



## Bacterial Contamination of Mobile Phones of Health Care Workers in A Tertiary Care Hospital

### KEYWORDS

Mobile phone; contaminated; Health care workers; nosocomial infection; Staphylococcus aureus

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### ABSTRACT

#### INTRODUCTION:

"MICROBIOLOGY + TECHNOLOGY = HAZARD TO HUMAN HEALTH ????"

( AN EMERGING CHALLENGE)

Hospital acquired infections (HAI) caused by multidrug resistant (MDR) bacteria are an emerging challenge in many health care institutions. Mobile phones being expensive and conveniently small in size are used by doctors and HCW's in hospitals for immediate communication during emergencies in rounds, and even in OT's and ICU's. The mobile phones of HCW's may harbour many harmful pathogens which can serve as reservoir for nosocomial infections. Further, sharing of mobile phones between HCW's and non HCW's may directly facilitate the spread of potentially pathogenic bacteria to the community.

**OBJECTIVES:** To investigate the rate of bacterial contamination of mobile phones of HCW's and their role in transmission of infectio and spectrum of contaminating bacteria on mobile phones.

**MATERIALS AND METHOD:** In this study a random sampling of mobile phones of 141 HCW's was carried out from various areas of hospitals like OPD's, wards, ICU's, ICCU's, OT's and laboratory. Swabs were collected and processed by standard techniques.

**RESULTS:-** Bacteriological analysis revealed that out of total 141 samples 108 (76.56%) mobile phones were contaminated with various microorganisms. Out of 108 positive samples, 75 (69.44%) were Staphylococcus aureus (MRSA 35.18%, MSSA 34.26%), 14.81 were Staphylococcus epidermidis, 28.70% Moraxella sp, 29.63% Aerobic sporing bacilli, 1.85% Micrococcus Sp, Acinetobacter sp and Pseudomonas sp and 9.92% Klebsiella sp. 43 of 108 (39.8%) mobile phones were contaminated with bacterias responsible for causing serious HAI's. Maximum colonization of bacteria were found in mobile phones of doctors (78.68%) and nurses (75.55%).

**CONCLUSION:-** Our study reveals that mobile phones of HCW's may get contaminated by pathogens which cause severe hospital infections and may serve as a vehicle of transmission of both hospital and community acquired bacterial diseases.

### Introduction:

Nosocomial infections continue to pose risks of increased mortality and morbidity in patients (Finegold et. al 1970, Krishna et al 2000). The hands of health care workers (HCW's) play an important role in the transmission of this infection (Rusin et al 2002). With recent advances in the source of information, use of mobile phones has become indispensable in the hospitals, by patients, visitors and health care workers, and this is one environment where hospital associated infection is most prevalent (Brady et al 2007, Krishna et al 2000). Further sharing of mobile phone between HCW's and non HCW's directly facilitate the spread of potentially pathogenic bacteria to community (Panhotra et al 2005, Ulger et al 2009).

The present study was carried out in the Dept of Microbiology Bombay Hospital Indore to determine the potential role of mobile phones of HCW's in transmission of nosocomial infections, to know the potential pathogens which

harbour on the mobile phones and to stress the importance of hand washing and other infection control practices to control the spread of pathogenic bacterias through mobile phones.

### Subjects and Methods:

**Subjects:-** A total of 141 swab samples from mobile phones were collected from various ICU areas of the hospital which included OPD's, Wards, ICU's, ICCU, Operation Theatre (OT) and Laboratory.

Out of the total 141 specimens collected, 61 (43.26%) samples were collected from doctors, 45 (31.91%) from nurses, 14 (9.92%) from laboratory technicians, 7 (4.96%) from ward boy/ward ladies, 7 (4.96%) from physiotherapy staff and 7 (4.96%) from trainee students.

The concept of the study was explained to analyze for the presence of bacterial pathogens on their mobile phones.

**Sample collection:** A sterile cotton swab moistened with sterile peptone water. With all the aseptic precautions the sterile cotton swab moistened with sterile peptone water was rotated on the keypad, screen and the sides of the mobile phones, since these areas are most frequently in contact with the tips of fingers. (Fig. 1)



**Sample Inoculation:** The samples after collection were transported immediately within 30 minutes of collection and were streaked onto blood agar and Mackonkeys agar for semiquantitaion by dilution streaking into 4 quadrants and incubated at 37°C for 24 to 48 hours. (Fig. 2)



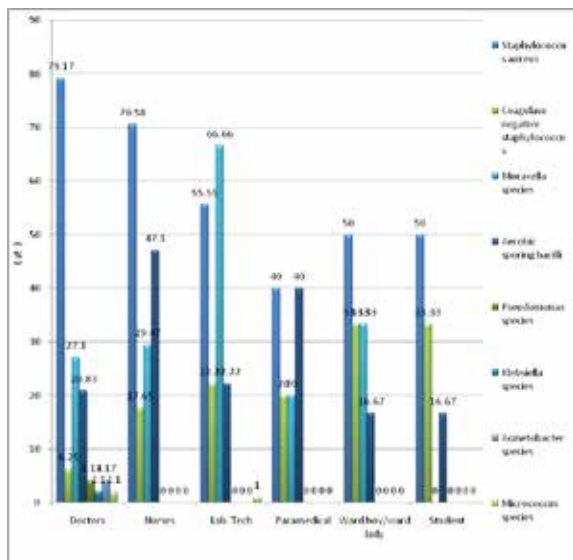
**Quantification of growth:** The visible growth from each plate was categorized into no growth, scanty, light, moderate or heavy growth based on the following criteria:- (Fig. 4)

- No growth : no colonies in any of the 4 quadrants of the plate.
- 1+ or scanty growth: growth in quadrant 1 only.
- 2+ or light growth: growth in quadrant 1 and 2 only.
- 3+ or moderate growth: growth in quadrant 1,2 and 3.
- 4+ or heavy growth: growth in quadrant 1,2,3 and 4.



**Identification of growth:** Based on the gram's staining, colony morphology and appropriate biochemical tests isolates were identified by standard methods.

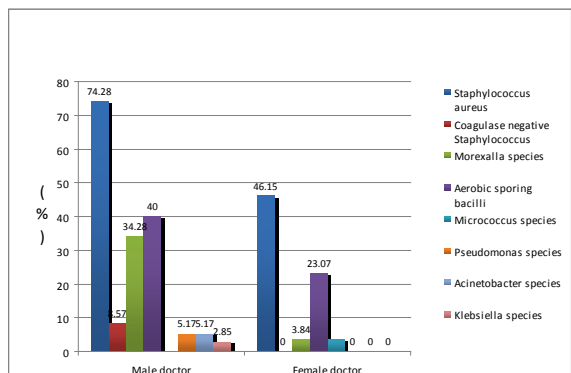
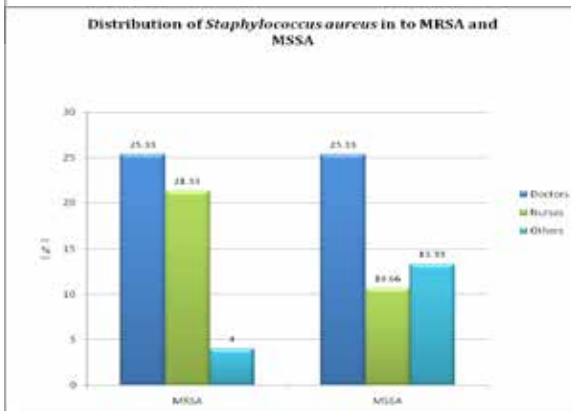
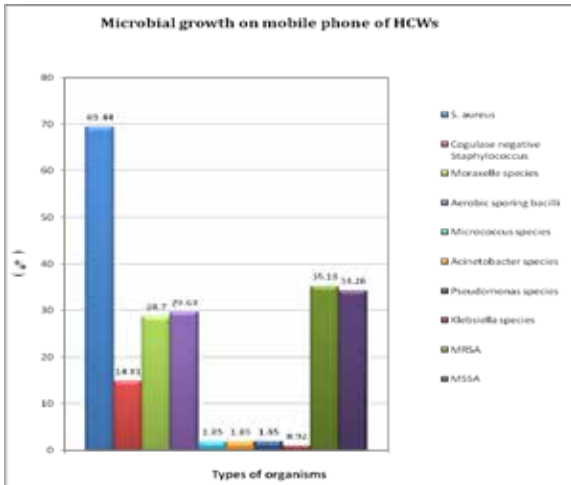
**Antibiotic sensitivity test:** Antibiotic sensitivity test was done using Kirby-Baurer's disc diffusion method on Mueller-Hinton agar according to the CLSI antibiotic disc susceptibility guidelines. MRSA was confirmed with an Oxacillin (1µg) disc on Mueller hinton agar with 4% NaCl at 37°C for 24 hrs.



**Results:**  
**ORGANISM WISE DISTRIBUTION OF BACTERIA ISOLATED FROM DIFFERENT HEALTH CARE WORKERS.**

II: Quantification of Bacterial Growth

Quantification of growth	Healthcare workers (HCWs)	
	Numbers	Percentage (%)
No growth	33	23.40%
Scanty	27	19.15%
Moderate	53	37.58%
Heavy	28	19.86%



**BACTERIAL PATHOGENS FROM DOCTORS MOBILE PHONES**

**Discussion:**

In our study as described in Graph no 1 a variety of bacterial pathogens were isolated from the mobile phones of different HCW's 108(76.56%) out of 141, which correlates with other studies (Kapdi et al 2008, Gurang et al 2008, Jayalakshmi et al 2008). The maximum mobiles contaminated with pathogenic bacteria were of doctors(44.44%) which correlates with similar studies of Brady.et.al (2006), who reported high rate of mobile phone contamination by pathogens who cause nosocomial infections. A similar study at Soroka hospital in Israel found that 12% of mobile phones belonging to doctors and nurses carried drug resistant bacteria that can be lethal to critically ill patients. Hence, the use of mobile phones in patients care areas has been banned in that hospital ( Brady et al 2007).

The non -surgeons mobile phone was comparatively more contaminated with bacterial pathogens, it may be due to not following the preventive measures (like hand washing practices) strictly as that of the surgeon (Krishna et al 2000). The potential of mobile of health care workers to serve as a reservoir of bacteria known to cause nosocomial infection was reported by Khivasara et al.(2006). They reported high levels (40%) of conamination in these phones by Staphylococcus aureus and its MRSA at a hospital in Mangalore which correlates with our study wherein the incidence of MRSA was (35.18%). In our study the incidence of MRSA on the mobile phones of doctors was (39.58%) and that on the mobile phones of nursing staff was also high (47.05%). Area wise MRSA were mostly found from the HCW's working in ICUs.

Most of the pathogenic bacteria isolated were found on doctors mobile phones (Kapdi et al 2008, Gurang et al 2008, Tunc et al 2006). The different methods of handling and treatment of patients by various doctors, the bioburden of pathogens varies along with different activities of patients like coughing, sneezing, loud talking etc. which expel the pathogens in the environment, which might get adhered onto the doctors mobile phones (Kapdi et al 2008,Brady et al 2006, Rafferty et al 1984).

Present study results indicate that mobile phones may get contaminated through the hands. Hence, these mobile phones when used carelessly in the ICU or surgical wards may act as a source of infections to patients (Rusin et al 2002). Moreover, these contaminated phones and the hands of the health care professionals may also pose a danger in the spread of infection in the community (Larson et al 1988). These findings clearly explain that, growth of organisms from mobile phone samples of health care professionals could be due to relaxed hand washing practice after patient examination, care and treatment. Though the incidence of highly pathogenic Multi drug resistant bacteria like Pseudomonas, Acinetobacter and Klebsiella was low ranging between 1-2% but still if hand hygiene is not practiced properly, mobile phones may pose a risk of transmission of these highly pathogenic bacteria to the patients and to the community (Borer et al 2005, Goldbatt et al 2007, Ramesh et al 2008, Rusin et al 2002).

Organisms like Moraxella sp., Aerobic sporing bacilli and coagulase negative Staphylococcus were also found but there are less pathogenic and usually are a commensal flora of human skin and nasal passages (Collee et al 1996).

**Conclusion:**

To conclude our study reveals that mobile phones of HCW's may get contaminated with pathogenic bacteria which can cause hospital infections and may serve as reservoirs and vehicle of transmission of infection to both hospital and community. Regular and appropriate hand washing (fig. 5) is the single most factor which can reduce the contamination of mobile phones (Brady et al 2007). Also decontamination of mobile phones with alcohol disinfectant wipes or with 70% isopropyl alcohol can be effective (Philpott et al 1994).

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