Bacterial contamination of the mobile phones of nursing students involved in direct patient care

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Abstract

The use of cell phones often occurs in hospitals, by patients, visitors and health care workers, and this is one environment where hospital-associated infection is most prevalent. The objective of this study was to determine the level and type of bacterial contamination of the mobile phones of nursing students involved in direct patient care. Samples from 40 nursing students’ mobile phones were cultured and growth was identified using colony morphology, Gram stain, catalase and oxidase reaction. Also a questionnaire was used for data collection.

The rate of bacterial contamination of mobile phones is 47.5%. 52.63% of the isolates were identified as coagulase-negative staphylococci. Staphylococcus aureus strains were isolated from mobile phones of 31.58%. Gram negative bacilli were isolated from mobile phones of 15.79%.

According to these results it is obvious that, the training of students about disinfection is very important. Also, strict adherence to infection control and precautions such as hand washing and good hygienic practice among the users of mobile phones is advocated, to prevent the possibility of phones as vehicles of transmission of both hospital and community-acquired bacterial diseases.

Key words: Mobile phones, bacterial contamination, nursing students, phone hygiene.

Introduction

Today, mobile phones have become one of the indispensable accessories of professional and social life [1]. There is an international trend to incorporate mobile phones as well as other wireless technology to increase the efficiency, cost-effectiveness and quality of healthcare [2]. In Brady et al.’s study, 78% of HCWs expressed support for doctors’ use of their mobile phone within the hospital environment; the approval ratings for nurses and patients were 56% and 49% respectively [3].

The use of cell phones often occurs in hospitals, by patients, visitors and health care workers, and this is one environment where hospital-associated infection is most prevalent [4]. Mobile phones act as perfect habitat for microbes to breed, especially in high temperature and humid conditions and may serve as vectors in transmitting nosocomial infections [5]. Brady et al. [3] had shown that the combination of constant handling and heat generated by the phones creates a prime breeding ground for microorganisms that are normally found in our skin. This may be because these types of bacteria increase in optimum temperature and phones are perfect for breeding these germs as they are kept warm and easy to handle in pockets, handbags and brief-cases [4].

The aim of present study was to determine the level and type of bacterial contamination of the mobile phones of nursing students involved in direct patient care.

Methods

The study was conducted in Sakarya University School of Health Sciences, in March 2011, with the participation of 40 third-grade volunteer nursing students during their clinical practice. Students were asked to participate in a self administered questionnaire that developed by researchers. Age, gender, type of mobile phone of the students were entered in the questionnaire. Students were also asked to answer questions regarding cleaning of their mobile phone.

In total, forty mobile phones were surveyed. For sampling a sterile swab moistened with sterile saline was rotated over the surface of both sides including cover and key part of mobile phones. The sampling were immediately streaked onto two plates that consist of blood agar and eosin met-
hylene blue agar. Plates were incubated at 37°C for 24 h and 48 h. Isolated microorganisms were identified using colony morphology, Gram stain, catalase and oxidase reaction.

The bacteria which made beta-hemolysis, catalase positive, Gram-positive coci seen under the microscope with Gram stain were defined according to the the result of DNase and plasma coagulase test. Catalase negative, Gram-positive cocci were identified according to the microscopic appearance.

Isolated microorganisms from mobile phones were identified as Staphylococcus aureus, coagulase-negative staphylococci (CoNS) and Gram negative bacilli.

**Results**

The mean age of the participants was 20.48±1.48 (min 18- max 24). 67.5% (n=27) of them were female and 32.5% (n=13) were male. Types of mobile phones 82.5% (n=33) were push-button and 17.5% (n=7) were touch screen. Study results about participants’ mobil phone hygiene paractices are shown at Table 1.

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**Discussion**

In this study, 47.5% of mobile phones were found to be contaminated by bacterial agents. Colonization of potentially pathogenic organisms on mobile phones has been reported by Brady et al., Akinyemi, et al. Ulger et al., Borer et al., [3, 4, 6, 7]. Ulger et al., [6] investigated the contamination rate of the healthcare workers mobil phones and hands in opereting room and intensive care unit. The results of their study revealed a high percentage (94.5%) of bacterial contamination with different types of bacteria. Akinyemi, et al., [4] determined 15.3% bacterial contamination. In a study conducted by Ramesh, et al., [2] 45% of the samples were culture positive. Sadat-Ali et al., [8] found in their study that 43.6% health care providers carried infective organism on their cell phones, which could potentially cause infections. In a study that was conducted by Singh et al., [1] at a dental school in Manipal, India, in total, fifty mobile phones were cultured for microorganisms and %98 of them were culture-positive, and 34% grew potentially pathogenic bacteria. Kilic et al., [9] observed 61.3% growth in samples of mobile phones used by healthcare staffs in their study.

In another study conducted by Jayalakshmi et al., [10] except for the 12 new cellphones, all the others (91.6%) were found to be contaminated 76 (90.4%) owned by clinical doctors and 56(93.3%) owned by non clinical doctors. Srikanth et al., [11] sampled 51 mobile phones of healthcare workers

| Table 1. Participants’ practices about mobile phone hygiene |
|-----------------|--------|
| Cleaning frequency of mobile phone | n | % |
| once a week | 18 | 45.0 |
| biweekly | 1 | 2.5 |
| monthly | 9 | 22.5 |
| less than once per month | 5 | 12.5 |
| never | 7 | 17.5 |
| What they use to clean their mobile phone? | n | % |
| wet wipes | 30 | 75 |
| tissue paper | 4 | 10 |
| cotton with alcohol | 2 | 5.0 |
| cologne | 3 | 7.5 |
| spray and brush | 1 | 2.5 |
| How they clean their mobile phone? | n | % |
| wiping the outer surface | 37 | 92.5 |
| wiping the interspace of the key | 1 | 2.5 |
| wiping by removing the key and cover parts | 2 | 5 |
and 36 of corporate office workers. Among the mobile phones sampled, 94% were contaminated and only 6% were free of aerobic bacterial growth. In Saxena et al.’s study [12] 42% of mobile phones carried by HCWs and 18% carried by the general public were found to carry one or more organisms.

The most prevalent bacterial agent isolated from 52.63% of mobile phones was coagulase-negative Staphylococcus (CNS). This result corroborates the findings of Singh et al., [1] (78%), Karabay et al. [13] (68.4%), Ramesh, et al. [2] (50%). Also in the Srikanth et al., [11] and Kilic et al.’s studies [9] the majority of isolates were Coagulase-negative Staphylococci. Akinyemi, et al., [4] found 26.3% and Saxena et al., [12] found 23% Coagulase-negative Staphylococci.


In this study, other organisms isolated included Gram negative bacilli. Gram negative bacilli were isolated from mobile phones of 15.79%. This was 17.68% in Srikanth et al.,’s study, 31.3% in Ulger, et al., ’s study [6] , and 33% in Ramesh, et al.’s study [2].

Adequate decontamination of mobile communication devices is one approach which could reduce the risk of these devices in the cross-transmission of bacteria. Studies have consistently reported high numbers of staff who never clean their mobile communication devices (80-92%) [3,14,15] In our study it was determined that 17.5% of the students never clean and 12.5% of them clean only less than once per month their mobile phones.

According to these results it is obvious that, the training of students about disinfection is very important. Also, strict adherence to infection control and precautions such as hand washing and good hygienic practice among the users of mobile phones is advocated, to prevent the possibility of phones as vehicles of transmission of both hospital and community-acquired bacterial diseases [4].

Mobile phone producers should be aware and take action for designing of protective material against the bacterial contamination. Decontamination of mobile phones with alcohol disinfectant wipes may reduce the risk of cross contamination without any failure at device by using protective material. Furthermore, it is important for nursing education to comply hand-washing practices and routine surface disinfection through strict procedures to reduce nosocomial infections from crucial tool use such as mobile phones, pen etc.

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