

BACTERIOLOGICAL STUDY OF NOSOCOMIAL INFECTIONS CAUSED BY AEROBIC BACTERIA IN HILLA GENERAL HOSPITAL⁺

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Abstract :

280 Samples were collected during the period from March 2007 to July 2007 from different places in Al- Hilla hospitals. 60 samples were collected from operating rooms, 60 samples were collected from burn ward & 60 samples were collected from kitchen and 100 samples from different sites in the hospital including the medical staff , results indicate a contamination rate of 32.85% with a high percentage in the burn ward of 50%.

المستخلص

تم جمع ٢٨٠ نموذج للفترة من شهر آذار ٢٠٠٧ ولغاية شهر تموز ٢٠٠٧ من مختلف الأماكن في المستشفيات التابعة لمدينة الحلة. هذه النماذج تتضمن ٦٠ نموذج من صالة العمليات و ٦٠ نموذج من ردهة الحروق و ٦٠ نموذج من المطابخ و ١٠٠ نموذج من مختلف الأماكن وبضمنها الأطباء والعاملين في الحقل الطبي (ممرض)، وكانت نسبة التلوث البكتيري للنماذج المفحوصة ٣٢,٨٥% وقد سجلت أعلى نسبة تلوث ٥٠% في ردهات الحروق.

Introduction:-

The term hospital acquired infection is applied to any infection causing illness that was not present or in it's incubation period when the subject entered hospital or received treatment in an out patient or accident and emergency departments, it includes not only incidents in which a single microorganisms spreads, or from person to person (cross infection),or from a common source in the hospital but also single and apparently unconnected infections. Nosocomial infections are infections which are a result of treatment in a hospital or a health care service unit [1].

The source of the infecting organism may be exogenous, from another patient or a member of the hospital staff, or from the inanimate environment in the hospital, or it may be endogenous from the patient own flora [2].

The infecting organisms may spontaneously invade the tissues of the patient or be introduced into them by surgical operation instrumental manipulation or nursing procedure , the

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microorganisms are transmitted in hospital by several routes, there are five main routes of transmissions, contact, droplet, air borne, common vehicle and vector borne [3].

In USA it has been estimated that more than 4 millions patients are infected in hospital each year. Nosocomial infections are responsible for about 20000 deaths in USA per year and it costs of nosocomial infections range from \$ 4.5 billion to \$ 11 billion each year [4].

Transmission of pathogens usually occurs via the hands of hospital personnel and via respiratory droplets, other sources of infections include food, drinking water, blood, bed linen and instruments [5].

Infected patients are the primary source of organisms, although asymptomatic carrier may transmit such infection, hand washing before and after contact with each patient is still the most important way to prevent spreading hospital acquired infections [6].

Methods.

Samples collection:

Samples were collected from different sources in the Hilla hospitals from March 2007 to July 2007. The samples were collected by taking swabs according to the method suggested by [7]. Sterile cotton swabs were soaked in sterile normal saline solution and rolled in the test place and were carried to the laboratory within half an hour for bacteriological testing.

Table (1) Source and number of samples collected.

Source	Sites	Number of samples
Operating rooms	Operating bed	10
	Anesthesia masks	10
	Room floor	15
	Surgical instruments	15
	Clothes	10
Total		60
Burns ward	Patient's beds	20
	Room floor	20
	Dressing instruments in kitchen	20
Total		60
Kitchen	Washing basins	15
	Kitchen floor	15
	Food preparing table	15
	Food staff workers	15
Total		60
Additional places		100
Total		280

In this study the samples were collected from different places (table 1). Samples collected from surgical operations include surgical operating bed, anesthesia masks, room floor, surgical instruments and clothes. In burns ward the samples include patient's beds, room floor, dressing instruments in kitchen. The samples collected from kitchen include washing basins, kitchen

floor, food preparing table and from foodstuff workers, and others samples collected from different places from hospital and from staff hospital (doctors and nursing).

Isolation

The samples were cultured aerobically and identification of bacterial isolates was done depending on colonial characteristics and biochemical test according to standards procedures [8].

Results and Dissection:

Table (2) shows that contamination rate was 32.85 % as indicated at each specific site, this result agree with Fraser who reported that contamination rate in hospital was 33% [9].and this result did not agree with [10] who recorded the prevalence rate of hospitalized patients infection were 19 %, 6.7 % and 14 % in France , Italy and Switzerland respectively this may be attributed to many factors including the abuse of disinfectant or even the carelessness throughout it's preparation ,also a high infection rate in burn words was recorded (50 %) , this may be due to the kind of patients which tend to be susceptible to infections because they may display broken skin or mucous membrane (wounds) or patients are immunocompromized [11].

[12] found in there study that tap water which used in dilution of concentrated disinfectants was contaminated by different microbial species including some highly resistant strains of *Acinetobacter*, *Pseudomonas* and *Bacillus* to that disinfectants & these species were able to over multiply in the commonly used concentrations of them.

[13] , [14] found in her study in Baghdad that contamination rate in floors, beds and anesthesial masks were 86.95%, 69.56%, and 47.82%, respectively . The variation in the ratio of infection in hospital may be due to different parameters including age, sex and socioeconomic status or even immunodeficiency due to drugs illness or IR radiation.

Table (3) indicate that contamination by gram negative bacteria represents 73.07% while gram positive bacteria responsible for 26.93%,also it was found that 80 samples gave a growth of one type of bacteria while 12 sample shared two types of bacteria and the reminder samples were sterile it gave no growth (table 4) . These results agree with Ali who reported that gram negative bacteria responsible for 74 % while gram positive bacteria responsible for 26 %. The dominancy of gram negative bacteria in this study was expected due to its capability to resist some low unfavorable and adverse environmental condition [15], only *Staph aureus* was isolated from all gram positive species in a rate of 26.93 % and this may be due to it's high resistance to unfavorable conditions and it's capability to grow at a wide range of pH [16].

A high percentage of contaminated samples were indicated in the burns ward (table 2) and this may be due to patients themselves, or particles capable of being air borne and low hygiene and sanitation conditions in the ward. The result of this study showed that *Staph aureus* was responsible for 26.93% of the contamination rate followed by *Klebsiella* species 22.1%, *Pseudomonas aeruginosa* 19.2%, *E.coli*. 20.19%, *Enterobacter cloacae* 7.69% and *Citrobacter freundii* 3.8% (table 3).

These results were in coordination with other results such as that of [17] who considered that contaminated bath equipment acts as a source of infection by bacteria and the cross infection due to failure of the staff to disinfect their hands is probably the main route of spread of nosocomial infection. Also washing hands frequently is the most important measure to reduce the risk of transmitting microorganisms from one person to another or from one site to another of the same patient , also wearing gloves play an important role in reducing the risk of transmission of microorganisms ,and wearing gloves dose not replace the need for hand washing because gloves may have small ,non apparent defects or may be turn during use , from this conclusion washing hands and wearing gloves play an important role in preventing transmission of microorganisms in hospitals, and the high rate of infection which was noted in this study may be regarded as a result in that most of the hospital staff don't fellow a perfect procedures in washing hands or disinfecting hazard us material [18].

The most important route of transmission of *Staph aureus* to patients is thought to be from healthy carriers, although transmission of methicillin resistant Staphylococci strain between patients has been reported. The major mode of transmission is believed to be by hand contact. Regular microbiological examinations followed by aggressive antibiotic treatment can possibly reduce the prevalence of nosocomial infections [19].

Klebsiella also isolated from different places, this organisms might be transferred from hands, hospital staff, from patients themselves or oven from environment in bath basin to patient's bed and bath room. [20] Mentioned that *klebsiella* species survive on the hand of personnel longer than other gram negative bacteria

Table 5 showed that the number of bacterial genera isolated from operating room, burns ward, kitchen and additional places with a dominance of *Staph aureus* in kitchen (7 isolates) and the additional places(11 isolates), *E.coli* was predominate in operating room(4 isolates) while *klebsiella* species was predominate in burns ward (10 isolates).

The most frequent bacteria in kitchen was *Staph aureus* (7 isolates) which may cause some problems such as food poisoning, it's dominancy is due to the weak sterility procedures employed in the hospital kitchen as well as most of the staff do not wear gloves. [21] Found that contamination rate in operating room and hospital wards were 42.6% and 62.8% respectively. While [22] stated that contamination rate in hospital wards was 6.4 %and these rates are not agreed with ours.

Table (2) Number and percentage of contamination in different sources.

sources	Total samples exam,	Contaminated samples	
		number	percentage
Operating rooms	60	11	18.33%
Burns ward	60	30	50%
Kitchen	60	18	30%
Additional places	100	33	33%
Total	280	92	32.85%

Table (3) Number and percentage of bacterial contamination detected in all samples collected.

bacteria	Number	percentage
Gram positive		
<i>Staph. aureus</i>	28	26.93%
Gram negative		
<i>Klebsiella spp</i>	23	22.1%
<i>Pseudomonas aeruginosa</i>	20	19.2%
<i>E.coli</i>	21	20.19%
<i>Enterobacter cloacae</i>	8	7.69%
<i>Citrobacter freundii</i>	4	3.84%
Total Gram negative	76	73.07%
Total	104	100%

Table (4)Frequency of isolation of bacterial isolates from all samples

Type of contamination	Number	percentage
Single contaminated	80	28.57
Mixed contaminated	12	4.28
Total	92	32.85
No growth	188	67.15
Total	280	100

Table(5) Number of bacterial species isolated from sample collected from sources

Bacteria species	Number of isolated strains isolated from				Total
	kitchen	additional places	operation room	burn ward	
<i>Staphylococcus. aureus</i>	7	11	2	8	28
<i>Klebsiella spp.</i>	2	9	2	10	23
<i>Pseudomonas aeruginosa</i>	4	6	3	7	20
<i>E.coli</i>	3	9	4	5	21
<i>Citrobacter freandii</i>	2	1	1	-	4
<i>Enterobacter cloacae</i>	2	2	1	3	8
Total	20	38	13	33	104

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