews with the PIECES framework (Performance, Information, Economic, Control, Efficiency, and Service) and collecting system evaluation data using questionnaires. This research was conducted at a clinic in Yogyakarta in November 2021.

The research population is the subject that meets the established criteria. The population used by the researcher is all consumers at one clinic in Yogyakarta in December 2021 with an average population in the last month of 1800 consumers. The sample is part of the representative population under study [16]. The sampling technique in this study is a non-probability technique, namely Convenience/accidental random sampling.

The stages of implementing this research are divided into three stages of work, namely the system requirements analysis stage, the system design stage, and the analysis of the benefits and effectiveness of the system.

System Requirements Analysis Stage

At this stage, interviews were conducted with pharmacists at the pharmacy installation in one of the

clinics in Yogyakarta to obtain data on the manufacture of drug use information systems so that the system was made according to the needs and expectations of the interview subjects. Interviews were conducted using the PIECES method, so that it contained aspects of Performance, Information, Economics, Control, Efficiency, and Service. Table 1 is a question posed by researchers.

System Design Stage

After analyzing system requirements, the next stage is system design. At this stage, the system design is made based on the analysis of system requirements so that the system is made according to the needs and expectations of users. Drug use information system design is done by using context diagrams, Data Flow Diagrams (DFD), and Entity Relationship Data (ERD).

Benefit Analysis and System Effectiveness Stage

The measuring instrument that researchers use to measure the benefits and effectiveness of the drug use information system as an effort to improve pharmaceutical services is a questionnaire.

The data processing method is as follows [17]:

1. Editing
2. Coding
3. Scoring

The questionnaire consisted of 2 types, namely a questionnaire for providing information on drug use and a questionnaire on the effectiveness of the drug use information system. The questionnaire for providing information on drug use was distributed twice to compare the provision of information on drug use manually with the provision of information on drug use using the information system. Based on the answers to the collected questionnaires, then data analysis was carried out by calculating the average percentage based on the total score for each answer, namely:

1. Strongly agree = 3
2. Agree = 2
3. Enough = 1
4. Disagree = 0

After scoring, the percentage calculation is carried out. The percentage results and statements of each

variable are categorized using 4 quality criteria, while the quality criteria are:

Very good: if the result is > 80% - 100%

Good: if the result is > 60% - 80%

Fairly good: if the results are > 40% - 60%

Not good: if the result is <10% - 40% [16].

RESULTS

The development of an information system on drug use is carried out as an effort to improve pharmaceutical services. Information services on drug use carried out by a pharmacy installation at one of the clinics in Yogyakarta were previously carried out manually, namely the provision of information when the drug was handed over to the patient. With a drug use information system, patients not only get information on drug use manually, but also patients can read and understand drug use information completely and accurately on a website-based drug use information system.

The development of a drug use information system begins with a system requirements analysis and system design.

System Requirements Analysis with the PIECES Method

The implementation of the need analysis of the drug use information system is carried out using the PIECES method. The analysis is carried out so that the system is made by the needs of users, namely pharmaceutical

workers. System requirements analysis was carried out by conducting interviews with pharmacists at the pharmacy installation in one of the clinics in Yogyakarta using the PIECES method (Performance, Information, Economic, Control, Efficiency, and Service) [18, 19]. The results of interviews with the PIECES method can be seen in Table 1.

Based on the results of interviews with the PIECES method, an Information System on Drug Use is needed so that pharmaceutical services can be carried out quickly, accurately, and with complete information. The existence of an information system on drug use is expected to assist pharmacy staff in communicating, providing information, and educating on drug use to each patient effectively and efficiently. The existence of this system is also expected so that patients can understand information on drug use completely and accurately to prevent medication errors.

Drug Use Information System Design

In this study, the system design was made to facilitate the implementation of the system. Data Flow Diagram (DFD) as a guide in system design. Entity Relationship Data (ERD) was created to make it easier to see interrelated objects [20]. The system design prototype is used to simplify the design of the interface [21].

In Figure 1 it can be seen that the interface design of this system involves the pharmacy department to input drug information data in the form of drug names, drug indications, drug use rules, how to use drugs, drug storage methods, drug side effects, duration of drug use and drug interactions. After each drug

Table 1: Interview Results Analysis System Design Requirements Information Use Drug

Analysis	Old System	New System
<i>Performance</i>	The workload of pharmacists is quite large. Not all drug use information can be conveyed to patients	Will help pharmacy work so that patients can understand complete drug use information.
<i>Information</i>	If there is unknown drug information, you must open the reference first.	Pharmacies have entered the information of each drug into the information system.
<i>Economic</i>	Using paper, ink, and pen in the form of pens in writing complete drug information.	Patients can easily operate the system on their respective cellphones
<i>Control</i>	Pharmacists cannot know the level of patient understanding of the information that has been given.	The patient can read and re-understand the instructions for using the drug completely and accurately.
<i>Efficiency</i>	It takes a long time for complete information on drug use to be conveyed.	Pharmacy work can be assisted with drug use information systems.
<i>Service</i>	Patient waiting time becomes long because pharmacists must convey complete drug use information.	The new system can reduce patient waiting times.

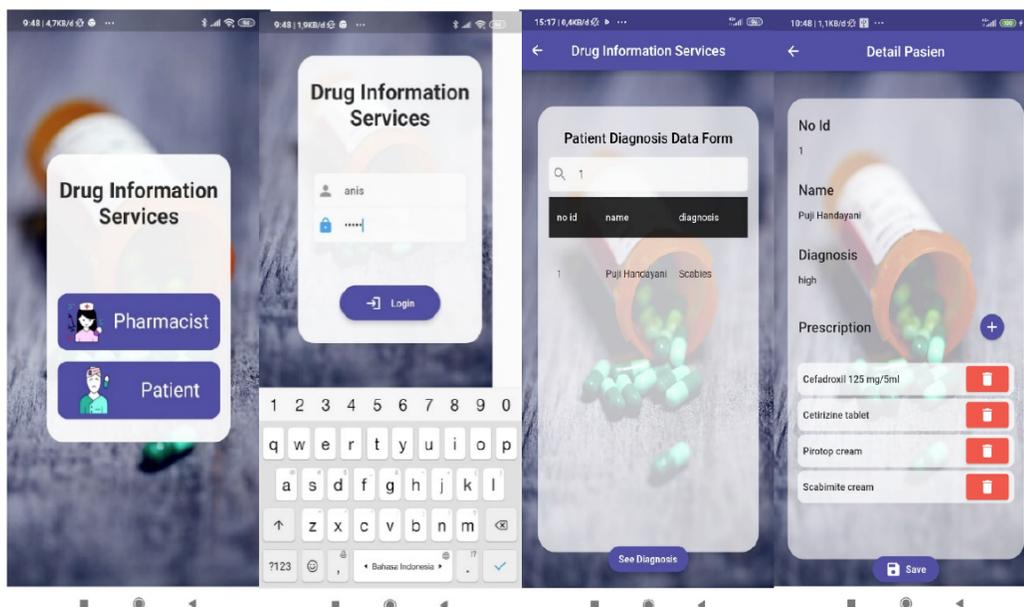


Figure 1: Pharmacist login page display.

information is input, the patient can find out the information by logging in using the patient's name and medical record number through the website.

Characteristics of Respondents

The study was conducted by distributing questionnaires to respondents who came to one of the clinics in Yogyakarta, filling out the respondents of the questionnaire in the waiting chair when the respondent finished receiving the drug accompanied by the researcher. The research was conducted in January 2022 with 1250 respondents.

Research subjects are divided into 3 characteristics which include, gender, age, and education level. The data on the characteristics of the research subjects are presented in the form of Table 2.

According to the gender of the respondents, it is known that most of the respondents in this study were women as much as 58%, while men as much as 42%. Based on the Health Profile of the city of Yogyakarta in 2021, it shows that the female population is more than the male, reaching 52% [22]. According to Pennebaker, women generally report more symptoms of illness than men [23].

In addition to gender, data on patient characteristics based on age are also needed in providing drug information [24]. Patients aged >65 years in addition to requiring verbal information, also need clear written information to anticipate patients in the elderly who easily forget treatment instructions, especially for patients who receive polypharmacy prescriptions. Descriptive analysis of a retrospective study, with a

Table 2: The Data of Patients' Characteristics at a Clinic in Yogyakarta

No.	Characteristics	Category	Frequency	Percentage
1	Gender	Man	518	42%
		Woman	732	58%
2	Age	18-30 years old	671	53.6%
		31-50 years old	396	31.7%
		>50 years	183	14.7%
3	Level of Education	Elementary School	45	3.7%
		Junior High School	107	8.5%
		Senior high school	793	63%
		College	305	24%

cross-sectional study of 3,009 elderly patients aged 65 years, showed that 55% of patients received polypharmacy therapy [25].

Based on the table above, shows that the majority of respondents in one of the clinics in Yogyakarta are aged 18 to 30 years. This age group includes the productive age group that has the potential to get the risk of disease from work and body resistance. The theory put forward by Navaro is that the productive age group is the age that tends to take advantage of health facilities [23].

Characteristics of respondents based on education level are the majority have a final high school education as much as 793 (63%). Based on this, it can be seen that the patients receiving treatment are a fairly well-educated group. This is also to the Yogyakarta City Health Profile data in 2021 that the majority of the population of Yogyakarta City has a final high school education [22].

Drug Use Information

The results of the assessment of providing information on drug use are presented and divided into categories of Good (81%-100%), Enough (61%-80%), and Less (20%-60%). The results of the questionnaire assessment on giving drug information manually were compared with providing information on drug use accompanied by an information system at one clinic in Yogyakarta to 1250 respondents, which contained 8 questions which can be presented in the form of Table 3 as follows:

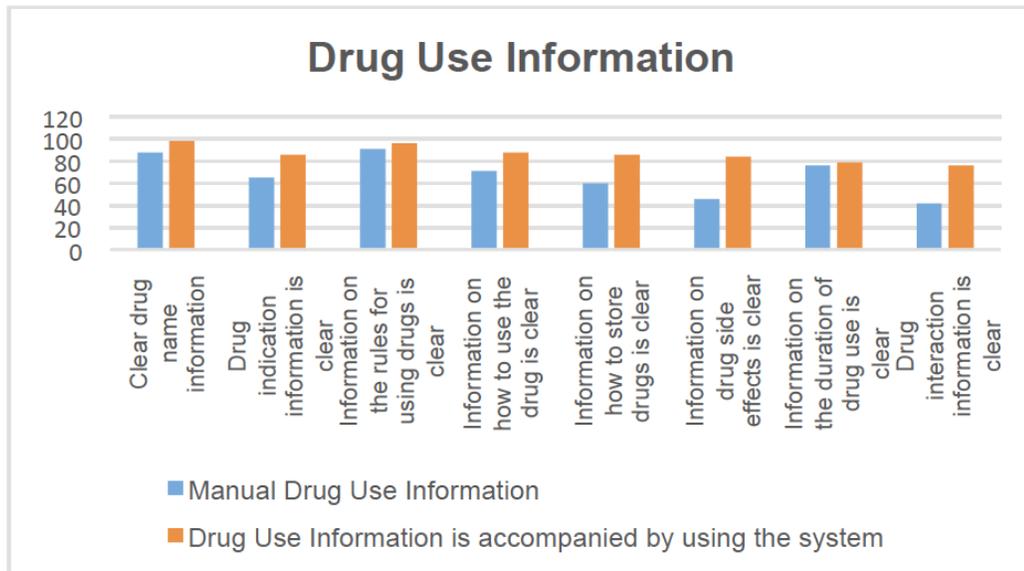
Based on the table above, the analysis of each respondent's answer to the results of the questionnaire shows that the value of the questionnaire assessment criteria is good for providing information on the use of drugs manually, only 2 information, the rest is sufficient (3 information) and less (3 information). Information on drug use along with using the information system showed that most of them had good assessment criteria, namely 6 information and 2 information indicating sufficient assessment. The assessment is sufficient in the form of providing information on the duration of drug use and drug interaction information. The graph below shows that providing information on drug use through an information system produces a higher rating in all sections compared to providing information on drug use manually.

The provision of information services on the use of drugs manually gives unsatisfactory results for patients. Assessment of information on how to store drugs, drug side effects, and drug interactions showed poor results or less than 50%. From the research that has been done, the pharmacy does not provide information about drug interactions with other drugs or certain foods, or contraindications for certain drugs, except for respondents who ask first. This is because the number of patients queuing makes pharmacists provide drug information services in particular.

The assessment of providing information on drug use manually on drug storage information also got poor results because pharmacies did not provide information about drug storage. It is necessary to pay attention to the correct way of storing drugs, this is done to avoid drugs from being damaged or degraded. Drugs and

Table 3: The Data Providing Information on Drug Use at a Clinic in Yogyakarta

No Question	Drug Use Information Questionnaire	Manual Drug Use Information		Drug Use Information is accompanied by using the system	
		Score (%)	Assessment criteria	Score (%)	Assessment criteria
1	Clear drug name information	88	Good	98	Good
2	Drug indication information is clear	65	Enough	86	Good
3	Information on the rules for using drugs is clear	91	Good	96	Good
4	Information on how to use the drug is clear	71	Enough	88	Good
5	Information on how to store drugs is clear	60	Less	86	Good
6	Information on drug side effects is clear	46	Less	84	Good
7	Information on the duration of drug use is clear	76	Enough	79	Enough
8	Drug interaction information is clear	42	Less	76	Enough
Average		67	Enough	86	Good



Graph 1: Comparison of Drug Use Information.

Table 4: The Data Providing Information on Drug Use at a Clinic in Yogyakarta

No Question	Drug Use Information System Effectiveness Questionnaire	Score (%)	Assessment criteria
1	The use of the system makes it easier to understand the rules for using drugs	96	Good
2	Using the system reduces patient waiting time	70	Enough
3	The use of the system is easily accessible to the patient	88	Good
4	The use of the system is easily accessible to the patient	90	Good
5	I feel helped by the existence of a drug use information system	96	Good
Average		88	Good

drug ingredients must be stored in suitable containers and must comply with packaging and labeling provisions by applicable regulations [26].

The average score was 67% with sufficient criteria for manual drug use information, and an average score of 86% with good criteria for drug use information along with using information systems. Thus, based on the table above and the average value, we can conclude that providing information on drug use accompanied by using an information system can make it easier for patients to understand the information provided.

The results of the questionnaire assessment on the effectiveness of the drug use information system in pharmaceutical services at a clinic in Yogyakarta for 1250 respondents, which contains 5 questions can be presented in the form of Table 4 as follows:

Based on research data on the effectiveness of the drug use information system, it shows that respondents feel helped by the information system with good

assessment criteria (4 questions) and sufficient (1 question), while the average score is 88% with good criteria. The assessment that is included in the criteria is sufficient in the form of a statement using the information system to reduce patient waiting time. This happens because the use of drug use information systems is a new technological innovation in the health sector, so it takes time to introduce the system to the patient.

DISCUSSION

Information on drug use in the information system includes things that patients often ask for and other information that patients need to know, including drug names, indications, directions for use, how to use them, storage methods, side effects, duration of drug use and drug interactions. Some of the things that patients have been asking about information on drug use are how to use drugs, drug doses, drug interactions with other drugs, drug safety, and drug administration to pregnant and lactating women [3, 4].

Meanwhile, based on a literature search, of the 27 identified drug information topics, patients most frequently requested information about adverse drug reactions (ADR) and drug-drug interactions (DDI) [7]. The information that the patient asks for is already in the drug use information system so the use of the information system makes it easier for patients to understand the treatment that must be done.

An assessment of the effectiveness of the drug use information system conducted by one of the clinics in Yogyakarta showed good results in pharmaceutical services. This happens because the public's need to obtain drug information is getting higher with evidence that the use of online health information services is increasing. For example in Germany, that about half of the population uses the internet to obtain health-related information, especially drug use services [7]. Indonesian society with several internet users of 212.35 million people can take advantage of the existence of information technology, one of which is to improve pharmaceutical services, namely by providing information on drug use [27].

The patient's response to the provision of drug information does not only take place while the patient is still at the health care facility but within 24 hours patients also often ask about the treatment they should take. In addition to direct verbal communication and written communication via mail, the use of information systems will save time and make it easier for patients to understand drug use instructions [3, 5].

The role of pharmacists is very important in drug information services. If drug information is not provided it will have a bad impact on the patient or the community. If the roles and responsibilities of pharmaceutical services are carried out correctly for patients, drug-related problems such as the use of drugs without indications, untreated indications, too high drug doses, and drug interactions can be avoided [28].

The provision of information on drug use in pharmacies is carried out by pharmacists who have special qualifications, namely taking pharmacist professional education, this is done because the quality of service is believed to increase if pharmaceutical personnel has attended formal training or supervision of drug information specialists. The drug information that the pharmacist enters into the system is based on a tertiary reference source, namely Lexi-Comp. This is to several studies which revealed that most

pharmacists around the world obtained drug information from Lexi-Comp, then ranked second using the reference source from Micromedex [29, 30].

CONCLUSIONS

Pharmacists need an information system in performing pharmaceutical services, one of which is providing information on drug use. The drug use information system helps the work of pharmacists to be more effective and efficient, so that drug use information can be conveyed completely and accurately to all patients. Drug use information systems make it easier for patients to understand medication instructions so that they can support better treatment.

ACKNOWLEDGEMENTS

We are grateful to the Rector of the Universitas PGRI Yogyakarta for the funding provided through the research of novice lecturers.

FUNDING

None to declare.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

ETHICS APPROVAL

None to declare.

REFERENCES

- [1] Minister of Health. Regulation of the Minister of Health Number 73 of 2016 concerning Pharmaceutical Service Standards in Pharmacies 2016; p. 123-130.
- [2] Shah SNH, Avery AJ, Aslam M. A Survey of Prescription Errors in General Practice. *Pharm J* 2001.
- [3] Alamri S, Ali Al Jaizani R, Naqvi A, Ghamdi M. Assessment of Drug Information Service in Public and Private Sector Tertiary Care Hospitals in the Eastern Province of Saudi Arabia. *Pharmacy* 2017; 5(4): 37. <https://doi.org/10.3390/pharmacy5030037>
- [4] Asrana AAN. Developing an Integrated Treatment Pathway for a Post-Coronary Artery Bypass Grating (CABG) Geriatric Patient with Comorbid Hypertension and Type 1 Diabetes Mellitus for Treating Acute Hypoglycemia and Electrolyte Imbalance. *J Pharm Bioallied Sci* 2017; 9(3): 216-20. https://doi.org/10.4103/jpbs.JPBS_33_17
- [5] Shah A, Naqvi A, Ahmad R. The need for providing pharmaceutical care in geriatrics: A case study of diagnostic errors leading to medication-related problems in a patient treatment plan. *Arch Pharm Pract* 2016; 7(3): 87. <https://doi.org/10.4103/2045-080X.186173>
- [6] Katoue MG. Role of pharmacists in providing parenteral nutrition support: current insights and future directions. *Integr Pharm Res Pract* 2018; 7: 125-40. <https://doi.org/10.2147/IPRP.S117118>

- [7] Kusch MKP, Haefeli WE, Seidling HM. How to meet patients' individual needs for drug information-A scoping review. Patient Preference and Adherence. Dove Medical Press Ltd. 2018; Vol. 12: pp. 2339-55. <https://doi.org/10.2147/PPA.S173651>
- [8] Tarn DM, Heritage J, Paterniti DA, Hays RD, Kravitz RL, Wenger NS. Physician Communication When Prescribing New Medications [Internet]. Available from: <https://jamanetwork.com/>
- [9] Sadikin M, Rizqi Yusuf M. Quality of Providing Drug Information Services on Prescription Services Based on Patient Satisfaction BPJS Health Center Cilandak District Quality of Providing Drug Information Services Based on Satisfaction of BPJS Patient in Prescription Services Puskesmas Cilandak District. Pharmaceutical Journal of Indonesia 2019; Vol. 16.
- [10] Adityawati R, Latifah E, Santi Hapsari W. The Evaluatio of Drug Information Service at the Outpatient in Pharmacy at Puskesmas Grabag I. Jurnal Farmasi Sains dan Praktis 2016; Vol. 1.
- [11] Grime J, Blenkinsopp A, Raynor DK, Pollock K, Knapp P. The role and value of written information for patients about individual medicines: A systematic review. Health Expectations 2007; Vol. 10: pp. 286-98. <https://doi.org/10.1111/j.1369-7625.2007.00454.x>
- [12] Saqib A, Atif M, Ikram R, Riaz F, Abubakar M, Scahill S. Factors affecting patients' knowledge about dispensed medicines: A Qualitative study of healthcare professionals and patients in Pakistan. PLoS One 2019; 13(6). <https://doi.org/10.1371/journal.pone.0197482>
- [13] Azhar EI, Hui DSC, Memish ZA, Drosten C, Zumla A, Kemdikbud RI. Circular on Prevention of the COVID-19 Outbreak in Education Units throughout Indonesia. Infect Dis Clin North Am 2020; 33: 1-5.
- [14] Alotaibi YK, Federico F. The impact of health information technology on patient safety. Vol. 38, Saudi Medical Journal. Saudi Arabian Armed Forces Hospital 2017; pp. 1173-80. <https://doi.org/10.15537/smj.2017.12.20631>
- [15] Kilova K, Mihaylova A, Peikova L. Opportunities of information communication technologies for providing pharmaceutical care in the COVID-19 pandemic. Pharmacia 2021; 68(1): 9-14. <https://doi.org/10.3897/pharmacia.68.e56987>
- [16] Glantaria Y, Arief B, Donomulyo Evaluation of IEC (Communication, Information and Education) Service Drugs at Shen Jaya Pharmacy Donomulyo. Malang 2018.
- [17] Nursalam. Concept and Application of Nursing Research Methodology. Jakarta: Salemba Medika 2008.
- [18] Saud NP, Kapalawi I, Nour HNB. Requirements Analysis of Outpatient Information System Development at Wahidin Sudirohusodo Hospital 2013. Hasanuddin Univ Repos 2013; 1-11.
- [19] Putri PH, Nilansari AF. The Information System Development of Prescription Screening Management in Public Health Center 1 Kotagede Yogyakarta. J Phys Conf Ser 2021; 1823(1). <https://doi.org/10.1088/1742-6596/1823/1/012003>
- [20] Silberschatz A, Korth HF SS. Database System Concepts. 7th. editi. McGraw Hill 2019.
- [21] Meiryani SA. System Development Method with The Prototype Method. Int J Sci Technol Res [Internet] 2019; 8: 7. Available from: www.ijstr.org
- [22] Yogyakarta City Health Office. Yogyakarta City of Health Profile 2021 (2020 Data) 2021.
- [23] Nadia Rahmayanti S, Ariguntar T. Characteristics of Respondents in Using Health Insurance in the BPJS Era at Cisoka Health Center, Tangerang Regency January-August 2015. J Medicoeticolegal dan Manaj Rumah Sakit 2017; 6(1): 61-5. <https://doi.org/10.18196/jmmr.6128>
- [24] Duggan CBI. Medicine information needs of patients: the relationships between information needs, diagnosis and disease. Qual Saf Heal Care 2008; 17(2): 85-9. <https://doi.org/10.1136/qshc.2005.017590>
- [25] Alsuwaidan A, Almedlej N, Alsabti S, Daftardar O, Deaji F Al, Amri A Al, *et al.* A comprehensive overview of polypharmacy in elderly patients in Saudi Arabia. Geriatr 2019; 4(2). <https://doi.org/10.3390/geriatrics4020036>
- [26] Linda S. Analysis of the Quality of Drug Information for Patients at the Surakarta City. Surakarta 2015.
- [27] Asnawi A. Indonesia's Readiness to Build a Digital Economy in the EraIndustrial Revolution 4.0. J Ilm Indones 2022; 7(1). <https://doi.org/10.36418/syntax-literare.v7i1.5739>
- [28] Delladari Mayefis AHRR. Effect of Drug Information Service Quality Patient Satisfaction City Pharmacy X Padang. J Ilmu Kefarmasian Indones 2015; 13(2): 201-4.
- [29] Hanrahan CT, Cole SW. Assessment of drug information resource preferences of pharmacy students and faculty. J Med Libr Assoc 2014; 102(2): 117-21. <https://doi.org/10.3163/1536-5050.102.2.012>
- [30] Moorman KL, MacDonald EA, Trovato A, Tak CR. Assessment and use of drug information references in Utah pharmacies. Pharm Pract (Granada) 2017; 15(1). <https://doi.org/10.18549/PharmPract.2017.01.839>

Received on 26-10-2022

Accepted on 07-12-2022

Published on 30-12-2022

<https://doi.org/10.6000/1929-6029.2022.11.24>

© 2022 Nilansari and Putri; Licensee Lifescience Global.

This is an open access article licensed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0/>) which permits unrestricted use, distribution and reproduction in any medium, provided the work is properly cited.