Community-acquired *Staphylococcus aureus*, a recent problem

The article published in this issue, "Community-acquired *Staphylococcus aureus* bacteremia in children: A cohort study for 2010-2014" (page 508) describes the circulation of resistant microorganisms, in this case, *Staphylococcus aureus*. The study was very well designed, inclusion criteria were adequate, and the follow-up period was sufficient. It complied with its objectives: to describe antibiotic resistance observed in bacteremias, and to compare the characteristics of such bacteremias in terms of methicillin resistance.[1] It is very important to have local, updated data available like those provided by this prospective study with results reported for a 5-year period.

Staphylococcus aureus (SA) is widely spread in the nature and is capable of colonizing humans and fomites very frequently. Around 30% of the population is colonized by SA, and this percentage increases to 60% among health care providers. Colonization may last weeks or months.[2,3]

At present, it is a major health problem, at both the hospital and the community levels. It is very common to find SA in intensive care, neonatology, and surgery units. Cases may be isolated or occur as part of an outbreak, and affect children of any age. During adolescence, SA is the most common causative agent of community-acquired sepsis,[3-5] probably due to transmission in dressing rooms used in relation to sport activities.

In recent years, the number of cases has increased, and antibiotic resistance has become more marked.

More than 50 years ago, Patricia Jevons published the first descriptions of methicillin-resistant *Staphylococcus aureus* (MRSA). Most cases were related to the hospital setting, and their rate increased notably in the 1990s. Emergence and dissemination reached the community in the form of community-acquired methicillin-resistant *Staphylococcus aureus* (CA-MRSA); its resistance pattern specifically affected children with no underlying conditions or hospitalization history. The first reports of CA-MRSA isolation were mostly related to skin and soft tissue infections (80-85%). Surveillance studies found that 7-10% of cases occurred as an invasive infection, e.g. pyomyositis, osteomyelitis, septic arthritis, or endocarditis, and as severe conditions, such as necrotizing pneumonia, pleural empyema, and sepsis, all associated with high morbidity and mortality.[4,5]

Then, CA-MRSA infections turned into an emerging problem due to its elevated virulence and high dissemination power. This problem was approached in an article published in the *Archivos Argentinos de Pediatría* in 2008.[6]

Molecular and epidemiological studies demonstrated that these strains are different from those of hospital-acquired infections. In the USA, CA-MRSA has the staphylococcal cassette chromosome mec type IV (USA300 clone), containing the mecA gene that codes the synthesis of a penicillin binding protein (PBP2A), which confers a susceptibility pattern that is different from that of hospital origin. These strains are resistant to methicillin and susceptible to clindamycin, co-trimoxazole, and tetracyclines. In addition, most strains contain the Panton-Valentine leukocidin (PVL), a toxin that causes neutrophil lysis and induces chemotactic factor release, which promote tissue inflammation and destruction, thus resulting in necrotizing pneumonia.[3,7,8]

The recent emergence of vancomycin-intermediate SA strains (VISA MICs of 4-8 µg/mL and hetero-VISA) and even resistant strains (MICs > 16 µg/mL) have forced to look for alternative antibiotic approaches. There are currently multiple options, including daptomycin, linezolid, and ceftaroline.[9,10]

The present epidemiological situation has thrust a change in the initial empiric antibiotic therapy scheme. It has also led to the implementation of surgical treatment for the adequate drainage of suppuration from the source of infection in order to solve it. Oral clindamycin, co-trimoxazole, or doxycycline may be used for mild infections without systemic complications, whereas serious infections require an empiric treatment with glycopeptides, linezolid, daptomycin, and tigecycline.[3,9]

Combined empiric treatment may be useful in certain clinical settings, including critically-ill patients with a suspected antibiotic-resistant infection, given that it provides a broadened coverage and accounts for an adequate initial therapy.

It is our responsibility to prevent and correctly manage multi-drug resistant microorganisms in accordance with the following

recommendations: a) Looking for carriers and decolonizing them with soapy clorhexidine baths and local antibiotics, such as mupirocin. Some neonatology units use mupirocin for umbilical cord disinfection to delay or prevent colonization. b) Doing cultures for patients with suppurative lesions to establish the causative agent. c) Isolating patients adequately during hospitalization. d) Ensuring adequate environmental sanitation. e) Hand washing. f) Implementing a rational use of antibiotics by reducing vancomycin long-term use to a minimum and discontinuing antibiotics early once culture results show negative for MRSA. g) Administering an adequate surgical chemoprophylaxis for not more than 24 hours. h) Considering this microorganism if the patient's course is not as expected. i) Considering therapeutic alternatives, such as daptomycin, linezolid, trimethoprim-sulfamethoxazole, or clindamycin.[9,11]

Mortality in SA bacteremias is below 3%, and most cases occur in children with lung involvement, endocarditis, hospital-acquired infections, and underlying diseases. In the article included in this issue, it is described that bacteremias are prevalent among school-aged boys; this may be related to the fact that boys have a greater participation in contact sports, and that overall mortality is 6%, which is higher than that described, probably in relation to the population seen at Hospital Garrahan, all associated with MRSA.

Besides, this surveillance study gives us a chance to become aware of changes in antibiotic susceptibility patterns and thus adapt recommendations to the local epidemiology. An interesting point of the study was that it demonstrated that clindamycin resistance remained at 9% over time, making it a valid option for use in our setting.

Once again, it is worth noting that these infections affect children with no medical history and cause persistent bacteremias and invasive infections that require surgery and intensive care, resulting in a high morbidity and mortality rate and elevated costs.

Finally, it is very important to implement strict susceptibility monitoring strategies, apply appropriate barrier measures to prevent dissemination, and insist on a cautious antibiotic use. There is no doubt as to the benefits this will bring for patients affected by this disease and for public health. ■

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REFERENCES

1. Pérez G, Martiren S, Reijtman V, Romero R, et al. Bacteriemia por *Staphylococcus aureus* adquirido en la comunidad en niños: estudio de cohorte 2010-2014. *Arch Argent Pediatr* 2016;114(6):508-13.
2. Sociedad Argentina de Pediatría. Comité Nacional de Infectología. Staphylococcus aureus. In: Libro Azul de Infectología Pediátrica. 4ta ed. Buenos Aires: Sociedad Argentina de Pediatría; 2012.Págs.620-4.
3. Fernández S, de Vedia L, López Furst MJ, Gardella N, et al. Methicillin-resistant Staphylococcus aureus ST30-SCCmec IVc clone as the major cause of community-acquired invasive infections in Argentina. *Infect Gen Evol* 2013;14:401-5.
4. Cobos-Carrascosa E, Soler-Palacin P, Nieves Larrosa M, Bartolomé R, et al. Staphylococcus aureus bacteremia in children: changes during eighteen years. *Pediatr Infect Dis J* 2015;34(12):1329-34.
5. Kaplan SL, Hulten KG, Gonzalez BE, Hammerman WA, et al. Three-year surveillance of community-acquired Staphylococcus aureus infections in children. *Clin Infect Dis* 2005;40(12):1785-91.
6. Paganini H, Della Latta MP, Muller Opet B, Ezcurra G, et al. Estudio multicéntrico sobre las infecciones pediátricas por Staphylococcus aureus meticilino-resistente provenientes de la comunidad en la Argentina. *Arch Argent Pediatr* 2008;106(5):397-403.
7. Vandenesch F, Naimi T, Enright MC, Lina G, et al. Community-acquired methicillin-resistant Staphylococcus aureus carrying Panton-Valentine leukocidin genes: worldwide emergence. *Emerg Infect Dis* 2003;9(8):978-84.
8. Seybold U, Kuorbatova EV, Johnson JG, Halvosa SJ, et al. Emergence of community-associated methicillin–resistant Staphylococcus aureus USA300 genotype as a major cause of health care-associated blood stream infections. *Clin Infect Dis* 2006;42(5):647-56.
9. American Academy of Pediatrics. Staphylococcal infections. In: Kimberlin DW, Brady MT, Jackson MA, Long SS, eds. Red Book: 2015 Report of the Committee on Infectious Diseases. 30th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2015.Págs.715-31.
10. Liu C, Bayer A, Cosgrove SE, Daum RS, et al. Clinical practice guidelines by the Infectious Diseases Society of America for the treatment of methicillin-resistant Staphylococcus aureus infections in adults and children. *Clin Infect Dis* 2011;52(3):e18-55.
11. Centers for Disease Control and Prevention. Methicillin-resistant *Staphylococcus aureus* (MRSA). Atlanta: CDC; 2015. [Accessed on: September 9th, 2016]. Available at: www.cdc.gov/mrsa/index.html