VOLUME - 9, ISSUE - 10, October - 2020 • PRINT ISSN No. 2277 - 8160 • DOI : 10.36106/gjra

Original Research Paper

Anaesthesia

MOBILE PHONES IN HOSPITAL SETTINGS AND CONTAMINATED DEVICES POSE THREAT TO PATIENTS IN THE OPERATION THEATRES

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ABSTRACT Personal items such as mobile phones are commonly used by doctors working in the operation theatre. The hands and personal use items of anaesthetic doctors and Nurses working in the operation theatre may serve as vectors for transmission of nosocomial pathogens among surgical patients. Our aim was to determine the mobile phones contamination among anaesthetists working in the operation theatres of anaesthetic doctors and nurses. Sixty anaesthetic doctors, other surgical department doctors and nurses working in the operation theatres at Madha Medical college and Research Institute, Chennai and Sri Lakshmi Narayana Institute of Medical sciences, puducherry were enrolled in the study. Swabs from fingertips and keypads of mobile phones were taken using moist sterile swabs and plated on Mac Conkey and Blood agar plates. The bacteria isolated were identified by biochemical tests. A significant number of mobile phones in the Operation Theatre were found to be contaminated with bacteria. Most of these bacteria though are nonpathogenic in normal circumstances but may become significant among the patient population. Daily disinfection practice of mobile phones of all Health Care Workers should be part of Operation Theatre safety protocols for prevention of infection.It is important to encourage higher compliance to hand washing practices and routine surface disinfection of personal use items brought to the operation theatre. Mobile phone disinfection should be part of infection prevention protocols in Operation Theatre.

KEYWORDS : Bacterial Contamination, Nosocomial Infections, Mobile Phones, HealthCare Workers, Contamination.

INTRODUCTION:

Microorganisms from surgical patients can be transferred to hands of Doctors and Nurses, and from their hands to their mobile phones & writing pens. Mobile phones and writing pens of health care workers can harbor nosocomial microorganisms and generally wash their hands but their mobile phones and writing pens can harbor nosocomial microorganisms. These may transmit nosocomial infection to their homes also. Several studies have been done in the different parts of world and they confirm the presence of nosocomial microorganism on healthcare worker's mobile phones. Nosocomial infections are a serious problem in hospitals causing increased morbidity and mortality among hospitalised patients. It significantly increases the patients' length of stay in hospital resulting in higher hospital costs. Approximately 2 million nosocomial infections occur in the USA. According to the Centers for Disease Control and Prevention (CDC), SSIs account for 14 to 16% of all nosocomial infections and account for 38% of nosocomial infections among surgical patients. Source of infection may be exogenous such as from the air, medical equipment, hands of surgeons and other staff or endogenous such as the skin flora in the operative site, or rarely from blood used in the surgery.CDC guidelines recommend several preoperative preparation practices important in preventing nosocomial infections in surgical patients which include hand scrubbing procedures of the surgical team.

Personal use items mentioned above are indispensable in normal daily life. In the health care setting the mobile phone gives quick and easy access to the health care personnel enabling them to be contacted promptly when required specially during an emergency. There are no cleaning guidelines for personal use items of health care workers or regulations restricting medical staff to carry these items into the sterile environment of the operation theatre. The possibility that these items can act as a vehicle for transmission of pathogens is high if they are used during patient contact or prior to invasive procedures.

As anaesthetists and Nurses perform various invasive procedures during surgery it is important to maintain sterility of the hands. Therefore it is possible that the use of personal items in the theatre will contribute to contamination of anaesthetists' hands and be a source of transmission of pathogenic organisms from the hospital wards and the community in to the operation theatres.

Mobile phones (MPs) are becoming commonplace in both community and hospital settings. More than 50% of healthcare workers (HCWs) admit using MPs (either personal or professional devices) in their clinical environment and practice, including during physical contact with patients [1–4]. The use of MPs can improve the quality, rapidity and efficiency of communication in healthcare settings [1]. Approximately 2 million nosocomial infections occur in the USA [1]. Bacterial contamination on these devices has been described [1], with up to 25% of MPs being found to be contaminated [5]. Nosocomial bacteria such as methicillin-resistant Staphylococcus aureus, Acinetobacter species, vancomycin-resistant enterococci, Pseudomonas species and coliforms have been retrieved from MPs [2,5–7]. These devices may thus serve as a reservoir of bacteria known to cause nosocomial infections [4-5] and may play a role in their transmission to patients through the hands of HCWs [8].

These mobile phones harbor a wide array of microorganisms which includes Coagulase negative Staphylococci (CONS) *Staphylococcus aureus*, *Escherichia coli*,*Klebsiella pneumoniae*, Acinetobacter species, *Enterococcus faecalis*, and *Pseudomonas aeruginosa*.[9-10]. Multidrug resistant strains like Methicillin resistant *Staphylococcus aureus* (MRSA) and Extended spectrum beta lactamases producing organisms (ESBL),high-level aminoglycoside-resistant *Enterococcus*, and carbapenem-resistant *Acinetobacter baumanii [11-12]* have also been isolated from mobile phones. Majority of the staff neither clean their mobile phones regularly nor wash hands after using these mobile phones [13] There are no restrictions on the use of mobile phones in the hospital setting and no guidelines have been formulated on cleanliness of mobile phones in the healthcare settings. Further sharing of mobile phones between the hospital staff may distinctly facilitate the spread of potentially pathogenic bacteria to the community. Operation Theatre (OT) of any hospital offers cleanest and sterile environment for patients undergoing surgeries. The cell phones are possessed by all HCWs working in OT. Before entering the operating theatres

anaesthetists change into sterilised theatre suits but do not perform routine hand washing or decontamination. However the practice of hand washing and decontamination is strictly followed when performing invasive procedures. Therefore it is possible that the use of personal items in the theatre will contribute to contamination of anaesthetists' hands and be a source of transmission of pathogenic organisms from the hospital wards and the community in to the operation theatres. Our study was conducted with the aim to screen the mobile phones of health-care personnel for various bacteria and fungi with special reference to methicillin-resistant *Staphylococcus aureus* (MRSA), Staphylococci, pseudomonas, coagulase negative staphylococci and pseudomonas and to evaluate the amount of contamination of the hand and mobile phones in anaesthetists working in the operation theatre and formulate suitable guidelines for their decontamination to screen the mobile phones of healthcare workers so as to elucidate all possible contaminants which can act as a source of infection, with their antibiotic resistance pattern.

MATERIALS AND METHODS:

60 anaesthetic doctors, other surgical department doctors and nurses working in the operation theatres at Madha Medical college and Research Institute, Chennai and Sri Lakshmi Narayana Institute of Medical sciences, puducherry were enrolled in the study. Study includes Doctors and Nurses from surgical operation theatre. Consent was obtained from the Doctors before inclusion in the study. Samples from mobile phones and fingertips were taken by sterile wet (sterile distilled water) swab stick. Microbiological cultures of all the samples were done and culture growths were subjected to antibiotic sensitivity.The procedure of specimen collection was explained to the volunteers and a questionnaire was filled after obtaining informed consent. Institutre Ethical clearance for the study was obtained from the Ethical review committees of Sri Lakshmi Narayana Institute of Medical sciences, puducherry and Madha Medical college and Research Institute, Chennai The swabs were in the laboratory to inoculate on Blood Agar and Mac.Conkey Agar plates. The plates were incubated at 37°C for upto 48 hours. Colonies were counted and the organisms were identified up to species level by using Gram's staining, colony morphology and appropriate bio chemical tests. For identification of Gram positive cocci (GPC); *Staphylococcus aureus* was identified by the catalase and coagulase tests. They were further checked for sensitivity to methicillin to differentiate between Methicillin Resistant *Staphylococcus aureus* (MRSA). Nonhaemolytic, catalase-positive, coagulase negative GPC were identified as *Micrococcus* species while the other catalase-positive, coagulase-negative Gram positive cocci were grouped as coagulase-negative *Staphylococci* (CNS). The Oxidase and catalase test was carried out for the Gram negative bacilli.

RESULTS:

Table.1: Shown Microorganism isolated from mobile phones from doctors and Nurses.

Microorganism isolated from mobile phones	Doctors and Nurses (n=60)
Staphylococcus aureus	9 (15%)
Methicillin-resistant Staphylococcus aureus(MRSA)	6 (10%)
Pseudomonas	3 (5%)
Candida	0
Coagulase negative staphylococci	9 (15%)
Bacillus subtilis	3 (5%)
Total	30 (50%)

DISCUSSION:

In this study we assessed the contamination of anaesthetists and Nurses hands and personal items used with human pathogenic microorganisms which may act as nosocomial pathogens in the operation theatre setting. Hands have been implicated as one of the most important transmission source of nosocomial pathogens in the health care setting. Increased clinical activity has been shown to result in increase of total bacterial counts on the hands of medical staff. Therefore maintaining good hand hygiene is important prior to patient handling. Further hand hygiene is considered to be a most simple, inexpensive and effective tool in reducing nosocomial infections.

Simple hand washing has been shown to be effective in reducing the transmission of pathogenic bacteria and viruses among health care workers especially during outbreaks. Generally majority of the doctors and Nurses used personal items such as mobile phones,Pens and wrist watches during the theatre sessions. Studies investigating personal items such as mobile phones, wrist watches, stethoscopes, pens and ties of doctors and Nurses have been shown to harbour nosocomial pathogens. As these items are constantly used in and out of hospital, they can act as transmission vehicles of pathogenic organisms. Due to low awareness among the medical staff these items are infrequently disinfected and extensively used in the hospitals. Currently there are no restrictions for bringing and using these items within the sterile environment of the operation theatre. Further there is a lack of guidelines and recommendations regarding the use of personal items within the hospital and routine surface disinfection practices.

Our study assessed the contamination of anaesthetists and Nurses personal item Mobile phones used with human pathogenic microorganisms which may act as nosocomial pathogens in the operation theatre setting. The mobile phone use is highly prevalent among medical staff playing a significant role in day-today life and contributes positively to their ability to communicate concerning hospital affairs [14] However; this referred only to technical aspects and gives no consideration of their possible role in transmission of infections [15] Jeske *et al.* found that the rate of bacterial contamination of HCWs' hands was 95% while that of mobile phone was 90% [15] Tambekar *et al.[16]* stated that 95% of mobile phone showed bacterial contamination and among *S. aureus* isolates 83% were meticillin resistant. Snigh *et al.[17]* reported that out of 50 mobile phones that were cultured, 98% were positive. On the same context, Goldblatt found that, one fifth of the cellular phones used by HCWs harboured pathogenic microorganisms and may serve as vectors for health care transmission of microorganisms [18]. Fukada[19] reported that anaesthetists should perform hand hygiene before and after anaesthesia and remove gloves after each procedure and before using any equipment. Lower rates were observed by Ramesh *et al.* who stated that 45% of mobile phones which were swabbed grew microorganisms [14] Similarly, Ali *et al.[20]* found that 43.6% of HCWs carried infective microorganisms on their cell phones and they recommended that cell phones should be cleaned regularly.

The present study reports were obtained Hand washing was performed by 50% (n=30/60) doctors and Nurses entering the theatre. 95% (n=57/60) brought their mobile phone to the theatre and 80% used it at least once during the theatre session. Bacterial growth was detected from mobile phone swabs. Staphylococci were predominantly cultured from all the specimens tested. Staphylococci 15%, Methicillin-resistant *Staphylococcus aureus (*MRSA) 10%, pseudomonas 5%, coagulase negative staphylococci 15%,pseudomonas 5% and total 50% anaesthetist, other doctors and Nurses mobile phones growth were detected. Doctors and Nurses should be

aware that their personal objects used in the hospital environment may be contaminated by pathogenic microorganism.

Our study revealed that almost 50% of the doctors and nurses used their mobile phones during the operation theatre shift. In present study, microorganism contamination rate of mobile phones were 50 %. The predominant pathogenic microorganisms isolated from the mobile phones of Doctors and Nurses of Surgery department were Staphylococcus aureus, followed by Methicillin resistant Staphylococcus aureus and Pseudomonas. In present study, Methicillin-resistant staphylococcus aureus and Pseudomonas both were important nosocomial microorganisms isolated from mobile phones of Doctors and Nurses in our surgical department. Doctors and Nurses are carrying their mobile phones with pathogenic microorganisms to their surgical outpatient department, surgical wards, surgical intensive care unit, surgical operation theatre, surgical post operative ward and also to their homes. Further study may be required to find out whether Mobile phones of Doctors and Nurses are involved in transmitting nosocomial infection. Other studies had also shown contamination of White coats of Doctors, Security Swipe Cards and Scanners of Hospital, Stethoscope of Doctors by pathogenic microorganism [21-24].

CONCLUSION:

A significant number of mobile phones in the Operation Theatre were found to be contaminated with bacteria. Most of these bacteria though are nonpathogenic in normal circumstances but may become significant among the patient population. Daily disinfection practice of mobile phones of all Health Care Workers should be part of Operation Theatre safety protocols for prevention of infection. Doctors and Health Care Workers (Nurses) both should be aware that they may carry pathogenic microorganism on their mobile phones. Cleaning of mobile phones with antiseptic solution along with emphasis on correct hand-washing technique should be given. Use of hands free kit for mobile phones may be useful in preventing direct contact of hands with mobile phones in hospital. Bacterial contamination on mobile phones may be reduced by making them with special material which prevents growth of microorganism which required further research. Restriction of mobile phone use in clinically sensitive areas, such as operating environment and ICU as a start point is recommended. Moreover, screening of Health Care Workers mobile phones inside the hospital should be done while doing environmental screening. The use of mobile phones in clinically sensitive areas should be weighed against the risk for contamination and transmission of infections. We could easily avoid spreading bacterial infections just by using regular cleaning agents and rearranging our environment.

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