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BACTERIOLOGICAL STUDY OF MICROORGANISMS ON MOBILES AND STETHOSCOPES USED BY HEALTH CARE WORKERS IN EMERGENCY AND ICU'S

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Abstract

Background: Nosocomial infections are important problem in all hospitals which is contributed by the contaminated hand of the health care workers. The most common and indispensable accessories are the mobile phones and stethoscopes which found to be used in hospitals by patients, visitors, health care workers which are majorly contaminated and transferring infections from person to person during their use. The contaminants of the mobile phones and their resistance patterns are presented in the present study. **Methods**: This prospective study was conducted in the Department of Microbiology at Sri Venkateswara Institute of Medical Sciences (SVIMS), Tirupati from October 2012 to March 2013. A total of 100 samples were processed and the isolates were identified by using standard microbiological techniques and antibiotic resistance was determined by Kirby Bauer disc diffusion method by CLSI guidelines[5].**Result**: Out of 100 samples 50 from Stethoscopes and 50 from mobiles. In this study it was noted that mobiles (96%) showed more percentage of bacterial pathogens than compared to stethoscopes (92%) which also include common commensals. The resistance patterns of mobiles are *CP Staphylococcus* to penicillin (33.3%), *CN Staphylococcus* to penicillin (54.5%),*Pseudomonas* to Gentamycin(66.7%), E.coli to ciprofloxacin (100%), *Klebsiella* tocefeperazonesulbactum(66.7%).The resistance patterns of stethoscopes are *CP Staphylococcus* to anmpicillin (66.6%),*CN Staph* to penicillin (47.5%),*Pseudomonas* to co-trimaxazole (66.7%), E.coli tociprofloxacin (100%), to *Klebsiella* toco-trimaxazole(100%).C**onclusion:** It can be concluded that mobile phones and stethoscopes carry possible range of drug resistant pathogens. So, it is recommended that simple measures of disinfection with 70% alcohol for stethoscopes and strict rules for preventing the usage of mobiles in ICU'S and emergency are suggested.

INTRODUCTION:

The transmission of infections in the hospital from contaminated medical equipments and non-medical equipment by Health care workers is a major problem in day today's life. Many epidemiological studies have proved that contaminated surfaces play important role in the transmission of infectious diseases. Nosocomial infection is important problem in all hospitals which is contributed by the contaminated hands and equipment's of health care workers. Thus Health Care Associated Infection (HCAI) causes significant morbidity and mortality.[1] Microbiologists says the combination of constant handling and heat generated creates a prime breeding ground for all the microorganisms that generally found on skin.[2] Microorganisms associated with HCAI are drug resistant and spread through hands of health care workers and inanimate objects used by them. These resistant organisms may be Multi Drug Resistant (MDR) or PAN drug resistant cause severe infections and they require aggressive treatment. These resistant organisms develop mainly due to 'ANTIBIOTIC STRESS'[3] causing colonization and spread of resistant organisms by horizontal gene transfer majorly. Research has shown that mobile phones and stethoscopes could constitute a major health hazard. Stethoscopes are symbol of health care which are used by all health care workers despite their best they act as carriers of infectious agents.[4] Mobile phones play important role in telecommunication skills also playing role in transmission of disease.

MATERIAL AND METHODS:

During the present study period 100 clinical samples 50 samples from Stethoscopes and 50 samples from mobiles are collected in ICU'S AND EMERGENCIES of SVIMS hospital. This study was conducted over a period of 6 months from October 2012 to March 2013.

During this work swabs from Stethoscopes and mobiles were collected randomly without any prior treatment with disinfectant. Samples were collected with a sterile cotton swab moistened with biological sterile peptone during collection. After collection samples were immediately transferred and processed in microbiology laboratory. They are inoculated on Blood agar and on Macconkey agar. All the plates

were incubated a 37ºc and read after overnight incubation.

After the growth of the plate was observed identification tests were performed like Gram staining, Coagulase test, Catalase test, Oxidase test, biochemical test of identification SIM(Sulphide Indole Motility), Citrate utilization test, Urease test, TSI(Triple Sugar Iron), Phenyl Pyruvic Acid(PPA), Bile esculin for enterococci.

All the isolates were screened with relevant antibiotics using Muller-Hinton medium. Filter paper disc containing specific concentration of the antimicrobial agents were pressed on to the surface of the plates and incubated at 37ºc for 18-24 hours. Antibiotic sensitivity testing of each isolate was performed by Kirby-Bauer method and in accordance to Clinical and Laboratory Standard Institute (CLSI) guidelines.[5].

RESULTS:

Bacteriological isolation of microorganisms on Stethoscopes and mobiles and their resistance patterns in ICU'S and Emergencies of the SVIMS hospital at Tirupathi locality. . Out of 100 samples 50 samples from Stethoscopes and 50 samples from mobiles were collected and processed in the Microbiology department. Among the 100 samples collected mobiles showed more percentage of bacterial pathogens than compared to stethoscopes. Among the mobile phones 96% are contaminated by bacterial agents they also include common commensals. Among the samples from stethoscopes 92% are contaminated with they also include common commensals. (Table 1).

In mobile isolates Linezolid was the most effective antibiotic for *staph*ylococcal isolates. Imipenem was the most effective antibiotic against the gram negative species. Most of the coagulase negative *staph*ylococcal strains are highly resistant to pencillin (54.5%), followed by erythromycin (45.4%), ampicillin (36.3%), cefoxitin (MRSA) (36.3%). coagulase positive *Staph*ylococcal strains showed high resistance to pencillin (33.3%), erythromycin (33.3%), ampicillin (33.3%) followed by co-trimaxazole (16.7). *Enterococcus* showed high resistance to ampicillin (100%). *Streptococcus* showed resistance to ampicillin and amoxyclav. *Pseudomonas* is majorly resistant to ampicillin and gentamycin. *Klebsiella* showed resistance to ampicillin and co-

trimaxazole. *E. coli* showed resistance to gentamycin & erythromycin .*Citrobacter* showed resistance to all beta-lactam group antibiotics. *Citrobacter* showed resistance to ampicillin(100%), amoxyclav(100%), piperacillintazobactum(100%) and imipenem(100%). *Klebsiella* showed resistance to cefaparazone sulbactum(66.7%). *E.coli* showed high resistance to gentamycin(100%) and Co-trimaxazole(100%) showed high resistance to gentamycin (66.7%) followed by ciprofloxacin(33.3%).(Table 2)

In Stethoscopes isolates Linezolid was most effective against Gram positive isolates. polymyxin-B& imipenem was most effective against Gram negative bacilli. *CP-Staph*ylococcus highest resistance to ampicillin (66.7%), amoxyclav (66.7%) followed by pencillin (55.6%), co-trimaxazole (22.2%), erythromycin (22.2%), clindamycin (11.1%), cefoxitin (11.1%). *CNStaph* showed high resistance to Pencillin (47.05%) followed by Co-trimaxazole(23.5%). *Enterococcus* showed high resistance to Ampicillin & Amoxyclav. GPB(Gram Positive Bacilli) showed high resistance to polymyxin-B. Among GNB showed high resistance to gentamycin (66.7%),co-trimaxazole(66.7%), followed by ciprofloxacin(33.3%). *Klebsiella* showed high resistance to ciprofloxacin(100%). *E.coli* showed high resistance to ciprofloxacin (100%). Acenetobacter showed resistance to co-trimaxazole(100%).(Table 3).

DISCUSSION:

Now days the hospital environment plays a critical role in the transmission of microorganisms associated with hospital infections resulting in severe spread of nosocomial pathogens.It was discovered that on an average cell phone is dirtier than bottom of the shoe. This present study revealed about the role of stethoscopes and mobiles as carriers of microorganisms and the need to clean or disinfect it.

In our study on an average 92% of stethoscopes are colonized with microorganisms in which 12% of stethoscopes are carry MRSA strains. This correlates with Nathania A J Burrie in which the diaphragm stethoscopes are colonized with micro-organisms on average 87.3% of the time. On average,14% of stethoscopes carry MRSA, and 16.5% carry gram-negative species.[6]

In this study diaphragm of the stethoscopes and mobile are cultured and the pattern of resistance are observed. Present study showed that common microorganism isolated was *Coagulase Negative staphylococcus* though CONS is a normal skin flora it is responsible for a large number of hospital acquired infections and is difficult to treat because of the bacterium's genetic characteristics and growing resistance to high powered antibiotics. Other isolated organisms include *Staphylococcus aureus*, *Pseudomonas*, *Klebsiella*, *E.coli*, *Streptococcus* and some of the Gram positive bacilli with terminal spores are observed microscopically. The common commensals of stethoscopes are *Micrococcus* and *Diptheroides* which are present along with some of the pathogens and also individually.

CONCLUSIONS:

It can be concluded that Stethoscopes and mobiles are potentially contaminated with various microorganisms Thus from our studies we recommend simple measures like hand washing, cleaning of stethoscopes and mobile phones with 70% isopropyl alcohol[7], using hand free mobile phone while working hours and well-practiced infection control plan to bring down the rate of hospital acquired Infection.

TABLE 1: NUMBER & PERCENTAGE OF ISOLATES FROM MOBILES AND STETHOSCOPES:

Organism	Mobile (n=50)	Percentage	Stethoscope (n=50)	Percentage
MRSA	4	8%	6	12%
CP STAPH	6	12%	9	18%
CN STAPH	11	22%	17	34%
DIPTHEROIDES	3	6%	2	4%
ENTEROCOCCUS	1	2%	1	2%
GPB	1	2%	2	4%
MICROCOCCUS	30	60%	23	46%
PSEUDOMONAS	3	6%	3	6%
KLEBSIELLA	3	6%	1	2%
ESCHERICHIA COLI	1	2%	1	2%
CITROBACTER	1	2%	0	0
ASB	14	28%	12	24%
STREPTOCOCCUS	1	2%	1	2%
ACINETOBACTER	0	0	1	2%

TABLE 2:ANTIMICROBIAL RESISTANCE OF BACTERIAL ISOLATES FROM MOBILE

ORGANISM	AMP %(n)	AMC %(n)	CX %(n)	CFS %(n)	CIP %(n)	COT %(n)	E %(n)	GEN %(n)	P %(n)	PIT %(n)	IPM %(n)	PB
CP Staph	33.3(2)	33.3(2)	S	-	S	16.7(1)	33.3(2)	S	33.3(2)	S	-	-
CN Staph	36(4)	36.3(4)	36.3(4)	-	S	S	45.45(5)	S	54.5(6)	S	-	-
Pseudomonas	S	S	S	S	33.33(1)	S	-	66.7(2)	-	S	S	-
Escherichia coli	S	S	-	S	100(1)	100(1)	-	100(1)	-	S	S	-
Klebsiella	66(2)	66.7(2)	-	66.7(2)	S	S	S	S	-	S	S	-
Citrobacter	100(1)	100(1)	-	100(1)	S	S	S	S	-	100(1)	100(1)	S
Streptococcus	100(1)	100(1)	-	-	-	S	S	-	S	-	-	-
GPB	-	-	-	-	-	-	-	-	S	-	-	100(2)
Enterococcus	100(1)	S	S	S	S	S	S	S	S	-	-	-

AK, amikacin; AMC, amoxyclav; AMP, ampicillin; CFS, cefaparazone –sulbactum; CTX, cefotaxime; CIP, ciprofloxacin; COT, co-trimoxazole; GEN, gentamicin; IPM, imipenem; PIT, piperacillin-tazobactum.

TABLE 3:ANTI-MICROBIAL RESISTANCE OF BACTERIAL ISOLATES FROM STETHOSCOPES

ORGANISMS	AMP %(n)	AMC %(n)	CX %(n)	CFS %(n)	CIP %(n)	COT %(n)	E %(n)	GEN %(n)	CD %(n)	P %(n)	PIT %(n)	IPM %(n)	PB %(n)	V %(n)
CPSTAPH	66.6(6)	66.6(6)	11.1(1)	-	S	22.2(2)	22.2(2)	-	S	55.6(5)	S	-	-	22.2(2)
CNS	5.8(1)	5.8(1)	30(5)	-	S	23.5(4)	35(6)	-	S	47.5(8)	S	S	-	29.4(5)
Enterococcus	1(100)	1(100)	-	-	S	S	s		-	s	-	-	-	-
Streptococcus	S	100(1)	-	-	-	-	-	-	-	-	-	-	-	-
Klebsiella	s	S	-	s	S	100(1)	-	S	-	-	S	S	-	-
Pseudomonas	-	-	-	s	33.3(1)	66.7(2)	-	66.7(2)	-	-	s	s	-	-
E.scherichia coli	s	S	-	s	100(1)	S	-	S	-	-	s	s	-	-
Acinetobacter	s		-	s	S	100	-	s	-	-	s	s	-	-
GPB	-	-	-	-	-	-	-	-	-	-	-	-	66.7(2)	-

References:

1. WHO: Global Patient Safety Challenge: 2005-2006 /World Alliance for Patient Safety. Available at:http : / /www .who .int /patientsafety /events / 0 5 /GPSC_Launch_ENGLISH_FINAL.pdf (AccessedMarch 17, 2009).

2. Brady RR, Wasson A, Stirling I, McAllister C,Damani NN. Is your phone bugged? The incidence of bacteria known to cause Hospital Acquired Infection on healthcare workers 'mobile phones. J. Hosp. Infect 2006; 62:123-125.

3. World Health Organization2000. Overcoming antimicrobial resistance. Available:www.who.int/infectious – disease – report/2000/. Accessed 2September 2009

4. Jones JS, Hoerle D, Riekse R. Stethoscope: a potential vector of infection. Ann Emerg Med 1995;26(3):296-9

5. Clinical Laboratory Standards Institute (CLSI) guidelines. Performance standards for antimicrobial susceptibility testing: Twentieth informational supplement. CLSI Document M100-S20. Wayne, PA: Clinical and Laboratory Standards Institute; 2010.

6. Nathania A J B.Stethoscopes as vectors of infections.Australian medical student journal volume 2,Issue 1,2011.

7. Marinella MA, Pierson C, Chenoweth C. The stethoscope.Apotential source of nosocomial infection? Arch Intern Med1997;157:86-90.