

Multicenter Study of Antimicrobial Prescribing in Primary Care Setting

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Abstract: The rational use of drugs requires that patients receive medications appropriate to their clinical needs. It is important to promote the rational drug use, especially in developing country. World Health Organization (WHO) has developed the useful guideline to manage it. Irrational antimicrobial prescribing is a global problem that leads to increasing morbidity, mortality, adverse drug reaction, costs and antimicrobial resistance. Surveillance of antibiotic use is one of the strategies to control and promote rational use of antimicrobials prescribing especially in primary care setting. A retrospective, quantitative and population-based study was conducted at 10 primary care during 6 months. Data were collected from antimicrobial prescribed encounters. The result showed that amoxicillin was the most frequent average prescribed (4481.69 DDD) and meet the standard of World Health Organization (WHO) and the International Network of Rational Use of Drugs (INRUD) prescribing indicator.

Key words: Antimicrobial, prescribing, primary care setting, prescribed encounters, medications appropriate, WHO

INTRODUCTION

Indonesia is a tropical country with a high population density in several locations which raises the prevalence of infectious diseases. The report from an Indonesian district of health in 2012 showed that infectious diseases increase. Problems arise when antimicrobial agents are used irrationally. This irrational drug use may increase morbidity, mortality, the incidence of adverse drug reaction, costs and antimicrobial resistance (Cizman, 2003; Ferech *et al.*, 2016). Nearly 80% the prescriptions of systemic antibiotics are made in primary care with respiratory tract infections the most frequent indication. There is limited evidence on the role of antibiotics in reducing both the duration of symptoms and the complications in cases of colds, otitis media, pharyngitis and bronchitis (Arroll, 2005; Molstad *et al.*, 2008).

The over prescription of antimicrobial exposes the patients to a greater risk of secondary effects, thereby, increasing their use for related problems whereas data about antimicrobial prescribing and their impact used especially in primary care lacked (Little *et al.*, 1997). Since, 2014, Health Department of Indonesia issued a regulation about pharmaceutical care in primary health care which are pharmacist, responsible for monitoring and evaluating the rational drug use (Desalegn, 2013). Therefore, it is

important to determine the trends in the outpatient use of antimicrobial to identify possible inappropriate increases and compare it with WHO prescribing indicator become a primary objective in this setting.

MATERIALS AND METHODS

Study setting: Yogyakarta is a big city, the capital of Yogyakarta special region. It is located in the middle Java island, at the foot of the Merapi volcano consist of 394.012 population. A directorate of health centers established that it has a network of 20 primary care health centers spread across the city, provide free curative and preventive care services to citizens including dispensing of essential drugs. The number of primary care general practitioners in each of these centers varies between 3 and 5, consist of a general physician, dentist, pharmacist and nurses. Yogyakarta is a famous education city therefore, this research could be used as a research overview for other cities.

Data source: A retrospective, quantitative, population based study was designed to describe the current antimicrobial prescribing. We investigated the systemic antimicrobial prescriptions issued by 10 primary care physicians during 5 months. The total amount of different

antimicrobials prescribed with official prescriptions made from each primary care setting were obtained from the prescribing and database of the pharmacy unit. The Anatomical Therapeutic Chemical (ATC) classification of the World Health Organization (WHO) was used to classify the antimicrobial (IHD, 2014). This system shows the structured encoding of the active substances according to the classification of the therapeutic subgroups which in this study, correspond to the group J01 (systemic anti-infectious drugs) and the assigning of a value of Defined Daily Dose (DDD) for each active substance. The so-called DID was used as the measure of consumption corresponding to the DDD/1,000 inhabitants/day (Capella, 1993).

Drug use indicator: There are several well-established methods to measure the type and degree of irrational use of medicines (Karande *et al.*, 2005; WHO, 1993). To determine the scope of improvement in a rational drug use in outpatient practice, WHO has developed and validated a set of core drug use indicators. These indicators are used to measure the performance in three areas related to the rational use of drugs in health care facilities, prescribing indicators measure the performance of prescribers, the patient care indicators measure what patients experience at health facilities and the facility indicators measure whether the health personnel can function effectively (Capella, 1993; Karande *et al.*, 2005; WHO, 2002). It is necessary to promote rational drug use in developing countries (WCCDSM, 2006; Hogerzeil *et al.*, 1993). In our study, we selected to measure the antibiotic prescribing indicator (percentage encounters with an antibiotic prescribed) to obtain preliminary data to describe and quantify the situation before promoting the rational antimicrobials use in primary care.

The World Health Organization (WHO) drug use indicators are intended to measure aspects of health provider behavior in primary health-care facilities in a reliable way, irrespective of who collects the data. The indicators provide information to health-care managers concerning medicine use, prescribing habits and important aspects of patient care. All the indicators have been extensively field-tested in many countries and found to be relevant, easily generated and measured, valid, consistent, reliable, representative, sensitive to change, understandable and action oriented. WHO and the International Network of Rational Use of Drugs (INRUD) for antimicrobial prescribing indicator were used in this study to compare the percentages of antimicrobial prescribing in primary care with the standard. It was calculated by dividing the number of patient's encounters in which an antimicrobial was prescribed by

the total number of drugs encounter surveyed multiple by 100. Average antimicrobials prescribing were rational when the value meet the standard 20-26.8%. For this particular study, >19,000 prescriptions were collected retrospectively during 6 months. All data in the ordinary prescribing indicator recording form were first analyzed manually and then using Microsoft Excel 2010.

RESULTS AND DISCUSSION

In this study, we present a detailed overview of the outpatient antimicrobial prescribing pattern. A total of 141.385 prescribing were considered for inclusion criteria in this study. Among these 18.069 eligible the inclusion criteria whereas the remaining 12.3316 (87.22%) were excluded because there were no antimicrobial prescribed, antimicrobial used with the different route of administration (topical). Antimicrobial prescribing was lower than other drugs used in primary health care.

Figure 1 compare the trends in the overall outpatient visit for each primary health care. Mergangsan primary health care had the highest outpatient visit during 6 months. Data collected from 10 primary health care showed that upper respiratory tract infection (83.5%) were major infection occur followed by gastrointestinal infection (7-5%) skin infection (2.8%) urinary tract and genital infection (1.2%) and others infection such as cardiovascular, renal, dental and tooth abscess, etc.

Antimicrobials prescribed to various ages, especially for adults (71%) neonates (5.5%) children (15.8%) elderly (7%) and some of them unclear stated. On the basis of overall antimicrobial utilization, our survey revealed that amoxicillin was the most antimicrobial used in every primary care (218.044 prescribing) and express the highest antimicrobial usage 1000 inhabitants/day (Table 1). It is about 10-1.000 times higher than others prescribing such as Ciprofloxacin (21.112) Cotrimoxazole (16.688) Metronidazole (11.029) Erythromycin (4.089) Thiamphenicol (2.902) Doxycycline (2.339) Chloramphenicol (2.520) Azithromycin (182) and Cefixime (182).

Drug use evaluation should be done to evaluate whether antimicrobials were prescribed appropriate or not. The widely publication concern about the effectivity of amoxicillin as the first-line drugs prescribed against the gram-positives microorganism, major cause of the upper respiratory tract infection (Arroll, 2005). In addition, due to incessant abuse and misuse of these antibiotics an extensive resistance of the microorganism to these antimicrobial has developed. Quinolone mainly ciprofloxacin has always been a reliable therapeutics intervention in Urinary Tract Infection (UTI) treatment because of their broad-spectrum activity as well as strong

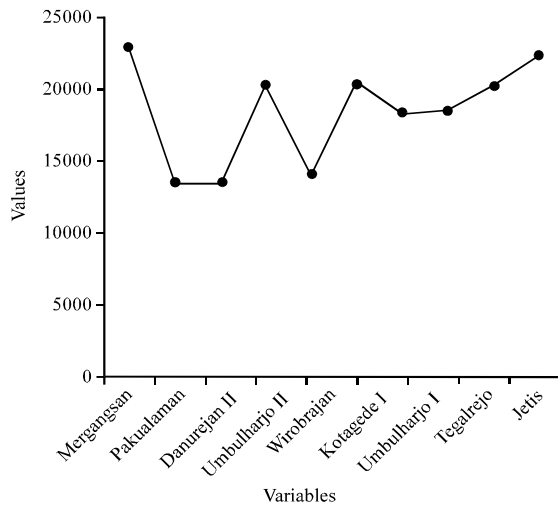


Fig. 1: Total of outpatients visitin primary health; total of parient visits

Table 1: Trends of antimicrobial usage expressed in DDD 1000 inhabitants/day (DID)

ATC	Antimicrobial classes	Antimicrobial agents	Usage (DID)
J01CA04	Penicillins	Amoxicillin	4481.69
J01MD01	Quinolone	Ciprofloxacin	446.24
J01EE01	Sulfonamides trimethoprim	Cotrimoxazole	170.22
J01XD01	Nitroimidazole	Metronidazole	169.11
J01BA01	Macrolide	Erythromycin	101.45
J01BA02	Amphenicol	Thiamphenicol	26.20
J01FA10	Macrolides	Azithromycin	16.02
J01FA01	Amphenicol	Chloramphenicol	9.40
J01DD08	Cephalosporine	Cefixime	4.31

action on gram-negatives. It also effective to use for upper respiratory infection treatment. However, it is advocated that they should be used as a last line due to their serious side effects profile, especially for younger patients. Moreover, overuse of antimicrobial could facilitate the emergence of resistance.

In Table 1, the first column of the table shows the ATC of the drugs proposed by WHO, the latter 3 columns shows the drugs classes, antimicrobial agents and a total of the antimicrobial used expressed in DDD per 1000 inhabitants/day (DID). As we can see from Table 1, amoxicillin being the most antimicrobial prescribed. Amoxicillin (J01CA04) usage were 4481.69 DDDs/1000 patients/day. It indicates that about 4.482 of 1000 patients (or 4.48%) may have theoretically received a standard dose of amoxicillin (1 g every day). This finding suggests amoxicillin used to treat upper respiratory infection, the highest infection occur in primary care.

In this study, we also calculate the percentage of antimicrobials prescribed in every primary care and compare it with the standard of antimicrobial prescribing indicator proposed by WHO and INRUD which is the standard of rational antimicrobial used quantitatively were 20-26.8%. We can from Fig. 2 all the antimicrobials

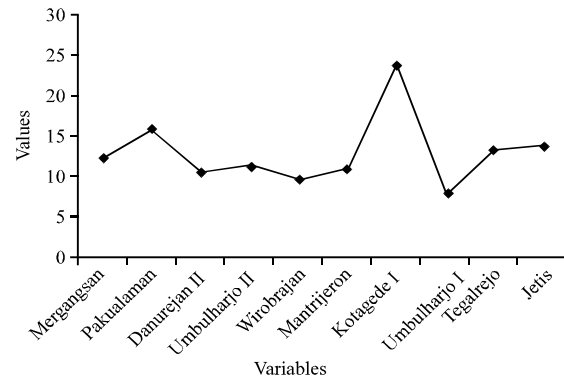


Fig. 2: Percentage of antimicrobials prescribing in primary care during 6 months

prescribing in primary care meet the prescribing indicator standard. Although, antimicrobial prescribed in Kotagede I was slightly higher than others but it still below the maximum standard value. In the drugs use pattern study in several developing countries, the percentages of encounter in which antimicrobial was prescribed was higher than standard such as India (43%), Nigeria (48%), Yaman (46%), Zimbabwe (29%), Uganda (56%), Sudan (63%). Possible reason of the high use of antimicrobials may be due to cultural beliefs about antimicrobials, the patient expectation to receive antimicrobials, prescriber's belief that the therapeutic efficacy of antimicrobial was low. It also could be based on drugs regulation and management in each country. The study used the WHO prescribing indicators which are supposed to record exactly what is prescribed to patients but not why. In order to explain why other techniques are needed.

CONCLUSION

The antimicrobials prescribing were rational in all primary care in Yogyakarta City. This study showed that all antimicrobial prescribing meet WHO standard for antimicrobial prescribing indicator 20-26.8% and Kotagede I was slightly >20%. It should be closely monitored for any development of resistance and low/diminished efficacy of the drugs. Besides, when determining the prescribing of antimicrobial we should consider about others rationality therapy parameter such as appropriate use of the drugs, dose of the antimicrobial given, duration of the treatment, adverse drugs reaction, drugs interaction, antimicrobial prices, etc. The high use of antibacterial drugs described the study can be used as a reference to develop an antimicrobial stewardship program and increase awareness of resistance.

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