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The Microbial Colonisation of Mobile Phone Used by Healthcare Staffs

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Abstract: Mobile phones are dispensable accessories in social life and normally they are not cleaned properly. Therefore, they serve as a reservoir of bacteria and may cause nosocomial infections in hospitals. The purpose of this study was to investigate microbiological colonization of mobile phones used by healthcare staffs. The study was carried out collecting swab samples with Cary-Blair transport medium from mobile phones of attending healthcare staffs from different departments of three hospitals in March, 2008. All collected samples were inoculated in 5% sheep blood agar, eosin-methylene blue agar and Sabouraud Dextrose agar. Isolated bacteria were identified using by classic technique and Vitec2 (Biomerieux, France) full automated bacteria identification system. Growth was observed in 65 of collected 106 samples, corresponding to 61.3%. The most frequent bacteria were *Staphylococcus epidermidis* followed by *Staphylococcus aureus*, *Bacillus* sp., *Corynebacterium* sp. and *Escherichia coli*, respectively. In conclusion, bacteria were colonized on mobile phones frequently and mobile phones may become reservoir of microorganism for nosocomial infections.

Key words: Mobile phone, colonization, healthcare staff

INTRODUCTION

Even if isolation, disinfection and sterilization techniques were applied with the use of new and wide spectrum antibiotics, nosocomial infections have been causing high mortality and morbidity. It was reported that equipments used in hospitals, such as sphygmomanometer, thermometer and stethoscopes, are likely to be contaminated with bacteria and may transmit bacteria to patients (Cohen *et al.*, 1997). Mobile phones are dispensable accessories in social life, often they are not cleaned properly. Although, patients do not have direct contact with mobile phones, colonized bacteria on the devices may be transmitted to them by healthcare staff. In patients with strong immune system, the bacteria may not do any harm but in patient groups with weak immune system, it may cause nosocomial infections as reported previously by Karabay *et al.* (2007) and Brady *et al.* (2006).

In the light of these, this study was designed to investigate colonized microorganism on mobile phones from healthcare staff worked in different departments of hospitals.

MATERIALS AND METHODS

Collection of samples: The samples were collected from three hospitals; grouped as 1, 2 and 3. One hundred and six samples were collected from mobile phones of healthcare staffs and thirty samples were collected as control from people not related with health service. Age and sex dispersion of the control group was similar to study group. They have been asked to clean mobile phones with alcohol.

The samples were collected by rotating cotton swabs on the keypad, earpiece and mouthpiece and then inoculated in the Cary-Blair transport medium.

Later, subcultures were made on 5% sheep blood agar, Eosin Methylene-Blue (EMB) agar and Sabouraud Dextrose Agar (SDA). Plates were incubated at 37°C during 24-48 h for bacteriological investigation and at room temperature for 2 weeks for mycological investigation. Microorganisms grown on plates were identified with conventional techniques and Vitec2 full automated identification system.

RESULTS AND DISCUSSION

One hundred and six samples were collected from 68 doctors and 38 nurses. Distribution of samples according to hospital departments and healthcare staffs was shown in Table 1. Growth was observed in 65 samples (61.3%). Isolated bacteria were showed at Table 2.

In 11 samples, which were shown as polymicrobial in Table 2, isolated bacteria were more than one. Three of them had *S. epidermidis* and *S. aureus*, 2 of them had *S. epidermidis* and *Corynebacterium* sp., 2 of them had *S. epidermidis* and *Bacillus* sp., 1 of them had *S. epidermidis* and *E. coli*, 1 of them had *S. epidermidis* and *Penicillium* sp., 1 of them had *S. epidermidis* and α -hemolytic streptococcus. Growth was observed in 4 of 12 samples from mobile phones cleaned with alcohol at least ones a week, although growth was in 61 of 94 samples from mobile phones not cleaned anyway. Samples collected from control group have been shown at Table 3.

Table 1: Samples distribution according to hospital departments and healthcare staffs

Department	Group						Total
	1		2		3		
	Doctor	Nurse	Doctor	Nurse	Doctor	Nurse	
Cardiology	3	3	1	3	2	2	14
Emergency	2	-	3	2	4	2	13
General surgery	3	-	2	2	2	2	11
Pediatric	3	2	3	1	2	-	11
Gastroenterology	2	1	4	1	-	2	10
Internal diseases	4	2	1	2	1	-	10
Orthopedic	3	-	2	2	1	-	8
Pulmonary diseases	2	1	2	2	-	-	7
Psychiatry	2	1	2	1	-	-	6
PTR	1	-	2	1	2	-	6
Hematology	1	2	1	1	-	-	5
Laboratories	5	-	-	-	-	-	5
Total	31	12	23	18	14	8	106

Table 2: Distribution of isolated bacteria from samples

Microorganisms	Cleaned with alcohol (n = 12)	Not-cleaned (n = 94)	Total (n = 106)
<i>S. epidermidis</i>	4	35	39
<i>S. aureus</i>	-	8	8
<i>Bacillus</i> sp.	-	2	2
<i>Corynebacterium</i> sp.	-	2	2
<i>E. coli</i>	-	1	1
Alpha-hemolytic streptococcus	-	1	1
<i>Penicillium</i> sp.	-	1	1
Polymicrobial	-	11	11
Not growth	8	33	41

Table 3: Distribution of isolated microorganism from control group

Microorganisms	Cleaned with alcohol (n = 12)	Not-cleaned (n = 94)	Total (n = 30)
<i>S. epidermidis</i>	2	14	16
<i>Bacillus</i> sp.	-	4	4
Not growth	2	12	14

From 30 samples of control group, growth was observed in 16 samples (53.3%) and in 4 samples *S. epidermidis* and *Bacillus* sp. were isolated together.

As a result, growth was observed in 65 of 106 samples from treatment groups and in 16 of 30 samples from control group.

Nowadays, nosocomial infection still poses increasing significance. Many-sided studies about prevention of nosocomial infection report a significant rate of mortality and morbidity. Economical loses were also reported. It was shown that shared equipments such as stethoscope, thermometer and sphygmomanometer may be a reservoir of microorganism as well. It was suggested that microorganism may colonize on mobile phones. Isolation of flora bacteria on hand and skin may be evaluated since many phone users may not care enough for their personal hygiene. Out of evaluated samples, growth was observed in 61%, in addition bulk of them was microorganisms belonging to normal skin and air floras. Furthermore, pathogen bacteria such as *S. aureus*, *E. coli* were isolated. Microorganisms corresponding to normal flora may act as opportunist bacteria in hospital should be in mind.

In Nigeria Ekrakene and Igeleke (2007) reported that *S. aureus*, *B. subtilis* and *E. aerogenes* were isolated from mobile phone of healthcare staffs and showed that infection might occur with these agents (Brady *et al.*, 2005).

In another study, Karabay *et al.* (2007) reported that *E. coli*, *Bacillus* sp., coagulase-negative staphylococcus, which are agents of nosocomial infection, have been isolated from mobile phones of healthcare staffs.

It was observed that mobile phones disinfected with alcohol have carried fewer bacteria. To reduce microorganism colonization on the mobile phones, hand hygiene should be emphasized more. In this respect, we suggest that hand hygiene should be a vital mechanism for preventing transmission of nosocomial infection with mobile phones of healthcare staffs.

Isolation of fewer bacteria from samples of control group was evaluated as statistically significant.

As a result of this study, more pathogen/opportunist bacteria were isolated from mobile phones of healthcare staffs than the ones of control group. These findings suggest that microbiological contamination of these mobile phones have an epidemiologic risk. Fewer microorganisms were isolated from samples of mobile phones disinfected with alcohol. It pointed that healthcare staffs should pay attention at hand hygiene.

Nevertheless, further investigations are needed to substantiate the role of mobile phones in the transmission of nosocomial infection to outside hospital.

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