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Antimicrobial Resistant Bacteria Isolated from Intensive Care Units

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ABSTRACT

Aimed to determine the kind of microorganisms probably to be gifted inside the in-depth care unit and the suitable antibiotics for them. Methods use the duration between October and December 2021. The samples had been carried from surfaces and in the ICUs of Al Wahada Hospital in Derna City Libya. Result: The percent and the type of pathogenic agent isolated from intensive care units (ICU & CCU) the highest percent for gram-positive bacteria at 47%, then gram-negative at 19% and fungi at 7.0%, and the percent for there is no presence of pathogenic agent by 27% The bacterial spp, types, numbers, and that the highest percent for Gram-positive bacteria (Staphylococcus epidermidis.20 (39.22%) Staphylococcus aureus 29 (56.86%). As for the Gram-negative bacteria, the highest percentage for Klebsiella pneumonia is 8(40%), and Escherichia coli 9 (45%). As for the Fungi, Candida albicans 2(25%), Aspergillus flavus 6(75%). the surface which has the highest contamination with many types of bacteria were beds then tables, cabinets, and covers of baskets, NBG was the most common bacterium found on all surfaces, followed by S. epidermidis, S. aureus, E. coli, and K. pneumonia. Pseudomonas aeruginosa, S. epidermidis, and S. aureus were all drug resistant., as for Klebsiella pneumonia resistant to most of the antibiotics, Streptococcus spp resistant to many antibiotics except CTX, COL, CAZ, IMIP, which is sensitive, and Escherichia coli and resistant for rest of antibiotic. The conclusion that Gram-negative bacteria are the most microorganisms that survive on different surfaces despite changes in environmental conditions which make them resistant to antibiotics.

INTRODUCTION

Because of their underlying diseases and exposure to different intrusive medical equipment, patients admitted to intensive care units (ICUs) are predisposed to multiple nosocomial infections (Agana et al., 2017). (1). Frustrated, many academics have issued warnings about the growing usage of antimicrobials and the rise of antibiotic resistance in the majority of the world's countries (2). Today, the development of multidrug-resistant (MDR) gram-negative and methicillin-resistant Staphylococcus aureus (MRSA) bacteria should be a large contamination manipulation committee (3). Furthermore, they have an impact on passive; outcomes, and boom within the length of significant care unit stay and clinical institutions (4-6). Many studies have also shown that managed antibiotic usage results in enhanced microorganism sensitivity to antimicrobial drugs (7-9).

The growth of resistant bacteria and their negative influence on impacted person survival and healthcare costs necessitates antimicrobial susceptibility testing in every clinic and clinic that allows you to control contamination. Therefore, the purpose of this study is to assess the Appropriate Antimicrobial Resistance of Nosocomial Bacteria and Moses traces from surfaces and medical devices

isolated from Al-Wahada Hospital Derna/Two Libya's Intensive Care Units.

METHODS

The study was carried out over three months (between October and December 2021), with samples taken from surfaces and scientific apparatus in the ICUs of Al Wahada Hospital in Derna City, Libya. Sample collection options for surfaces and scientific instruments (Table 1) were obtained by swabbing the same ancient ISO/DIS 14698-1. Before usage, sterile cotton swabs were wet with nutrient broth. For flat ground, the swabs were used to create areas (10 cm2) with parallel spaced stripes by rotating them slightly, and then, on the same area, one-of-a-kind stripes perpendicular to the first ones were completed. For unusual surfaces, the entire ground was transformed into a sample. Each sample was placed in its container and swiftly transported to the laboratory (Norme ISO/DIS 14698-1, 1999).

A total of 108 samples were collected. As a result, the swabs were now seeded on four-way media (Cysteine Lactose Electrolyte Deficient agar-CLED) a non-selective MacConkey agar, Mannitol Salt Agar (MSA) selective for Staphylococcus, Cetrimide agar for the selective isolation of P. aeruginosa), and Sabouraud Dextrose Agar (SDA) for isolated fungus. The quadrants approach was used regularly to complete streaks. The inoculation plates were incubated for 24 hours at 37 °C. Fungi-isolated inoculation plates were incubated at 25 °C for forty-eight hours. Hours. (Pittet et al., 1999). (Pittet et al., 1999). Following the incubation period, the appearance, size, and coloration of the colonies were observed, and purification of each colony was conducted on nutrient agar. Identification of bacterial traces: all isolated traces were Gram-stained and identified using standard procedures. Catalase and coagulase (Kateete et al., 2010) (Oxoid STAPHYTECT PLUS DR0850) were employed to identify Staphylococcus aureus (S. aureus). Enterobacteriaceae and non-fermenting Gram-negative bacilli traces were tested for oxidase before identification using API 20 E Biomerieux, France).

All fungus isolates on SDA plates were inspected under a microscope. All isolates that were smooth, wet, and convex on SDA with a yeast-like odor and creamy-white color were then evaluated microscopically using a moist mount preparation. Candida spp. has been identified as large budding yeast cells with or without pseudohyphae. Candida spp. isolates were then tested using the API 20 Candida system (BioMe'rieux-France). All mold isolates on SDA plates were macroscopically examined for colony growth rates, color, texture, floor, and pigmentation. Microscopic examination A wet mount using a forty x objective lens was also used to view the size and shape of conidiophores and phialides, as well as the association of spores. Colonies having a rapid growth rate, a downy to powdery texture, a yellow-green hue, a light or yellowish reverse, and conidial heads with difficult-walled conidiophores particularly around the vesicle, with uninervate and biseriate phialides A. flavus was identified by rounded conidia with tough walls and brown sclerotia developed in a few isolates.

RESULTS AND DISCUSSION

The type of surfaces and the number of samples in ICU & CCU were the highest numbers for tables then cabinets, commodities, and Beds by 8 shown in table 1.

Table 1. Sites Sampling in two intensive care units

Surfaces	Samples NO
Tables	12
cabinets	8
refrigerators	4
Commodinos	8
Treatment trolleys	2
Beds	8
Cover of baskets	2
X-Ray stand	2
Bed sheets	6
Chairs	4
Main Doors	4
Bathroom's doors	3
Walls inside bathroom	4
Walls outside bathroom	4
Central floor	6
Corner of wall	6
Fluids stands	6
Light power keys	4
E.C.G	2
Sphygmomanometer	1

Surfaces	Samples NO
Mechanical ventilation	2
Monitoring machines	4
Instruments	4
Ultraviolet lamp	2

The percent and the type of pathogenic agent isolated from intensive care units (ICU & CCU) lustrated in Figure 1, that the highest percent for gram-positive bacteria at 47%, then gram-negative at 19%, and fungi at 7.0%, and the percent for there is no presence of pathogenic agent by 27%

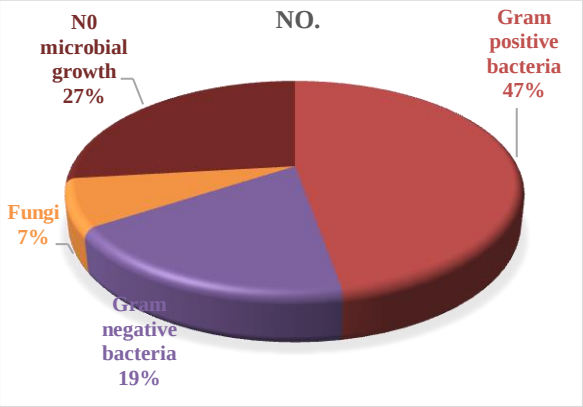

Figure 1. Gram-negative, Gram tremendous microorganisms and fungi remoted from distinctive websites of in-depth care units

The spp of bacterial, types, numbers, and percentages can be illustrated in table 2, that the highest percent for Gram-positive bacteria (Staphylococcus epidermidis.20 (39.22%) Staphylococcus aureus 29(56.86%). As for the Gram-negative bacteria, the highest percentage for Klebsiella pneumonia is 8(40%), and Escherichia coli 9 (45%). As for the Fungi (Candida albicans 2(25%), Aspergillus flavus 6(75%).

Table 2. Percent of bacterial strains and fungi isolated from two intensive care units

microbe	Bacterial species	No.	Percent (%)
Gram negative bacteria	Klebsiella pneumonia	8	40
	Escherichia coli	9	45
	Pseudomonas aeruginosa	3	15
Gram-positive	Staphylococcus epidermidis.	20	39.22
bacteria	Staphylococcus aureus	29	56.86
	Streptococcus	2	3.29
Fungi	Candida albicans	2	25
	Aspergillus flavus.	6	75
N0 microbial growth		29	
Total	108		

As for the types of bacteria on different surfaces in intensive care units (ICU & CCU) that`s shown in figure 2 that the surface which has the highest contamination with many types of bacteria were beds then tables, cabinets, and cover of baskets, As for the bacteria most prevalent on all surfaces was NBG followed by S. epidermidis, S. aureus, E. coli, and K. pneumonia.

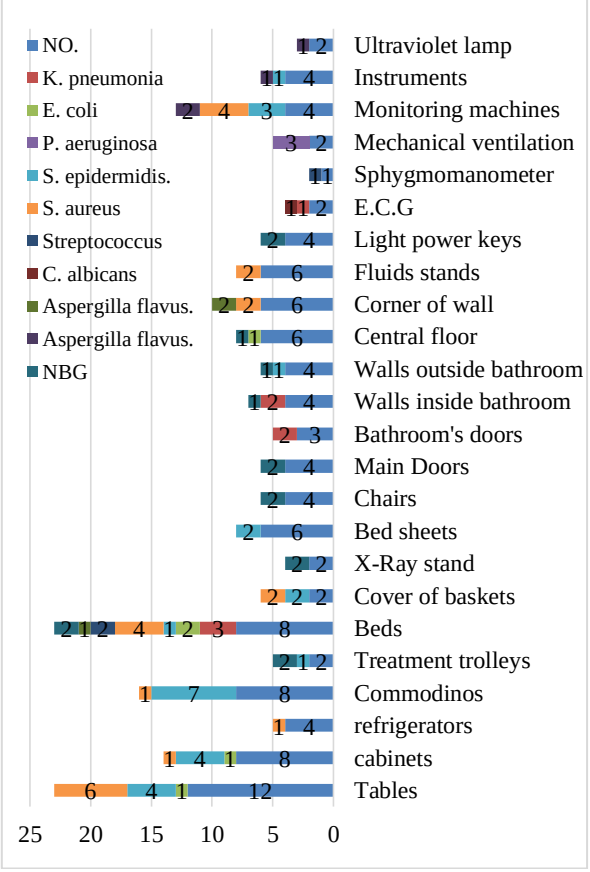

Figure 2. types of bacteria on different surfaces in both intensive care units

The Antibiotic resistance of Gram-negative bacterial strains isolated from the two intensive care units (CCU & ICU) in Table (3) shows that Pseudomonas aeruginosa, S. Epidermidis, and S. Aureus were resistant to all antibiotics, while Klebsiella pneumonia was resistant to most antibiotics but sensitive to others. for KF, COL, CAZ, TS, CN, about Streptococcus spp resistant to many antibiotic except CTX, COL, CAZ, IMIP, which is sensitive, and Escherichia coli sensitive to KF, COL, CAZ, TS, CN, and resistant to rest of antibiotic.

Table 3. Gram-negative bacterial strains obtained from two intensive care units show antibiotic resistance.

Bacterial species	TZB	CTX	CIP	KF	COL	CAZ	TS	IMIP	MEM	CN	AK	NET	FF	T	AMC	AMP	CRO
Escherichia coli	R	R	R	S	S	S	S	R	R	S	R	R	R	R	R	R	R
Klebsiella pneumoniae		R	R	R	R	R	S	R	S	R	R	R	R	R	R	R	R
Pseudomonas aeruginosa	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
S. Epidermidis.	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
S. Aureus	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
Streptococcus spp	R	S	R	R	S	S	R	S	R	R	R	R	R	R	R	R	R

The gift has a take an observation become done on a complete of 108 swab samples that had been accrued from ICUs in Al-Wahada Hospital. About 73% of the samples had been microbial boom and 27% had a non-microbial boom. Figure (1) indicates that the very best percent of remoted bacterial swab samples become discovered from a gram-nice microorganism (47%), accompanied by the aid of using gram-bad microorganisms (18.5%) and Fungi (7.5%). Regarding the superiority of microorganism lines and fungi remoted from each in-depth care gadget, the end result discovered that E. coli has an excessively wide variety of gram-bad microorganisms (45%), than klebsiella pneumonia (40%), at the same time as gram-nice staphylococcus aureus greater than one-half (56%) of gram-nice microorganism, on the subject of nonbacterial boom the end result stated the 29 wide variety of samples had been now no longer have any bacterial boom figure (2) Concerning to varieties of microorganism on one of a kind surfaces in each in-depth care gadgets the researchers observed the subsequent aspects; S. epidermis (26) and S. aureus (23) had been excessive numbers of all varieties of microorganism table (3).

Tables 2-3 provide information on the outcomes of the in vitro susceptibility testing. The six bacterial strains recovered from major care equipment proved multi-resistance to the investigated medicines, with MDR Gram-bad bacilli predominating. Gram-positive bacteria have shown extraordinary resistance to all antibiotics Antibiotic resistance characteristics of Gram-positive bacterial isolates from the intensive care unit 1. Legend: AK, Amikacin; AMC, Amoxicillin-clavulanic acid; AMP, Ampicillin; ATB, Antibiotic; CAZ, Ceftazidim; CIP, Ciprofloxacin; COL, Colistin; CRO, Ceftriaxone; CTX, Cefotaxim; ESBL, Extended-spectrum beta-lactamase; FF, Fosfomycin; Intermediate; MDR, Multidrug-resistant; MEM, Meropenem; Nd, Not determined; IMP, Imipenem; KF, Cefalotin; MEM, Meropenem; Nd, Not determined; NET stands for netilmicin; R stands for resistant; and S is for sensitive. T, tetracycline; TS, sulfamethoxazole/trimethoprim; TZP, piperacillin-tazobactam, tetracycline, tetracycline, tetracycline. The testing of these antibiotics is not recommended due to the use of the Antibiogram Committee of the French Society for Microbiology standards, they have a study accepted as true with previous have a study (Eljamay, 2019; Eljamay et al, 2020; Eljamay et al, 2022).

CONCLUSION

The gram-poor microorganism is the most common type of microorganism that lives on special surfaces, despite changes in environmental conditions that cause them to become antibiotic resistant. the surface which has highest contamination with many types of bacteria were beds then tables, cabinets, and covers of baskets, As for the bacteria most prevalent on all surfaces was NBG followed by S. epidermidis, S. aureus, E. coli,

and K. pneumonia for KF, COL, CAZ, TS, CN, about Streptococcus Spp resistant for many antibiotics except CTX, COL, CAZ, IMIP, which is sensitive, and Escherichia coli sensitive for KF, COL, CAZ, TS, CN, and resistant for rest of antibiotic.

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