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Studying the Antibiotic Resistance Pattern among Bacteria Isolated from Different Clinical Environments

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Abstract: Hospitals serve as focal points for the prliferation and dissemination of antimicrobial-resistant bacteria (ARB), significantly contributing to their emergence and transmission, with a large quantity discharged through wastewater systems. Antimicrobial-resistant bacteria present a pressing public health issue in the twenty-first century, primarily driven by the overuse and improper use of antimicrobials. A variety of bacteria, including *Acinetobacter baumannii*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Escherichia coli* (at a low percentage), and *Klebsiella pneumoniae*, were widespread in operating rooms, pediatric sections, intensive care, patient rooms, and burn units. Notably, *Acinetobacter baumannii* was most prevalent, with rates fluctuating between 16.12% and 40.67% from February to September, peaking in March and equaling *Staphylococcus aureus* in April. Drug susceptibility testing revealed that *Acinetobacter* was more sensitive to Ceftriaxone and more resistant to Amoxicillin, while other bacteria exhibited varying susceptibilities and resistances. *Klebsiella* showed higher resistance to Tetracycline, and *E. coli* was notably resistant to Tetracycline as well. These findings underscore the critical need for effective strategies to combat antibiotic resistance in healthcare settings.

Key words: Nosocomial infections, Antibiotic resistance.

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Introduction

A hospital provides an environment that is favorable for the growth and transmission of infections. Major sources of nosocomial infections include the indigenous microorganisms found in patients, the microorganisms present in the hospital environment or carried by medical staff, commercially available goods that are contaminated, and sick patients themselves (1). The use of invasive devices significantly enhances the transmission, colonization, and vulnerability to infection. Infections produced by bacteria, such as *Staphylococcus aureus* are either due to strains that are naturally present in the body or from contact with medical workers who carry the bacteria (2). Infections with gram-negative bacilli are acquired from inside the body or via contact with contaminated water sources in the hospital. The transportation of germs on the hands of medical staff who are not colonized seems to be a significant method of transmitting infections between individuals.

Hospital-acquired infections, also known as infections related to healthcare, are illnesses that are obtained in the hospital environment and were not present or developing at the time of admission (3). The infections encompass catheter-associated urinary tract infections, central line-associated infections of the bloodstream (4), surgical site infections, ventilator-associated pneumonia, hospital-acquired pneumonia (5), and *Clostridium difficile* infections (6). Indicators of an infection include a cough that produces mucus, difficulty breathing, pain in the abdomen (Kadian), tenderness that worsens when pressure is released, changes in mental function (7), irregular heartbeats, pain in the lower abdomen, increased urination, painful urination, and tenderess in the area between the ribs and spine. This activity provides a comprehensive overview of the assessment and treatment of infections that are acquired during a patient's hospital stay (8).

Bacteria can be innately resistant or may acquire resistance to antibiotics. Both types of resistance are probably equally important in the context of the treatment of infections (9). Acquired drug resistance may develop as a result of antibiotic-induced mutations altering the target site for the antibiotic, or by acquisition of new drug resistance genes from either the same or different species (infectious resistance). The acquisition of resistance genes is mediated by transferable extrachromosomal genetic elements called plasmids, or special genetic elements known as transposons and integrons, which have the ability to integrate with both the chromosomes and plasmids (10).

The present study was investigated to evaluated the distribution and prevalence of Gram negative and Gram positive bacteria from medical city hospitals and their resistance to antibiotics.

Materials and Methods

One hundred and ten samples were collected from Medical City hospitals, Baghdad, Iraq from the the period February to September 2023. The sampling included surfaces, beds, walls, medical instruments, floors, heating and cooling vents, and medical equipment in lobbies of various specialties, operating theaters, and lying patients. The isolated were cultured on macconkey agar and blood agar for primary isolation and then identification.

Inclusion criteria: Selected growth of gram positive and gram-negative bacteria classified as a nosocomial bacteria,

Exclusion crateria: Exclude any bacteria other than nosocomial bacteria

Morphological examinations

In order to examine the physiologies of bacterial isolate growth, various culture mediums were employed. To differentiate various bacterial strains, the characteristics of the colony, such as color, form, and texture, were used.

Identification of bacteria by VITEK2 compact system

Bacteria were diagnosed using VITEK2 compact system

Test for antibiotic susceptibility

The antibiotic susceptibility of the isolates was ascertained using the VITEK 2 system. The subsequent antimicrobials have been employed: Meropnem, Ciprofloxacin, Amikacin, Amoxicillin, Azithromycin, Ceftriaxone, Tetracycline and Trimethoprim. The results recorded according to world health organization recommendations .

The VITEK2 system's identification and test for antibiotic susceptibility. The surface of MacConkey, Blood, Mannitol salt, and Nutrient agars show streaks from isolated bacteria that require identification. These agars are then incubated at 37 °C for a duration of 24 to 48 hours. Additionally, the model number of the device is added to the database of the system. A suitable number of pure colonies are suspended in 3 milliliters of physiological saline solution in two transparent plastic test tubes. To diagnose the isolated bacteria suspension, the turbidity of the suspension must equal (0.50-0.63), or about 1.5 X 10^8 CFU/m, according to the Densichek VETIK2 turbidity device. Proceed to transfer 145 µL from the first tube to the second for the Antibiotic Susceptibility Test. It was filled with a two-test tube cassette holding a bacterial suspension in accordance with the company's (Biomerieux) specifications. After severing the transport tube, the apparatus placed the material inside the incubator card and heated it to 37°C. For every card in the reader, the result was read and a diagnostic report containing an antibiotic susceptibility test was written.

Results and discussion

1. Isolation and identification bacteria during February 2023

Primary identification of bacteria isolates depends on phenotypic characterization on culture media and Gram stain, results in February revealed a total of 32 (42%) of *Acinetobacter baumannii* were identified and *Staphylococcus aureus* was 14 (18.42%). The *Pseudomonas aeruginosa* 8 (10.52%), *Escherichia coli* 1(1.3%)and *Klebsiella* was 18(23.68%). From the results, it was found that *Acinetobacter baumannii* bacteria was more widespread than other types and were more present in the children’s room. On the other side, *Pseudomonas aeruginosa* was less found among the types of bacteria that were estimated.

Table (1): Source of isolates, isolates, and types of bacteria estimated in the hospital in February.

Source of isolates	No. of isolates	Types of Bacteria	No. of Isolates	Percentage %
Operations rooms	12 isolates	*Acinetobacter baumannii*	4	33.33
		Staphylococcus aureus	3	25
		Pseudomonas aeruginosa	3	25
		Klebsiella pneumonia	2	25
Children section	20 isolates	*Acinetobacter baumannii*	9	45
		Staphylococcus aureus	6	30
		Klebsiella pneumoniae	5	25
Intensive care	4 isolates	*Acinetobacter baumannii*	2	50
		Staphylococcus aureus	2	50
Patient rooms	21 isolates	*Acinetobacter baumannii*	8	38.09
		Klebsiella pneumonia	6	28.57
		Staphylococcus aureus	3	14.28
		Pseudomonas aeruginosa	3	14.28
		Escherichia coli	1	4.76
Burn rooms	7 isolates	*Acinetobacter baumannii*	5	71.42
		Pseudomonas aeruginosa	2	28.57
In patient samples	12 isolates	*Acinetobacter baumannii*	4	33.33
		Klebsiella pneumonia	5	41.66
		staphylococcus aureus	3	25
Total	**76**		**77**	

2. Isolation and identification bacteria during March 2023

Primary identification of bacteria isolates depends on phenotypic characterization on culture media and Gram stain, results in Marcch, the *Acinetobacter baumannii* was 24 (40.67%), *staphylococcus aureus* was 12 (20.33%), *pseudomonas* was 6 (10.16%) *Escherichia coli* 6(10.16%) and *Klebsiella* was 11 (18.64%). From the results, it was found that *Acinetobacter baumannii* bacteria was more widespread than other types and were more present in the children's room. On the other side, *pseudomonas* was less found among the types of bacteria that were estimated.

Table (2): Source of isolates, isolates, and types of bacteria estimated in the hospital in march.

Source of isolates	No. of isolates	Types of Bacteria	No. of Isolates	Percentage %
Operations rooms	9 isolates	*Acinetobacter baumannii*	4	44.44
		Staphylococcus aureus	3	33.33
		Pseudomonas aeruginosa	1	11.11
		Klebsiella pneumonia	1	11.11
children section	22 isolates	*Acinetobacter baumannii*	9	40.90
		Klebsiella pneumoniae	6	27.27
		Escherichia coli	5	22.27
		Staphylococcus aureus	2	9.09
Intensive care	1 isolates	*Acinetobacter baumannii*	1	100
Patient rooms	18 isolates	*Acinetobacter baumannii*	5	27.77
		Klebsiella pneumoniae	4	22.22
		Staphylococcus aureus	4	22.22
		Pseudomonas aeruginosa	4	22.22
		Escherichia coli	1	5.55
Burn rooms	5 isolates	*Acinetobacter baumannii*	3	60
		Pseudomonas aeruginosa	1	20
		Staphylococcus aureus	1	20
In patient samples	4 isolates	*Acinetobacter baumannii*	2	50
		Staphylococcus aureus	2	50
Total	**59**		**59**	

3. Isolation and identification bacteria during April 2023

Primary identification of bacteria isolates depends on phenotypic characterization on culture media and Gram stain, results in April, the *Acinetobacter baumanii* was 15 (34.09%) and *Staphylococcus aureus* was 13 (29.54%). The *Pseudomonas aeruginosa* was 5 (11.36%), *Escherichia coli* 2 (4.54%) and *Klebsiella pneumoniae* was 9 (20.45%). From the results, it was found that *staphylococcus aureus* bacteria were more widespread than other types and were more present in the children's room. On the other side, *Pseudomonas aeruginosa* was less found among the types of bacteria that were estimated (11).

Table (3): Source of isolates, isolates, and types of bacteria estimated in the hospital April.

Source of isolates	No. of isolates	Types of Bacteria	No. of Isolates	Percentage %
Operations rooms	4 isolates	*Acinetobacter baumannii*	2	50
		Staphylococcus aureus	1	25
		Klebsiella pneumonia	1	25
Children section	12 isolates	*Acinetobacter baumannii*	4	33.33
		Staphylococcus aureus	4	33.33
		Klebsiella pneumonia	2	16.66
		Pseudomonas aeruginosa	1	8.33
		Escherichia coli	1	8.33
Intensive care	2 isolates	*Staphylococcus aureus*	2	100
Patient rooms	13 isolates	*Acinetobacter baumanii*	4	30.76
		Klebsiella pneumonia	4	30.76
		staphylococcus aureus	3	23.07
		Pseudomonas aeruginosa	1	7.69
		Escherichia coli	1	7.69
Burn rooms	3 isolates	*Acinetobacter baumannii*	3	100
In patient samples	10 isolates	*Acinetobacter baumannii*	2	20
		Klebsiella pneumonia	2	20
		Staphylococcus aureus	3	30
		Pseudomonas	3	30
Total	**44**		**44**	

4. Isolation and identification bacteria during May 2023

Primary identification of bacteria isolates depends on phenotypic characterization on culture media and Gram stain, results in May revealed a total of 29 (39.18%) of *Acinetobacter baumannii* were identified and *Staphylococcus aureus* was 12 (16.12%). The *Pseudomonas aeruginosa* 14 (18.91%), *Escherichia coli* 8(10.81%) and *Klebsiella* was 11 (14.86%). From the results, it was found that *Acinetobacter baumannii* bacteria was more widespread than other types and were more present in the Patient rooms. On the other side, *Pseudomonas aeruginosa* was less found among the types of bacteria that were estimated.

Table (4): Source of isolates, isolates, and types of bacteria estimated in the hospital in May.

Source of isolates	No. of isolates	Types of Bacteria	No. of Isolates	Percentage %
Operations rooms	7 isolates	*Acinetobacter baumannii*	2	28.75
		Staphylococcus aureus	2	28.75
		Pseudomonas aeruginosa	1	14.28
		Klebsiella pneumonia	2	28.57
children section	23 isolates	*Acinetobacter baumannii*	6	26.08
		Staphylococcus aureus	3	13.04
		Klebsiella pneumoniae	3	13.04
		Escherichia coli	6	26.08
		Pseudomonas aeruginosa	5	21.73
Intensive care	1 isolates	*Acinetobacter baumannii*	1	100
Patient rooms	18 isolates	*Acinetobacter baumannii*	9	50
		Klebsiella pneumonia	3	16.66
		Staphylococcus aureus	2	11.11
		Pseudomonas aeruginosa	2	11.11
		Escherichia coli	2	11.11
Burn rooms	6 isolates	*Acinetobacter baumanii*	3	50
		Pseudomonas aeruginosa	2	
		Staphylococcus aureus	1	33.33
In patient samples	19 isolates	*Acinetobacter baumannii*	8	42.10
		Klebsiella pneumonia	3	15.78
		Staphylococcus aureus	4	21.05
		Pseudomonas aeruginosa	4	
Total	**74**		**74**	

5. Isolation and identification bacteria during June 2023

Primary identification of bacteria isolates depends on phenotypic characterization on culture media and Gram stain, results in June, the *Acinetobacter baumannii* was 26 (38.58%) and *staphylococcus aureus* was 9 (10.58%). The *Pseudomonas aeruginosa* was 11 (12.94%), *Escherichia coli* 14 (16.47%)and *Klebsiella pneumoniae* was 16(7.05%). From the results, it was found that *acinetobacter baumannii* bacteria were more widespread than other types and were more present in the children's room. On the other side, *Klebsiella pneumoniae* and *Pseudomonas aeruginosa* were the same and less common among the types of bacteria that were estimated (12).

Table (5): Source of isolates, isolates, and types of bacteria estimated in the hospital in June.

Source of isolates	No. of isolates	Types of Bacteria	No. of Isolates	Percentage %
Operations rooms	5 isolates	*Acinetobacter baumannii*	2	40
		Staphylococcus aureus	1	20
		Klebsiella pneumonia	1	20
		Pseudomonas aeruginosa	1	20
children section	30 isolates	*Acinetobacter baumannii*	9	30
		Staphylococcus aureus	2	6.66
		Klebsiella pneumonia	2	6.66
		Pseudomonas aeruginosa	1	3.33
		Escherichia coli	16	53.33
Intensive care	2 isolates	*Acinetobacter baumannii*	2	100
Patient rooms	10 isolates	*Acinetobacter baumannii*	3	30
		Klebsiella pneumonia	2	20
		Staphylococcus aureus	2	20
		Pseudomonas aeruginosa	2	20
		Escherichia coli	1	10
Burn rooms	12 isolates	*Acinetobacter baumannii*	4	33.33
		pseudomonas aeruginosa	4	33.33
		staphylococcus aureus	2	16.66
		Klebsiella pneumonia	1	8.33
		Escherichia coli	1	8.33
In patient samples	26 isolates	*Acinetobacter baumannii*	6	23.07
		Klebsiella pneumonia	5	0.19
		Staphylococcus aureus	2	7.69
		Pseudomonas aeruginosa	3	11.53
		Escherichia coli	12	46.15
Total	**85**		**87**	

6. Isolation and identification bacteria during July 2023

Primary identification of bacteria isolates depends on phenotypic characterization on culture media and Gram stain, results in July, *Acinetobacter baumannii* was 25 (33.33%) and *staphylococcus aureus* was 21 (28%). The *Pseudomonas aeruginosa* was 13 (17.33%) and, *Escherichia coli*7(9.3%) and *Klebsiella pneumoniae* was 15 (20%). From the results, it was found that *Acinetobacter baumannii* bacteria were more widespread than other types and were more present in the children's room. On the other side, *Pseudomonas aeruginosa* was less found among the types of bacteria that were estimated.

Table (6): Source of isolates, isolates, and types of bacteria estimated in the hospital in July.

Source of isolates	No. of isolates	Types of Bacteria	No. of Isolates	Percentage %
Operations rooms	9 isolates	*Acinetobacter baumannii*	1	11.11
		Staphylococcus aureus	4	44.44
		Klebsiella pneumonia	2	22.22
		Pseudomonas	2	22.22
children section	24 isolates	*Acinetobacter baumannii*	8	33.33
		Staphylococcus aureus	7	29.16
		Klebsiella pneumonia	3	12.5
		Pseudomonas aeruginosa	2	8.33
		Escherichia coli	4	16.66
Intensive care	1 isolates	*Staphylococcus aureus*	1	100
Patient rooms	16 isolates	*Acinetobacter baumannii*	5	31.25
		Klebsiella pneumonia	3	18.75
		Staphylococcus aureus	5	31.25
		Escherichia coli	3	18.75
Burn rooms	7 isolates	*Acinetobacter baumannii*	4	50
		Pseudomonas aeruginosa	2	33.33
		Staphylococcus aureus	1	100
In patient samples	28 isolates	*Acinetobacter baumannii*	7	42.10
		Klebsiella pneumonia	4	15.78
		Staphylococcus aureus	3	21.05
		Pseudomonas aeruginosa	7	21.05
		Escherichia coli	7	21.05
Total	**75**		**78**	

7. Isolation and identification bacteria during August 2023

Primary identification of bacteria isolates depends on phenotypic characterization on culture media and Gram stain, results in August, the *Acinetobacter baumannii* was 36 (38.29%) and *staphylococcus aureus* was 19 (20%). The *Pseudomonas aeruginosa* was 22 (23%) *Escherichia coli* 9(9.5%) and *Klebsiella pneumoniae* was 8 (8.51%). From the results, it was found that *Acinetobacter baumannii* bacteria were more widespread than other types and were more present in the children's room. On the other side, *Klebsiella pneumoniae* was less found among the types of bacteria that were estimated.

Table (7): Source of isolates, isolates, and types of bacteria estimated in the hospital in august.

Source of isolates	No. of isolates	Types of Bacteria	No. of Isolates	Percentage %
Operations rooms	12 isolates	*Acinetobacter baumannii*	6	50
		Staphylococcus aureus	3	25
		Pseudomonas aeruginosa	3	25
children section	34 isolates	*Acinetobacter baumannii*	13	38.23
		Staphylococcus aureus	10	29.41
		Klebsiella pneumonia	3	8.82
		Pseudomonas aeruginosa	4	11.76
		Escherichia coli	4	11.76
Intensive care	0 isolates	*0*		
Patient rooms	22 isolates	*Acinetobacter baumannii*	10	45.45
		Pseudomonas aeruginosa	6	27.27
		Klebsiella pneumonia	3	13.63
		Staphylococcus aureus	2	9.09
		Escherichia coli	1	4.54

Source of isolates	No. of isolates	Types of Bacteria	No. of Isolates	Percentage %
Burn rooms	4 isolates	*Acinetobacter baumannii*	2	50
		Pseudomonas aeruginosa	2	50
In patient samples	22 isolates	*Acinetobacter baumannii*	5	22.72
		Klebsiella pneumonia	2	9.09
		Staphylococcus aureus	4	18.18
		Pseudomonas aeruginosa	7	31.81
		Escherichia coli	4	18.18
Total	**94**		**94**	

8. Isolation and identification bacteria during September 2023

Primary identification of bacteria isolates depends on phenotypic characterization on culture media and Gram stain, results in, the bacteria were collected and the *Acinetobacter baumannii* was 37(23.89%) and *staphylococcus aureus* was 8 (7.07%). The *Pseudomonas aeruginosa* was 33 (29.20%) and *Klebsiella pneumoniae* was 13 (11.50%). From the results, it was found that *Acinetobacter baumannii* bacteria were more widespread than other types and were more present in the Patient's room. On the other side, *Pseudomonas aeruginosa* was less found among the types of bacteria that were estimated.

Table (8): Source of isolates, isolates, and types of bacteria estimated in the hospital in September.

Source of isolates	No. of isolates	Types of Bacteria	No. of Isolates	Percentage %
Operations rooms	21 isolates	*Acinetobacter baumannii*	7	33.33
		Staphylococcus aureus	6	28.57
		Pseudomonas aeruginosa	6	28.57
children section	30 isolates	*Acinetobacter baumannii*	6	20
		Staphylococcus aureus	8	26.66
		Klebsiella pneumonia	2	6.66
		Pseudomonas aeruginosa	6	20
		Escherichia coli	8	26.66
Intensive care	2 isolates	*Acinetobacter baumannii*	1	50
		Pseudomonas aeruginosa	1	50
Patient rooms	28 isolates	*Acinetobacter baumannii*	12	42.85
		Pseudomonas aeruginosa	11	39.28
		Klebsiella pneumonia	2	7.14
		Staphylococcus aureus	2	7.14
Burn rooms	1 isolates	*Acinetobacter baumannii*	1	100
In patient samples	31 isolates	*Acinetobacter baumannii*	11	35.48
		Klebsiella pneumonia	8	25.80
		Staphylococcus aureus	2	6.45
		Pseudomonas aeruginosa	7	22.58
		Escherichia coli	3	9.67
Total	**113**		**110**	

Antimicrobial susceptibility test and drug resistance

Primary identification of bacteria isolates depends on phenotypic characterization on culture media and Gram stain, results in September, the *Acnitobacter* bacteria that had been previously diagnosed and estimated. It was noted that the *Acinetobacter* bacteria are more sensitive to the drug Ceftriaxone by an amount than to other drugs (13) and they are also more resistant to the drug amoxicillin by an amount.

Table (9): The results of antibiotics susceptibility of *Acinetobacter baumannii*.

Antibiotic	Sensitivity	Resist
Mropnem	180 S	39 R
Ciprofloxacin	105 S	114 R
Amikacin	173 S	46 R
Amoxicillin	18 S	201 S
Azithromycin	25 S	194 R
Ceftriaxone	181 S	38 R
Tetracycline	30 S	189 R
Trimethoprim	53S	166 R

S : Sensitive , R: Resistance

Staphylococcus was less sensitive to amoxicillin and higher resistant to trimethoprim drug as shown in Table (9).

Table (10): The results of antibiotics susceptibility of *Staphylococcus.*

Antibiotic	Sensitivity	Resist
Mropnem	102 S	20 R
Ciprofloxacin	77 S	45 R
Amikacin	80 S	20 R
Amoxicillin	42 S	80 R
Azithromycin	69 S	53 R
Ceftriaxone	88 S	34 R
Tetracycline	15 S	107 R
Trimethoprim	10 S	112 R

S : Sensitive , R: Resistance

On the other side, *pseudomonas aeruginosa* was less sensitive and resistant to amoxicillin from other types of bacteria as shown in (Table 10) (14).

Table (11): The results of antibiotics susceptibility of *Pseudomonas.*

Antibiotic	Sensitivity	Resist
Mropnem	71 S	39 R
Ciprofloxacin	12 S	98 R
Amikacin	19 S	91 R
Amoxicillin	8 S	102 R
Azithromycin	12 S	98 R
Ceftriaxone	50 S	60 R
Tetracycline	9 S	101 R
Trimethoprim	20 S	90 R

S : Sensitive , R: Resistance

Klebsiella was less sensitive and higher resistant to Tetracycline drug as shown in Table (11).

Table (12): The results of antibiotics susceptibility of *Klebsiella pneumonia.*

Antibiotic	Sensitivity	Resist
Mropnem	81 S	11 R
Ciprofloxacin	45 S	47 R
Amikacin	62 S	32 R
Amoxicillin	10 S	82 R
Azithromycin	22 S	70 R
Ceftriaxone	77 S	15 R
Tetracycline	3 S	89 R
Trimethoprim	23 S	69 R

S : Sensitive , R: Resistance

Klebsiella was less sensitive and higher resistant to Tetracycline drug and more sensitivity to Mropnem drug as shown in table (12).

Table (13): The results of antibiotics susceptibility of *E. coli.*

Antibiotic	Sensitivity	Resist
Mropnem	66 S	10 R
Ciprofloxacin	60 S	16 R
Amikacin	62 S	14 R
Amoxicillin	54 S	22 R
Azithromycin	28 S	48 R
Ceftriaxone	58 S	18 R
Tetracycline	16 S	60 R
Trimethoprim	42 S	34 R

S : Sensitive , R: Resistance

The operating room has been under intense scrutiny because of its high vulnerability to infection. This is mostly due to the direct contact between infections and exposed tissues, as well as the interaction between surgical equipment and patients (15). Operating room contamination is considered one of the most major and possibly life-threatening sources of contamination for patients in hospitals. Ventilation systems, disinfection treatments, and operating rooms are susceptible to contamination from several sources (16).

In the study, the total number of samples and the overall contamination percentage are shown. Even though hospital rates vary slightly, it is observed that some areas have relatively high rates. This is because some people are careless and leave operation room doors open after sterilization, which allows air currents contaminated with various germs to enter the room and contribute to the contamination of the surrounding area (17). Since hospitals receive visitors with various ailments, they are considered germ-infested environments. Several variables, such as sanitation protocols for medical personnel, environmental circumstances, methods for isolating and identifying bacteria, patients' social and cultural backgrounds, variations in infection rates between countries, and patient-specific factors (18), can either impede or promote the proliferation and spread of bacteria within healthcare facilities. The activities that had favorable results for us accounted for 58%. The high prevalence of *A. baumannii* infections and its resistance to many medicines may be responsible for this concerning trend of nosocomial infections. In addition, *A. baumannii* exhibits greater resistance to drying out compared to other *Acinetobacter* species (19).

Further inquiry has shown that a substantial proportion of people have opted for pharmaceuticals obtained from community pharmacies rather than hospital medications, resulting in a notable influence on the resistance of *P. aeruginosa* to wound infections. Self-medication in the region has become a notable public health issue and a potential contributor to antibiotic resistance. *Acinetobacter baumannii* often acquires resistance to medicines and antiseptics in its surroundings, rendering it comparable to a burn patient who must confront this opportunistic bacterium before the lesion can properly heal (20).

The fact that 92% of bacteria are resistant to amoxicillin suggests that *Pseudomonas aeruginosa* has become immune to aminoglycosides in a number of ways, such as by changing ribosomal genes or getting plasmids that carry enzymes that change aminoglycosides. These findings are consistent with Kumar *et al*., (21).

The rapid emergence of multidrug-resistant *Acinetobacter baumannii* is considered a significant and urgent issue attributed to the improper use of antibiotics. The prevalence of azithromycin resistance was found to be the greatest at 97%. This result is consistent with previous research conducted by Motbainor *et al*. (22), which reported a 98% resistance rate to amoxicillin in clinical isolates from hospitals in Baghdad. The present study found a significant prevalence of azithromycin resistance, reaching higher. This result is in line with earlier research by Gomes *et al*., (23).

Through the research that was conducted, we recommend using safety supplies to protect against pollutants of various types present in hospitals. Therefore, gloves and masks must be worn, in addition to the use of medical sterilisers periodically, in order to maintain the cleanliness of hospitals.

Conclusion

There are several types of pathogenic bacteria in the hospital in which the research was conducted, such as *Acinetobacter baumannii*, *staphylococcus aureus*, *pseudomonas aeruginosa*, and *Klebsiella pneumoniae*. We support utilizing safety items to defend against hospital pollution based on studies. Thus, gloves, masks, and medical sterilizers are needed to keep hospitals clean.

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