Cell Phones- Homes for Microbes!

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Abstract:

Introduction: *Mobile phones are in close contact with body serving transportation of bacteria in hospital settings. Further, sharing of mobile phones among health care workers & non Health care workers distinctly facilitate the spread of potentially pathogenic bacteria to the community.*

Aims & Objective: *To study the bacterial flora present on cell phones of II & III MBBS students & to compare it with that found oncell phones of I MBBS students in terms of antibiotic resistance.*

Material & Methods: *Swabs from mobile phones of 100 I st MBBS & 100 II& III MBBS students were taken & processed by standard bacteriological technique. Antibiotic susceptibility done by Kirby-Bauer disc diffusion technique.*

Result: *Mobile phones of 15 I[st] MBBS students were contaminated among which 13% were staphylococcus aureus. Whereas mobile phones of 30 II & III MBBS students were contaminated. Among these 30 isolates, 9 were staphylococcus aureus of which 2 were MRSA sensitive to vancomycin & linezolid,17coagulase negative staphylococcus, 2 pseudomonas aeruginosa , 1E.coli & 1enterobacter species.*

Conclusion: *To prevent spread of potential pathogens through mobile phones in hospital, hand hygiene ,routine decontamination of mobile phones & avoiding sharing of phones should be encouraged.*

Key Words : *Cell phones, Bacterial contamination, Drug resistance, MRSA.*

I. Introduction

Mobile phones have become part of health professional's equipment and are used extensively for communication in a clinical setting [1]. However, they are seldom cleaned and are often touched during or after examination of patients and even specimens are handled without proper hand washing. These cell phones can harbour various potential pathogens and become exogenous sources of infection for the patients and are also potential health hazard for self and family members [2, 3]. Further, sharing of cell phones between HCWs and non-HCWs may directly facilitate the spread of potentially pathogenic bacteria to the community [4].

Nosocomial infections constitute a major problem globally with major social, economic, moral and personal effects that increase morbidity and mortality of hospitalized patients [5]. Different studies in different parts of the world indicated that medical equipment and mobile phones of health care workers are potential sources of nosocomial infections. So, this study focuses on determining the presence & type of bacteria that contaminate mobile phones of medical students and their antibiotic susceptibility

II. Aims & Objective

1) To study the bacterial flora present on cell phones of I, II & III MBBS students
2) To study the anti-microbial resistance pattern of bacterial isolates
3) To compare the bacterial flora & their antimicrobial resistance pattern found on cell phones of I MBBS students with that of II & III MBBS students.

III. Material & Methods

Mobile swabs of 100 volunteer students of I MBBS &100 volunteer students of II & III MBBS were taken. A sterile swab moistened with sterile demineralised water was rotated on the sides and over the keypad of mobile phone. The swabs were immediately inoculated and streaked onto nutrient agar, 5% sheep blood agar and MacConkey agar (Hi-Media, India) (6).Plates were incubated aerobically at 37˚C for 24 hours. Isolated organisms were processed & identified according to standard bacteriological technique (7). Antibiotic susceptibility testing was performed by Kirby-Bauer disk diffusion technique (8). The drugs used were as per theCLSI2013guidelines.MethicillinsensitivityofStaphylococcusaureuswascarried outbycefoxitinndiskdiffusiontest(9).

Observation

Table1: Contamination rate of mobile phones of I ,II & III MBBS students

Number of contaminated mobile phones of I MBBS(n=100)(%)	Number of contaminated mobile phones of II & III MBBS(n=100)(%)
15 (15)	30()

A high level of contamination was detected among the II & III MBBS students as compared to I MBBS students which is **significant with p value = 0.01109 & chi sq test = 6.452.**

Table 2: Organisms isolated from mobile phones of I MBBS students(n=15):

S.no	Organisms	Number(%)
1	Coagulase negative staphylococcus	13(86.66)
2	S.aureus	2(13)

All the above coagulase negative staphylococcus strains were sensitive to all the tested antibiotics .
All the above staphylococcus aureus strains were resistant to penicillin but sensitive to all other tested drugs.

Table 3 : Organisms isolated from mobile phones of II & III MBBS students(n=30):

S.no	Organisms	Number (%)
1	Coagulase negative staphylococcus	17(56.66)
2	S.aureus	9(30)
3	Ps.aeruginosa	2(6.66)
4	E.coli	1(3.33)
5	Enterobacter spp.	1(3.33)

Table 4: Resistance pattern of staphylococcocci of II & III MBBS

S.no	Drug	Number of resistant staphylococcus aureus (%)(n=9)	Number of resistant coagulase negative staphylococcus (%)(n=17)
1	Ox	2	0
2	P	2	0
3	Ac	2	0
4	Ci	2	0
5	Cn	2	0
6	Cz	2	0
7	Cpm	2	0
8	C	1	0
9	R	1	0
10	G	1	0
1	E	2	0
11	Va	0	0
12	Lz	0	0
13	Of	0	0
14	Le	0	0
15	Pm	0	0
16	Co	1	0

E-Erythromycin, Oxacillin, P-Penicillin, Ac–Amoxycillin-clavulanic acid ,Ci – Ceftriaxone, Cn – Cefoxitin,Cz-Cefazoline, Cpm-Cefepime, C-Chloramphenicol, R-Rifampicin, G- Gentamicin , E-Erythromicin, Va-Vancomycin, Lz – Linezolid , Of – Ofloxacin, Le – Levofloxacin, Pm- pristinomicin , Co-Co-trimaxazole **.**

Table 4: Resistance pattern of E.coli & Enterobacter

s.no	Drug	Number of E.coli resistant to mentioned antibiotic(%) (n=1)	Number of Enterobacter spp. resistant to mentioned antibiotic(%) (n=1)
1	A	0	0
2	Ac	0	0
3	Ce	0	0
4	Ci	0	0
5	Cfz	0	0
6	Cs	0	0
7	Nt	0	0
8	Tcc	0	0
9	Azt	0	0
10	G	0	0
11	Ak	0	0
12	Cf	0	0

13	Le	0	0
14	Pb	0	0
15	Ip	0	0

A-Ampicillin, Ac–Amoxycillin-clavulanic acid ,Ce- Cefotaxime, Ci – Ceftriaxone, Cfz - -Cefazoline, Cs - Cefaperazone, , Nt – Natilmicin,Tcc – Ticarcillin,Azt – Aztreonam, cf – ciprofloxacin,le-Levofloxacin, Pb-Polimymixin B,Ip- Imepenem.

Table 5: Resistance pattern of Psuedomonas spp.

s.no	Drug	Number of resistant Psuedomonas (%) (n=1)
1	Cfz	0
2	Ci	0
3	Cpm	0
4	Pc	0
5	Tcc	0
6	Azt	0
7	Pit	0
8	Nt	0
9	G	0
10	Ak	0
11	Tb	0
12	Lo	0
13	Ip	0

Cfz – Cefazoline, ci – Ceftriaxone,Cpm – Cefepime, Pc – piperacillin,Tcc- Ticarcillin,Azt – Aztreonam, Pit-Piperacillin-tazobactum, Nt – Natilmicin, G- Gentamicin,Ak – Amikacin,Tb – Tobramycin, Lo -Lomefloxacin, Ip-Imepenem.

IV.   Discussion

Mobile phones due to their personal nature and proximity to sensitive parts of our bodies in usage such as faces, ears, lips and hands of users could become veritable reservoirs of pathogens that could result in infections. Results from this study showed high levels of bacterial contamination of mobile phones used by medical students. Specially a high levels of contamination was seen among the II & III MBBS students(30%) as compared to I MBBS students (15%) which is found significant.

Bacteriological analysis of mobile phones of II & III MBBS students revealed 30% contamination with bacteria. These isolated bacteria were : 56.66% coagulase negative staphylococcus, 30% staphylococcus aureus,6.66% were Pseudomonas aeruginosa & 3.33% were E.coli. Thus, total 12(40%) of the mobile phones were contaminated with bacteria which are well known to be associated with hospital associated infections i.e. Staphylococcus aureus, Pseudomonas aeruginosa & E.coli which were defined as significant isolates means the organisms commonly associated with nosocomial infections (10).

Again high number of mobile phones of II & III MBBS students were contaminated with organisms known to cause nosocomial infection as compared to I MBBS students which is also found significant with p value =0.04417 & chi sq. Test – 4.05.This difference clearly indicates the exposure of II & III MBBS students to hospital environment leads to such contamination of mobile phones which is a cause of concern. Comparing our study with other studies, a higher percentage of contamination of mobile phones by these significant isolates was reported by Gashaw et al 2014 reported 99.99 %(11), Datta et al 2009 reported 36 % (12) whereas Karabay O et al Turkey reported only 9 % contamination (13). Even the organisms isolated from mobile phones of students of II & III were more resistant to commonly used drugs as compared to I MBBS. This difference could be because of acquiring nosocomial pathogens from the hospital itself during their clinical postings.

In the present study, each mobile phone was contaminated by a single organism.Total 100% contamination with multiple organisms was reported by Togae et al 2011(14) In the present study, isolation of GNR is less from mobile phones (10%).Such less isolation of gram negative bacilli from the mobile phones is also reported by Brady et al (10) and Karabay O et al (13).

MRSA detected in present study is 22.22% . various authors reported MRSA from 0 % to higher % such as Ulger et al 2009 reported 37.7 % (15). Datta et al reported 18 % (9) Utsan et al 2012 (16) reported 0 % MRSA contamination of mobile phones. No multidrug resistant organism was isolated in our study whereas multidrug resistant organisms from mobile phones were reported by Gashaw et al 2014 (11)

V.   Conclusion

As most of the sampled mobile phones specially of students exposed to hospital environment were highly contaminated with various types of bacteria known to cause nosocomial infection & also resistant to

commonly used antibiotics. This suggests the potential of the mobile phone as a fomite, which can result in community-acquired infections with possible public health implications. Periodic cleaning of mobile phones with disinfectants like 70 % isopropyl alcohol or hand cleaning detergents as well as frequent hand-washing should be encouraged as a means of curtailing any potential disease transmission.

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