



Research Article

Appropriateness of Antimicrobial Therapy for Treatment of Acute Tonsillitis at Primary Care level in Qatar- Clinical Audit Report

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Abstract

Background: Acute tonsillitis is considered as a common sore throat and difficulty in swallowing which is indicated by swelling and inflammation of the tonsils and throat, including the adenoids and lingual tonsils. Treatment of tonsillitis is commonly performed at the primary care level, which accounts for approximately 1.3% of total consultations. Appropriate antibiotic prescription is frequently associated with appropriateness in the differentiation of viral and bacterial etiologies. The inappropriate use of antibiotics has resulted to antibiotic resistance. Therefore, it is necessary to find a balance between rational antibiotic use and antibiotic access, both of which complement each other. In this paper, we will discuss the effectiveness of an action plan developed to improve compliance with appropriate antibiotic use in acute tonsillitis, based on baseline audit results, as well as the impact of this action plan on clinical practice, as measured during the reaudit.

Methods: A baseline audit was conducted in 2021 by retrospectively reviewing, a randomly selected 306 medical records of patients treated with antibiotics for tonsillitis during the audit period from December 2020 to February 2021, at 27 health centers across Qatar against the agreed audit criteria. Many gaps have been identified in practice and action plans have been developed to improve practice. After implementing the action plans and considering the time taken for staff to become familiar with the newly implemented changes, a re-audit was performed on a sample of 215 medical records from April to June 2022, to measure possible improvements in clinical practice following the implementation of recommendations.

Results: The baseline audit results showed only 0.3% of patients had received antibiotics based on the CENTOR scoring. 30% of patients had received antibiotics without providing any clinical justification. Adherence to first-line antibiotics (penicillin) and appropriate dosage were found in 82% of health records and 89% of health records, respectively. Appropriateness of frequency and duration was found in 100% of cases. In the re-audit, further to the implementation of the action plan, a diminutive development of 7% in using CENTOR scoring was noticed before the prescription of antibiotics when compared to the baseline. However, compliance with an appropriate antibiotic prescription decreased from 70% in the baseline audit to 59% in the re-audit. Although, improvements were noted in the choice of prescribing a first-line antibiotic, which was found to have improved from 82% in the baseline audit to 96% in the re-audit. Similarly, the appropriateness of dosage increased from 89% in the baseline audit to 100% in the re-audit. Adherence to the appropriateness of the frequency and duration of prescribed

antibiotics remained at its optimal level of 100% in both baseline and reaudit.

Conclusion: Appropriateness in the usage of antibiotics with regards to adherence to first-line antibiotic prescription and dosage was not optimal at baseline. The action plan developed to reach the optimal status for this criterion was effective, and the re-audit revealed improvements. Whereas compliance to justified use of antibiotic declined. The audit team was able to assess and document actual clinical practice at the health Centers following the implementation of action plans during this audit cycle, allowing the team to determine, which actions were successful, and which was not. New action plans have been created based on the findings to enhance the process and achieve the best level.

Keywords: Acute tonsillitis; Primary care; CENTOR scoring; Antibiotic resistance; Clinical audit

Introduction

Primary-care-Physicians often face dilemmas when treating acute tonsillitis: treatment with antibiotics or not. Is antibiotic treatment appropriate? Or spread antibiotic resistance? On the other hand, is treatment without antibiotics dangerous for the patient, and does it bring risks such as rheumatic fever or other complications?

This study measured the appropriateness of antibiotic use during the treatment of tonsillitis in primary care in Qatar. An action plan implemented to fill the gaps and the evaluation of the implemented action plan as well as future activities has been discussed in this paper.

Acute tonsillitis is considered a common sore throat, and difficulty in swallowing which is indicated by swelling and inflammation of the tonsils and throat, including the adenoids and lingual tonsils. Treatment of tonsillitis is commonly provided at the primary care level, which accounts for approximately 1.3% of total consultations [1]. Tonsillitis can be viral or bacterial. Pathogens like rhinovirus, Respiratory Syncytial Virus (RSV), and adenovirus are commonly responsible for viral tonsillitis [1]. Bacterial tonsillitis is caused by *Streptococcus pyogenes* or group A streptococci (GAS), for which antibiotics are indicated for clearing bacteria from the region and preventing the risk of rheumatic fever [2].

Appropriate antibiotic prescription is frequently associated with appropriateness in the differentiation of viral and bacterial etiologies [3]. The pathogens that cause viral tonsillitis are typically low virulent, rarely cause complications, and are self-limiting, whereas bacteria-caused tonsillitis required immediate treatment to relieve symptoms and other complications [4]. As a result, antibiotics are prescribed to treat deteriorating symptoms. To avoid inappropriate antibiotic prescribing, the National Institute of Health, and Care Excellence (NICE) recommends using CENTOR scoring. [1]. There is still an inappropriateness to the prescription of antibiotics.

Antibiotic resistance is deemed a major concern globally. Antibiotic-resistant bacteria in the United States cause at least 2 million illnesses and 23,000 fatalities each year, as per the Centers for Disease Control and Prevention (CDC) [5]. As per the WHO, antibiotic resistance is one of the biggest threats to global health, food security, and development. Also, infections such as pneumonia, tuberculosis, gonorrhoea, and salmonellosis are becoming harder to treat because of antibiotic resistance. A study conducted in the USA reported that one third of antibiotics prescribed are inappropriate [6].

The intensity of overall antibiotic resistance in GCC countries is unknown. At the same time, there is evidence of antibiotic resistance in *Escherichia coli* reported from GCC countries. Studies from this region have found possible clinical concerns related to bacteria that produce extended-spectrum beta-lactamases (ESBL) [7].

Antibiotic resistance leads to longer hospital stays, higher medical costs, and increased mortality [4]. Antibiotic-resistant bacterial infections, particularly those caused by multi-drug-resistant organisms, can result in major health issues such as extended hospital stays, unsuccessful treatment, and even fatalities [8]. Therefore, there is a need for equilibrium between appropriate usage of antibiotics and access to antibiotics, both of which are complementary to each other [9]. Studies show 75% of antibiotic prescriptions take place in primary care settings [10], and 80% of acute tonsillitis cases are treated with antibiotics in primary care settings [11]. Most inappropriate prescriptions of antibiotics are reported while treating URTIs, and they account for between 30% and 60% [4]. Lack of adherence to guidelines while prescribing antibiotics has been reported in many studies [12]. The Primary Healthcare Corporation (PHCC) of Qatar has developed and is using clinical practice guidelines for the treatment of URTIs. This guideline is reviewed and revised periodically. We are using the clinical audit tool to measure the adherence of clinicians to the guidelines while prescribing antibiotics. In this paper, we will discuss the effectiveness of the action plan developed based on the findings that went beyond the baseline audit, as well as how this action plan impacted clinical practice as measured by the re-audit (Figure 1).

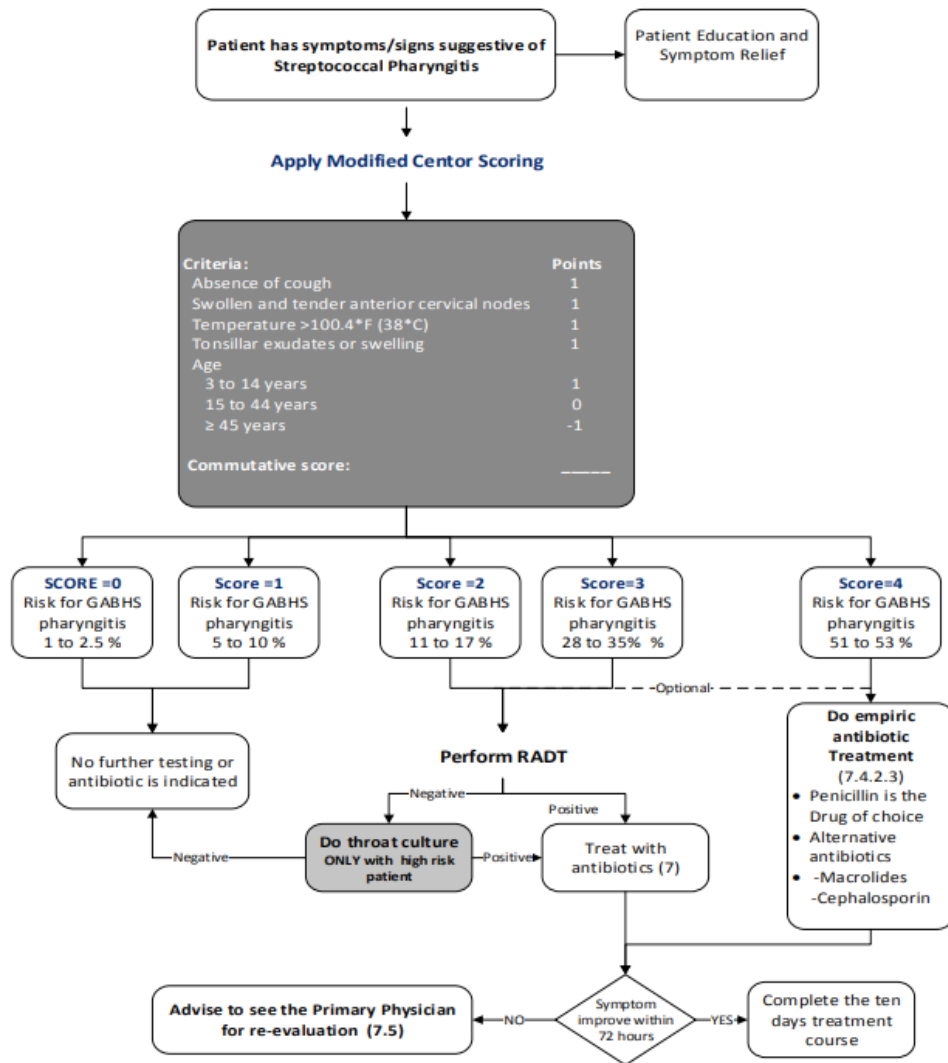


Figure 1: Treatment pathway.

Methodology

A baseline audit was conducted in 2021 to evaluate the adherence of clinicians to PHCC clinical practice guidelines for prescribing antibiotics for patients with bacterial tonsillitis. From December 2020 to February 2021, 306 randomly selected health records of patients treated with antibiotics for tonsillitis from 27 health centers were reviewed retrospectively against the agreed audit criteria.

Many gaps were identified in the practice, and action plans were developed for improving the practice. Following the implementation of action plans and ample time given for staff to become acquainted with the new changes made, a re-audit was conducted with a randomly selected sample size of 215 health records from April to June 2022, to measure any improvements in clinical practice following the implementation of the recommendations.

Interventions

Based on the baseline audit findings and identified gaps, the following action plan has been implemented:

1. Sharing the audit report with the physicians and reflecting on their own practice.
2. Partial implementation of CENTOR scoring pops as a reminder when selecting tonsillitis as a diagnosis and prescribing antibiotics with the help of the Clinical Information System (CIS).
3. Alerting physicians via system triggers emphasizes prescribing first-line antibiotics and potential antimicrobial resistance.

Results

The baseline audit results showed only 0.3% of patients had received antibiotics based on the CENTOR scoring. 30% of patients had received antibiotics without providing any clinical justification. Adherence to first-line antibiotics (penicillin) and appropriate dosage were found in 82% of health records and 89% of health records, respectively. Appropriateness of frequency and duration was found in 100% of cases.

In the re-audit, further to the implementation of the action plan, a diminutive development of 7% in using CENTOR scoring was noticed before the prescription of antibiotics when compared to the baseline. Contrary to our expectations, however, compliance with appropriate antibiotic prescription decreased from 70% in the baseline audit to 59% in the re-audit. Improvements were noted in the choice of prescribing a first-line antibiotic, which was found to have improved from 82% in the baseline audit to 96% in the re-audit. Similarly, the appropriateness of dosage increased from 89% in the baseline audit to 100% in the re-audit. Adherence to the appropriateness of the frequency and duration of prescribed antibiotics remained at its optimal level of 100% in both (Figures 2-5) (Table 1).

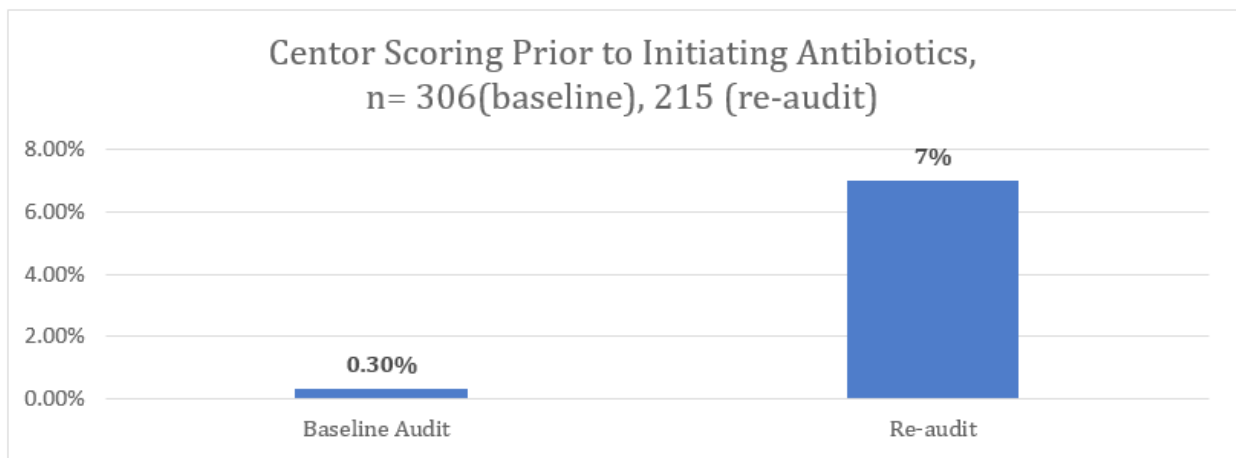


Figure 2: Comparative analysis of adherence to CENTOR scoring between baseline and reaudit.

Above figure shows only 7% improvement shown in the re-audit when compared to the baseline.

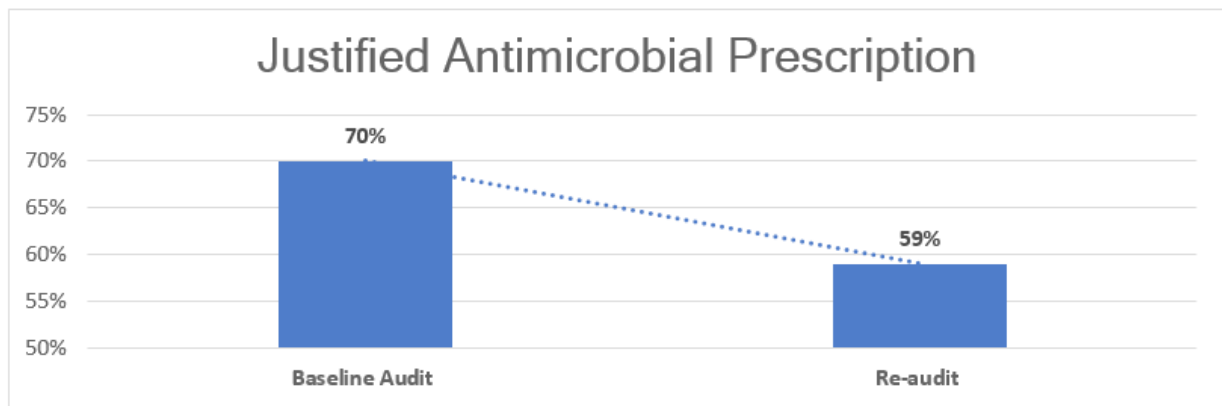


Figure 3: Justified antibiotic Prescription reaudit Vs baseline n=306 (baseline), 215 (re-audit).

The above figure shows 11 percent decline to appropriate prescription of antibiotics when compared to baseline.

Antibiotics	Total inappropriate Prescription reviewed	Inappropriate Prescriptions, %
Amoxicillin	17	20%

Amoxicillin/clavulanate	46	53%
Azithromycin	5	6%
Cefixime	5	6%
Cefuroxime	4	5%
Ciprofloxacin	1	1%
Clarithromycin	8	9%
Metronidazole	1	1%
Grand total	87	

Table 1: Antibiotics prescribed incorrectly (unjustified prescription) when there was no indication to be prescribed. N=87 (data from the re-audit).

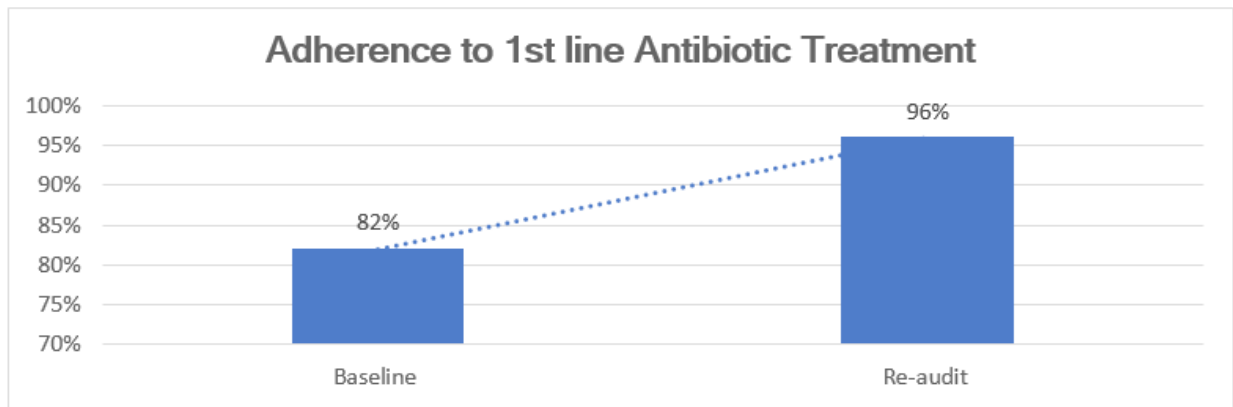


Figure 4: Adherence to first line antibiotic reaudit versus baseline n=215(baseline), 126 (re-audit).

Above figure shows adherence to first line antibiotic treatment improved when compared to the baseline audit.

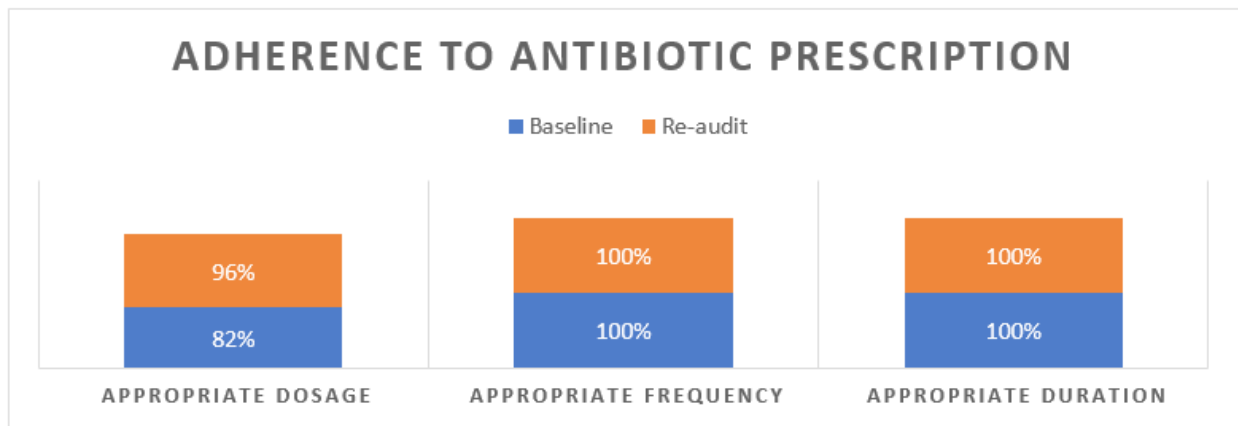


Figure 5: Compliance to appropriate dosage, frequency and duration reaudit Vs baseline n=215(baseline), 126(re-audit).

Discussion

The World Health Organization developed a policy to combat Antimicrobial Resistance (AMR) in response to low adherence to appropriate antibiotic prescriptions worldwide [13]. A reduction in the scope of treatment for tuberculosis is an example of AMR. Drug resistance had resulted from inappropriate prescription, poor quality drugs, and poor patient compliance to treatment [14]. Drug-resistant TB accounts for about 1 in 3 deaths from AMR [15], indicating the threat of AMR. With the importance of bacterial resistance due to inappropriate prescriptions in mind, a baseline audit was conducted in 2021 to learn about current practice in treating acute tonsillitis. Results of the baseline study had shown that 70% of patients had received antibiotics for clinically justified reasons, signs, or symptoms. The remaining 30% could have been treated without antibiotics, as the signs and symptoms of those cases were pointed

out to be of viral origin. The clinical CENTOR scoring system assists physicians in differentiating viral infections from bacterial infections. It paves the way to identify the likelihood of a group A streptococcal infection [15]. The scoring is performed in the CENTOR scoring system based on the patient's age, signs, and symptoms. For instance, a CENTOR score of 3-4 shows a high likelihood of streptococcal infections. In that case, physicians can use rapid antigen tests (RATs) to confirm bacterial infection before prescribing antibiotics. CENTOR scores of 0-2 indicate that RATs are unnecessary and that patients can be treated with paracetamol or ibuprofen (symptomatic treatment). Both the audit results showed exceptionally low use of CENTOR scoring conducted before prescribing antibiotics [16]. Prescribing antibiotics without CENTOR scoring precipitates inappropriate prescriptions.

Although the guidelines succinctly stated the importance of CENTOR screening before prescribing antibiotics, a few practitioners had prescribed antibiotics based on their clinical judgment without any appropriate justification. Practitioners have a tendency to rely on their clinical intuition rather than the best practice derived from an empirical approach. To overcome this gap in clinical practice, the audit team developed an action plan to remind physicians through implementing pop-ups or circulars to promote appropriate and rational use of antibiotics by physicians based on CENTOR scoring. The re-audit results, however, revealed a decrease in appropriate antibiotic prescription. The audit team found that the action plan was only partially implemented, and the same might be the reason for low performance. To improve the practice further, a comprehensive action plan was initiated; apart from that, a new action plan has been developed focused on creating alerts for the physicians to apply CENTOR scoring whenever a bacterial tonsillitis is suspected. The effectiveness of this new action plan in improving clinical practice will be measured by doing another audit in the future.

Adherence to first-line antibiotics was found to be 82% at baseline. For further improvement, the audit team implemented an action plan by sending reminders and conducting meetings to emphasize prescribing first-line antibiotics to avoid any potential antimicrobial resistance. Also, share this discussion through email and an official memo with the practitioners. The main objective behind doing the above was to create general awareness among practitioners. The re-audit result showed this activity was effective. Compliance with first-line antibiotic prescriptions has increased to 96% in the re-audit. Similarly, the appropriateness of dosage showed an improvement when compared to the baseline audit. The general awareness session conducted was deemed to have impacted the practice, which reflects an increase in proportion from 82% to 96%. During the baseline and re-audit, appropriateness in prescription frequency and duration remained at the optimum level of compliance (100%).

Way forward

The results of the re-audit after the action plan's implementation still reveal a below-optimal level of compliance,

particularly when employing CENTOR scoring and justifiable antibiotic prescription. The audit team suggested optimizing CIS through clinical popup messages in CIS on the documenting of justification for deviation from the prescribed course of action and developing warnings for the physicians to use CENTOR scoring, if bacterial tonsillitis was detected. Additionally, system-based triggers will be activated, and clinical audit champions from every health center will be involved to underscore the need of administering antibiotics in accordance with the recommended protocol.

Conclusion

During the baseline audit, application, and documentation of CENTOR scoring as per the guideline, it was poor, and as a result, 30% of antibiotic prescriptions turned out to be unjustified. An action plan was developed to avoid unjustified antibiotic prescription but was not fully implemented, and as a result, the compliance percentage in the re-audit declined. Further to the re-audit, an initiative was taken to complete the existing action plan; apart from that, a new action plan was developed to improve this practice. The effectiveness of this can be seen in the next audit cycle.

Although appropriateness in the usage of antibiotics with regards to adherence to first-line antibiotic prescription and dosage was above 80% in the baseline, it was not optimal. The action plan developed further to achieve the baseline has proven effective in increasing improvements from 80% to 96% and 100%, respectively. Appropriateness in the prescription frequency and duration remained at the optimal level. Through this audit cycle, the audit team could measure and report the actual practice happening in the clinics, which enabled them to develop future activities to improve the practice and reach the optimum level.

Implication

This audit study enabled the audit team to measure the relevance of tonsillitis treatment in health centers. Action plans have been established and implemented based on these findings. The review helps determine the effectiveness of the action plan implemented. And based on the lessons learned, future activities are planned and being implemented. The effectiveness of ongoing improvement activities will be measured in the next review.

Declaration

Ethics approval and consent to participate

Not applicable (since it is a quality improvement project).

Consent for publication: Not applicable

Availability of Data and Material

The datasets generated and/or analyzed during the current clinical audit are not publicly available due to the publicly non-availability but are available from the corresponding author on reasonable request.

Competing Interests

The authors declare that they have no competing interests

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