RESEARCH

Revista Brasileira de Enfermagem
REBEn

Nasal colonization in nursing professionals from units specialized in HIV/AIDS

Colonização nasal em profissionais de enfermagem de unidades especializadas em HIV/aids

Colonización nasal en unidades de enfermeras especializadas en el VIH/SIDA

Lílian Andreia Fleck Reinato[I], Fernanda Maria Vieira Pereira[I], Letícia Pimenta Lopes[I], Daiana Patrícia Marchetti Pio[I], Elucir Gir[I]

[I] *University of São Paulo at the Ribeirão Preto College of Nursing, Graduate Program in Nursing. Ribeirao Preto, São Paulo, Brazil.*

How to cite this article:
Reinato LAF, Pereira FMV, Lopes LP, Pio DPM, Gir E. Nasal colonization in nursing professionals from units specialized in HIV/AIDS. Rev Bras Enferm. 2015;68(2):292-6. DOI: http://dx.doi.org/10.1590/0034-7167.2015680119i

Submission: 12-24-2014 **Approval:** 02-09-2015

ABSTRACT

Objective: to investigate the presence of microorganisms in the nostrils of the nursing professionals of a Brazilian teaching hospital. **Method:** cross-sectional study in two inpatient units specialized in HIV/AIDS. Nasal secretion samples of nursing professionals were collected in one month. The samples were processed at the microbiology laboratory of the institution and analyzed using the Statistical Package for the Social Sciences (SPSS) software, version 19.0. Ethical aspects were abided. **Results:** from the 73 members of the nursing staff, samples of nasal secretions were collected from 61 (80.2%). Six types of microorganisms were isolated in 22 (41.0%) positive cultures. It is noteworthy that *Staphylococcus aureus* accounted for 22.9%, four of them oxacillin-resistant (MRSA). **Conclusion:** *Staphylococcus aureus* microorganism accounted for the largest prevalence in individuals of this study.

Key words: AIDS Serodiagnosis; Nursing Staff; *Staphylococcus Aureus;* Bacteria.

RESUMO

Objetivo: investigar a presença de micro-organismos nas narinas dos profissionais de enfermagem de um hospital de ensino brasileiro. **Método:** estudo transversal, em duas unidades de internação especializadas em HIV/aids. Foram coletadas amostras de secreção nasal de profissionais de enfermagem no período de um mês. As amostras foram processadas no laboratório de microbiologia da instituição e a análise dos dados resultantes por meio do *software Statistical Package for the Social Sciences (SPSS)* versão 19.0. Os aspectos éticos foram contemplados. **Resultados:** dos 73 profissionais de enfermagem do serviço, foram coletadas amostras de secreção nasal de 61 (80,2%). Foram isolados seis tipos de micro-organismos em 22 (41,0%) culturas positivas. Destaca-se que o *Staphylococcus aureus* representou 22,9%, sendo quatro resistentes à oxacilina (MRSA). **Conclusão:** o *Staphylococcus aureus* foi o micro-organismo de maior prevalência nos indivíduos deste estudo.

Descritores: Sorodiagnóstico da AIDS; Recursos Humanos de Enfermagem; *Staphylococcus Aureus;* Bactérias.

RESUMEN

Objetivo: investigar la presencia de microorganismos en las fosas nasales del personal de enfermería de un hospital universitario brasileño. **Método:** estudio transversal en dos unidades de hospitalización especializados en VIH/SIDA. Muestras de secreción nasal de enfermeras fueron recolectados durante un mes. Las muestras fueron procesadas en el laboratorio de microbiología de la institución y se analizaron con el paquete estadístico para el software de Ciencias Sociales (SPSS) versión 19.0. Los aspectos éticos fueron cubiertos. **Resultados:** 73 de los profesionales de enfermería, se recogieron muestras de las secreciones nasales de 61 (80,2%). Se aislaron seis tipos de microorganismos en 22 (41,0%) cultivos positivos. Es de destacar que el *Staphylococcus aureus* representó el 22,9%, cuatro oxacilina-resistente (MRSA). **Conclusión:** *Staphylococcus aureus* fue la prevalencia más microorganismo en los individuos de este estudio.

Palabras clave: Serodiagnóstico del SIDA; Personal de Enfermería; *Staphylococcus Aureus;* Bacterias.

CORRESPONDING AUTHOR **Elucir Gir** E-mail: egir@eerp.usp.br

INTRODUCTION

Antimicrobial resistance is considered a problem in global public health. Two main factors have contributed to the sharp increase of this resistance: the inappropriate use of antibiotics and the spread of resistant microorganisms[1].

According to the Centers for Disease Prevention and Control (CDC), resistant microorganisms are those resistant to one or more classes of antimicrobials. Special attention must be paid to these microorganisms in health units[2].

A group of pathogens responsible for most infections related to health care is known as ESKAPE (*Enterococcus faecium, Staphylococcus aureus, Klebsiella pneumoniae, Acinetobacter baumannii, Pseudomonas aeruginosa* and the *Enterobacter* species)[3]. These infections are increasingly present in health services[4]. A better understanding of virulence, resistance, transmission and pathogenicity of these microorganisms can drive innovative strategies for the development of new therapeutic options[1].

The main control measures for multi-resistant microorganisms involve the early identification of colonized or infected patients, identification of patients isolation with illustrative plates and compliance with contact precautions recommended by the Hospital Infection Control Services[5].

Health professionals, especially the nursing staff due to direct contact with patients, objects and environmental surfaces, are susceptible to colonization by resistant pathogens[6]. The hands of these professionals are considered as the main means for the transmission of bacteria among patients[7-8].

Therefore, it is essential to adopt control and prevention measures. Standard precautions (SP) are a set of essential measures to minimize the spread of microorganisms, especially hands hygiene[9-10].

The nasopharyngeal microbiota is the primary site of colonization by microorganisms of clinical importance, such as *Staphylococcus aureus*[11]. Therefore, it is the most suitable site for the collection of specimens for screening[12].

OBJECTIVE

Considering the relevance of this topic, the aim of this study was to investigate the presence of microorganisms in the nostrils of the nursing professionals of a Brazilian teaching hospital, as this survey can provide support for the implementation of measures for microorganisms control and improve clinical practice in care for individuals, in this case the population with HIV/AIDS.

METHOD

This is a cross-sectional study with a quantitative approach. The population studied involved nursing professionals (nurses, nursing technicians and nursing assistants) working in the care of patients with HIV/AIDS in two specialized care units, situated in a Brazilian teaching hospital.

The list of professionals and their functions was obtained from the Human Resources Department of the hospital. It was possible to identify 73 professionals (16 nurses, 55 nursing assistants and 2 nursing technicians) working in the specialized care units and providing care services. All professionals were invited to participate in the research. Professionals performing administrative functions and on sick leave during the data collection period were excluded.

The project was evaluated and approved by the Research Ethics Committee of the institution in compliance with ethical aspects (Case number 1304/2011).

All nursing professionals, after being invited to participate in the research, were asked to read the information contained in the Informed Consent Form and to state their approval by signing it. Complete anonymity and confidentiality of identity and information provided were guaranteed to participants.

For data collection, an instrument with sociodemographic variables was used. Then the collection of nasal secretion using a Stuart Swab was performed. Data were collected between January and February 2012.

Samples of nasal secretions collected were processed at the microbiology laboratory of the institution. The material was seeded in culture media as blood agar, mannitol, MacConkey agar. For identification of microorganisms, Vitek 2 (Biomerieux) automated system was used by means of Vitek 2 GP Test Kit cards for gram-positive bacteria, and Vitek 2 GN Test Kit for gram-negative bacteria. AST-P585 cards were used to assess MRSA sensitivity to antibiotics (AST - antibiotic sensitivity testing), and AST-N105 cards for analysis of sensitivity to antibiotics of gram-negative bacteria.

It is noteworthy that the positive results for multi-resistant microorganisms identified were communicated directly to the nursing professional by the head researcher and, by agreement, reported to the Hospital Infection Control Committee of the institution for action.

Data were organized in a Microsoft Excel® 2007 spreadsheet and analyzed using the Statistical Package for the Social Sciences (SPSS) software, version 19.0.

RESULTS

From the 73 members of the nursing professionals, samples of nasal secretions were collected from 61 (80.2%). From these members, 14 (23.0%) were nurses, one (1.6%) was a nursing technician and 46 (75.4%) were nursing assistants. Regarding gender, 46 (75.4%) were female and 15 (24.6%) were male. The predominant age group was 40-50 years (42.9%), followed by 30-40 years (33.3%).

With respect to time in function, 11 (18.0%) had been working for 5-10 years, 22 (36.1%) for 10-20 years, 16 (26.2%) for less than five years and 12 (19.7%) for over 20 years. Concerning workday, 45 (73.8%) reported a weekly workload of 30-39 hours. All 61 (100.0%) participants attended SP trainings. As for the place they became aware of these precautions, 27 (44.3%) mentioned school or university and 20 (32.8%) informed a speech at the hospital.

Of the 61 samples of nasal secretion processed, 41 (67.2%) were negative. Twenty (22.8%) samples of nasal secretion had positive cultures for some microorganisms. *Staphylococcus*

aureus was the most common bacteria and represented 23.0% (14/61). From the amount of 14 *Staphylococcus aureus*, four (28.6%) were resistant to oxacillin (MRSA), which represents a prevalence of 6.6%, or 4/61.

Table 1 - Distribution of microorganisms present in samples of nasal secretion from nursing professionals (n = 61), Ribeirão Preto, São Paulo, 2012

	Microorganisms	n	%
Negative culture	Negative	41	67.2
Positive culture	*Staphylococcus aureus*	12	19.7
	Staphylococcus aureus/Enterobacter aerogenes	2	3.3
	Enterobacter aerogenes	2	3.3
	Klebsiella pneumoniae	1	1.6
	Pseudomonas aeruginosa	1	1.6
	Staphylococcus lugdunensis	1	1.6
	Proteus mirabilis	1	1.6
Total		61	100.0

Enterobacter aerogenes was present in two (3.3%) of the samples of nasal secretion. *Klebsiella pneumoniae, Proteus mirabilis, Staphylococcus lugdunensis* and *Pseudomomas aeruginosa* were found in four different samples (6.6%) of nasal secretion from nursing professionals.

It is noteworthy that two nurses had positive nasal culture for two microorganisms, *Staphylococcus aureus* and *Enterobacter aerogenes*.

DISCUSSION

Prolonged hospitalization, prolonged or inappropriate use of antimicrobials, and the presence of invasive procedures are factors that contribute to human colonization by microorganisms in hospitals[13].

Research performed in a unit specialized in HIV/AIDS found that immunosuppression and prolonged use of antimicrobials, associated with prolonged hospitalization could facilitate colonization by multiresistant bacteria in individuals with HIV/AIDS[14]. Consequently, nursing professionals providing direct care to these patients are more susceptible to contamination and colonization by resistant pathogens.

A study indicates that nursing professionals represent a more vulnerable group to colonization by microorganisms because they are in constant contact with potentially colonized patients and contaminated hospital materials[6].

A survey made with students from a nursing undergraduate program in Botucatu, a city in São Paulo, Brazil, indicated that among the samples of nasal secretion collected, 30 (27.5%) had *S. aureus*, 63 had (79.7%) *S. epidermidis*, 9 had (10.1%) *S. warneri*, 3 had (3.8%) *S. haemolyticus*, 2 had (2.5%) *S. capitis*, 1 had (1.3%) *S. simulans* and 1 had (1.3%) *S. lugdunensis*[15].

Nostrils are relevant bacterial reservoirs. A study developed with resident doctors at a hospital in Londrina (Paraná, Brazil) identified 21 bacteria. The most common strains were *Staphylococcus* with negative coagulase (39.2%) and *Staphylococcus aureus* (17.7%)[16].

The preference of staphylococci in colonizing the nasal vestibule was demonstrated in this study because it was the microorganism most frequently isolated in samples of nasal secretion. The prevalence rate of *Staphylococcus aureus* was 22.9%. This sustains an investigation in Pernambuco, which identified a colonization rate of 25.8% among nursing professionals. In the same study, 48.8% of the biological samples from the 39 colonized individuals were isolated from the nasal cavity[6].

Research made in a public hospital in the state of São Paulo, Brazil, indicated an MRSA colonization rate of 4.1% in healthcare professionals[17]. In this study, the MRSA colonization rate found was 6.6%.

Although healthcare professionals recognize hands hygiene as a simple procedure, studies have shown that this measure is not totally adopted[18-19]. Despite the awareness about the effectiveness of hands hygiene, low compliance with this procedure by health professionals was identified[20].

Research performed in an institution with endemic levels of MRSA among patients implemented a strategy that reduced such levels from 1.8 to 0.68 cases per thousand days of hospitalization in a period of five years[21]. Named as multimodal strategy, one of its implementations established the universal application of SP by professionals, especially emphasizing the five stages of hands hygiene.

Actions towards professionals, especially the use of precautions, are among the main measures to reduce the transmission of these microorganisms.

Notwithstanding the importance of the subject addressed, few studies have been published on the colonization by resistant microorganisms of nursing professionals working in specific units for care of patients with HIV/AIDS.

A limitation of this study was the participation of specific professionals from a health institution, which did not allow data generalization. But it is noteworthy that this fact does not diminish its importance, since this event provides subsidies to answer some questions about the colonization of nursing professionals, allowing an approach to the subject, in addition to the promotion of new broader research on the theme, covering a multiprofessional team.

CONCLUSION

The category of nursing professionals with the largest representation in this study was nursing assistants, totaling 75.4%, with the same proportion of women.

The most prevalent microorganism in this study was *Staphylococcus aureus*, representing 23.0% of the bacteria identified

in nasal cavity. It is worth emphasizing the concerning presence of 6.6% of MRSA.

Considering that nursing professionals are more susceptible to colonization by microorganisms in their work activities, there must be awareness about the adoption of preventive measures during care provision in order to interrupt transmission and reduce the potential for dissemination of these microorganisms. It is also noteworthy that the institution must maintain constant surveillance in order to identify factors that could contribute to potential infections.

REFERENCES

1. Pendleton JN, Gorman SP, Gilmore BF. Clinical relevance of the ESKAPE pathogens. Expert Rev Anti Infect Ther [Internet]. 2013 Mar [updated 2015 Mar 18; cited 2014 Apr 03];11(3):297-308. Available from: http://www.ncbi.nlm.nih.gov/pubmed/23458769 DOI: 10.1586/eri.13.12
2. Siegel JD, Rhinehart E, Jackson M, Chiarello L; Healthcare Infection Control Practices Advisory Committee. Management of multidrug-resistant organisms in healthcare settings, 2006 [Internet]. Atlanta (US): CDC; 2006 [updated 2015 Mar 18; cited 2014 Apr 03]. Available from: http://www.cdc.gov/hicpac/pdf/MDRO/MDROGuideline2006.pdf
3. Rice LB. Federal funding for the study of antimicrobial resistance in nosocomial pathogens: no ESKAPE. J Infect Dis [Internet]. 2008 Apr [updated 2015 Mar 18; cited 2014 Apr 03];197(8):1079-81. Available from: http://www.ncbi.nlm.nih.gov/pubmed/18419525 DOI: 10.1086/533452
4. Tenover FC. Mechanisms of antimicrobial resistance in bacteria. Am J Med [Internet]. 2006 [updated 2015 Mar 18; cited 2014 Apr 03];119(6A):S3-S10. Available from: http://www.amjmed.com/article/S0002-9343(06)00342-1/pdf DOI: http://dx.doi.org/10.1016/j.amjmed.2006.03.011
5. Agência Nacional de Vigilância Sanitária (BR). Investigação e controle de bactérias multirresistentes [Internet]. Brasília: ANVISA; 2007 [updated 2015 Mar 18; cited 2014 Apr 03]. Available from: http://www.professores.uff.br/jorge/manual%20_controle_bacterias.pdf
6. Silva ECBF, Samico TM, Cardoso RR, Rabelo MA, Bezerra Neto AM, Melo FL, et al. Colonization by Staphylococcus aureus among the nursing staff of a teaching hospital in Pernambuco. Rev Esc Enferm USP [Internet]. 2012 [updated 2015 Mar 18; cited 2014 Apr 03];46(1):132-7. Available from: http://www.scielo.br/pdf/reeusp/v46n1/en_v46n1a18.pdf
7. Centers for Disease Control and Prevention. Guidelines for environmental infection control in health-care facilities: recommendations of CDC and the healthcare infection control practices advisory committee (HICPAC) [Internet]. Atlanta (US): CDC; 2003 [updated 2015 Mar 18; cited 2014 Apr 03]. Available from: http://www.cdc.gov/hicpac/pdf/guidelines/eic_in_hcf_03.pdf
8. Drees M, Snydman DR, Schmid CH, Barefoot L, Hansjosten K, Vue PM, et al. Prior environmental contamination increases the risk of acquisition of vancomycin-resistant enterococci. Clin Infect Dis [Internet]. 2008 Mar [updated 2015 Mar 18; cited 2014 Apr 03];46(5):678-85. Available from: http://www.ncbi.nlm.nih.gov/pubmed/18230044 DOI: 10.1086/527394
9. Garner JS. Guideline for isolation precautions in hospitals. The Hospital infection control practices advisory committee. Infect Control Hosp Epidemiol [Internet]. 1996 Jan [updated 2015 Mar 18; cited 2014 Apr 03];17(1):53-80. Available from: http://www.ncbi.nlm.nih.gov/pubmed/8789689
10. Pittet D, Allegranzi B, Sax H, Dharan S, Pessoa-Silva CL, Donaldson L, et al. Evidence-based model for hand transmission during patient care and the role of improved practices. Lancet Infect Dis [Internet]. 2006 Oct [updated 2015 Mar 18; cited 2014 Apr 03];6(10):641-52. Available from: http://www.ncbi.nlm.nih.gov/pubmed/17008173
11. Berkovitch M, Bulkowstein M, Zhovtis D, Greenberg R, Nitzan Y, Barzilay B, et al. Colonization rate of bacteria in the throat of healthy infants. Int J Pediatr Otorhinolaryngol [Internet]. 2002 Mar [updated 2015 Mar 18; cited 2014 Apr 03];63(1):19-24. Available from: http://www.ncbi.nlm.nih.gov/pubmed/11879925
12. Kluytmans J, Van Belkum A, Verbrugh H. Nasal carriage of Staphylococcus aureus: epidemiology, underlying mechanisms, and associated risks. Clin Microbiol Rev [Internet]. 1997 Jul [updated 2015 Mar 18; cited 2014 Apr 03];10(3):505-20. Available from: http://www.ncbi.nlm.nih.gov/pubmed/9227864
13. Hidron AI, Kourbatova EV, Halvosa JS, Terrell BJ, Mcdougal LK, Tenover FC, et al. Risk factors for colonization with methicillin-resistant Staphylococcus aureus (MRSA) in patients admitted to an urban hospital: emergence of community-associated MRSA nasal carriage. Clin Infect Dis [Internet]. 2005 Jul [updated 2015 Mar 18; cited 2014 Apr 03];41(2):159-66. Available from: http://www.ncbi.nlm.nih.gov/pubmed/15983910
14. Reinato LAF, Pio DPM, Lopes LP, Pereira FMV, Lopes AER, Gir E. Nasal colonization with Staphylococcus aureus in individuals with HIV/AIDS attended in a Brazilian Teaching Hospital. Rev Lat Am Enfermagem [Internet]. 2013 Nov-Dec [updated 2015 Mar 18; cited 2014 Apr 03];21(6):1235-9. Available from: http://www.ncbi.nlm.nih.gov/pubmed/24402339 DOI: 10.1590/0104-1169.3067.2359
15. Pereira EPL, Cunha MLRS. [Evaluation of nasal colonization for oxacillin resistant Staphylococcus spp. in nursing students]. J Bras Patol Med Lab [Internet]. 2009 Out [updated 2015 Mar 18; cited 2014 Apr 03];45(5):361-9. Available from: http://www.scielo.br/pdf/jbpml/v45n5/v45n5a04.pdf Portuguese.
16. Heshiki Z, Quesada RMB, Heshiki RE, Joaquim DM, Brandão LG. [Nasal bacteriological flora: a study among medical residents of Londrina University Hospitais - Parana State - Brazil]. Semina Cienc Biol Saúde [Internet]. 2002 [updated 2015 Mar 18; cited 2014 Apr 03];23(1):3-10. Available from: http://www.uel.br/revistas/uel/index.php/seminabio/article/view/3688/2965 Portuguese.
17. Carvalho MJ, Pimenta FC, Hayashida M, Gir E, Silva AM,

Barbosa CP, et al. Prevalence of methicillin-resistant and methicillin-susceptible s. aureus in the saliva of health professionals. Clinics (São Paulo) [Internet]. 2009 [updated 2015 Mar 18; cited 2014 Apr 03];64(4):295-302. Available from: http://www.ncbi.nlm.nih.gov/pubmed/19488585

18. Oliveira AC, Cardoso CS, Mascarenhas D. Contact precautions in intensive care units: facilitating and inhibiting factors for professionals' adherence. Rev Esc Enferm USP [Internet]. 2010 Mar [updated 2015 Mar 18; cited 2014 Apr 03];44(1):161-5. Available from: http://www.scielo.br/pdf/reeusp/v44n1/en_a23v44n1.pdf

19. Pereira FMV, Malaguti-Toffano SE, Silva AM, Canini SRMS, Gir E. Adherence to standard precautions of nurses working in intensive care at a university hospital. Rev Esc Enferm USP [Internet]. 2013 [updated 2015 Mar 18; cited 2014 Apr 03];47(3):686-94. Available from: http://www.scielo.br/pdf/reeusp/v47n3/en_0080-6234-reeusp-47-3-00686.pdf DOI: 10.1590/S0080-623420130000300023

20. Cruz EDA, Pimenta FC, Palos MAP, Silva SRMS, Gir E. [Handwashing: 20 years of divergences between practive and theory]. Cienc Enferm [Internet]. 2009 [updated 2015 Mar 18; cited 2014 Apr 03];15(1):33-8. Available from: http://www.scielo.cl/pdf/cienf/v15n1/art05.pdf Portuguese.

21. Peres D, Neves I, Vieira F, Devesa I. [Strategy to Control Methicillin-Resistant Staphylococcus Aureus: the 5 year experience of a hospital. Acta Med Port [Internet]. 2014 [updated 2015 Mar 18; cited 2014 Apr 03];27(1):67-72. Available from: http://www.actamedicaportuguesa.com/revista/index.php/amp/article/viewFile/4736/3879 Portuguese.