



**ORIGINAL RESEARCH PAPER**

**Anesthesiology**

**MICROBIOLOGICAL CONTAMINATION OF MOBILE PHONES OF HEALTH CARE WORKERS IN OPERATION THEATRE OF A TERTIARY CARE HOSPITAL**

**KEY WORDS:** Mobile phones, Health Care Workers, Microbial contamination

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**ABSTRACT**

**BACKGROUND:** Mobile phone use by the Health Care workers in hospitals is a common practice. They are frequently contaminated with micro-organisms and are rarely disinfected. The objective of this study was to find out the prevalence of contamination of mobile phones in the operation theatre of a tertiary care hospital.

**METHODS:** All the HCWs present in the OT on a random day were chosen for collection of swabs from mobile phones for culture. A questionnaire was given to each HCW to fill demographic profile and questions related to mobile phones use and disinfection practices. The samples were cultured, the organisms grown were identified and results analysed.

**RESULTS:** 63 HCWs were part of the study and a total of 67 samples were taken. 29 (43.3%) samples were found to be positive for microbial culture. Most common organisms grown were coagulase negative Staphylococcus (CoNS), the virulent organisms grown were Acinetobacter, E coli and MRSA.

**CONCLUSION:** A significant number of mobile phones were found to be contaminated with microbial organisms in the OT of our hospital. Mobile phone disinfection should be part of infection prevention protocols in Operation Theatre.

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**INTRODUCTION**

Technology is an essential part of modern day practice of medicine. Mobile phones are one of many gadgets which not only keep us connected with other health care professionals but also keep us updated with the latest developments in our field. Mobile phones are now connected to the Hospital Information System and deliver patient information in real time including vital parameters, laboratory investigation results, radiological imaging and opinion of clinicians.

Study on telephones as a potential source of infection were first published in early 1980's by White- Raffery [1,2]. Health Care associated infection (HAI) are a leading cause of morbidity and mortality among patients in health care facilities and cause significant financial burden on the state. Health Care Workers (HCWs) are routinely contaminated by pathogens. Mobile phones in last decade and a half have emerged as a potential source of HAI [3,4].

Mobile phones are used at every possible place, home, kitchen, washroom, market place exposing them to different types of microorganisms. They are rarely cleaned being electronic gadgets. There are reports of colonization of bacteria on cell phones exposing our patients to nosocomial infections through contact [5].

Operation Theatre (OT) of any hospital offers cleanest and sterile environment for patients undergoing surgeries. The cellphones are possessed by all HCWs working in OT.

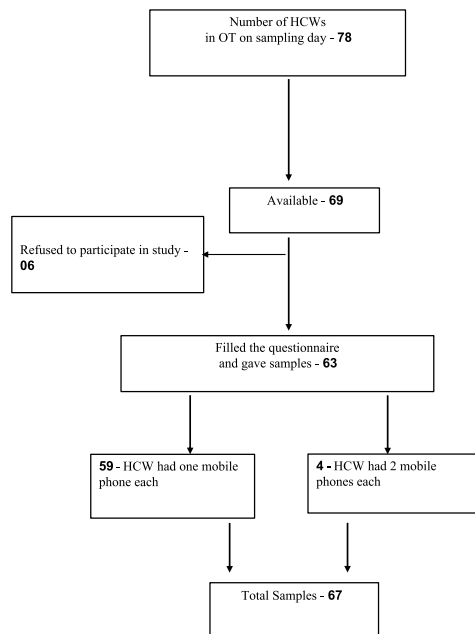
We conducted a spot surveillance of cell phone contamination in the operation theatre of our hospital, a tertiary care hospital. The aim was to find out the quantum of contamination the cell phones carry and the potential threat they pose as a source of infection and formulate suitable guidelines for their decontamination.

**MATERIAL & METHODS**

A day was randomly chosen for the spot surveillance of the mobile phones of all available HCWs in the OT of our hospital for contamination. No prior intimation was given to the HCWs and the date and time of the sample collection was kept confidential. All mobile phones were collected in sterile polybags and allocated a number. The identity of the cell phone owners was kept confidential. The participation was voluntary and the HCWs were given a choice to or not to participate in the study. A total of 68 HCWs were present in the OT on the day of study, 05 HCWs refused to participate, 63 HCWs were part of study, 04 HCWs had two mobile phones each, both the mobile phones from them were included in the study. A total of 67 cell phones were available for the study. The recruitment of HCWs and flow chart is as per Fig 1. The samples were taken by 04 laboratory technicians who were briefed by the microbiologist, sterile swab sticks were moistened with sterile demineralized water and rubbed on both sides of the mobile phones and inoculated on MacConkey and blood agar plates. Alcohol based disinfectant was used for hand hygiene after every sample was taken to prevent cross contamination. After the sampling cell phones were returned back to the HCWs. All the participants were given a short questionnaire to fill, care was taken to keep the questionnaire confidential. The questionnaire besides demographic profile had questions regarding the purpose of usage of mobile phones, the places they are used and the disinfection of mobile phones. The collected samples were incubated in the media at a temperature of 37 degree Celsius for 48 hours. The data was analysed by using Microsoft Excel 2007 and the Statistical Package for Scientific Solutions (SPSS) version 22.0 Proportions were calculated and Chi square test was used as a test for significance. A p value of less than 0.05 was considered significant. The data collected included the demographic characteristics and professional profile of the

participants. The data pertaining to microbiological growth of the contaminating bacteria was noted and analysed.

**Fig 1. Patients Flow Chart**



**RESULTS**

A total of 63 HCWs were part of the study, 04 HCWs had 02 mobile phones each, making it a total of 67 samples which were tested for microbial growth. The demographic and professional profile of HCWs is as per Table 1. Out of the 63 HCWs 09 were females and 54 were males. The mean age was 35.2 years with SD of 7.6. The participants included 13 Surgeons, 06 Anaesthesiologists, 07 Surgery and Anaesthesiology residents, 04 theatre nurses and 33 operating room assistants. According to the questionnaire except 03 participants 60 HCWs reported to be using their mobile phones in the OT. The commonest reason for use was answering calls by 92% of the HCWs, 35% HCWs used their cell phones for browsing the net for professional information. 30% of the HCWs used mobile phones to take picture of the procedures carried out. Only 28.5% of the HCWs reported to disinfect their phones 2-3 times a week, none of them did it daily. The disinfectant used by all of them was alcohol based disinfectant.

Out of 67 samples 29 (43.3%) samples tested positive for microbial growth. The microbial growth pattern is as per table 2. Coagulase Negative Staphylococcus (CoNS) was the commonest organism grown in 17 out of 29 positive samples (58%).

**Table 1 Demographic Characteristics and Professional profile**

Demographic Characteristics	Mean ( Standard Deviation)
Age (Years)	35.2 (7.6)
Gender	
Male	54 (85.5%)
Female	09 (14.5%)
Professional profile	
Consultant Surgeons	13
Consultant Anaesthesiologists	06
Residents Surgery & Anaesthesia	07
Theatre Nurses	04
Operating room Assistants	33

**Table.2 Microbiological profile**

		Positive	Negative
		N (%)	
		29 (43.3)	38(56.7)
a)	CoNS	17 (25.3)	
b)	Streptococcus Viridans	02 (2.9)	
c)	Staphylococcus Aureus		
	i. MSSA	01 (1.5)	
	ii. MRSA	02 (2.9)	
d)	Other Gram positive Bacilli	03 (4.4)	
e)	Acinetobacter	02 (2.9)	
f)	Escherichia Coli	01 (1.5)	
g)	Enterococcus	01 (1.5)	

CoNS – Coagulase Negative Staphylococci  
 MSSA – Methicillin Sensitive Staphylococcus Aureus  
 MRSA – Methicillin Resistant Staphylococcus Aureus

**DISCUSSION**

The present study was carried with an aim to find out the microbiological contamination of mobile phones of HCWs in operation theatre of our tertiary care hospital. A total of 43.3% mobile phones were found to be contaminated. This figure is quite close to the study by Saxena et al [6] who quoted a figure of 42% of cell phones found to be contaminated. Much higher rates of contamination have been found in studies by Heyba et al [9] with 73.7% cell phones being found to be colonized in various Intensive care units in Kuwait and Ustun Cet al [4] who found 97.8% cell phones to be contaminated with microbial organisms. This wide variation could be because of sample being selected from various departments of the hospital, different categories of HCWs and to some extent different laboratory techniques.

The study was also aimed to describe the microbiological profile of the contaminated mobile phones in the OT. Most of the phones that showed growth had normal flora such as Coagulase Negative Staphylococcus (CoNS) 19 out of 67 samples (28.3%). Our results were similar to study by Brady RR et al [3] which showed CoNS to be the commonest organism isolated. CoNS are nonvirulent in the normal circumstances but pose a risk of infection in the settings of ICU in immunocompromised patients [7]. The positive swab samples from mobile phones for potentially pathogenic bacteria were 12 (18% of all the samples). MRSA was isolated in 02 samples (2.9%), the rate of isolation of MRSA in our study was comparable to a growth percentage range of 2-10% in a review of mobile devices as a potential source of nosocomial pathogens by RRW Brady et al [3]. E coli and Acinetobacter were the gram-negative bacteria isolated from the samples. E Coli was isolated in 01 sample (1.5%), which suggests a poor hand hygiene as it is potentially pathogenic bacteria from the gut flora [8]. Acinetobacter was isolated from two mobile phones (3%), the isolation frequency of Acinetobacter in various studies which have been covered in the review by Brady RRW et al quoted above is 1-12%. As per the questionnaire only 18 participants admitted to surface disinfect their mobile phones 2-3 times a week with alcohol based disinfectant. Only 04 mobile phones out of these 18 showed positive culture (22.2%), the corresponding figures for the participants not using any disinfectant are 25 positive cultures out of 45 (55.5%), this difference was found to be statistically significant with p value less than 0.02. Disinfection appeared to be a major factor in reducing the rate of positive culture of microorganisms. Similar conclusion was drawn in the study conducted by Heyba et al in 2015 [9]. No other factor like sex of the HCWs or the professional profile was found to be significantly associated with the rate of positive cultures from the mobile phones.

**CONCLUSION**

A significant number of mobile phones in the Operation

Theatre were found to be contaminated with bacteria. Most of these bacteria, though are nonpathogenic in normal circumstances but may become significant among the patient population. Frequent surface disinfection of mobile phones decreases colonization of bacteria on the mobile phones but is practiced by a very few HCWs. Daily disinfection practice of mobile phones of all HCWs should be part of Operation Theatre safety protocols for prevention of infection.

**CONFLICT OF INTEREST** – None declared

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