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Meta-analysis of Risk Factors for Poor Prognosis in Pediatric Osteomyelitis

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ADMINISTRATIVE INFORMATION

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Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 26 August 2025 and was last updated on 26 August 2025.

INTRODUCTION

Review question / Objective This study aims to comprehensively explore the risk factors for poor prognosis of osteomyelitis in children through a systematic review and Meta-analysis. The study will include all cohort studies and case-control studies addressing this topic, with the study subjects being children (aged < 18 years) diagnosed with acute osteomyelitis by clinical and imaging examinations. We will systematically assess the strength of the association between a series of potential risk factors (such as delayed diagnosis, MRSA infection, extremely high inflammatory markers, etc.) and poor prognosis (including progression to chronic osteomyelitis, recurrence, functional impairment, and the need for reoperation, etc.). By comparing these children with those without these factors, we will quantify the independent impact of each factor on the prognosis.

Condition being studied Osteomyelitis is an infectious disease affecting bone tissue. While osteomyelitis in adults is often associated with trauma or surgery, hematogenous osteomyelitis is the predominant type in children.In the early stage of pediatric osteomyelitis, clinical manifestations and imaging features are often indistinct—this can lead to delays in both diagnosis and subsequent treatment of the disease. Furthermore, such delays in diagnosis and management contribute to an increased incidence of complications and sequelae of osteomyelitis.

METHODS

Participant or population A total of 9,580 pediatric patients with osteomyelitis were included, among whom 2,234 patients experienced poor prognosis.

Intervention Children with Risk Factors to Be Investigated.

Comparator Children Without These Risk Factors.

Study designs to be included Cohort Study.

Eligibility criteria Inclusion Criteria：①Study design: observational cohort study,case-control study, or controlled study;②Study subjects: infants,young children,and adolescents aged 0-18 years who were diagnosed with osteomyelitis; ③Study content: including risk factors or predictive factors for poor prognosis in pediatric osteomyelitis patients, and required to include or allow calculation of the corresponding odds ratio (OR) and 95% confidence interval (CI);④Outcome indicators:good prognosis or poor prognosis.
Exclusion Criteria：①Literatures with unavailable full text,missing data, or inability to extract valid data;②Duplicated published literatures; ③Literatures judged as low-quality by NOS quality evaluation;④Literatures of case reports,animal experiments,reviews,and conference abstracts; ⑤Literatures with ambiguous or unquantifiable outcome indicators.

Information sources PubMed,Embase,Web of Science,Cochrane Library,China National Knowledge Infrastructure(CNKI),Wanfang Data.

Main outcome(s) Among the 6,689 screened literatures,20 studies were included in the meta-analysis.Delayed source control[OR=2.62,95%CI (1.63,4.20),P<0.001],positive microbial detection [OR=4.65,95%CI (2.42,8.95),P<0.001],soft tissue abscess [OR=5.41,95%C I(1.70,17.24), P=0.004],age[OR=1.84,95%CI(1.09,3.09), P=0.022],fever[OR=2.26,95%CI (1.47,3.47),P<0.001],disseminated disease [OR=4.18,95%CI(1.78,9.82),P=0.001],concurrent arthritis [OR=3.96,95%CI(2.67,5.87), P<0.001],MRSA infection [OR=6.20,95%CI (3.02,12.73),P<0.001],and elevated CRP [OR=1.31,95%CI(1.11,1.55),P=0.002]were associated with poor prognosis in patients with osteomyelitis.

Quality assessment / Risk of bias analysis NewcastleOttawa Scale(NOS).

Strategy of data synthesis STATA software was used for meta-analysis.OR and its 95%CI were used as effect size indicators.The heterogeneity among the results of the included studies was evaluated by the Chi-square test and quantified by I^2 (test levelα=0.10).If P>0.10and I^2≤50%,a fixed-effects model was used for analysis;if P≤0.10 and I^2>50%, the heterogeneity among studies was considered large,and a random-effects model was used for meta-analysis.

Subgroup analysis The age data were uniformly divided into two groups:<3years old and≥3years old To identify the source of heterogeneity in elevated CRP,grouping was performed according to time points:initial elevated CRP and failure of CRP to decrease after treatment.

Sensitivity analysis For the influencing factors with statistically significant results in the meta-analysis (P<0.05),sensitivity analysis was conducted by using fixed-effects model and random-effects model.

Country(ies) involved China - HongHui Hospital.

Keywords osteomyelitis;meta-analysis;poor prognosis;risk factors.

Contributions of each author
Author 1 - Xin Jiang - Study design, data collation and analysis, manuscript writing.
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