NASAL CARRIAGE OF MRSA STRAINS AMONG HOSPITAL EMPLOYEES IN A SURGICAL DEPARTMENT

WOJCIECH TUR, MACIEJ KIELAR, AGATA KŁACZKOWSKA, EDYTA TEODOROWICZ, ANDRZEJ LEWCZUK

Department of General and Vascular Surgery, 2nd Medical Faculty, Warsaw Medical University
Kierownik: prof. dr hab. P. Ciostek

The aim of the study was to estimate the prevalence of methicillin-resistant Staphylococcus aureus (MRSA) strain carriage among hospital employees who have contact with patients treated at the General and Vascular Surgery Teaching Hospital of the Capital Bródnowski Hospital. Comparison of the findings with results from similar studies performed in various medical centers around the world.

Material and methods. Using microbial cultures, we screened for nasal carriage of MRSA strains in hospital employees who have contact with patients at the General and Vascular Surgery Teaching Hospital. The medical and custodial staff of the Faculty of General and Vascular Surgery, Anesthesiology and Operating Suite were studied. If MRSA strains were present on bacterial cultures, identification of the strain was further confirmed using molecular methods, including reverse transcription polymerase chain reaction (RT-PCR). Examinations were performed in collaboration with the Department of Epidemiology and Clinical Microbiology of the National Medicines Institute.

Results. The carriage rate confirmed by molecular techniques was 4.5%. Confirmed cases of MRSA carriage in hospital staff underwent eradication with a five-day treatment scheme of intranasal 2% mupirocin ointment. Control results confirmed its effectiveness.

Conclusions. The prevalence of nasal carriage of MRSA among the medical and custodial staff screened was 4.5%. This prevalence of carriage among medical employees is similar to the rate of carriage in the general population. This finding suggests a low rate of bacterial transmission between the faculty, staff, and patients. Eradication of MRSA with the use of a five-day course of 2% intranasal mupirocin ointment is an effective method of controlling carriage among medical staff as well as among the general public.

Key words: Staphylococcus aureus, MRSA, medical staff colonized with MRSA, mupirocin

Hospital infections remain an underestimated problem in everyday medical practice in many hospitals in Poland. In an era of increasing numbers of legal claims against medical care and the pursuit of treatment cost optimization, attention should be paid to the epidemiological situation among the medical staff.

Methicillin-resistant Staphylococcus aureus (MRSA) is of particular importance for the epidemiology of hospital infections. Research confirming the connection between this pathogen and the percentage of communicable complications has been performed all over the world for at least 30 years. As a consequence, centers in many countries screen for carriage of Staphylococcus aureus (e.g., Australia, Holland, Great Britain, Germany). However, Polish data concerning the prevalence of this phenomenon are still too incomplete to evaluate a universal protocol for dealing with the organism.

The rate of MRSA carriage among hospital staff around the world is still increasing. The likelihood for transmission of the infection between staff and patients may be influencing the increased number of infections ensuing from medical procedures. This situation requires us to introduce effective measures and standards for MRSA treatment, with an aim
of reducing the prevalence and consequences of MRSA strains and infections.

Staphylococcus aureus is the most pathogenic representative of the Staphylococcus group and is responsible both for hospital and post-hospital infections. Previous research has demonstrated a strong relationship between carriage and colonization of Staphylococcus aureus in the anterior nares – particularly of MRSA strains – and occurrence of communicable infections. It is estimated that nearly 10% of the healthy population are carriers of Staphylococcus aureus, while as many as 70-90% may be transient carriers (1). In research performed in Great Britain by Hassan and Paturi’s team in 2008, rates of MRSA carriage in the anterior nares in the general population were about 4% (2). In healthy people, MRSA carriage has no negative consequences for one’s health, but in sick patients undergoing hospitalization and surgical treatment, nasal MRSA carriage may increase the risk of symptomatic infections and influence treatment results. These findings were confirmed by Yano et al. (3) in patients admitted for surgery of the upper alimentary tract, Nicholson and Huesman (4) in cardiac surgery patients and Kluytmans et al. (5) in thoracic surgery patients. These studies confirmed the correlation between Staphylococcus aureus carriage and the increased risk of peripertative infection. It is worth emphasizing is that each study was performed in surgical departments (cardiac, thoracic, neurosurgical and vascular departments), for whose patients any postoperative infection can have exceptionally serious and even life-threatening consequences.

The purpose of the study was to estimate the prevalence of MRSA carriage among hospital employees who have contact with patients treated at the Department of General and Vascular Surgery Bródnowski Hospital.

MATERIAL AND METHODS

Research material was collected from the anterior nares of employees of the Department of General and Vascular Surgery, Intensive Care Department, Operating Suite and Anesthesiology Department of the Capital Bródnowski Hospital in Warsaw, in May and June 2008. Doctors, nurses and all members of custodial staff, namely kitchen employees, medical secretaries and other employees who had contact with patients, participated in the study. In sum, we examined 134 people. All collected samples were cultured on classic agar plates. If a culture results were positive, the strain of microorganism was identified in collaboration with the Department of Clinical Microbiology at the National Medical Institute in Warsaw, using bacterial cultures and molecular methods, including RT-PCR technique (Real time PCR). Genetic examination is currently the method of choice for all epidemiologic investigations, and the RT-PCR method yields results in as little as an hour. In the present study, sensitivity to mupirocin was also determined. In cases of confirmed MRSA strains, treatment with a five-day course of 2% mupirocin was performed.

RESULTS

Of the 134 employees examined of the operative departments of Province Bródnowski Hospital, eight positive cultures were obtained. After the results were verified using molecular methods, 6 (4.5%) results of confirmed MRSA carriage were obtained. These results were from the nursing and custodial staff; we did not find carriage among the medical staff.

In the next stage, all carriers underwent treatment with 2% mupirocin (Bactroban), an intranasal ointment. A control culture was performed after the five-day treatment course. We did not observe any increase in MRSA strains in subsequent cultures.

DISCUSSION

The 4.5% rate of colonization among the staff corresponds with similar research results from Slovenia, Brazil, and other locations. In these reports, the percentage of carriers among the hospital staff oscillates between 2.6% in research performed by Cretnik, to 9.7% in research performed by the Prados-Palos team (6, 7). Similar rates of 6.2% and 8.3% of MRSA carriage among the hospital staff were observed by Eveillard et al. (8) and Wang et al. (9), respectively. These results contrast with other papers, in which the percentage of carriers of MRSA strains among the healthy staff oscillates between 17–40% (10).

As discrepancies in the results may partly result from differences in selecting the study groups and the specificity of individual depart-
ments, rates should be estimated taking into consideration the situation and epidemiological history of the center.

The relatively low percentage of MRSA strain carriage among the medical and custodial staff in our study should be emphasized, as it does not significantly differ from the population carriage rates despite constant contact between patients and MRSA carriers; moreover, none of the doctors examined was a carrier.

Irrespective of rates of Staphylococcus aureus carriage in particular medical centers, we must not forget the basic ways in which this microorganism is transmitted in hospital conditions, namely the staff-patient and patient-patient modes of transmission. Rigorous use of aseptic and antiseptic rules, single-use equipment, isolation of infected patients, constant staff training and properly managed antibiotic therapy are the only methods to control this dangerous phenomenon in hospital departments.

A new threat that Poland is likely to face is the increasing prevalence of strains of community-acquired methicillin-resistant Staphylococcus aureus (Ca-MRSA). These strains derive from community-acquired methicillin-sensitive strains. The course of the infection caused by these microorganisms is usually severe (11).

Our results with the anti-MRSA 2% pseudomonic acid A prove its excellent efficacy, which has been confirmed in numerous reports from centers all over the world (12). At the same time, it is worth paying attention to the extremely low rate of complications and relatively low cost of applying this therapy.

Mupirocin is nowadays a medicine of choice for eliminating carriage of staphylococci from the anterior nares. There are reports of cures following seven-day and even 14-day courses of application of the ointment in the vestibule of the nose. However, because of its efficiency, duration and low costs, the five-day scheme used in the present study seems the most advantageous.

In light of the very different reports on the prevalence of multiresistant Staphylococcus aureus strains among employees of medical centers and the increasing social and economic costs resulting from infectious complications, further epidemiologic research is appropriate. Such data will allow the creation of uniform protocols in surgical departments and in the future will also reduce the threat posed by the increasing drug-resistance of Staphylococcus aureus.

Therefore, it should be remembered that screening examinations should be performed regularly among medical staff and should be a part of hospital infection prevention programs, inseparable from actual performance of medical procedures. A relatively low prevalence of Staphylococcus aureus carriage in the presented study is only a good starting point for introducing effective prevention programs.

REFERENCES

7. Prados-Palos MA: Staphylococcus aureus e Staphylococcus aureus meticilina- resistentes (MRSA) em profissionais de saúde e as interfaces com as infecções nosocomiais. (Tese de Doutorado em Enfermagem), Universidade de São Paulo, Ribeirão Preto 2006.
8. Eveillard M, Martin Y, Hidri N et al.: Carriage of meticillin-resistant Staphylococcus aureus among hospital employees: prevalence, duration,