

Study of Bacterial Contamination of Mobile Phones and Stethoscopes in Neonatal Intensive Care Unit

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Abstract

Background

Mobile phones and stethoscopes used in neonatology units could be colonized by potential bacteria pathogens. It can be a vector of severe nosocomial infections and multi-drug-resistant pathogens. The aim of this study was to evaluate the microbial contamination of mobile phones and stethoscopes, used by medical and paramedical staff.

Materials and Methods

The study was conducted in neonatal intensive care unit (NICU) of Mohamed VI University Hospital, Marrakech (Morocco) in April 2016. The bacteriological study was made on 17 mobile phones and 13 stethoscopes. Samples were taken from all surfaces of mobile phones and stethoscopes, with a sterile swab. These swabs were inoculated onto sheep blood agar plates and incubated for 3 days at 37°C.

Results: Bacterial contamination rate of all mobile phones and stethoscopes was 100%. The cultures of bacteria isolated were polymorphic. Of the 17 mobile phones, 6 were contaminated with multi-drug-resistant pathogens, with a contamination percentage of 35%. The isolated germs correspond to 4 (66.6%) *Klebsiella pneumoniae* and 2(33.3%) *Escherichia coli* both were expanded-spectrum beta-lactamase (ESBL). A strain of *Klebsiella pneumoniae* ESBL (7.7%) was found on a stethoscope.

Conclusion

This study showed that mobile phones and stethoscopes could be involved in the transmission of severe nosocomial infections, with multidrug-resistance.

Key Words: Contamination, Mobile Phones, Newborn, Nosocomial infection, Stethoscopes.

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1- INTRODUCTION

Mobile phones and stethoscopes used in neonatology units could be colonized by potential bacteria pathogens. It can be a vector of severe nosocomial infections and multi-drug-resistant pathogens. Many epidemiological studies have confirmed that a considerable number of contaminated surfaces play a major role in the spread of infectious diseases (1-3).

Hospital operating rooms and intensive care units (NICU) are the workplaces that need the highest hygiene standards, the same requirements are recommended for the staff and the equipment (4). Mobile phones and stethoscopes are used routinely but not cleaned properly. This study was conducted after an outbreak of multidrug resistant nosocomial infection in the unit. The aim of study was to evaluate the microbial contamination of mobile phones and stethoscopes, used by medical and paramedical staff in the NICU of Mohamed VI University Hospital, Marrakesh, Morocco.

2- MATERIALS AND METHODS

The bacteriological study was made on 17 mobile phones and 13 stethoscopes used by medical staff in the NICU of Mohamed VI university hospital, Marrakesh, Morocco, without previous warning. Samples were taken from all surfaces of mobile phones and stethoscopes, with a sterile swab. These swabs were inoculated onto sheep blood

agar plates and incubated for 3 days at 37°C. Organisms were identified with standard algorithms using gram stain, pigmentation, colony morphology, catalase, motility, esculin hydrolysis test, and Staphaurex test. The penicillin-binding protein latex agglutination test was used to identify methicillin resistance in *Staphylococcus aureus* isolates.

3- RESULTS

The rate of Bacterial contamination of all mobiles phones and stethoscopes was 100%. The cultures of bacteria isolated were polymorphic. The rate of contamination of mobile phones by multi-drug-resistant organisms was 35%. The stethoscopes contamination levels by multi-drug-resistant organisms was 7.7% (**Table.1**).

Of the 17 mobile phones, 6 were contaminated with multi-drug-resistant pathogens, with a contamination percentage of 35%. The isolated germs correspond to 4 (66.6%) *Klebsiella pneumoniae* and 2 (33.3%) *Escherichia coli* (*E.coli*) both were expanded-spectrum beta-lactamase (ESBL). A strain of *Klebsiella pneumoniae* ESBL (7.7%) was found on a stethoscope (**Table.2**).

The other isolated pathogens that are not multi-drug-resistant, 65% of mobile phones and 92.5% of stethoscopes, correspond to coagulase-negative *Staphylococcus* sensible to methicillin.

Table-1: The rate of contamination mobile phones and stethoscopes with multi-drug-resistant pathogens

Variables	Number of multi-drug resistant pathogens	Percentage
Mobile phones, n= 17	6	35%
Stethoscopes, n= 13	1	7.7%

Table-2: Bacteriology of isolates (multi-drug-resistant pathogens) from mobiles phones and stethoscopes

Bacteria	Mobile phones, number (%)	Stethoscopes, number (%)
Klebsiella pneumoniae	4 (66.6%)	1
Escherichia coli	2 (33.3%)	0

Table-3: comparison of contamination of stethoscopes and mobile phones between our unit and other pediatric units in our hospital

Variables	Pediatric intensive care unit	General pediatric Units	Pediatric surgery unit	Intensive care unit
Mobiles phones	15	40	22	17
Stethoscopes	6	9	0	13
Rate of contamination	100	100	100	100
Number of multi-drug resistant pathogens	6	0	0	7

4- DISCUSSION

At current study, the results showed that mobile phones and stethoscopes are a reservoir of community and nosocomial bacteria. The rate of bacterial contamination in this study was 100%, which is comparable to the other reports who observed 95 % (4-6). This rate is the same in different pediatric units in our hospital (**Table.3**). This may be mainly due to lack of awareness and low hygiene standards. In this study, *Klebsiella Pneumoniae* (KP) was the first pathogen isolated; the same KP was the cause of previous nosocomial infection outbreak. Some studies of mobile phones found a dominance of *staphylococcus epidermidis* strains (5, 7). Ulger et al. in their study (4), isolated *staphylococcus aureus* strains from mobile phones in 52 %, and from hands in 37.7%, were methicillin resistant. These results demonstrated that the isolated microorganisms from hands and phones were similar. These findings

emphasize that the training of healthcare staff about strict infection control procedures, hand hygiene and optimum disinfection methods are of great importance (4). Restricting phones could be adopted in some high prevalence of nosocomial infection units. However, these devices are now, so integrated with clinical care that restrictions may be not feasible. Adequate decontamination of mobile phones devices is one approach which could reduce the risk of these devices in the cross-transmission of bacteria (8).

The most reported method of decontamination by cleaning the mobile devices with 70% isopropyl alcohol, demonstrated a significant reduction of bacterial contamination in most studies and is widely recommended (9, 10). After this study, important restriction of mobile phones, and efficient cleaning of stethoscopes were implemented in the unit with drastic improvement of nosocomial infection. Multifaceted approaches which

combine education with written material, reminders and continued feedback of performance can have a marked effect on handwashing compliance and rates of hospital acquired infections (11).

5-CONCLUSION

The potential role of mobile phones and stethoscopes, used by medical staff of neonatology units, as a source of microbial transmission is considerable. In order to reduce this potential risk, healthcare staff education, comprehensive guidelines, strict handwashing, regular decontamination of the materials including mobile phones and stethoscopes, and review of the appropriateness of mobile communication devices use within high risk are as should be undertaken.

6- CONFLICT OF INTEREST

The authors declare that they have no conflict of interests.

7- REFERENCES

1. Hendley JO, Wenzel RP, Gwaltney JMJ. Transmission of rhinovirus colds by self-inoculation. *N Engl J Med.* 1973; 288(26):1361-64.
2. Noble J. Textbook of primary care medicine .3rd ed .St Louis: Mosby; 2001, pp.8:82-95.
3. Bures S, Fishbain JT, Uyehara CF, Parker JM, Berg BW. Computer keyboards and faucet handles as reservoirs of nosocomial pathogens in the intensive care unit. *Am J Infect Control* 2000, 28:465-71.
4. Ulger F, Esen S, Dilek A, Yanik K, Gunaydin M, Leblebicioglu H. Are we aware how contaminated our mobile phones with nosocomial pathogens? *Annals of Clinical Microbiology and Antimicrobials* 2009; 8:7.
5. Nwankwo EO, Ekwunife N, Mofolorunsho KC. Nosocomial pathogens associated with the mobile phones of healthcare workers in a hospital in Anyigba, Kogi state, Nigeria. *Journal of Epidemiology and Global Health* 2014; 4: 135–40.
6. Elkholy MT, Ewees IE. Mobile (cellular) phone contamination with nosocomial pathogens in intensive care units. *Med. J. Cairo Univ.* 2010; 78(2): 1-5.
7. Sepehri G, Talebizadeh N, Mirzadeh A, Mir-shekari TR, Sepehri E. Bacterial contamination and resistance to commonly used antimicrobials of healthcare worker's mobile phones in teaching hospitals ,Kerman.Iran .*Am J Appl Sci.* 2009; 6(5):806-10.
8. Brady RR, Verran J, Damani NN, Gibb AP. Review of mobile communication devices as potential reservoirs of nosocomial pathogens. *Journal of Hospital Infection* 2009; 71: 295e300.
9. Brady RR, Fraser SF, Dunlop MG, Paterson-Brown S, Gibb AP. Bacterial contamination of mobile communication devices in the operative environment. *J Hosp Infect* 2007; 66: 397e398.
10. Braddy CM, Blair JE. Colonization of personal digital assistants used in a health care setting. *Am J Infect Control* 2005; 33: 230e232.
11. Naikoba S, Hayward A. The effectiveness of interventions aimed at increasing handwashing in healthcare workers -a systematic review. *J Hosp Infect* 2001; 47: 173e180.