BUGGED MOBILE PHONES OF HEALTH CARE PROVIDERS COULD TRANSMIT MORE THAN JUST A CALL

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ABSTRACT

Objective: To evaluate contamination of mobile phones from healthcare workers with nosocomial pathogens.
Study Design: Cross sectional study.
Place and Duration of Study: Microbiology Section, Pathology Department, Allama Iqbal Medical College, Jinnah Hospital Lahore, from Jul 2016 to Feb 2017.
Material and Methods: A total of 257 culture swabs were collected from the mobile phones of HCWs of Jinnah Hospital, Lahore, every samples was processed for bacterial culture following standard protocols. Organisms were identified by colonial morphology, gram staining, and with the help of API 20NE and API 20E.
Results: Out of 257 mobile phones, 66% (n=169) were contaminated with any 01/>01 bacteria. Most prominent pathogen isolated was coagulase negative staphyloccoi (CoNS) followed by Staphylococcus aureus 34.8% and 24% respectively. Other microorganisms identified, were Acinetobacter species (12.6%) n=29, Bacillus species 10.4% (n=24), Enterococcus species 4.8% (n=11), Escherichia coli 3.5% (n=8), Micrococcus species 3.5% (n=8), Diphtheroids 2.5% (n=5) Klebsiella species 1.7% (n=4), Aspergillus species 1.7% (n=4) and Pseudomonas aeruginosa 1.0% (n=2.0). Out of 55 Staphylococcus aureus, Methicillin-resistant Staphylococcus aureus (MRSA) were 36.0% (n=20) and methicillin-sensitive Staphylococcus aureus (MSSA) were 64.0% (n=35).
Conclusion: In the hospital setting mobile phones should be regularly decontaminated. Moreover, utmost emphasis needs to be paid to hand washing practices among HCWs.

Keywords: Contamination, Healthcare workers, Mobile phones.

INTRODUCTION

Mobile phones (MPs) being extensive development are very fast communication devices, based on wireless media technology are becoming a fixture of modern life. Since 1982 they have become an essential accessory to social and professional life. In a hospital setting, it contributes alot for active communications[1,2]. It facilitates management as well as healthcare professionals in multiple ways like laboratory reports, imaging results, patient data, and photographic images can be viewed via cell phones.

Mobile phones harbor more microorganisms than a toilet seat; Tens of thousands of micro-organisms are present on each square inch of mobile surface. Therefore present study was planned. In health care settings frequently used items (medical instruments like stethoscopes and other accessories such as MPs) are serving as reservoirs for micro-organisms. Infections can transmit to the hands of healthcare workers and then to patients by these items[3].

The hazards of MPs are unintentionally overlooked in front of its benefits[4]. Like it may contribute to transmission of nosocomial infec-tions. These are available throughout the hospital and most health care staff and patients use them frequently. It is reported that pathogenic bacteria are present in approximately 40% of mobile phones belonging to patients in a hospital, and on approximately 20% of mobile phones belonging to hospital staff[5].

We often carry mobile phones in our pockets and hold with clean or dirty hands. The chances of transfer of microorganisms increases leading to nosocomial infections. (Any infection carried by the patient under medical care)[6]. Therefore now

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the days MPs have become a major health care related hazard.

With the continual use of MPs by HCWs, patients, and visitors, make them an open place for the transmission of microorganisms. Our palm and moist skin provide a good environment for the breeding of microorganisms[7]. Doctors and health care staff working in ICUs are more prone to be a carrier of fatal micro-organisms. Mobile phones used by HCWs in these premises often become carriers and may serve as vectors to spread microorganisms[8]. Infections can transmit to the hands of healthcare workers and then to patients by these items. Examples of these objects include medical instruments like stethoscopes and other accessories such as cell phones[3].

The discussion on the limitation of mobile phone use in clinical settings has reached to an end, but the potential role of cell phones in spreading infections remains under intense debate. Different studies have described the contamination of clinician's mobile phones in healthcare settings and reported a level of contamination and type of microbe that depend on the clinical and geographical setting[9]. Therefore present study was carried out to evaluate contamination of mobile phones from health care workers with nosocomial pathogens.

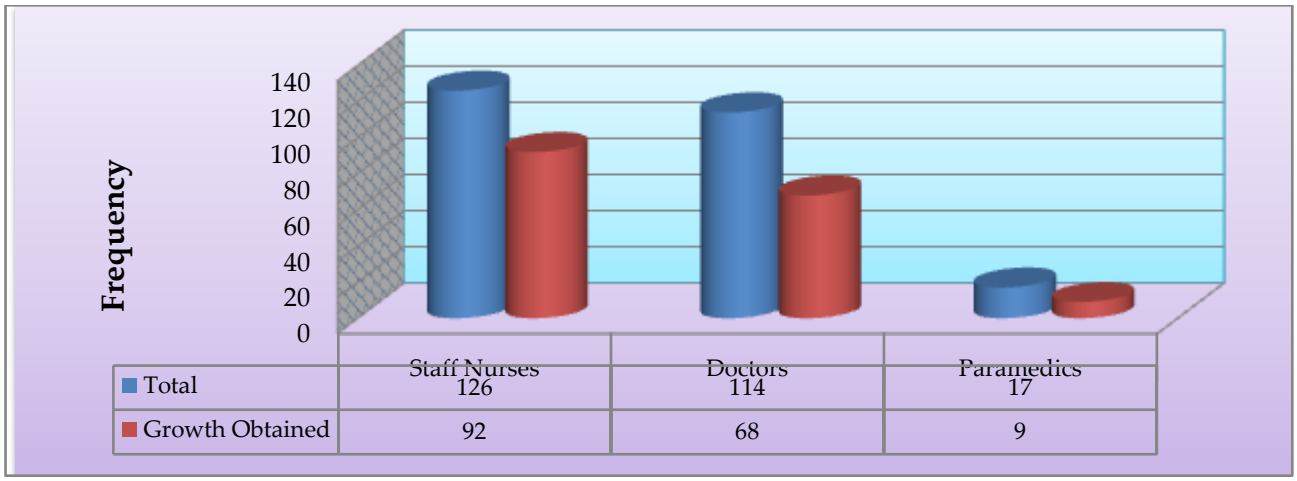

Figure-1: Frequency of contaminated mobile phones according to owners of 257 tested mobiles.

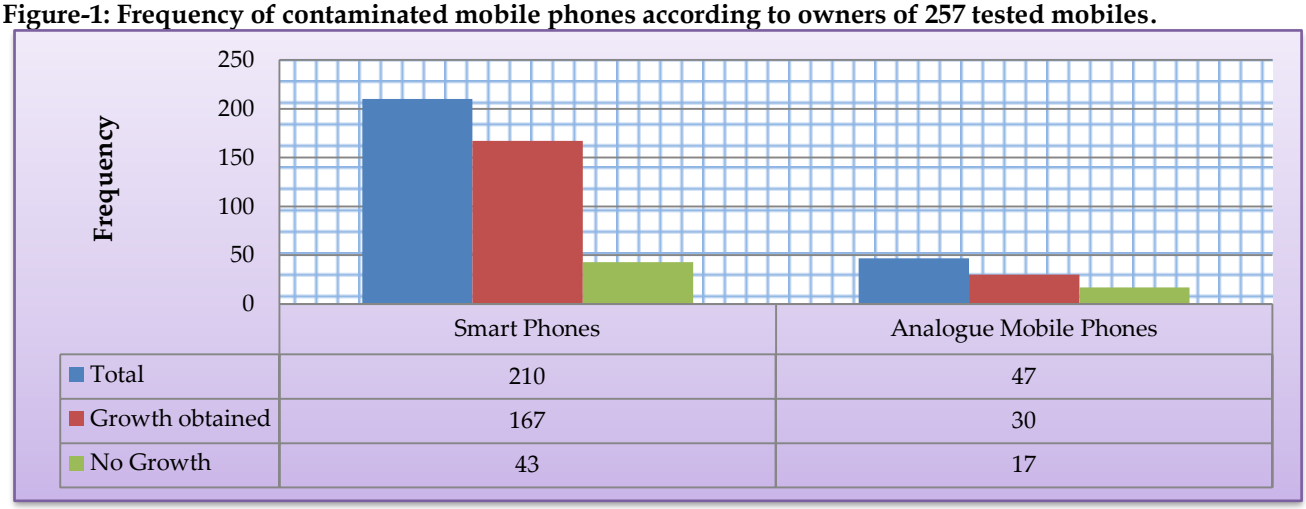

Figure-2: Frequency of contamination based comparison between smart and analogue mobile phones.

MATERIAL AND METHODS

This cross-sectional study was conducted in in Microbiology section, Pathology department of Allama Iqbal Medical College/ Jinnah Hospital, Lahore, Pakistan, from July 2016 to February

2017. Non-probability consecutive sampling technique was used and 257 samples were collected from mobile phones of HCWs who volunteered and verbally consented, from the different departments of Jinnah hospital. Inclusion criteria include all age groups, both genders, health care worker of JHL while exclusion criteria was Healthcare workers not willing to participate in the study and HCWs already having a pre-existing skin infection.

For sample collection, sterile cotton swabs moistened with sterile normal saline were rotated over the surfaces of the mobile phone on both sides. Every sample was streaked on 5% sheep blood agar and MacConkey agar plate within 30 minutes of collection. The plates were incubated aerobically at 37°C for 24-48 hours. For appropriate bacterial identification Gram stain, biochemical tests, (Catalase test, Oxidase test, Coagulase test, DNase test) and other Biochemical test, under the supervision of Microbiologist and Medical Laboratory Technologist were applied.

Data Analysis

Data was entered and analyzed by using SPS version 21. Descriptive statistics like frequency and percentages were calculated for all variables.

RESULTS

Among 257 study participant, nurses, doctors and paramedics were 49%, 44% and 7% respectively. From these 66% yield positive cultures. Mobile phones of staff nurses were more contaminant 73% as compare to doctors 59% and paramedics 52% (fig-1).

MPs category wise distribution showed a maximum rate of culture positivity 79.5% among smartphones while 63.8% analog phones were also contaminated (fig-2).

Maximum MPs showed growth of single organism 44% while two organisim were found in 20% and more than two organisms were also observed in many MPs. Coagulase negative *Staphylococcus aureus* (CoNS) followed by *Staphylococcus aureus* were predominant isolates on mobile phones, 34% and 24% of all mobile phones, respectively. Other micro-organisms identified, were Acinetobacter species 12%, Bacillus species 10%, Enterococcus species 5%, Escherichia coli 3%, Micrococcus species 3%, Diphtheroids 2%, Klebsiella species 2%, Aspergillus species 2% and Pseudomonas aeruginosa 1% (fig-3).

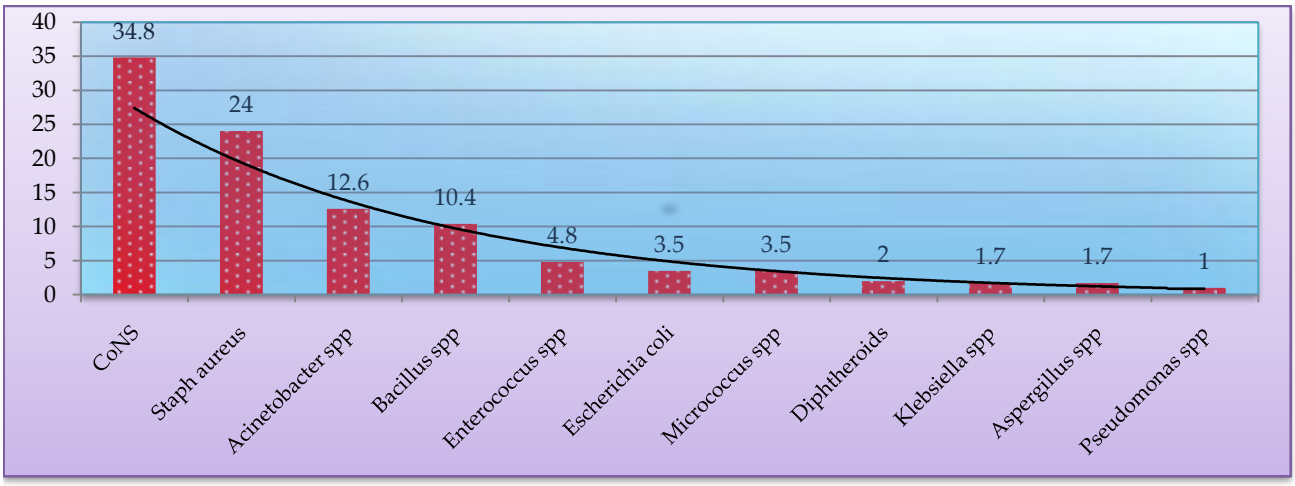

Figure-3: Percentage of different isolates obtained from mobile phones (n=257).

Out of total 55 *Staphylococcus aureus*, Methicillin-resistant *Staphylococcus aureus* (MRSA) were 36% and methicillin-sensitive *Staphylococcus aureus* (MSSA) were 64% (fig-4).

A maximum number of positive caltures were observed in the MPs of HCWs from surgical ward followed by dermatology and minimum number observed in eye wards and orthopedics (table).

DISCUSSION

Inspite of solid steps taken to overcome the burden of Healthcare-associated infections (HCAI), still it is significant health care dilemma around the globel, which might be credited to behavior of HCWs and our poor infection control strategies.

Tens of thousands of microorganisms are present on each square inch of mobile surface. According to a report from daily mail UK, it is stated that MPs harbor more micro-organisms than toilet seat[10]. The assessed number of bacteria found on the hands of healthcare workers (HCWs) ranges between 3.9 x 10^4 and 4.6 x 10^6 bacteria/cm^2. This number increases with expanding term of performed clinical procedures, at a rate of 16 cells per minute[11].

The present study reported that bacterial growth was obtained from 66% samples, similar to previous studies conducted by Kokate *et al* from India in 2012 reported that 60% MPs of HCWs were colonized[8].

The frequency of bacterial isolates in present study was as followed CoNS 34.8% and *Staphylococcus aureus* 24.0% were predominant isolates from mobile phones culture. Other include Acinetobacter species 12.6%, Bacillus species 10.4%, Enterococcus species 4.8%, Escherichia coli 3.5%, Micrococcus species 3.5%, Diphtheroids 2.0%, Klebsiella species 1.7%, Aspergillus species 1.7% and Pseudomonas aeruginosa 1.0%. Out of total 55 Staphylococcus aureus, MRSA and MSSA were 36% and 64% respectively. While Kokate *et al* reported CoNS 71.8% followed by Diphtheroids 21.8%, Aspergillus niger 6.2%[8].

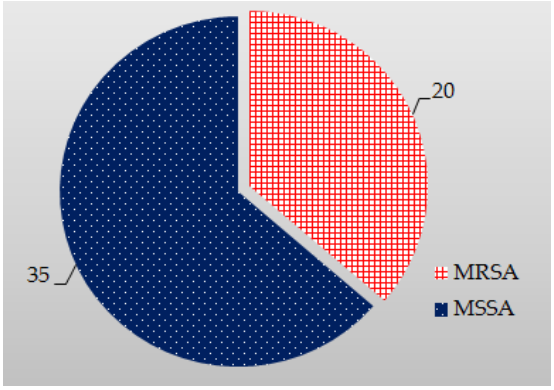

Figure-4: Frequency of MRSA and MSSA among 257 tested mobile phones.

Table: Department wise distribution of contaminated mobile phones.

Ward Name	Frequency	Percentage (%)
Surgical	30	17.7
Dermatology	17	10.1
Medical	16	9.5
Ccu	16	9.5
Gynecology	15	9.0
Burn center	13	7.7
Oncology	12	7.1
Neurosurgery	10	5.9
Icu	8	4.7
Pulmonology	8	4.7
Pediatric	8	4.7
Urology	7	4.1
Orthopedics	5	2.9
Eye department	4	2.4
Total	169	100

Zubair *et al*[12] conducted a study on Telephonic devices including landlines and cell phones from doctors, staff nurses and other HCWs from different wards of Children Hospital, Lahore in 2014. Telephonic devices including landlines and mobile phones from

doctors, staff nurses and related disciplines of HCWs from different wards were included in this study. The isolated organisms were coagulase negative *Staphylococci* 49.1%, MRSA 5.5%, MSSA 2.7%, *E.coli* 1.8%, Pseudomonas spp 1.8%, Acinetobacter spp 1.8%, Serratia spp 1.8% and Bacillus spp 0.9%.

Chawla *et al*[13] conducted a study in May 2009 in India reported 75% cell phones were colonized with atleast one potentially pathogenic organism frequency of different isolates was as followed MRSA 20.0%, Acinetobacter species 5.0%, Pseudomonas species 2.5%. almost 97.5% HCWs use their cell phone in the hospital, 57.5% never cleaned their cell phone and 20% admitted that they did not wash their hands before or after attending patients, although majority 77.5% knows that cell phones can have harmful colonization and act as a vector for nosocomial infections.

Another study conducted in Kuwait in 2015 by Heyba *et al*[14] reported Out of 203 samples from clinicians, 73.7% were contaminated. The present study reported 66% positive cultures. The percentages of CoNS were 62.9% according to Heyba *et al* but 34.8% according to our research. Other isolated micro-organism were Micrococcus 61 (28.6%), *Streptococcus viridans* 15 (7.0%), Diphtheroids 6 (2.8%), Acinetobacter species 6 (2.8%), Bacillus spp 3 (1.8%), Fungus 2 (0.9%) and MRSA 3 (1.4 %).

Heat generated by mobile phones also contributes to harboring bacteria on the mobile at an alarming level. Infection rate increases because mobile phones always remain in contact with our face, hands, ears etc[15]. We can easily disinfect our hands using disinfectant but it is cumbersome to clean mobile phones. As a result, various bacterial agents have the ability to infect us[16]. These micro-organisms can be dangerous for patient's health if they are pathogen especially to those who are immuno-compromised. And if the transferred microorganism happened to be drug resistant than it could be difficult to treat and will increase the cost of treatment for the patient. Also, will lead to overstay of patient in the hospital be a care facility[17].

CONCLUSION

Mobile phones of health care workers were found highly contaminated there for it is highly needed that these devices should be regularly decontaminated. Moreover, utmost emphasis needs to be paid on hand washing practices among HCWs which will reduce pathogenic contamination and transmission as well.

CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author.

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