

## Role of mobile phones as a possible source of nosocomial infections: A study in a tertiary care hospital

Prasanna Chhagan Nakate<sup>1,\*</sup>, Mangala Prakash Ghatole<sup>2</sup>, Virendra Ashok Kashetty<sup>3</sup>

<sup>1</sup>Assistant Professor, <sup>2</sup>Professor & Head, <sup>3</sup>Associate Professor, Dept. of Microbiology, Ashwini Rural Medical College, Hospital & Research Centre, Solapur, Maharashtra

**\*Corresponding Author:**

Email: prasannanakate@gmail.com

### Abstract

**Background:** Mobile phones of health care workers (HCW) may harbor pathogenic microorganisms and act as a source of infections for patients. This study was conducted to determine the bacterial contamination of mobile phones in health care workers (HCW) and to compare it with mobile phones of non-HCW's.

**Methods:** Mobile phones of 125 HCW's were screened for bacterial contamination and it is compared with mobile phones of 125 non-HCW's. The isolated bacteria were identified using standard microbiological techniques.

**Results:** The study revealed bacterial contamination in case of 120 mobile phones of HCW's and 121 mobile phones from non-HCW's. Commonest organism isolated was Coagulase negative Staphylococci in both groups. 37 bacterial isolates (30.83%) from HCW's were significant nosocomial pathogens whereas 46 isolates (38.01%) from non-HCW were pathogenic; *Staphylococcus aureus* being the most frequent isolate for both groups.

**Conclusion:** As mobile phones act as reservoir of micro-organisms among HCW's, frequent disinfection of these along with good hand hygiene practices is important for preventing transmission of infectious organisms. In addition screening of mobile phones for nosocomial pathogens and restricting their use in sensitive areas of hospital is also advisable.

**Keywords:** Mobile phones, Healthcare associated infections, Nosocomial infections

### Introduction

For improvement in communication system, the global system of mobile telecommunication was established in Europe in 1982. Today, it has grown to such an extent that mobile phone devices have become one of the most indispensable accessories in our social, personal and professional life. For most of us, life without mobile phones is unimaginable. Just as any other system, health care system has also become largely dependent on use of mobile phones especially for communication during emergency situations. This frequent handling of mobile phones during patient care hours has created a little concern in the minds of infectious disease practitioners. Mobiles are potential tools for carrying pathogenic microorganisms which may be transferred to the patients via hands of health care workers and it may result in healthcare associated infections.

There are few reports on the role of mobile phones in the spread of nosocomial infections.<sup>1,2,3,4</sup> Considering this, the present study was conducted to determine the bacterial contamination of mobile phones in health care workers (HCW) as compared to the mobile phones of non-health care workers.

### Materials and Methods

**Study group:** HCW's – Medical and para-medical staff working in the hospital and who are directly involved in patient care (n=125)

**Control group:** Non-HCW's – Staff who are not involved in patient care such as teaching staff, administrative staff and office workers (n=125)

Specimens were collected randomly from the mobile phones with the help of sterile cotton swabs moistened with sterile saline. These swab specimens were inoculated directly on sheep blood agar, nutrient agar and MacConkey agar plates without delay. The culture plates were incubated for 24 hours at 37°C in an aerobic incubator and were examined for microbial growth the next day. The organisms isolated were identified based on their Gram staining properties, cultural characteristics and biochemical reactions.<sup>5</sup> All isolates of *Staphylococcus aureus* were tested for Methicillin sensitivity using 30 µg cefoxitin disc by disc diffusion method as per Clinical Laboratory Standard Institute (CLSI) guidelines.<sup>6</sup>

Among all the microorganisms isolated, Coagulase negative Staphylococci, Micrococci, *Bacillus species* (aerobic spore forming bacteria) were considered non-pathogenic (clinically insignificant) as these are not commonly associated with nosocomial infections.

### Results

In our study, it was observed that out of 125 mobile phones of HCW's who are actively involved in patient care, 120 phones were contaminated with bacteria. The predominant organisms isolated from hospital workers included Coagulase negative *Staphylococcus species* (70) followed by *Bacillus species* (18), *Staphylococcus aureus* (18), *Klebsiella species* (6) and *E. coli* (4), *Pseudomonas species* (2) and *Acinetobacter species* (2). 37 of these bacterial isolates were known nosocomial

pathogens. Out of 18 isolates of *Staphylococcus aureus*, 12 (66.67%) were methicillin resistant (MRSA).

In case of non-health care workers, 121 mobile phones were found contaminated. The commonest organism isolated was Coagulase negative *Staphylococcus species* (62) followed by *Staphylococcus aureus* (25), *Bacillus species* (17), *E. coli* (10), *Klebsiella species*(4), *Enterococcus species*(2) and *Acinetobacter species*(1)in that order. In this group, 46 isolates were known pathogens. Out of 25 isolates of *Staphylococcus aureus*, 9 (36%) were MRSA. The distribution of different bacteria obtained from mobile phones of study group and control group is as given in Table 1.

**Table 1: Distribution of different bacteria obtained from mobile phones of HCW's and non-HCW's**

Organism isolated	Study group (Healthcare personnel), n=125, %	Control group (Non-healthcare personnel), n=125, %
Coagulase negative <i>Staphylococci</i>	70 (56%)	62 (49.6%)
<i>Bacillus species</i>	18 (14.4%)	17 (13.6%)
<i>Staphylococcus aureus</i>	18 (14.4%) (MRSA = 12, MSSA = 06)	25 (20%) (MRSA = 09, MSSA = 16)
<i>Klebsiella species</i>	06 (4.8%)	04 (3.2%)
<i>E. coli</i>	04 (3.2%)	10 (8%)
<i>Pseudomonas species</i>	02 (1.6%)	00
<i>Enterococcus species</i>	00	02 (1.6%)
<i>Acinetobacter species</i>	02 (1.6%)	01 (0.8%)
No bacterial growth	05 (4%)	04 (3.2%)

In case of HCW's, 37 bacterial isolates were clinically significant nosocomial pathogens whereas in non-HCW's 46 isolates were potential pathogens. Table 2 shows distribution of clinically significant pathogens which can cause hospital acquired infections among study group and control group.

**Table 2: Distribution of clinically significant pathogens among mobile phones of HCW's and non-HCW's**

	Significant pathogens	Non-pathogens	No. of bacterial isolates
Healthcare workers	37 (30.83%)	83 (69.17%)	120
Non-healthcare workers	46 (38.01%)	75 (61.99%)	121

## Discussion

In our study, it was observed that out of 125 mobile phones of HCW's who are actively involved in patient care, 120 (96%) showed bacterial contamination

whereas 121 (96.8%) mobile phones of non-HCW's were contaminated out of 125. In a study carried out by Srikanth P. et al, 71% mobile phones of HCW's had microbial contamination whereas in in case of corporate workers, the contamination rate was 78%.<sup>7</sup> In another study conducted by Akinyemi et al, 15.3% of mobile phones of HCW's were found contaminated as compared to non-HCW's; marketers and food vendors (37%), lecturers and students(30.6%), public servants (16.9%).<sup>8</sup>

In our study Coagulase negative *Staphylococcus species* was the commonest bacterial agent isolated from mobile phones of both HCW's and non-HCW's. Srikanth P. et al and Akinyemi et al. have also reported Coagulase negative *Staphylococcus* as the most frequent organism isolated from mobile phones.<sup>7,8</sup>

In a study carried out by Srikanth P. et al, 65% isolates from mobile phones of HCW's were known pathogens as compared to 54% from corporate workers.<sup>7</sup> Contrary to this finding, in our study we observed that the mobile phones of non-HCW's had a higher contamination with known nosocomial pathogens as compared with HCW's. Out of 120 bacterial isolates from HCW's, 37 were known pathogens (30.83%) whereas out of 121 isolates from non-health care workers, 46 were pathogenic (38.01%). This finding may be attributed to appropriate hand hygiene practices (hand washing and hand rub) followed by the HCW's in our hospital which has an influence on microbial contamination of mobile phones. Among *Staphylococcus aureus* isolates, the prevalence of MRSA was higher in HCW's (66.67%) as compared to non-HCW's (36%).

Our study has certain limitations. The purpose of this study was to detect presence of aerobic bacterial flora on mobile phone surfaces. Cultivation of fungi and anaerobic bacteria was not done. Only one time random sampling was done, so it is not possible to conclude from the study whether the organisms isolated from mobile phones were transient or resident pathogens. Nevertheless, presence of bacterial pathogens on mobile phones of HCW's still represents a possible source of infection for patients.

## Conclusion

Mobile phones may act as an important reservoir of infection in hospital settings as these are contaminated by pathogenic organisms especially in case of HCW's. Though it is not possible to completely stop their use in hospitals by the HCW's, it is important to disinfect them frequently. Strict adherence to infection control practices and precautions such as hand washing and good hygienic practice among the users of mobile phones are of utmost importance as this indispensable device may act as a source of hospital associated infections. Restriction of mobile phone use in clinically sensitive areas, such as operating environment and ICU is also recommended. Moreover, screening of mobile

phones for microorganisms should also be done whenever environmental screening is undertaken in the hospitals.

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