WHAT DOES A PEN CARRY? ARE YOU AWARE?

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ABSTRACT

Background: Health care associated infections are usually caused by Multidrug resistant bacteria that are associated with morbidity, mortality and excess health care cost. Although microorganisms are most commonly transmitted by the hands of health care workers, materials and articles used in hospitals could also act as fomites in spreading infections. Method: 100 writing pens used by health care workers were screened for the presence of bacteria. Result: Bacteria were isolated from 53 pens of which *Coagulase Negative Staphylococci (CONS)* were the major isolates. Methicillin resistance was observed in *Staphylococcus aureus*(66.7%*)* and *Coagulase Negative Staphylococci* (31.8%).Conclusion: Contamination of writing pens with bacteria as commonly seen in this study can be prevented by hand washing along with regular disinfection of writing pens.

KEY WORDS: Health care associated infections, health care workers, writing pens.

1. INTRODUCTION

Health Care Associated Infections (HCAIs) are of utmost concern and relevance to anyone who deals with patients, from the clinician; who has to judiciously advocate antibiotic therapy, to the laboratory personnel who have to isolate and characterize new microbes and the hospital administrators who have to maintain cost effectiveness.

HCAIs are one of the major causes of patient morbidity and mortality in developed countries. The scenario is much worse in developing countries. HCAI concern 5-15% of hospitalized patients and lead to complications in 25-50% of those admitted in ICUs.[1] The increasing incidence of HCAI is attributed to many factors like drug resistant microorganisms, patients, hospital environment, health care personnel, and various invasive, diagnostic and therapeutic procedures.

The hospital environment may play a significant role in transmission of organisms.[2] Many fomites including thermometers, stethoscopes ,aprons etc. are known to spread pathogenic organisms from patient to patient through hospital personnel.[3] The degree of contamination and extent of microbial survival may play an important role for transmission of such infections.[4] Although micro-organisms are most commonly transmitted by the hands of health care workers (HCWs), materials and articles such as pens used by health care personnel would also carry micro - organisms causing transmission of HCAIs from Patient to Patient and from health care personnel to the Patient .[5] This

study was carried out in Department of Microbiology of this medical college with the aim to find out the probable role of writing pens used by Medical and Paramedical staff in the transmission of micro organisms.

2. MATERIAL AND METHODS

The present study was conducted in the Department of Microbiology of this Medical College. 100 writing pens, 30 each from Doctors and Nurses of various departments and wards (15 from surgical departments-Ophthalmology, Surgery, ENT, Obstetrics and Gynecology; 15 from medical departments of Pediatrics, Medicine, Dermatology and Anaesthesia) while 20 each from Laboratory technicians of Microbiology Department and interns were included in the study. Swabs were obtained from the holding area of the pen using sterile cotton swabs moistened with Peptone water. These swabs were then passed in Peptone water and incubated at 37^0C for 18 to 24 hours. Swabs were then inoculated on Blood agar and MacConkey's agar. Plates were incubated aerobically at 37^0C for 24-48 hours and were examined for bacterial growth. The bacteria were identified using standard techniques; utilizing their colony characteristics, Gram's nature, motility and a battery of biochemical reactions like catalase test, oxidase test and sugar fermentation.[6] Antibiotic susceptibility of the bacteria was tested using Kirby – Bauer disc diffusion method. Methicillin Resistance in *Staphylococcus aureus (S aureus)* was detected by agar screen method using Mueller -Hinton agar containing 6 µg Oxacillin /ml and 4% NaCl .[7]

Five varieties of pens were included in the study:-

1. Capped plastic pens
2. Capped metal pens
3. Uncapped click plastic pens
4. Uncapped click metal pens
5. Pens with rubber grip

3. OBSERVATIONS AND RESULTS

The Present study shows that capped plastic pens are used by maximum HCWs of this institute, followed by uncapped click plastic pens whereas capped metal pens are used less commonly. (Table No 1). As observed in this study capped plastic pens are mainly used by laboratory technicians and Nurses whereas capped metal pens are used mostly by doctors and interns. Percentage of bacterial contamination of pens was maximum in pens with rubber grips (84.6%) followed by uncapped click plastic pens (76.2%), capped plastic pens (42.8%), uncapped click metal pens (40%) and capped metal pens (22.2%). (Table No 3). Bacterial contamination was seen in 53 pens out isolates 100 pens studied, majority of pens showed the growth of *CONS* (22 %) followed by *Bacillus species* (09%).Among the Gram negative bacteria *Pseudomonas spp* was the most common isolate (5%). However 1 writing pen showed mixed growth of *CONS* and *Bacillus spp.* Methicillin resistance was seen in 4 out of 6 in *S aureus* isolates (66.7%) where as 7 out of 22 *CONS* were Methicillin resistant (31.8%). (Table No 6).

4. DISCUSSION

The present study shows that bacterial contamination of writing pens used by HCWs is common (Table no 3). Maximum bacterial contamination was observed in pens with rubber grips

(84.6%) comparable with the study done by Bhat G K et al.[8] Many of the micro-organisms isolated from the pens are known to cause HCAIs. In our study the maximum isolates were *CONS*. This is comparable with studies done by Bhat G K et al and Datz et al.[8,9] Maximum *CONS* isolates were obtained from pens used by nurses (8/22) followed by Laboratory Technician (06/22) (Table No 5). It may be attributed to poor hygiene and hand-washing practices in healthcare workers. The survival of these organisms on environmental surfaces may have significant role in transmission of infection in hospital. Staphylococci are one of the major groups of bacteria inhabiting the skin, skin glands and mucus membrane of human beings. Several factors such as duration of usage, type of pen, number of persons using the pen may influence the rate of contamination of pens.

Methicillin resistance once thought is not confined to *S aureus*. During the 1980's attention was drawn to the incidence (20 – 85 %) of the strains of Methicillin resistance among CONS. Out of 6 isolates of S. aureus, 4 were found to be Methicillin resistant (MRSA). Out of 22 samples of CONS, 07 were Methicillin Resistant. Rising level of resistance to a wide range of antibiotics by both *S. aureus* & *CONS* represent a significant threat to the efficacy of treatment. Amongst the Gram Negative isolates *Pseudomonas spp* was isolated from 5 pens. Its significance lies in the fact that *Pseudomonas* is a major cause of nosocomial infection (Table No 4). Similar study by Patil P et al shows *S.aureus, E.coli, P.aeruginosa* and *Klebsiella* as important pathogens.[10]

This study shows that writing pens used by HCWs are frequently contaminated with microorganisms. Many of the organisms act as potential pathogens causing HCAIs. Thus proper hand washing along with regular disinfection of writing pens used by HCWs may help in reducing the risk of spreading infectious agents.

5. CONCLUSION

Since in this study, bacterial contamination of pens was maximally seen in pens with a rubber grip and minimally in capped metal pens, it is advocated that usage of pens with metal bodies be encouraged in healthcare settings. Moreover, enhanced hand hygiene (and frequent hand washing practices) shall prove beneficial in decreasing the contamination of pens through the hands.

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Table 1: Types of pens used by HCWs

S.No	***Types of pens***	***Number***
1	Capped plastic pens	42
2	Capped metal pens	09
3	Uncapped click plastic pens	21
4	Uncapped click metal pens	15
5	Pens with rubber grip	13
	Total	100

Table 2: Distribution Of pens at different levels of HCWs

S.No	*Types of pens*	*Doctors*	*Nurses*	*Laboratory Technician.*	*Interns*	*Total*
1	Capped plastic pens	03	19	14	06	42
2	Capped metal pens	06	-	01	02	09
3	Uncapped click plastic pens	07	07	02	05	21
4	Uncapped click metal pens	10	02	-	03	15
5	Pens with rubber grips	04	02	03	04	13

Table 3: Number of bacteria isolated from different pens

S.No	*Type of pen*	*No of bacteria isolated(n=53)*	*Percentage*
1	Capped plastic pens	18	42.8
2	Capped metal pens	02	22.2
3	Uncapped click plastic pens	16	76.2
4	Uncapped click metal pens	06	40
5	Pens with rubber grip	11	84.6

Table 4: Bacterial isolates from pens

S.No	***Bacteria***	***No. of contaminated pens (n=53)***	***Percentage***
1	*CONS*	22	41.50
2	*Bacillus species*	09	16.98
3	*Diptheroids*	06	11.32
4	*S. aureus*	06	11.32
5	*Pseudomonas spp*	05	9.43
6	*Acinetobacter spp*	01	1.88
7	*Klebsiella pneumoniae*	01	1.88
8	*Micrococcus spp.*	03	5.66
9	Mixed	01	1.88

n is the number of pens contaminated with bacteria

Table 5: Distribution Of Bacterial Isolates From Pens used By HCWs At Different Levels

S.No	***Organisms isolated***	***Doctors***	***Nurses***	***Laboratory technician***	***interns***	***Total***
1	*CONS*	05(22.7%)	08(36.4%)	06(27.3%)	03(13.6%)	22
2	*Bacillus species*	02(22.2%)	03(33.3%)	04(44.4%)	-	09
3	*Diphtheroids*	-	01(16.7%)	02(33.3%)	3(50%)	06
4	*S .aureus*	02(33.3%)	02(33.3%)	01(16.7%)	01(16.7%)	06
5	*Pseudomonas spp*	02(40%)	01(20%)	02(40%)	-	05
6	*Klebsiella pneumoniae*	-	-	01(100%)	-	01
7	*Micrococcus spp.*	01(33.3%)	-	01(33.3%)	01(33.3%)	03
8	Mixed	-	-	-	01(100%)	01

Figures in parentheses indicate percentage

Table 6: Incidence of Methicillin Resistance among Staphylococcal isolates

S .No	**Total Staphylococcal isolates**	**Methicillin resistant *S. aureus***	**Methicillin resistant *CONS***
1	28	04(66.7%)	07(31.8%)

Figures in parentheses indicate percentage