

Screening of the Mobile Phones of Resident Doctors for Microbial Contamination in Tertiary Health Care Center

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Abstract

Background: Use of mobile phones for communication is increasingly becoming important today. Mobile phones can carry various harmful microbes and can act as exogenous source of infection in hospital acquired infections. **Aims:** To screen the mobile phones of resident doctors for microbial contamination in tertiary health care center. **Materials and Methods:** swabs were taken from 70 resident doctor's mobile phones by using sterile cotton swab and inoculated on MacConkey agar and Blood agar. Organisms isolated were processed as per standard protocol. **Results:** out of the 70 mobile phone swabs 62 swabs (88.5%) were contaminated with microorganisms. Eighty-eight microorganisms were isolated from 70 mobile phones. Among 88 isolates, coagulase negative staphylococci were 42(47.73%), *Staphylococcus aureus* 18(20.45%), *Pseudomonas aeruginosa*, *Acinetobacter*, *Micrococci* were 6(6.82%) each, *Klebsiella pneumonia* and *Enterococcus* were 3(3.41%) each. 2 isolates of diphtheroids; *Escherichia coli* and *Bacillus* with 1 isolate each. **Conclusion:** Mobile phones can act as exogenous source of microorganisms and can spread hospital acquired infections. Hence proper infection control practices like proper hand washing should be routinely practiced.

Keywords: Health Care Workers, Hospital Acquired Infections, Mobile Phones

1. Introduction

Nowadays mobile phones have become very important part of professional as well as social life. Mobile phones are an important mean of communication among health care providers too. Global burden of hospital acquired infections is on rise and contributes significantly to morbidity and mortality of patients. More than 2 million patients acquire hospital acquired infections each year and results in 90,000 deaths¹. Researchers found that when phone is used frequently it remains warm and it create an

ideal environment for growth of the microorganisms that are normally present as commensal on the skin^{2,3}. These organisms from mobile phones are transferred through hands of health care workers to other patients resulting in hospital acquired infections. Mobile phones which are frequently used by health care workers without washing their hands after direct or indirect contact with patients can act as a source of infection.

Studies on microbial contamination of mobile phones used by health care workers and its role in hospital acquired infections have been done by many researchers.

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However, such study was not conducted in our area. Hence the present study was undertaken with objective to screen mobile phones of resident doctors working in various departments of our hospital for the presence of microorganisms.

2. Materials and Methods

By taking 60% prevalence of contamination of mobile phones, and taking 20% error, calculated sample size was 66 ($N = 4PQ/L^2$).

All resident doctors working at tertiary health care Centre using mobile phones were contacted and requested to participate in study. Institutional Ethical committee permission was taken before starting the study.

Duration of this study was from August 2017 to December 2017. Study design was cross sectional study. Seventy resident doctors of both genders who were ready for consent were included in this study. Swabs were taken from their mobile phones.

Collection of specimen from mobile phone was done by using sterile cotton swab moistened with sterile normal saline. Swab was rotated on the front, sides and backside of mobile. Then swabs were inoculated immediately on MacConkey agar and Blood agar. Plates were incubated aerobically at 37° C for 24 hours. Isolated organisms were processed according to colony morphology and Gram staining and identified according to standard protocol⁴.

3. Results

A total of 70 mobile phone swabs of resident doctors were analyzed for presence of microorganisms, it is found that 62 mobile phones (88.57%) were contaminated with microorganisms (Table 1 and Figure 1).

Table 1. Microbial contaminations of mobile phones of resident doctors

Contamination status	No. of Mobile phones	Percentage
Contaminated	62	88.57%
Not Contaminated	8	11.43%
Total	70	100.00%

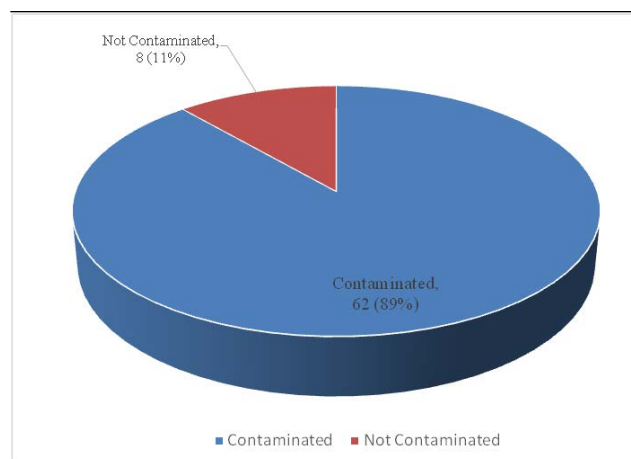


Figure 1. Microbial contaminations of mobile phones of resident doctors.

Eighty-eight microorganisms were isolated from 70 mobile phones (Table 2 and Figure 2). Among 88 isolates 42(47.73%) were Coagulase negative staphylococci which are dominant organisms, followed by 18(20.45%) isolates were *Staphylococcus aureus*. *Pseudomonas aeruginosa*, *Acinetobacter* and *Micrococcus* with 6 isolates each; *Klebsiella pneumoniae* and *Enterococcus* with 3 isolates each; two isolates of diphtheroids; *Escherichia coli* and *Bacillus* with 1 isolate each.

Table 2. Distribution of various micro-organisms from mobile phones of study participants.

Bacterial Isolates	No. of Isolates	Percentage
1. Coagulase negative staphylococcus	42	47.73%
2. <i>Staphylococcus aureus</i>	18	20.45%
3. <i>Pseudomonas aeruginosa</i>	6	6.82%
4. <i>Acinetobacter</i> species	6	6.82%
5. <i>Micrococcus</i>	6	6.82%
6. <i>Enterococcus</i>	3	3.41%
7. <i>Klebsiella pneumoniae</i>	3	3.41%
8. Diphtheroids	2	2.27%
9. <i>Escherichia coli</i>	1	1.14%
10. <i>Bacillus</i>	1	1.14%
Total	88	100.00%

In our study among 70 resident doctors, male and female resident doctors were 34 and 36 respectively.

Contamination of mobile phones was reported from 31 (91%) out of 34 male resident doctors, while in female resident doctors contamination was reported in 31(86%) mobile phones out of 36 (Table 3).

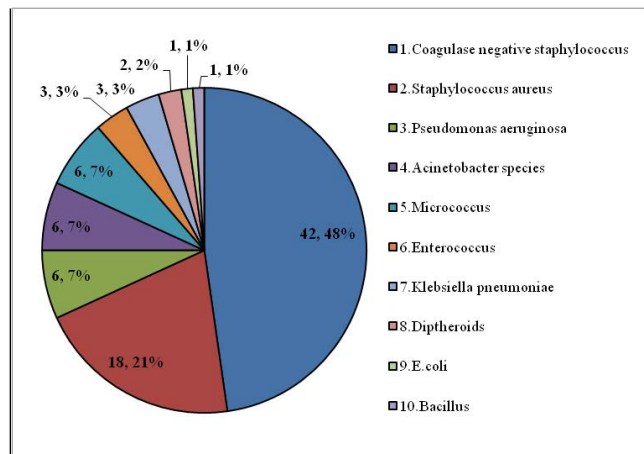


Figure 2. Distribution of various micro-organisms from mobile phones of study participants.

Table 3. Organisms isolated among male and female resident doctors

Mobile phones	Resident Doctors		Total
	Male	Female	
Contaminated	31 (91%)	31(86%)	62(89%)
Non-contaminated	3 (9%)	5(14%)	8(11%)
Total	34 (100%)	36(100%)	70(100%)

Chi square value: 0.443, Fisher exact test: p value =0.711 (Non-significant (p >0.05))

There is no statistical significant association between mobile contamination and gender of resident doctors.

4. Discussion

The present study was conducted at tertiary health care center. It was found that out of total 70 mobile phones 62 (88.57%) were contaminated with microorganisms. It is similar to studies conducted by Karabey *et al.*⁵ Ulger *et al.*⁶ Tambekar D.H. *et al.*⁷ who found contamination of mobile phones 90.9%, 94.5% and 95% respectively.

In our study isolation of Coagulase negative staphylococcus is predominant with 47.19% which is comparable with study of Killic I.H. *et al.*⁸ and Ulger *et al.*⁶ who found Coagulase negative staphylococcus 60% and 58.96% respectively. *Staphylococcus aureus* was isolated

from 20(45%). This is a well-known fact that organisms like *Staphylococcus aureus* and coagulase negative staphylococcus resist drying and thus can survive and multiply rapidly in the warm environments like mobile phones³. Other organisms found are *Pseudomonas aeruginosa*, *Acinetobacter*, *Micrococcus*, *Enterococcus*, *Klebsiella pneumoniae*, Diphtheroids, *Escherichia coli*, and *Bacillus*. It is well established fact that these bacteria are agents of nosocomial infections.

Many pathogens, particularly *Pseudomonas aeruginosa* and *Acinetobacter* spp., have been proven to remain viable for months on inanimate surfaces⁹.

In our study among 70 resident doctors, male and female resident doctors were 34 and 36 respectively. Contamination of mobile phones was reported from 31 (91%) out of 34 male resident doctors, while in female resident doctors' contamination was reported in 31(86%) mobile phones out of 36. It was found that there is no statistical significant association between mobile contamination and gender of resident doctors. However, study by Sandeep B.Kokate *et al.*¹⁰ reported that contamination of mobile phones of male resident doctors were more (76%) than that of female resident doctors (44%). Also, study by Tambekar *et al.*⁷ reported that out of 90 isolated pathogens, 62(72%) pathogens were found on male doctors' mobile phones while 25(28%) on female doctors' mobile phones. Above two studies found statistically significant association between gender and mobile contamination and the reason given was that female doctors often keep their phones in purses and use less frequently during their duties. On the other hand, male doctor keeps their mobile phones in their pockets and use frequently anywhere, anytime whenever it is needed and thus contaminated and played an important role in transmission of pathogens, but these studies were done in 2008 – 2011, now due to boon of smartphone use and free mobile internet available on smartphone, lead to increased usage both in males and females that might be the reason we didn't find any statistically significant association.

5. Conclusion

Major finding in this study is that mobile phones acts as a carrier and may play an important role in spreading of hospital acquired infections. Since we can't restrict use of mobile phones by health care workers, as it is an

important mean of communication and a portable source of knowledge and recent updates; so simple control measures like hand washing performed correctly and at right time and routine decontamination of mobile phones with alcohol are suggested to prevent potential spread of infections through mobile phones in the hospital settings.

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7. References

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