Distributions of Antibiotics Resistant in Clinical Isolates of Staphylococcus. aureus

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Abstract:

According to this study, the most clinical types of bacteria diagnosed in patients who were visiting Medical City Hospital in Baghdad are *Staphylococcus aureus* bacteria, at a rate of (١٤٠) out compared to other types of pathogenic bacteria. The most common areas of bacterial spread and distribution are wounds and burns, where the rate of infection with *Staphylococcus aureus* was recorded at a frequency of (٣٣) isolates, at a percentage of (٢٣,٥٧) out of the total number of isolates of ١٤٠. As for burns, (٢٧) isolates were obtained at a rate of (١٩,٢٩٪). As for us, (١٥) isolates were obtained at a frequency of (١٠,٧١٪), while (١٧) isolates of *Staphylococcus aureus* were found in the Urinary Tract at a rate of (١٢,١٤٪). It was also shown that the rate of skin infection was obtained at a rate of (١٢,٨٦٪). As for other samples of *Staphylococcus aureus* isolated from vaginal infections, it reached (١١) samples, at a rate of (٧,٨٦٪), as well as sputum (١٠) samples, at a rate of (٧,١٤٪), and Cerebrospinal fluid . (C.S.F) (٩) samples, at a rate of (٦,٤٣٪), which is the least isolated sample of *Staphylococcus aureus* according to the study. In general, the infection rate of males was higher than that of females, with statistically significant differences. The study showed that *S. aureus* bacteria were resistant to most antibiotics at percentages ranging from ٩٠٪ to ١٠٠٪. According to the, shows note that the bacteria were ١٠٠٪ resistant to the antibiotics Cefixime, Amikacin, Linezolid, Teicoplanin, Vancomycin, Tigecycline, Fosfomycin, Nitrofurantoin, and Mupirocin. This is a large number of antibiotics that the bacteria are no longer affected by at all. As for the antibiotics that the bacteria were sensitive to at varying percentages, they were Gentamicin at a percentage of (٣٨,٥٧٪), Moxifloxacin at a percentage of (٧٠,٠٠٪), Norflox\acin and Ofloxacin at almost the same percentages at (٣١,٤٣٪). The most sensitive antibiotics against the bacteria under study were Trimethoprim/sulfamethoxazole, Rifampicin, and

Fusidic Acid, which reached percentages of (٨٨,٥٧٪), (٨٥,٧١٪) and (٨٢,٨٦٪) respectively.

Keywords: *Staphylococcus aureus,* wounds and burns, bacterial distribution, antibiotics.

Introduction:

Staphylococcus spp., a genus of ٤٧ species and ٢٤ subspecies, are responsible for severe infections with high morbidity and mortality rates (*Kot et al*., ٢٠١٨). Three *Staphylococcus* species, *Staphylococcus aureus*, *Staphylococcus epidermidis,* and Staphylococcus saprophyticus, are primarily responsible for human diseases isolated from humans (*Eun et al*., ٢٠٢١). *Staphylococcus aureus* is the most widespread and pathogenic species among these species.(*Foster et al*., ٢٠١٤). These species, commensal bacteria, are common on human skin and nasal areas, causing diseases like ١ to ٥٪ of community infections and up to ٣٠٪ of hospital-acquired infections, often observed during wounds and burns (*Yarovoy et al*., ٢٠١٩). *Staphylococcus aureus is a bacterium that can infect humans and animals, cause food poisoning, and is resistant to antibiotics, particularly methicillin. It can be found in hospital equipment, surfaces, and the food industry, with replicas often found in the nose*(*Onyango et al*., ٢٠١٨). Hospital staff may be a second reservoir of *Staphylococcus aureus,* which can be rapidly transmitted to patients due to their resistance to multiple antimicrobial agents and adaptability to changing environmental conditions, and their virulence may be influenced by genes (*Andela.,2020*).

This bacterial genus's infection-causing ability may be due to its adhesion to host cells, which also leads to biofilm formation, causing resistance to immune defenses and antibiotics (*Morar et al*., ٢٠٢١). *Staphylococci* resistance to beta-lactam antibiotics is due to their ability to produce the beta-lactamase enzyme and possess the MecA gene, which reduces the penicillin-binding protein, which has little affinity for binding to these antibiotics (*Gong et al.,* ٢٠٢٢), Methicillin-resistant *Staphylococcus aureus* is a major clinical problem worldwide due to the increasing prevalence of S. aureus bacteria in hospitals and local communities (Laupland et al. ٢٠٢١). The prevalence of methicillin-resistant *Staphylococcus aureus* infections in the community, including community-acquired strains, is expanding beyond hospital patients(*Yarovoyet et al.,* ٢٠١٩). Modern technologies in microbiology and genetic engineering enable the detection of genes related to virulence factors and antibiotic resistance, eliminating the need for antibiotic sensitivity testing, isolation, and diagnosis(*Ruegg et al., 2015*). The increasing rate of hospital-acquired infections with *S. aureus* strains and the spread of multidrug-resistant strain (*Laupland et al. 2021*).

The current objectives of this study were confined to determining the distribution of antibiotic-resistant bacteria in clinical isolates.

Methodology:

Collection of samples and Diagnosis:

In this study, (٤٥٠) clinical samples were collected from patients admitted to and visiting the Medical City Hospital in Baghdad, Iraq. From ١\٧\٢٠٢٤ to ٣٠\٩\٢٠٢٤, Then, all samples were cultured on mannitol medium and blood agar medium to isolate and purify *Staphylococcus aureus* isolates, and the samples were identified as follows: wounds (٣٣) samples, burns (٢٧) samples, pus (١٥) samples, urine samples (١٧), infected skin swabs (١٨), vaginal swabs (١١), and sputum (١٠), and spinal fluid samples (٩). The lowest number among the diagnosed isolates was ١٤٠ samples. The source, sex, and age were determined. The method of isolating the samples and culturing them on mannitol salt agar medium and incubating them at a temperature of ٣٧ for ٢٤ hours and then transferring the samples to brain and heart infusion agar medium and then blood agar where and after biochemical diagnosis using reagents such as Oxidase Test and Catalase Test(*Ektaet et al.,2022*), and to determine the accurate diagnosis using by cultures and biochemical reaction and then confirmed diagnosis VITEK ٢ technology and, while other isolates of other types of bacteria were excluded, and the results were recorded.

Results and discussion:

Biochemical Identification of bacterial species under study of *Staphylococcus aureus*:

The types of pathogenic bacteria under study were diagnosed by the first diagnosis using biochemical methods and according to Table(١), where *Staphylococcus aureus* bacteria were identified by the Catalase test, where the test was (+), and they were differentiated from *Escherichia coli* bacteria first by the Gram stain and also by the Indol Test, where the test was (−), while the rest of the other types of bacteria positive for the Gram stain were diagnosed and identified according to Table (١). As for the bacteria *Klebsiella pneumonia*, it was identified by the Motility test, where it was (Non-motile), in addition to the Urease Test, which was certainly (+), and it may be the only type of bacteria under study that is (+) for the Urease Test, and the Gram-negative *Pseudomonas aeruginosa* bacteria were also identified by the Oxidase test, which is (+), and it is certainly the only type of bacteria that is (+) For the Oxidase test and the Catalase test, and this is a distinctive feature of this type of pathogenic bacteria for biochemical tests, as all other types of bacteria are (−) for the Indol Test, and as noted in Table (١) and Figure (١), the rest of the other types of bacteria that were identified.

Table (١) Biochemical Diagnosis of Types and Genera of Bacteria under Study:

Types of bacteria	Number of isolations AND %		Tests						
			Gram stain	Catalase	Oxidase	Glucose	Motility	Urease Test	Indol Test
S.aureus	١٤٠	٣١,١٪	G+Ve	+	−	A+	Motile	−	−
S.aesciuri	٢٠	٤,٤٪	G+Ve	−	−	+	Nonmotile	−	−
S.aeLentus	٢٣	٥,١٪	G+Ve	−	−			−	−
K.Pneumoniae	٥٧	١٢,٦٪	G-Ve	+	−	A + G+	Nonmotile	+	−
K.oxytoca	٢٣	٥,١٪	G-Ve	−	−	+	Nonmotile	−	−
P.aeruginosa	٨٥	١٨,٨٪	G-Ve	+	+	A+	Motile	−	−
E. coli	١٠٢	٢٢,٦٪	G-Ve	+	−	A + G+	Motile	−	+
the total	٤٥٠	١٠٠٪							

Figure (١) Catalase positive reaction for *Staphylococcus aureus* bacteria.

Isolation of *Staphylococcus aureus* In the present study, the most common types of bacterial isolates from a total of ٤٥٠ clinical samples and pathological isolates were found to were ١٤٠ samples infected with *Staphylococcus aureus* bacteria, as mentioned in Table (١) at a rate of (٣١,١٪) of the total pathological isolates. After completing the diagnosis of ١٤٠ samples under study, the most widespread areas in the body of the samples were identified and calculated. It became clear through the study and by percentages and according to cases , as it was shown that the number of samples and their percentage in Table (٢).It was indicates the presence of significant differences at P value level (٠,٠٠٠١) * * that all pathological samples have a high significant P value among them, as the percentage of infection with wounds with *Staphylococcus aureus* reached (٣٣) isolates at the percentage of (٢٣,٥٧٪), and this is consistent with was found (*Eunet al., 2021*), which indicated that the highest percentage of *Staphylococcus aureus* isolation in post-operative wounds or that the source of contamination may be external represented by germs or Quoted from medical workers operating room environment, surgical tools and materials, operating table, etc.(*Monistero et al., 2018*),

For burn injury infected, (٢٧) isolates were obtained at a rate of (%١٩,٢٩) and agreed with what was found (*Laupland et al., 2021*), which indicates the presence of *Staphylococcus aureus* in high proportions compared to other types of bacteria.

Staphylococcus aureus from pus were obtained (١٥) isolates at a rate (of ١٠,٧١٪), which is an expected result of the spread of these bacteria. (*Hindy et al., 2022*) indicated that *Staphylococcus aurous* is more pathogenic than aerobic bacteria, which often work in synergy with other aerobic bacteria or may exist naturally or be considered opportunistic pathogens (opportunistic microbes), meaning that they become pathogenic in the event of a decrease in the body's resistance or virulent factors required by transgenic or mutation rate in environments (*Benjamin et al., 2022)*

In the cases of urinary tract infections, (١٧) isolates of *Staphylococcus aureus* were found at a rate of (١٢,١٤٪) The result agreed with (*Savini et al., 2018*) where they found that the incidence of these bacteria in the urinary tract and urinary tract infections reached (٥,٢٪) and this result differed from (*Hindy et al., 2022*) where these bacteria were isolated at a rate of (١٦,٩٪) according to his study where he found that *Staphylococcus aurous* at a rate of (٠,٥-٦٪) of the total bacteria positive for bacteria in urinary tract infections and it is also considered contaminated as a result of the frequent use of treatments and antibiotics in particular, as strains resistant to these antibiotics have developed continuously, so their diagnosis as a cause of urinary tract infections has become new in the incidence of infection. As for skin infections, ١٨ samples of *Staphylococcus aurous* bacteria were obtained at a rate of (١٢,٨٦٪), and the result was similar to (*Rezia et al., 2018*), where these bacteria were isolated at a rate of (١٠,٥٪). The contamination of the hospital environment with *Staphylococcus aureus* and methicillin-resistant *Staphylococcus aureus* bacteria may be due to failure to follow the correct cleaning methods and failure of workers to adhere to sterilization rules in the hospital. This also leads to medical workers playing an important role in the spread of bacteria in the hospital environment and among patients lying down. These percentages are similar to the current study(*Sihamet al., 2023*). As for the other samples of *Staphylococcus aureus* isolated from vaginal infections, they amounted to (١١) samples, at a rate of (٧,٨٦٪), as well as sputum (١٠) samples, at a rate of (٧,١٤٪), and spinal cord fluid (C.S.F) (٩) samples, at a rate of (٦,٤٣٪), which are the least isolated samples of *Staphylococcus aureus* in the study, and the lowest number among the diagnosed isolates according to Table (٢) and Figure (٢). The reason may certainly be due to the lack of suitability of the environment of this area of the body to a large extent for the spread of these bacteria, although it is considered the most dangerous area that these bacteria may reach, which may lead to infection, and which is likely to be found in it. Through previous research and studies, the number of infections with these bacteria has increased in recent years, as they were acquired from hospitals as a result of infection with multiple *Staphylococcus aureus* bacteria and their resistance to antibiotics, which helped the bacteria to multiply and multiply rapidly and produce beta-lactase enzymes, which led to the occurrence of multiple painful infections that may be fatal and sometimes (*Ekta et al.,2022).*

Table (٢) Numbers of Isolates from patients According to Cases:

Specimens	sampling frequency	Percentage (%)
Wounds (swabs)	٣٣	٢٣,٥٧
Burns	٢٧	١٩,٢٩
Pus	١٥	١٠,٧١
Urine samples	١٧	١٢,١٤
Skin lesions (swabs)	١٨	١٢,٨٦
Vaginal swabs	١١	٧,٨٦
Sputum	١٠	٧,١٤
Cerebrospinal fluid .C.S.F.	٩	٦,٤٣
Total	١٤٠	١٠٠
P-value	---	٠,٠٠٠١ **
** (P≤٠,٠١).		

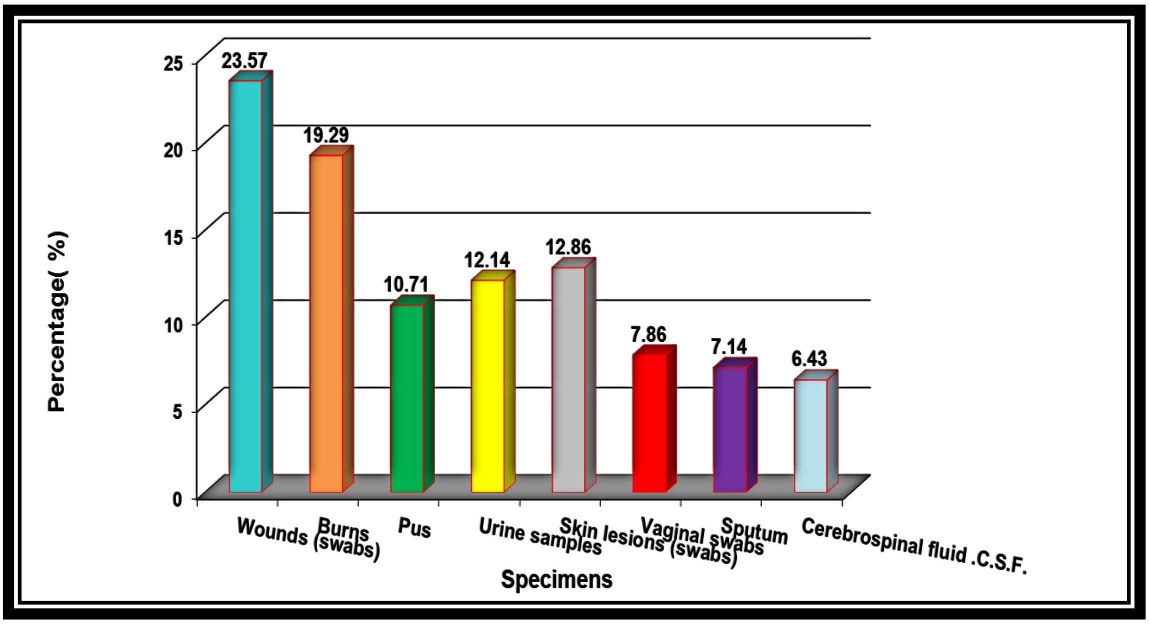


Figure (٢) Isolation of *Staphylococcus aureus* from its Sources

Distribution of *Staphylococcus aureus* according to origin of samples and Gender:

It is clear, according to Table (٣), that there may be significant statistical differences between the sample source and according to gender, source, and antibiotic resistance. It is noted that males recorded a higher rate than females for wounds, as male samples had a higher resistance than females, as they recorded percentages of (٣٠,١٧٪) and (١٢,١٢٪), respectively. The reason may be that men are more exposed than women to meeting and mixing with others, and thus, the transmission of infection is greater. This also applies to Burns, where it recorded (٣٦,٢٨٪) and (١٣,٨٠٪), respectively. This may be due to the same reasons mentioned above. This applies to all other sources from which isolates were collected, such as sputum, nasal passages, and cerebrospinal fluid, with the exception of urine and vaginal swabs. This is due, in fact, to the physiological difference between males and females origin of Sample Figure (٣). These results may be consistent with most studies, such as the study of

(*Hindy et al., 2022*) as well as the study of (*Laupland et al., 2021*), which confirmed that the appearance of infection in females is more than in Males in general because men mix more in medical institutions than women.

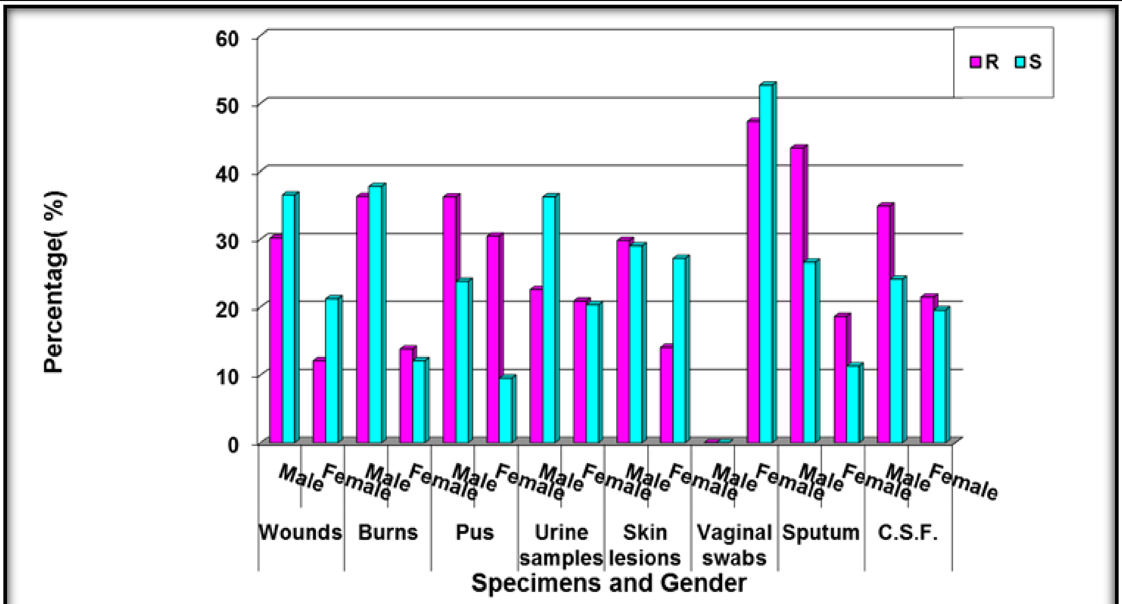
(Table ٣) Distribution of Sample Study According to Specimens and Gender

Specimens	**Male**		**Female**		**P-value**
	R No. (%)	**S No. (%)**	**R No. (%)**	**S No. (%)**	
Wounds (swabs)	**(٣٠,١٧٪)**	**(٣٦,٥٠٪)**	**(١٢,١٢٪)**	**(٢١,٢١٪)**	**٠,٠٠٠١ ****
Burns	**(٣٦,٢٨٪)**	**(٣٧,٧٩٪)**	**(١٣,٨٠٪)**	**(١٢,١٢٪)**	**٠,٠٠٠١ ****
Pus	**(٣٦,٢١٪)**	**(٢٣,٧٩٪)**	**(٣٠,٤٥٪)**	**(٩,٥٤٪)**	**٠,٠٠٠١ ****
Urine samples	**(٢٢,٥٩٪)**	**(٣٦,٢٣٪)**	**(٢٠,٨٦٪)**	**(٢٠,٣٢٪)**	**٠,٠٠٠١ ****
Skin lesions (swabs)	**(٢٩,٨١٪)**	**(٢٩,٠١٪)**	**(١٤,٠٤٪)**	**(٢٧,١٤٪)**	**٠,٠٠٠١ ****
Vaginal swabs	**---**	**---**	**(٤٧,٣١٪)**	**(٥٢,٦٩٪)**	**٠,٣٤٧ NS**

Sputum	**(٤٣,٤١٪)**	**(٢٦,٥٩٪)**	**(١٨,٦٤٪)**	**(١١,٣٦٪)**	**٠,٠٠٠١ ****
Cerebrospinal fluid C.S.F.	**(٣٤,٨٥٪)**	**(٢٤,١٣٪)**	**(٢١,٤٥٪)**	**(١٩,٥٧٪)**	**٠,٠٠٠١ ****
P-value	**٠,٠٠٠١ ****	**٠,٠٠٠١ ****	**٠,٠٠٠١ ****	**٠,٠٠٠١ ****	**---**
**** (P≤٠,٠١).**					

Where (R) means resistant isolates and (S) means sensitive isolates.

All samples have a highly significant effect among themselves, except vaginal smears are not significant under the influence of p-value ** (P≤٠,٠١).



Distribution of bacterial isolate according to sample and gender

Figure (٣) Distribution of bacterial isolate according to sample and gender

Antibiotic Susceptibility of bacterial isolates in this study :

According to Table (٤), Show the result of antibiotic Susceptibility (resistant and sensitive) antibiotics among *S.aureus* isolates by using the VITIK٢ method ٤٤. All antibiotics used to test *S. aureus* strains from different infection using the VITIK ٢ method were resistant and *S.aureus* Strains different in their resistance rate to antibiotics when using the P-value (**p≤ ٠,٠١) as an indicator. It was found that there were no significant statistically significant differences in most of the antibiotics under study, as ٤٤ antibiotics were used according to VITIK٢ measurements. It was found that the bacteria were resistant to most antibiotics at percentages ranging from ٩٠٪ to ١٠٠٪. We note, according to the table, that the bacteria were ١٠٠٪ resistant to the antibiotics Cefixime, Amikacin, Linezolid, Teicoplanin, Vancomycin, Tigecycline, Fosfomycin, Nitrofurantoin, and Mupirocin. This is a large number of antibiotics that bacteria have become resistant to. It is not affected by them at all, but the antibiotics that the bacteria were sensitive to in varying proportions are Gentamicin at a rate of (٣٨,٥٧٪), and Moxifloxacin at a rate of (٧٠,٠٠٪) and Norfloxacin and Ofloxacin at almost the same proportions, and the most sensitive antibiotics against the bacteria under study were Trimethoprim/sulfamethoxazole, Rifampicin and Fusidic Acid, whose proportions reached (٨٨,٥٧٪), (٨٥,٧١٪) and (٨٢,٨٦٪) respectively, and according to Table and Figure (٤), we note that the bacteria were sensitive to a group of antibiotics that may not exceed ٨ antibiotics only out of the total number of antibiotics, which is ٤٤ antibiotics, meaning that they were resistant to approximately ٨٠٪ of antibiotics and sensitive to ٢٠٪ of antibiotics according to these results, which may agree with some studies such as the study (*Hindy et al., 2022*), (*Onyango et al., 2018).*

Which confirmed the ability of *S.aureus* bacteria carrying virulence genes to resist the most common antibiotics.

Table (٤) was used in this research (present study).

Isolate	Antibiotic	Sample	R No. (%)	S No. (%)	P-value
١	Cefoxitin	FOX	١٣٠ (٩٢,٨٦٪)	١٠ (٧,١٤٪)	٠,٠٠٠١ **
٢	Benzylpencilli	PENPE	١٣٦	٤ (٢,٨٦٪)	٠,٠٠٠١ **

	n	N	(٩٧,١٤٪)		
٣	Amoxicillin	AMX	١٢٨ (٩١,٤٣٪)	١٢ (٨,٥٧٪)	٠,٠٠٠١ **
٤	Ampicillin	AMP	١٢٨ (٩١,٤٣٪)	١٢ (٨,٥٧٪)	٠,٠٠٠١ **
٥	Amoxicillin/ClavulaniAcid	AMC	١٢٨ (٩١,٤٣٪)	١٢ (٨,٥٧٪)	٠,٠٠٠١ **
٦	Ampicillin/ Sulbactam	AM /SCF	١٣٠ (٩٢,٨٦٪)	١٠ (٧,١٤٪)	٠,٠٠٠١ **
٧	Piperacillin/Tazobactan	PTZ	١٣٠ (٩٢,٨٦٪)	١٠ (٧,١٤٪)	٠,٠٠٠١ **
٨	Oxacillin MIC	OX/ MIC	١٢٨ (٩١,٤٣٪)	١٢ (٨,٥٧٪)	٠,٠٠٠١ **
٩	Oxacillin	OX	١٣٢ (٩٤,٢٩٪)	٨ (٥,٧١٪)	٠,٠٠٠١ **
١٠	Cefuroxime	CXM	١٢٨ (٩١,٤٣٪)	١٢ (٨,٥٧٪)	٠,٠٠٠١ **
١١	Cefixime	CFM	١٤٠ (١٠٠٪)	٠ (٠,٠٠٪)	٠,٠٠٠١ **
١٢	Cefpodoxime	CPD	١٣٠ (٩٢,٨٦٪)	١٠ (٧,١٤٪)	٠,٠٠٠١ **
١٣	Cefotaxime	CTX	١٢٨ (٩١,٤٣٪)	١٢ (٨,٥٧٪)	٠,٠٠٠١ **
١٤	Ceftriaxone	CRO	١٣٠ (٩٢,٨٦٪)	١٠ (٧,١٤٪)	٠,٠٠٠١ **
١٥	Cefepime	FEP	١٢٦ (٩٠,٠٠٪)	١٤ (١٠,٠٠٪)	٠,٠٠٠١ **
١٦	Imipenem	IMP	١٢٦ (٩٠,٠٠٪)	١٤ (١٠,٠٠٪)	٠,٠٠٠١ **
١٧	Meropenem	MEM	١٢٤ (٨٨,٥٧٪)	١٦ (١١,٤٣٪)	٠,٠٠٠١ **
١٨	Amikacin	AK	١٠٠ (٧١,٤٣٪)	٤٠ (٢٨,٥٧٪)	٠,٠٠٠١ **
١٩	Gentamicin	GN	٨٦ (٦١,٤٣٪)	٥٤ (٣٨,٥٧٪)	٠,٠٠٠١ **
٢٠	Tobromycin	TO	٩٠ (٦٤,٢٩٪)	٥٠ (٣٥,٧١٪)	٠,٠٠٠١ **
٢١	Ciprofloxacin	CIP	٧٤ (٥٢,٨٦٪)	٦٦ (٤٧,١٤٪)	٠,٠٠٠١ **
٢٢	Levofloxacin	LFV	٤٦ (٣٢,٨٦٪)	٩٤ (٦٧,١٤٪)	٠,٠٠٠١ **
٢٣	Moxifloxacin	MXF	٤٢ (٣٠,٠٠٪)	٩٨ (٧٠,٠٠٪)	٠,٠٠٠١ **
٢٤	Norfloxacin	NOR	٤٤ (٣١,٤٣٪)	٩٦ (٦٨,٥٧٪)	٠,٠٠٠١ **
٢٥	Ofloxacin	OFL	٤٤ (٣١,٤٣٪)	٩٦ (٦٨,٥٧٪)	٠,٠٠٠١ **
٢٦	Inducible clindamycin Resistance	I/CD/R	٨٨ (٦٢,٨٦٪)	٥٢ (٣٧,١٤٪)	٠,٠٠٠١ **

٢٧	**Azithromycin**	**AZM**	٩٢ (٦٥,٧١٪)	٤٨ (٣٤,٢٩٪)	٠,٠٠٠١ **
٢٨	**Clarithromycin**	**CLR**	٩٢ (٦٥,٧١٪)	٤٨ (٣٤,٢٩٪)	٠,٠٠٠١ **
٢٩	**Erythromycin**	**E**	٩٢ (٦٥,٧١٪)	٤٨ (٣٤,٢٩٪)	٠,٠٠٠١ **
٣٠	**Clindmycin**	**CD/DA**	٨٤ (٦٠,٠٠٪)	٥٦ (٤٠,٠٠٪)	٠,٠٠٠٢ **
٣١	**Lincomycin**	**LCM**	١٠٠(٧١,٤٣٪)	٤٠ (٢٨,٥٧٪)	٠,٠٠٠١ **
٣٢	**Linezolid**	**LZD**	١٤٠ (١٠٠٪)	٠ (٠,٠٠٪)	٠,٠٠٠١ **
٣٣	**Teicoplanin**	**TEC/TEI**	١٤٠ (١٠٠٪)	٠ (٠,٠٠٪)	٠,٠٠٠١ **
٣٤	**Vancomycin**	**VAN**	١٤٠ (١٠٠٪)	٠ (٠,٠٠٪)	٠,٠٠٠١ **
٣٥	**Doxycycline**	**DOX**	٤٠ (٢٨,٥٧٪)	١٠٠ (٧١,٤٣٪)	٠,٠٠٠١ **
٣٦	**Minocycline**	**MIN**	٤٠ (٢٨,٥٧٪)	١٠٠ (٧١,٤٣٪)	٠,٠٠٠١ **
٣٧	**Tetracycline**	**TE**	٢٢ (١٥,٧١٪)	١١٨ (٨٤,٢٩٪)	٠,٠٠٠١ **
٣٨	**Tigecycline**	**TIG**	١٤٠ (١٠٠٪)	٠ (٠,٠٠٪)	٠,٠٠٠١ **
٣٩	**Fosfomycin**	**FOS**	١٤٠ (١٠٠٪)	٠ (٠,٠٠٪)	٠,٠٠٠١ **
٤٠	**Nitrofurantoin**	**NI/F**	١٤٠ (١٠٠٪)	٠ (٠,٠٠٪)	٠,٠٠٠١ **
٤١	**Fusidic Acid**	**FD**	٢٤ (١٧,١٤٪)	١١٨ (٨٢,٨٦٪)	٠,٠٠٠١ **
٤٢	**Mupirocin**	**MUP**	١٤٠ (١٠٠٪)	٠ (٠,٠٠٪)	٠,٠٠٠١ **
٤٣	**Rifampicin**	**RA**	٢٠ (١٤,٢٩٪)	١٢٠ (٨٥,٧١٪)	٠,٠٠٠١ **
٤٤	**Trimethoprim/sulfamethoxazole**	**TS/SXT**	١٦ (١١,٤٣٪)	١٢٤ (٨٨,٥٧٪)	٠,٠٠٠١ **
P-value		---	٠,٠٠٠١ **	٠,٠٠٠١ **	---
** (P≤٠,٠١).					

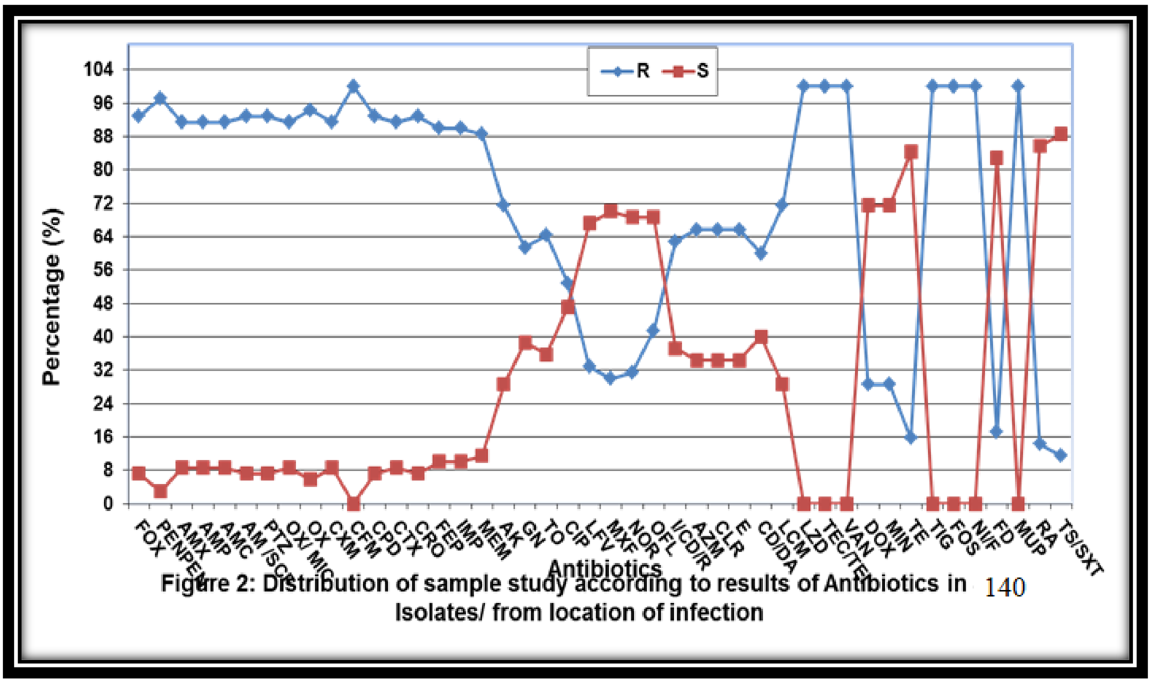


Figure (٤) Distribution of Sample Study According to Results of Antibiotics in ١٤٠ Isolates / from Location of Infection Resistance and Sensitive.

The spread of antibiotic resistance:

The spread of antibiotic resistance currently poses a major public health risk threat for humanity. Bacteria that are resistant to many drugs are reported annually, while the development of new antibiotics is declining. Emphasis has been placed on limiting the spread of antibiotic resistance by limiting the use of antibiotics in health care, which has led to a reduction in the exposure of pathogens to antibiotics, thus reducing the selection of resistant strains(Table ٥)(*AL-Zobaidy et al., 2019*).

Table (٥) shows some types of common antibiotics and their most important properties.

Pharmacological family	Category	Drug Classification	Trade Name	The scientific name
Penicillin	Infectious diseases	Antibacterial	Amoxil	Amoxicillin
Aminoglycosides	sexual diseases	Antibacterial	Garamycin	Gentamicin
٣rd generation cephalosporin	sexual diseases	Antibacterial	Rocephin	Ceftriaxone
tetracycline derivatives	sexual diseases	Antibacterial	Doryx,Dox-idar	Doxycycline

feline new-burns	**sexual diseases**	**Antibacterial**	**Azith,Zaha**	**Azithromycin**

Conclusion:

According to this study, it was found that the most common types of bacteria diagnosed in the health institutions under study are *Staphylococcus aureus* bacteria, at a rate of ٣١,١٪, compared to other types of pathogenic bacteria. The most common areas of spread and distribution of bacteria are wounds and burns, and the least common areas are pus and spinal fluids. In general, the rate of infection of males with these pathogenic bacteria is higher than that of females. It was also found that S. aureus bacteria are resistant to common antibiotics at rates that may exceed ٨٠٪ of the antibiotics under study, which total ٤٤ antibiotics, as it was found that they are ١٠٠٪ resistant to Cefixime, Amikacin, Linezolid, Teicoplanin, Vancomycin, Tigecycline, and sensitive to a small group of antibiotics, namely Trimethoprim/sulfamethoxazole, Rifampicin, and Fusidic Acid, which reached rates of (٨٨,٥٧٪), (٨٥,٧١٪), and (٨٢,٨٦٪), respectively.

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