



# Cellphones A Modern Stayhouse For Bacterial Pathogens

Usha Arora, Pushpa Devi, Aarti Chadha, Sita Malhotra

## Abstract

Cellphones are increasingly used by health care personnels for communication. These can harbour various potential pathogens and become an exogenous source of nosocomial infections. A total of 160 cellphones belonging to doctors and paramedical staff working in various departments at govt. medical college and hospital, Amritsar were screened for bacterial isolates. Sterile swabs moistened with nutrient broth were used to swab the front, back and the sides of the cellphones and were subjected to culture and sensitivity. The same procedure was repeated after decontamination with 70% iso propyl alcohol. Out of total 160 cellphones growth was obtained in 65(40.62%) cellphones. 31(19.37%) from clinical workers and 34(21.25%) from non clinical workers. Coagulase negative staphylococcus was the most commonly isolated organism. The efficacy of decontamination with 70% isopropyl alcohol was found to be 98% as only 5 cellphones showed growth after decontamination. It was found that around 40% of the cellphones of health care workers were contaminated and thus acted as a potential source of nosocomial infections. Simple measures like decontamination with 70% isopropyl alcohol was found to be 98% effective.

## Key Words

Cellphones, Microorganism, Nosocomial Infections

## Introduction

Today India has 287 million mobile phone users and these account for 85% of all the telecommunication users (1). With recent advances in the source of information, use of mobile phones has become indispensable in the hospitals (2). These can be put in vibratory mode in Intensive care units, Post operative wards and operation theatres etc (3). But however they are seldom cleaned and are often touched during or after examination of patients and handling of specimens without proper hand washing (3). These cells phones can harbour various potential pathogens and become an exogenous source of nosocomial infection among hospitalised patients and also a potential health hazard for self and family members (2). In a study it was discovered the average cell phone is dirtier than either a toilet seat or the bottom of your shoe (4). However no study has been conducted out in this part of country. Our study was carried out to know

the carriage rate of cell phones of health care persons working in various departments of our hospital.

## Material and Methods

A total of 160 cell phones belonging to health care personnels from both clinical and non clinical departments of Govt. Medical College and Hospital, Amritsar were screened for bacterial isolates for a duration of 9 months from Jan 08 to Sept 08. Sterile swabs soaked in Nutrient broth were used for swabbing the front, the back and the sides of cellphones. This was followed by decontamination of cell phones with 70% isopropyl alcohol. After allowing it to dry for 10 minutes, repeat swabs were taken from the cell phones. These swabs were brought to the department of Microbiology, where they were subjected to culture on blood agar and Mac Conkey agar. After incubation for 24 hours at 37 degree Celsius, the growth obtained was identified on the basis of colonial characters,

From the PG Department of Microbiology, Government Medical College, Amritsar, Punjab-India.

Correspondence to : Dr. Usha Arora, Prof & Head, PG Department of Microbiology, Govt. Medical College, Amritsar, Punjab-India



morphology by gram staining and various bio chemical tests following standard procedures (5). The isolates were further subjected to antibiotic sensitivity testing by Kirby-Bauer method (6). The results were interpreted according to CLSI guidelines (7).

### Results

Out of total 160 cell phones growth was obtained in 65(40.62%) cell phones 31 (19.37%) from clinical departments and 34(21.25%) from non clinical departments as shown in *table 1*. Out of the total organism isolated coagulase negative staphylococcus was the most common followed by staphylococcus aureus and E.Coli both from clinical and non clinical departments. Various organisms isolated are shown in *table 2*. MRSA and E.Coli were mainly isolated from cell phones of health care personnels performing surgeries or handling acutely ill patients and could transfer this MRSA to the patients. Acinetobacter spp. was isolated from the cell phones of 2 clinicians working in intensive care unit of the hospital. It was observed that cell phones from the health care personnels working in clinical departments showed higher carriage rate as compared to those from non clinical side as shown in *table 3*. After decontamination with 70% isopropyl alcohol only 5 cell phones showed growth again thus proving the efficacy of decontamination to be nearly 98% shown in *table 4*. From the antibiotic sensitivity testing, it was observed that most of the isolates obtained from cell phones of clinical workers were showing growth of multi drug resistant organisms as compared to those isolated from non clinical sections.

**Table 1. Number of Cellphones Showing Growth**

Department	Growth Obtained	No growth	Total
Clinical	31	39	70
Non- clinical	34	56	90
Total	65	95	160

**Table 2 . Microorganism Isolated From Cell Phones of Clinical and Non Clinical Departments**

Isolates	Clinical	Non-Clinical
1. Coagulase negative staphylococci	15	12
2. staphylococcus aureus	10	12
3. E. coli	10	5
4. Klebsella	5	2
5. Micrococcus	4	3
6. Bacillus spp.	3	2
7. Acinetobacter spp.	2	1
8. Citrobacter spp.	1	-
9. Streptococcus viridans	-	1

**Table 3. Showing Growth Pattern**

Department	Total Samples	Postive Growth	% age
Clinical	70	31	44.78
Non Clinical	90	34	37.77

**Table 4. Showing Results After Decontamination of Cell Phones With 70 % Iso Proply Alcohol**

Cell Phones	Growth Postive	Growth Negative	Total
Before Decontamination	65	95	160
After Decontamination	5	155	160

### Discussion

In the world over, microbiological standards in hygiene are prerequisite for a healthy living. Out of total 160 cell phones growth was obtained in 65(40.62%) cell phones 31 (19.37%) from clinical departments and 34 (21.25%) from non clinical departments (*Table 1*). This study is in contrast with the findings of another study, which showed positivity of 91.60% (3). This might be because of less frequent usage of these devices by health care workers in our institution. Out of the total organism isolated coagulase negative staphylococcus was the most common organism (*Table 2*). This goes well with the results of study at Coimbatore (3) showing isolation of coagulase negative staphylococcus in 108 out of 229 bacterial isolates obtained. 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 cell phones. MRSA and E. Coli were mainly isolated from cell phones of health care personnels performing surgeries or handling acutely ill patients and could transfer this MRSA to the patients. Acinetobacter spp. was isolated from the cell phones of 2 clinicians working in intensive care unit of our hospital. Similar study at the Soroka University medical centre, Israel, identified multidrug resistant Acinetobacter baumannii in the hands, cell phones of the health care workers and patients admitted to the ICU (8). The ability of Acinetobacter to contaminate cell phones is not unexpected as this is a multi drug resistant water and soil organism and is responsible for infection in predisposed patients in the hospital. As observed most of the isolates obtained from cell phones of clinical workers in the present study were showing growth of multi drug resistant organisms as compared to those isolated from non clinical sections. This correlates well with the results obtained in a study done at PSG medical



college, Coimbatore (3) who have shown that MRSA was isolated only from cell phones of clinicians. These clinicians who performed surgeries or handled acutely ill patients may transfer MRSA to the patients (9). However the relatedness between isolates found on the mobiles and from patients was not performed.

In one study on public telephones, twelve different types of bacteria were found on the surface of telephones. The level of bacterial contamination for the telephone mouthpiece was increased to its highest point in October from its lowest value in August. It was also found that the microbial contamination of mouthpiece was about twice the contamination of earpiece (10).

Similarly, in another recent study (11) determining the contamination rate of the healthcare workers' (HCWs') mobile phones and hands in operating room and ICU suggested 94.5% of phones to have the evidence of bacterial contamination with different types of bacteria. The gram negative strains were isolated from mobile phones of 31.3% and the ceftazidime resistant strains from the hands were 39.5%. *S. aureus* strains isolated from mobile phones of 52% and those strains isolated from hands of 37.7% were methicillin resistant. Some mobile phones were contaminated with nosocomial important pathogens.

### Conclusion

It is thus concluded that in comparison to non clinical sections, the carriage rate on cell phones was higher in the clinical sections. Also after a simple procedure of decontaminations with 70% iso propyl alcohol the carriage rate was decreased to almost 2% as compared to 40.62% before decontamination which is significant. Thus mobiles as carried by health care professionals in the hospital

may serve as mechanical vectors for transmission of multi drug resistant organisms to the patients and even to their family members. As restriction or prohibition of such devices may prove impractical, strategies for preventing nosocomial transmission is needed.

### References

1. Kapdi M, Hoskote S, Joshi S R. Health hazards of mobile phones: an Indian perspective. *JAPI* 2008; 56:893-97.
2. Gurang B, Bhati P, Rani U, Chawla K, Mukhopodhyay C, Barry I. Do mobiles carry pathogens. *Microcon* 2008 Oct.
3. Jayalakshmi J, Appalaraju B, Usha S. Cell phones as reservoir of nosocomial pathogens. *JAPI* 2008;56: 388-89.
4. Your cell phones could be home to nasty bacteria . Accessed on, Aug 2006, Available from URL: <http://www.CTV>.
5. Collee J G, Miles R S, Watt B. Tests for identification of bacteria In : Colle J G , Duguid JP, Frase AG, Marmion BP Mackie, McCartney (Edt). *Practical medical microbiology*. 14<sup>th</sup> ed., Vol 2 Churchill Livingstone, London 1996.pp.131-48.
6. Miles R S, Amyes SGB Laboratory control of antimicrobial therapy In : colle J G , Duguid JP, Frase AG, Marmion BP Mackie and McCartney practical medical microbiology 14<sup>th</sup> ed., Vol 2 Churchill Livingstone, London 1996.pp.152-54.
7. Performance Standards For Antimicrobial Disc Susceptibility Tests. *CLSI* 2007;25(1):1
8. Issacs D, Daley A, Dalton D. Swabbing computers in search of nosocomial bacterias. *Peds Infect Dis J* 1998 ;17: 533.
9. Borer A, Gilad J, Smolyakov R *et al.* Cell phones and acinetobacter transmission (Online). *Emerging infectious diseases* 2005; 11(7). Available from URL : <http://www.cdc.gov/eid>.
10. Tunc K, Olgun U. Microbiology of public telephones *J Infect* 2006 ;53(2):140-3
11. Ulqer F, Esen S , Dilek A, *et al.* Are we aware how contaminated our mobile phones with nosocomial pathogens ? *Ann Clin Microbiol Antimicrob* 2009 6;8:7