Original Article :

Pattern of Practice in Treating Pediatric Patients with Musculoskeletal Infections in the Western Region of Saudi Arabia

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Abstract

Background and Aims:
Managing pediatric osteomyelitis and septic arthritis is challenging due to the potential for long-term disability and irreversible damage if not managed properly. A unified approach to managing these conditions in Saudi Arabia is needed. Our study explores current practices in the Western region and highlights the need for unified guidelines.

Methods:
A cross-sectional, survey-based study was conducted among pediatric infectious diseases specialists, general pediatricians, and pediatric rheumatologists in western Saudi Arabia. From March to July 2024, a self-administered electronic questionnaire was distributed. The survey assessed variability in diagnostic approaches, treatment regimens, and criteria for orthopedic specialists' involvement.

Result:
Thirty-eight physicians completed the survey. Half of the respondents involved orthopedic surgeons for procedures like biopsies and aspirations, while others relied on different specialties due to limited pediatric orthopedic surgeons. Ultrasound and MRI were the most common initial diagnostic tools. Third-generation cephalosporins combined with clindamycin or vancomycin is the most favored empirical therapy. There was significant variability in antibiotic regimens.

Conclusion:
This study reveals considerable variation in managing pediatric osteomyelitis and septic arthritis in Saudi Arabia, affecting care quality. Our findings underscore the need for local guidelines tailored to our society's microbial profiles and clinical conditions. Further research, including multicenter studies, is needed to optimize treatment.

Keywords:
Osteomyelitis, septic arthritis, children, Saudi Arabia

Introduction:

In developed countries, osteomyelitis (OM) affects 2 to 13 per 100,000 children, while septic arthritis (SA) ranges from 4 to 37 cases per 100,000 children. Significant variations exist between countries and various age groups[1-4]. A study in Saudi Arabia revealed that acute OM occurred in Saudi Arabia at a similar rate for infants as in other parts of the world and that most cases of OM among pediatrics occurred during their first year of life[5]. Proper treatment is crucial, considering the pediatric population's vulnerability and the long-term consequences of OM and SA. A comprehensive approach is necessary to guarantee prompt diagnosis and effective treatment. When one condition is suspected, prompt investigation for the other should be established as they might concur[6,7]. Antibiotic therapy is the standard management approach. Empiric antibiotics targeting common pathogens causing these conditions should be chosen as initial therapy while considering the child's age, clinical presentation, and the local antibiogram. Subsequently, the microbiological results must guide the proper antibiotic choice. However, due to the varying antibiotic-resistant patterns, there is currently no clear consensus on the specific antibiotic choice; furthermore, the optimal duration of treatment continues to be a subject of ongoing debate[6-8]. There is a considerable variation in the management practices for acute OM in children across different pediatrics and pediatric orthopedics departments in France in terms of antibiotic choice and duration of treatment[9].

An Italian study published in 2021 revealed the first consensus in Italy regarding managing uncomplicated acute hematogenous osteomyelitis (AHOM) in pediatric patients[10]. A set of recommendations would greatly benefit Saudi Arabian medical society. At the moment, antibiotic therapy for OM and SA in Saudi Arabia relies heavily on the clinician experience due to the lack of national guidelines for treating these conditions. Implementing unified guidelines would effectively reduce the excessive use of broad-spectrum antibiotics and combination therapy for both conditions[11]. Following specific guidelines for treating OM and SA could improve decision-making about antibiotic choice, leading to the desired outcomes in addressing these conditions. Given the limited availability of data on managing childhood OM and SA in Saudi Arabia, conducting a study specifically focusing on these conditions would be valuable. Such a study could provide important insights into local practices, treatment strategies, and

any unique factors or challenges that may influence management decisions. Assessing the current practices of different pediatric subspecialties is the first step in developing practice guidelines that are widely agreed upon. The study was conducted with the aim of collecting and analyzing questionnaires regarding the management practices of OM and SA among Saudi pediatricians in the Western region of the Kingdom. The objectives were to identify patterns, trends, and areas for improvement in the management of these conditions within our country. This study would contribute to the global knowledge of these conditions and offer valuable guidance to healthcare providers in Saudi Arabia.

Materials And Methods:

A survey-based, cross-sectional study was conducted among pediatric subspecialists in infectious disease, general pediatrics, and pediatric rheumatologists in the western region of the Kingdom of Saudi Arabia. From March 2024 to July 2024, a self-administrated electronic questionnaire created through Google Forms was distributed directly to the targeted participants. A convenience sampling technique was used to recruit participants. The study was approved by the King Abdulaziz University Biomedical Ethics Committee (approval number 95-24).

The questionnaire included two sections about the diagnosis and management approach for septic arthritis and osteomyelitis. Data was collected, reviewed, fed into Microsoft Excel 2016, and analyzed. Descriptive statistics, frequencies, and percentages were performed for categorical variables.

Link to the questionnaire:
https://docs.google.com/forms/d/e/1FAIpQLScqPWqZgiM-mtY2DWV_Z5SLCmXZESnhsULMuvMm5zvNGH9ezww/viewformZ5SLCmXZESnhsULMuvMm5zvNGH9ezww/viewform

Results:

The total number of participating physicians in this study was thirty-eight. n our results, infectious disease pediatricians accounted for over half the participants, followed by general pediatricians, with pediatric rheumatologist accounting the least.

Half of the physicians in our study always involved orthopedic surgeons in planning the management of OM and SA.

Furthermore, 57% of respondents opted for prolonged intravenous (IV) antibiotic therapy to treat infections caused by methicillin-resistant Staphylococcus aureus (MRSA), following culture and sensitivity results, with a longer duration compared to other pathogens.

When determining the need for

prolonged intravenous antibiotic therapy for musculoskeletal infections based on blood culture results, most participants (63%) indicated that it should be considered if blood culture persisted as positive after 72 hours of appropriate therapy. In contrast, 29% believed a single positive blood culture was sufficient to decide on extended treatment.

Questions related to the management of septic arthritis:

For diagnosing SA, ultrasound (US) was preferred by 68% of respondents as a first-choice modality. This is followed by MRI at 24% and X-ray at 5%.

Regarding which empirical antibiotic to choose first in SA, responses are shown in Table 1.

Table 1: Empirical Antibiotics in SA.

Antibiotics	No. of participants *n* (%)
Third generation cephalosporin + clindamycin/vancomycin	15 (39.5%)
First or second-generation cephalosporin + clindamycin/vancomycin	7 (18.5%)
First or second-generation cephalosporin as monotherapy	6 (16%)
Clindamycin as monotherapy	5 (13%)
Others	5 (13%)

The result showed that 40% of participants chose third-generation Cephalosporin with MRSA coverage (24% clindamycin and 16% vancomycin). Moreover, 18 % chose first or second-generation cephalosporins with MRSA coverage (10.5% clindamycin and 8% vancomycin).

The decision to switch from intravenous to oral antibiotics in uncomplicated SA (without osteomyelitis) was less consistent among participants. Around 37% of participants suggested continuing until inflammatory markers normalized, while 26% recommended stopping as soon as the patient was clinically ready for discharge Table 2.

Table 2: Switching from intravenous to oral antibiotics.

Responses	No.
Until the normalization of inflammatory markers	14
As soon as the patient is fit for discharge	10
After a minimum of 7 days	7
Oral antibiotics are not an option in septic arthritis	5

The decided treatment duration for uncomplicated SA (without OM) varied between the responders when the organism's sensitivity was known. The majority (60%)

suggested a treatment period of 2-3 weeks with CRP normalization. Meanwhile, around 26% recommend 10-14 days under similar conditions (Figure 1).

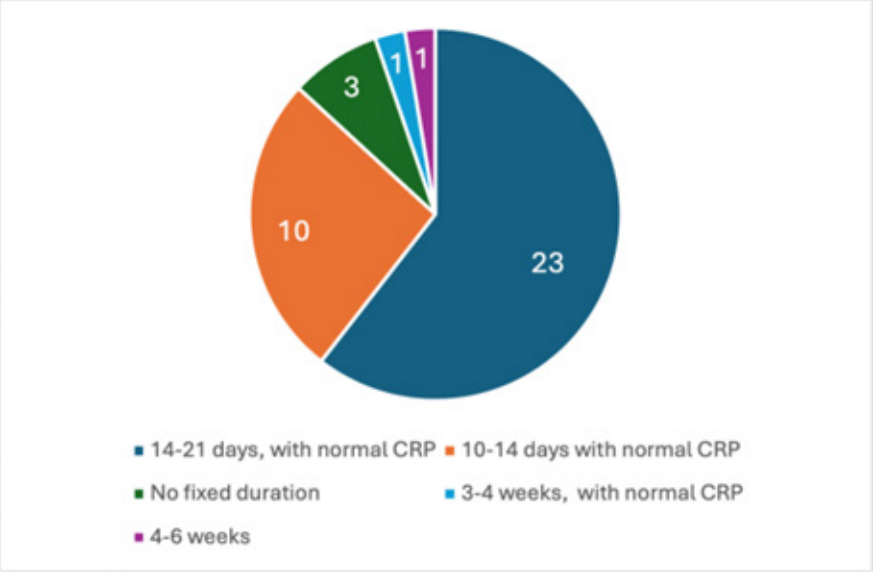


Figure 1: Treatment duration for uncomplicated SA, (number of participants).

The data indicate that most (90%) do not routinely recommend repeating MRIs after completing therapy with a good clinical response.

Questions related to the management of uncomplicated osteomyelitis:

In cases of uncomplicated OM, MRI is the imaging modality most preferred as the first choice for diagnosis, as over 76% of the participants chose it.

The preferred regimen of empirical antibiotic treatment is shown in Table 3.

Table 3: Empirical antibiotics in OM.

Antibiotics	No. of participants *n* (%)
Third generation cephalosporin + vancomycin/clindamycin	22 (58%)
First (or second) generation cephalosporin as monotherapy	6 (16%)
First (or second) generation cephalosporin + third generation cephalosporin/vancomycin/clindamycin	5 (13%)
Others	5 (13%)

Generally, most participants (58%) chose third-generation Cephalosporins with MRSA coverage (55% vancomycin and 45 % clindamycin). However, 16 % chose first—or second-generation cephalosporins as monotherapy without MRSA.

Regarding switching to oral therapy, 40% of participants preferred switching from intravenous to oral antibiotics with inflammatory markers normalization. In

comparison, 29% recommended a minimum of 7 days of intravenous therapy before switching regardless of the inflammatory markers, and 16% suggested switching as soon as the patient's clinical condition improved and was deemed fit for discharge, as shown in Table 4.

Table4: Switching from intravenous to oral antibiotics.

Responses	No.
Until normal inflammatory markers	15
After a minimum of 7 days	11
As soon as the patient is fit for discharge	6
Oral antibiotics are not an option in uncomplicated osteomyelitis	3

Regarding therapy based on micro-biological sensitivity, most participants recommended treatment duration of four to six weeks for uncomplicated OM, provided CRP levels were normalized. Alternatively, 32% of participants recommended three to four weeks under the same condition of CRP normalization.

Discussion:

Previous studies showed that acute OM is just as common in young infants in Saudi Arabia as in other regions globally[5]. Delaying the diagnosis and proper treatment of musculoskeletal infections leads to severe joint damage and long-term disability[12]. Despite the importance of timely and appropriate management, clinical practices in our country vary, as there is no unified treatment approach, which may impact patient outcomes.

This survey provides an opportunity to assess the various practices in managing acute MSK infections in Saudi Arabia. It is a cross-sectional survey, not a retrospective study relying on objective data. The results highlight the varying experience levels among medical professionals managing OM and SA in the western region of the Kingdom of Saudi Arabia.

The pediatric infectious disease specialists who responded to the survey represent approximately 30–40% of this subspeciality providers in the western region of Saudi Arabia. Given their paramount role in managing these patients, we also included rheumatologists and general pediatricians in our survey as they manage some of these patients as well. We confidently believe these results accurately reflect the practices within our country.

In our study, nearly half of the respondents would involve orthopedic specialists for procedures such as biopsies. In contrast, others may rely on different specialties for these procedures, likely due to a shortage of pediatric orthopedic surgeons

at their centers. As anticipated, ultrasound and MRI were predominantly selected as the initial diagnostic tools for SA and OM respectively, aligning with the international recommendations[13-15].

The major result of our study is regarding the chosen antibiotics in SA and OM, there is notable variability in managing both, highlighting the need for national guidelines. A recent Italian study investigated the effects of implementing guidelines on managing SA and OM, and it effectively reduced the excessive use of broad-spectrum antibiotics and combination therapy. A narrow-spectrum intravenous empirical antibiotic regimen using cefazolin, followed by oral monotherapy with first/second-generation cephalosporins, was both applicable and effective. This approach is non-inferior to broad-spectrum regimens in terms of safety and efficacy11. These findings highlight the benefits of following specific guidelines in treating OM and SA, leading to more appropriate antibiotic use and favorable outcomes.

While some participants opted for a narrower spectrum option as their first choice, third-generation cephalosporins plus clindamycin or vancomycin represented the most chosen broad-spectrum regimens among the surveyed physicians. These regimens effectively cover most potential pathogens while awaiting culture results. This approach is also supported by the American and European guidelines[13,14,16.] A local study exploring the effectiveness of broad versus narrow-spectrum empirical antibiotics as an initial regimen would be valuable in determining effectivity and non-inferiority.

The international recommendation is to switch from intravenous to oral therapy as soon as the patient is clinically well, afebrile, and tolerating orally. American guidelines recommend transitioning to an oral antibiotic regimen for children who respond to initial intravenous therapy and can tolerate oral medications. Similarly, Spanish guidelines strongly advise switching to oral antibiotics for children who show favorable clinical progress after two to four days of intravenous treatment[13-15]. Despite that, the survey respondents' approaches to this issue were heterogeneous.

Most responders followed the international recommendation for the total duration of SA management. Nevertheless, the total management duration chosen for uncomplicated OM was longer than the international recommendation, which is 3-4 weeks [13-15].

This study shows that pediatrics with MSK infections are managed differently, which can influence the quality of care and the sensitivity of antibiotics in our region.

This obligates national support to conduct more research in this field and conclude a national consensus or recommendation for these diseases.

This study reveals significant variation in treating pediatric patients with musculoskeletal infections in Saudi Arabia, including differences in when to do transition from I/V to oral antibiotics, the choice of initial antibiotics, and the duration of treatment. This heterogenicity in practice influences patient care. As this survey-based study does not include patient data, a multicentric study involving patients is needed to understand these variations better and to develop local guidelines and recommendations. While empirical antibiotics targeting age-specific pathogens are commonly used for acute osteomyelitis and septic arthritis, antibiotic choices differ by country due to regional variations in antibiotic resistance[7]. Therefore, it is essential to tailor treatments to local microbial profiles, patient age, and clinical conditions. Continued research is vital to develop guidelines that reflect these factors and optimize patient care.

Conflict of interest:

All authors declare no conflict of interest

Acknowledgments:

Declaration of using an AI-based model:

The authors affirm that they employed an artificial intelligence-based linguistic model to improve clarity in English and enhance writing, ensuring that all ideas, data, results, and discussions are original, with no involvement from AI in their generation.

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