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Microbial Ecology of Mobile Phones Staff Maternity Hospital Public Lubumbashi, DR Congo

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ABSTRACT

Background and Objectives: *Mobile phones are used throughout; However, in hospitals they can be carriers of pathogens that can cause nosocomial infections. The objectives of this study were to evaluate the use of mobile phones by maternity staff of public hospitals in Lubumbashi and determine the bacterial contamination of mobile phones.*

Methods: *The study was descriptive cross conducted during the period July to December 2016. The sampling was done by volunteer staff in maternity wards of public hospitals in Lubumbashi. Were excluded from the study staff did not have a maternity-care activity. A form was filled by bringing together all the data regarding the type of mobile phone caregivers (with ordinary buttons, digital and / or digital with pouch) and the use of mobile phones during work time. The collection of samples was performed by swabbing on phones by using ISO / DIS 14698-1. Sample analysis was performed in the laboratory of the University Clinics of Lubumbashi and statistical analyzes were performed using Epi Info 7.1.*

Results: *The results showed that 100% (54) of our respondents had a mobile phone and used it in the presence of patients. The majority of staff (40/54 or 74.1%) stopped caring to answer the phone and of these, 39 (97.6%) did not apply hand hygiene systematically before resuming treatment. 51 of the 54 phones collected were infected (94.4%). Most organisms isolated were Escherichia coli (17.6%), Enterococcus faecalis (15.6%) and Citrobacter freundi (11.7%). The presence of bacteria on the cell phone was significantly associated with the phone hygiene ($p = 0.005$) and personal care who stopped to answer the phone ($p = 0.001$). The association between the type of phone, and the presence of germs was not statistically significant ($p = 0,$).*

Conclusion: *Mobile phones could play a role in the transmission of nosocomial infections. It is necessary to promote hand hygiene and the use of hydro-alcoholic solutions for disinfecting both mobile phones as hands.*

Keywords

Bacterial Ecology, Mobile phone, Carers, Maternity.

Introduction

Mobile phones such as the name suggests is to carry and use anywhere; therefore, this qualification is also observed in the care environment with caregivers or even at the time of care of directors. The literature shows that the hospital environment is at risk of contracting nosocomial infections; This leads us to believe that the mobile phones of staff could be colonized by germs or even carry pathogens responsible for nosocomial infections.

Mobile phones are increasingly common in health centers and even reach the operating rooms. They have several uses in medicine: photography, medical documentation, registered and downloaded, communication-related work, etc. 5 of 21% of mobile phones caregiver would bacterial reservoirs could cause a nosocomial infection [1]. Contamination can spread outside (areas) to more than 80% of hands exposed [2]. Mobile phones of health personnel constitute a reservoir of bacteria [3]. Every phone call, mobile

phones are in close contact with highly contaminated regions of the human body: hands, mouth, nose and ears. These are personal objects used both in hospitals and outside of which the dirt comes from simple things, they can be the cause of nosocomial and community infections [4]. Mobile phones are usually carried in the blouse of nursing staff, to the nearest sick and care. Research has shown that it could be a major health risk for transmission of multi-resistant bacteria in health care facilities that can lead to serious infections associated with high morbidity, high mortality and additional medical surcharge [4].

Objectives of Work

- Describe the use of mobile phones by maternity staff of public hospitals in Lubumbashi;
- To determine the rate of bacterial contamination of mobile phones.

Methods

Study area

This work was performed in general hospitals of the city of Lubumbashi, the capital of Haut-Katanga Province of the Democratic Republic of Congo. This city has an area of 747 Km2 and its density is 3730 inhabitants / km^2. It includes 11 health zone each with a General Referral Hospital (HGR), intermediate structures, referral health center for some (CSR) and Health Centers (CS). Added to this is a Provincial Hospital (HP) and the University Clinics of Lubumbashi.

Population and study

This is a descriptive cross-sectional study performed on a period from July to December 2016 with the nursing staff working in maternity wards of General Hospitals in Lubumbashi and owners of mobile phones. Was included in the study staff with a mobile phone, working in the maternity ward for at least 1 year and who agreed to participate in the study. The study involved 54 mobile phones. Data were collected on the basis of observation, interview questionnaire and swab surfaces of mobile phones (for laboratory analysis) according to ISO / DIS 14698-1. The study has secured the consent of the staff and anonymity.

Data analysis

- Culture was performed on MacConkey Agar (for the isolation of Gram Negative Bacilli) Agar NAC (for the isolation of gram positive bacilli) and Sabouraud agar (for the isolation of fungi)
- The identification was done with Api Api 20E and 20NE.
- The statistical analysis was performed with Epi Info 7.1 and Excel 2013.

Results

Use of Mobile Phone

On 54 caregivers who participated in the study, the analysis showed that 100% used their Cell Phones in health care and in the presence of patients. 62.9% did not clean their hands before using the Mobile Phone 100% and did not do it after using it. 96.3% were not disinfecting their Cell Phones. 74.1% stopped a care to meet the Mobile Phone and among them, 97.6% did not apply hand hygiene before resuming treatment (Table 1).

Behavior	Yes N (%)	No N (%)
Using the Phone to hospital	54 (100)	0
Using Mobile Phone in the presence of patients	54 (100)	0
Clean hands before use of Mobile Phone	20 times (37.1)	34 (62.9)
Clean hands after use of the Mobile Phone	0	54 (100)
Mobile Phone Disinfection	2 occasional (3,7)	52 (96.3)
Stop a care in response to Mobile Phone	40 (74.1)	14 (25.9)
If so, washing hands after	1 (2.4)	39 (97.6)

Table 1: Distribution of staff according to the use of mobile phones.

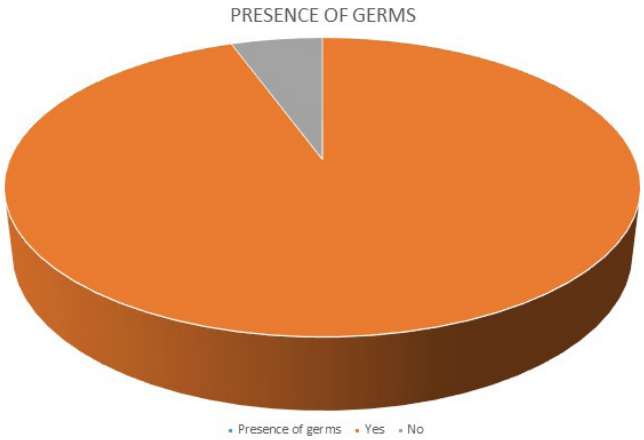

Figure 1: Distribution of mobile phones according to bacterial contamination.

Bacterial colonization of Mobile Phone

100% of samples from the Mobile Phones 94.4% were colonized by germs (Figure 1). 54% of samples were made on Cell Phone with ordinary keys (Figure 2).

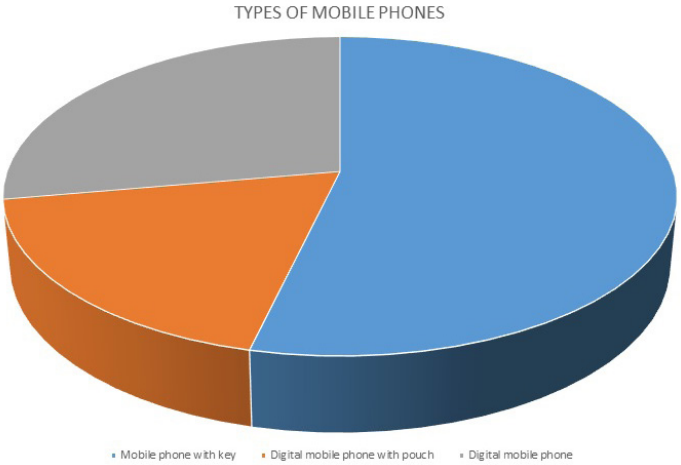

Figure 2: Type of phones used by healthcare workers of maternity HGR.

Isolated germs

Different strains have been isolated and including *Escherichia coli* (17.6%), *Enterococcus faecalis* (15.6%), *Citrobacter freundi* (11.7%), *Acinetobacter baumani* and *Klebsiella spp* with

9,8% each, *Candida albicans*, *Klebsiella oxytoca*, *Klebsiella pneumoniae*, coagulase-negative *Staphylococci*, *Pseudomonas aeruginosa* and *Staphylococcus aureus* at 5.8% each (Table 2).

Isolated germs	Frequency	%
Acinetobacter baumani	5	9.8
Candida albicans	3	5.8
Citrobacter freundi	6	11.7
Enterococcus faecalis	8	15.6
Escherichia coli	9	17.6
Klebsiella oxytoca	3	5.8
Klebsiella pneumoniae	3	5.8
Klebsiella spp	5	9.8
Coagulase negative staphylococci	3	5.8
Pseudomonas aeruginosa	3	5.8
Staphylococcus aureus	3	5.8
Total	51	100

Table 2: Distribution of mobile phones as isolated germs.

The presence of bacteria on the cell phone was significantly associated with the phone hygiene (p = 0.005) and personal care who stopped to answer the phone (p = 0.001). The association between the phone type and the presence of germs was not statistically significant (p = 0.25). The median number of colonies was 31796 CFU (Figure 3).

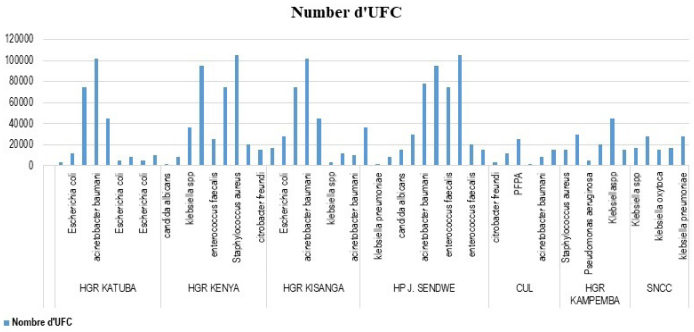

Figure 3: Quantification of bacteria CFU.

Discussion

Our results show that mobile phones are used in maternity wards of public hospitals in Lubumbashi (100%) even in the presence of patients. 62.9% did not clean their hands before using the mobile phone and 100% did not do it after using it. 96.3% were not disinfecting their mobile phones. 74.1% stopped a care to answer the phone and of these 97.6% did not apply hand hygiene before resuming treatment.

The study by Botelho and employees in France on mobile phones at the hospital use by caregivers and microbial contamination also found a use of phones in 93.6%. 46.6% used their mobile phones in the presence of the sick; 66.7% stoppaient a care to answer the phone and before taking care 17.3% did not clean their hands [5]. Our results appear to account held senior difference investigative backgrounds. Africa and particularly DR Congo still has serious problems of hospital hygiene.

Our study revealed that 94.4% of the mobile phones were colonized by bacteria and 54% of samples were made on mobile phones with ordinary keys. This shows that mobile phones are a reservoir of bacteria that may be associated with nosocomial infections because they are used even at the time of care. Our rate is higher than Botelho revealed colonization 68.5% and 32.0% in the study by Sepehri et al. [6]. This can be explained by the lack of hygiene and mobile phones in our midst investigation. Our rate is close to those of Uwingabiye J. et al. which was 100% [7]; 94% Murgier et al. [1]; 97.8% for Ustun et al. [4]; 94.6% for Nwankwo et al. [8]; 94.5% for Ulger et al. [9]. It should educate caregivers decontamination of mobile phones and systematic hand hygiene.

Our study revealed a significant association (p = 0.005) between the presence of bacteria on the mobile phone and the hygiene of mobile phones (decontamination); The decontamination of mobile phones is crucial to reducing bacteria. The association between the phone type and the presence of germs was not statistically significant (p = 0.25). Brady et al. found that 89.7% of smartphones were contaminated with bacteria [10]. Bacterial colonization on mobile phones does not depend on the type of phone. Any phone brand as it can harbor bacteria; it is therefore appropriate to apply hygiene measures. Shakir et al. found a decrease in bacterial colonies on smartphones which had a screen protector [11]. This is partly explained by the fact that the protective screen glass often does not react to foreign substances and does not absorb; it is described as inert [12].

We also found a significant association between mobile phone and discontinuing a treatment to answer the phone; this leads us to believe that the risk of certain nosocomial infections come from mobile phone use in care environment; especially as 97.6% took up the task without applying the hand hygiene measures. This pushes us closer to the study of Sepehri et al. which revealed that the type of isolated microorganisms and their sensitivity to commonly used antimicrobials from the dominant hands were almost identical to those of phones (p <0.05) [6]. We are also closer to the study Murgier et al. who found that the number of smartphones UFC carriers was 94% prior to disinfection and 75% after disinfection (p = 0.02) [1].

The predominant bacteria were *Escherichia coli* (17.6%) followed by *Enterococcus faecalis* (15.6%), *Citrobacter freundi* (11.7%), *Acinetobacter baumani* and *Klebsiella spp* with 9.8% each, *Candida albicans*, *Klebsiella oxytoca*, *Klebsiella pneumoniae*, *Staphylococcus coagulase negative*, *Pseudomonas aeruginosa* and *Staphylococcus aureus* with 5.8% each. Unlike other studies, it is the *coagulase negative staphylococci* strains that were frequently isolated (57.7%) followed by Corynebacterium spp (18.8%), *Staphylococcus aureus* (18.1%) and *Bacillus sp* (2.3 %) [7]. *Staphylococcus aureus* (52%) and *coagulase-negative staphylococci* (31.3%) [9]. The *coagulase-negative staphylococci* were the most prevalent (69.3%), followed by micrococci (51.8%), *Klebsiella* (1.5%) and *Pseudomonas* (1%) [13]. *Staphylococci*

coagulase-negative were more rependus (50.1%), followed by *Staphylococcus aureus, Enterococcus faecalis, Pseudomonas aeruginosa, Escherichia coli* and *Klebsiella spp* [1]. *Staphylococcus sp* (30.2%), *Pseudomonas aeruginosa* (14%), *Klebsiella sp* (9.3%) [15]. In the study Zakai et al., the most abundant isolates were also *coagulase-negative staphylococci* (68%), *Staphylococcus aureus* (16.2%), *Streptococcus viridans* and *Pantoeas species* were also isolated, but at lower levels [2]. In view of this literature, we find that the reality of home is far from that of other lands; the level of hygiene is low. This is proven by the prevalence of *Escherichia coli* often indicating fecal contamination. An application of appropriate health measures in hospitals would be ideal to prevent the spread of bacteria.

Conclusion

Mobile phones of maternity staff of public hospitals in Lubumbashi are colonized by bacteria and could play a role in the transmission of nosocomial infections. It is therefore necessary to promote hand hygiene and the use of hydro-alcoholic solution for disinfection of mobile phones and hands.

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