



Research Article

ASSESSMENT OF THE RATIONAL USE OF MEDICINES: PRESCRIBING PATTERNS AND INDICATORS AT PUBLIC PRIMARY HEALTH CARE CENTER AND HOSPITAL IN INDONESIA

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ABSTRACT

Drug use is one part of drug management cycle which covers selection, procurement, distribution, and use. This study aimed to assess drug prescription pattern using WHO prescribing indicator at primary healthcare centers and public hospital in Indonesia. A cross-sectional study was conducted with the study samples of 2,401 prescriptions from public primary healthcare centers and 1,218 prescriptions from public district hospital in the period of year 2012 – 2016. The average number of drugs prescribed per encounter at primary healthcare center and hospital settings were upon WHO standard, indicating the worse practices. At primary healthcare setting, the percentages of drugs prescribed by generic name and the percentages of encounters in which an injection were the same with WHO standards. The percentages of encounters in which an injection is prescribed at hospital setting was also inline with WHO standard. The percentage of encounters in which an antibiotic is prescribed at primary healthcare center was below WHO standard and in contrast at hospital setting was upon WHO standard. The percentage of drugs prescribed from formulary at primary healthcare center and hospital settings were almost achieve WHO standard. In general, the prescribing practices tended to show better pattern by time. The most problem of prescribing practices from this study was the high average number of drugs prescribed per encounters which leads to polypharmacy. The other problems were the low percentage of drugs prescribed by generic name and high percentage of encounters with antibiotic, particularly at hospital setting.

Keywords: drug prescription, WHO indicators, primary health care, hospital, Indonesia

INTRODUCTION

The rational use of drugs is a concern for healthcare practitioners worldwide. Rational use of drugs is an important part to achieve quality of health care for patients and the community ¹. According to the World Health Organization (WHO), rational use of drugs requires that “patients receive medications appropriate to their clinical needs, in doses that meet their own individual requirements for an adequate period of time, at the lowest cost to them and their community” ². Irrational use of medicines includes all of the practices that make the mentioned processes of appropriate medicine prescribing not fulfilled. The irrational use of drugs is a serious problems that can cause adverse drug reactions, increased morbidity and mortality rates, wasted resources and higher out-of-pocket costs to patients and society ^{3,4}.

The World Health Organization (WHO) suggests a set of drug use indicators to describe the drug use situation in a country, region or individual health facility. The guideline was first introduced in international conference in Nairobi, Kenya, in 1985 ^{1,2}. The introduction of the drug use indicators by the WHO offers a useful tool for assessing drug use practices in various settings, thus the guideline was improved lately ⁵. The guideline consists of drugs use indicators to measure the performance of three general areas related to the rational use of drugs, which are prescribing practices by health providers, key element of patient care, and availability of facility-specific factors. The indicators are classified into two types, namely core indicators and complementary indicators. The core indicators are highly

standardized and can be applied in any country, while complementary indicators are less standardized and need to be adapted based on local variables. The core indicators consist of prescribing indicators, patient indicators, and facility indicators ¹.

Drug prescribing indicators provide useful information in understanding general medicines prescribing patterns in health facility ⁶. The drug used indicators are first introduced to be used in primary healthcare, however they are also relevant to be used in other level of health facilities, for instance in hospital. Drug management cycle in a hospital includes selection, procurement, distribution, and use ⁷. In the step of use, the drug use indicators are applicable to measure the performance of rational use of drugs ⁸. Evaluation of drugs prescribing using WHO prescribing indicators are aimed to guide such program for improving rational use of drugs.

Prescribing indicators have been applied in several studies at different level of health facilities of primary healthcare and referral healthcare in different regions of the world. Some of the studies included the studies conducted at village health clinics in Western China ⁹, at teaching hospital in South Ethiopia ¹⁰, at different level of health care in Brazil ¹¹, at teaching hospital in Goa - India ¹², at four hospitals in West Ethiopia ¹³, at secondary care referral hospital in South India ¹⁴, at four government hospitals in Saudi Arabia ¹⁵, at other four hospitals in South Ethiopia ¹⁶, at four teaching hospitals in Pakistan ¹⁷, at teaching hospital in rural area of India ¹⁸, at general hospitals in East Ethiopia ¹⁹, at community pharmacies in Southern India ²⁰, and at private hospital in Warangal - India ^{3,4,5,21}.

Previous study to assess drug prescription using WHO indicators has been conducted by other researchers at several various settings in Indonesia, such as at community pharmacies²², at public and private primary health care facilities²³, and at outpatient hospital²⁴. Our study was different in the assessment aspect from that of Abdulah²² that conducted assessment of patient care indicators. Our study was the same as Yuniar²³ and Dinger²⁴ which conducted assessment of prescribing indicators, however our study was conducted in different study site from that of Dinger²⁴ and might different study sites and time period from that of Yuniar²³. In addition, given a large geographical area and big population of Indonesia as well as so many and various health facilities, more studies regarding assessment of drug prescription are still relevant and necessary to be conducted. Our study aimed to assess drug prescription pattern using WHO prescribing indicator at primary healthcare centers and public hospital in Indonesia.

MATERIAL AND METHODS

Study area and period

This study was a cross sectional study conducted at five public – primary healthcare centers in Yogyakarta Province and one public – district hospital in Central Java Province, Indonesia. Data was collected retrospectively from encounters of outpatients visiting the primary healthcare centers in four period of 1 January 2012 to 31 December 2015 and from encounters of outpatients visiting the district hospital in two period year of 1 January 2015 to 31 December 2016. The data collection was conducted between November 2016 to March 2017. This study obtained the ethical approval from Medical and Health Research Ethics Committee (MHREC) Faculty of Medicine Gadjah Mada University – Dr Sardjito General Hospital with the reference number of Ref: KE/FK/304/EC/2016. The study also began after receiving permissions from each study site of primary healthcare center and hospital. This study used secondary data of patients' prescribing records, hence patients' consents were not required.

Sample size and selection

WHO suggests a minimum sample of 600 encounters for this kind of study¹. In this study, 2,401 prescriptions from primary healthcare centers and 1,218 prescriptions from district hospital were retrieved. Proportional technique sampling was applied in this study to select the study sample from population in each study site. Sample selection in each site was then also selected using proportional technique based on the following formula: Sample size of prescriptions per month for each year = Proportion of prescriptions month × Population of prescriptions per year. The distribution of study sample was described in Table 1.

Data analysis

Data were analyzed using descriptive statistic to describe the prescribing patterns based on WHO prescribing indicators including the average number of drugs prescribed per encounters, the percentage of drugs prescribed by generic name, the percentage of encounters in which an antibiotic was prescribed, the percentage of encounters in which an injection, and the percentage of drugs prescribed from hospital formulary. The value of each indicator was then compared with the standard value recommended by WHO as reference values^{1, 5}. Table 2 described the data analysis method.

RESULTS

The summary of study results of prescribing patterns were shown in Table 3. Results were presented by time trend to assess change in performance¹. Drug prescription patterns at the primary health care center setting were presented in two period times which were year of 2012 – 2013 and 2014 – 2015 to emphasize the different of prescription pattern before and after the implementation of Universal Health Coverage in Indonesia that began at 1 January 2014. Meanwhile drug prescription patterns at the hospital setting was presented in two period times which were year of 2015 and 2016.

The averages numbers of drugs per encounter at primary health care center were lower than those of hospital, which were 2.90 and 2.69 for indicators at primary health care center in period year of 2012 – 2013 and 2014 – 2015, respectively and 3.0 and 3.1 at the hospital in period year of 2015 and 2016, respectively. The indicators were above the optimal values recommended by WHO which were 1.8 - 2.2¹ and 1.6 - 1.8⁵. The indicators at primary health care center tended to decrease by time, but remained stable at hospital setting. The percentages of drugs prescribed by generic name at primary health care center were at maximum number (100%) and in accordance with the optimal value recommended by WHO, meanwhile the indicators at hospital setting were not satisfied yet which were 63.9% and 68.2% in period year of 2015 and 2016, respectively. However, the indicators tended to increase by time. Regarding the percentage of encounters with antibiotic, the indicators at primary health care were slightly increase by time which were 6.4% and 9.12% in period year of 2012 – 2013 and 2014 – 2015, respectively but still far below the WHO standards which were <22.7%¹ and 20.0%-26.8%⁵. In contrast, the indicators at hospital were above the standard indicator which were 37.8% and 34.3% in period year of 2015 and 2016, respectively. However, the indicators tended to decrease by time. As for the percentage of encounters with injection, the indicators at primary health care center were stable at 0, meanwhile those of hospital were slightly increase by time which were 1.1% and 3.1% in period year of 2015 and 2016, respectively, but still far below the standard indicator which was 13.4% - 24.1%⁵. Lastly, the percentages of drugs from essential drug list increased by time both at primary health care center (72% and 92% in period year of 2012 – 2013 and 2014 – 2015, respectively) and hospital (96.9% and 98.2% in period year of 2015 and 2016, respectively) but have not yet achieved the standard indicator which was 100%^{1, 5}.

DISCUSSIONS

Average number of drugs per encounters

Indicator of average number of drugs per encounters is used to investigate polypharmacy in drug prescribing for a patient⁶. The averages number of drugs per encounter in this study both at primary health care center and at hospital setting were above the WHO standard. This findings were inline but still lower than previous study conducted in Indonesia by Yuniar which found that the average numbers of drugs per encounter in public and private facilities was 3.31 and 3.06, respectively²³. Other study conducted in Indonesia by Dinger²⁴ found the average numbers of drugs per encounter was 2.3, better than our findings but still above the WHO standard. In our study, the encounters with many drugs were indicated for patients with chronic diseases and geriatric patients that might required much more medicines.

Table 1: Distribution of study sample

Setting: Primary Health Care center											
Year	PHC 1		PHC 2		PHC 3		PHC 4		PHC 5		Total Sample
	P	S	P	S	P	S	P	S	P	S	
2012	15,214	127	20,074	168	n/a	n/a	16,224	136	20,301	170	601
2013	15,431	127	20,469	168	n/a	n/a	16,812	138	20,410	167	600
2014	18,662	124	21,293	142	13,583	90	17,503	117	19,013	127	600
2015	14,197	94	21,359	142	16,128	106	19,759	130	19,426	128	600
Total sample		472		620		196		521		592	2,401
Setting: Hospital											
Year	Insurance scheme		Number of population		Sample size		Total Sample				
2015	Non-UHC		12,585		148		609				
	UHC		33,449		461						
2016	Non-UHC		10,333		124		609				
	UHC		37,707		485						
Total sample							1,218				

PHC=Primary Health Care center, UHC=Universal Health Coverage, Non-UHC=Non- Universal Health Coverage

Table 2: Summary of data analysis ¹

Prescribing indicators	Calculation
Average number of drugs per encounters	Number of drugs ÷ number of encounters
Percentage of drugs prescribed by generic name	(Number of drugs prescribed by generic name ÷ Number of drugs) × 100%
Percentage of encounters with an antibiotic	(Number of encounters with antibiotic ÷ Total number of encounters) × 100%
Percentage of encounters with an injection	(Number of encounters with injection ÷ Total number of encounters) × 100%
Percentage of drugs prescribed from hospital formulary	(Number of drugs in accordance with hospital formulary ÷ Total number of drugs) × 100%

Table 3: Summary of prescribing pattern

Prescribing indicators	Primary Health Care center setting		Hospital setting		Standard value	
	2012 – 2013	2014 – 2015	2015	2016	WHO (1993)	WHO (2004)
Average number of drugs per encounters	2.90	2.69	3.0	3.1	1.8-2.2	1.6-1.8
Percentage of drugs prescribed by generic name	100%	100%	63.9%	68.2%	82%-94%	100%
Percentage of encounters with antibiotics	6.4%	9.12%	37.8%	34.3%	<22.7%	20.0%-26.8%
Percentage of encounters with injection	0	0	1.1%	3.1%	Minimum	13.4%-24.1%
Percentage of drugs from essential drug list	72%	92%	96.9%	98.2%	100%	100%

Findings of indicator of average number of drugs per encounters from other countries mostly had deviation from WHO standard, for instances the studies conducted in East Ethiopia showing the result of 2.34 ¹⁹, in Western China showing the result of 2.36 ⁹, in Saudi Arabia showing the result of 2.49 ¹⁵, in South India showing the result of 2.7 ¹⁴, in Warangal - India showing the result of 3.45 ²¹, in Pakistan showing the result of 3.53 ¹⁷, in Southern India showing the result of 3.7 ²⁰, and in rural area of India showing the result of 5.11 ¹⁸. Some studies found average number of drugs per encounters were already in accordance with WHO standard, for instances the studies conducted in South Ethiopia showing the result of 1.9 ¹⁰, in South Ethiopia showing the results of 1.82-2.28 ¹⁶, in Goa - India showing the result of 1.8 ¹², and in West Ethiopia showing the result of 2.1 ¹³.

Percentage of drugs prescribed by generic name

Indicator of percentage of drugs prescribed by generic name is aimed at measuring prescriber's tendency to prescribe medicines using generic or international nonproprietary name (INN) ⁶. The percentages of drugs prescribed by generic name at hospital setting in this study were lower than WHO standard. This might be due several drugs were not available in generic product such as ophthalmic preparation and insulin. In contrast the indicator was found to be 100% in primary health care centers. There has been regulatory of mandatory for prescribing drugs by generic name in government health facilities ²⁵. The percentages of drugs

prescribed by generic name found in study by Yuniar ²³ were 93.3% and 62.0% in public and private primary health care center, respectively. Whereas, The percentages of drugs prescribed by generic name found in study by Dingel ²⁴ was 84.14%. It seemed that The percentages of drugs prescribed by generic name in hospital setting and in private health facility tended to be lower than those in primary health care center and public health facility.

Previous studies in other countries shows variation of the percentages of drugs prescribed by generic name. Higher percentages were found in studies conducted in Brazil which was 86.1% ¹¹, in rural area of India which was 89.88% ¹⁸, in Warangal – India which was 97.7% ²¹, in South Ethiopia which were 98.7% ¹⁰ and 95.8% ¹⁶, and in Saudi Arabia which was 100% ¹⁵. On the other hand, lower percentages are found in studies conducted in in Goa – India which was 0.05% ¹², in Southern India which was 2.5% ²⁰, in Pakistan which was 39.5% ¹⁷, in South India which was 42.9% ¹⁴, in Western China which was 64.12% ⁹, and in West Ethiopia which was 79.2% ¹³.

Percentage of encounters with antibiotics

The percentage of encounters with antibiotics is aimed to measure the use of antibiotic which is an essential drugs that commonly used excessively and costly ¹. Higher use of antibiotics also might potential to increase antibiotic resistance. In this study, the percentage of encounters in which an antibiotic is prescribed at

primary healthcare center was below WHO standard and in contrast at hospital setting was upon WHO standard. The most antibiotic used at the hospital setting in this study was cefadroxil, which was indicated for post-operative treatment. The percentages of encounters in which an antibiotic found in study by Yuniar²³ were 42.8% and 39.4%, higher than finding of our study in hospital setting. Finding of study by Dinger²⁴ for the percentages of encounters in which an antibiotic at hospital setting was 33.43%, slightly lower than our findings but still upon WHO standard.

The percentages of encounters in which an antibiotic found from studies in other countries that higher from our study were for instances in Warangal – India which was 46.21%²¹, in Western China which was 48.43%⁹, in West Ethiopia which was 54.7%¹³, in East Ethiopia which was 57.87%¹⁹, in Pakistan which was 69.9%¹⁷, and in South Ethiopia which were 58.1%¹⁰ and 46.7% - 85%¹⁶. The percentages of encounters in which an antibiotic found from studies in other countries that lower from our study were for instance in South India which was 9.6%¹⁴, in Saudi Arabia which was 9.8%¹⁵, in Brazil which was 13.1%¹¹, in Goa – India which was 17.26%¹², in Southern India which was 22%²⁰, and in rural area of India which was 24.46%¹⁸.

Percentage of encounters with injection

The percentage of encounters with injection describes the frequency with which injectable forms of medicines are prescribed. This form of medicine was also commonly used excessively and costly^{1,6}. The percentage of encounters with injection found in this study was minimum and lower than WHO standard, even 0% at primary health care center. The low percentages due to minimum use of injection in out patient services. Calculation of this indicator at the primary health care center excluded vaccines for immunizations. Yuniar²³ also found the percentages of encounters with injection were also low which were 0.7% and 2.2% in public and private primary health care facilities, respectively. Dinger²⁴ also found an inline finding in which the percentage of encounters with injection which was 3.4%.

Findings from other countries showed higher percentages of injection use, for instances studies conducted in Saudi Arabia which was 3.14%¹⁵, in Southern India which was 7.2%²⁰, in Warangal – India which was 7.76%²¹, in Goa – India which was 9.7%¹², in East Ethiopia which was 10.9%¹⁹, in Western China which was 22.93%⁹, in rural area of India which was 24.05%¹⁸, in West Ethiopia which was 28.3%¹³, in Pakistan which was 34.95%¹⁷, and in South Ethiopia which were 38.1%¹⁰ and 15%-61.7%¹⁶, except in South India and Brazil were lower which were 1.6%¹⁴ and 2.5%¹¹, respectively.

Percentage of drugs from essential drug list

The main focus of indicator of the percentage of drugs from essential drug list is to assess whether prescribing practices conform to drug use policy as pertaining to the use of essential medicines list⁶. The percentage of drugs from essential drug list in this study showed slightly deviation from WHO standard. Findings from our study showed that the prescriber tended to obey the regulatory for prescribing based on drugs listed in national formulary or hospital formulary. Since the implementation of UHC in 2014, the national formulary serves as health benefit package thus the percentages of drugs from essential drug list increased. Meanwhile, findings of the percentage of drugs from essential drug list from previous studies in Indonesia tended to be lower which were 89% in public primary health care center,

64.5% in private primary health care center²³, and 60.13% in public hospital²⁴.

Findings of the percentage of drugs from essential drug list from other countries were also high, which were in Western China 67.7%⁹, in Brazil 73.7%¹¹, in rural area of India 76.06%¹⁸, in West Ethiopia 83%¹³, in South India 95.6%¹⁴, in South Ethiopia 94.1%¹⁰ and 96.6%¹⁶, in Goa – India 99.7%¹², in Southern India 99.8%²⁰, and in Saudi Arabia 100%¹⁵, except in Warangal – India in which the percentage of drugs from essential drug list was low which was 28.58%²¹.

Limitations of the study

The findings of this study are subject to limitations and hence interpretation of study results should be made with some cautions. First, the distribution of sample size according to WHO should include about 20 primary health care facilities with about 30 prescriptions/encounters of each PHC. In our study we took sample only from 5 PHS but with quite large samples of 2,401 for 4 years. Second, the prescribing indicators are useful for investigating medicines prescription pattern at PHC centers and less helpful for inpatient settings or specialist outpatient facilities, but we used the indicators for hospital setting as other previous studies also applied. Third, the interpretation of prescribing patterns in this study referred to WHO reference values for each of the indicator. Nevertheless, the WHO permits recognition of prescribing habits that differ widely from the proposed reference values due to the indicators are influenced by the presenting case mix at a facility or within a region. However, the prescribing indicators in this study could describe the drug use situation in some health facilities in Indonesia.

CONCLUSION

The prescribing practices tended to show better pattern by time. The most problem of prescribing practices from this study was the high average number of drugs prescribed per encounter which leads to polypharmacy. The other problems of prescribing practices were the low percentage of drugs prescribed by generic name and high percentage of encounters with antibiotic, particularly at the hospital setting. This problems tended to increase treatment cost. Efforts should be made for improving rational use of drugs at hospital setting in Indonesia, particularly the program concerning on reduce polypharmacy, as well as campaign for prescribing generic drugs and smart use of antibiotics.

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