ORIGINAL ARTICLE

Isolation of Pathogenic Bacteria from Equipment of the Care Units, Hands and Mobile Devices for Medical Staff in Educational Al-Hussein Hospital

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ABSTRACT

Bacterial contamination of intensive care units is of medical concern because it is one of the large risk factors of ICU -acquired infections and centre point of multi-drug resistant pathogens . Cell phones are important source of the microbial transmission as human pathogens also may be cause increased risk for incidence of bacterial infections as well as natural microbiota of human skin .The aim of this study to isolate and diagnose bacteria from intensive care units and mobile devices for medical staff in these units at Educational Al -Hussein Hospital In the city of Nasiriyah.

Collection of samples from teaching Al-Hussein hospital, the number of samples 100 distributed Between Swabs of mobiles(30) teaching Al-Hussein hospital medical staffs and (50) from hands of nursing and worker and Technicians and doctor Stethoscope also collecting samples(20) swab from department of ICU (Intensive care unit),CCU (Critical care unit), RCU (Respiratory care unit) collect the samples from medical equipment in care unit (ECG (Electro cardio graph), DC- Shock, Suction Device (sucker) , Monitor Device and Ventilator Device)analyzed by standard Bacteriological methods.

The frequency pathogenic bacteria obtained in clinical isolates from the sections was 60 out of 20 swab. The maximum frequency of E. coli is 15 isolates by (25)%, most of them in Ventilator Device, The lowest frequency was for Staphylococcus epidermitis with 3 isolates by (5)%, mostly in Suction unit(sucker)and The positive culture was (32) which is more than negative culture(18) out of 50 swabs, But higher positive culture found in a stethoscope with 8 isolates (25)% followed by in hands of technician , Workers , with 7 isolates (21.8)% Respectively as well as highest number and percentage of bacterial contaminated on phone of medical and health staffs were E.coli, Enterococcus faecalis(16.3) % Respectively followed by Staphylococci aureus (14.5%), and Klebsiella pneumonia (12.7%) .bacterial cultures found at higher rate among age groups (31-40) years by 56.3%. But the female showed higher rate of bacterial cultures compares to males by 56.2% .

Keywords: intensive care units(ICU) , Bacterial contamination , E.coli , Hospital

INTRODUCTION

Intensive care unit is important part of effective health care service that provides care of resuscitating, management and monitoring of life-threatening cases. Clinical activities in the unit include high antibiotic exposure , surgical and mechanical manipulation, long hospitalization favoring emergence of multidrug resistant bacterial strains and rapid spread, and high morbidity and mortality rate, [1, 2]. Bacterial contamination of the unit is one of the great factors responsible for high incidence of ICU associated infection which accounts increased incidence of nosocomial infections, responsible for 40% of ICU admission[3].

Hospital-acquired infections known as healthcare-associated infections are nosocomially acquired infections ,These infections include central associated bloodstream infections, catheter-associated UTI , surgical site infections, hospital-acquired pneumonia, ventilator-aquired pneumonia, and Clostridium difficile infections.The risk of hospital-acquired infection is dependent on the patient's immune , infection control, and the prevalence of the various pathogens in the local community. Risk factors for hospital-acquired infections include,

mechanical ventilatory support, indwelling devices and stay in a critical care unit with an increased risk of hospital-acquired infections.

Contamination occurs by cross-transmission and spread, occupancy density, use of medical equipment for multiple patient like stethoscope, gowns and clothing [4,5] , colonized health care worker/patient their accessories and specimens [6]. Non maintain of health care worker to simple standard procedure of hand washing, contribute to the spread of pathogens, and cross-transmission during contact with patient or contaminated surfaces [7,8].

also source of contamination is colonized and infected health care worker and patients in which the pathogens and recovered from the immediate environment of the patient [9,10], while the dispersion depends on type of organism, source and contamination with the surface, humidity level and size of suspention [5,11] .Wide range of bacterial pathogens have been implicated in ICU contamination, includes Staph.aureus, coagulase negative staphylococci, Enterobactericiae and Enterococci, as failure in these basic procedure tends to increase the spread these pathogens within the units and hospital location.

Now mobile phones have become an inevitable part of our lives. Their number per capita is often much larger than the community of a country [12] Using phones in hospitals can lead to improved quality of health care, especially in terms of faster communication in emergency within hospital departments [13].However, with all the benefits that mobile phone offer, their role in microorganism transmission has to be emphasized as well [14]. While working with patients and touching their mobile phones, health care workers can easily transmit microorganisms from patients to their mobile phones and vice versa.

Combination of constant handling with the heat generated by the mobile phones can create breeding ground for many microorganisms [15] .Researchers reported different kinds of isolated microorganisms from the surface of mobile phones. In some cases those microorganisms belong to the normal skin flora, but researchers have also isolated and given attention to microorganisms which can cause nosocomial infections [16].

The ICU cares for patients who sevital functions are at risk, patients are connected to various tubes and the entry of pathogens is very pronounced and easily enabled , such patients are extremely sensitive to be infected by microorganisms that can be transmitted, not only from any of the objects connected to the patient but also from mobile phones of HCWs [18], it is necessary to examine whether the HCWs in ICU clean their mobile phones, how often and what microorganisms can be found on the surface. It is expected from HCWs who work in the intensive care unit to pay special attention to hand hygiene before and after using mobile phones [19,20].Nevertheless, medical students, who are participating in the work of the clinic, could transmit microorganisms, causes of nosocomial infections through their mobile phones maybe even more often [21].The aim of this study to isolate and diagnose bacteria from intensive care units and mobile devices for medical staff in these units at Educational Al -Hussein Hospital In the city of Nasiriyah.

METHODS

Collection of Samples: We take samples from teaching Al-Hussein hospital, the number of samples 100 distributed Between Swabs of

mobiles(30)teaching Al-Hussein hospital medical staffs and (50) from hands of nursing and worker and Technicians and doctor Stethoscope also collecting samples(20) swab from department of ICU (Intensive care unit),CCU (Critical care unit), RCU (Respiratory care unit),(fractions dept and X-Ray dept) collect the samples from medical equipment in care unit (ECG (Electro cardio graph), DC- Shock, Suction Device (sucker) , Monitor Device and Ventilator Device) .After obtaining the legal approval to take the samples by taking an important facilitation book entitled from the Faculty of Sciences, Thi-qar University toTeaching Al Hussein Hospital.

Method: This study was conducted at Al-Husain teaching hospital in Thi-qar . eighty swabs were obtained from mobile phones of medical and health staff and medical equipment of care unit . The sterile cotton swab moistened by the sterile normal saline had been rolled over the area of outer surfaces of mobile phone (included buttons ; lateral and back side of phone and areas that most contact with fingers) .and from the surface of medical equipment of care unit and hands of nursing ,workers ,Technicians and Stethoscope of doctors. also from ICU,CCU, RCU, fractions dept , X-Ray dept , ECG, DC- Shock, Suction Device (sucker) , Monitor Device and Ventilator Device.

Then inoculated on MacConkey agar , blood agar and mannitol agar then incubated at 37°C for (24-48) hours, after then the bacterial growth was diagnosis and identified by routine standard of bacteriological technique (based on bacterial morphology, gram-stained and IMVIC test and biochemical test [22,23] .

RESULT

In our current study, 100 swabs were distributed between 20 swabs to isolate the bacteria from the units and the intensive care equipment and 50 swabs from Doctors Stethoscope and the hands of the medical staff and also 30 swabs from mobile devices for Medical staff at Educational Al Hussein Hospital

Table 1: The frequency pathogenic bacteria obtained in clinical isolates from the sections Out of 20 swabs

Type of bacteria	Section	Number of isolated	Frequency (Percent)
Escherichia coli	ICU	4	25%
	CCU	0	
	RCU	3	
	Ventilator Device	8	
Klebsiella pneumonia	Suction unit(sucker)	6	21.6%
	DC-Shock	4	
	ECG	3	
Enterobacteraerogenus	RCU	0	21.6%
	Ventilator Device	5	
	Suction unit(sucker)	7	
	ECG	1	
Enterococcus faecalis	Suction unit(sucker)	4	13.3%
	ECG	1	
	ICU	2	
	Patient monitor	1	
Staphlococcusepidermitis	Suction unit(sucker)	3	5%
	ICU	0	
	CCU	0	
Staph.aureus	Suction unit(sucker)	5	13.3%
	Surgery	2	
	Patient monitor	1	
total		60	100 %

In Table 1, the number of isolates was 60 out of 20 swab. The maximum frequency of E. coli is 15 isolates by (25)%, most of them in Ventilator Device, The lowest frequency was for Staphlococcus epidermitis with 3 isolates by (5)%, mostly in Suction unit(sucker).

Table 2 The positive culture of Doctors Stethoscope and medical staff hands was 32 out of 50 swabs, most of which had a stethoscope with 8 isolates (25)%and the lowest in the pharmacists with 4 isolates by(12.5)%

Table 2: percentages of bacteria culture isolated from Doctors Stethoscope and the hands ofmedical and health staffs, Out of 50 swabs

Medical/health	Positive culture		Negative culture	
	No	%	No	%
Doctors Stethoscope	8	25	2	11.1
Nurses	6	18.8	4	22.2
Technicians	7	21.8	3	16.6
Workers	7	21.8	3	16.6
Pharmacists	4	12.5	6	33.3
Total	32	100	18	100

Table 3 Frequency of bacteria in mobile devices for the medical staff, isolated 55 isolates out of 30 swabs and the highest frequency was E. coli and staphylococcus epidermitis with 9 isolates by (16.3)% for both Proteus mirabilis and Staphyococcus epidermitis had the lowest frequency with 3 isolates by(5.5)% respectively

Table 3: Types and percentages of bacteria isolated from mobile phone of medical and health staffs,Out of 30 swabs

Bacterial isolation	No	%
Bacillus spp.	5	9.1
E.coli	9	16.3
Staph.aureus	8	14.5
Klebsiella pneumonia	7	12.7
Enterococcusfaecalis	9	16.3
Proteus mirabilis	3	5.5
Staphylococcus epidermitis	3	5.5
Enterobacteraerugenes	4	7.2
Pseudomonas aeruginosa	7	12.7
Total	55	100

Table 4 shows the distribution of positive isolates by age and sex ,It was noted that the most frequent in the age group (31-40) with 18 isolate by(56.3)% and the majority of women with 18 isolate by (56.2)% out of 32 isolation.

Table 4: Distribution of bacterial cultures isolate From the hands according to age and gender of medical and health staff , out of 50 swabs

Age groups (years)	Bacterial culture	percentage
25 -30	7	21.9
31-40	18	56.3
41-50	4	12.5
≥51	3	9.4
total	32	100
Gender		
male	14	43.8
female	18	56.2
total	32	100

DISCUSSION

Bacterial contamination of ICU is the great factor responsible for increased state of nosocomial infections, with consequential effect on patient and hospital management [24]. The findings of this study is of importance to the hospital infection control and prevention unit as it had given overview of the degree of hygiene, indoor air quality and evaluation of units personnel to adherence to standard infection control.

Apart the bacterial contamination rate, the recovery of clinically pathogens from routinely used equipments and crucial area is of serious concern because of their clinical effect. the bacterial contamination rate recorded in both units ICU ,ventillater

and sucker with 60 isolate out of 20 swab may be due to some obvious reasons, as high number of patient with different clinical state are admitted frequently for clinical attention and evaluation.

This clinical practice requires the frequent presence and attention of health care worker, thus increasing the unit density, traffic and human activities [25]. Different contamination rate had been reported in some other studies, in Maiduguri, Nigeria, 62.5% and 26.9% was reported adult ICU [26] 67.8% in NICU in Ilorin . [27], 17.8% in Iraq [28].

This study showed the present of bacteria around the devices inside the units such as sucker device and the ventilator and DC-Shock structural design that allows frequency in the entry and ventilation system [29]. contamination rate was recovered from inanimate surfaces in medical units Reasons for this contamination rate may be attributable to several factors, firstly the hand of health care workers and strict adherence to simple hand hygiene, as it acts as vector for cross-transmission, colonized, and ineffective cleaning procedure of contaminated inanimate surfaces, [30]. In addition , the studies showed positive culture of Doctors Stethoscope and medical staff hands was 32 out of 50 swabs, most of which had a stethoscope with 8 isolates (25)% . Our results in agreement with study of (Kokate ,2012)which showed that doctors and others medical staff who working in operating units and intensive care units (ICUs) are highly exposed to pathogenic microorganisms. [31]

Mobile phones which used by medical staffs and health workers play important role in spread the pathogenic microorganisms [31] and these pathogenic organisms can be causing drug resistant and causing difficult to treatment [32] Results of current study appeared that , highest frequency was E. coli and Staphylococcus epidermitis with 9 isolates by (16.3)% for both because coagulase-negative staphylococci (CONs) are main component of the mucosal microbiota and normal skin ,that responsible for the catheter and other medical device related the infections [33] Escerchia coli constitute about (0.1%) of gut flora , and fecal oral transmission is the great route through which pathogenic strains of the bacterium that causing infections, the presence E. coli in the mobile phones suggested faecal contamination of phones, which can result in acquired infections . As well as the Staphylococcus aureus consider as micro biota of the skin could be transferred via mobile phone by contact or by hand to hand [34] study accept with Selim and Abaza , 2015 showed all mobile phones of medical staff were contaminated (100%) by mixed bacterial isolate or by single bacterial isolate, and high percentage of bacterial contaminants were methicillin resistant S. aureus (MRSA) and coagulase-negative staphylococci (CONS) [35]

Bacillus.Spp found a moderate rate of 5 isolates out of 55 isolates giving its greater ability the colonization and spores ability to resist changes of environmental. As well as some Bacillus spp. as Bacillus cereus as normal flora of the vegetables ; water and cooked food that causing food poisoning and opportunistic infections in the immune compromised patients [36]

showed 9 various types of bacterial organisms from cell phones as S. aureus; coagulase-negative Staphylococcus (CONs); Enterococcus. fecalis; Pseudomonas aeruginosa; E.col i; Enteriobacter aerugenes; Klebsiella pneumonia Proteus mirabilis and Bacillus.Spp. the studies indicate that increasing the prevalence of bacterial isolate isolated from mobile phones of medical staff were attributed to the sanitary practices and poor hygienic [37] .As the study groups never washing the hands after using mobile phone [38].

results of this study showed that bacterial cultures were found in female medical and health staffs hand (56.2)% more than males (43.8)%this disagree with results of Auhim, 2013 who showed that , the rate of bacterial contamination of mobile phones of male (85%) was more than in female (80%) .[39]

most frequent in the age group (31-40) with 18 isolate by(56.3)% moderate ratio Do not agree to studies of Ulgeret al.,(2009) showed that 94.5% of cell phones used by healthcare workers were bacterial contaminated and differences bacterial species which isolated from the mobiles surface of workers may be attributed to the changing in properties of skin of the mobile users, that appear with increase the age [40].

CONCLUSION

1 higher positive culture isolated from Doctors Stethoscope and the hands of medical and health staffs include Technicians and workers

2 The rate of bacterial contamination is high in intensive care units and includes inanimate device from ventilator , sucker , ECG ,DC-Shock , RCU

3 higher bacterial contaminated on phone of medical staff were Enterococcus faecalis and E.coli followed by Staphylococcus aureus

4 More isolates are bacteria in the age group (31-40). And more frequently in female from male.

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