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Staphylococcal Scalded Skin Syndrome (SEPE): Diagnosis and Treatment: Outbreak Control Presented in a Neonatal Unit at a Clinic in Monteria Colombia 2021

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Abstract

Objective: Staphylococcal scalded skin syndrome (SEPE) is a reaction to a staphylococcal skin infection in which blisters form on the skin due to a staphylococcal toxin, which is common in infants and children. In the following observational study, the appearance of cases of a staphylococcal scalded skin syndrome (SEPE) in a neonatal intensive care unit (epidemiological outbreak) associated with health care (IAAS) is analyzed and the importance of having an infection committee in the service-providing institutions for the containment of these events is highlighted.

Materials and Methods: We reported an outbreak of scalded skin staphylococcal syndrome, over a period of 4 weeks, in a neonatal intensive care unit in the city of Montería Colombia 2021, intervention measures by the institution's infection committee to resolve the events presented.

Results: Eight patients with suggestive characteristics of SEPE were identified between May and June 2021. The germ responsible for these events was the resistant Staphylococcus Aureus methicillin, resistant to Clindamycin, sensitive to Vancomycin, Lenzolid, identified in the blister secretion in one of these patients.

Conclusions: Staphylococcal scalded skin syndrome is a common condition in childhood, mediated by toxin-producing strains of Staphylococcus aureus. The inappropriate approach can represent complications in the child in addition to an epidemiological outbreak, which is the appearance or increase of cases in a certain population. These cases occurred in a service provider entity (IAAS), it is of great importance to have the committee of infections and the participation of senior management is fundamental to the resolution of the appearance of adverse events presented in the institutions.

Keywords: Epidemiological outbreak; Infections associated with health care; Staphylococcal scalded skin syndrome; Intervention measures

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Introduction

An epidemiological outbreak is defined as the occurrence in a community, region or institution of an excessive number of cases of a disease relative to the expected values (endemic) and related to each other by deriving from a common source or from a propagated source [1] that it can be classified as localized in cases that may be circumscribed; for example, to a hospital, a building, a school, a work centre or a housing area, as evidenced in this study or diffused if there is no such delimitation [2].

Staphylococcal scalded skin syndrome (SEPE or SSSS), formerly known as Ritter's disease or neonatal pemphigus, is a potentially severe clinical syndrome mediated by toxins produced by certain strains of Staphylococcus aureus, with clinical manifestations of

sudden onset with fever and irritability, and sensitive and even painful skin that includes a spectrum ranging from impetigo blistering localized form, to widespread involvement [3] that can occur with high indices, constituting an infection associated with health care (IAAS).

Infections Associated with Health Care (IAAS) are one of the main difficulties for the safety of the patient, affecting the quality of care, increased costs in institutions; hospital stay, new reinterventions, increased consumption of antibiotics, disability in patients, mortality, among others [4].

There are a number of risk factors for these infections to increase in incidence, mainly related to patient characteristics, such as in the case of children in a neonatal intensive care unit (Preterm

newborns, low birth weight children, parenteral nutrition need, medical support, central catheters, use of broad spectrum antibiotics [5].

In health care institutions, there are surveillance and prevention measures for HAIs, with the aim of reducing the incidence of onset and mortality in hospitalized patients, which are supervised by the infection committee; scientific technical body at the institutional level, in charge of coordinating, executing education, promotion, prevention, surveillance strategies related to health care-associated infections and monitoring the emergence of antimicrobial resistance.

In a clinic in the city of Montería, Colombia, 8 cases of children with staphylococcal scald skin syndrome (SEPE) were reported in the neonatal intensive care unit (NICU), in a short period of 4 weeks, showing the diagnostic approach-therapeutic treatment provided, the behavior of this disease in newborns, the intervention measures used to control the outbreak of infection (IAAS), and the different areas of participation [6].

As for the pathophysiology of this syndrome, it is caused by the epidermiolytic toxins A and B of *S. aureus*. Any skin infectious focus (nasopharynx, conjunctiva, navel) or extra cutaneous can be the source of the disease by spreading the toxin through the blood to the skin. It is seen in the first years of life by the lack of anti-exfoliating antibodies and by the renal inability to quickly purify the toxin, as is the case of the newborn. Patients present with malaise, fever, irritability and then generalized erythematous macular rash, which in 1-2 days progresses to a painful scarlatiniform rash with flexure I and periorifice accentuation. Flaking begins 1 to 3 days later with the formation of prominent serous crusts and large flaccid blisters. The skin comes off easily with the pressure of a finger (Nicol'ski's sign). Conjunctivitis may occur, but oral mucosa is never involved. In general, patients evolve favorably and mortality is less than 5%.

Materials and Methods

We performed an observational, descriptive intervention in neonatal patients with staphylococcal scalded skin syndrome, in the 4-week surveillance period, from 11-05-2021 to day 14-06-2021. The data were collected, analyzed and later recorded in the program Microsoft Excel for registration.

Results

The institution in which the study was conducted is a maternal - child clinic located in the city of Montería, where about 2265 children are born annually and an average of 616 patients per year are admitted to the neonatal intensive care unit, representing an IT 6.1%. It has the presence of 16 neonatal beds, specialties such as neonatology, cardiology, pneumology, infectology, epidemiology, surgery, dermatology, nephrology, neurology.

The rate of device-related infections in this institution corresponds to 1) catheter-associated infection (ITS-AC) of 0.01%, 2) respirator-associated pneumonia (NAV) of 1%, 3) urinary tract associated infections (UTI-AC) 0.01%. An average of 23 deaths of neonates with weight less than 1000 gr, 11 deaths between the weight of 1000 to 1500 gr and more than 2000gr 17 deaths per year.

In the second week of May, patients with the following clinical characteristics began to be identified; children with blistering, crusty lesions, skin lesions with the appearance of burns, compromising the face as seen in **Figure 1**, however, lesions that progressed rapidly were also identified on the trunk and extremities, as seen in **Figure 2** and **3**. Inclusive, most of the patients showed systemic compromise, evolution requiring critical support and some had a fatal outcome. Eight children were identified (4 female and 4 male), with a 1: 1 ratio, the cases occurred in a period of 4 weeks between May and June 2021 (05-11-2021 at day 06-14-2021). The median gestational age of these



Figure 1 Patient admitted with blistering and crusty lesions with the appearance of a burn in the area of the face.



Figure 2 **A:** Progression of squamous lesions to the trunk and upper and lower extremities. **B:** Erythema and edema located in the right upper limb.



Figure 3 Peeling skin on the trunk and upper and lower extremities secondary to progression of skin lesions.

patients was 29 weeks and the average onset of symptoms was 34 days after birth.

87.5% of the children had received previous antibiotics due to the identification of maternal risk factors for sepsis in the newborn such as (PROM, chorioamnionitis, colonization by sgb) and ampicillin + gentamicin is the scheme used in these patients by the institution's protocols, coupled to national and international. 12.5% of patients had received a different antibiotic regimen due to the appearance of late sepsis after birth, a regimen consistent with the usual microbiota of the neonatal unit, the most widely used was Cefepime, Vancomycin. 12.5% were stable at the time of diagnosis and 87.5% had critical support.

37.5% died, which is equivalent to 3 deaths, 100% had used adequate antibiotics, the antibiotics initially proposed were, Vancomycin + cefepime, vancomycin + amikacin, Clindamycin as monotherapy. Subsequently, the infectology, epidemiology, and infection committee team optimized the antibiotic scheme in orientation to the antibiogram of a secretion culture of one of the bullous lesions of these patients, identifying staphylococcus aureus resistant to methicillin, resistant to clindamycin, sensitive to linezolid, vancomycin, proposing the use of linezolid as a toxin-inhibiting antibiotic in this condition mediated by toxins produced by staphylococcus aureus, controlling the pathology and therefore, avoiding death.

To control the outbreak, the following interventions were carried out

The institution has pediatric emergency services, 3 pediatric care rooms, 1 pediatric intensive care unit, 1 intermediate room, 1 neonatal intensive care unit, operating room, delivery room, and other areas for the care of adults, each area has the attention of different specialties. At the time of the appearance of SEPE cases in the neonatal unit, the alert was given in the institution, the competent body in charge of coordinating and executing the strategies to be used to contain the appearance of these infectious interurrences was informed in the kids. The infection committee is made up of the nursing, epidemiology, neonatology, pediatric infectious disease, medical coordination team, and senior management.

Its functions include

- Carry out the Institutional Committee for the prevention, surveillance and control of IAAS with the participation of the different actors that allow the socialization of progress and results.
- Implement the national guidelines for the prevention, surveillance and control of HAI.
- Lead and participate in the formulation and implementation of institutional infection prevention and control initiatives.
- Carry out the implementation, monitoring and adherence of the technical annexes protocolized in the institutions.
- Periodically socialize the behavior of infections that require precautions and the percentage of adherence to it.
- Periodically socialize the behavior of infection outbreaks in the institution and the actions generated for containment.

The first strategy used to control the outbreak was to identify if there were reports of other cases of SEPE in other areas of the institution such as pediatric ward, pediatric intensive care unit, intermediate, among others, to identify if the cause was external to the unit neonatal, identifying the neonatal intensive care unit as the only place of reported cases. (Control of the chain of contagion).

As a second strategy, the request for cultures in these children was expanded to identify the causative germ of the reported cases because many of the antibiotic regimens used had no therapeutic response, managing to identify a methicillin-resistant Staphylococcus aureus, resistant to clindamycin, optimizing an effective scheme for the management of the disease and thus avoid mortality in children.

Finally, as a third strategy, standard measures in infection prevention were indicated, avoiding the appearance of new cases, which included:

- Hand hygiene
- Use of gloves
- Use of personal protection elements (PPE)
- Care for the management of the environment, clothing, waste, solutions and equipment.
- Respiratory hygiene
- Cleaning, disinfection of biomedical devices and equipment.
- Cleaning and disinfection of surfaces in the operating room, laundry room, delivery room, neonatal unit, etc.
- Culture of blisters in children (methicillin-resistant Staphylococcus aureus, clindamycin resistant)
- Catheter change at 7 days in all patients

In general, the strategy was used to identify the cause and evaluate the behavior of human talent that would be allowing the appearance of this event, as seen in **Tables 1 and 2**.

Discussion

As could be observed in the study, this pathology presents as a rapidly evolving toxic shock that can trigger death, as occurred in 37.5% of patients, therefore the approach must be timely, identifying the pathology, its possible cause to finally implement proper handling.

Antibiotics such as clindamycin, linezolid have the mechanism of action to act at the intracellular level of Staphylococcus aureus and act as inhibitors of toxins produced by this germ. Other antibiotics proposed by the literature is the use of vancomycin, so the doctor in charge of the patients must know the current resistance profiles of both community-acquired infections and those acquired at the hospital level, offering adequate management to each patient.

Therefore, authors such as Chacín and others, who present a case report of Staphylococcal Scalded Skin Syndrome in a younger infant, conclude that early evaluation and a timely diagnosis to start early parenteral antibiotics has shown to reduce

Table 1. Strategy implemented to identify the cause of the event.

Causes of the Identified Event	Brand (You can check more than one)	
	Yes	No
Brand (You can check more than one)		
Outbreak due to a virulent microorganism		
Outbreak due to a resistant microorganism		
Changes in patient care		
Due to the entry of residents or students		
Change in the ratio of the number of nurses/patients		
Change in the use of prophylactic or empirical antibiotics		
Decreased adherence to prevention measures (bundles)		
Related to a single health service or professional		
Change in data handling		
Changes in infection control personnel		
Variations in the intensity of surveillance		
Changes in the personnel who upload the data		
Changes in definitions of hospital infection		
Changes in laboratory procedures or in% of samples cultured		
Changes in demographic characteristics of patients		
Temporary increase in high-risk patients		
Increased incidence of a particular pathology		

Table 2. Strategy used to evaluate the behavior of human talent that would be allowing the appearance of this event.

Measures Implemented to Control the Increase in Cases	Brand (You can check more than one)	
	Yes	No
Assessment of infection control standards		
Review of infection control standards		
Identification of standards not met		
Development of new standards		
Application of insulation measures		
Increase in the number of staff		
Staff training		
Review of laboratory practices		
Data handling review		
Identification of high-risk patients		

complications, and guarantee the success of the procedure. Treatment; Cephalosporins and Betalactamase inhibitors are the most frequently used, obtaining good results, from the experience of our department the use of glycopeptides in view of the increased frequency of methicillin-resistant *Staphylococcus aureus* infections in our population has also proven to be a valid option in the treatment of this disease. In addition to antibiotics, there are also general measures such as controlling the environment where the patient is and improving the general conditions of the skin, in order to ensure the prompt recovery of turgor, pigmentation or gross appearance of the skin.

In turn, in its retrospective, descriptive and observational study, in which the medical records of patients diagnosed with SEPE seen between May 2000 and May 2010, treated in the Pediatric Dermatology Section of the Ramos Mejía Hospital, were reviewed, and between May 2005 and May 2010 in the Dermatology Service of the German Hospital, Losada et al. concluded that the timely recognition of SEPE and the early initiation of treatment with antibiotics resistant to β -lactamases reduces the extent of the condition. On the contrary, the use of

corticosteroids could aggravate it. The clinical evolution of SEPE is very good in pediatric age and does not leave sequelae or scars.

For its part, thorough hand washing continues to be the fundamental pillar to prevent the spread of infections at the nosocomial level and the rational use of antibiotics in all institutions should be a priority, the infection committee, the team in charge of caring for patients must have the support of senior management to be able to identify and implement measures to prevent events that put patients' lives at risk, unnecessarily high consumption of antibiotics, increased hospital stays, increased costs, as well as resistance profiles difficult to handle.

The institution must constantly update the protocols with the personnel in charge of health care in order to reduce the incidence of infections associated with health care, hand washing, use and care of catheters, preventive measures in pneumonia associated with the ventilator, while the microbiology laboratory has to periodically update the resistance profiles of the institution so that the infection committee offers a rational use of antibiotics

through its doctors to each pathology to present.

Conclusion

Staphylococcal skin scald syndrome is a rare skin disease that is clinically manifested by the presence of erythema, blisters and scaling, as well as pain to the touch in the patient, which is a frequent pathology in childhood, mediated by toxin-producing strains of staphylococcus aureus, so its inappropriate approach can represent complications in the child and in some cases cause mortality rates.

Regarding the treatment established for this, clindamycin and

linezolid are antibiotics with activity against staphylococcus aureus, which act by binding the 50s subunits of bacterial ribosomes, inhibiting the synthesis of toxins, which is why they are useful in strains that produce these.

At the same time, periodic updates of protocols for surveillance and prevention of infections related to health care such as hand washing, device care (catheter, endotracheal tubes, bladder catheters) and the constant participation of senior management on issues are essential. of patient care by providing the necessary tools to prevent infections, safeguarding their integrity and reducing unnecessary expenses to the institution.

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