



RESEARCH ARTICLE

POTENTIAL ROLE OF CELLPHONES IN HOSPITAL ACQUIRED INFECTIONS

*Shakthivel, M., Suresh, V. C., Vinod, R. and Easow, J. M.

Sri Venkateshwaraa Medical College, Pondicherry University

ARTICLE INFO

Article History:

Received 18th October, 2016
Received in revised form
10th November, 2016
Accepted 20th December, 2016
Published online 31st January, 2017

Key words:

Cellphones, Disinfectant, Health care worker (HCW), Resistance pattern.

Copyright©2017, Shakthivel et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Citation: Shakthivel, M., Suresh, V. C., Vinod, R. and Easow, J. M. 2017. "Potential role of cellphones in hospital acquired infections", *International Journal of Current Research*, 9, (01), 45070-45072.

ABSTRACT

Background and Objectives: The use of cellphones has increased as an easy mode of communication. Health Care Workers (HCW) have made it a potential fomite in transmission of Hospital Acquired Infections (HAI). At present there are no guidelines for the care and disinfection of cellphones in the health care setting. This study is aimed to determine the resident organisms, its frequency, antibiotic susceptibility and efficacy of isopropyl alcohol in disinfecting mobiles.

Methods: Swabs from 100 cellphones were taken; 50 each from study and control group. Two samples were collected from each phone using sterile cotton swabs and cultured as per standard protocol. Phones were disinfected with 90% isopropyl alcohol using sterile gauze piece.

Interpretation and Results: 70 % of cellphones of HCW were contaminated, with a predominance of *Pseudomonas spp.* - 71.4%. The disinfection procedure was effective only in 57% of cellphones.

INTRODUCTION

Cellphones are an essential commodity for our daily lives. It is a potential fomite for transmission of HAI. According to Meltzer (Meltzer, 2003), possibility of spillover of nosocomial infections to the environment and community, is likely due to the usage and portability of cellphones. Rarely HCW clean their hands before attending the phone. Cellphones harbor bacteria by providing suitable temperature (21-35° C) and act as breeding site in pockets and handbags. Research on bacterial contamination of cellphones, pens, otoscopes and stethoscope reported potentially pathogenic bacteria such as *Methicillin Resistant Staphylococcus aureus* (MRSA). At present, there is a lack of guidelines for appropriate use and care of cellphones in health care settings. This study attempts to determine the resident organisms, frequency, antibiotic susceptibility, role in HAI and the efficacy of isopropyl alcohol in disinfecting mobiles

MATERIALS AND METHODS

This study was conducted from May to August 2014 at Sri Venkateshwaraa Medical College Hospital & Research Centre, Pondicherry. Institutional ethical committee clearance, informed verbal consent were obtained before initiating the study. Using random sampling method, 50 cellphone samples each, were collected from HCW and control group. Two

samples from each phone were collected, one before and one after disinfecting the phone.

Sample collection: Sterile swab moistened with sterile saline was used to collect the samples from the QWERTY keypads and touch screens of mobiles.

Exclusion criteria: Phones purchased within the previous two weeks.

Disinfection procedure: A sterile gauze was soaked in 90% isopropyl alcohol, squeezed, and applied over the keypads and screen for 30 seconds. A second sample was collected over the same area after disinfection.

Processing of samples: Samples were transferred to the laboratory, inoculated on Blood and MacConkey agar and incubated overnight. Direct smears were made, isolates were identified and antibiotic susceptibility test was performed as per specific protocols. Results were analyzed using SPSS version 17.

RESULTS

70% (35) of the samples from study group and 38 % (19) of control group showed growth. Results are illustrated in Figure I and Table I.

Efficacy of isopropyl alcohol: Disinfection amongst study group was 57.14% (20/35) effective while 100% in control group.

*Corresponding author: Shakthivel, M.

Sri Venkateshwaraa Medical College, Pondicherry University

Table I. Distribution of bacterial isolates from the study group (HCW) and controls

Organism	HCW(50)		Control (50)		p-value
	n	%	n	%	
Diphtheroids	1	2	0	-	0.317
MSCoNS	2	4	7	14	0.081
MSSA	3	6	3	6	NA
MRSA	2	4	0	-	0.153
Micrococci	1	2	9	18	0.007
<i>Pseudomonas spp.</i>	25	50	0	-	0.001
<i>Klebsiella</i> spp	1	2	0	-	0.317
No growth	15	30	31	62	0.0013

Table II. Antibiotic susceptibility of *Pseudomonas spp.*

S.No.	ANTIBIOTICS	Sensitive (%)	Resistant (%)
1	Cotrimoxazole (COT)	87.5	12.5
2	Ofloxacin (OF)	100	-
3	Doxycycline (DO)	100	-
4	Cefoperazone (CPZ)	92	8
5	Cefixime (CFM)	48	52

Table III. Susceptibility of *Staphylococcus spp.* to First line antibiotics (%)

Organism	COT	OF	Ampicillin	DO	CPZ	E (Erythromycin)	OX (Oxacillin)
1. <i>Staphylococcus aureus</i> (5)	60	80	20	100	60	80	60
2. <i>Staphylococcus epidermidis</i> (2)	0	50	0	100	100	50	100

Prior to disinfection, 20 phones in which disinfection was successful initially showed growth of 60% *Pseudomonas spp.*, 10% MRSA, 10% MSSA, 10% CoNS, 5% *Klebsiella spp.*, 5% *Micrococci*. The rest 15 phones in which disinfection was ineffective showed growth of *Pseudomonas spp.* 93% and MSSA 7%. Among the ICU staff, disinfection was effective in 93.33% cellphones. Antibiotic susceptibility pattern of the isolated organisms is shown in Table II, Table III and Figure III.

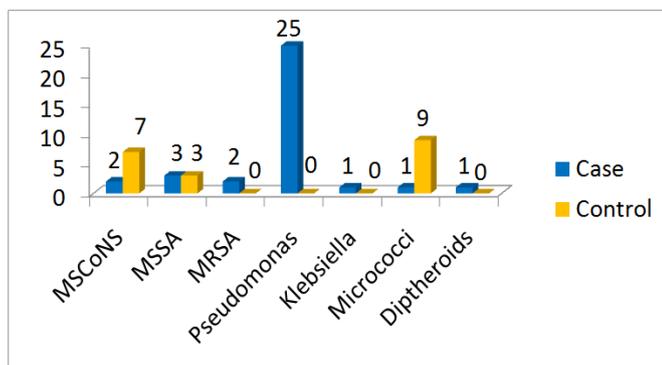


Figure I. Distribution of bacterial isolates

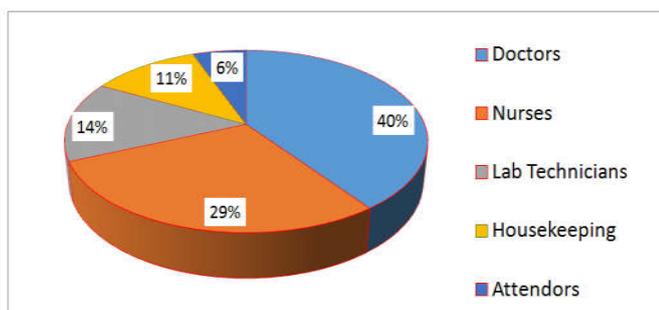


Figure II. Percentage of bacterial contamination of mobiles among HCW

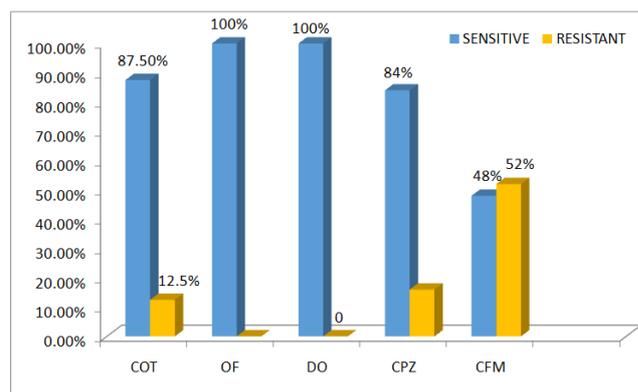


Figure III. Antibiotic susceptibility of *Pseudomonas spp.*

DISCUSSION

In our study there was overwhelming growth of *Pseudomonas spp.* (50%). A similar research from Saudi Arabia (Al-Abdalall, 2010) had Gram negative bacteria predominating with *Pseudomonas spp.* in 8% of the cellphones. Matching reports of *Pseudomonas spp.* 14% and *Klebsiella spp.* 9.3% have been reported from third world countries such as Nigeria (Emmanuel et al., 2013). An Indian study, pens were studied as vectors (Patil et al., 2010), reported 10.41% contamination with *Pseudomonas spp.* and 16.66% *Klebsiella spp.* with the added isolate of *E.coli* being present, which was not isolated in our study. On comparing these results with our study, there was a two fold increase in Gram negative organisms. This marked variation may be due to the dominating effect of *Pseudomonas spp.* which inhibits commensal bacteria, thus accounting for frequent isolation from fomites in hospitals. The Gram positive isolates in our study show a stark contrast to the study conducted by Datta et al. (2009) and Padmaja et al. (2011) which shows exclusively gram positive organisms. No gram negative bacteria were isolated from our control group. This indicates resistant strains are not easily spread into our local community. The p-value of 0.001 for *Pseudomonas spp.*

supports that it is a major causative factor for HAI. The p-value of gram positive which are higher in control group isolates suggests that growth of commensals is higher.

Efficacy of disinfection with isopropyl alcohol: The disinfection procedure was 57.14% (20/35) effective. This result was not satisfactory as compared to the 100% efficacy as shown by Mehta *et al.* (2013). As the disinfection procedure with isopropyl alcohol was ineffective in our study, it must be used with caution as a regulatory method for maintaining sterility. However, the effectiveness of disinfectants is reduced in the presence of biofilms. Other factors which may affect the disinfection is the quality and quantity of alcohol used which necessitates further studies.

Bacterial Contamination rate among ICU stuff: ICU where impeccable and uncompromising aseptic conditions were maintained, 34.86% of phones were contaminated. On comparison with a study in Austria (2007) among anesthetists, 95% of their phones were contaminated.

Antibiotic sensitivity: Amongst *Pseudomonas spp.* 48% were sensitive to Cefixime and 92% for Cefoperazone. Use of Cephalosporins as presurgical prophylaxis and as a first choice drug by General Practitioners could have added to the rise in resistance. As Cotrimoxazole usage is diminished, it was found to be 87.5% sensitive to *Pseudomonas* favoring antibiotic cycling. Among the gram positive bacteria, all cocci were sensitive to tetracycline, 80% to erythromycin. 40% of the staphylococcus aureus isolates were MRSA. This study may be used as a model for formulating policies. This study can be strengthened with a larger sample size.

REFERENCES

- Al-Abdalall, A. H. 2010. Isolation and identification of microbes associated with mobile phones in Dammam in eastern Saudi Arabia. *J Family Community Med.*, 17:11.
- Datta P, Rani H, Chander J, Gupta V. 2009. Bacterial contamination of mobile phones of health care workers. *Indian J Med Microbiol.*, 27: 279-81.
- Emmanuel CA, Tochukwu NN, Vera E. 2013. Mobile phones of health care workers are potential vectors of nosocomial agents. *Afr J Microbiol Res.*, 7:2776-81.
- Jeske HC, Tiefertalder W, Hohliedier M, Hinterberger G, Benzer A. 2007. Bacterial contamination of anaesthetist's hands by personal mobile phone and fixed phone use in the operating theatre. *Anaesthesia.*, 62:904-6.
- Manjula M, Jyoti S, Sonia B. 2013. The role of mobile phones in the spread of bacteria associated with nosocomial infections. *International Journal of Engineering and Industries*, 1:58- 60.
- Meltzer B. 2003. Nosocomial Infections: Doctor's cell phones may spread hospital infections. *Outpat. Surg. Mag.*, 11:1-4
- Padmaja N. and Nageswara RP. 2011. A study on bacterial contamination of cell phones of health care workers (HCW) at KIMS Hospital, Amalapuram. (personal communication)
- Patil P, Hulke S, Thakre A, Gaikwad M. 2010. Pen of health care worker as vector of infection. *Online J Health Allied Sci.*, 9:15.
