ORIGINAL ARTICLE

Occurrence of methicillin-resistant *staphylococcus aureus* in primary health care units and infection prevention conformity index

Ocorrência de staphylococcus aureus resistente a meticilina em unidades de atenção primária a saúde e indicadores de comformidade para prevenção de infecções

Ocurrencia de staphylococcus aureus resistente a la meticilina en las unidades de atención primaria de salud e indicadores de conformidad para la prevención de infecciones

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ABSTRACT

Background and Objective: To identify the association between the presence of methicillin-resistant *Staphylococcus aureus* (MRSA) in wounds and the conformity of the structure, work processes, and exposure related to wound care in Primary Healthcare Units (PHU). **Methods:** This is a prospective, cross-sectional study. Patients cared at 15 BHUs in the interior of São Paulo were screened to identify the presence of MRSA in chronic wounds and nasal cavities. Concurrently, an evaluation of conformity of the structure and work process for infection prevention related to the wound care procedure was conducted. The frequency of patients' exposure to healthcare procedures was recorded as well. **Results:** The study included 65 patients, with a prevalence of *Staphylococcus aureus* and MRSA (wound and/or nasal cavity) of 64.6% (n=42) and 10.7% (n=7), respectively. No association was identified to the either healthcare exposure or conformity of structure and process and the presence of MRSA. However, the mean value of the confor-mity index of the dressing process was low (59.7%). As for process evaluated, hand hygiene displayed a lower index, being performed only 41% of the times before and 72% after the completion of the dressing. **Conclusions:** This study demonstrated the occurrence of MRSA and the vulnerability to pathogen transmission of patients receiving wound care at PHU due to the low conformity index of structure and process for infection prevention.

Keywords: Methicillin-resistant Staphylococcus aureus; Primary health care, Infection control; Indicators of health services; Patient safety; Process assessment (health care)

RESUMO

Justificativa e Objetivo: Identificar a associação entre a presença de *Staphylococcus aureus* resistente à meticilina (MRSA) em feridas e a conformidade da estrutura, processos de trabalho e exposição relacionada ao cuidado de feridas em Unidades Básicas de Saúde (UBS). **Métodos:** Trata-se de um

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estudo prospectivo, transversal. Pacientes atendidos em 15 UBS no interior do estado de São Paulo foram selecionados para identificar a presença de MRSA em feridas crônicas e nas cavidades nasais. Concomitantemente, foi realizada uma avaliação da conformidade da estrutura e processo de trabalho para prevenção de infecção relacionada ao procedimento de tratamento de feridas. A frequência de exposição dos pacientes aos procedimentos de saúde também foi registrada. **Resultados:** O estudo incluiu 65 pacientes, com prevalência de *Staphylococcus aureus* e MRSA (ferida e / ou cavidade nasal) de 64,6% (n = 42) e 10,7% (n = 7), respectivamente. Nenhuma associação foi identificada para a exposição de saúde ou conformidade de estrutura e processo e a presença de MRSA. No entanto, o valor médio do **índice** de conformidade do processo de curativo foi baixo (59,7%). A higienização das mãos apresentou um menor **índice**, sendo realizada apenas 41% das vezes antes e 72% após a realização do curativo. **Conclusões:** Este estudo demonstrou a ocorrência de MRSA e a vulnerabilidade à transmissão de patógenos de pacientes que recebem cuidados de feridas em UBS, devido ao baixo **índice** de conformidade de estrutura e processo de prevenção de infecções.

Descritores: Staphylococcus aureus resistente à meticilina; Atenção primária à saúde; Controle de Infecções; Indicadores de serviços; Segurança do paciente; Avaliação de processos (Cuidados de saúde).

RESUMEN

Justificación y Objetivo: Identificar la asociación entre la presencia de Staphylococcus aureus resistente a la meticilina (MRSA) en las heridas y el cumplimiento de la estructura, los procesos de trabajo y la exposición relacionada con la atención de heridas en las Unidades Básicas de Salud. **Metodos:** Este es un estudio prospectivo, transversal. Los pacientes atendidos en 15 UBS en el interior del estado de São Paulo fueron seleccionados para identificar la presencia de MRSA en heridas crónicas y cavidades nasales. Al mismo tiempo, se realizó una evaluación de conformidad de la estructura y el proceso de trabajo para la prevención de infecciones relacionadas con el procedimiento de tratamiento de heridas. También se registró la frecuencia de exposición del paciente a procedimientos de salud. **Resultados:** El estudio incluyó 65 pacientes, con una prevalencia de *Staphylococcus aureus* y MRSA (herida y / o cavidad nasal) de 64.6% (n = 42) y 10.7% (n = 7), respectivamente. No se ha identificado ninguna asociación para la exposición a la salud o la estructura y el cumplimiento del proceso y la presencia de MRSA. Sin embargo, el valor medio del **índice** de cumplimiento del proceso de apósito fue bajo (59,7%). La higiene de las manos presentó un **índice** más bajo, realizándose solo el 41% de las veces antes y el 72% después del vendaje. **Conclusiones:** este estudio demostró la aparición de MRSA y la vulnerabilidad a la transmisión de patógenos de pacientes que reciben atención de heridas en UBS debido a la baja tasa de cumplimiento de la estructura y al proceso de prevención de infecciones.

Palavras claves: Staphylococcus aureus resistente a meticilina; Atención primaria de salud; Control de infecciones; Indicadores de Servicios; Seguridad del paciente; Evaluación de Proceso (Atención de Salud).

INTRODUCTION

The World Health Organization has placed patient safety as a high priority on the agenda, being the first challenge to reduce healthcare-associated infections (HAIs). HAIs are considered undesirable events arising out of the process of health care and represent a major concern for global public health.[1] These infections prolong the length of hospital stay, increasing costs and mortality rates, besides prolonging the suffering experienced by the patients and their family.

The term HAIs has been used since the beginning of the 1990s replacing the term "hospital infection" actually considering that infections can be acquired wherever the health care is provided. This means that prevention measures should be applied not only in hospitals but also in outpatient services, hemodialysis services, nursing homes for the elderly, home care, dental clinics, and the primary care.[2]

In Brazil, the primary care is mainly provide at Primary Health care Units (PHU), and, interconnected with other levels of care (secondary and tertiary) forms the Health Unic System (HUS). Despite the large number of patients being cared at PHU, there are only few studies that assessed the incidence or risk of HAIs at these settings.[3] Unlike hospitals that have well-structured surveillance systems, the PHU still lacks information HAIs rates, which is maybe due to the complexity and dynamics of the work process but also largely due to the lack of awareness about the problem.

A preliminary study performed in a city in the interior of the State of São Paulo, Brazil, identified a prevalence of 8.7% for methicillin-resistant *Staphylococcus aureus* (MRSA) in patients' open wounds dressed at the PHU[4]. This information lead to question whether certain factors could favor the propagation of this agent among patients attending the same PHU. We were interested in explore potential factors related to the work process and the physical structure. Hence, this study aimed to identify the association between the presence of MRSA in wounds and factors related to the structure, work processes, and patients' exposure to healthcare in PHUs in the interior of São Paulo.

METHODS

Study design. This was a quantitative, cross-sectional, prospective, and observational study conducted from 2012 to 2013.

Settings and patients. Patients with open wounds cared for at PHU of a municipality of approximately 122,000 inhabitants, in the interior of São Paulo, Brazil. In the study period, the city had a primary care network comprising 17 PHUs; however, the study was conducted in 15 of these PHUs. Among enrolled PHUs, 6 units were part of Brazilian family health strategy and 9 units were managed in the traditional primary care model.

The inclusion criterion was as follows: adults who had colonized or infected open wounds, of any etiology, being cared for at the PHU. Patients were excluded if they reported hospitalization or surgery up to 1 year prior to the assessment, in order to avoid confounding factor related to hospital-acquired MRSA.

Outcomes. Outcomes of interest were the presence of *Staphylococcus aureus* or MRSA, regardless of the isolation site. At least two of the following clinical signs and symptoms of infection observed were used as criteria to define an infected wound: fever, erythema (redness), edema (swelling), pain, local heat, and increase of purulent secretion.[5] Presence of microorganisms without signs and symptoms were defined as colonization.

Data collection. Data collection was conducted by the main researcher of this study with on-site visits to the PHU. Patients were invited to participate in the study at the moment they were in the PHU for wound care. Samples were collected using sterile swabs from the nose and wounds of patients.[4] The

samples were sowed on culture plates containing Baird-Parker agar (Oxoid Ltd), and incubated at 37°C for 24 to 48 hours. The colonies were submitted for the identification of *Staphylococcus aureus*.[6] *S. aureus* isolates were further classified as MRSA or methicillin-sensitive *S. aureus* (MSSA) based on the results of real-time polymerase chain reaction assays for the *mec*A gene.[4] A structured questionnaire was used to collect data in order to identify previous opportunities of exposure to healthcare procedures, at any level of HUS. During the wound care, one of the researcher observed the structure and process related to the wound care, using a standard protocol for data collection. Details about this observation's protocol are provided in the supplementary file. The data collection occurred once for each patient, during the wound care. From the data collected, we built the following indicators:

Exposure index: This indicator comprises the frequency and type of exposure of each patient during the last year at primary or secondary health care level. For primary care, the index consisted of seven components related to invasive procedures (wound care, inhalation, blood glucose check, insulin application, parenteral drug application, blood collection, oncotic cytology examination) and six noninvasive procedures (medical consultation, nursing consultation, blood pressure measurement, home visiting, consultation with physiotherapist/psychologist/ nutritionist, and participation in health promotion groups). For secondary care, the index consisted of two components of noninvasive procedures (specialized medical consultation - dermatology, vascular, or nursing consultation) and three components of invasive procedures (wound care, biopsy, and urinary drainage). In total, this indicator was composed of 18 components. The exposure index was constructed using two categories of analysis: 1) general index (GI) of exposure, expressed in absolute numbers according the number of opportunities exposures to health care and, 2) proportional index (PI) of exposure, expressed as the percentage of the exposure opportunities identified. For this second category of analysis, the index was further classified according to the type of exposure: invasive (EII) or noninvasive (EIN) and level of health care: primary care (PC) or secondary care (SC).

Conformity index for infection prevention. This indicator comprises the conformity regarding the structure (seven components) and the work process (nine components) for infection prevention measures related to wound care. The conformity index was constructed using two categories of analysis: 1) conformity of structure for infection prevention (CIE) and, 2) conformity of process for infection prevention (CIP), both expressed as a percentage of number of components in conformity among the total number of evaluated components. The final index was determined by the ratio of the components in conformity among the components observed.

Data analysis. The Epi-Info software for Windows version 7 (Centers for Disease Control and Prevention, Atlanta, GA, USA) was used when performing a univariate analysis. Categorical variables were compared using the nonparametric tests X^2 and Fischer's exact test. Continuous variables were compared using Student's t-test and Mann-Whitney U test.. p < 0.05 was considered to be statistically significant.

Ethics. All patients were informed and signed an informed consent form to participate in the study. The study was approved by the Ethics Committee of the Faculty of Medicine of Botucatu, Universidade Estadual Paulista "Julio de Mesquita Filho" - UNESP (Protocol 3958-2011).

RESULTS

Sixty-five patients were included in the study. During the wound care, 65 observations were performed in 15 PHUs (Table 1). The mean age of the study sample was 64.8 years (±14.5). The overall prevalence of *S. aureus* was 64,6% (n = 42), being 10,7% MRSA (n= 7) and 53,8% MSSA (n= 35).

Among the participants, 39 (60.0%) had *S. aureus* infection only in the surgical site wound, 20 (31.0%), had *S. aureus* colonization in the nasal cavities, and 6 (9.3%) patients were identified *S. aureus* in both sites. There was an association between the presence of *S. aureus* in the nasal cavities and the presence of *S. aureus* in the surgical wound (OR: 6.2; 95% CI: 1.58-24.3; p=0.005). Regarding the presence of MRSA, all individuals who had MRSA in the wound also had MRSA in the nasal cavities.

Data regarding conformity of structure and process for infection prevention are shown in table 2.

The analysis revealed no significant differences between the positive outcome for MRSA and variables evaluated (Table 3).

Table 1. Distribution of number of patients according to the primary health care unit (PHU) and the presence of methicillin-resistant *Staphylococcus aureus* (MRSA) or methicillin-sensitive *S. aureus* (MSSA). São Paulo, 2012–2013.

PHU*	Number of patients	MRSA N (%)	MSSA N (%)
A	16	1 (6)	12 (75)
B	10	1 (10)	7 (70)
C	10	2 (20)	6 (60)
D	5	0	2 (40)
E	5	1 (20)	2 (40)
F	3	1 (34)	2 (67)
G	3	0	2 (67)
H	3	0	2 (67)
I	2	0	1 (50)
J	2	0	1 (50)
L	2	0	1 (50)
K	1	0	1 (100)
M	1	1 (100)	1 (100)
N	1	0	1(100)
O	1	0	1 (100)
Total	65	7 (10)	42 (64)

PHUs were identified by capital letters to ensure confidentiality of data.

Table 2. Distribution of frequency of conformity of structure and process related to the wound care in the 15 Primary Healthcare Units. São Paulo, 2012–2013. (Total of observations= 65)

Observed component	Frequency of conformity N (%)
Work process	
Use of gloves during the whole procedure	61 (94)
Use of disposable apron	59 (89)
Change of gloves during the procedure, when indicated	53 (81)
Hand hygiene after the procedure	47 (72)
Adequate disinfection of the wound care room	41 (63)
Presence of competent professional	33 (51)
Hand hygiene before the procedure	27 (41)
Structure	
Adequate sink	62 (95)
Disinfection agent available in the room	61 (94)
Basin to wash the wound	61 (94)
Proper faucet	61 (94)
Exclusive room for wound care	59 (91)
Soap available in the room	58 (89)
Paper towel available in the room	55 (85)

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Table 3. Distribution of mean, median, and standard deviation (SD) of the conformity index of structure and processes for infection prevention and exposure index to health care, according to the presence or absence of MRSA in patients attended at 15 Primary Healthcare Units. São Paulo, 2012–2013.

Indicator	Overall			Presence of MRSA ‡‡			Absence of MRSA			p value
	Mean	Median	Minimum to maximum (SD) ††	Mean	Median	Minimum to maximum (SD)	Mean	Median	Minimum to maximum (SD)	
CIE (%)	96.0	100.0	71.4–100 (7.3)	95.9	100.0	85.7–100 (6.9)	96.0	100.0	71.4–100 (7.5)	0.9
CIP† (%)	59.7	57.1	28.5–85.7 (17.1)	55.9	57.1	28.5–71.4 (17.3)	60.3	57.1	28–71.4 (17.1)	0.4
GI‡	37.2	32.0	3–139 (27.5)	42.4	24.0	11–88.0 (11–88)	36.5	32.0	3–139 (3–139)	0.5
EII-PC§ (%)	63.3	65.0	27–95 (20.6)	55.7	52.4	27.3–94.3 (27.7)	64.2	65.2	27–95 (19.7)	0.3
EIN-PC‖ (%)	31.8	27.3	0–73 (20.2)	40.9	42.8	5.7–72.7 (25.5)	30.7	27.0	0–73 (19.4)	0.2
EII-SC¶ (%)	0.8	0.0	0–13 (2.7)	0.7	0.0	0–5.5 (2.0)	0.8	0.0	0–13.9 (2.8)	0.9
EIN-SC** (%)	3.8	0.0	0–71 (10.2)	2.5	0.0	0–11.2 (4.2)	4.0	0.0	0–71.5 (10.6)	0.8

*Conformity of structure for infection prevention
†Conformity of process for infection prevention
‡General index of exposure to procedures, expressed in absolute number of exposures
§Index proportional to exposure to invasive procedures in primary care
‖Index proportional to exposure in primary care to noninvasive procedures
¶Proportional index of exposure to invasive procedures in secondary care
**Proportional index of exposure to noninvasive procedures in secondary care
††Standard deviation
‡‡Methicillin-resistant Staphylococcus aureus

DISCUSSION

The present study intended to add a contribution to the knowledge on the occurrence of resistant pathogens at primary health care. It was designed with the purpose of identifying the possible association between gaps in the infection prevention structure and process and the presence of MRSA. We also seek to explore any association between the level of health care exposure and the MRSA occurrence. Although this association was not demonstrated in the present study, we cannot consider this as a final position. The present study can be understood as a pilot to inform further studies design to explore this association.

In our sample, the proportion of MRSA was much lower than reported in hospitals.[2] However, patients participating in this study had no recent history of hospitalization. Thus, some hypotheses can be raised: prolonged persistence of colonization acquired during remote preceding hospitalization, acquisition during the assistance in PHC (either by cross-transmission between patients or by transmission via professionals colonized by MRSA), or acquisition in the community.[7–9] There has been an increase in the prevalence of resistant microorganisms in the PHC worldwide.[4,10] This causes concern because the best practices to prevent the dissemination of these agents may be not yet fully implemented in many outpatient settings.

In spite of high prevalence of MRSA found in the literature, the use of contact precautions for this pathogen is still controversial in the hospital environment.[11] The rationale is that contact precautions could potentially prevent the transmission of epidemiologic relevant pathogen among patients, but some studies failed to demonstrate this.[12] Additionally, some authors suggest adverse events related to contact precautions, such as lower quality of care and reduction in

patient's psychological well-being.[11] Contact precautions is even more controversial in primary health care. The dynamics of care provided in PHU encompasses several situations, in which unlike hospitals, patients are not isolated in bedrooms, but came diurnal from home, have short stay in the PHU and still have daily contact with their family and other members of community.

The results showed a low mean of conformity index in the wound care process (59.7%), being the lowest index item of hand hygiene. This was performed only 41% of the time before wound care and 72% after the procedure. Our findings provoke many concerns on the capabilities of PHUs to prevent dissemination of epidemiologically relevant pathogens. The importance of hand hygiene as a preventive measure for the transmission of microorganisms is well known. However, as shown by Maroldi et al.,[13] health professionals in primary health care have low risk perception. They believe that the risks of exposure to pathogens are minimal compared to the hospital environment, due to the smaller quantity and low complexity of the invasive procedures performed. Nevertheless, in addition to cross-transmission between patients, there is also the potential for occupational risk. Rezende et al.[14] had shown that health professionals at primary health care are exposed to the risk of contact with biological material mainly due to the use of sharps, aerosols, contact with blood, secretions, and immunobiological material. Furthermore, health professionals may have insufficient technical knowledge on hand hygiene and the indication of the use of alcohol hand rubber, in addition to the lack of in-service training.[13]

We observed that the components that showed lower conformity were those related to the provision of paper towel and soap, which may have influenced the low conformity in the components of hand hygiene. Roseira et al.[15] performed a diagnosis of conformity of the processing of health products and identified an impairment of the quality of the process, because all the

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indicators were below the ideal.

We evaluate the presence of a competent professional during the wound care. For this purpose, we considered as competent at least a nurse or physician able to prescribe appropriate wound dressing products. The presence of this professional was observed in only 51% of cases, while in all the others the assessment, conduct, and the procedure were fully performed only by the technician or nursing assistant.

This study presents some limitations. The number of observations could have limited the statistical power of the sample. There was also the risk of memory bias, since the survey information on the exposures to healthcare was collected from patient's answers.

Despite its limitations, this is a first attempt to define the exposure index to pathogens in patients attending care ate PHUs. There is a significant challenge in designing studies that evaluate the exposure of outpatients to healthcare mainly due to the lack of standardization of a reliable denominator of indicators that allow the monitoring of the process.[3]

CONCLUSION

This study demonstrates a potential vulnerability to HAI of patients receiving care at PHU due to the low conformity index of structure and process for infection prevention. We also demonstrated the occurrence of MRSA in patients receiving wound care at this level. These results pointed out the need for guidelines addressing infection prevention at PHU, with focus on wound care.

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REFERENCES

1. Pittet D, Allegranzi B, Storr J, et al. Clean care is safer care: the global patient safety challenge 2005–2006. Int J Infect Dis 2006; 10: 419–424. doi: 10.1016/j.ijid. 2006.06.001

2. Horan TC, Andrus M, Dudeck MA. CDC/NHSN surveillance definition of health care-associated infection and criteria for specific types of infections in the acute care setting. Am J Infect Control 2008;36(5):309–332. doi: 10.1016/j.ajic.2008.03.002

3. Padoveze MC, Figueiredo RM. O papel da Atenção Primária na prevenção de Infecções Relacionadas à Assistência à Saúde. Rev Esc Enferm USP 2014;48(6):1137–1144. doi: 10.1590/S0080-623420140000700023

4. Pereira-Franchi EPL, Barreira MRN, Costa NSLM, et al. Prevalence of and risk factors associated with the presence of Staphylococcus aureus in the chronic wounds of patients treated in primary health care settings in Brazil. Rev Soc Bras Med Trop 2017;50(6):833–838. doi: 10.1590/0037-8682-0205-2017

5. Wound infection in clinical practice. An international consensus. Int Wound J 2008;5(suppl 3):iii-11. doi: https://doi.org/10.1111/j.1742-481X.2008.00488.x

6. Winn WC, Allen SD, Janda WM, et al. Gram-Positive Cocci: Part I. In: Winn WC, Allen SD, Janda WM, Koneman E, Procop G, Schreckenberger P, Woods G, editors. Color Atlas and Textbook of Diagnostic Microbiology. 6th edition. Philadelphia: Lippincott Williams and Wilkins; 2006. p. 623-671.

7. Harrison EM, Ludden C, Brodrick HJ, et al. Transmission of methicillin-resistant Staphylococcus aureus in long-term care facilities and their related healthcare networks. Genome Med 2016; 8:102. doi: 10.1186/s13073-016-0353-5

8. Batina NG, Crnich CJ, Döpfer D. Acquisition and persistence of strain-specific methicillin-resistant Staphylococcus aureus and their determinants in community nursing homes. BMC Infectious Diseases 2017;17:752. doi: 10.1186/s12879-017-2837-3

9. Köck R, Werner P, Friedrich AW, et al. Persistence of nasal colonization with human pathogenic bacteria and associated antimicrobial resistance in the German general population. New Microbe and New Infect 2016;9:24–34. doi: 10.1016/j.nmni.2015.11.004. eCollection 2016 Jan

10. Shady HMA, Bakr AEA, Hashad ME, et al. Staphylococcus aureus nasal carriage among outpatients attending primary health care centers: a comparative study of two cities in Saudi Arabia and Egypt. Braz J Infect Dis 2015; 19: 68–76. doi: 10.1016/j.bjid.2014.09.005

11. Kullar R, Vassallo A, Turkel S, et al. Degowning the controversies of contact precautions for methicillin-resistant Staphylococcus aureus: A review. Am J Infect Control 2016; 44: 97–103. doi: 0.1016/j.ajic.2015.08.003

12. Marra AR, Edmond MB, Schweizer ML, et al. Discontinuing contact precautions for multidrug-resistant organisms: A systematic literature review and meta-analysis. Am J Infect Control 2018;46(3):333–340. doi:10.1016/j.ajic.2017.08.031

13. Maroldi MAC, Felix AMS, Dias AAL, et al. Adherence to precautions for preventing the transmission of microorganisms in primary health care: a qualitative study. BMC Nursing. 2017;16:49. doi 10.1186/s12912-017-0245-z

14. Rezende KCAD, Tipple AFV, Souza ACS, et al. Risco de exposição a material biológico em unidades de saúde da atenção primária à saúde. Rev enferm UERJ 2016;24(2):e6442. doi: 10.12957/reuerj.2016.6442.s

15. Roseira CE, Silva DM, Passos IPBD, et al. Diagnóstico de conformidade do processamento de produtos para saúde na Atenção Primária à Saúde. Rev. Latino-Am. Enfermagem 2016; 24:e2820. doi: 10.1590/1518-8345.1439.2820

SUPPLEMENTARY 1:

Elements comprising the healthcare exposure opportunity index, and the conformity index for infection prevention structure and process. São Paulo, 2012–2013.

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Exposure opportunity indicator (last 12 months)*

A. Basic health unit (BHU)

N†	Exposures to invasive procedures	N†	Exposure to noninvasive procedures
	Dressings		Medical consultation
	Inhalation		Nursing consultation
	Capillary glycemia check		Verification of PA
	Application of insulin		Home visit
	Application of parenteral drug		Referral to physiotherapy/psychology/nutrition and others
	Blood collection		Participation in groups
	Papanicolaou test		

B. Secondary care (specialized clinics)

N†	Exposures to invasive procedures	N†	Exposure to noninvasive procedures
	Dressings		Specialized medical consultation (dermatology, vascular)
	Biopsy		Nursing consultation
	Probing		

Index of conformity requirements for the prevention of MRSA with dressings

Evaluation of the process: (register AT, conformity; NA, nonconformity)
Hand hygiene before the procedure (1)
Hand hygiene after the procedure (2)
Use of gloves (3)
Change of gloves during the procedure (4)
Use of disposable apron (5)
Adequate disinfection of the room (6)
Evaluation and conduct by competent professional (7)

Structure evaluation (register AT, conformity; NA, nonconformity)
Exclusive room (8)
Sink (9)
Faucet (10)
Basin to wash the wound (11)
Disposable glove (12)
Disposable apron (13)
Soap (14)
Paper towel (15)
Disinfection product (16)

Criteria used to define each component of the conformity index for MRSA prevention conditions

(1) Hand hygiene before the procedure: when washing hands with soap and water or alcohol-gel, immediately before the procedure.

(2) Hand hygiene after the procedure: when washing hands with soap and water or alcohol gel immediately after the procedure.

(3) Use of gloves: when using gloves during the entire procedure.

(4) Change of gloves during the procedure: when gloves are changed after wound cleaning and no material was handled with the same glove that manipulated the wound.

(5) Use of disposable apron: when disposable apron is used throughout the procedure.

(6) Adequate disinfection of the room: when disinfection of the dressing room is done according to the protocol of the unit.

(7) Evaluation and conduct by a competent professional: when the evaluation and conduct is held by a higher-level professional with competence in wound care (doctor, nurse).

(8) Exclusive room: when the room is used only for dressings and if used for other procedures, adequate disinfection was carried out and at a different time from the dressing routine.

(9) Sink: when adequately dimensioned, on which the professional does not need to touch the sink and does not get wet during handwashing or other procedures.

(10) Tap: when working and does not splash water out of the sink.

(11) Suitable basin for washing the wound: the use of appropriately sized sterile basins and basins for exclusive dressing use.

(12) Disposable gloves: when present in the dressing room and packed in the original glove box.

(13) Disposable apron: when present in the dressing room for single use.

(14) Soap: when present in the dressing room and in its own dispenser and working.

(15) Paper towel: when present in the dressing room and packed in a suitable dispenser.

(16) Disinfection product: when present in the dressing room or unit, product for disinfecting the dressing room, according to the protocol of the unit. Must be within the period of validity.

*Number reported by the patient during the interview
†N: number of exposures

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