



Short Report:

Pen of Health Care Worker as Vector of Infection

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Abstract:

Nosocomial infections are the major concern in tertiary hospitals. Health care workers and their belonging are known to act as vector in transmission of infections. In present study, the writing pen of health care workers was worked out for carrying infection. The swab from writing pen of health care workers were cultured for any growth of microorganism and compared with swab from pen of the non health care workers. It was found that the rate of growth of microorganism were more in pen of health care workers. Similarly the organism attributed to the nosocomial infection was grown from the pens of health care workers. These organisms might be transmitted from the hands of health care workers. The writing pen which health care worker are using became the vectors of transmission of infection. So to prevent it, the most important way is to wash the hands and pen properly after examining the patients.

Key Words: Pen; Vector; Microorganism; Health care worker; Nosocomial infection

Introduction:

It is well known fact that nosocomial infection is an important problem in hospital. As early as in 1861, it was demonstrated that microorganism were transmitted to the patient by the contaminated hands of health care workers. In ICCU, ICU, NICU and operating room requires almost sterilized/ disinfected atmosphere so as to carry out precious treatment. Similarly persons working in these departments must have strict personal hygiene so that they do not become vector of infection. Many of the personal instruments of medical health care worker such as stethoscope, mobile, pen are used by them on daily basis in hospital. It is well known fact that stethoscope, mobile phones, apron of health care workers act as a carrier of infection.(1-9) They carry potential pathogens which can be transmitted from patients to patients. In the same way the pen with which the doctor writes is also vehicle for carrying pathogens. (10) Very few studies have been done to know the role of personal pen of medical health care worker in carrying the potential pathogens. In the present study, the role of pen as vector of infection is evaluated in transmitting the pathogens in the hospital.

Material and Method:

The study was conducted in tertiary health care centre in Bhopal. Sample size was 48. Samples were collected from the hospital and controls were from the Medical

College. A printed questionnaire was filled regarding the hygiene practice and awareness.(Table 1)

Table 1: Health Awareness among HCW and NHCW

	HCW(48)				NHCW(48)			
	Yes	%	No	%	Yes	%	No	%
Do you know pen can transmit infection?	31	65.58	17	34.42	5	10.41	43	89.59
Do you wash your hands regularly after examining the patients?	12	25	36	75	-	-	-	-
Do you clean your pen regularly?	0	0	48	100	0	0	48	100

Sample collection: Separate Decron swab with the polypropelene stick was used for taking the swabs. The stick with the swab was rolled over area of pen coming in contact with hand during writing. The swab was inoculated on the site in sheep blood agar for culture in all four quadrant of the plate, and incubated overnight at 37° C. Antibiotic sensitivity was done on ready to use hi media disc (Makie Macurtney) as per protocol.(11) Such sample collection was done on 48 writing pen from the hospital staff using them daily. Similar sample collection was done 48 writing pen from the staff of medical college, not working in the hospital (includes clerical staff, class IV staff, and teaching staff).

The bacterial growth was measured in the following manner.

- 0: No growth
- 1+: Growth in 1 quadrant
- 2+: Growth in 2 quadrant
- 3+: Growth in 3 quadrant
- 4+: Growth in all 4 quadrant

Identification of growth was done on the basis of gram stain and appropriate biochemical tests. The bacterial colonies were counted in all four quadrants where growth was found. Analysis was done using student's unpaired t test and chi square test.

Results:

Out of 96 subjects pen, 44 (91.66%) from the health care workers (HCW) showed the positive growth of organisms while 34 (71.84 %) pens from non health care workers (NHCW) showed the positive growth. In 4 (8.33%) pens from health care workers (HCW) and 14 (29.16%) from non health care workers (NHCW) showed no growth of organisms and difference was statistically significant ($p < 0.05$).

Statistically significant scanty, light, moderate and heavy growth of organisms was seen in health care worker. 19 (39.58%), 10 (20.83%), 9 (18.75%) and 6 (12.5%) of the pen from HCW while 18 (37.5%), 11(22.91%), 3 (6.25%), and 2 (4.16%) pens from NHCW showed the scanty, light, moderate and heavy growth of organisms. (Table 2).

Quantification of growth	PEN Hospital (n=48)		PEN College (n=48)		p value
	n	F(%)	n	F(%)	
No Growth	4	8.33	14	29.16	0.0015*
Scanty Growth	19	39.58	18	37.5	0.0236*
Light Growth	10	20.83	11	22.91	0.0207*
Moderate Growth	9	18.75	3	6.25	0.0004**
Heavy Growth	6	12.5	2	4.16	0.0025**

* $p < 0.05$ significant change; ** $p < 0.01$ very significant

Commonest type of organism grown was *S. aureus*. It was grown in 21 (43.75%) in HCWS. In NHCWS *S. epidermidis* was the commonest organism & was grown in 18 (37.5%). In HCW other pathogenic organism grown were *E. coli* (9, 18.75%), *Klebsiella* (8, 16.66%), *Enterobacter* (9, 18.75%), Diphtheroids (10, 20.83%), *Pseudomonas* (5, 10.41%). Non pathogenic organism was found in HCW, it was *S. epidermidis* (13, 27.08%). (Table 3)

Type of organism	PEN Hospital (n=48)		PEN College (n=48)	
	n	F(%)	n	F(%)
<i>S. aureus</i>	21	43.75	12	25
<i>E. coli</i>	9	18.75	6	12.5
<i>Klebsiella</i>	8	16.66	6	12.5
<i>Enterobacter</i>	9	18.75	10	20.83
<i>Pseudomonas</i>	5	10.41	2	4.16
Diphtheroids	10	20.83	8	16.66
MRSA	8	16.66	0	0
<i>S. epidermidis</i>	13	27.08	18	37.5

In NHCWS pathogenic organism grown were *E. coli* (6, 12.5%), *Klebsiella* (6, 12.5%), *Enterobacter* (10, 20.83%), *Pseudomonas* (24, 16%) while nonpathogenic organism grown were *S. epidermidis* (18, 37.5%) & *Diphtheroids* (8, 16.6%).(Table 3)

Average number of colonies of bacteria were counted it was found that in all above organism the number of colonies in HCWS were statistically significant as compared with NHCW except for *S. epidermidis* where no significant difference was seen.(Table 4)

Bacteria	Pen (H)	Pen (C)	P Value
<i>S. aureus</i>	18.25 ± 9.452	6.458 ± 5.247	$P < 0.0001$
<i>E. coli</i>	14.06 ± 7.361	5.708 ± 4.635	$P < 0.0001$
<i>Klebsiella</i>	11.17 ± 7.725	3.958 ± 4.202	$P < 0.0001$
<i>Enterobacter</i>	8.167 ± 6.058	2.063 ± 3.316	$P < 0.0001$
<i>Pseudomonas</i>	22.27 ± 9.567	4.563 ± 4.907	$P < 0.0001$
Diphtheroids	14.79 ± 6.240	2.604 ± 2.648	$P < 0.0001$
MRSA	7.271 ± 6.696	0	$P < 0.0001$
<i>S. epidermidis</i>	6.792 ± 6.977	8.729 ± 8.617	NS

Methicillin resistant *S. aureus* was found in 8(16.66%) of the pens of HCW while in pen from NHCW it was 0 % (Table 3). Average numbers of colonies for MRSA were 7.271±6.696. (Table 4).

Discussion:

In the present study it has been seen that the writing pen used by the health care workers is contaminated by the pathogens. This study indicated that the contamination of the writing pen of HCWS is highly significant when compared with the pen of NHCWS ($P < 0.01$). In this study bacterial load and its contamination on the pen was compared with HCWS and NHCWS and we had not come across such study in India. One study was done by Christian Diaz et al.(10)They also found that pens of health care worker were highly contaminated by the potential pathogens. Comparative growths of colonies from writing pens of HCWS were much more in our study. It may be because of poor hygiene and hand washing practice in HCWS.

Similar type of study was done on mobile phone and stethoscope.(1-5) In these studies it has been found that mobile phones of HCW are significantly contaminated by potential pathogens. Similar studies have been done on the stethoscope and significant growth was seen on stethoscope.(1-5)

Most important pathogens which were found in our studies are *S. aureus*, *E. coli*, *P. aeruginosa* and *Klebsiella*. In other studies done on mobile phone organism growth was same as in ours. This indicates that these bacterial floras must be present in hospital environment. MRSA was found in the pen from HCW there was no MRSA growth from NHCW. This indicates that these strains of pathogens are also present in hospital environment. These pathogens may have been transmitted from patient to HCW hand which in turn are transmitted to other patients while examination.

In response to our questionnaires it was found that most of the HCWS & NHCWS do not know about the fact that there pen can be vehicle of transmission of infection. It was found that 65.58% of the HCW acknowledged the fact that the pen can be vector of transmission of infection while 10.41 % of NHCW acknowledged this fact. Only 25% of the HCW wash their hands after examining patients. Fatma Ulger et al (9) found that the microorganisms on the hands and mobiles phones were similar. That indicates that the microorganisms are transmitted from the hands. So in the present study the contamination of pen may due the hands. So the hand washing can decrease the contamination of pen through the hands.

Resident flora of the body normally do not cause the infection unless the person is immunocompromised, but the transient flora tends to be more pathogenic and are responsible for nosocomial acquired infections. These transient floras may be picked up by the hands of HCW when they touch the patients or contaminated pen. So the frequent hand washing could remove this transient flora.

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