

HOSTED BY



Contents lists available at ScienceDirect

International Journal of Nursing Sciences

journal homepage: <http://www.elsevier.com/journals/international-journal-of-nursing-sciences/2352-0132>

Flashlight contamination and effectiveness of two disinfectants in a stomatology hospital

Dongye Yang^a, Liting Lin^a, Penghao Guo^b, Weina Zhang^a, Xingfang He^a, Qiuyu Huang^a, Longhui Lai^a, Weiqing Long^{b,*}^a Guanghua School of Stomatology, Hospital of Stomatology, Sun Yat-Sen University, Guangdong Provincial Key Laboratory of Stomatology, Guangzhou, China^b Department of Clinical Laboratory, The First Affiliated Hospital of Sun Yat-Sen University, Guangzhou, China

ARTICLE INFO

Article history:

Received 27 May 2016

Accepted 10 March 2017

Available online 27 March 2017

Keywords:

Flashlights

Cross-contamination

Infection control

Disinfectant

ABSTRACT

Aim: This study aims to assess the infection risks of flashlight contamination in a stomatology hospital and compare the disinfection effectiveness of alcohol (75%) and disinfecting wipes.**Background:** The flashlight is a basic non-critical medical device in oral and maxillofacial surgery wards. Wounds are mostly found in oral cavities; therefore, reusable flashlights may be a potential source of nosocomial infections (NIs). However, the microbial flora present in flashlights used in hospitals has not yet been explored.**Methods:** This study investigated the microbial contamination of 41 flashlights used in a stomatology hospital in Guangzhou in March 2016.**Results:** Results indicated that 75.6%(31/41) of the flashlights had microbial contamination. Gram-positive bacteria accounted for 72.7%(24/33) of the microbial groups contaminating the flashlights, and Gram-negative bacteria (21.2%, 7/33), and fungi (6.1%, 2/33) constituted the remaining contaminants. The predominantly isolated species was *Staphylococcus* (66.7%, 22/33), especially *Staphylococcus aureus* (24.2%, 8/33). Approximately 77.3% (17/22) of the types of bacteria detected in the hands were same as those in the corresponding flashlights. Both the bacterial overstandard and *S. aureus* detection rates of doctors' flashlights were higher than those of nurses' flashlights (16/17 vs. 14/23, 7/17 vs. 1/23, respectively) ($P < 0.05$). Moreover, both disinfectants performed excellently, and their eligibility rates were not significantly different (17/17 vs. 14/14) ($P > 0.05$).**Conclusion:** Flashlights are potential causes of NIs. Disinfecting flashlights could be an effective and practical infection control method.© 2017 Chinese Nursing Association. Production and hosting by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

1. Introduction

Nosocomial infections (NIs) are rising worldwide [1]. Disease transmission in hospitals occurs mainly through the air, droplets, or by contact, directly (touching with the hands) or indirectly (fomites) [2]. Microorganisms on a fomite, which may remain viable for days or months, could be transmitted among patients and hospital personnel [3]. Several studies have demonstrated the bacterial contamination of non-critical medical devices (NCMDs), such as otoscopes, white coats, pens, goggles, and other surfaces

[3–8]. In China, the flashlight is a basic NCMD for healthcare workers. This device is usually used for examinations, especially for oral care in oral and maxillofacial surgery wards, because patients' partial wounds are in oral cavities. Microorganisms are commonly transmitted through the hands of healthcare personnel, but hospital materials and articles could also carry microorganisms [1]. Thus, reusable flashlights may be a potential source of NIs. However, the microbial flora present in flashlights used in hospitals has not yet been explored.

2. Materials and methods

2.1. Design

A study was conducted in March 2016 in the wards of a

* Corresponding author.

E-mail address: Lwq_16@163.com (W. Long).

Peer review under responsibility of Chinese Nursing Association.

stomatology hospital in Guangzhou.

2.2. Methods

A total of 41 flashlights of the same type were included in the study. They were used by doctors and nurses, except for one exclusively used by an isolated patient. The flashlights were small and cylindrical, with a length of 9.5 cm, a radius of 1.25 cm, and a total surface area of approximately 28.66 cm². According to Chinese standards, if the surface area of an object is below 100 cm², the whole object needs to be swabbed [9]. Therefore, the entire flashlight surface was swabbed before disinfection. These swab samples were divided into the following: A, swabs from the flashlights used by doctors ($n = 17$); B, swabs from the flashlights used by nurses ($n = 23$); and C, swabs from the flashlight used by the isolated patient ($n = 1$). The hands of doctors and nurses were swabbed, and the swabs were marked with the same numbers in accordance with the flashlight samples. After disinfection, additional swabs from the entire flashlight surface were obtained. These swab samples were divided into the following: A, swabs from the flashlights disinfected using alcohol (75%) ($n = 20$) and B, swabs from the flashlights disinfected using CaviWipes R (Metre, Orange, CA; 17.2% isopropanol and 0.28% diisobutylphenoxyethoxyethyl dimethyl benzyl ammonium chloride) ($n = 21$). The disinfection procedure lasted for at least 30 s, and the swabs were collected within 5 min. During sampling before disinfection, the swabs were placed in 10 mL tubes of common broth at the end of sampling. The common broth was used as a neutralizing agent in the alcohol group, whereas common broth supplemented with 0.3% Tween 80 and 0.3% lecithin as surfactants was used as the neutralizing agent in the disinfectant wipes group [10,11]. Each sample was placed in a tube and shaken 80 times in an oscillator before the solution (1 mL) was extracted and inoculated on a general nutrient agar plate, which was then incubated for 48 h at 37 °C. The colony morphology on the culture plate was then observed. According to the standard protocols for contamination, an object is not contaminated if the total number of bacterial colonies based on the culture result is 0 CFU/cm². If the number is greater than 10 CFU/cm², then the object exceeds the standard; if the number is less than 10 CFU/cm² after disinfection, then it can be considered as an eligible contamination [9].

2.3. Data analysis

Frequency of positive data was analyzed using a χ^2 test. The McNemar test was used to evaluate the differences before and after disinfection. All statistical procedures were performed on SPSS software (version 13.0; Chicago, IL, USA). Statistical significance was considered at $p < 0.05$.

3. Results

3.1. Bacterial colony contamination of flashlights

Up to 75.6% (31/41) of the flashlights were contaminated with bacteria and/or fungi, 93.5% (29/31) of which were colonized by one organism and 6.5% (2/31) were colonized by more than one organism. In total, Gram-positive bacteria accounted for 72.7% (24/33) of the microbial group contaminating the flashlights, and Gram-negative bacteria (21.2%, 7/33) and fungi (6.1%, 2/33) constituted the remaining contaminants. The distribution of microorganisms isolated from the flashlights is elaborated in Fig. 1. The leading isolated species was *Staphylococcus* (66.7%, 22/33), with *Staphylococcus aureus* being the most common (24.2%, 8/33). Moreover, *Pseudomonas aeruginosa* was isolated from the isolated patient.

Both bacterial overstandard and *S. aureus* detection rates of the doctors' flashlights were higher than those of the nurses' flashlights (16/17 vs. 14/23, 7/17 vs. 1/23, respectively) ($P < 0.05$) (Table 1).

3.2. Comparison of the types of bacteria between flashlights and health care workers' hands before disinfection

Up to 53.6% (22/41) of the health care workers' hands were contaminated with bacteria. Moreover, 77.3% (17/22) of the types of bacteria detected in the hands were the same as those in the corresponding flashlights.

3.3. Comparison of the disinfection effectiveness of alcohol and disinfecting wipes

Colony reduction after disinfecting either with alcohol or CaviWipes was significant, and the eligibility rates of alcohol and CaviWipes were not significantly different (17/17 vs. 14/14) ($P > 0.05$) (Table 2).

4. Discussion

In clinics, the flashlight is a common tool for healthcare workers. Oral and maxillofacial surgery patients usually have partial wounds in the oral cavities with saliva or other secretions. The flashlight does not have direct contact with patients; however, the contamination probability and cross-infection risk are high if the flashlight is used during wound cleaning. Usually, only one healthcare worker changes the patients' dressings; therefore, the worker must remove the gauze from wounds using his hands and clean wounds with one hand while holding a flashlight in the other. Therefore, microorganisms are likely to be transmitted from the patients' wounds to the healthcare personnel's hands. However, flashlight disinfection is not consciously practiced by the users. Flashlights can harbor high amounts of pathogenic microorganisms, which can be transmitted to other patients and cause NIs. Li-sha Shi et al. [12], found that *S. aureus* or MRSA cross-contamination between medical workers' hands and contact surfaces occurs within and between departments of a large metropolitan hospital. Healthcare workers' hands are major vectors of pathogenic cross-transmission, causing an estimated 20%–40% of health care-associated infections [13]. Uneke [8] reported that NCMD contamination rates range from 25% to 100%, with *Staphylococcus* as the predominant contaminant; however, healthcare workers rarely disinfect NCMDs used by different patients. Longtin Y et al. [6] found substantial contamination levels in stethoscopes after each physical examination, and these contamination levels are comparable with those in parts of the physician's dominant hand. Similar results are shown in this study. The results indicated that all flashlights have been used; however, none of the flashlights was disinfected after each use. Therefore, 75.6% (31/41) of the flashlights had microbial contamination, with *Staphylococcus*, especially *S. aureus*, being predominant. Moreover, 77.3% (17/22) of the types of bacteria detected in the hands were same as those in the corresponding flashlights. Therefore, flashlights may be crucial in transmitting pathogenic bacteria in hospitals. The results also showed that both the bacterial overstandard and *S. aureus* detection rates of the doctors' flashlights were higher than those of the nurses' flashlights. The reasons could be that the doctors' flashlights were for public use and the nurses' flashlights were for personal use, which meant that the former were frequently and widely shared by more staff and in more disease types, thereby leading to increased opportunities for spreading pathogenic microorganisms. Therefore, healthcare workers in cases of contact with patients or hospital settings are supposed to practice proper hand hygiene and disinfect flashlights

Download English Version:

<https://daneshyari.com/en/article/5568351>

Download Persian Version:

<https://daneshyari.com/article/5568351>

[Daneshyari.com](https://daneshyari.com)