

## ASSOCIATION BETWEEN MCISAAC SCORE AND ANTIBIOTIC PRESCRIBING IN SUSPECTED BACTERIAL TONSILLITIS

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### ARTICLE INFORMATION

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### ABSTRACT

Tonsillitis merupakan infeksi saluran napas atas yang umum pada anak dan remaja. Meskipun sebagian besar disebabkan oleh virus, penggunaan antibiotik masih sering terjadi. Skor McIsaac digunakan untuk memperkirakan kemungkinan infeksi Streptococcus grup A dan mendukung penggunaan antibiotik yang rasional, namun penerapannya masih bervariasi. Penelitian ini bertujuan menganalisis hubungan antara skor McIsaac dengan penggunaan antibiotik pada pasien tonsillitis. Penelitian observasional analitik dengan desain cross-sectional ini menggunakan data retrospektif rekam medis di RSUD K.R.M.T. Wongsonegoro Semarang periode Januari 2020–Desember 2025, dengan sampel 97 pasien. Sebagian besar pasien berada pada kategori skor McIsaac sedang (83,5%). Antibiotik diresepkan pada 48,5% pasien, sementara 45,7% termasuk kategori skor sedang. Hasil uji Fisher–Freeman–Halton menunjukkan tidak terdapat hubungan signifikan antara skor McIsaac dan penggunaan antibiotik ( $p=0,314$ ). Temuan ini menunjukkan bahwa penggunaan antibiotik belum sepenuhnya berdasarkan penilaian skor McIsaac, sehingga perlu peningkatan penerapan prinsip antibiotic stewardship dalam praktik klinis.

### ABSTRACT

**Association Between McIsaac Score and Antibiotic Prescribing in Suspected Bacterial Tonsillitis.** Tonsillitis is a common upper respiratory tract infection in children and adolescents. Although most cases are caused by viruses, antibiotics are still frequently prescribed. The McIsaac score is used to estimate the likelihood of group A Streptococcus infection and to support rational antibiotic use, but its application in clinical practice remains variable. This study aimed to analyze the relationship between the McIsaac score and antibiotic use in tonsillitis patients. This analytic observational study with a cross-sectional design used retrospective medical record data from RSUD K.R.M.T. Wongsonegoro Semarang from January 2020 to December 2025, with a sample of 97 patients. Most patients were in the moderate McIsaac score category (83.5%). Antibiotics were prescribed in 48.5% of cases, while 45.7% fell into the moderate category. Fisher–Freeman–Halton test results showed no significant relationship between the McIsaac score and antibiotic use ( $p=0.314$ ). These findings indicate that antibiotic use has not been fully based on McIsaac score assessment, highlighting the need to strengthen the implementation of antibiotic stewardship in clinical practice.

### INTRODUCTION

Tonsillitis is an inflammatory condition of the palatine tonsils that can occur in all age groups and is generally caused by viral or bacterial infections. Viral infections are the most

common cause (40–60%), whereas bacterial infections account for approximately 15–30% of cases.<sup>1,2</sup> Bacterial tonsillitis is primarily caused by Group A  $\beta$ -hemolytic Streptococcus (*Streptococcus pyogenes*). Although tonsillitis is often considered a common and self-limiting disease, inappropriate management may lead to complications such as peritonsillar abscess, airway obstruction, or systemic infection.<sup>3,4</sup>

Antibiotics are recommended only for bacterial tonsillitis. However, in clinical practice, antibiotics are often prescribed empirically, which may result in irrational use and contribute to the growing problem of antimicrobial resistance. Appropriate clinical assessment is therefore essential to support appropriate antibiotic prescribing.<sup>5</sup> One commonly used clinical tool to estimate the likelihood of *Streptococcus pyogenes* infection is the McIsaac score. This scoring system evaluates several clinical signs and symptoms, including fever, absence of cough, anterior cervical lymphadenopathy, tonsillar enlargement or exudate, and patient age.<sup>6</sup> The McIsaac score helps clinicians estimate the probability of bacterial infection and supports decision-making about antibiotic therapy. However, the diagnostic accuracy of the McIsaac score is considered moderate, with a sensitivity of approximately 55.6% and a specificity of 70.7%.<sup>6–8</sup>

Despite its usefulness, the McIsaac score has not been consistently applied in routine clinical practice. As a result, decisions regarding antibiotic prescription are not always based on standardized clinical assessment. Therefore, this study aimed to analyze the relationship between McIsaac scores and clinicians' antibiotic prescribing in patients with tonsillitis at K.R.M.T. Wongsonegoro Regional Hospital.

## METHOD

This analytical observational study with a cross-sectional design aimed to assess the relationship between McIsaac scores and antibiotic prescribing in patients with tonsillitis. Retrospective data were collected from medical records at K.R.M.T. Wongsonegoro Regional Hospital, Semarang (January 2020–December 2025). The sample consisted of 97 patients selected through purposive sampling, in which subjects were chosen based on predetermined inclusion and exclusion criteria relevant to the study's objectives.

The inclusion criteria were children aged 3–14 years presenting with clinical symptoms such as fever, cough, odynophagia, tonsillar enlargement or exudate, and enlarged lymph nodes, particularly in the submandibular region. Patients with comorbidities were excluded from the study. Clinical variables required for the McIsaac score (Figure 1), including body temperature, presence or absence of cough, tonsillar swelling or exudate, anterior cervical lymphadenopathy, and patient age, were collected from medical records and subsequently used to calculate the McIsaac score for each patient.

Symptoms	McIsaac score
Temperature >38°C	1
No cough	1
Tender anterior cervical adenopathy	1
Tonsillar swelling or exudate	1
Age 3-14 year	1
Age 15-44 year	0
Age 45 ≥year	-1

Total score	Chance of streptococcal infection in community with usual levels of infections, %	Suggested management
0	2-3	No culture or
1	4-6	Antibiotic is required
2	10-12	Culture all; treat only if culture results
3	27-28	is positive
4	38-63	Culture all; treat with penicillin on clinical grounds*

\*if patient has high temperature or is clinically unwell, and presents early in disease course. Use erythromycin if patient is allergic to penicillin.

Figure 1. McIsaac Score.<sup>8</sup>

Data were analyzed using SPSS version 29. The association between McIsaac score categories and antibiotic prescribing was analyzed using the Fisher–Freeman–Halton exact test. A p-value < 0.05 was considered statistically significant.

## RESULTS

This study was an analytical observational study with a cross-sectional design aimed at determining the association between McIsaac scores and antibiotic prescribing in patients with tonsillitis. A total of 97 patients who met the inclusion and exclusion criteria were identified from medical records and included in the analysis.

### Relationship between McIsaac Score and Antibiotic Prescribing in Tonsillitis Patients

As shown in Table 1, most patients had moderate McIsaac scores (81%). Among them, 45.7% received antibiotics, while 53.3% did not. In patients with high McIsaac scores, antibiotic prescribing was more common. However, the Fisher–Freeman–Halton Exact Test showed no statistically significant association between McIsaac score categories and antibiotic prescribing ( $p = 0.314$ ).

**Table 1. Prevalence of McIsaac Score categories by Antibiotic Use**

McIsaac Score Category	Antibiotic		Total	P-value Fisher's Exact Test
	Yes Σ (%)	No Σ (%)		
Low (0-1)	5 (50,0)	5 (50,0)	10 (100)	0.314
Medium (2-3)	37 (45,7)	44 (53,3)	81	
High (≥4)	5 (83,3)	1 (16,7)	6	
<b>Total</b>	<b>47 (48,5)</b>	<b>50 (51,5)</b>	<b>97</b>	

### Distribution of Antibiotic Types in Tonsillitis Patients

As shown in Table 2, cefixime was the most commonly prescribed antibiotic for tonsillitis patients. Other frequently used antibiotics included cefadroxil and azithromycin.

**Table 2. Distribution of Antibiotic Types in Tonsillitis Patients**

Antibiotic Type	Number (n)	Percentage (%)
Cefixime	14	29,8
Cefadroxil	13	27,7
Azithromycin	10	21,3
Eritromicin	8	17,0
Amoxicillin	1	2,1
Levofloxacin	1	2,1
<b>Total</b>	<b>47</b>	<b>100,0</b>

## DISCUSSION

This study aims to determine the relationship between McIsaac scores and antibiotic prescribing in patients with tonsillitis. The McIsaac score is a clinical tool used to estimate the likelihood of group A Streptococcus infection based on clinical symptoms such as fever, absence of cough, enlargement of the anterior cervical lymph nodes, and tonsil enlargement/exudate.<sup>9-11</sup> The McIsaac score is still used in clinical practice as an initial guide for therapeutic decision-making in acute sore throat, especially in health care facilities with limited supporting examinations, as it helps to promote more rational antibiotic prescribing.<sup>4,12</sup>

In this study, tonsillitis was most frequently observed in children and adolescents, likely related to high exposure to respiratory droplets in crowded environments such as schools. Most patients had moderate McIsaac scores (2-3), indicating an intermediate probability of bacterial infection. This condition makes clinical differentiation between viral and bacterial etiologies more difficult and may contribute to variability in antibiotic prescribing practices. Nevertheless, nearly half of the patients in this study received antibiotics.

In cases with an intermediate probability, clinical guidelines generally recommend additional diagnostic testing or clinical observation before initiating antibiotic therapy. However, limited availability of confirmatory tests and time constraints in clinical settings may lead clinicians to prescribe antibiotics empirically. This may explain the absence of a significant association between

McIsaac scores and antibiotic prescribing in this study. Although a trend toward increased antibiotic prescribing was observed with higher McIsaac scores, the association was not statistically significant ( $p > 0.05$ ), indicating that the McIsaac score is not consistently used as the primary basis for prescribing decisions.

The implementation of clinical scoring systems, including the McIsaac score, remains inconsistent in clinical practice, and distinguishing viral from bacterial infections based solely on clinical examination is still challenging.<sup>13</sup> Previous studies have demonstrated that higher McIsaac scores are associated with an increased likelihood of bacterial infection as confirmed by throat swab culture.<sup>14</sup> Culture results showed that the most common pathogen in acute tonsillitis was Group A  $\beta$ -hemolytic Streptococcus (*Streptococcus pyogenes*) (48%), followed by *Pseudomonas* spp. (10%), *Enterococcus* spp. (9%), and *Klebsiella* spp. (8%), while 25% of cases showed no bacterial growth.<sup>15</sup>

The management of tonsillitis includes symptomatic therapy, guideline-based antibiotic treatment, and tonsillectomy when indicated for chronic or recurrent cases. Therefore, a comprehensive understanding of the etiology, pathophysiology, diagnosis, and management of tonsillitis is essential to prevent complications and recurrence.<sup>16,17</sup> Bacterial tonsillitis is generally caused by Group A  $\beta$ -hemolytic Streptococcus, and penicillin is recommended as first-line therapy.<sup>17</sup> However, frequently reported histories of penicillin allergy often lead clinicians to choose alternative antibiotics such as cephalosporins or macrolides.<sup>18</sup>

In the present study, cefixime and cefadroxil (cephalosporins) were more frequently prescribed, reflecting the empirical use of broad-spectrum antibiotics without etiological confirmation through throat swab culture. Cefixime is often selected due to its broad activity against both Gram-positive and Gram-negative bacteria, particularly when the causative pathogen has not been definitively identified. Nevertheless, empirical use of cefixime without bacterial confirmation may contribute to antimicrobial resistance.<sup>5,17,19</sup>

Several studies have emphasized the importance of antibiotic stewardship in the management of acute tonsillitis and pharyngitis. Clinical prediction rules, such as the McIsaac score, are recommended to guide antibiotic prescribing and reduce unnecessary antibiotic use. Previous studies have demonstrated that the implementation of clinical scoring systems, combined with rapid antigen detection tests or throat cultures, can significantly reduce inappropriate antibiotic prescribing in patients with sore throat. These findings underscore the importance of integrating clinical scoring tools into routine clinical practice to promote more rational antibiotic use.<sup>9,20</sup>

Validation studies have also demonstrated that the McIsaac score has moderate diagnostic accuracy in predicting Group A Streptococcus infection. Systematic reviews have reported that although the score is useful as an initial screening tool, its sensitivity and specificity vary across different populations; therefore, it should ideally be combined with microbiological confirmation. Consequently, the McIsaac score is generally recommended as a clinical guide rather than a definitive diagnostic tool.<sup>6,10,14</sup>

This study has several limitations. First, the retrospective design relied on medical record data, which may be incomplete or subject to documentation bias. Second, throat swab culture results were unavailable in some cases, preventing confirmation of bacterial etiology and limiting the ability to validate the McIsaac score against microbiological findings. Third, the sample size was relatively small and the study was conducted in a single hospital, which may limit the generalizability of the findings to other healthcare settings. Future studies with larger sample sizes

and prospective designs, including microbiological confirmation, are needed to further evaluate the relationship between McIsaac scores and antibiotic prescribing practices.

## CONCLUSION

This study found no significant association between McIsaac scores and antibiotic prescribing in patients with tonsillitis. These findings suggest that prescribing decisions may not be consistently guided by clinical scoring systems. Strengthening adherence to clinical guidelines and antibiotic stewardship programs is essential to promote rational antibiotic use.

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