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Knowledge and Behavior Regarding Antibiotic Stewardship in Health Workers at Sultan Syarif Mohamad Alkadrie Hospital

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Abstract

Antimicrobial resistance is a global public health concern. The World Health Organization reports that antimicrobial resistance constitutes a serious threat to public health worldwide. One of the risk factors in the development of antimicrobial resistance cases is the irrational use of antibiotics. Knowledge and behavior of health worker about antibiotic stewardship play a role in preventing antibiotic resistance cases. This study aimed to demonstrate knowledge and behavior regarding antibiotic stewardship in health workers at Sultan Syarif Mohamad Alkadrie Hospital, Pontianak. This was a cross-sectional descriptive study using consecutive sampling with total of 39 respondents. Data were collected through questionnaires with total of 45 questions. Knowledge and behavior of respondents were categorized as good, moderate, and low. The data was analyzed using the spearman rank correlation coefficient. The results showed that most health workers had good knowledge 97.44% (38/39) and good behavior 87.18% (34/39) related to antibiotic stewardship with a spearman p-value >0.05. Antibiotic stewardship is important for health workers to prevent an increase in antibiotic resistance cases and their impact on public health worldwide. As we know, increasing antibiotic resistance is a globally major problem as health system depends on effective antibiotics to treat bacterial infections.

Keywords: Antibiotic, Knowledge, Behavior, Health Workers

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Introduction

Microbes are microorganisms that can adapt to various environments and have multiple types[1]. Several microbes can cause several diseases and are even difficult to overcome[2]. This condition can occur due to antimicrobial resistance. Antimicrobial resistance is a global public health problem. The World Health Organization (WHO) reports antimicrobial resistance seriously threatens public health worldwide. The AMRIN study (Antimicrobial Resistance in Indonesia, Prevalence and Prevention Study) has reported the state of antimicrobial resistance, especially antibiotics. In 2001-2005, Dr. Kariadi Hospital, Semarang, reported majority infections caused by multi-resistant bacteria, such as Extended Spectrum Beta Lactamases (ESBLs) producing bacteria and Methicillin Resistant Staphylococcus Aureus (MRSA)[3]. WHO also stated that in 2015, Indonesia ranked 8th out of 27 countries that had cases of bacterial resistance to antibiotics[4].

One of the core strategies of antibiotic resistance combat is antibiotic stewardship. Antibiotic stewardship promote the implementation of good antibiotics prescribing practice that aims to improve patient outcomes through enhanced quality of antibiotic use that includes diagnosis, selection of antibiotic, dose, interval, route, and duration of administration[5]. Health workers play an important role in overcoming the increase of antibiotic resistance through the implementation of antibiotic stewardship[6].

A study on antibiotic prescription in Dr. Kariadi Hospital reported the irrational of antibiotics prescribing, especially in internal medicine, surgery, obstetrics-gynecology, and intensive care units[7]. Of 30% of irrational of antibiotics prescribing, ignoring antibiotic prescription guidelines also found in the internal medicine residents of Dr. Wahidin Sudirohusodo Hospital[8].

Data reported that antibiotic resistance due to irrational antibiotic stewardship is still common among health workers. Antimicrobial stewardship is essential to strengthening the health care system, notably in antibiotic resistance issue. The knowledge and behavior of health workers towards antibiotic stewardship play an important role in its implementation. Thus, this study was conducted to describe the knowledge and behavior of health workers related to antibiotic stewardship at the Sultan Syarif Mohamad Alkadrie Hospital.

Methods

The study was a cross-sectional approach, conducted at Sultan Syarif Mohamad Alkadrie Hospital, Pontianak, in year 2023. A total of 39 health workers (general doctor/dentist, specialist doctors/dentists, and pharmacists) participated using a consecutive sampling technique. All respondents provided written informed consent for participation in the study.

A modified questionnaire to describe the knowledge and behavior of health workers regarding antibiotic stewardship has been evaluated with validity 0.538 – 0.756 for knowledge and 0.556 – 0.951 for behavior ($p >$ r table: 0.514) and reliability with Cronbach's alpha value 0.901 ($p > 0,6$) for knowledge and 0.933 ($p > 0,6$) for behavior.9 The questionnaire had a total of 45 questions, consisting of 25 knowledge questions and 20 behavior questions. The knowledge and behavior of the respondents were categorized into good, moderate, and low.

Data processing was carried out using the Microsoft Excel application by describing the frequency and percentage of respondent's answers. The data was analyzed using the Spearman rank correlation coefficient through the SPSS software 24.0. The results of data

analysis have a significant correlation if $p<0.05$. This study has been approved by the Ethics Committee of the Faculty of Medicine, Universitas Tanjungpura, through Ethical-Clearance Letter No: 7353/UN22.9/PG/2022.

Result and Discussion

Respondents in this study consisted of general doctors/dentists (14), specialist doctors/dentists (17), and pharmacists (8). Based on data, 8 (20.52%) of respondents had enrolled in antimicrobial resistance control program training. The antimicrobial resistance control program training contains modul regarding service management of antimicrobial resistance control programs, strengthening networks and the quality of services related to antimicrobial resistance control, monitoring and evaluation of services related to antimicrobial resistance control and preparation of antibiograms (microbial and antibiotic susceptibility pattern). Thus, the training is suggested to have an impact to the knowledge and behavior of health workers and play an important role in controlling antimicrobial resistance. 12 out of 39 respondents did not know the availability of antibiotic guidelines at the hospital and 14 out of 39 respondents also did not know about the hospital formulary. Detailed data are shown in Table 1.

The study results showed that majority general doctors/dentists, specialist doctors/dentists, and pharmacists have good knowledge and behavior regarding antibiotic stewardship. Detailed data are shown in Table 2. This study is in line with Hadi, et al.[10] who state that >64% of primary healthcare doctors have good knowledge about the use of antibiotics. Tegagn et al.[11] also reported that >60% of health workers had good behavior regarding antimicrobial stewardship. Our finding showed that respondents with moderate knowledge and moderate/low behavior have yet to enroll in antimicrobial resistance control program training. Studies showed that antimicrobial resistance control program training positively impacts health worker knowledge and behavior towards antibiotic stewardship. Rational antibiotics prescribing increased by 15.1% and 55.9% after antimicrobial resistance control program training at Arifin Achmad Hospital and Panda Arang Boyolali Hospital, respectively[12,13]. Thus, antimicrobial resistance control program training play essential role in decreasing antibiotic resistance rates.

Based on Spearman analysis, we found there was no significant correlation ($p>0.05$) between knowledge and behavior of health workers (Table 2). A study conducted by Herawati et al[8]. with a total of 257 health workers respondents showed a positive relationship between knowledge and behavior towards antibiotic stewardship, where low knowledge affected the use of inappropriate antibiotics[8]. In contrast to our study, with a total of 39 health workers, there were no respondent with low knowledge, 4 respondents with moderate behavior, and 1 respondent with low behavior. This result with majority respondent has a good knowledge and behavior, suggested have an impact to statistical analysis that show no correlation. Although our study is reported no correlation between knowledge and behavior of antibiotic stewardship, it is stated that knowledge and behavior of health workers has an important role in preventing antimicrobial resistance.

In this study, we classified the knowledge questionnaire into three subtopics: the etiology of resistance (10 questions), resistance control (9 questions), and effect of resistance (6 questions). Then, the behavior questionnaire is classified into four topics, i.e. performance antimicrobial resistance control program (10 questions), controlling antibiotic

prescribing (1 question), the performance of preventing the spread of resistant microbes (1 question), and good antibiotics prescribing practice (4 questions). Knowledge and behavior of health workers based on subtopic questions are shown in Table 3.

The study results in Table 3 about the knowledge questionnaire subtopic showed that 82.05% (32/39) of respondents have good knowledge about the etiology of antibiotic resistance. Minority of the respondents have moderate knowledge 15.38% (6/14) and low knowledge 2.56% (1/17). Based on questionnaire data, these health workers with moderate and low knowledge have attended antimicrobial resistance control program training yet and did not know the presence of antibiotic guidelines and formulary at the workplace. The study showed that pharmacists (100%) had good knowledge about antibiotic-resistant etiology. This may be due to the majority of pharmacists (6/8) know the existence of antibiotic guidelines and formulary at hospital. Acknowledgment of antibiotic guidelines and hospital formulary is essential and assumed to be related to the behavior of antibiotic prescription. As reported in a study at Hasan Sadikin Hospital in Bandung, that respondents with poor knowledge about antibiotic guidelines had low behavior regarding antibiotics prescription[14].

The results also show that all respondents (100%) indicated a good knowledge of antibiotic resistance control (Table 3). The development of resistance is closely related to the control of antibiotic use. The management of antibiotic use can be done by World Health Organization classifying antibiotics in the AWaRe category: ACCESS, WATCH, and RESERVE. This grouping aims to (1) facilitate the implementation of antibiotic management at the local, national, and global levels; (2) improve treatment outcomes; (3) suppress the emergence of resistant bacteria; and (4) maintain the usefulness of antibiotics in the long term[15].

Table 3 shows majority of the health workers have good knowledge and behavior based on the questionnaire topics. Although we found less than 70% of health workers have good behavior on controlling antibiotic prescribing and good antibiotic prescribing practice based on subtopic questions. Our study demonstrated that 12.82%/23.07% have moderate/low behavior in controlling antibiotic prescribing and 25.64%/15.38% have moderate/low behavior in good antibiotic prescribing practice, respectively. Based on data, respondents with moderate/low behavior in these subtopics does not know about the existence of antibiotic guidelines and hospital formulary. The study conducted in Arifin Achmad Hospital, Pekanbaru, showed the important role of antibiotic guidelines, and there was an increase in the rational use of antibiotics after implementing antibiotic guidelines in the hospital. Their study reports the rational use of antibiotics increased by 15.1%, and the antibiotics prescription without indications decreased by 10.9%[13].

Antimicrobial Resistance Control Program is a mandatory in hospital. The implementation of the program requires team collaboration of the Antimicrobial Resistance Control Program, Pharmacy and Therapy Committee, Infection Prevention and Control, clinical microbiology consultants, as well as facilities to perform the program. Infection Prevention and Control as a team collaboration play a role in improving the quality of health service through protection to health workers, patients, and the community in the healthcare environment[5]. The question about infection prevention and control in our study is presents in third subtopic in behavior questionnaire, which is “Preventing the spread of resistant microbes”. The results

in Table 3 show that general doctor/dentists have the good behavior (100%). Based on respondent statement, general doctor/dentists always communicate about room cleaning in antibiotic resistant patient through Infection Prevention and Control team, while other respondents are not.

Apart from knowledge and behavior of antibiotic stewardship, supportive hospital stakeholders, facilities, and infrastructure also have a role in antibiotic stewardship. These factors will lead to a successful antimicrobial resistance control program. A study in Dr. Wahidin Sudirohusodo Hospital reported that the implementation of an antimicrobial resistance control program has not optimal yet due to a lack of financial, commitment of team, and coordination within internal hospital team (the antimicrobial resistance control program team, management, clinicians/Departments/SMFs/clinical pharmacy/clinical microbiology team), inadequate information of antimicrobial resistance control program, the high workload of the antimicrobial resistance control program team, inadequate infrastructure, and the problem of referral patients with bacterial resistance infection[16].

Indonesia is still facing a challenge in implementing antimicrobial resistance control programs. We need to increase the commitment of hospital management, fulfilling facilities, and infrastructure for antimicrobial resistance control. As a health worker, we should apply antimicrobial resistance control program guidelines, rational antimicrobial prescribing, and antibiotic prescription surveillance[17].

Conclusion

The majority of health workers at the Sultan Syarif Mohamad Alkadrie Hospital, Pontianak, had good knowledge and good behavior regarding antibiotic stewardship, even though there was no significant correlation between them. Antibiotic stewardship is important for health workers to prevent an increase in antibiotic resistance cases and their impact on public health worldwide. As we know, increasing antibiotic resistance is a globally major problem as health system depends on effective antibiotics to treat bacterial infections. As a prevention the increase of antibiotic resistance, the hospital could make a policy about the antimicrobial resistance control program team formation, improving the performance of existing antimicrobial resistance control program team, assessing and evaluating antibiotic administration records, and implementation antibiotic guidelines based on hospital antibiogram.

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Conflict of Interest

We declare there was no conflict of interest during this study.

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Table 1. Characteristics of health workers (n=39).

No	Characteristic	n (%)
1	Profession	
	a. General doctor/dentist	14 (35.90)
	b. Specialist doctor/ dentist	17 (43.59)
	c. Pharmacist	8 (20.51)
2	Gender	
	a. Male	14 (35.90)
	b. Female	25 (64.10)
3	Antimicrobial Resistance Control Program Training	
	a. Yes	8 (20.51)
	b. No	31 (79.49)
4	Knowing the Availability of Antibiotic Guidelines at the Hospital	
	a. Yes	27 (69.23)
	b. No	12 (30.77)
5	Knowing Availability of Hospital Formulary	
	a. Yes	25 (64.10)
	b. No	14 (35.90)

Table 2. Knowledge and behavior of health workers about antibiotic stewardship.

	General doctor/dentist (n=14)		Specialist doctor/dentist (n=17)		Pharmacist (n=8)		Total		Correlation between Knowledge and Behavior
	n	%	n	%	n	%	n	%	
Knowledge									
Good	14	100	16	94.12	8	100	38	97.44	
Moderate	0	0	1	5.88	0	0	1	2.56	p = 0.519
Low	0	0	0	0	0	0	0	0	r = 0.108
Behavior									
Good	12	85.71	17	100	5	100	34	87.18	
Moderate	2	14.29	0	0	2	25	4	10.26	
Low	0	0	0	0	1	12.5	1	2.56	

Table 3. Health worker's knowledge and behavior based on the questionnaire topic.

	General doctor/dentist (n=14)		Specialist doctor/dentist (n=17)		Pharmacist (n=8)		Total	
	n	%	n	%	n	%	n	%
Knowledge								
The etiology of antibiotic resistance								
Good	8	57.14	16	94.12	8	100	32	82.05
Moderate	6	42.86	0	0	0	0	6	15.38
Low	0	0	1	5.88	0	0	1	2.56
The antibiotic resistance control								
Good	14	100	17	100	8	100	39	100
Moderate	0	0	0	0	0	0	0	0
Low	0	0	0	0	0	0	0	0
The effect of antibiotic resistance								
Good	11	78.57	15	88.24	8	100	34	87.18
Moderate	3	21.43	1	5.88	0	0	4	10.26
Low	0	0	1	5.88	0	0	1	2.56
Behavior								
Performance of Antimicrobial Resistance Control Program								
Good	14	100	17	100	6	75	37	94.87
Moderate	0	0	0	0	2	25	2	5.13
Low	0	0	0	0	0	0	0	0
Controlling Antibiotic Prescribing								
Good	6	42.86	12	70.59	7	87.5	25	64.10
Moderate	2	14.29	3	17.65	0	0	5	12.82
Low	6	42.86	2	11.76	1	12.5	9	23.07
Performance of Preventing the Spread of Resistant Microbes								
Good	14	100	14	82.35	1	12.5	29	74.36
Moderate	0	0	3	17.65	5	62.5	8	20.51
Low	0	0	0	0	2	25	2	5.13
Good Antibiotics Prescribing Practice								
Good	5	35.71	13	76.47	5	62.5	23	58.97
Moderate	9	64.29	1	5.88	0	0	10	25.64
Low	0	0	3	17.65	3	37.5	6	15.38