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SURGEONS BEHAVIOR TOWARD PROPHYLAXIS ANTIBIOTICS IN SANGLAH HOSPITAL

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ABSTRACT

Background: The emergence of antibiotic resistance is a complicated problem due to many factors, especially its use and abuse. Inappropriate use of antibiotics is very common in both developed and developing countries. The goal of this study was to see the knowledge of the surgeons toward prophylaxis antibiotic at Sanglah Hospital.

Methods: This is a descriptive study of 55 surgeons who performed elective surgery at Sanglah Hospital. A questionnaire was filled by the surgeons randomly without prior notice about the study. The information about their behavior toward prophylaxis antibiotics was gathered from medical record of the day.

Result: Out of the 55 surgeons participated in this study, 85.5% have followed a training on rational antibiotic use. The level of knowledge about factors that can increase surgical wound infections is quite good (94.4%), while the knowledge regarding factors that can reduce surgical wound infections very low (16.4%). Almost all (92.7%) clean-surgery patients were given prophylactic antibiotics. The most given antibiotic was ceftriaxone (72.7%), the third generation of cephalosporins.

Conclusion: The mean knowledge of the surgeons toward antibiotic prophylaxis was 59.8%. The most used antibiotic as pre-surgical prophylaxis was ceftriaxone. And the time of administration for prophylaxis antibiotic was 16-60 minutes prior to surgical incision.

Keywords: *clean surgery, elective surgery, nosocomial infection, rationale*

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INTRODUCTION

Antibiotics play an important role in preventing infection in patients at risk.[1] Antibiotics can be given as empirical, definitive, or prophylactic therapy.[2] The principle of prophylactic use of antibiotics in the pre-surgical stage is that during the start of the surgery the antibiotics have reached the optimal concentration level in the target tissue, so it is effective for inhibiting bacterial growth.

The emergence of antibiotic resistance is a complicated problem due to many factors, especially its use and abuse. Inappropriate use of antibiotics is very common in both developed and developing countries. The use of large amounts of antibiotics and their incorrect use is thought to be the main cause of the high number of pathogens and resistant commensal bacteria throughout the world. This causes an increase in the need for new types of antibiotics. Reducing the number of improper use of antibiotics is the best way to control bacterial resistance.[3]

2014 CDC data found that nearly 50% of all antibiotics prescribed were not needed or were effectively ineffective as prescribed. Every year in the United States, at least 2 million people get serious infections with bacteria that are resistant to one or more antibiotics designed to treat the infection. At least 23,000 people die each year as a result of this antibiotic-resistant direct infection.[4]

Operation actions are classified into four categories (clean, clean-contaminated, contaminated and dirty).[1] In elective surgery, clean-surgery generally does not require prophylactic antibiotics except in some types of surgery, such as the eyes, heart, and joints or in the act of installing prosthetics or implants.[5] The route of administration of prophylactic antibiotics is given intravenously. The timing of prophylactic antibiotics is given ≤30 minutes before skin incision. Repeat doses can be given for indications of bleeding in excess of 1500 ml or surgery lasting more than 3 hours.[6]

The literature shows that around 30-50% of antibiotic use in hospitals is for prophylactic surgical antibiotics, and between 30% and 90% of prophylactic administration is inappropriate.[7] This is in line with studies in Iran, India, and US which show that cefazolin is used as the first line in surgical prophylaxis.[8-10]

A rationale of drugs at Sanglah Hospital, including antibiotics, was good enough but the implementation of the rational use of antibiotic drugs had not gone well.[11] One factor that plays a role is the knowledge and understanding of doctors about infectious diseases and antibiotics that are still lacking.

The purpose of this study was to see the knowledge of the surgeons toward prophylaxis antibiotic

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usage in clean-surgery cases at the Central Operating Theatres of Sanglah Hospital Denpasar.

MATERIAL AND METHODS

This is a descriptive study conducted at Sanglah Hospital of Bali on February 2018. The research subjects were surgeons who scheduled elective-clean-surgery in central operating theaters of Sanglah Hospital. Data on antibiotic prophylactic therapy is taken from the patient's status. The study was approved by the Committee of Ethical Research of Sanglah Hospital/Faculty of Medicine Udayana University of Bali.

Evaluation of the use of prophylactic antibiotics was carried out by providing a questionnaire to be filled by the subjects to assess their knowledge and attitudes toward the use of prophylaxis antibiotics. The sampling method was random sampling, where we conducted the study and give out a questionnaire to all attending surgeons that day without prior notice about this study. The collected data was analyzed using SPSS 22.0 software.

RESULTS

The 55 surgeons' classification is shown in Table 1. The highest number of clean-elective surgery procedures performed by orthopedic and oncology surgeons. Out of the 55, 85.5% have participated in rational antibiotic use training (Table 2). The results of the research on the level of operator knowledge about factors that can increase surgical wound infections are quite good (94.4%), inversely proportional to the knowledge of operators regarding factors that can reduce surgical wound infections very low (16.4%).

On the day of the survey, we collected some information about the subjects' behavior toward prophylaxis antibiotic, which is seen in Table 3.

Table 1 Distributions of subjects based on specialty

Specialties	Distribution N (%)
Thoracic surgeon	4 (7.3)
Neurosurgeon	9 (16.4)
Pediatric surgeon	4 (7.3)
Ophthalmologist	4 (7.3)
Orthopedic surgeons	12 (21.8)
ENT	1 (1.8)
Oncology surgeon	12 (21.8)
OBGYN surgeon	1 (1.8)
Urology surgeon	2 (3.6)
Digestive surgeon	3 (5.5)
Plastic surgeon	3 (5.5)
Total	55 (100)

Table 2 Results of the questionnaire

Questions asked in the questionnaire	Positive or correct answers N (%)	Negative or incorrect answers N (%)
Attended an antibiotic course in the past	47 (85.5)	8 (14.5)
Factors increasing the risk of surgical site infection	52 (94.5)	3 (5.5)
Factors decreasing the risk of surgical-site infection	9 (16.4)	46 (83.6)
Risks of giving prophylaxis antibiotics	20 (36.4)	35 (63.6)
Drugs that are classified as prophylaxis antibiotics	43 (78.2)	12 (11.8)
The time prophylaxis antibiotics should be given	18 (32.7)	37 (67.3)
The dose of prophylaxis antibiotics should be given	32 (58.2)	23 (41.8)
When a repeated dose of prophylaxis antibiotics should be given	26 (47.3)	29 (52.7)
Which antibiotic that should be given as prophylaxis for clean-surgery	43 (78.2)	12 (11.8)
The best route of administration for prophylaxis antibiotics	53 (96.4)	2 (3.6)

Table 3 **Prophylaxis antibiotic profile of the subjects on the day of survey**

Variables	N (%)
Prophylaxis antibiotic	
- Given	51 (92.7)
- Not given	4 (7.3)
Route of administration	
- Intravenous	51 (92.7)
- Oral	4 (7.3)
Antibiotic used	
- Cefazoline	10 (18.2)
- Ceftriaxone	40 (72.7)
- Ampicillin	1 (1.8)
- None	4 (7.3)
Time of administration (minutes before incision)	
- 0-15	9 (16.4)
- 16-30	21 (38.2)
- 30-60	19 (34.5)
- 60-120	2 (3.6)

Almost all (92.7%) clean-surgery patients were given prophylactic antibiotics. The most given antibiotic was ceftriaxone (72.7%), a third generation of cephalosporins. Based on the result of the questionnaire, the mean knowledge about antibiotic prophylaxis by the operator was 59.8%.

DISCUSSION

The highest number of clean-surgery procedures performed by the surgeons in this study was orthopedic and oncology surgery. This study showed that most surgeons have participated in the rational antibiotic prescribing training. The operator's knowledge of factors that reduce surgical site infections is low, that only 9 (16.4%) answered correctly. However, other knowledge regarding the route of administration, drugs that classified as prophylactic antibiotics, antibiotic of choice for prophylaxis in clean-surgery, and factors that can increase surgical wound infection are satisfactory (>75%).

The most commonly used prophylactic antibiotic drug in this study is ceftriaxone. This is in line with the research conducted by Desiyana et al in the operating room of Dharmais Cancer Hospital in 2008 that prophylactic antibiotics were still given in 73% of clean elective surgeries, and the most used antibiotics was third-generation of cephalosporin.[12] Antomi and Supadmi[13] reported that the most widely used antibiotic as prophylactic in Tugureji Hospital is cefazolin (44%).

Both WHO[14] and the Minister of Health of the Republic of Indonesia[5] recommended the use of first and second generation cephalosporins as surgical prophylaxis, aiming in the prevention of emergent multiresistant pathogens, superinfection, and Clostridium difficile infection. The third and fourth generation of cephalosporins, carbapenems, and quinolones are not recommended for prophylaxis.

Ceftriaxone is a broad-spectrum third-generation cephalosporin and is sensitive to both gram-positive and gram-negative. Cefazolin, in the other hand, is a first line cephalosporine is a narrower spectrum antibiotic and effective for gram-positive bacteria, especially Staphylococcus aureus. This is in line with studies in Iran, India, and US that show that cefazolin is used as the first line in surgical prophylaxis.[8-10]

Education designed specifically for surgeons is needed about factors that increase the risk of infection in the operating theatre. The high use of ceftriaxone as a prophylactic antibiotic also needs special attention because ceftriaxone is a newer generation antibiotic and is very important in its function as a therapeutic antibiotic. If an infection occurs when ceftriaxone has been used as prophylaxis, then the choice of antibiotics for therapy becomes very difficult. In addition, ceftriaxone is an antibiotic that induces the onset of the Extended-Spectrum Beta-Lactamase (ESBL) strain. Physicians should be more selective in using ceftriaxone, especially in its use as prophylaxis.

In choosing the right antibiotics, we must also pay attention to the bacteriological profile of the hospital. A study by Hamdiyanti[15] in Sanglah Hospital reported that the common bacterias found are Pseudomonas aeruginosa (18%), Acinetobacter baumanii (18%), positive-coagulase Staphlycoccus (12%), Candida spp (10%) and Staphylococcus aureus (8%). The same study also reported that the gram-positive bacteria were resistant to tetracycline and erythromycin, and the gram-negative bacteria were resistant to cefotaxime, amikacin, cefuroxime, cefalotin, and chloramphenicol. It is worth noting though that this study was conducted not specifically in the operating theatre environment.

The recommended time of prophylactic antibiotics administration is 30-60 minutes before surgical incision.[6] In this study, most prophylaxis antibiotic were administrated 15-30 minutes before incision. An early administration of prophylactic antibiotic may cause inadequate concentration of antibiotics in the tissues, thus its effectiveness in protecting patients from pathogens is reduced so the risk of postoperative infections may increase.[1]

These improper use of antibiotics need to be given greater attention by various parties, especially prophylactic antibiotics related to clean-surgery. An education aiming to better knowledge to both surgeons and senior registrars in antibiotic

prescribing accordingly to the current guidelines are needed.

CONCLUSION

The mean knowledge of the surgeons toward antibiotic prophylaxis was 59.8%. The most used antibiotic as pre-surgical prophylaxis was ceftriaxone. And the time of administration for prophylaxis antibiotic was 16-60 minutes prior to surgical incision.

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