Research Article

PROFILE OF BACTERIA ON HANDBAGS AND PURSES OF HEALTHCARE WORKERS

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ARTICLE INFO	ABSTRACT

Background: Healthcare associated infections (HAIs) have been recognized as a critical challenge affecting the quality of healthcare services provided. A significant proportion of these infections result from cross-contamination of microorganisms which are often acquired and spread by direct contact with patients or contaminated adjacent environmental surfaces through the hands of healthcare workers (HCWs). Material and methods: The present study was conducted in the department of Microbiology on the Health Care Workers of Guru Gobind Singh Medical College and Hospital Faridkot. Ethical clearance was taken from institutional ethical committee. Out of 100health care workers studied, 34 were doctors, 31 were nurses, 25 laboratory technicians and 10 health attendants only. **Result:** The most common bacterial isolates from the 97 purses that were culture positive in our study were Coagulase negative *Staphylococci*(26) followed by *Diptheroids*(21), Methicillin resistant *Staphyloccous aureus*(14), *Micrococcus* (11) *Pseudomonas aeruginosa* (9),*Escherichia coli* (5) Methicillin sensitive *Staphylococcus aureus* (5),*Acinetobacter* species(4) and *Klebsiella* species (2). Antibiotics susceptibility testing of the staphylococcal isolates showed that most of the Coagulase negative *staphylococci* were Methicillin sensitive(24/26)while majority of *Staphylococcal aureus* isolates were Methicillin resistant (14/19) Methicillin resistant *Staphylococcus aureus* isolates showed higher resistance to other antibiotics as compare to Methicillin sensitive *Staphylococcus aureus* and the Coagulase negative *staphylococci*.All the staphylococcal isolates (MRSA, MSSA, MRCONS, and MSCONS) were susceptible to vancomycin and linezolid. Antibiotic susceptibility pattern of gram-negative isolates showed that most of the isolates were resistant to commonly used antibiotics most of these isolates were multi drug resistant. Conclusions; The result of the present study which was conducted to look for bacterial contamination of purses/handbags of various health care workers in our institute suggests that. Handbags and purses of health care workers are contaminated with various pathogenic and non pathogenic bacteria. The pathogenic bacteria were found to be resistant to multiple classes of antibiotics.Most of the health care workers never washed their purses/handbags.The health care workers should be encouraged to clean their handbags / purses frequently so that the bacterial contamination could be reduced.The health care workers should be familiar with proper hand washing technique, hand hygiene and should follow good infection control practices in the hospital which would result in decrease in colonization and contamination of inanimate objects like purses hence restricting the spread of these bacteria.

INTRODUCTION

Health care associated infections are serious problem for today's medical community. Health care workers come in contact with large number of microorganisms which they transfer to the patients either directly through their hands or indirectly through some inanimate objects.[1-2]The risk of transmission of diseases through inanimate objects has often been seen in community and medical settings. Currency notes, mobile phones and medical equipments from health care settings have been reported to be colonized with number of opportunistic pathogen.[3]

Purses have been considered as status symbol by some people and key accessories by others. Purses are used not only for the storage of money, but also to store keys, credit cards, mobiles phones and receipts etc. Thus purses come in regular contact with the hands and a variety of other articles and surfaces.

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Moreover, majority of purses hardly get washed and are only discarded after years of use. In the healthcare settings, purses and handbags of medical staff have been found to be colonized with bacteria as they are often kept in the environment laden with microorganisms such as patients side tables, ICU counter tops, restroom counters and laboratory shelves etc.[1, 4] Therefore, purses can be easily contaminated with infectious agents and may serve as vehicles of transmission of microorganisms from one place to another.[3]The increase in bacterial load on purses is probably contributed by storage of various articles inside them. The incidence of positive bacterial cultures from purses is reported to be highest in physicians.[5–6]

The isolation of commensal and opportunistic pathogens from the handbags and purses of healthcare workers is well reported in number of studies from India and abroad.[1,3,4]*Staphylococcus* species *(spp.)*, *Enterococcusspp.*, *Escherichia coli* and *Pseudomonas* spp. are the most commonly isolated organisms.[7–8] Coagulase negative *Staphylococci* which have been isolated most frequently from the purses is a constituent of normal skin microflora.[9,10]*Bacillus* and *Micrococcus* spp. also contaminate the purses of both men and women as they are ubiquitous in nature and can settle anywhere.[3] At times all the above mentioned organisms can act as opportunistic pathogens in immunocompromised individuals.

The present study was therefore undertaken to make the healthcare workers aware of the fact that they could transmit various infection producing organisms through their purses/bags and the use of appropriate infection control measures are important to prevent the transmission of infection.

MATERIAL AND METHODS

The present study was conducted in the department of Microbiology on the Health Care Workers of Guru Gobind Singh Medical College and Hospital Faridkot. Ethical clearance was taken from institutional ethical committee.Out of 100health care workers studied, 34 were doctors, 31 were nurses, 25 laboratory technicians and 10 health attendants.

Collection of sample

The samples were collected from the handbags and purses of healthcare workers (Doctors, Nurses, Lab technician and Lab attendant) after taking their consent and filling up of complete proforma.The sterile swabs moistened with sterile peptone water were used to collect the samples.

Procedure

The moistened swabs were rolled over the outer surfaces, base and handles of handbags/purses and were immediately transferred to the laboratory.The swabs were streaked over the sterile Blood agar and MacConkey agar plates. The bacterial growth was observed after 24 hours of incubation at 37°C.The isolates were be identified by gram staining, motility and biochemical test.

RESULTS AND OBSERVATIONS

The following observations were made in the present study.

Table 1 General Characteristics of Health workers

Characteristics		Percentage

Gender	Male	52
	Female	48
Category	Doctor	34
	Health Attendant	10
	Lab technician	25
	Nurses	31
Department/Ward	Dermatology	6
	Orthopaedics	9
	Burn unit	12
	ICU	23
	Surgery	34
	Others	16

Characteristics of Purses/handbag used by Health Care Workers

Majority of the health care workers used purses/handbags which were made of synthetic material (39%), followed by leather (36%) and cloth (25%). Of the 100 health care workers, 60%were using their handbags /purses since last 2years followed by 24% for upto 3 years. Only 16% health care workers used their purses/handbags for more than 3-4 years. 43% of health care workers were not washing their purses/handbags at all, while 32% were washing their purses/bags within 3months of use.

Table 2 Characteristics of Purses/handbag used by Health Care Workers

Characteristics		Percentage
Material	Leather	36
	Cloth	25
	Synthetic	39
Duration of utilization (in years)	0-0.5	13
	0.5-1	14
	1.0-2.0	33
	2.0-3.0	24
	3.0-4.0	13
	4.0-5.0	3
Frequency of washing (in months)	0-3.0	32
	3.0-6.0	15
	6.0-9.0	10
	No Washing	43

.**Table 3** Results of bacterial culture of the purses/handbag (n=100)

Culture	Frequency	Percentage
Positive	97	97
Negative	3	3
Total	100	100

Table 3 shows that 97% (97/100) purses samples were contaminated and were positive for bacterial growth. Only 3% (3/100) did not show growth of any bacteria.

Table 4 Sex wise Distribution of Health care workers showing Positive culture of Purses/Handbag (N=100)

Hcw	Culture positive (97)	Culture negative
	Frequency	Frequency
Male (N=52)	52 (100%)	0 (0%)
Female(N=48)	45 (93.75%)	3 (6.25%)
Total(N=100)	97 (97%)	3(3%)

The relationship of the culture positivity to the purses of male/female Health care workers showed no significant difference; p =1.547(insignificant)

Table 5 Distribution of culture positive cases on the basis of the material of the purses/handbag used

Material of the purses	Culture Positive	Culture Negative
	Frequency	Frequency
Leather (n=36)	34 (94.4%)	2 (55.5%)

Cloth (n=25)	24 (96%)	1(40%)
Synthetic (n=39)	39(100%)	0 (0%)
Total (n=100)	97(97%)	3(3%)

This table shows that there was no significant difference in the culture positivity with the material of the purses although all the purses made of synthetic were contaminated (100%) followed by leather (94.4%)and cloth (96%)

Table 6 Distribution of culture positive cases on the basis of duration of utilization of the purses/handbag

Duration of utilization	Culture positive	Culture negative
	Frequency	Frequency
6 Months (n=19)	17(89.47%)	2 (10.53%)
More than 6 months (n=81)	80(98.7%)	1(1.23%)
TOTAL (n=100)	97(97%)	3 (3%)

Bacterial isolates	Frequency	Percentage
staphylococcus		
Diphtheroids	21	21.65
Micrococcus	11	11.34
Methicillin resistant staphylococcus aureus (MRSA)	14	14.43
Methicillin sensitive staphylococcus aureus (MSSA)	5	5.15
Pseudomonas aeruginosa	9	9.27
Escherichia coli	5	5.15
Klebsiella species	2	2.06
Acinetobacter species	4	4.12
Total	97	97

Other bacteria isolated were Micrococcus (11) *Pseudomonas aeruginosa* (9),*Escherichia coli* (5) Methicillin sensitive *Staphylococcus aureus* (5),*Acinetobacter species*(4) and

Table 9 Antimicrobial susceptibility pattern of the Staphylococcal isolates

Antimicrobial agent	Coagulase negative Staphylococcus (n=26)		Methicillin resistant Staphylococcus aureus(n=14)		Methicillin sensitive Staphylococcus aureus(n=5)	
	S	R	S	R	S	R
Cefoxitin	24 (92.30%)	2(7.69%)	0(0%)	14(100%)	5(100%)	0(0%)
Erthromycin	25(96.15%)	1(3.84%)	3(21.42%)	11(78.57%)	5 (100%)	0(0%)
Vancomycin	26(100%)	0(0%)	14(100%)	0(0%)	5(100%)	0(0%)
Linezolid	26(100%)	0(0%)	14(100%)	0(0%)	5(100%)	0(0%)
Amikacin	24 (92.30%)	2(7.69%)	12(85.7%)	2(14.28%)	5(100%)	0(0%)
Ciprofloxcin	24(92.30%)	2(7.69%)	2(14.28%)	12(85.7%)	5(100%)	0(0%)

S: Sensitive; R: Resistant

Table 10 Antimicrobial susceptibility pattern of Gram negative bacteria isolated.

Antimicrobial agents	*Escherichia coli(n=5)*		*Klebsiella species(n=2)*		*Acinetobacter species(n=4)*		*Pseudomonas aeruginosa(n=9)*	
	S	R	S	R	S	R	S	R
Ceftriaxone	2 (40%)	3(60%)	0(0%)	2(100%)	0(0%)	4(100%)	NA	NA
Ciprofloxacin	1(20%)	4(80%)	0(0%)	2(100%)	NA	NA	3(33.33%)	6(66.6%)
Ceftazidime	NA	NA	NA	NA	NA	NA	4(44.4%)	5(55.5%)
Piperacillin- Tazobactam	2(40%)	3(60%)	1(50%)	1(50%)	0(0%)	4(100%)	7(77.7%)	2(22.2%)
Imipenem	5(100%)	0(0%)	1(50%)	1(50%)	0(0%)	4(100%)	0(0%)	9(100%)
Amikacin	3	2(40%)	2(100%)	0(0%)	0(0%)	4(100%)	8(88.89%)	1(11.1%)
Colistin	NA	NA	NA	NA	4(100%)	0(0%)	NA	NA
Cefotaxime	2(40%)	3(60%)	0(0%)	2(100%)	0(0%)	4(100%)	NA	NA
Cefepime	NA	NA	NA	NA	NA	NA	5(55.5%)	4(44.4%)

S: Sensitive; R: Resistant

Of the 97 purses that gave a positive bacterial growth on culture, 80(98.7%) were in used for more than 6 months while only 17(89.47%) were in used for less than 6 months.

Of the 97 purses that had bacterial contamination 43 Health care workers never washed their handbags.The most common bacterial isolates from the 97 purses that were culture positive in our study were Coagulase negative *Staphylocci* (26) followed by Diptheroids (21).However Methicillin resistant *Staphyloccous aureus* were isolated from (14) purses.

Table 7 Distribution of culture positive cases on the basis of frequency of washing the purses/handbag

Frequency of washing	Culture Positive
Before 6 months	44(45.36%)
After 6 months	10(10.30%)
Don't wash	43(44.32%)
Total	97

Table 8: Profile of bacteria isolated from purses/Handbags of health care workers

Bacterial isolates	Frequency	Percentage
Coagulase negative	26	26.80

MRSA: Methicillin resistant *Staphylococcus aureus*; MSSA: Methicillin sensitive *Staphylococcus aureus*
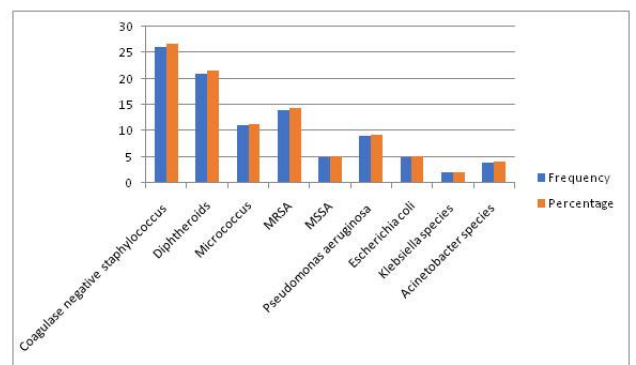

Figure 1: Profile of bacteria isolated from purses/Handbags of health care workers

Antimicrobial susceptibility pattern of gram negative isolates show that most of the isolates were resistant to commonly used antibiotics .Most of these isolates were multi drug resistant.

DISCUSSION

Purses have been considered as status symbol by some people and key accessories by others. Health care workers often carry their purses or handbags to their workplace and therefore these could be contaminated with infectious agents which may serve as vehicle from transmission of diseases from one place to another.[2]

In healthcare settings purses/handbags of medical staff have been found to be colonized with bacteria.[1,4] However there is paucity of reports regarding bacterial contamination of purses/handbags belonging to healthcare workers. We studied purses/handbags of 100 Health care workers of our institute. There were 34 doctors, 31 nurses, 25 laboratory technicians, and 10 lab attendants .Overall there were 52% males and 48% females. In 2009 Dotanl et al.,[2] undertook a study on 65 Health care workers which included 18 physicians, 31nurses, 11 orderlies and staff. In contrast the study of Feldman et al., included only purses of 13 female doctors. 1 Majority of purses sampled in the study were from Health care workers posted in Surgery department followed by ICU 23, Burn unit 12, Orthopaedics9, Dermatology 6 and from other departments 16 were isolated.

In the present study maximum were made of synthetic (39%) followed by leather, (36%) and cloth 25(%). However In a study conducted by Biranjia-Hurdoyal et al.,[11] (43.4%) participants used leather purses, (38.6%) used synthetic purses and 17.9% used cloth purses.

Analysis of duration of used of purses in the present study showed that, majority of (40%) of Health care workers use their purses only for 0.5-1 year, while only 4% use the purses for more than 3 years.

In the present study we observed that 43% of Health care workers never wash their purses/bags at all, while 32% were washing their purses/bags within 3 months of use. This is in accordance with a study conducted by Bazian et al.,[12] that purses are hardly ever washed and are often only thrown out when they become worn out and unusable.

In the present study 97%0f the purses were positive for bacterial culture and only 3 were free of any bacteria which corroborates the study of Bazian et al.,[12] where bacteria were isolated from 95% of purses. Similarly a study conducted by Biranjia-Hurdoyal et al.,[11] bacterial contamination was observed in 95.2% of the purses. However In the study of Dotan et al [2] bacteria were found only 58.5% of handbags of Health care workers studied.

This difference in the rates of isolation of bacteria from the purses of Health care workers could be because of culture techniques used for swabbing of bags and methodology of culture employed. Also it could be because of different occupational groups of health care workers (doctors, nurses, lab technicians, students etc) participating in the study who work in different areas of hospital.

Majority of the (78/97) 80.4% that were positive for bacterial culture were being used for a period of more than 6 months while only (19/97) 19.6% were use less than 6 month. This may be because of longer duration of use of purses and handbags with no or infrequent washing.There was no significant difference in the culture positivity with the material of the purses although all the purses made of synthetic were contaminated (100%) followed by leather (94.4%)and cloth (96%) which is in contrast to a study conducted by Biranjia-Hurdoyal et al.,[3] where contamination of synthetic purses was significantly higher than purses made up of other material.

Coagulase negative Staphylococci were the most common isolate (27) which is in accordance with other studies. Diptheroids(21), Methicillin resistant *Staphylococcus aureus* (14), *Micrococcus* (11), *Pseudomonas aeruginosa* (9), *Escherichia coli*(5), *Klebsiella* (4), *Acinetobacter*. Chandra *et al.,* have also reported isolation of various bacteria with maximum being *Staphylococcus aureus*. Dotanl *et al.,*[4] have also reported isolation of commensals and pathogenic bacteria in their study. This difference may be because of prevalence of different microorganisms in individual health care settings.

Antibiotics susceptibility testing of the staphylococcal isolates showed that most of the Coagulase negative *staphylococci* were Methicillin sensitive(24/26)while majority of *Staphylococcal aureus* isolates were Methicillin resistant (14/19)*Staphylococcus aureus* isolates showed higher resistance to other antibiotics as compare to Methicillin sensitive *Staphyloccous aureus* and the Coagulase negative *Staphyhlococci*. All the staphylococcal isolates (MRSA, MSSA, MRCONS, and MSCONS) were susceptible to vancomycin and linezolid. Antibiotic susceptibility pattern of gram negative isolates show that most of the isolates were resistant to commonly used antibiotics .Most of these isolates were multi drug resistant. This poses a risk as these agents may be carried from one patient to other resulting in nososcomial infections and also these agents may be transferred to the community.

CONCLUSION

The result of the present study which was conducted to look for bacterial contamination of purses/handbags of various health care workers in our institute suggests thatHandbags and purses of health care workers are contaminated with various pathogenic and nonpathogenic bacteria.The pathogenic bacteria were found to be resistant to multiple classes of antibiotics. Most of the health care workers never washed their purses/handbags.The health care workers should be encouraged to clean their handbags / purses frequently so that the bacterial contamination could be reduced. It is recommended that the health care workers should wash their hands before and after examining the patients so that the commensally and pathogenic bacteria cannot be carried on their handbags/purses from the hospital environment. This will also help in avoiding of carriage of these bacteria from the health care settings to their homes and community and vice versa.The health care workers should be familiar with proper hand washing technique, hand hygiene and should follow good infection control practices in the hospital which would result in decrease in colonization and contamination of inanimate objects like purses hence restricting the spread of these bacteria.

Ethical approval

The approval from the ethical Committee of the Guru Gobind Singh Medical College& Hospital, Faridkot, Punjab was taken before conducting the present study.

References

1. N J, Feldman M. Women doctors' purses as an unrecognized fomite. Del Med J. 2012; 84(9):277–80.

2. Carrico R.M., Niner S. Multidrug-resistant organismsVRE and MRSA: practical home care tips*. Home Healthcare Nurse.* [Internet]. 2002 jan [cited 2019 May 28; 20(1)23-8; quiz 28-97. Available from: https://www.ncbi.nlm.nih.gov/pubmed/11839961

3. Biranjia-Hurdoyal SD, Deerpaul S, Permal GK. A study to investigate the importance of purses as fomites. Adv Biomed Res [Internet]. 2015 [cited 2019 May 22];4:102. Available from: http://www.ncbi.nlm.nih.gov/pubmed/ 26261804

4. Dotan I, Somin M, Basevitz A, Beilinson N, Bardenstein R, Zimhony O, et al. Pathogenic bacteria on personal handbags of hospital staff. J Hosp Infect [Internet]. 2009 May [cited 2019 May 22];72(1):90–2. Available from: http://www.ncbi.nlm.nih.gov/pubmed/19272671

5. Marinella MA, Pierson C, Chenoweth C. The stethoscope. A potential source of nosocomial infection? Arch Intern Med [Internet]. 1997 Apr 14 [cited 2019 May 28];157(7):786–90.Availablefrom:http://www.ncbi.nlm.nih.gov/pubmed/9125011

6. Brady RRW, Wasson A, Stirling I, McAllister C, Damani NN. Is your phone bugged? The incidence of bacteria known to cause nosocomial infection on healthcare workers' mobile phones. J Hosp Infect [Internet]. 2006 Jan [cited 2019 May 28];62(1):123–5. Available from: http://www.ncbi.nlm.nih.gov/pubmed/16099536

7. Reynolds KA, Watt PM, Boone SA, Gerba CP. Occurrence of bacteria and biochemical markers on public surfaces. Int J Environ Health Res [Internet]. 2005 Jun [cited 2019 May 26];15(3):225–34. Available from: http://www.ncbi.nlm.nih.gov/pubmed/16134485Bures S, Fishbain JT, Uyehara CFT, Parker JM, Berg BW. Computer keyboards and faucet handles as reservoirs of nosocomial pathogens in the intensive care unit. Am J Infect Control [Internet]. 2000 Dec [cited 2019 May 26];28(6):465–71. Available from: http://www.ncbi.nlm.nih.gov/pubmed/11114617

8. Kalita M, Palusińska-Szysz M, Turska-Szewczuk A, Wdowiak-Wróbel S, Urbanik-Sypniewska T. Isolation of cultivable microorganisms from Polish notes and coins. Polish J Microbiol [Internet]. 2013 [cited 2019 May 26];62(3):281–6. Available from: http://www.ncbi.nlm.nih.gov/pubmed/24459833

9. Bhoonderowa A, Gookool S, Biranjia-Hurdoyal SD. The Importance of Mobile Phones in the Possible Transmission of Bacterial Infections in the Community. J Community Health [Internet]. 2014 Oct 13 [cited 2019 May 26];39(5):965–7. Available from: http://www.ncbi.nlm.nih.gov/pubmed/24522388

10. Friedman, N.D., Kaye, K.S., Stout, J.E., McGarry, S.A., Trivette, S.L., Briggs, J.P., et al. (2002) Health Care—Associated Bloodstream Infections in Adults: A Reason to Change the Accepted Definition of Community-Acquired Infections.Ann Intern Med[Internet].2002 NOV 19 [cited 2019 May 28];137 (10):791-7.Available from:https://www.ncbi.nlm.nih.gov/pubmed/12435215

11. Is your purse a hotbed of bacterial infection? - NHS [Internet]. [cited 2019 May 22]. Available from: https://www.nhs.uk/news/lifestyle-and-exercise/is-your-purse-a-hotbed-of-bacterial-infection.

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