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Mobile phones as a potential threat for spreading nosocomial Infection

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ABSTRACT
Mobile phone have become one of the most necessary accessory now a days and become a potential source of spreading nosocomial infection, as it travelled from different contaminated places such as toilets, wards, emergency, hospital kitchens which have increase microbial load. This study determined the possible role of mobile phone as potential threat in spreading infection. A cross sectional study was done in order to isolate and identify various microorganisms from mobile phone of volunteers in working in Laboratory, emergency, Wards and general ICU department. A total number of 100 mobile phones were swabbed and cultured, which were then identified by using gram staining. Analyzed result were displayed in the form of table and charts and p value of <0.05 were considered statistically significant for categorical variables. A total number of 52 mobile phones (52 %) showed bacterial contamination. Gram positive cocci were most frequent isolate (96.6%) while least isolates were gram negative rod (1.7%) and Candida spp(1.7%) respectively. A higher prevalence were also found in wards workers (63%) followed by laboratory (16%), emergency (11%) and general ICU (10%). Present study demonstrates mobile phone as a potential source of dissemination of infection among health workers. Measures are necessary to take such as hand hygiene, periodic decontamination of mobile phones in order to reduce risk of infection and possible cross contamination due to this device.
Key words: Mobile phones, Prevalence, bacterial pathogen, Nosocomial infection, Health Care workers.

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INTRODUCTION

World become modern day by day due to increase progression of technological revolution i.e laptops, iPads and mobile phones which become fundamental to the human life. Health care associated infections spread through Mobile phones, medical instruments, and other inanimate objects used in patient handling. [1-4] Mobile phone one of the substantial movable device use for telecommunication and is used as communication and contact between the health care workers in case of queries, sharing medical information, dictionary as reference guide, imaging, and for efficient health care delivery [5-7]. Mobile phone is frequently use by health care visitors as well as health care providers and possess a serious threat to spread infection as carrier of bearing potential microorganism of great concern [8-11]. Contaminated hands and mobile phone of health care workers derive a path towards spreading infections, as microorganism can survive up to few weeks on these surfaces [12-14]. The most frequent nosocomial infection associated with mobile phone contamination are respiratory tract infection, urinary tract infection, surgical site infections and soft tissue infections [15]. Patients are more vulnerable to these infections as mobile phones are frequently used in patient bedside area, emergency department, pathology laboratories , Imaging departments and Intensive care units [16-19].

Many microorganism are involve in transmission of mobile phone associated nosocomial infection however enteric pathogen are frequently reported by various studies [8, 20]. Studies conducted in New York and in Turkey reported that almost one fifth of mobile phone harbor potential microorganism.(4, 8, 21)Another study from Austria, University Hospital in Innsbruck reported prevalence of 64% mobile phone contamination especially in high risk area such as operation theater and intensive care units [22].

Many hospital in Pakistan as well as worldwide [23, 24]forbidden the use of mobile phone during operationalizable health care delivery, however with their substantial use it become commonplace in

every department of hospital. There is scarce of literature available in Pakistan in regard to mobile phone as serious threat that's why mobile phone are commonly use in every department especially in Intensive care unit and emergencies which contribute to serious illnesses. This study were designed to evaluate the possible role of mobile phone as transmission vector of potential microorganism.

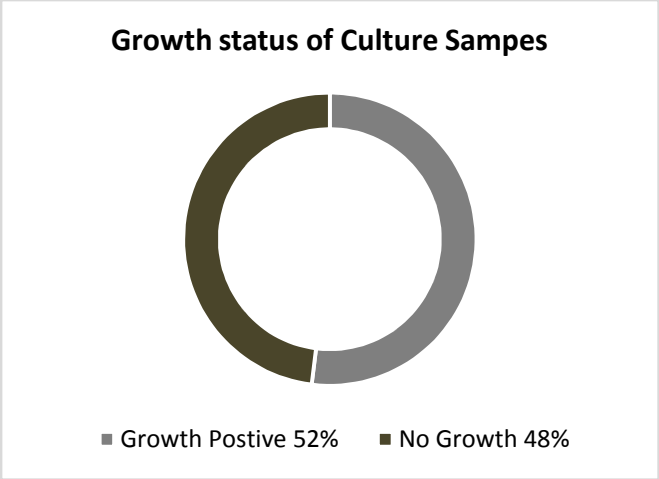
MATERIAL AND METHODS

This was cross sectional study conducted in Department of Microbiology, Rahman medical institute from March to August 2019. The study were performed after ethical approval and informed consent was obtained from each of the study participant before enrolling them. Microbial sample were collected from a total of 100 health care worker mobile phone including Pathology department, Intensive care unit, Operation Theater and wards using convenience sampling technique. Consultants and physicians were not include, as they wish not to be the part of study. Health care workers, who owned mobile phone for less than 1 month were excluded from the study. A self-structured questionnaire was provided by the principal investigator after visiting different department to recruit participant. Demographic information was recorded by health care workers on administered questionnaire. After that HCWs were requested to give their mobile phone to the investigator. The sample were taken using standard microbiological protocol with the help of sterile damp cotton swab by rotating on different parts of mobile phone i.e key, screen, speakers and backside. Samples were immediately transported to Pathology lab for culture. All samples were inoculated on blood and MacConkey agar and incubate aerobically at 37c overnight in Incubator. After overnight incubation, all plates were observe for growth and was further processed for identification of isolates on basis of colony morphology, and gram staining. Catalase positive gram positive cocci were tested for coagulase development. Fungi were cultured on Sabouraud's dextrose agar.Data obtained were analyzed on SPSS version 24 using descriptive statistical tools and were presented in the form of tables. Chi-square test was used for statistical significance between categorical variable and P value of less than 0.05 was considered significant.

RESULTS

A total of 100 mobile phone from HCWs were screened for presence of growth, out of which 52% HCWs showed positive growth as shown in Pie chart 1. Gram positive cocci was the most frequent (96.6 %),among them 3% are MRSA positive isolates. Other organisms isolated from the mobile phone were gram negative rod (1.7%) and Candida spp(1.7%) respectively. The highest prevalence of bacterial contamination on mobile phone was observed to be the sample from the wards (31%) followed by laboratory staff (08%), emergency staff (08%) and Intensive Care Unit (05%) respectively. Table 1 summarizes the percentage of bacterial isolates obtained from mobile phone of HCWs from different department of Hospital..

The percentage of MSRA isolated were observed to be (1%) from wards, ICU (1%) and Emergency (1%) with no case from laboratory. Difference with respect to type of isolated organism from different department i.e ward, emergency and ICU was statistically not significant (P = 0.7569) as shown in Table 2.



Pie chart 1: Prevalence of Bacterial isolates from mobile phone of Health care workers.

Table 1: Prevalence of bacterial isolates* cross tabulate with Sample source

	Growth status		
Sample source	Growth	No growth	Total
Wards	31	32	63
Laboratory	08	08	16
Emergency	08	03	11
Intensive care unit	05	05	10
Total	52	48	100

Table: 2: Types of Organism Isolated from mobile phone of HCWs *Sample source Cross tabulation

Sample Source					
Organism Isolated	Wards	Laboratory	Emergency department	General ICU	Total
Gram positive Cocci	31 29.81 (0.05)	6 7.69 (0.37)	8 7.69 (0.01)	5 4.81 (0.01)	50
Gram Negative Rod	0 0.60 (0.60)	1 0.15 (4.65)	0 0.15 (0.15)	0 0.10 (0.10)	1
Candida Specie	0 0.60 (0.60)	1 0.15 (4.65)	0 0.15 (0.15)	0 0.10 (0.10)	1
Total	31	08	08	05	52
$\chi 2 = 11.44$, $P(\chi 2 > 11.44) = 0.7569$ Expected values are displayed in italics. Individual $\chi 2$values are displayed in (parentheses)					

DISCUSSION

Mobile phone are fundamental to communication between healthcare workers during emergencies, patient related aspects, rounds in wards [10. There is no restriction in Pakistan in concern of mobile phone use in hospitals by health care workers. This is the first study from our setting which determine the existence of potential microorganism on mobile phone of Health care workers. We found the frequency of 52% of bacterial contamination from mobile phone of HCWs with most abundant isolate were gram positive cocci followed by gram negative rod and candida spp. Methicillin resistant *Stap. aureus* (MRSA) was found to be 3% of bacterial isolates. Hands and mobile phone are considered to be a source of spreading potential microorganism especially in setting of wards which ultimately increase incidence of nosocomial infection. Increase clinical activity associated with increase bacterial contamination was reported by a study conducted by Gunasekara *et al* [15] reported increase prevalence (70%) of mobile phone contamination due to increase contact time during working hours. Another study reported similar findings, conducted by Saxena *et al*, 42% of health care workers carried potential microorganism.

Singh *et al* [25] shows decrease in positive culture 34% from mobile phone of clinical staff with respect to our study.This is an alarming situation for health care mangers to achieve standards and tract appropriate steps for prevention and education of health care workers in different department of hospitals. Orsi *et al* [26] shows discordant agreement with our finding and reported 85% of mobile phone were contaminated with different types of microorganism. Most of the health care workers not follow the guidelines and proper hygiene and observed difference due to not following periodic decontamination of mobile phone.

Gram positive cocci (47%), especially S.aureus were predominant isolate and (3%) of mobile phones contaminate with MRSA. A study conducted in Gujrat India (1)reported similar finding with 4 cases shows positive status for MRSA contamination. This is of prime concern as multidrug resistant are difficult to treat and is growing concern in health community. S. Zakai *et al* [27] shows higher prevalence (17%) of mobile phone contamination by gram positive cocci with respect to our study. The higher percentage is due to increase in sample size.

Candida and gram negative rods were least microorganism observed in our study with the prevalence of (1%). Several previous studies report similar finding with conducted in different geographical areas [10, 15].

CONCLUSION

The higher prevalence of microorganism on mobile phone of health care workers has been found in this study. Mobile phone a potential vehicle for transmission of nosocomial infection. Health professionals must be aware of mobile phone as threat for transmission vehicle of infection Proper hand washing and Periodic disinfection of mobile phone is necessary for reduce microbial load before and after patient examination. There must be restriction and guidelines with respect to the usage of mobile phone in hospital settings.

CONFLICT OF INTEREST

Authors declared no conflict of interest in concern to publication of this research

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