

PDF - ANTIBIOGRAM AND MICROBIAL CARRIAGE OF CAMPUS SHUTTLE DOOR HANDLES IN FEDERAL UNIVERSITY OF TECHNOLOGY, AKURE. - researchcub.info **ABSTRACT**

The transmission of infection via fomites constitutes a major threat to public health especially in the developing countries. This study was carried out to investigate the microbial carriage and antibiotics pattern of bacteria on the door handles of campus shuttle operating in the Federal University of Technology Akure. Samples were randomly collected from a total of one hundred and fifty (150) door handles following standard laboratory techniques. Enumeration of the bacterial counts was carried out using pour plating technique while the bacteria isolates were identified using cultural, morphological and biochemical characteristics. The results show that the drivers' door handles, front passengers' door handles and back passengers' door handles had overall mean aerobic bacterial counts of 195.56 ± 2.05 ($\times 10^4$ cfu/ml), 228.08 ± 1.56 (10^4 cfu/ml) and 176.92 ± 2.70 ($\times 10^4$ cfu/ml) respectively. Bacteria isolated and identified were *Enterobacter aerogenes* (17.1%), *Escherichia coli* (12.4%), *Klebsiella pneumoniae* (10.1%), *Proteus* spp. (4.7%), *Pseudomonas aeruginosa* (4.7%), *Salmonella enteritidis* (2.3%), *Staphylococcus aureus* (17.1), *Staphylococcus epidermidis* (22.5) and *Streptococcus pneumoniae* (9.3%) while the fungal isolates were *Aspergillus fumigatus* (29.3%), *Aspergillus niger* (19.5%), *Candida* spp. (6.1%), *Fusarium* spp. (14.6%), *Mucor* spp. (9%), *Penicillium* spp. (15.9%), and *Rhizopus* spp. (3.7%). The antibiotics pattern of the bacteria indicated that all the bacteria isolated were susceptible to pefloxacin (19.25 ± 4.031 - 26.33 ± 4.041 mm) and gentamycin (15.00 ± 2.685 - 25.00 ± 3.916 mm) while all were resistant to amoxicillin (3.67 ± 0.082 - 13.75 ± 2.217 mm) except *Enterobacter aerogenes*. These campus shuttles aside their usage as a means of transportation could also serve as a means of transmission of both pathogenic and non-pathogenic microorganisms which pose public health risks. Personal hygiene and sanitation such as hand washing and the use of antimicrobial wipe to clean the hands could serve as a means of reducing the incidence of microbial transmission to drivers and passengers.

CHAPTER ONE

1.0 Introduction

The spread of infectious disease through hand contact has been an area of major public health concern because of the frequent contact of the hand with fomites which are potential carriers of pathogenic organisms may lead to an alarming rate of outbreaks of infections transmitted by the fomites. Worldwide annually there are 1.7 million deaths from diarrhoeal diseases and 1.5 million deaths from respiratory infections (Pruss-Ustun and Covahan, 2006), these are examples of diseases which could be contracted by humans via fomites. According to (Itah, 2004), Gram positive *Staphylococcus aureus*, and Gram negative bacteria such as *Escherichia coli*, *Klebsiella* species, *Pseudomonas* species, were found to contaminate various contact surfaces including chairs, tables, windows, door handles and many other common household fixtures. The presence of

these pathogenic bacteria on environmental surfaces poses a potential risk to vulnerable, immune-compromised individuals (Pruss-Ustun and Covahan, 2006).

It has been shown that hard, non-porous surfaces such as door handles have the highest bacterial transfer rates to hands (Rusin *et al.*, 2002). In recent past, a lot of effort has been invested in emphasized hand hygiene through hand wipes and hand sanitizers (Hota, 2004). Hand wipes with higher ethanol content are more effective in not only antimicrobial activities but also remover of endospores via mechanical action (Stout *et al.*, 2010). Even though people are commonly aware of such practices, the possibility of inaccessibility or lack of use of these practices do exist. According to Hansen and Knochel (2010) up to 60% Of adults do not wash their hands when appropriate. People believe that microbes are only present in research laboratories, hospitals or clinics and thus they have a misleading feeling of security in other places or while touching other surfaces such as door handles (Stout *et al.*, 2010). Lack of knowledge of the roles of micro-habitat such as door handles in dissemination of microorganisms is a threat to public health. In fact 80% of infections are spread through hand contact with hands or other objects (Reynold and Hurst, 2005). Reynold and Hurst (2005) used an invisible fluorescent tracer for artificial contamination of public surfaces. They found that contamination from outside surfaces was transferred to 86% of exposed individual's and 82% tracked the tracer to their home or personal belongings hours later. The viability of Gram positive and Gram negative organism under various environment conditions have been described (Noskin *et al.*, 1995). Some microbes are infectious at very low doses and can survive for hours to weeks on nonporous surfaces, such as countertops, telephone and door handles (Reynold and Hurst, 2005). *Enterococci* have been found to survive in dry conditions and on various fabrics utilized in the health care environment. Infectious doses of pathogen may be transferred to the mouth after handling everyday contaminated objects such as the door handles. Door handles are contaminated with various types of microorganisms including varying species of bacteria and fungi and this may be a source of nosocomial infections in hospitals. Scientific information about the occurrence of microorganisms on various objects outside the health care facilities is very little and needs to be enriched in order to educate people on the necessity of improving the habit of hand washing to reduce microbial transmission.

In the past 60 years, antibiotics have been critical in achieving a dramatic rise in life expectancy and significant improvements in public health (El-Astal, 2005). However, disease-causing microbes have become increasingly resistant to the antibiotics commonly in use (El-Astal, 2005). It has been clearly shown that the use of antimicrobials leads to selection of resistant strains both in the individual and in the community, and overuse or inappropriate use only increases this risk (Reynold and Hurst, 2005). History suggests that microbes will never run out of ways of developing resistance, but we may run out of effective antimicrobials (Reynold and Hurst, 2005). The Gram

negative enteric bacilli are common causes of a wide variety of infections involving diverse anatomic sites in both healthy and compromised hosts (El-Astal, 2005). In general, among adults, the incidence of infection due to these agents increases with age. Thus, as the mean age of the population increases, so will the number of these infections (Reynold and Hurst, 2005). Drug resistance is a serious medical problem. Progressive increase in resistance to commonly used antibiotics with many gram-negative bacilli being multidrug-resistant has been noticed (Reynold and Hurst, 2005). The emergence of antibiotic resistance in the management of infections is a serious public health issue, particularly in the developing world where apart from high level of poverty and ignorance, there is also high prevalence of fake and spurious drugs of questionable quality in circulation (El-Astal, 2005). This has led to a significant increase in morbidity.

There also appears to be a significant lack of studies highlighting the susceptibility patterns of locally prevalent microorganisms (El-Astal, 2005). Knowledge of etiological agents of infections and their sensitivities to available drugs is of immense value to the rational selection and use of antimicrobial agents and to the development of appropriate prescribing policies (El-Astal, 2005). Microbial transmission via several surfaces such as automated teller machines, mobile phones, door handles and currency has been extensively studied but the role of commercial buses door handles in the dissemination of pathogenic microorganisms have not been properly investigated. Therefore this research project will be centered on the role of commercial buses door handle in the transmission of pathogenic microorganism to human via hand contact and the antibiotics pattern of the potential isolates.

1.1 The objectives of the study

The aim and objectives of this research are to:

- (a) assess the role of campus shuttle door handles in dissemination of pathogenic microorganisms; and
- (b) determine the antibiotics susceptibility and resistance pattern of the potential isolates.

1.2 Justification

Over the years, different researches has been conducted to examine the role of various surfaces, such as tables, computer key boards and mobile phones on the carriage and dissemination of pathogenic infection, but the role of door handles of commercial shuttle buses as a route of microbial transmission has not been reported. Hence the need to assess the carriage and transmission of microorganism by shuttle door handles. The knowledge of this is expected to broaden our understanding of the microbial carriage of the door handles and their antibiotics pattern. This will help the University management to implement public health preventive and control measure to forestall future outbreak of infection that may result from this pathogenic microorganisms associated with the shuttle door handles.

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