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Antibiotic Sensitivity Test to Bacteria in the Postoperative Treatment Room at Royal Prima Marelan Hospital

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ABSTRACT

Nosocomial infections in postoperative patients are a serious problem in hospitals because they can increase the rate of illness, death, and treatment costs. One of the important steps in controlling these infections is to conduct an Antibiotic Sensitivity Test to Bacteria in the Postoperative Treatment Room at Royal Prima Marelan Hospital to determine the effectiveness of drugs against bacteria causing infection. This study aims to identify the types of bacteria found in the postoperative intensive care room of Royal Prima Marelan Hospital and assess the level of sensitivity to several antibiotics. The study used an observational descriptive design with a cross-sectional approach. A total of 10 samples were taken from air, wall surfaces, floors, beds, and medical equipment. Bacterial identification was carried out through culture and Gram staining, followed by sensitivity tests using the Kirby-Bauer method against the antibiotics levofloxacin, amoxicillin, and tetracycline. The results showed that the most common bacteria found were Bacillus sp. (60%), followed by Staphylococcus sp. (30%), and Streptococcus sp. (10%). Sensitivity tests showed that levofloxacin had the highest sensitivity level at 90%, amoxicillin sensitivity was 70% with 30% resistance, while tetracycline showed a balanced result between sensitive and intermediate at 50%. Based on these results, levofloxacin is still the most effective antibiotic against bacteria in the postoperative room, while amoxicillin and tetracycline are less effective. These findings are expected to support the selection of appropriate antibiotics and help control bacterial resistance in hospitals.

Keywords: *bacteria; sensitivity test; antibiotic; postoperative treatment room; Resistance*

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INTRODUCTION

Hospitals are one of the health service facilities that play a role in providing various forms of services, such as therapeutic care, inpatient, outpatient, and other supporting services that aim to support the achievement of optimal public health degrees. The implementation of health efforts in hospitals is carried out comprehensively, integrated, and continuously, which includes promotive, preventive, curative, rehabilitative, and conservation activities. Although hospitals function as a place of healing, at the same time, hospitals also have the potential to be a source of transmission of various types of diseases, both for patients, visitors, and health workers. This transmission is generally caused by the presence of pathogenic microorganisms that can multiply in the hospital environment, such as in the air, water, floor surfaces, food, as well as on medical and non-medical equipment (Azimar Khatimah Zusandy et al., 2021; Baharutan, 2015; Konoralma, 2019; Seftiwan Pratami Djasfar & Pradika, 2023; Wahyuningsih & Ekawati, 2021).

Globally, antimicrobial resistance (AMR) has emerged as one of the most pressing threats to public health in the 21st century. The World Health Organization (2023) reports that AMR is directly responsible for at least 1.27 million deaths annually worldwide, with projections indicating that drug-resistant infections could cause 10 million deaths per year by 2050 if current trends continue unchecked. The overuse and misuse of antibiotics in clinical

settings, particularly in hospitals, accelerate the selection pressure that drives the evolution of multidrug-resistant organisms (MDROs), rendering conventional antibiotics increasingly ineffective.

Within the Indonesian hospital context, the challenge of AMR is particularly acute. Indonesia, as a lower-middle-income country with a rapidly expanding healthcare infrastructure, faces unique vulnerabilities in infection control and antibiotic stewardship. Limited resources, variable adherence to sterilization protocols, and widespread empirical antibiotic prescribing without culture-based guidance contribute to the escalation of resistant bacterial strains in healthcare facilities (Gach et al., 2024).

Nosocomial infection is a type of infection experienced by patients while undergoing treatment in the hospital. The existence of this infection not only has an impact on increasing the rate of morbidity, mortality and patient suffering, but also leads to an increase in the burden of medical and treatment costs that must be borne by infected patients. It is estimated that about 5–15% of patients who undergo hospitalization are at risk of nosocomial infection. Generally, this infection appears within 3 x 24 hours from the time the patient starts receiving treatment in the hospital. Each year, nosocomial infections cause about 5,000 deaths, accompanied by considerable treatment financing (Seftiwan Pratami Djasfar & Pradika, 2023).

Infections caused by microorganisms are one of the main factors that cause the onset of various diseases, and the use of antibiotics is still the main choice in treating them. However, a number of studies show that around 40% to 62% of antibiotic use is done inappropriately, both in terms of duration and how it is given. This condition is one of the causes of the increase in cases of antibiotic resistance, of which around 59.7% are caused by multi-drug resistant organisms (MDROs). One of the bacteria that shows high levels of resistance is *Staphylococcus aureus*, with about 40% of the isolated strains reported to have been immune to all types of antibiotics currently available. In addition, these bacteria also have the ability to undergo mutations, which allows for increased resistance to new antibiotics developed (Waleleng et al., 2024).

Previous research efforts have predominantly focused on isolating bacteria from infected surgical sites or patient samples, with less attention devoted to environmental surveillance within postoperative care units. Studies by Prastiyanto et al. (2024) and Kholifah et al. (2023) examined bacterial profiles from wound infections but did not systematically assess the microbial contamination of the physical environment—air, surfaces, and medical equipment—that surrounds postoperative patients. This represents a critical knowledge gap, as environmental reservoirs can serve as continuous sources of pathogen transmission and reinfection, particularly in settings where immunocompromised patients are recovering from surgery.

The results of a survey conducted by the World Health Organization (WHO) on 55 hospitals in 14 countries spread across four regions, namely Europe, Southeast Asia, the Eastern Mediterranean, and the Western Pacific, showed that the average incidence of nosocomial infections in hospitals reached 8.7%. The Southeast Asian region is reported to have a higher prevalence than other regions, which is around 10%. Based on WHO data, the incidence rate of Health Care Associated Infections (HAIs) globally is in the range of 3% to 21%, with an average of around 9%. This nosocomial infection has become a serious problem

in various healthcare facilities around the world, including in Indonesia (Amelinda et al., 2014; Kurniawan et al., 2015; Mirza et al., 2024).

Research conducted in the Surgical Section of H. Adam Malik Hospital during the period from April to September 2018 showed that there were 30 cases of nosocomial infection in patients with clean category surgical wounds, with a prevalence of 5.6%. Meanwhile, a similar study conducted at Dr. Djasamen Saragih Pematangsiantar Hospital in 2021, in the same period (April to September), revealed that the C1 room recorded the highest incidence of surgical wound infections. In May, the surgical wound infection rate in the room reached 8.00%, and decreased to 6.25% in June (Bangun & Safitri, 2020; Everentia Ngasu & Endra Gunawan, 2019; Istiqomah & Nurhayati, 2023; Ngasu & Gunawan, 2019; Suherni et al., 2023).

Patients who undergo treatment in the postoperative room have a fairly high risk of developing infections, as a result of the surgical procedures that have been performed. Therefore, strict supervision of the use of antibiotics is very important, including through the implementation of sensitivity tests to ensure that the antibiotics given are appropriate and effective against bacteria that cause infections. The urgency of this research is underscored by the escalating rates of antibiotic resistance documented in Indonesian hospitals and the critical need for localized antimicrobial surveillance data to inform empirical therapy guidelines.

This study addresses a significant gap in the literature by exploring antibiotic sensitivity within environmental samples of postoperative rooms, rather than focusing exclusively on clinical isolates from infected patients. Unlike prior studies that examined wound infections after they occurred, this research proactively investigates the microbial ecology of the postoperative environment itself—including air, surfaces, and medical equipment—to identify potential sources of contamination before patient infection develops. This preventive approach represents the novelty of the current investigation.

This study aims to identify the types of bacteria found in the postoperative treatment room and assess the sensitivity of these bacteria to various types of antibiotics commonly used in infection management. Through this study, it is hoped that a more comprehensive understanding of the pattern of infection can be obtained, so that it can support the use of antibiotics more appropriately and rationally, as well as contribute to efforts to prevent nosocomial infections and control antimicrobial resistance.

The formulation of the problem in this study focuses on two main things, namely what types of bacteria cause infection in the postoperative treatment room, and whether there is a difference in the level of sensitivity of antibiotics to bacteria found in the room. In general, this study aims to determine the sensitivity of antibiotics to bacteria in the postoperative treatment room at Royal Prima Marelan Hospital Medan which is the object of the research. The specific purpose of this study is to identify the types of bacteria that cause infection in the postoperative treatment room, test the sensitivity of antibiotics to various types of bacteria found, and determine the effectiveness of antibiotics in inhibiting the growth of bacteria that cause postoperative infections based on sensitivity test methods.

The results of this study are expected to provide useful information in the selection of the right antibiotics for the treatment of postoperative nosocomial infections so as to reduce the risk of antibiotic resistance. In addition, this study is expected to help hospitals in managing the use of antibiotics rationally, reducing the spread of nosocomial infections, and increasing awareness

among medical personnel and the public about the importance of using antibiotics wisely to prevent resistance in the hospital environment.

METHOD

This study uses an observational descriptive design with a cross-sectional approach. This study aims to see a picture of the sensitivity of antibiotics to bacteria tested at a specific point in time without intervention.

The research was conducted at Royal Prima Marelan Hospital, especially in the post-surgical treatment room. The research time took place in the period March 2025 – June 2025.

Sampling was carried out in the post-surgical treatment room of Royal Prima Marelan Hospital and the total samples taken were 10 samples, consisting of two samples taken from the air, two samples from wall surface swabs, and two samples from floor surface swabs. In addition, one sample was taken from medical equipment, namely beds, and three other samples were taken from infusion poles, trolleys, and nurses' tables. The sample size of ten was determined based on the principle of representative sampling across diverse contamination points within the postoperative unit. These ten sampling locations encompass the primary environmental surfaces and air spaces that have direct or indirect contact with patients, thereby capturing a comprehensive snapshot of potential microbial reservoirs. This strategic selection ensures that high-touch surfaces (beds, nurse's desk, trolley, infusion pole), high-traffic areas (floor), and airborne transmission routes (air samples) are all represented in the analysis.

Research Criteria

1) ***Inclusion Criteria***
   a. Bacterial isolates that are successfully isolated from the postoperative treatment room.
   b. Bacteria that have enough growth to be tested for sensitivity to antibiotics.
   c. Samples collected in sterile conditions and according to procedures.

2) ***Exclusion Criteria***
   a. Samples that are contaminated with other bacteria and are therefore not valid for testing.
   b. Isolated that is not sufficiently developed in the culture media.
   c. Samples collected outside the research period.

Laboratory test methods

This study uses a laboratory antibiotic sensitivity test method with the Kirby-Bauer approach. Bacterial samples were obtained from the post-surgical treatment room through the surface swab technique, then the culture process was carried out. The samples were grown on MacConkey Agar, Blood Agar, and Mueller-Hinton Agar media for the purpose of isolation and identification of bacteria. After Gram staining, the bacterial colonies that have grown are diluted using a 0.85% NaCl solution until it reaches the McFarland standard of 0.5. The bacterial suspension is then spread evenly on the surface of the Mueller-Hinton media using the swabbing method. Next, the antibiotic discs used in the test, namely Tetracycline, Amoxicillin, and Levofloxacin, were placed on the agar surface and incubated at 37°C for 16

to 18 hours. After the incubation process, the barrier zone formed around the disc is measured in millimeters using a caliper, to determine the level of sensitivity of bacteria to antibiotics, whether they belong to the sensitive, intermediate, or resistant categories.

Data were analyzed descriptively by calculating sensitivity percentages according to Clinical and Laboratory Standards Institute (CLSI) 2023 criteria. Inhibition zone diameters were compared against CLSI interpretive breakpoints for each antibiotic to classify isolates as susceptible, intermediate, or resistant. The percentage of isolates in each category was then calculated for each antibiotic tested. This quantitative approach allows for objective assessment of antibiotic efficacy and facilitates comparison with national and international resistance surveillance data.

Research Instruments

The instruments used in this study include:

a. Bacterial culture media (MacConkey Agar, Blood Agar, and Mueller Hinton Agar)
b. Sterilizer (autoclave)
c. Antibiotik uji (Tetrasiklin, Amoxicilin, Levofloxacin)
d. Alat uji sensitivitas antibiotik (Kirby-Bauer disk diffusion method)
e. Microscopy and Gram staining for bacterial identification

Research Flow

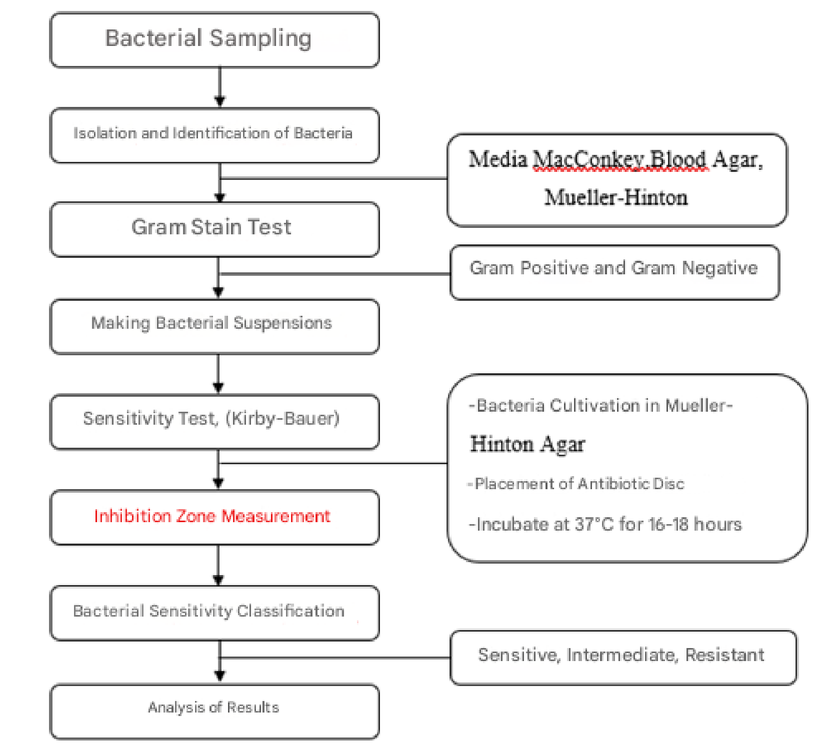

Figure 1. Research Flow Diagram

RESULTS AND DISCUSSION

Research on Antibiotic Sensitivity Test to Bacteria in the Postoperative Treatment Room at Royal Prima Marelan Hospital has been carried out with a total of 10 samples.

Table 1. Percentage of Types of Bacteria

Bacterial Group	Bacterial Species	Number	Percentage (%)
Gram-Positive Bacteria	*Staphylococcus spp.*	3	30%
	Streptococcus sp.	1	10%
	Bacillus sp.	6	60%
Gram-Negative Bacteria	*Escherichia coli*	0	0%
Total Bacteria		**10**	**100%**

Based on Table 1, it was found that the most common type of bacteria is Gram-Positive Bacteria, namely *Bacillus sp*. (60%), *Staphylococcus spp* (30%) and *Streptococcus sp* (10%).

Table 2. Antibiotic Sensitivity Test

Types of Antibiotics	Antibiotic Sensitivity n (%)		
	Sensitive	**Intermediate**	**Resistant**
Levofloxacin	9 (90%)	-	1 (10%)
Amoxicillin	7 (70%)	-	3 (30%)
Tetracycline	5 (50%)	5 (50%)	-

Table 2 demonstrates that Levofloxacin exhibited the highest efficacy with 90% of isolates demonstrating susceptibility, followed by Amoxicillin at 70% sensitivity with 30% resistance, and Tetracycline showing 50% sensitivity and 50% intermediate resistance.

Table 3. Antibiotic Sensitivity Test Against Gram-Positive Bacteria and Gram-Negative Bacteria

Sample	Types of Bacteria	Antibiotic Sensitivity Test		
		Levofloxacin	**Amoxicillin**	**Tetracycline**
Air 1	*Staphylococcus*	Sensitive	Sensitive	Sensitive
Air 2	Streptococcus	Sensitive	Resist	Intermediate
Floor 1	*Bacillus*	Sensitive	Resist	Intermediate
Floor 2	*Bacillus*	Sensitive	Sensitive	Intermediate
Wall 1	*Staphylococcus*	Resist	Resist	Sensitive
Wall 2	*Bacillus*	Sensitive	Sensitive	Intermediate
Bed	*Staphylococcus*	Sensitive	Sensitive	Sensitive
Nurse's Desk	*Bacillus*	Sensitive	Sensitive	Sensitive
Cart	*Bacillus*	Sensitive	Sensitive	Sensitive
Infusion Pole	*Bacillus*	Sensitive	Sensitive	Intermediate

Based on Table 3, Levofloxacin Antibiotics are sensitive to Gram-Positive Bacteria and Gram-Negative Bacteria (90%) Resistant (10%), Amoxicillin Antibiotics are sensitive (70%) and Resistant (30%) and Tetracycline Antibiotics are sensitive (50%) and Intermediate (50%).

Based on the results of the study, the most common type of bacteria found in the postoperative treatment room is *Bacillus* sp. by 60%, followed by *Staphylococcus spp.* at 30%, and *Streptococcus sp.* by 10%. Dominance of *Bacillus* sp. suggests that environmental bacteria can be a potential source of infection in hospitals, especially in patients with low immunity after surgery. *Bacillus* is known as Gram-positive bacteria that can form spores and survive extreme conditions such as high temperatures, drought, as well as exposure to disinfectants. *Bacillus* spores that persist in the air or on the surface of medical devices can become postoperative contaminants if optimal environmental cleaning is not carried out. This condition is in accordance with the findings of Prastiyanto et al. (2024) at Dr. Kariadi Hospital Semarang, who explained that the hospital environment plays a major role in the colonization of Gram-positive bacteria in surgical wounds.

In addition to *Bacillus*, *Staphylococcus spp.* is found in 30% and is a common cause of postoperative wound infections. *Staphylococcus* is the normal flora of human skin, but it can turn into pathogens when it penetrates the skin barrier during surgery. Infection by *Staphylococcus aureus* is known as one of the leading causes of nosocomial infections in the operating room due to its ability to form biofilms on wound tissues and medical devices. Research by Kholifah et al. (2023) in Surabaya also showed that *Staphylococcus aureus* dominated postoperative infectious wound isolates, suggesting that although *Bacillus* was dominant in the postoperative space of this study, the role of *Staphylococcus* remained clinically important.

Meanwhile, *Streptococcus sp.* found by 10%. Although the percentage is small, this bacterium still acts as a secondary pathogen that can aggravate the wound healing process. Streptococcus can produce hemolytic toxins and enzymes that damage tissues, so the infection it causes can spread quickly. This diverse distribution of bacteria illustrates that although postoperative room conditions are more sterile than other treatment rooms, the potential for colonization and contamination remains. This variation also illustrates that the pattern of microbial flora in each hospital can differ depending on the level of cleanliness, air ventilation, and sterilization policies of medical equipment.

The bacterial profile identified in this study should inform hospital antibiotic protocols and environmental disinfection schedules. Given the predominance of spore-forming *Bacillus* species and the persistent presence of *Staphylococcus*, infection control strategies must incorporate sporicidal disinfectants (such as hydrogen peroxide vapor or sodium hypochlorite solutions) rather than relying solely on alcohol-based sanitizers, which are ineffective against bacterial spores. Furthermore, high-touch surfaces such as infusion poles, trolleys, and nurse workstations should be subjected to enhanced cleaning frequencies, potentially including ultraviolet-C (UV-C) disinfection technologies to reduce environmental bioburden.

Antibiotic sensitivity tests showed that Levofloxacin had the highest sensitivity level of 90%, followed by Amoxicillin at 70%, and Tetracycline at 50%. These results illustrate that Levofloxacin is still the most effective antibiotic against infection-causing bacteria in the postoperative care room. Levofloxacin is a fluoroquinolone antibiotic that works by inhibiting DNA girase and IV topoisomerase, two enzymes that are important in the process of bacterial DNA replication. This mechanism of action causes impaired replication and transcription, so that bacteria undergo lysis (Yusuf et al., 2022). These results are in line with the research of Kholifah et al. (2023) which reported that Levofloxacin has high effectiveness against

Staphylococcus aureus and Pseudomonas aeruginosa from infectious wound isolates at Dr. Soetomo Surabaya Hospital. A similar study by Fauzan & Mahfudz (2023) on patients with diabetic lesions in Banda Aceh also found that Levofloxacin remained effective against *Staphylococcus* and *Bacillus*, reinforcing the results of this study.

Amoxicillin showed a sensitivity level of 70% and resistance of 30%. These results showed that most of the isolates were still sensitive to the β-lactam antibiotic, but resistance began to increase. Resistance to Amoxicillin generally occurs due to the production of the enzyme β-lactamase which can destroy the structure of the β-lactam ring in antibiotics, so that the drug is no longer able to inhibit the synthesis of bacterial cell walls (Simanjuntak et al., 2022). The research of Prastiyanto et al. (2024) also explains that the increase in resistance to β-lactam antibiotics in hospitals is caused by irrational use of antibiotics and is not based on culture results. These results indicate that Amoxicillin can still be used, but its use needs to be guided by the results of sensitivity tests so as not to accelerate resistance.

Tetracycline shows a sensitivity of 50% and an intermediate of 50%, in the absence of full resistance. Although no completely resistant isolates were found, the high intermediate number indicates a decrease in the effectiveness of Tetracycline in suppressing bacterial growth. The resistance mechanism of Tetracycline occurs due to the presence of an efflux pump protein that releases antibiotics from inside the bacterial cell before reaching the target ribosomes. This decrease in the effectiveness of Tetracycline was also found in the studies of Prastiyanto et al. (2024) and Kholifah et al. (2023), where Tetracycline was reported to have decreased sensitivity to *Staphylococcus* and *Bacillus* isolates. Based on these results, Tetracycline is no longer recommended as the primary empirical therapy in postoperative infections due to its decreased effectiveness.

These findings align closely with the World Health Organization Global Action Plan on Antimicrobial Resistance (2023), which emphasizes the critical importance of antimicrobial surveillance and stewardship in healthcare settings. The WHO framework recommends that hospitals implement routine monitoring of local resistance patterns to guide empirical therapy and reduce inappropriate antibiotic use. The current study's demonstration of variable antibiotic susceptibility across different sampling sites underscores the necessity for hospital-specific antibiograms rather than reliance on national or regional data alone. Furthermore, the WHO's emphasis on infection prevention and control (IPC) measures is directly relevant to the environmental contamination documented in this research, reinforcing the need for integrated approaches that combine antimicrobial stewardship with rigorous environmental hygiene protocols.

The sensitivity test results showed different variations in resistance patterns between sampling sites, even though the bacteria found were from the same species. This variation illustrates that environmental conditions, humidity levels, frequency of human contact, and antibiotic exposure in each area affect the adaptability of bacteria to antibiotics.

In air sample 1, *Staphylococcus* sp. shows sensitive results to Levofloxacin, Amoxycillin, and Tetracycline. These results indicate that *Staphylococcus* isolates in the air of the postoperative chamber have not been subjected to high antibiotic selection pressure. The operating room has a filtered sterile ventilation system, so the number of air colonies is more controlled and the likelihood of cross-contamination of the patient is lower. According to

Kholifah et al. (2023), *Staphylococcus* from sterile air has a high sensitivity to fluoroquinolones and β-lactams because they have not been frequently exposed to clinical antibiotics.

Air sample 2 showed *Streptococcus sp.* which is sensitive to Levofloxacin, but resistant to Amoxicillin and intermediate to Tetracycline. This can be caused by the presence of Streptococcus strains that have carried the β-lactamase gene due to exposure to antibiotics from aerosols of patients or medical personnel. Research by Sandjaya et al. (2024) explains that emergency room air that patients often pass through with antibiotic therapy can be a medium for transmission of resistant strains through droplets or fine particles. Sensitivity to Levofloxacin is still high because this antibiotic has a different mechanism of action, namely inhibiting gyrase DNA, which rarely mutates in environmental Streptococcus.

Bacillus sp. from the 1st floor showed sensitivity to Levofloxacin, resistance to Amoxycillin, and intermediate to Tetracycline. Floor conditions are areas with high exposure to dirt, body fluids, or dust that carry microorganisms. *Bacillus* is able to survive on dry surfaces because it forms spores. Resistance to Amoxicillin is likely due to the stable activity of the enzyme β-lactamase in the spores, as described by Prastiyanto et al. (2024). Spores that linger on the floor for a long time have the potential to carry resistance genes due to exposure to ineffective disinfectants against dormant forms of bacteria.

The 2nd floor sample also contained *Bacillus* sp., but showed sensitivity to Levofloxacin and Amoxycillin, as well as an intermediate to Tetracycline. The difference in results compared to the 1st floor may be due to different levels of hygiene and exposure to antibiotics. The 2nd floor area may be cleaned more frequently with an alcohol- or chlorine-based disinfectant that is effective against vegetative bacteria, but not against spores. This reduces the number of strains that carry the β-lactamase gene, so Amoxicillin is still effective.

Samples from wall 1 showed results resistant to Levofloxacin and Amoxycillin, but sensitive to Tetracycline. This difference in pattern suggests that *Staphylococcus* adhered to wall surfaces may be a strain that has adapted to environmental antibiotic stress. Rarely cleaned wall surfaces can become reservoirs of bacteria that have thick biofilms, inhibiting the penetration of antibiotics. Research by Sandjaya et al. (2024) shows that *Staphylococcus* from non-sterile surfaces such as emergency room walls has a tendency to be highly resistant to β-lactam due to long-term exposure. Sensitivity to Tetracycline may be due to the lack of selection pressure of antibiotics of this class in a hospital setting.

On wall 2, *Bacillus* sp. exhibits sensitivity to Levofloxacin and Amoxycillin, as well as an intermediate to Tetracycline. Relatively dry wall surfaces and less exposure to systemic antibiotics cause bacteria to be more sensitive to common oral antibiotics. However, intermediate levels of Tetracycline indicate exposure to environmental antibacterial or disinfectant residues that trigger partial adaptation of the strain. According to Kholifah et al. (2023), the condition of walls that are rarely cleaned deeply can leave a biofilm that reduces the effectiveness of certain antibiotics.

In the bed sample, *Staphylococcus* sp. shows sensitivity to all three antibiotics. These results indicate that sterilization procedures and the use of sterile bed sheets in the postoperative room are quite effective in preventing the colonization of resistant strains. Although the bed is the patient's direct point of contact, a regular cleaning procedure with 70% alcohol disinfectant can suppress microbial growth. This result is different from the report by Sandjaya et al. (2024) in the emergency room, where *Staphylococcus* from the patient's bed surface showed resistance

to ampicillin because they were often exposed to patients who were undergoing antibiotic therapy.

A sample of the nurse's table showed *Bacillus* sp. that are sensitive to all three antibiotics. This shows the effectiveness of the cleanliness of the medical workers' work area which is regularly maintained. Good workbench hygiene reduces the likelihood of biofilm formation and prevents the transfer of resistance genes. According to research by Gach et al. (2024), the cleanliness of high-contact areas such as the action table is very influential in suppressing the presence of multiresistant bacteria.

On the trolley, *Bacillus* sp. also showed sensitivity to all antibiotics tested. This can be caused by the process of cleaning and sterilizing the trolley which is carried out with a strong disinfectant before being used carrying sterile medical equipment. The difference in results compared to *Bacillus* isolates on the floor shows that the frequency of cleaning affects the level of resistance. *Bacillus* that is often cleaned does not have time to form dormant spores that carry resistance genes, so they remain sensitive to antibiotics.

Samples from the IV pole showed sensitive results to Levofloxacin and Amoxycillin, as well as to Tetracycline intermediates. Infusion poles include metal surfaces that are often touched, but also cleaned frequently. However, the patient's skin residue or aerosol can be a source of colonization. According to Prastiyanto et al. (2024), metal areas such as infusion poles can maintain microbiofilms that protect bacteria from certain antibiotics. Therefore, although Levofloxacin and Amoxicillin are still effective, the intermediate effects on Tetracycline show partial resistance to environmental antimicrobial stresses.

In synthesis, the variability in antibiotic susceptibility patterns across different environmental niches within the postoperative room underscores the complexity of infection control in hospital settings. The data suggest that a one-size-fits-all approach to empirical antibiotic therapy is inadequate; rather, clinicians should consider the specific environmental context (e.g., floor-acquired versus air-acquired versus equipment-associated contamination) when selecting prophylactic or therapeutic antibiotics. Moreover, hospital infection control committees should prioritize enhanced surveillance and targeted interventions for surfaces demonstrating higher resistance rates, such as floor areas and wall surfaces, which may require more frequent disinfection with sporicidal agents.

CONCLUSION

The study on antibiotic sensitivity in the postoperative treatment room at Royal Prima Marelan Hospital found that Bacillus sp. was the most prevalent bacteria (60%), followed by *Staphylococcus spp.* (30%) and Streptococcus sp. (10%). Levofloxacin demonstrated the highest sensitivity at 90%, making it the preferred antibiotic for postoperative wound infections, although its use should be tailored based on culture and sensitivity results to minimize resistance risks. Amoxicillin remains effective but shows a 30% resistance rate, and Tetracycline has limited effectiveness with 50% intermediate results. Future research should explore the long-term impact of antibiotic use patterns on resistance development and investigate alternative therapies or combination treatments to enhance infection control and sustain antibiotic efficacy.

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