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Antibiotic Stewardship: How It Is Implemented in Primary Healthcare Facility

Rini S. Handayani and Vita Pertiwi

Abstract

Antibiotic stewardship plays an important role in controlling antibiotic resistance. The problem of antibiotic resistance in primary healthcare has not been given much attention, so far, the focus has been on the hospital. Antibiotic resistance control needs to start from primary healthcare facilities such as community health centers, clinics, and independent doctor practices because patients who enter the hospital are often already resistant. Therefore, it is necessary to identify things that can be done to control antibiotic resistance in primary health care facilities. Things that can be done include making policies or regulations that support antibiotic stewardship in primary healthcare, optimizing available facilities and infrastructure, improving facilities that support antibiotic stewardship, increasing capable human resources, monitoring and evaluating antibiotic prescribing, and building system information on antibiotic resistance that is easily accessible to health workers in primary health care facilities.

Keywords: antibiotic stewardship, primary healthcare, resistance policy, primary care provider, stewardship implementation

1. Introduction

According to World Health Organization (WHO), antibiotic stewardship is a comprehensive integrated series of activities to promote the responsible and appropriate use of antibiotics so that patients get optimal treatment results. These strategies are reducing antibiotic utilization by increasing the rational use of antibiotics and reducing the incidence of infectious diseases by carrying out immunizations. The irrational use of antibiotics includes inaccuracies in diagnosis, dosage, interval, and duration. Prescribing antibiotics recklessly is a predisposing factor for the emergence of antibiotic resistance. In primary health facilities, antibiotics are widely prescribed for acute Upper Respiratory Tract Infections (URTI), even though URTI is mostly caused by viruses and antibiotic is not a proper drug choice. Using broad-spectrum antibiotics too frequently is also not recommended. The existence of guidelines for prescribing appropriate antibiotics with the application of evidence-based interventions helps clinicians to use antibiotics wisely. Besides, the proper management of antibiotics also plays a role in controlling antibiotic-resistant bacteria and saving costs. Therefore, doctors and pharmacists in primary health facilities play

an important role in overcoming inappropriate antibiotic prescribing problems and antibiotic stewardship is a key strategy to maintain the effectiveness of antibiotics in the future [1–9]. Implementation of antibiotic stewardship will be effective if it is carried out cross-sectorally from the national level to the regional level by involving all parties such as local health offices, hospitals, primary health facilities, health workers like doctors, pharmacists, and the community.

2. Problems

Currently, the antibiotic stewardship strategy is mostly carried out in hospitals, especially referral hospitals, rather than primary health facilities [1]. In contrast to referral hospitals, the primary health center has limited human resources, facilities, and infrastructure. It is estimated that about 80% of antimicrobials are consumed in primary health facilities. Therefore, antibiotic stewardship must be started in primary health facilities immediately. Limited sources should not be used as a barrier to initiating antibiotic stewardship. Although it is not yet ideal, it is hoped that antibiotic stewardship in primary health facilities will play an important role in controlling antibiotic resistance. Besides limited resources, the understanding of antibiotic resistance among health workers is not comprehensive. Lack of risk awareness of antibiotic resistance among health workers like doctors and pharmacists is also one of the leading factors for increasing antibiotic resistance. Therefore, interventions to increase the awareness of doctors and pharmacists in primary health centers about using antibiotics wisely need to be carried out. This intervention will help increase rational antibiotic utilization. Other factors include physician non-compliance with antibiotic utilization management, limited access to microbiological testing to support diagnosis, lack of support and coordination with local policymakers, and limited access to antibiotic resistance data in the community [5, 10]. Even though policymakers have made several interventions by developing antibiotic indication and utilization regulation, for example in the case of URTI, the rate of inappropriate antibiotic prescribing is still high [3]. Optimal antibiotic stewardship implementation is expected to reduce inappropriate antibiotic prescribing. Antibiotic stewardship programs and activities can be successful if the challenges faced by primary health facilities can be overcome [3, 7]. Therefore, challenges or obstacles to the implementation of antibiotic stewardship in primary health facilities must be minimized, considering that inappropriate antibiotic prescribing often occurs in primary health facilities.

3. Antibiotic stewardship implementation in primary healthcare facilities

3.1 Antibiotic stewardship policies in primary health care facility

In developing countries, enforcement of policies prohibiting the free sale of antibiotics is often not optimal. This allows people to self-medicate using antibiotics that are not needed [11]. Improvements across the health system and drug supply chain are needed to tackle the problem of antibiotic resistance [9]. In addition, the government needs to make policies to strengthen the role of primary healthcare facilities in controlling antibiotic resistance because they are the ones dealing with the most patients. Antibiotic stewardship policy needs to start from the upstream to primary healthcare facilities to have a significant impact. Antimicrobial stewardship programs

in the form of education, clinical support, supervision, and policy have reduced rates of prescription writing and inappropriate prescribing [12]. The government needs to immediately make national policies related to antibiotics following WHO recommendations, including the Access, Watch, and Reserve (AWaRe) classification in national guidelines for antibiotics application [13].

The Ministry of Public Health in Qatar developed the NAP (National Plan of Action) to Fight Antimicrobial Resistance (AMR) in collaboration with the WHO Regional Office for the Eastern Mediterranean (WHO/EMRO)) [14]. Indonesia, through the Ministry of Health, has established rational drug prescription indicators for URTI and diarrhea at Public Health Centers. Tolerance to the use of antibiotics in URTI is at 20% and in diarrhea is at 8%. This is based on the fact that antibiotics are often given to treat diarrhea and acute respiratory infections, although in most cases these conditions are caused by viruses and do not require antibiotics [9]. This target is stated in the Regulation of the Coordinating Minister for Human Development and Culture of the Republic of Indonesia number 7 of 2021 concerning the national action plan for controlling antimicrobial resistance for 2021–2024. The Indonesian Ministry of Health has also made pharmacists as the agents of change which are part of the Community Movement to Use Drug Intelligently program. One of the goals of this program is to educate health workers and the public to use antibiotics wisely and be aware of the antibiotic resistance dangers. Another important component of the program is comprehensive surveillance of antibiotic prescription and antimicrobial resistance. This data is intended to help antibiotic stewardship efforts be more precise and wise [12].

3.2 Optimizing primary healthcare's facilities to support the antibiotic stewardship program

In developing countries, facilities and infrastructure in primary healthcare facilities are often limited, especially in rural and remote areas. There is a shortage of diagnostic tools so that the diagnosis becomes inaccurate and inappropriate antibiotic prescribing occurs when the patient does not need antibiotics [11]. Rapid diagnostic tests will allow doctors to prescribe specific antibiotics rather than broad-spectrum antibiotics and to differentiate between viral and bacterial infections [9].

The lack of human resources, the inaccessibility of diagnostic tests, and the cheap price of antibiotics resulted in a tendency to give treatment with empiric antibiotics directly without conducting cultures because they were considered more efficient economically [9, 15]. General practitioners in developed countries commonly use the rapid antigen detection test for the diagnosis of streptococcal pharyngitis. The C-reactive protein (CRP) kit is used to differentiate serious respiratory infections [16].

In addition to the absence of a rapid diagnostic test, inappropriate application of guidelines, unavailability of specific antibiogram data, and the short consultation time due to many patients are also factors triggering the irrational use of antibiotics [14]. Public understanding of the dangers of antibiotic resistance plays an important role in controlling the spread of antibiotic resistance. Unfortunately, people often believe that antibiotics will help cure colds and flu caused by viruses. Whereas viral infections generally do not require antibiotics [11].

Poor sanitation in primary healthcare facilities also facilitates spreading of the microbes that are resistant to antibiotics. To control the spread of antibiotic-resistant microbes in the environment, primary healthcare facilities must be clean. Contamination in water supplies is driving the spread of antibiotic-resistant

microbes. This clean primary healthcare can be achieved if it is supported by community health workers who are competent in environmental sanitation. Adequate water, good sanitation, and public health workers implementing effective infection prevention and control procedures will control the spread of antibiotic-resistant microbes. Unfortunately, many primary health care facilities do not follow basic sanitation measures such as aseptic technique, hand washing, and the use of personal protective equipment, such as gloves and masks. Without clean water and good sanitation in primary healthcare facilities, they become infection exposure points for patients and the staff. These inadequate facilities can be the starting point for transmission of antimicrobial resistance in the community [9].

A comprehensive assessment of primary healthcare facilities in resource-limited settings is essential to strengthening the Infection Prevention and Control (IPC) measures and Antibiotic Stewardship Programs (ASP) activities. This approach for assessing existing IPC and ASP activities will provide relevant data for establishing further policies regarding adequate facilities and infrastructure in primary healthcare facilities to support the Antibiotic Stewardship Program [17].

3.3 Increase health worker's capacity in primary healthcare

Some health workers consider antibiotic resistance as a national and even international problem but sadly this does not affect their daily practice in primary healthcare facilities. The others do not understand and have full awareness about antibiotic resistance. Some doctors in primary healthcare facilities may prescribe antibiotics out of habit or are reluctant to follow the new policy in prescribing antibiotics. Therefore, antibiotic prescribing varies greatly [9, 18]. Other health workers like pharmacists and informal health service providers, especially in countries and regions where there is relatively free access to antibiotics also contribute to antibiotic resistance [12]. Raising awareness and understanding the antibiotic resistance must start with professional education, and continue to any other advanced education program. This continuing education is carried out with the hope of behavior changes in health workers [16]. Besides educational interventions, it is necessary to audit and give feedback because it will increase the rational use of antibiotics. If needed, policy changes and an information system are formed to remind and promote the rational use of antibiotics in primary healthcare facilities [10, 18].

In Indonesia, especially in rural and remote areas, the prescription of antibiotics is also carried out by nurses or midwives due to the absence of general practitioners. Therefore, education interventions about the dangers of antibiotics should also be given to nurses or midwives. Unfortunately, continuing education for health workers in primary healthcare facilities is not yet intensive. Poor management of antibiotics in primary healthcare facilities also has a role in antibiotic resistance [7].

In addition to the health workers mentioned above, pharmacists also play a role in controlling antibiotic resistance. Pharmacists have a significant role in ensuring the proper consumption of antibiotics. Unfortunately, pharmacists often lack the education about advanced antibiotic resistance even though have an important role in the Antibiotic Stewardship Program. Another crucial point is the lack of collaboration between health workers such as doctors, nurses, midwives, and pharmacists [19].

Apart from health workers, understanding and being aware of the antibiotic resistance danger is also crucial for patients. The public also needs to be educated regarding this matter. Unawareness of the public regarding the proper use of antibiotics and free access to antibiotics is a potential risk for antibiotic resistance [10–12]. People

believe that antibiotics can cure diseases caused by viral infections such as the common cold or flu [11]. People often self-medicate using leftover antibiotics that have been previously prescribed for diseases that are not necessarily caused by bacteria. Non-compliance with the dosage and rules of use that doctors have prescribed is one of the factors for the development of antibiotic resistance in a community [12]. This behavior needs to be changed, they must be taught to only use antibiotics according to the doctor's instructions and not self-medicate using antibiotics [18]. Effective education and communication to the public to increase public awareness is part of the Antibiotic Stewardship Program [7]. Public education about antibiotic utilization and the dangers of antibiotic resistance can be carried out through talk shows with pharmacists and doctors through electronic media such as TV, radio, YouTube, and other mass media [16]. Besides educating health workers, raising awareness and educating the public about antibiotic resistance also needs to be done.

Although doctors are the most influential health professionals in addressing the problem of antibiotic resistance in primary healthcare facilities, treatment decisions are sometimes influenced by patient demands and are often driven by an unfounded belief in getting the 'quickest cure' with antibiotics [10–12]. Inappropriate use of antibiotics and demands on doctors to prescribe antibiotics can result from a poor understanding of the implications of antibiotic abuse, limited access to trained doctors, limited resources, and health literacy [12]. General practitioners often feel that patients with URTI consult with the hope of getting antibiotics [18]. Even though doctors understand the dangers of antibiotic resistance, sometimes doctors prescribe antibiotics to maintain good relations with patients and avoid patient dissatisfaction. This paradox still occurs and may be one of the main contributors to the continued over-prescribing of antibiotics for URTI [11, 18]. The gap in knowledge about antibiotic resistance that contributes to the continuation of this antibiotic resistance needs to be eliminated. Therefore, better communication skills are needed for patients and the wider community. Continuing education materials apart from material on the rational use of antibiotics, the dangers of antibiotic resistance are also material on communicative ways of communicating to patients and the wider community. Communicative communication with patients is the key to making joint decisions to use antibiotics rationally. This has been shown to reduce antibiotic prescriptions for URTI in several studies [18, 20].

Given a lot of factors cause antibiotic resistance, the high risk of antibiotic resistance, and the involvement of many parties, this antibiotic resistance must be overcome by all parties in collaboration. Working together to tackle antibiotic resistance, both from the sector in humans and livestock, (one health priority agenda) will be more successful than doing it alone [11, 21]. Doctors and pharmacists in primary healthcare can be the spearheads of the "one health priority agenda" because primary healthcare does not only provide health services but also has the functions and duties of carrying out health promotion and preventive programs.

3.4 Antibiotic monitoring and evaluation

Monitoring and evaluation of antibiotic prescribing and resistance are very important in controlling antibiotic resistance. This is necessary as a feedback basis for primary healthcare facilities, an intervention that needs to be carried out by the local health authority (public health office) or on a national scale by the Ministry of Health. The results of monitoring and evaluation are also needed as a reference for improving antibiotic prescribing guidelines.

Comprehensive surveillance of antibiotic prescription and resistance is an important component of the Antibiotic Stewardship Program [12]. WHO issued the "Global Antimicrobial Resistance and Use Surveillance System (GLASS)" program on October 22, 2015. This GLASS program is the first global collaborative effort to standardize AMR surveillance. Surveillance is a way to obtain data as a basis for assessing the spread of AMR and to inform and monitor the impact of local, national, and global strategies. Based on the surveillance results, infection prevention, control responses, and policy improvements are determined. GLASS was compiled by combining data from AMR monitoring in humans, namely monitoring of microbial resistance and antimicrobials utilization including in the food chain (use of antimicrobials in animal husbandry and fisheries) and resistant microbes in the environment [22]. Unfortunately, this can only be done at the hospital level, it cannot be done yet in primary health facilities due to the absence of microbiological examination facilities and limited infrastructure, as well as health human resources to carry out antimicrobial resistance tests. Collaboration with hospitals is needed to overcome this problem. Besides the surveillance program, data on antibiotic consumption at the primary healthcare is also needed for monitoring and evaluating antibiotic management. Community-level resistance and consumption data are needed to monitor resistance, inform treatment guidelines and patient care, and understand prescribing patterns. For evaluating and monitoring antibiotic utilization, WHO classifies antibiotics into three groups, namely Access, Watch, and Reserve. The Access group is a group of antibiotics that have activity against a wide range of commonly encountered susceptible bacteria while also having lower resistance potential than other groups. This group of antibiotics is recommended as the first or second choice of infectious disease treatment. Therefore, the Access group should be the most widely available antibiotics in primary healthcare [9]. There is a direct correlation between antibiotic use and resistance. High consumption of antibiotics leads to high levels of resistance [16]. In Indonesia, monitoring of antibiotic use in primary healthcare facilities is carried out on the use of antibiotics in non-pneumonic URTI and non-specific diarrhea. The Indonesian government has also established a national formulary that includes a list of antibiotics used in primary healthcare facilities. Community Health Centers were asked to report the use of antibiotics in non-pneumonic URTI and non-specific diarrhea to the local public health office and then they will report to the Ministry of Health, meanwhile, an evaluation of the suitability types of antibiotics prescribed at the primary healthcare with the national formulary had not been carried out.

3.5 Building an information system on antibiotic resistance

An obstacle in making the right diagnosis in primary healthcare facilities is the absence of microbiological examination to determine whether the cause of infection is bacteria or virus. This situation makes choosing precise antibiotics harder. Microbiological examination currently only exists in hospitals, so collaboration with hospitals is needed. Building an antibiotic-resistant information system that is easily accessible to health workers in primary healthcare facilities can be a solution to overcome this [9].

An information system coordinated by the local health authority (public health office) in collaboration with hospitals is urgently needed considering that the hospital has antibiotic resistance data as well as laboratory facilities and human resources for the microbiology examination laboratory. Primary healthcare facilities will provide information on the use of antibiotics. A comprehensive information system involving

hospitals, primary healthcare facilities, and health offices will be effective in increasing rational antibiotic prescribing [9].

Data on antibiotic utilization and antibiotic resistance that are integrated into a system can monitor antibiotic use and emerging resistance so that future antibiotic prescribing can be based on local resistance patterns and results with more accurate diagnosis and therapy. This information system can also be accessed by primary healthcare facilities in rural areas, given that internet access is now quite extensive in rural areas. This will overcome the problem of health workers in rural areas who lack information about local resistance patterns. This application should not be too complicated so that it can be accessed by smartphone. An app launched in South Africa in late 2017, provides information to patients about their diagnosis, proper use of antimicrobials, and infection prevention; physicians can enter patient characteristics and symptoms to obtain guidance on their diagnosis and local prevalence of resistance [9].

This information system can also be used by the health office to monitor and provide feedback to primary healthcare facilities. This comprehensive information will assist doctors in prescribing appropriate antibiotics or not prescribing antibiotics for patients with viral infections who usually do not require antibiotics [9]. Information systems that are supported by interventions can provide a better result of antibiotic resistance prevention, but this information and interventions are very specific regionally, so they will vary depending on the region [10].

In addition to the information system intended for health workers, the public health office can create an information system intended for the community. This system will be useful for socializing about the danger of antibiotic resistance with interesting content for the public. The Internet can be one of the media because it is widely accessed by the public. There were an estimated 4.90 billion social media users worldwide in 2017 and is projected to increase to 5.85 billion in 2027 [23]. Public health offices can promote proper use of antibiotics, and hygiene practices to the public as part of antibiotic stewardship activity. Besides, this information system can be used against media that provide wrong information about health problems, such as the use of antibiotics to treat colds and influenza and the dangers of vaccines [9].

4. Conclusion

An Antibiotic Stewardship Program is necessary to solve antibiotic resistance. Focus programs need to change from hospital-based to primary healthcare-based due to their large coverage. An implementation that can be done in primary healthcare is forming a solid policy, optimizing its infrastructure, upgrading human resources, monitoring and evaluating antibiotic use routinely, and building an information system. Cooperation between primary healthcare, hospitals, and public health offices made a comprehensive and powerful antibiotic stewardship program.

Conflict of interest

The authors declare no conflict of interest.

Author details

Rini S. Handayani[1] and Vita Pertiwi[2*]

1 National Research and Innovation Agency, Jakarta, Indonesia

2 Prambanan Public Hospital, Yogyakarta, Indonesia

*Address all correspondence to: vitapertiwi96@gmail.com

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