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ORIGINAL ARTICLE

Microbiological characterization of the surface contamination in surgical room areas in a Hospital in Sao Paulo (Brazil)



Vanessa Augusto Bardaquim*, Clovis Wesley Oliveira-de-Souza, Douglas de-Melo-Martins, Carlos Alberto Soares, Cristina Paiva de Sousa¹

Universidade Federal de São Carlos, Rodovia Washington Luis, Km 235, Sao Carlos, SP, Brazil

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KEYWORDS

Health-care associated infections;
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Abstract

Objective: To describe the microorganisms present on surface areas of surgical rooms, in a medium-sized hospital in Sao Paulo state (Brazil).

Materials and method: Sixty samples were collected with the aid of sterile swabs soaked in peptone water and rubbed into quadrants of 20 cm². The surfaces investigated were: medication tables, surgical tables, marble countertops and air conditioning grilles.

Results: *Staphylococcus aureus*, coagulase negative, was the microorganism most frequently found on the surgical tables and on the medication tables (50.7% of the samples). This microorganism is also the most frequent cause of post-surgical infection at the same hospital.

Conclusions: Prophylactic measures should include proper hand washing, the use of personal protective equipment, appropriate uniforms, and cleaning and sterilization of surface and medical and hospital equipment.

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PALABRAS CLAVE

Infección adquirida en el hospital;
Enfermería;
Microbiología

Caracterización microbiológica de la contaminación de la superficie de áreas del quirófano en un hospital de Sao Paulo (Brasil)

Resumen

Objetivo: Describir los microorganismos presentes en las superficies del área de quirófanos de un hospital de tamaño medio en el estado de Sao Paulo (Brasil).

Materiales y métodos: Se recolectaron y cultivaron 60 muestras con la ayuda de hisopos estériles en agua peptonada y aplicadas sobre cuadrantes de 20 cm². Las superficies investigadas

* Corresponding author at: Av. Otto Werner Rosel, Direcciones Residenciales 1, N° 1455, Suplemento: Caminar tres casa, N° 518, Barrio: Jardim Ipanema, CEP: 13563-673, São Carlos, SP, Brazil, CEP: 13575-420, Brazil.

E-mail addresses: va.bardaquim@gmail.com, va.baradaquim@bol.com.br, va.bardaquim@bol.com.br (V.A. Bardaquim).

¹ Cristina de-Sousa-Paiva works for the Government of Brazil.

fueron: tabla de medicamentos, mesa operatoria, terminaciones de mármol de la sala y grillas del aire acondicionado.

Resultados: El organismo aislado de manera más frecuente fue *Staphylococcus aureus* coagulasa negativa y se encontró sobre la mesa operatoria y en la mesa de drogas (50,7% de las muestras). Este es el microorganismo reportado como la causa más frecuente de infecciones post-quirúrgicas en el mismo hospital.

Conclusiones: Las medidas profilácticas deben incluir un apropiado lavado de manos, uso de equipo personal protector y limpieza y esterilización del equipo médico y hospitalario y de las superficies de trabajo.

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Introduction

The Ministry of Health of Brazil, defined health-care associated infections (HAIs) as any infection acquired after admission of the patient which become manifested during hospitalization or after 72 h of hospital admission, or even after discharge.¹⁻³ However, it is important to note that infections developed in the first year after surgery can also be considered as HAIs.^{2,3} Among the main factors reported in the literature for acquiring HAIs can be mentioned older age, malnutrition, obesity, diabetes mellitus, infection with Human Immunodeficiency Virus (HIV), the presence of distant infectious focus and previous arthroscopy or arthroplasty infection. Patients with rheumatoid arthritis and psoriatic arthritis also have a higher risk of postoperative infections, being estimated to be three to eight times higher than in other patients.⁴

A study related to orthopedic implants found that the majority of infections are due to Gram-positive facultative aerobic, predominantly *Staphylococcus aureus* and *Staphylococcus epidermidis* (44–50%).⁶ Yet, in the case of orthopedic infections, these should be treated with antibiotics that have action in the hospital microbiota service in which surgery was carried out, even before results of culture are available.⁴ For this reason there is a constant need for information of the microorganisms circulating in surgical rooms in order to orientate preventive measures, education and control to reduce nosocomial infection rates.⁵

This study was undertaken to characterize the microorganisms that are present in the surface of operating rooms and to determine their profile of antimicrobial resistance. This will afford valuable information to propose preventive measures in the hospitals for HAIs.

Materials and methods

This study was carried out in the pre-operative elective orthopedic surgery rooms in a surgical center of a midsize hospital in São Carlos (Sao Paulo, Brazil). The project was evaluated and approved by the ethics institutional board and the internal Infection Control and Management of Nursing committee. The hospital has 360 beds, 20 of them dedicated to intensive care. Monthly, the hospital attends about 2500

urgencies, 800 surgery and 200 deliveries. Approximately 100 orthopedical surgeries are done each month.

The microbiological samples were collected in the following areas: medication on the table, operating table, a table of drugs and marble countertops. In total, 60 samples from November 2010 to February 2011 were collected. We used a swab (sterile wood, approximately 10 cm long, with a cotton sheath on one end) soaked in sterile water and sterile peptone (PA), and then pressed and rubbed on 20 cm² of each surface area during 5 s. The swab was identified and placed within a test tube containing PA by using aseptic procedures and transported in polystyrene boxes containing ice to the Laboratory of Teaching, Research and Diagnostic in Microbiology. The transport period does not exceeded 2 h until the start of the microbiological analysis.

The culture media was prepared according to the manufacturer's instructions and distributed as required on plates or in sterile test tubes. All swabs were incubated in brilliant green agar, MacConkey agar, mannitol salt agar, cetrimide agar and blood agar. After incubation for 24–48 h at 37 °C, typical colonies for each of the bacterial groups were evaluated and classified. For detecting coagulase-positive bacteria we used Mannitol Salt Agar. Mannitol positive colonies (small and yellow isolates) were transferred to trypticase soy agar (TSA), incubated at 37 °C for 24 h and kept under refrigeration (7 °C). From TSA colonies we prepared some smears of the samples on slides that were fixed and Gram-stained. Thereafter, we made a screening of samples containing clusters of Gram-positive cocci that were submitted to the coagulase test. The reagents used were of commercial origin. Tubes with plasma coagulation were considered to be positive for coagulase. Results are expressed as the mean and standard deviation for continuous variables and N (%) for categorical variables.

Results

In total, 60 samples in different areas of the surgical center were studied with a varied distribution of microorganisms (Tables 1 and 2). There was growth of bacteria in 73% of samples collected from the bars of air conditioners, 87% of marble countertops and table of drugs and 93% of surgical tables (Table 2). By analyzing the locations where samples were collected, its percentage of contamination was of 40%,

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