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ABSTRACT

The research aims to study the bacterial contamination of the two Species, intestinal *Escherichia coli* and cutaneous *Staphylococcus aureus*, which are endemic in the lobbies and halls of operations and childbirth in hospitals in Diwaniyah Governorate, where 4475 samples isolated from governmental and private hospitals in the governorate from October 2019 to September 2020. The samples are taken from six hospitals in the city center and three in the districts and sub-districts of the governorate, where showed that there is a slight variation in contamination rates, as the department of burns exceeded with a contamination rate of (29.28%), followed by Afak Hospital (20.37%), Al-Shamiya Hospital (20.26%), Women and Children's Hospital (19.74%), Al-Diwaniyah Teaching Hospital (19.33%), Al-Hamzah Hospital (17.64%), Al-Furat private hospital (13.02). Finally, Al-Diwaniyah private Hospital with a rate (4.92%) which had the lowest level of infection. The rates of infection of the two Species of bacteria under study varied as little difference was observed between the level of contamination of the two Species within the same site. In addition the department of burns also showed a high rate of contamination compared with the other sites.

1-Introduction

The evaluation and determination of the type number and bifurcation of the different Species of bacteria present in hospital rooms and lounges, especially sensitive units such as operation rooms is of great importance and concern at the global level as it was found that 10% of the infection that infects patients is an infection acquired by them while they are in hospitals such an infection may have serious consequences in terms of increasing the mortality rate, infection rate, length of lodging in hospital and the increase in the total cost (15).

The presence of high levels of microorganisms in the air of the indoor environment of hospitals is a factor of concern and increasing. This is related to many acute diseases infections and allergies caused by microorganisms (12).

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Medical personnel also represent an external source of contamination of the operation rooms (5) and the movement of medical personnel between operation rooms and other parts of them without changing their clothes and shoes. Moreover the arrival of patients to the operation rooms without cleaning or shaving properly before their entry into the operation room is very important factors to the contamination of operation rooms and development of the infections acquired in hospitals after various surgeries (21).

Wound infections and burns are among the major problems that the patient exposed after a wound or burn incident, especially if contamination occurs in the area. Bacterial infections are the main cause of death for patients with acute wounds and burns (15).

The Gram-positive bacteria grow rapidly within 48 hours, after which the Gram negative bacteria replace them (3). *Staphylococcus aureus* and *Escherichia coli* are among the common species responsible for most cases of wound and burn infections(23). These Species are characterized by their high resistance to many antibiotics used in the treatment of wounds and burns.

Skin infections may also occur after medical operations in which tools contaminated with germs or are not sterilized are used. (18) indicating that bacteria-negative are the most lethal of burn injuries and wounds after operations, as they constitute a ratio of up to three times more than gram positive bacteria.

The pathogenicity of *Escherichia coli* bacteria which is pathogenic to the urinary tract depends on a wide number of virulent determinants, as it is the most important bacterium responsible for urinary tract infection, and it is colonies selected from normal flora(24).

Escherichia coli bacteria cause urinary tract infections by having virulence factors that help it has an ability to adapt and survive in the host and the virulence factors that allow it to escape from host defense mechanisms such as urine flow, osmosis, alteration of PH and production of cytokines. (6)

Antiseptics have multiple target sites in the target cell while the antibiotic has one target site for attacking the target cell. Numerous studies have shown similarities between the methods by which the bacterial cell resists antibiotics and those that mediate chemical disinfectants. These mechanisms include altering the target site and changing the permeability and resistance barrier by having enzymes and a flow pump or by forming a biofilm. (19)

Furthermore many researches were conducted about the operation room, as it is the most sensitive place for infection due to direct contact between the infection and the tissues exposed to the air and the contact between surgical tools and the patient. For instance (1) found that the highest rate of infection in the hospital halls of Al-Diwaniyah province was for both bacterial sexes where *Escherichia coli* was (36.04%), followed by the bacterial genus *Staphylococcus aureus* (22.07%).

2-Materials and Methods

The data were collected from governmental and private hospitals in Al-Diwaniyah province in the center and the districts; they are about (4475) swabs. The samples were taken by sterile cotton swabs container on transport media, from walls, floors, gauze, carts, beds. The sampling devices for examination such as sugar testing and the cartridge, in addition to swabs from surgical instruments,

anesthesia device, doctor's and nurse's gloves, and at a height of one meter (at the level of the patient's bed). The samples were transferred to the laboratory and then activated in tubes containing 5 ml of brain hart infusion broth and placed in the incubator at a temperature of 37 m for a period of 24 hours as they are used. The purpose of this operation is for assisting the bacteria and the presence of turbidity as index of growth. Then the samples were plotted on MacConkey agar and blood agar media and incubated at 37 ° C for 24 hours.

3-Diagnosis of bacteria:

The two Species were diagnosed according to the method indicated by (17) by studying the shape of bacterial colonies on solid nutrient media, MacConkey agar and blood agar, depending on the biochemical tests mentioned by (4). The colonies in terms of colony size, diameter, height, color and shape of its edge. The diagnosis included making smears from the novae on clean glass slides stained with a cream dye. After that, the shape, color and arrangement of the stained cells were observed by light microscopy using an oily lens for the purpose of diagnosing the bacteria as negative or positive for the gram stain.(13)

4-Results and Discussion

The results of the study showed in table (1) that the highest contamination rate was in the department of burns, where the percentage was (29.28%), followed by Afak hospital which was (20.37%) whereas the lowest contamination rate was (4.92%) in Al-Diwaniyah Private Hospital, there is a difference in contamination between the governments and the privates hospitals due here to the fact that the health conditions worldwide and particularly in Iraq and more precisely conservative in relation to the outbreak of Coronavirus pandemic in 2020 in which has claimed many lives, especially the elderly and those with chronic diseases. As such governmental hospitals have suffered a population momentum for cases of suspected infection and confirmed infection with this deadly virus, which led to the departure of most patients from governmental hospitals and resorting to private ones, as they are limited to certain diseases. Thus a marked decrease in governmental hospitals compared to private ones despite the population boom, but their injuries were few, while the department of burns which witnessed the highest increase in contamination, that because the burns causes damage the cornified stratified squamous epithelium tissue , which is the first protection system for the human body and thus will be a suitable environment for the endemic bacterial species such *Staphylococcus aureus.*

On the other hand, the population density surrounding the hospital has a major role in the increasing contamination, as the districts and sub-districts are an open environment with more ventilation compared to the center and neighboring buildings that are a barrier to good ventilation, in addition to surgical medical tools and their role in the proportion of contamination, as the better the sterilization, the less contamination. (1)

Table (1) percentages of the bacterial contamination in the different sites in the present study.

no	The Hospital	Total smears	Smears with growth	Percentage to contamination (%)
1.	Al-Diwaniyah Private	487	24	4.92
2.	Al-Hamza	170	30	17.64
3.	Al-Furat Private	261	34	13.02
4.	Al- Diwaniyah Teaching	1050	203	19.33
5.	Women and children	876	173	19.74
6.	Al-Shamiaa	153	31	20.26
7.	Afak	265	54	20.37
8.	Dar Al-Shifa Private	571	97	16.98
9.	Department of Burns (beside Al-Diwaniyah hospital)	642	188	29.28

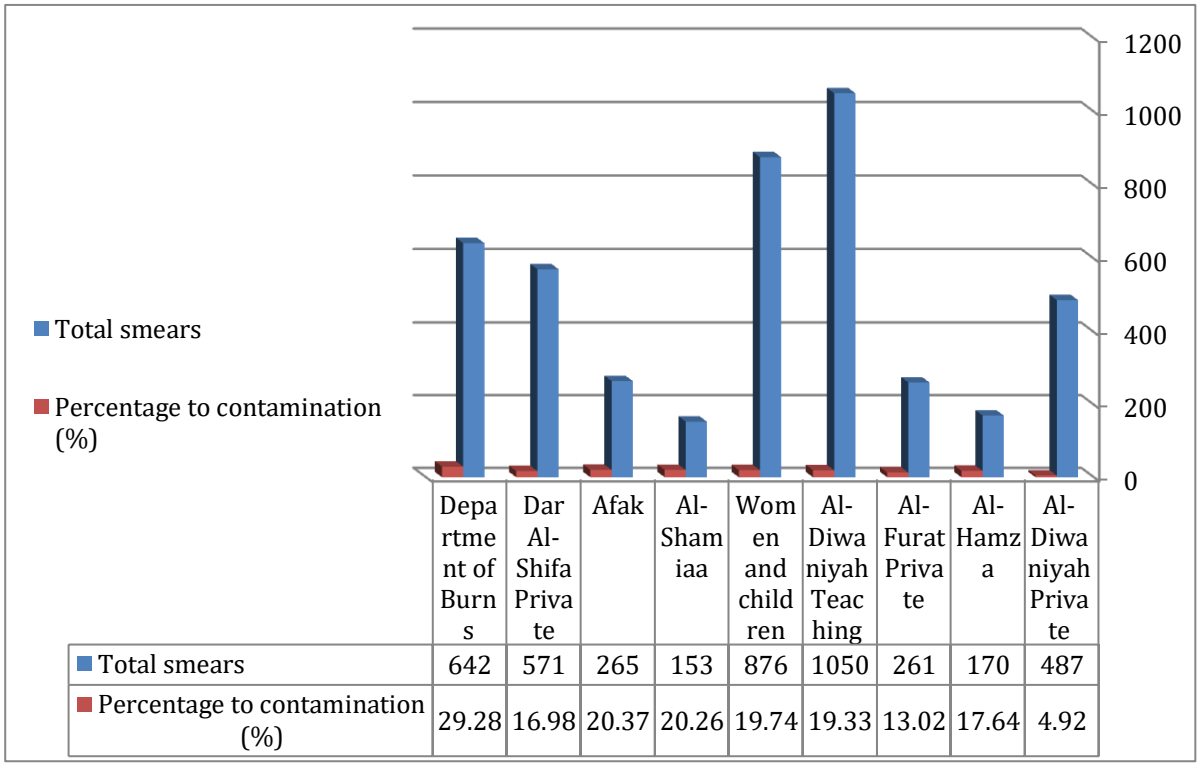

Figure (1) shows the total smears and the total percentage of contamination in the studied hospitals.

Table (2) shows the percentage of contamination in maternity rooms in hospitals. It is noticed that despite the slight difference among hospitals, some rates are somewhat high, this is due to the negligence through leaving the doors of the operation rooms open after sterilization and this helps to enter air currents loaded with different germs working on the contamination of the environment

surrounding the operation room. In this case hospitals are considered an environment that contains a large numbers of germs due to visitors entering it with various diseases, knowing that *St.ausrus* bacteria can live for several weeks in a dry environment such as beds, medical tools and some fabrics.(4)

The sterilization of the operation rooms is a basic condition for the safety of the mother and her newborn because of the wounds that she may be exposed to or the use of medical tools that may be contaminated or the hands of the workers. All of these reasons may be laden with pathogenic or non-pathogenic germs that cause harm. (2)

Contamination of operation rooms is considered one of the most important life threatening sources for hospitalized patients, especially cardiac surgery, organ transplant surgery, prostate surgery and bladder tumors, as they have been identified. Many sources are responsible for contaminating operation rooms, ventilation systems, and disinfection solutions. (14)

Table (2) Percentages of the bacterial Contamination in the Maternity Halls in the Hospitals in the present Study

no	The Hospital		Maternity hall		percentage
			Total number to smear	Smears with growth	
1.	Women and children	Teaching	85	12	14.11%
		Private	74	16	21.62%
2.	Al-Diwaniyah Private		96	19	19.97%
3.	Al-Furat Private		101	21	20.79%
4.	Dar Al-Shifa Private		94	22	23.40%
5.	Afak		65	16	24.61%
6.	Al-Hamza		81	22	27.16%
7.	Al-Shamiaa		72	20	27.77%
8.	Department of burns		nil	nil	nil
9.	Al-Diwaniyah Teaching		nil	nil	nil

Table (3) shows a variation in the percentages of contamination between governmental and private hospitals, as the slight increase in the number of bacteria under study in governmental hospitals than in private ones, and the reason may be attributed to the fact that *Staphylococcus aureus* is one of the bacteria resistant to antibiotics such as methicillin (MSRN) (20). Also (25) it is indicated that the CNSA-negative bacteria including *Staphylococcus aureus*, accounted for (34%) of the infections in

hospital infections. In addition to its habitat above the skin, where it is in the form of a normal flora, it waits for the opportunity to overcome the resistance of the skin tissue to cause inflammation.

Escherichia coli, *Staphylococcus aureus*, is one of the most important germs responsible for the occurrence of hospital infection. Angiogenesis is the result of infection with germs that are resistant to antibiotics (10).

Methicillin-resistant *Staphylococcus aureus* (MRSA) and vancomycin-resistant *Staphylococcus aureus* (VRSA) have become a problem of a major cause of hospital-acquired infections and have been identified with increasing frequency in community-acquired infections. (8)

This necessitates the need for programs to prevent the spread of antimicrobial resistant microorganisms and control the use of antimicrobial drugs in health care settings. (22)

In the numbers of the *Escherichia coli* genus, there is a slight variation, but the largest percentage is in Al-Diwaniyah Hospital because the source of this sex is of the human intestine. Further the reason is attributed to contamination and lack of concern for personal hygiene or cleanliness of medical tools, in addition to noting the entry of companions beyond the sterile red lines, which in turn conveys any Contamination to the family and thus to the hall.

Bacteria have several resistance mechanisms of antibiotics including the natural resistance responsible for preventing the action of antibiotics through the failure or inability of the antagonist to reach its target. This is due to the structural and anatomical characteristics of the organism that prevent the interaction of the antagonist with the centers of its vital effects (9), and resistance may result. Moreover the chromosomal or plasmid mutations that carry resistance through the jumping genes, which are pieces of the DNA genes that have the ability to move from one site to another is another reason to explain the above point (7). The site on which the antagonist works, and resistance may be the result of building enzymes that work to detoxify the antibiotic (11).

Table (3) The Bacterial Species Isolated from the Hospitals under Study.

no	The Hospital	*Staphylococcus aureus*	*Escherichia coli*	Total	Percentage of smears that gave growth (under study(
1.	Al-Diwaniyah Teaching	24	43	67	33%
2.	Women and children	22	32	54	31.21%
3.	Al- Diwaniyah Private	3	2	5	20.83%
4.	Al-Furat Private	3	6	9	26.47%
5.	Dar alshifa Private	18	10	28	28.86%
6.	Afak	7	9	16	29.62%
7.	Al-Hamza	6	3	9	30%
8.	Al-Shamiaa	9	2	11	35.48%
9.	Department of burns	42	32	74	39.36%

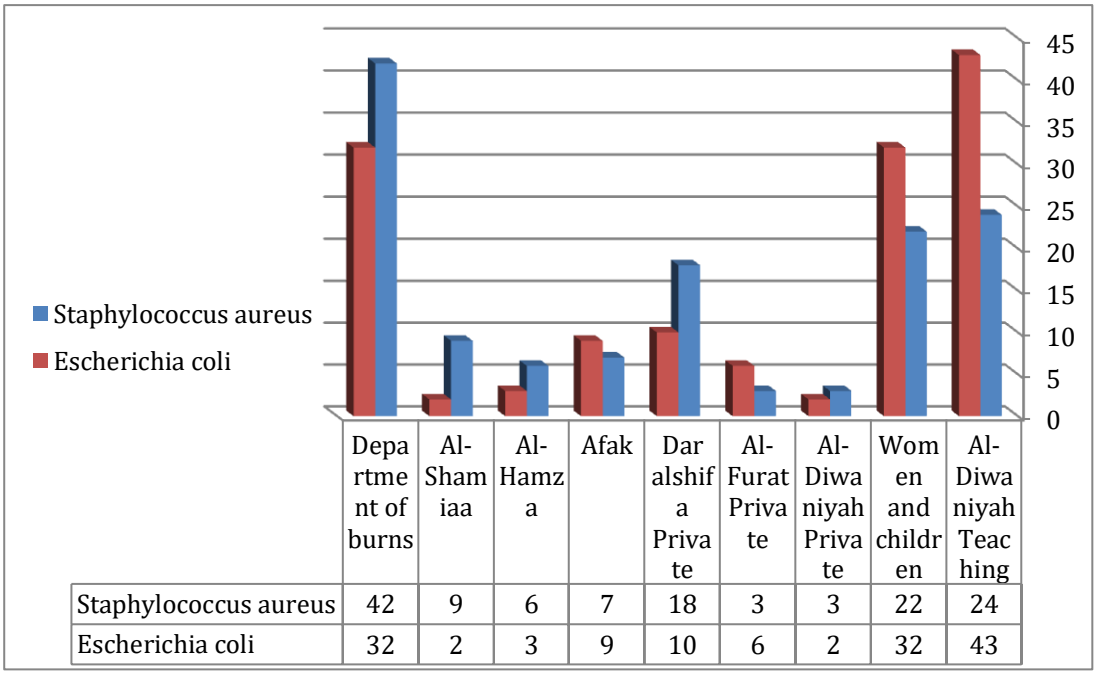

Figure (2) shows the compared of the total positive numbers between two species under the study.

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