



MRSA COLONITATION DETECTION IN OBJECT NEAR PATIENTS IN BURN UNIT RSUD DR. SOETOMO - INDONESIA

DETEKSI KOLONISASI MRSA PADA BENDA DI SEKITAR PASIEN BURN UNIT RSUD DR. SOETOMO - INDONESIA

Melisa Indah Mustikasari¹, Manik Retno Wahyunitisari^{2*} , Lynda Hariani³

¹ Medical Faculty of Universitas Airlangga, Surabaya - Indonesia.

² Department of Microbiology, Universitas Airlangga, Surabaya - Indonesia.

³ Department of Plastic Surgery, Universitas Airlangga, Surabaya - Indonesia.

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ABSTRACT

Background: Burn unit is a unit where patients with a burn wound in which the patient's skin is not intact are taken care of. Methicillin-resistant *Staphylococcus aureus* (MRSA) as the prototype of a nosocomial pathogen is usually transmitted through contact from the surfaces of the object to the non-intact skin. Therefore, the possibility of MRSA infection increase in the burn unit.

Purpose: The purpose of this research is to find out whether there is any colonization of MRSA on the objects around burn unit patients that can contribute to the spreading of MRSA in the RSUD Dr. Soetomo Indonesia. **Method:** The sampling period was started from October 2019 until March 2020. Samples were taken randomly from 28 patients in the Burn unit RSUD Dr. Soetomo - Indonesia and then tested for identification in the microbiology laboratory of the medical faculty, Universitas Airlangga. **Result:** Nineteen bacterial growths were obtained from twenty-eight samples taken, nine of them were confirmed as *Staphylococcus aureus* and one from nine of them was confirmed as MRSA. **Conclusion:** MRSA contamination was found on an object around the patient burn unit Dr. Soetomo-Indonesia which comes from the stethoscope membrane.

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Correspondence:
Manik Retno Wahyunitisari

E-mail :
manik-r-w@fk.unair.ac.id

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ABSTRAK

Latar belakang: Unit luka bakar adalah unit tempat merawat pasien luka bakar yang kulitnya tidak utuh dan *Methicillin-resistant Staphylococcus aureus* (MRSA) sebagai prototipe patogen nosokomial biasanya ditularkan melalui kontak dari permukaan benda ke kulit yang tidak intak. Jadi, kemungkinan infeksi MRSA meningkat di unit luka bakar. **Tujuan:** Penelitian ini bertujuan untuk mengetahui apakah ada kolonisasi MRSA pada benda-benda di sekitar pasien unit luka bakar yang dapat berperan dalam penyebaran MRSA di RSUD Dr. Soetomo-Indonesia.

Metode: Periode pengambilan sampel dimulai dari Oktober 2019 sampai Maret 2020. Sampel diambil secara acak dari 28 objek di sekitar pasien di Unit luka bakar RSUD Dr. Soetomo-Indonesia kemudian diuji identifikasi di laboratorium mikrobiologi fakultas kedokteran Universitas Airlangga. **Hasil:** Dari dua puluh delapan sampel yang diambil diperoleh sembilan belas pertumbuhan bakteri, sembilan di antaranya terkonfirmasi *Staphylococcus aureus* dan satu dari sembilan terkonfirmasi MRSA. **Kesimpulan:** Kontaminasi MRSA ditemukan pada benda-benda di sekitar pasien Unit luka bakar RSUD Dr. Soetomo-Indonesia yang berasal dari membran stetoskop.

Kata kunci:

Methicillin-resistant Staphylococcus aureus (MRSA), Kontaminasi, Unit luka bakar, RSUD Dr. Soetomo Indonesia



INTRODUCTION

A burn Unit is a specific unit in the hospital for burn cases. The Burn Unit consists of various components that are coordinated in carrying out its operations, such as specialists, nurses, pharmacy personnel, nutritionist and others. Burn Unit must have some specific programs, such as educational programs for staff and infection control programs. Burn Units must have effective and consistent isolation rooms with universal precautions and reduce the risk of cross-infection and contamination. Burn unit must have analysis data regarding nosocomial infection and the risk factors which is related to infection prevention and control for Burn Units (Gamelli, 2007).

Burn Unit treats patients with burn wounds in which the patient's skin is not intact so the possibility of bacterial infection increases in these patients. Methicillin-resistant *Staphylococcus aureus* (MRSA) is the prototype of a nosocomial multi-resistant pathogen. *Methicillin-resistant* is a *Staphylococcus aureus* bacterium that produces PBP2' which results in resistance to antimicrobials such as penicillin, methicillin, β -lactam, cephalosporin and carbapenem *Methicillin-resistant S. aureus* results in serious infections such as skin infections, soft tissue infections, bloodstream infections and pneumonia (Pantosti and Venditti, 2009). *Methicillin-resistant Staphylococcus aureus* is usually transmitted through shared towels, used bandages and other personal items that are shared then it can be entered inside the human body (CDC, 2019). Items that can be touched freely by medical personnel, patients, and patient's visitor are very likely to be the transmission medium for MRSA bacteria because *S. aureus* is easily found on human skin (Pantosti and Venditti, 2009).

The carriage rate of MRSA in the nose and throat of patients on admission to Dr. Soetomo Hospital Surabaya, Indonesia was 8.1% of 643 patients (Kuntaman et al., 2016). For this reason, researchers research to find out the role of objects around burn unit patients in spreading MRSA in the RSUD Dr. Soetomo-Indonesia and also to provide knowledge and educate medical team to maintain hygiene and make some efforts to reduce the risk of cross-infection and contamination.

MATERIAL AND METHOD

Samples were taken randomly based on the existing object in Burn Unit RSUD Dr. Soetomo on the day of swab taking, but the object that had been swabbed was labeled and did not get the swab anymore. Samples were taken from October 2019 until March 2020. The swabbed objects are the closest objects to the patient. The sample size formula used in this study is

$$n = 28.274176$$

Information:

n = Sample size Z

α = Significance level (determined: 1.96)

P = Proportion (from literature: 0.08)

Q = 1-P (1-0.23)

d = Absolute precision (defined: 0.10)

The proportion used in this study is based on a literature review which states that the prevalence of MRSA in Indonesia in 2016 was 8.1% (Kuntaman et al., 2016)

• Exclusion criteria

The labeled object which means it has been swabbed before and also objects that come from outside the burn unit. Samples were taken by amies transport media and then taken to be tested in the microbiology laboratory of the medical faculty of Universitas Airlangga.

• Mannitol test

After the samples were transported to the microbiology laboratory than the samples were cultured on mannitol salt agar for screening. We moved the swab from amies to the mannitol then incubated it at 37° for 24 hours. *S. aureus* will grow as yellow colonies surrounded by a golden-yellow zone because of the fermentation of mannitol (Carroll et al., 2007).

• Gram staining test

Samples that were positive for the mannitol test were then tested by Gram staining. The result of *S. aureus* was Gram-positive, coccuses and tetrads (Carroll et al., 2007).

Table 1. The swabbed object

| Sample Source | Amount |
|------------------------|--------|
| Stetoschope | 6 |
| Patient bed handle | 8 |
| Infuse pole | 5 |
| ECG button | 3 |
| Bedside cabinet | 5 |
| Triangle traction tool | 1 |

• Catalase test

After identified the morphology, then the positive-Gram with coccus-tetrad morphology sample was tested by catalase test. *Staphylococcus* sp has positive catalase test results. The reaction that occurs is $2\text{H}_2\text{O}_2 \rightarrow 2\text{H}_2\text{O} + \text{O}_2$ Gas is formed (bubbles form) which indicates the presence of the enzyme catalase (Weitz et al., 2016).

• Antibiotic resistance test

Samples that confirmed positive *S. aureus* were then tested by antibiotic resistance test. The MRSA resistance identification can be performed using the method recommended by the Clinical and Laboratory Standards Institute. Isolates were tested using cefoxitin disk then incubated at 33 - 37°C and read in 16 - 18 hours. The positive result if the inhibition zone <21mm. (CLSI, 2007).

Table 2. Identification test result

| No | Sample | MSA | Gram Staining | Antibiotic resistance test |
|----|-----------------|-----|-----------------------|----------------------------|
| 1 | Stethoscope | - | | |
| 2 | Stethoscope | - | | |
| 3 | Stethoscope | - | | |
| 4 | Stethoscope | * | | |
| 5 | Stethoscope | - | | |
| 6 | Bed Handle | - | | |
| 7 | Bed Handle | + | Coccus, gram positive | X |
| 8 | Bed Handle | + | Coccus, gram positive | X |
| 9 | Traction tool | x | | |
| 10 | Bed Handle | x | | |
| 11 | Bed Handle | x | | |
| 12 | Bed Handle | x | | |
| 13 | Bed Handle | - | | |
| 14 | Infuse Pool | - | | |
| 15 | Infuse Pool | x | | |
| 16 | ECG Button | - | | |
| 17 | ECG Button | x | | |
| 18 | ECG Button | * | | |
| 19 | Infuse Pool | + | Coccus, Gram positive | |
| 20 | Infuse Pool | + | Coccus, Gram positive | X |
| 21 | Infuse Pool | + | Coccus, Gram positive | X |
| 22 | Infuse Pool | + | Coccus, Gram positive | X |
| 23 | Bedside Cabinet | + | Coccus, Gram positive | X |
| 24 | Bedside Cabinet | - | | |
| 25 | Bedside Cabinet | - | | |
| 26 | Bedside Cabinet | + | Coccus, Gram positive | X |
| 27 | Bedside Cabinet | + | Coccus, Gram positive | X |
| 28 | Traction Tool | x | | |

Notes : (+) = yellow color () = contaminants (-) = Any color other than yellow (x) = Does not grow () = not tested () = <21mm (X) = >21mm

RESULT

Samples cultured on TSB media were then cultured on MSA. From the results of the tests carried out, it was found that 9 samples experienced bacterial growth by changing the color of MSA to yellow which indicates the possibility of growth of *S. aureus*. Meanwhile, 10 samples experienced bacterial growth without changing the color or changing the color to a color other than yellow, which indicates the possibility of other bacterial growth. Bacteria that have been confirmed as *S. aureus* are then cultured on the nutrient broth until it conforms to the 0,5 MC. Farland standard. After that, it was tested for antibiotic resistance according to the existing procedure using a cefoxitin disk. The test results showed that 1 sample had an inhibitory effect of <21 mm, which means that the bacteria were resistant to methicillin. Meanwhile, the other eight samples showed results of inhibition >21 mm so, it can be said that the bacteria is not resistant to methicillin and is not MRSA (CDC, 2019).

DISCUSSION

From the results of the test, it was found that 19 samples had bacterial growth from 28 samples. Nine of them were confirmed as *S. aureus* and one of them was confirmed as MRSA which was from a stethoscopes. Burn Unit RSUD Dr. Soetomo Indonesia has six stethoscopes, usually the doctors use that stethoscope alternately and then hang up it back to the shelf. This could be the cause MRSA bacteria were found in a stethoscope Burn Unit of RSUD Dr. Soetomo Indonesia besides the fact that membrane stethoscope is directly in contact with the patient's skin.

The result of this research is appropriate with the results of research in the burn unit at the tertiary care center of Ghana. The gram-positive bacteria found are mostly *S. aureus*. It also showed that 50% of the patients there were infected by *S. aureus* including *Methicillin-resistant Staphylococcus aureus* (Amisshah et al., 2017).

CONCLUSION

The results of this study indicate that there is MRSA contamination on objects around the patient in the burn unit of Dr. Soetomo Surabaya. Positive MRSA came from the stethoscope, it can be caused a stethoscope is an object that is always in direct contact with the skin. Based on the results of this study, periodic cleaning of objects near the patient and implementing handwashing rules for all people who will enter the Burn Unit, both medical personnel and the patient's family can be applied to prevent bacterial transmission from objects near the patient to the patient.

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