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## RESEARCH ARTICLE

### STUDY OF BACTERIOLOGICAL PROFILE OF MOBILES - A GATEWAY OF INFECTION IN HOSPITALS

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#### ABSTRACT

**Introduction:** In the past few years mobile phones have become indispensable part of communication not only among common people but also among doctors and other Health care workers (HCW) in hospitals. Mobile phones are rarely disinfected and as a result devices have potential for contamination with various bacterial agents and leads to hospital associated infection and becomes gateway of infection in hospitals. **Aims and Objective:** To study Bacteriological profile of surface of mobile phones used in hospitals and knowledge, attitude & practice (KAP) study was done to know educational status of health care workers about use of mobile phones. **Methodology:** This was hospital based cross-sectional study on 200 subjects using mobile phones in tertiary level hospital. Set predesigned questionnaires were filled by HCW. Swab samples were taken from surface of mobile phones and microbial flora were detected by standard methods. **Result:** Out of 200 samples, amongst pathogenic microorganism *Citrobacter* -50 (25%), *Staphylococcus aureus* - 23 (11.5%), *Pseudomonas spp.* -5 (2.5%), *Klebsiella spp.* - 2 (1%), *Escherichia coli* - 1 (0.5%), *Acinetobacter spp.* -1 (0.5%) were isolated in culture and in 12.5% cases Polymicrobial infection was seen. **Conclusion:** There is recommendation of restricted use of mobile phones in high risk areas of hospitals. HCW should keep their mobile phones in sterilised bags for emergency use and regular cleaning of mobile phones with disinfectants is recommended.

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## INTRODUCTION

A mobile phone or cellular telephone is a long -range ,portable electronic device for personal telecommunication . The vast majority of mobile phones are hand -held. In many countries, mobile phones out number landline telephones since most adults and many children now own mobile phones. At present, Asia has the fastest growth rate of cellular phone subscribers in the world <sup>(1)</sup>. The global burden of Hospital associated infections (HAI) is increasing day by day and is a great threat to public health. Cell phones have become one of the most indispensable accessories of professional and social life <sup>(2)</sup>. In the past few years mobile phones have become essential part of communication not only among common people but also among doctors and other Health care workers (HCWs) in hospitals<sup>(3)</sup>. They have become one of the essential devices used for communication in daily life, and are commonly used almost everywhere. Healthcare workers use these phones for rapid communication within hospital settings. However, one of the most common concerns regarding heavy use of mobile devices is that they can act as a vehicle for transmitting pathogenic bacteria and other microorganisms<sup>(4)</sup>.

Contamination can spread from outside surfaces to > 80% of exposed hands <sup>(5)</sup>. Although mobile phone has many advantages, but it can serve as vehicle for transmission of nosocomial pathogens from HCWs to patients. The constant handling of cell phones by laboratory personnel poses a severe threat to spread of infectious pathogens which could be multi drug resistant also; both inside the facility and to the community outside. This is especially so because the skin of our palms provide moisture and optimum temperature of human body for these bacteria to proliferate <sup>(6)</sup>. These factors and the heat generated by cell phones contribute to harboring bacteria on the device at alarming levels. When we consider a phone's daily contact with the face, mouth, ears, and hands, the dire health risks of using germ-infested mobile devices are obvious<sup>(7)</sup>. As mobile phones are rarely sanitized properly and often used before and after examination of patients without following proper hand hygiene practices, so mobile phones can act as reservoir and vehicle for transmission of nosocomial infections to patients.<sup>(8,9)</sup>Use of mobile phones in OT, ICU, NICU, Labor room is of serious concern, as these patients are more vulnerable to HAIs. The present study was done at Tertiary level Hospital of Western Rajasthan to determine whether mobile phones could play a role in the spread of nosocomial pathogens and

what all initiatives could be taken to prevent it from being a vehicle of infection.

**AIM- 1.** To study Bacteriological profile of mobile phones. KAP (knowledge, attitude & practice) study was done with help of taking response of all willing participants.

## MATERIALS AND METHODS

This was a cross sectional study conducted from July 2022 to August 2022 at Tertiary level hospital of Western Rajasthan to analyze microbiological profile of mobile phones chosen randomly from faculty (8), residents (23), nursing staff (25), lab technicians (32) and patients (112).

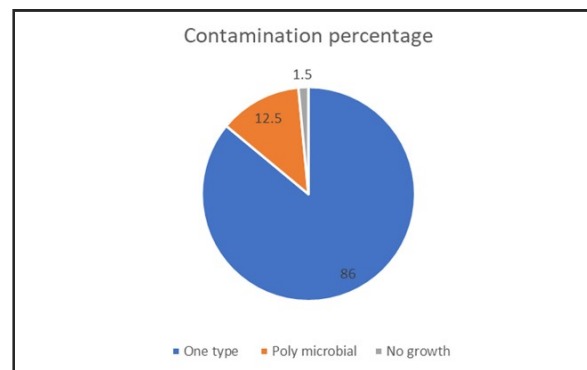
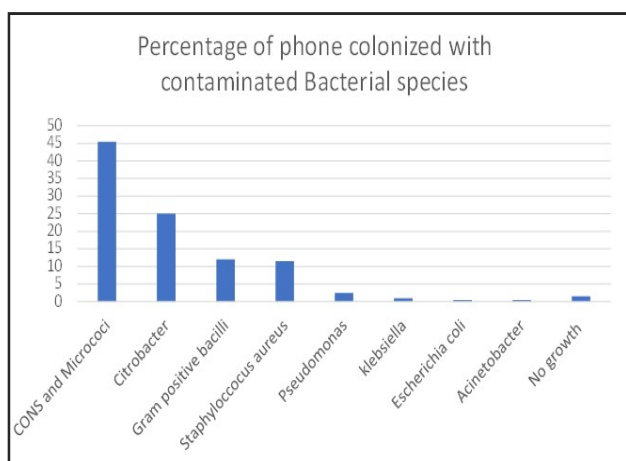
**Sampling:** Total 200 mobile phones were randomly sampled from subject persons in this study by using sterilized cotton swab moistened by sterile normal saline which was rotated to swipe from overall (screen, keypad, sides, and back) area of the mobile phones. For KAP study set of Questions were asked response of participants were noted.

**Culturing:** The cotton ends of these swabs were cut off and soaked in 5 ml of Thioglycollate broth. All swabs were immediately streaked over the surface of Blood agar and MacConkey agar plates, were incubated aerobically at 37° C, further identification of microorganism was done according to Standard Text Book of Medical Microbiology<sup>(9)</sup>.

**ISOLATION OF BACTERIA:** Primary isolation of bacteria was made based on their colony characteristics and Gram's stain reaction microscopically. Different biochemical tests like Mannitol Salt Agar, Triple Sugar Iron agar, Indole, Methyl Red, Citrate, Urease, Voges-Proskauer, Oxidase, Catalase, Coagulase and Motility Tests were used for further identification.

## RESULTS

Out of 200 samples, 197 (98.5%) showed growth of bacteria. Out of which the most common isolates were CONS - 91 (45.5%), *Citrobacter spp.*- 50 (25%), Gram positive bacilli - 24 (12%), *Staphylococcus aureus* - 23 (11.5%), *Pseudomonas spp.* - 5 (2.5%), *Klebsiella spp.* - 2 (1%), *Escherichia coli* - 1 (0.5%), *Acinetobacter spp.*- 1 (0.5%). Polymicrobial infections were seen in 12.5% cases. A set of questions were asked for KAP study for all medical & paramedical staffs. 24% of staff knows infection can be transmitted by mobiles. 79% of staff knows that mobile phones with a cover can prevent infection. 76% of staff uses mobile phones for other than calls /messages. 65% of staff uses mobile phones while attending patients. 21% of staff routinely sanitizes their mobile phones. 40% of staff follows proper hand hygiene practices before & after attending each patient.



Questionnaires to judge knowledge, attitude & practice of all participants (88)	Response (Yes)	%
Questions:-		
Do you know infection can be transmitted by mobiles?	21	24%
Do you know mobile phones with a cover can prevent infection?	70	79%
Use of mobile phones other than calls /messages?	67	76%
Use of mobile phones while attending patient?	57	65%
Is the mobile phone routinely sanitized?	18	21%
Proper hand hygiene practices followed before & after attending each patient.	35	40%

## DISCUSSION

In this study our main aim was to isolate the bacteria which contaminate the cell phones of health care personnel as they are the ones who come in maximum contact of patient's while taking their care. This poses a potential health risk to them. Also it results in contamination of those zones of hospitals which are already sterile. The surface spread method is an easy and useful tool for detection of bacterial contamination of mobile phones. In today's era, mobile phones are widely used in the health care facility & there is no restriction for use of mobile phones despite of the microbial load they carry<sup>(10)</sup>. Mobile phone act as source for the transmission of nosocomial infections<sup>(3-6)</sup>. These infections increase the risk of mortality among patients, the various factors responsible for such infections vary from hospital to hospital and from one geographical area to another<sup>(7)</sup>. In a study done by Salim et. al.<sup>(9)</sup> Swab samples for bacterial contamination in their study were collected from 40 mobile phones of patients and health care workers at the Alexandria University Students' Hospital. All of the tested mobile phones (100%) were contaminated with either single or mixed bacterial agents. Incidence of nosocomial infections can be reduced by properly sanitizing phones and following hand hygiene practices by HCWs before and after examining the patients<sup>(10)</sup>. The most prevalent bacterial contaminants were Methicillin-resistant *S. aureus* and *Coagulase-negative Staphylococci* representing 53% and 50%, respectively. Similar results were reported by study done by Tagoe et.al<sup>(11)</sup>. In present study, out of 200 samples CONS were the most prevalent bacteria i.e. 91 (45.5%). CONS have low virulence and are normal flora of skin but now it has become the most common cause of nosocomial bacteraemia associated with indwelling devices. Similar study was done by Shekhar Pal et.al<sup>(1)</sup>.. and results were in concordance with our study. A cross-sectional study was done by Shadi Zakai et. al.<sup>(13)</sup> in which they identified both pathogenic and non pathogenic bacteria on cell phones of 105 medical students at King Abdulaziz University, Jeddah, Saudi Arabia, using standard microbiological methods. Out of 105 cell phones screened, 101 (96.2%) were contaminated with bacteria. Coagulase-negative Staphylococci were the most abundant isolates (68%). 17 (16.2%) cell phones were found to harbor *Staphylococcus aureus*. Gram-positive bacilli were isolated from 20 (19%) samples.

On the contrary, in our study second most common isolate was *Citrobacter* i.e. 50 (25%) followed by *Staphylococcus aureus* i.e. 2 (11.5%).

## CONCLUSION

Restriction of cell phones in clean zones of hospitals like OT, ICU or facilities of lockers should be mandatory. Due care should be taken when using phones especially during working hours. Hand hygiene must be taken care before and followed handling of phones to reduce risk of nosocomial infection. Adequate decontamination of phones by cleaning it with 70% Isopropyl alcohol, prove beneficial in curtailing transmission. Use of mobile phones in health care set up should be restricted only for emergency calls especially in high risk areas such as OT, ICU, labour room, postoperative wards and laboratories.

### Take Home Message and Recommendations

There is recommendation of restricted use of mobile phones in high risk areas of hospitals when required, base phone can be used. Reasons for restriction are

- Slightest distraction can lead to communication of wrong results to the patients.
- Potential carrier of harmful bacteria and can result in contamination in sterile zones in microbiological laboratories.
- Danger of fire or explosion in laboratory and restricted zone of hospitals which may prove disastrous.
- As the camera feature can be used to take pictures of sensitive documents or facilities and convey them to outside interested parties, security of hospital data is must.
- Due care should be taken when using phones especially during working hours. If needed, individual should keep the phone on their person, under their lab coat and only make or attend calls in emergency after removing gloves. HCW should keep their mobile phones in Sterilised Bags for emergency use and regular cleaning of mobile phones with disinfectants are recommended.
- Proper hand hygiene practices should be followed before and after handling of phones to reduce risk of nosocomial infection.
- Adequate decontamination of phones by cleaning it with 70% Isopropyl Alcohol is one such process which could reduce the risk of cross contamination of bacteria and may prove beneficial in curtailing any potential disease transmission.
- Lockers should be provided for safe custody of mobile phones along with other valuables items for all health care personnel.

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