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Mobile phones of Health care workers: Friend or Foe

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ABSTRACT

Mobile phones can act as a reservoir of a wide variety of bacterial species, many of which have the potential to be pathogenic. A cross sectional study was carried out in two health facilities in the southern part of Nigeria within a two month period to screen the mobile phones of health workers for bacterial contamination. 58 % of hospital staff mobile phones were contaminated with bacteria and the most prevalent bacteria was Staphylococcus aureus (34%). Other bacteria isolated were Micrococcus sp (14%), Coagulase negative Staphylococcus (24%), P aeruginosa (14%) and E.coli (14%). Mobile phones of Clinical staff were more contaminated than those of the non clinical staff though the difference was not statistically significant as p> 0.05. Cleaning and proper handling of mobile phones by all hospital staff is relevant to curtail the spread of Nosocomial infections

KEYWORDS : Mobile phones, bacteria, hospital, contamination, Nosocomial infections

Introduction

The global system for mobile telecommunication was established in 1982 and mobile phones have become one of the most essential gadget in the day to day lives of both the common man and professional. Mobile phones are used for a variety of purposes such as keeping in touch with family members, conducting business, banking services as well as paying bills (Ekrakene et al., 2007)

Apart from the need for instantaneous communication, its application is very vital within the hospital environment especially in clinically sensitive areas like wards, laboratories, intensive care units, operation theatres and recovery rooms (Rawia et al., 2012; Kabir et al., 2009).

With all the achievements and benefits of the mobile phone, it is easy to overlook the health hazard it might pose to it many users as well as Hospital acquired infections (HAI). The combination of constant handling and the heat generated by the phones create a prime breeding ground for all sorts of microorganism that are normally found on our skin (Brady et al., 2006).

Unlike fixed phones, mobile phones serve as a perfect habitat for microbes to breed providing higher temperature and humid conditions (Padma et al., 2009). These cell phones can harbor various potential pathogens and become an exogenous source of Nosocomial infection among hospitalized patients and also a potential health hazard for self and family members (Gurang et al., 2008). These phones come in contact with various surfaces while carrying out health care activities like examining the patients, providing nursing care, processing samples and are likely to get contaminated by variety of organisms some of which could be pathogenic (Nikhil et al., 2012). Patients might not have direct contact with these cell phones but colonized bacteria on the device may be transmitted to them by health care staff (Mofolorunsho et al., 2013).

Nosocomial infection is an important problem in all modern hospitals and it has been demonstrated that bacteria were transmitted to the patients by healthcare workers (Semmelweis 1861)

The use of mobile phones in hospitals has become indispensable since they can be put in vibratory mode. They are however seldom cleaned and are often handled during or after examination of patients and handling specimen without proper hand washing (Jayalakshmi et al., 2008).

This study was carried out to determine the bacteria load on the mobile phones of health care workers in two health facilities that provides secondary health care in the southern part of Nigeria. The result of this study will help create awareness amongst health workers and also provide statistics from this part of the country where no information is available.

Materials and Methods

The study was carried out in two health facilities in Bayelsa state, southern Nigeria. Mobile phones of clinical and non clinical staff of the hospitals were analyzed within a two month period. The protocol was approved by the ethical committee of both health facilities and informed consent was obtained from each participants. The samples were collected before and after phones were decontaminated with 70% isopropyl alcohol. Sterile swab moistened with sterile normal saline was used to swab the phone outer surface, keypads, ear/mouth piece. The mobile phone samples were immediately streaked onto Blood and MacConkey agar. Plates were incubated aerobically at 37°C for 48 h. Isolated microorganisms were characterized and identified using their colonial, morphological and biochemical characteristics as described by Vanderzannt and Splittstoesser 1997 and Cheesbrough 2000 with reference to the Bergey's Determinative Bacteriology (Holt *et al.,* 1994).

Statistical analysis

Data generated were assessed by the Graphpad Prism 6.0 Statistical software using the pearson chi square to determine significant difference. p values < 0.05 was considered significant.**Result**

The rate of contamination was 58% before decontamination and the key bacteria isolated were *Staphylococcus aureus*, Coagulase negative *Staphylococcus* (CONS), *Micrococcus* sp, *Pseudomonas aeruginosa* and *Echerichia coli*. Table 1 shows the percentage distribution of the isolated bacteria amongst the hospital staf

Table 1: Distribution of bacte ria isolates

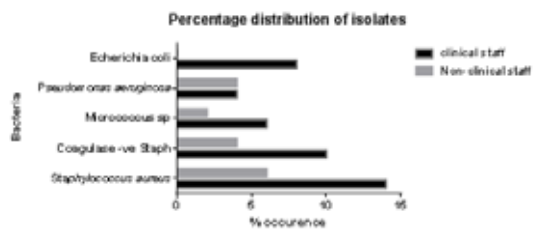
Bacteria Isolate	%
Staphycoccus aureus	34
Micrococcus sp	14
Coagulase –ve *Staphylococcus*	24
Pseudomonas aeruginosa	14
Escherichia coli	14

Table II: Prevalence of isolates amongst the HCW's

Bacteria isolate	Doctors	Lab Scientist	Nurses	Pharmacist	Admin staff	Cleaners
Staph aureus	2(6.9%)	1 (3.4%)	3(10.3%)	1(3.4%)	1(3.4%)	2(6.9%)
CONS	1(3.4%)	2(6.9%)	1(3.4%)	2(6.9%)	-	1(3.4%)
Micrococcus sp	1(3.4%)	-	1(3.4%)	1(3.4%)	1(3.4%)	-
P. aeruginosa	-	1(3.4%)	1(3.4%)	-	1(3.4%)	1(3.4%)
E. coli	2(6.9%)	-	-	-	1(3.4%)	1(3.4%)

Prevalence of the isolates amongst the staff is shown in Table 2, mobile phones of doctors were more contaminated than other clinical staff. The distribution of bacteria between Clinical staff and non Clinical staff is displayed in figure 1. Mobile phones of Clinical staff were more contaminated than the non clinical staff but the difference was not statistically significant as the calculated p value was higher than the set significance level of 0.05

Figure 1: Distribution of isolates between Clinical and non clinical staff



Discussion

Mobile phones can act as a reservoir of a wide variety of bacterial species, many of which have the potential to be pathogenic (Annand et al., 2009). Many studies (Jeske et al., 2007; Ulger et al 2009; Nikolic et al 2011) have reported that majority of people, including health care workers, do not clean their mobile device. This poses a potential risk factor, as many doctors and nurses not only carry their mobile devices with them, but some have also reported using them while observing patients (Goldblat et al., 2007). This study shows that mobile phones of both clinical and non cliinical staff harbor bacteria but the phones of Clinical staff was more contaminated (21%) than the non clinical staff (8%). The high level of contamination might be due to the job specification of clinical staff s and also many users may have no regard for personal hygiene after attending to patients. Sharing of phones amongst colleagues which is a common practice might also be a reason for the high contamination rate observed within clinical staff. Non clinical staff may not have a direct contact with patients but indirectly through movement of patient folders and other administrative procedures that links them with patients. Before decontamination twenty nine mobile phones were contaminated with bacteria but a second culture after decontamination yielded no bacteria growth which shows the efficacy of the decontaminant. The most widely used disinfecting agent for bacterial contamination of cell phones is 70% isopropyl alcohol, which works by damaging the bacterial cell membrane and denaturing proteins found in the cytosol (Brady et al., 2009). However, recommendations for proper cleaning have not yet been established as many phone manufacturers recommend against using alcohol to clean their phones

Few studies on the contamination of mobile phones has been carried out in Nigeria even though report shows the country as the highest users of mobile phone in the continent (Budde 2015). A prevalence of 86% was obtained in a study conducted in eastern Nigeria (Amadi et al., 2013) and 97.4% in other part of Africa(Daka 2014) while the prevalence in Turkey(Ulger et al., 2009) was 94.5%. A prevalence of 58% was observed in this study which is lower than that reported in other health care facilities. This lower prevalence rate may be due to the high personal hygiene observed by health care workers because of the Ebola virus.

Highest rate of bacteria contamination was *Staphylococcus aureus* (34%), a gram-positive cocci, normally found on the skin, as well the respiratory tract of humans (Chaibenjawong and Foster 2011) could be the reason for their high presence on the phones. Mobile phones of nurses were more contaminated (10.3%) with this bacteria while the prevalence on the phones of doctors and cleaners was 6.9%. The high occurence might be due to the use phones while working and may come in contact with various surfaces while providing nursing care.

S. aureus can cause a host of various illnesses, from minor skin infections to much more serious diseases which include pneumonia and bacteremia. Methicillin-resistant *Staphylococcus aureus* (MRSA) is of particular importance in the medical community, as it has evolved resistance to beta-lactam antibiotics (Holmes and Williams 2010)

The prevalence of Staphylococcus aureus in this study is lower than that observed in the eastern part of Nigeria (Amadi et al., 2013) and this difference might be due to personal use and care of phones. Determining the level of *Staphylococcus* aureus on mobile phones of HCW's could serve as a tool for the determination of hygiene standards implemented during handling of phones in the health sector.

Coagulase negative staphylococcus had a prevalence rate of 24 % amongst hospital staff and was isolated more from the mobile phones of Medical Laboratory scientist and pharmacist than others. These group of bacteria are usually avirulent commensal organism of human skin but unfortunately have become pathogen of medical progress. Currently they are the prominent cause of nosocomial bacteriamia and can prey on the immunocompressed (Rupp and Archer 1994) .

Another gram positve cocci isolated from mobile phones was the genus Micrococcus which is generally thought to be a saprotrophic organism, though it can be an opportunistic pathogen, particularly in hosts with compromised immune systems, such as HIV patients. It can be difficult to identify Micrococcus as the cause of an infection, since the organism is a normally present in skin microflora, and the genus is seldom linked to disease (Smith et al., 1999). The presence of Micrococcus sp on the phones may be due to the habitat which is a wide range of environments, including water, dust, and soil and since mobile phones

Presence of *E. coli* signifies fecal contamination of hands through bed pans or poor personal hygiene; this stresses the need for better sanitary measures amongst medical personnel. *E. coli* and *P. aeruginosa* are the most predominant Gram –ve bacteria involved in nosocomial infections (Gaynes and Edward, 2005). *E.coli* and *P.* aeruginosa made up 14% each from this study which is higher than a study carried out in Enugu (Amadi et al., 2013) and 4% in India (Sharma et al.,2014) and the varying prevalence could be due to the use and care of each personnel's mobile phone.

Conclusion

Mobile phones of health care workers could be a friend or foe depending on how it is used during working hours in the hospital. Determining the level of bacteria contamination on mobile phones of hospital staff could serve as a tool for the determination of hygiene standards implemented by health care workers during handling of phones in the hospital. Cleaning and proper handling of hospital mobile phones by all health personnel is relevant to curtail the spread of Nosocomial infectionsand should be enforced. There is also a need to restrict the use of mobile phones in high risk areas such in the hospital as is done in some other parts of the world.

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Competing interest

There isno competing interest.

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