ORIGINAL ARTICLE

Frequency of Bacterial Contamination on Telephonic Devices in hospital setting

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ABSTRACT

Aim: To determine the frequency of bacterial contamination on telephonic devices.
Place and duration of study: This descriptive study was carried out in The Children's Hospital, Lahore from July to December 2014.
Method: A total of 110 swab samples were taken from telephonic devices. Sterile swabs were used for sample collection. The swabs were dampened in TSB (tryptic soya broth) and rotated on telephonic keypads, sides, mouth pieces as well as ear pieces of telephonic devices. These swabs were transported to the Microbiology department for further processing. The organisms were identified by routine lab techniques and biochemical tests.
Results: A total of 72 micro organisms were isolated, among which 64 were Gram positive bacteria while 8 were Gram negative bacteria. Coagulase negative *Staphylococci* were the most commonly isolated bacteria from both cell phones and landlines.
Conclusion: Telephonic devices present in hospital settings are heavily contaminated with various pathogens, which are responsible for the transmission of nosocomial infections. In order to reduce microbial contamination in these areas, there should be an increased focus on regular cleaning of mobile phones as well as landline phones used by health care professionals with alcohol. It is also advised that there should be proper "hand washing" after each use of telephones.
Keywords: Bacterial contamination, contamination of telephonic devices, bacteria on mobile phones

INTRODUCTION

The word "nosocomial" is a combination of two Greek words, "nosus" (disease) and "komeion" (to take care of). Hence, "nosocomial" applies to any disease contracted by a patient while under medical care. A nosocomial infection is the one which occurs only after 48 hours of hospital admission, 3 days after hospital discharge or 30 days of surgery. Majority of the nosocomial pathogens are resistant to antibiotics[1].

The contaminated hands and inanimate objects such as thermometers, stethoscopes and toys may be a source nosocomial infection in ICUs[2]. *Staphylococcus saprophyticus*, *Staphylococcus aureus, Pseudomonas aeruginosa* and *Serratia* species are transferred in greater number than *Escherichia coli* from contaminated fabric to clean fabric after hand contact[3].

Telephones are one of the devices which may contribute to transmission of nosocomial infections. These are available throughout the hospital and most health care staff and patients use them frequently. Contaminated hospitals devices and instruments including telephones may contribute to the propagation of infection. Infectious microorganisms may be transmitted to the telephonic devices from patients and by the health care staff who use them frequently.

Investigators have reported that telephones, intercoms, bedpan and flusher handles may be contaminated with potentially pathogenic bacteria. Bacteria on mobile phones of hospital staff are different in composition, number and antibiotic susceptibility, from cell phones of non-health care worker. Mobile phones are vital accessories that serve as a reservoir of bacteria[4].

The skin is always colonized with the environmental microflora. The heat generated by mobile phones favours the growth of environmental bacteria present on our skin[5].

The cell phones are one of the barriers in the implementation of infection control practices. The bacteria can transfer from hands to mouth during routines activities[6]. Hand washing is infrequently performed despite recommendations. Many people use personal mobile phones while performing their duties, due to which microbial transmission is possible[7]. The aim of the present study was to determine the bacterial contamination of various telephonic devices.

METHODOLOGY

This study was done in the Microbiology Department of The Children's Hospital Lahore, for a period of six

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months (July to December 2014) to evaluate the bacterial contamination on telephonic devices (both landline and cell phones). A total of 110 sterile swabs were used for sample collection. The swabs were dampened in TSB (tryptic soya broth) and rotated on the keypads, sides, mouth pieces and ear pieces of telephonic devices. These swabs were shifted to Microbiology Laboratory for further processing. The swabs were cultured on Blood, MacConkey and Chocolate agar plates. The organisms were identified on the basis of colony morphology, growth characteristics and biochemical reactions.

RESULTS

Telephonic devices including landlines and cell phones from doctors, staff nurses and related disciplines of health care workers from different wards were included in this study. The frequency of different categories in the present study included Doctors 41.8% (46 samples), Staff Nurses 36 samples (32.7%) and related health care workers 25.5% (28 samples) (Table I). Out of 110 samples, 44 were landlines and 66 were cell phones (Table II). The isolated organisms were coagulase negative *Staphylococci* 54 (49.1%), Oxacillin Resistant *Staphylococcus aureus* 6 (5.5%), Oxacillin Sensitive *Staphylococcus aureus* 3 (2.7%), *E.coli* 2 (1.8%), *Pseudomonas* spp. 2 (1.8%), *Acinetobacter* spp. 2 (1.8%), *Serratia* spp. 2 (1.8%) and *Bacillus* spp. 1 (0.9%) (Figure I). Gram positive bacteria isolated were 58.2% while 7.2% were Gram negative bacteria. Coagulase negative *Staphylococci* were the most commonly isolated Gram positive bacteria from both the cell phones as well as landlines (Table III). It was also observed that almost all devices were heavily contaminated with mixed growth of both Gram positive and Gram negative organisms.

Fig. I: Frequency of organisms isolated from telephonic devices

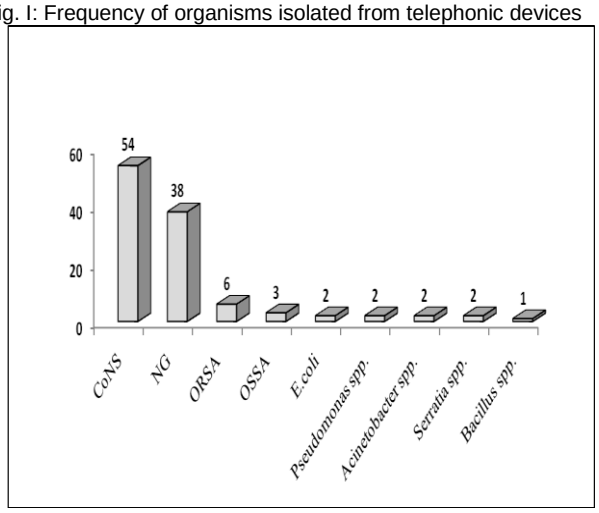

Table I: Frequency of different categories of personals in the study (n=110)

	Frequency	% age
Doctors	46	41.8
Staff Nurses	36	32.7
Health care workers	28	25.5

Table II: Frequency of different categories of personals in the study (n=110)

	Frequency	% age
Land line phones	44	40
Cell phones	66	60

Table III: Frequency of various organisms isolated from telephonic devices

Organisms	Telephonic devices		Total
	Landline	Cell phones	
Coagulase Negative Staphylococci	22(40.7%)	32(59.2%)	54(100%)
No growth	15(39.4%)	23(60.5%)	38(100%)
Oxacillin Resistant Staphylococcus aureus	2(33.3%)	4(66.6%)	6(100%)
Oxacillin Sensitive Staphylococcus aureus	2(66.6%)	1(33.3%)	3(100%)
E.coli	1(50%)	1(50%)	2(100%)
Pseudomonas spp.	1(50%)	1(50%)	2(100%)
Acinetobacter spp.	1(50%)	1(50%)	2(100%)
Serratia spp.	0(0%)	2(100%)	2(100%)
Bacillus spp.	0(0%)	1(100%)	1(100%)

DISCUSSION

The present study was conducted to determine the surveillance of various infectious agents on telephonic devices in different wards of The Children's Hospital Lahore, Pakistan. In the present study 65.4% of the 110 sampled telephonic devices were found to be contaminated with various microorganisms. A total of 72 samples were positive for growth, while no growth was observed in 38 samples. Gram positive bacteria were 58.2% (64 out of 110 samples) while Gram negative bacteria were 7.2% (8 out of 110 samples). Among the Gram positive bacteria the incidence of Coagulase negative *Staphylococci* was 49.1% (54 out of 110 samples), Oxacillin Resistant *Staphylococcus aureus* 5.5% (6 out of 110 samples), *Bacillus spp.* 0.9% (1 out of 110 samples) and Oxacillin Sensitive *Staphylococcus aureus* was 2.7% (3 out of 110 samples). Similarly the incidence of Gram negative bacteria were *E.coli* 2 (1.8%), *Pseudomonas* spp. 2 (1.8%), *Acinetobacter* spp. 2(1.8%) and *Serratia* spp. 2(1.8%). The prevalence of CoNS was predominant among Gram

positive bacteria. There were 46 (41.8%) telephonic devices frequently used by doctors contaminated by bacteria. These were followed by telephonic devices commonly used by staff nurses 36 (32.7%) and other health care worker staff 28(25.5%).

A research carried out at Mangalore, India reported 201 mobile phones contaminated with bacteria out of 204 mobile phones. The bacterial load included *Staphylococcus*, *Escherichia coli* and *Enterobacter* spp[8-9]. Such organisms were also isolated in our study.

A study carried out in an Italian teaching hospital evaluated the environmental contaminants in hospital settings and saw the progress in disinfecting techniques. Swab samples were taken from 37 telephone handsets and 27 computer keyboards and 35 stethoscopes. *Staphylococci* and coliforms were the most commonly isolated bacteria[10-11].

Another study conducted to assess the bacterial contamination and resistance to commonly used antimicrobials on healthcare worker's mobile phones in teaching hospitals in Kerman, Iran, revealed *Staphylococcus epidermidis* as the most commonly isolated organism. This was followed by *Staphylococcus aureus*, *Bacillus subtilis*, *Klebsiella pneumoniae* and *Enterococcus* species[12].

In Government Hospital Mandya, in the state of Karnataka, India a study was conducted on bacteriological screening of hands and mobile phones of healthcare workers and its management working in various departments. Samples were collected and analyzed. The isolated organisms on mobile phones were *Staphylococcus aureus*, *Streptococcus* spp. and *Bacillus* species[13-14].

CONCLUSION

In a hospital, the environment is contaminated with a variety of pathogenic microorganisms. These are mainly responsible for the transmission of nosocomial infections.

Limitations: Non-health care workers were omitted from the study. No disinfectant was used in the study. Only the prevalence of microbes on telephonic devices-landlines and cell phones was observed.

Suggestions: There should be an increase focus on routine decontamination of mobile phones, as well as landline telephone sets to reduce the spread of nosocomial infections. Bacterial contamination can be decreased, by proper "hand washing" after each use of the cell phone or landline telephone set.

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