

## HEALTH CARE PERSONNEL: UNCLEAN, CONTAMINATED OR DIRTY

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### ABSTRACT

The aim of this review article is to analyse whether and in what ways the health care personnel while imparting health care contribute to spread of infection from one patient to another and how it can be reduced. Health care personnel in the process of imparting health care not only are exposed to infection but may act as a carriers of the infection from one patient to another. The risk of colonisation by micro-organisms of inanimate objects used by the health care personnel makes the health care personnel susceptible and exposed to infection, thereby causing transmission of infection from one patient to another. Common objects carried and used by health care personnel were studied and found to act as carriers causing/ spreading infection. Health care personnel unknowingly carry micro-organisms on their mobiles, pagers, purses, stethoscopes and white coats causing an increase in nosocomial infections. Health care personnel may transmit infection in a hospital setting from one patient to other. Accessories, clothing and objects commonly used by them may spread infection. Small steps and common measures can be adopted to reduce the spread of such infection. Purses used by female health care personnel should be cleaned regularly, and the use of synthetic purses should be discouraged. Aprons or white coats are potential source of cross infection and there should be a ban on aprons from non-clinical areas such as canteens and the library and stricter white coat changing and washing regimes should be implemented. Regular cleaning of the mobile phones and proper hand hygiene practices would significantly decrease the transmission rate of infection. All canned beverages be washed before consuming them just as we wash fruits and vegetables.

**Keywords:** Health care personnel, apron, white coat, purse, mobile, canned beverages.

### INTRODUCTION

Health care personnel is susceptible, exposed, carries and transmits infection and should take necessary steps and preventive measures so that he or she is not infected and spreads infection from which he or she is trying to shield his patient. It has been studied that a health care personnel in the process of imparting health care to the patients is not only exposed to infection but may act as a carrier of the infection from one patient to another. The risk of transmission of diseases by inanimate objects has often been investigated in both community and medical settings. Currency notes, mobile phones, stethoscopes, computers, keyboards, medical equipment from healthcare settings, the interior of the car in which the health care worker travels and even the canned beverage which he or she consumes after a hectic shift have been reported to be colonized with micro-organisms. This article enumerates the mechanism by which health care personnel unknowingly carry and spread micro-organisms on their mobiles, pagers, purses, stethoscopes, white coats and the measures which may be taken to reduce the spread of infection.

### Purses

Purses have been considered as status symbols by some people and key accessories by others. The use of purses has not been limited to storing money, as individuals also use them to store valuables, keys, credit cards, mobile phones, and receipts. The majority of purses hardly get washed and are discarded after years of use. Purses are often kept in environment laden with bacteria, such as, kitchen tables, handbags, restroom countertops, and fast food counters. Therefore, purses can be easily contaminated with infectious agents and may serve as vehicles for the transmission of diseases from one place to another. Purses from both men and women are potential vectors for transmission of diseases across the community.<sup>1</sup> In the healthcare settings, purses and handbags of the medical staff have been found to be colonized with bacteria.<sup>2,3</sup> It was found that 95.2% of the purses from the community setting were colonized by bacteria, which was higher than the 69.2% reported for purses from the medical setting.<sup>4</sup> A previous study reported that the insides of women's handbags and shopping bags were laden with bacteria.<sup>5</sup> Several studies reported that the microbial colonization on the currency notes in circulation.<sup>6</sup> Commensals as well as

opportunistic pathogenic organisms have been isolated from fomites, which have included mostly Staphylococcus, Enterococcus, E Coli, Pseudomonas and Micrococcus.<sup>7</sup>

The adhesion and survival of bacteria could be affected by the nature of a surface. Rough surfaces and grooved materials increased the surface area and provided hidden sites, which could favour bacterial adhesions, compared to smooth surfaces. Furthermore, microorganisms adhere more to braided materials than to flat ones.<sup>8</sup>

### **White Coat**

Traditionally, the white coat is thought to bring credibility and dignity to the medical profession and is worn over personnel clothing as a personal protection equipment (PPE) against contamination of skin and clothing by "splashes" or touch by patients. White coats are worn primarily for identification, but there has always been some concern that white coats, like nurses' uniforms and other hospital garments, may play a part in transmitting pathogenic bacteria in a hospital setting, as white coats are known to be potentially contaminated with pathogenic drug resistant bacteria.<sup>9</sup> Microorganisms can survive between 10 and 98 days on fabrics which are used to make white coats, which include cotton, cotton and polyester, or polyester materials.<sup>10,11</sup> Another study found the sleeves and the pockets of the white coat as the sites that were most highly contaminated.<sup>12</sup> A yearly purchase of white coats and the possession of 2 or more white coats at any point of time should be made compulsory. The wearers of the white coats should be encouraged to wash their white coats weekly. A lack of hand hygiene undoubtedly enhances the contamination of the white coats, since they are often touched by the physicians in the course of their work. As a result, there is a pressing need to promote a scrupulous hand washing among the physicians before and after they attend patients and also to promote alternatives to the white coats, which includes the universal use of protective gowns.

### **Mobile phones**

Mobile phones are indispensable part of communication and are also an important means of communication among doctors and other health care workers (HCWs) in hospitals where hospital-associated infections (HAI) are prevalent.<sup>13</sup> Hands of HCWs play an important role in transmission of HAI and mobile phones which are seldom cleaned and often touched during or after the examination of patients without hand washing, act as a reservoir as

well as vehicle for transmission of nosocomial infections.<sup>14</sup> One third of the mobile phones belonging to HCWs are contaminated by potential pathogens.<sup>15</sup> Microorganisms that are normally found on our skin thrive and multiply in optimum temperature and mobile phones are perfect for breeding these microorganisms as they are kept warm and easy to handle in pockets, handbags and briefcases.<sup>16</sup> Simple measures such as proper hand hygiene practices and regular decontamination of the mobile phones with alcohol wipes may reduce the risk of HAI's caused by these devices.<sup>17</sup>

### **Accessories used by health care worker**

The personal work tools such as stethoscopes, ball pens which are not included in routine hospital cleaning, have also been proved to be possible sources of contamination.<sup>18</sup> Dental gloves which protect the dental care personnel from being infected by the patients, are not a fool proof method for containing contamination. Use of cellular phones by HCWs with gloved hands is not uncommon, leading to increased tendency of developing nosocomial infections. Use of gloves does not eliminate the purpose of hand washing, as gloves may become contaminated due to punctures, while in use. Research has found that prolonged use of gloves and the use of products like disinfectants, composite resins, and alcohol may increase the permeability of these gloves.<sup>19</sup> The Canadian Dental Association recommends that hands be washed with germicidal soap before and immediately after the use of gloves.<sup>20</sup>

### **Cola and energy drink cans**

Having a chilled canned cola or an energy drink frequently consumed by health care worker after a hectic shift tastes good and feels refreshing. The most modern warehouses and supermarkets have rodents and the cola and beer cans may have been stored or handled in an unsanitary manner before they get transported to the retail outlets without being properly cleaned. Rodents are reservoirs of parasites and carry different kind of diseases including bubonic plague, murine typhus, spirochetal jaundice, rabies, rat bite fever and bacterial food poisoning. Hantavirus pulmonary syndrome (HPS) and Leptospirosis are two fatal bacterial zoonotic diseases caused by dried rat urine. Leptospirosis commonly known as Weil's disease has emerged as a globally important infectious disease which causes enlargement of spleen, hepatic and renal failure or massive pulmonary haemorrhage.<sup>21</sup> The mainstay of preventive measure to follow for these

diseases is to create awareness about them by an intense educational campaign.

### Interiors of car

Automobiles are potentially important fomites for exposure to microbes as many health care workers travel multiple times to the hospital whenever they receive calls and spend a significant amount of time in this setting. *Staphylococcus epidermidis*, *S. aureus*, and *S. warnerii* are the most prevalent causative organisms because staphylococci can colonize commonly touched inanimate objects and it is feasible that interior surfaces of automobiles could serve as reservoirs for pathogenic staphylococci and may play an important role in human colonization and infection. In a study by Stephenson RE et al, it has been found that the most highly colonized locations with over 100 culturable CFUs per 6.5 cm<sup>2</sup> surface area were areas of frequent touching by the occupants, including locations on the steering wheel, the gear shifter, door handles and window switches, and the centre console near the beverage holder.<sup>22</sup> It is proposed that individuals experiencing frequent *S. aureus* skin infections or those concerned about *S. aureus* carrier status consider the surfaces of car interiors as potential reservoirs for *S. aureus*. Coatings containing 5% silver ion additives may be applied to steering wheels to eliminate the presence of culturable pathogenic bacteria recovered from these sites.<sup>22</sup>

### CONCLUSION

Purses of both male and female health care workers carry potential pathogens. Bacterial growth in purses of females is more than in those of males because females are more likely to place their purses on kitchen tables, slabs of wash rooms, never empty their purses, and more frequently store them in their bags.<sup>23</sup> Purses should be cleaned regularly, and the use of synthetic purses should be discouraged.

Aprons or white coats are potential source of cross infection. There should be a ban on aprons from non-clinical areas such as canteens and the library and stricter white coat changing and washing regimes should be implemented.

There is an urgent need to stress awareness among the HCWs about the potential role of mobile phones in transmission of infectious agents in and outside the hospital. Regular cleaning of the mobile phones and proper hand hygiene practices would significantly decrease the transmission rate of infection.

It is recommended that all canned beverages be washed before consuming them just as we wash fruits and vegetables.

Individuals experiencing frequent *S. aureus* skin infections or those concerned about *S. aureus* carrier status should consider the surfaces of car interiors as potential reservoirs for *S. aureus*. Coatings containing 5% silver ion additives may be applied to steering wheels to eliminate the presence of culturable pathogenic bacteria recovered from these sites.

### REFERENCES

1. Kalita M, Palusińska-Szys M, Turska-Szewczuk A, Wdowiak-Wróbel S, Urbanik-Sypniewska T. Isolation of cultivable microorganisms from Polish notes and coins. *Pol J Microbiol.* 2013;62:281–6
2. Feldman J, Feldman J, Feldman M. Women doctors' purses as an unrecognized fomite. *Del Med J.* 2012;84:277–80.
3. Dotan J, Somin M, Basevitz A, Beilinson N, Bardenstein R, Zimhony O, et al. Pathogenic bacteria on personal handbags of hospital staff. *J Hosp Infect.* 2009;72:90–2.
4. Feldman J, Feldman J, Feldman M. Women doctors' purses as an unrecognized fomite. *Del Med J.* 2012;84:277–80.
5. Bakunas-Kenneley I, Madigan EA. Infection prevention and control in home health care: The nurse's bag. *Am J Infect Control.* 2009;37:687–8.
6. Kuria JK, Wahome RG, Jobalamin M, Kariuki SM. Profile of bacteria and fungi on money coins. *East Afr Med J.* 2009;86:151–5.
7. Reynolds KA, Watt PM, Boone SA, Gerba CP. Occurrence of bacteria and biochemical markers on public surfaces. *Int J Environ Health Res.* 2005;15:225–34.
8. Katsikogianni M, Missirlis YF. Concise review of mechanisms of bacterial adhesion to biomaterials and of techniques used in estimating bacteria-material interactions. *Eur Cell Mater.* 2004;8:37–57.
9. Wong D, Nye K, Hollis P. The microbial flora on doctor's white coats. *British Medical Journal.* 1991;303:21–28.
10. Uneke CJ, Ijeoma PA. The potential for nosocomial infection transmission of the white coats which were used by

- physicians in Nigeria: Implications for improved patient-safety initiatives. *World Health and Population*. 2010;11(3):44–54.
11. Chacko L, Jose S, Issac A, Bhat KG. Survival of nosocomial bacteria on hospital fabrics. *Indian Journal of Medical Microbiology*. 2003;21(4):291.
  12. Loh W, Ng W, Holton J. Bacterial flora on the white coats of medical students. *J Hosp Infect*. 2000;45:65–8.
  13. Brady RR, Wasson A, Stirling I, McAllister C, Damani NN. Is your phone bugged? The incidence of bacteria known to cause nosocomial infection in healthcare workers' mobile phones. *J Hosp Infect*. 2006;62:123–5.
  14. Datta P, Rani H, Chander J, Gupta V. Bacterial contamination of mobile phones of health care workers. *Indian J Med Microbiol*. 2009;27:279–81.
  15. Fleming K, Randle J. Toys-friend or foe? A study of infection risk in a paediatric intensive care unit. *Paediatr Nurs*. 2006;18:14–8.
  16. Brady RR, Wasson A, Stirling I, McAllister C, Damani NN. Is your phone bugged? The incidence of bacteria known to cause nosocomial infection in healthcare workers' mobile phones. *J Hosp Infect*. 2006;62:123–5.
  17. Jeske HC, Tiefenthaler W, Hohlrieder M, Hinterberger G, Benzer A. Bacterial contamination of anaesthetists' hands by personal mobile phone and fixed phone use in the operating theatre. *Anaesthesia*. 2007;62:904–6.
  18. Jeske HC, Tiefenthaler W, Hohlrieder M, Hinterberger G, Benzer A. Bacterial contamination of anaesthetists' hands by personal mobile phone and fixed phone use in the operating theatre. *Anaesthesia*. 2007;62:904–06.
  19. Kanjirath PP, Coplen AE, Chapman JC, Peters MC, Inglehart MR. Effectiveness of gloves and infection control in dentistry: student and provider perspectives. *J Dent Educ*. 2009;73(5):571–80.
  20. Canadian Dental Association. Recommendations for infection control procedures. *J Can Dent Assoc*. 1988;54:383–4.
  21. Bharti AR, Nally JE, Ricaldi JN, Matthias MA, Diaz MM, Lovett MA, Levett PN, Gilman RH, Willig MR, Gotuzzo E and Vinetz JM (2003) The *Lancet Infectious Diseases* 3:757–771
  22. Stephenson RE, Gutierrez D, Peters C, Nichols M, Boles BR. Elucidation of bacteria found in car interiors and strategies to reduce the presence of potential pathogens. *Biofouling*. 2014;30(3):337–346. doi:10.1080/08927014.2013.873418.
  23. Bakunas-Kenneley I, Madigan EA. Infection prevention and control in home health care: The nurse's bag. *Am J Infect Control*. 2009;37:687–8.