Research Paper Dentistry

Bacterial Contamination of Computer Key Board and Mouse in Tabriz Dentistry School

Shahriar Shahi	Professor, Department of endodontics,Tabriz university of medical sciences.
Mohammad Samiei	Assistant Professor, Department of endodontics,Tabriz university of medical sciences.
Negin Ghasemi	Assistant Professor, Department of endodontics,Tabriz university of medical sciences.
Zahra Borna	Assistant Professor, Department of endodontics, Uromie university of medical sciences.
Farrokh Farhadi	Assistant Professor, Department of Oral &Maxillofacial surgery, Tabriz university of medical sciences.
Nahid Pourhashem	Infection control committee, Tabriz university of medical sciences.

ABSTRACT

Introduction: Use of computers in health care setting increased in recent years. The role of hands in the transmissionof nosocomial infections is well established. The aim of this study was to evaluate contamination rate of computers in dental clinic.

Materials &Methods: Microbial sampling was performed on 51 computer keyboards and mice. After incubation on blood agar and EMB plate at 37 for 48 hours bacterial species were identified.

Results: Contamination rate in clinical part and outpatient site were 87.5% and 94.74%, respectively. The most common species were staphylococcus, streptococcus spp. Staphylococcu aureus, Escherichia coli, Psudomonas spp and gram positive bacillus were isolated potentially pathogenic bacteria.

Conclusions: Computer key boards and mice act as reservoirs for bacteria. So good hand hygiene and frequent cleaning of surface including computer keyboards and mice will be necessary.

KEYWORDS Bacterial contamination; dental clinic's computer.

Introduction

Microorganisms are everywhere, bacteria and fungi contaminate out body, our houses, work places, pets and whole environment. Fortunately among many billions of bacteria, only 1500 can be dangerous for our health, causing different disease such as pneumonia or skin infection (1). European Congress clinical Microbiology and infectious Disease (ECCMID) reported that there are no safe objects. Tables, utensils, computers, door knobs, gym equipment and other objects were shown too contaminated with potentially dangerous pathogens. Bacterial presence has been revealed also on mobile phones and even on the mouse and key board of computer (2). All these items and surfaces can be potential source for cross infections, transmitting microorganisms (3,4)

Considering that most human microbial pathogens have been isolated from oral secretion (5). So dentists might be occupationally exposed to infections materials, including body and contaminated supplies, equipment, environmental surface, water or air cross- infection can be defined as the transmission of infectious agent between individuals within a clinical environment(6).

To prevent cross infection it is necessary to determine the many sources that facilitate transmission of pathogens to persons. There is no doubt that organism carriage and transfer on the hands of all types of health care workers is a major factor (7,8). Because of frequent dermal contact by numerous users, one interesting reservoir is computer key boards and mice. In a study by Eltablawy computer key boards and mice had bacterial contamination in 99.9% and 100% of them respectively, which was mostly skin normal flora(1). Rutala showed bacterial contamination in all tested computers that were inactivated by disinfectant (9).Waghorn reported moderate to severe contamination in 79% of computers in clinical department (10).

Objectives

The aim of this study was to evaluate the extent of microbial contamination of some computer keyboards and mice in dental faculty of Tabriz University of medicine, Iran.

Methods & Materials

A total of 51 computer keyboards and mice were sampled. Selection of computers was done using web site (www. Randomizer.org). Study was done in both clinical and out patient sites of faculty. The computers in clinical departments were in use by a wide variety of clinical staff including teachers, nurses and students. The computers were situated in the following clinical areas: Endodontic, Oral and Maxillofacial Surgery, Orthodontics, Periodontics, Pediatric dentistry, Prosthodontics, Pathology Restorative dentistry, Radiology. In outpatients site sampling was done in library and computer site.

Individual sterile swabs moistened with the Amies transport medium used for subsequent transportation were rubbed over

'Enter', "Space", 'Alt", delete keys and right click of mice. Swabs were immediately taken to the microbiology laboratory.

The suspension was spread on to blood agar and EMB (Eosin Methylen Blue) plates then incubated aerobically for 48 hours, all at 37 C. Identification of bacterial species accomplished base on results of gram staining colony morphology, detection of hemolysis on sheep blood agar, colony pigmentation and selective and specific biochemical tests**.**

Results

Of the 51 cultures performed 46 of them (90.2%) had growth of one or more bacteria. Contamination rate for clinical part and out patient part were 87.5% and 94.74%, respectively.

Normal skin flora including coagulase negative staphylococci and streptococci were isolated in 72.54% and 52.94% of computers respectively and

Potentially pathogenic bacteria, including staphylococcus were detected. Aureus which is part of the normal micro biota of human skin and nasal passage, it is known to be associated with numerous diseases was isolated in 3.92% and Escherichia .coli indicative of fecal contamination in 3.92% of computers.

Contamination rate of out patient area was more than clinical area especially for ***staphylococci, E. coli*** and environmental bacteria. This is indicative of more hygiene in clinical area than out patient site. Environmental floras cultured in this study include Bacillus spp and Pseudomonas spp with prevalence of 1.96% and 3.92%, respectively.

Discussion

The aim of this study was to evaluate the extent of microbial contamination of some computer keyboards and mice in dental faculty of Tabriz University of medicine.The results showed that most computer key boards and mice grew bacteria of some kind with skin flora being the predominant growth.

Several investigations have evaluated the degree of bacterial contamination and the type of contaminating organisms on computer key board (9-13). Rate of contamination for pathologic and non pathologic micro biota in present study was lower than studies of Waghorn, Rutala, and Eltablawy (1,9-10). Contamination rate with ***S.aureus*** in our study was 3.92% which was very low in comparison to other studies ranging from 2% up to 60 % (11-13).

The reduced colonization rate may be due to better compliance with the institutions hand washing policy. Indeed the low contamination rate, the degree of contamination was high enough to raised concern that contact with contaminated computer keyboards might serve as a mechanism for transmission of pathogenic bacteria and even may be significant if skin or environmental type flora transmit to immune compromised or severely debilitated individuals.

Study of Bures et al revealed a twofold increased contamination rate for computer keyboards (24%) when compared with faucet handles (11%) in an ICU (3).

The risk of transmission from contaminated key boards would be eliminated if staff performed hand hygiene after contact with inanimate objects in the patient care environment (14). Unfortunately 34 studies have demonstrated low compliance (40%) with centers for Disease Control and Prevention guideline on hand hygiene (14). Hand hygiene could be done better with alcohol based hand sanitizer (15).

Use of plastic keyboard cover is recommended, which may help in prevent organisms such as spore- bearing C. difficile from contaminating computer keyboards but this is not the full solution (10,16-18) and do not provide secure protection against bacterial transmission (16,19). Also, computers in these areas should be disinfected daily and when visibly soiled. Base of Rutala findings, keyboards can safely and successfully decontaminated with disinfectants, such as quaternary ammonium compounds (9).

Conclusions

There is good evidence that environmental surface may serve as potential reservoirs for the microbial of a wide variety of organisms. This study and other support the recommendation that frequent cleaning of clinical areas including equipment such as computer keyboards and mice should become routine practice; However emphasis must continue to be placed on compliance with proper hand hygiene by all staff before and after patient contact.

Table 1. Distribution of isolated bacteria in study sites (clinical sites(cs)-out patient sites(os))

		Potentially pathogenic bacteria								Potential non pathogenic bacteria			
Area	number	S.aureus		E.Coli		Psudo monas SP		Gram positive Bacillus		Strepto coccus SP		Other staphyl ococcus SP	
		n	%	n	%	n	%	n	%	n	%	n	%
CS	32	1	3.12	0	0	2	6.25	0	0	13	40.62	23	71.87
OS	19	1	5.26	2	10.52	0	0	1	5.26	14	73.67	14	73.68
Total	51	2	3.92	2	3.92	2	3.92	1	1.96	27	52.94	37	72.54

REFERENCES

1-Eltablawy SY, Elhifnawi H. N. Microbial contamination of some computer keyboards and mice in National center for Radiation Research and Technology (NCRRT). World Appl Sci J 2009; 6: 162-7. | 2-European Congress clinical Microbiology and infections Disease (ECCMID). Infections control and contamination of daily use objects. The 18th ECCMID, Barcelona 2008; 19-22. | 3-Bures S, Fishbain JT, Uyehara CF, Parker JM, Berg BW. Computer keyboards and faucet handles as reservoirs of nosocomial pathogens in the intensive care unit. Am J Infect Control 2000; 28:465-71. | 4-Neely AN, Maley MP, Warden GD. Computer keyboards as reservoirs for Acinetobacter baumannii in a burn hospital. Clin Infect Dis 1999; 29:1358-60. | 5- Cottone JA, Terezhalmy GT, Molinari JA. Practical infection control in dentistry. 2nd edition 1996. | 6- Mutlu S, Porter SR, Scully C. Cross-infection control in dentistry. Erofset, Istanbul, Turkey; 1996. | 7-Pittet D.Compliance with hand disinfection and its impact on hospital-aquired infections . J Hosp Infect,48 2001:540-6. | 8-Teare L, Cookson B, Stone s. Hand Hygiene.BMJ 2013;23:411-22. | 9- Rutala WA, White MS, Gergen MF, Weber DJ. Bacterial contamination of keyboards: Effect and functional Impact of disinfectants. Infect control Hosp Epidemiol , 2006; 27: 372-7. | 10-Waghorn DJ, Wan WY, Greaves C, Whittame N, Bosely HC and Cantirrlls Contamination of computer key boards in clinical areas : potential reservoir for nosocomial spread of organism . British J Infect control 2005; 6:22-4 | 11-Egua JM and Chambers HF ommunity-aquired mthicilin-resistnt staphylococcus aureus :Epidemiology and potential virulence facors. Curr Infect Dis Rep2003;5:459-66. | 12-Kassem IK.Sigler V,Esseilyi MA Public computer surface are reservoir for mthicilin-resistnt staphylococci. J Microbial Ecology 2007;3:1-5. | 13-Askarian M, Assadian O Infection control practices among dental professionals in shiraz dentistry school ,Iran. Arch Iranian Med 2009 ;12:48-51. | 14-Boyce JM, Pittet D, Healthcare Infection Control Practices Advisory Committee, HICPAC/SHEA/APIC/IDSA Hand Hygiene Task Force. Guideline for hand hygiene in health-care settings. Infect Control Hosp Epidemiol 2002; 23: 3–40. | 15-Myers R, Larson E, Cheng B ,Schwartz A, Silva K, Kunzel C. Hand hygiene among general practice dentists.JADA 2008;139:948-57. | 16- Hartmann B, Benson M, Junger A, Quinzio L. Computer key Board and Mouse as a reservoir of pathogens in an intensive care unit . J Clinical Manit compu. 2004; 18:7-12. | 17- Schultz M. Bacterial contamination of computer keyboards in a teaching hospital. Infection Control and Hospital Epidemiology 2003; 24: 302-3. | 18- Man GS, et al. Bacterial contamination of wardbased computer terminals. Journal of Hospital Infection 2002; 52: 314–18. | 19- Kampf G, Kramer A. Epidemiologic background of hand hygiene and evaluation of the most important agents for scrubs and rubs. Clinical Microbiology Reviews 2004; 17: 863–93. | |