



ORIGINAL RESEARCH PAPER

Dental Science

CELLULAR TELEPHONE AS A PATHOGEN RESERVOIR: MYTH OR FACT

KEY WORDS:

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INTRODUCTION

Mobile phones have become a most important part of daily life.¹ Mobile phones have now become an easiest and fastest means of communication. The vast majority of mobile phones are hand-held.² Constant handling of these gadgets generates heat and creates a prime breeding ground for numerous microbes that are normally found on the skin.³ It has been reported that a mobile phone can harbor more microorganisms than a toilet seat, the sole of a shoe or the door handle.⁴ Hospital-acquired infection (HAI) is an increasing global concern for patient safety. The potential sources of HAIs consist of patient's own flora; inanimate hospital objects; medical personnel; or, less often, the visitors. Hand washing may not usually be performed often enough and many people may use a personal mobile phone during working hours throughout the day, thus the potential role of mobile phones as a source of microbial transmission is considerable.⁵ Many epidemiological studies have confirmed that a various number of contaminated surfaces play a major role in the spread of infectious diseases.⁶ Mobile phones are more problematic compared with other stationary fomites because they facilitate inter-ward (and possibly inter-facility) transmission, and pathogens on them are very difficult to eliminate.⁷

AIMS AND OBJECTIVE

- To assess bacterial contamination of cellular telephone of Dental Care Personnel.
- To determine factors contributing to bacterial contamination of the cellular telephones used by them.
- To correlate the bacterial contamination with the use of cellular telephone by them.

MATERIALS & METHOD

This study is a cross sectional descriptive study which was carried out in the Out patient department of Himachal Institute of Dental Sciences Paonta Sahib, Himachal Pradesh. The study included 300 participants.

Sampling Design

In this study the samples were divided under 3 groups. Dental

RESULTS

Table 1: Distribution of microorganisms isolated from cellular telephone of study participants

PATHOGEN		DHCP (n=100)	IHP (n=100)	OHP (n=100)	Pearson Chi-square	p value
Non-potential pathogens	Spore bearing gram positive bacilli	20	16	17	.596	.742
	Coagulase negative Staphylococci (CoNS)	27	35	59	23.04	<.001**

Health care personnel (DHCP), In-Hospital Personnel(IHP), Out-Hospital Personnel(OHP).

Dental Health care personnel (DHCP).

- Those who come in direct contact with the patient (10-20/day)
- Doctors, Post-Graduate students, Interns, final year B.D.S students, House Surgeons
- Included 100 samples for study.

In-Hospital Personnel (IHP).

- Those who do not come in direct contact with patients.
- 1st and 2nd year B.D.S students, Lab. Technicians
- Included 100 samples for study.

Out-Hospital Personnel (OHP).

- Those who are not the employs of the hospital
- Patients and their attendants/ relatives
- Included 100 samples for study.

Collection of Sample

Sterile cotton Swab was wiped along the front and sides of handset with slight rotation several times and Swab was immediately incubated in glucose broth (transport media).

Analysis of Sample

The swab was subplated onto MacConkey and Blood Agar; incubated for 48 hrs at 37 °c. Plates isolates were subcultured for purity and identified employing standard methods. Microbiological Analysis of all the samples was done at clinical microbiological laboratory of the hospital. Isolated microorganisms were identified using gram stain, morphology, catalase, and oxidase reaction, and all isolates were allocated to the appropriate genera. Gram-positive cocci (GPC) were tested for catalase and coagulase reactions (Staphaurex, Murex Diagnostics Limited, Hartford, England). Catalase-positive, coagulase-positive GPC were identified as Staphylococcus aureus and were further tested for antibiotic sensitivity, including methicillin resistance. Antibiotic sensitivity was done using the Kirby-Bauer disc diffusion method on Mueller-Hinton agar according to Clinical Laboratory Standards Institute antibiotic disc susceptibility testing guidelines.

Table 2: Distribution of microorganisms isolated from cellular telephone of study participants

PATHOGEN		DHCP (n=100)	IHP (n=100)	OHP (n=100)	x2	p value
POTENTIAL PATHOGENS	Enterobacter growth	14	13	0	14.89	.001**
	Pseudomonas species	8	0	6	7.792	.020*
	Methicillin Sensitive Staphylococci aureus (MSSA)	8	9	4	2.151	.341
	Methicillin Resistant Staphylococci aureus (MRSA)	29	4	0	50.46	<.001**
	Acinetobacter	2	0	6	7.192	.027*

Table 3: Distribution of microorganisms between the groups

PATHOGEN		DHCP-IHP		DHCP-OHP		IHP-OHP	
		Pearson Chi-square	p value	Pearson Chi-square	p value	Pearson Chi-square	p value
Non-potential pathogens	Spore bearing gram positive bacilli	.542	.462	.298	.716	.036	.849
	Coagulase negative Staphylococci (CoNS)	1.496	.221	20.89	<.001**	11.56	<.001**

Table 4: Distribution of microorganisms between the groups

PATHOGEN	POTENTIAL PATHOGENS	DHCP-IHP		DHCP-OHP		IHP-OHP	
		x ²	p value	x ²	p value	x ²	p value
	Enterobacter growth	.043	.836	15.05	<.001**	13.91	<.001**
	Pseudomonas species	8.33	.004*	.307	.579	6.18	.013*
	Methicillin Sensitive Staphylococci aureus (MSSA)	0.64	.800	1.41	.234	2.06	.152
	Methicillin Resistant Staphylococci aureus (MRSA)	22.68	<.001**	33.91	<.001**	4.08	.043*
	Acinetobacter	2.02	.155	2.08	.149	6.18	.013*

DISCUSSION

The possibility of transmission of nosocomial pathogens by electronic devices used in the hospitals has been previously reported; some of which were epidemiologically important drug-resistant pathogens.⁸ Almost all the mobile phones sampled in the three groups at our dental school cum hospital were contaminated.

In the present study 27 cellular telephones of the DHCP group were contaminated with CoNS, and 20 telephones were contaminated with spore bearing gram positive bacilli which are non potential pathogens, while 61 telephones had potential pathogens. Use of mobile phones by dental faculty and trainees involved in direct patient care not only demonstrated a high contamination rate with bacteria, but more importantly with nosocomial pathogens (Staphylococcus aureus, Acinetobacter, Pseudomonas, Staphylococcus citreus).⁹ 30% of nosocomial infections in the ICUs are associated with Acinetobacter spp.¹⁰ A similar study in Israel identified multidrug-resistant Acinetobacter baumannii on the hands, cell phones of health care workers, and patients admitted to the ICU.¹¹ The potential pathogens in the IHP and OHP group were seen in 26 and 16 cellular telephones respectively. Personnel with direct contact with the patient and an increased atmospheric bacterial contamination during routine dental activity could be probable factors for the increased bacterial contamination. Negligence on the part of the dental personnel on using cellular telephone while performing a dental procedure.

Nosocomial infections have become a potential threat in health care setups. The hospital environment plays a critical role in the transmission of organisms associated with nosocomial infections. Micro-organisms can be transferred from person to person or from inanimate objects (such as stethoscopes, bronchoscopes, pagers, ballpoint pens, patient hospital charts, computer keyboards, mobile phones and fixed telephones) to hands and vice versa.¹² The cellular telephones being used in close proximity to such surfaces have an increased risk of being cross-contaminated with such organisms.

The distribution of micro organisms between the groups was calculated with significant differences between the groups on comparing MRSA bacteria, highlighting the presence of wide range in distribution of the same. Organisms which were non significant in distribution between the three groups showed the uniformity of its presence, irrespective of the environment they are subjected to.

CONCLUSION

Use of cellular telephone by the Dental care personnel excessively while in hospital can potentially act as 'Trojan Horses' or 'carrier' of pathogenic bacteria. The benefit of using cellular telephones in the hospital should be weighed against the risk for unperceived contamination.

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