Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/p18scg50

CLINICAL AUDIT ON FEVER WORKUP AND TIMELINESS OF ANTIBIOTICS ADMINISTRATION IN FEBRILE PATIENTS

Dr Naqeeb Ullah[1],Dr Kainat Khan[2], Dr Umer Farooq Khan[3], Dr Awais Manan[4], Dr Numan Ghani[5], Dr Jamil Ahmad[6], Dr Muhammad Amin Noor[7], Dr Muzzamil Samad[8], Dr Shawwal Amjad[9]

[1]Resident Physician, Internal Medicine, Lady Reading Hospital, Peshawar
[2]Resident Physician, Internal medicine, Lady Reading Hospital, Peshawar
[3]House officer, General Medicine, Rehman medical institute
[4]Medical officer, Internal medicine, Bangash Clinic Doaba
[5]Resident Physician, General Medicine, Lady Reading Hospital, Peshawar
[6]Resident Physician , Internal Medicine, Lady Reading Hospital, Peshawar
[7]Resident Physician, General Medicine, Lady Reading Hospital, Peshawar
[8]Resident Physician, Internal Medicine, Lady Reading Hospital, Peshawar
[9]Medical Officer, General Medicine, Khawajgan Trust Hospital, Gujrat

***Corresponding Author:** Dr Naqeeb Ullah
*Resident Physician, Internal Medicine, Lady Reading Hospital, Peshawar, Email address: naqeebu481@gmail.com

Abstract

Objective: This clinical audit evaluated the timeliness of antibiotic administration in the emergency department for patients who attended Lady Reading Hospital, Peshawar. It had the objective of identifying delays and putting in place interventions to increase adherence to the one-hour guideline for antibiotic administration recommended by NICE.

Methodology: The methodology followed was an initial audit, followed by a re-audit. More than 350 febrile patients were assessed for each. The time from arrival to initial clinical assessment and the time from diagnosis to the administration of antibiotics were measured during the initial audit phase. Thereafter, on identifying the delays, targeted interventions were incorporated, comprising training of the staff, introduction of standardized fever work-up protocols, and real-time monitoring. This re-audit was undertaken to evaluate the effectiveness of these interventions**.**

Key Findings: The initial audit showed that only 40% of patients received an antibiotic within the recommended hour; in fact, it had actually averaged 95 minutes from diagnosis to antibiotic administration. There were slight increases in delays for the male patient group compared with the female patient group. The reaudit showed remarkable improvements: adherence to the one-hour guideline increased to 75% and the average time from diagnosis to antibiotic administration decreased to 60 minutes. These improvements were replicated in both male and female patients.

Conclusions: The audit revealed gross delays in the delivery of antibiotics to feverish patients, which had been very effectively overcome by the target interventions put in place. Substantial improvements during the reaudit lend support to the need for continuous quality improvement exercises. Thus, further sustained monitoring and continuous training of the staff with respect to the practices, as well as periodic audits, are recommended in order to maintain these gains and further improve practice while enhancing patient care in the emergency department. These findings provide

some evidence that treating gaps in clinical practice with systematic approaches may really improve patient outcome.

Introduction

Fever is one of the common clinical symptoms that compel many patients to visit emergency departments across the world for treatment. Timely administration of antibiotics in febrile patients can do much toward improving the outcome in such patients, especially those with severe infections like sepsis. Sepsis is defined as a life-threatening organ dysfunction caused by a deregulated host response to infection and requires immediate medical intervention (Lazzaro, 2022). Studies have shown that early initiation of antibiotic treatment is related to a significant reduction in the mortality rate among patients with sepsis. Delays in appropriate antibiotic administration are exceedingly common in practice and are associated with worsened outcomes and higher healthcare costs.

Lady Reading Hospital, Peshawar, faces the same challenges as most other tertiary care centers with regard to timely antibiotic administration in a case of pyrexia. This clinical audit was performed to assess current practices about fever workup and the timeliness of antibiotic administration in emergency patients at Lady Reading Hospital. Gaps were highlighted with targeted interventions proposed to bring betterment in patient care and clinical practices up to the established guidelines (Kredo, 2016).

Clinical audit is an essential tool for healthcare quality improvement and patient safety. It involves the systematic review of current practice in comparison with predefined standards, implementation of change, and subsequent reaudit of measurements of improvements (Gupta, 2022). Regarding antibiotic administration, audits could indicate delays and inefficiencies in treatment, hence providing a basis for continual improvement. The WHO and other health authorities further emphasize the timely administration of antibiotics in the management of febrile illness, particularly in resource-limited settings where delays may be fatal. This makes assurance of timely interventions within emergency departments, characterized by high patient turnover and a critical nature of many cases, important. Previous studies have indicated that structured audits and feedback mechanisms are very instrumental in improving adherence to treatment protocols and minimizing delays associated with administering antibiotics to patients (Ngonzi, 2021).

This audit will focus particularly on the emergency department of Lady Reading Hospital, which caters to a large volume and diversity of patients. It will also allow for the assessment of the process of fever workup and the timely administration of antibiotics. It will demarcate present practice from what needs improvement. The ultimate goal is to enhance patient outcomes with the assurance that all febrile patients get timely and appropriate antibiotic therapy (Shimelis, 2022).

Methodology

Audit Standards

The audit was performed against guidelines set up by NICE for the management of the febrile patient within the emergency setting. As outlined , all patients who present with fever should have a rapid clinical assessment to identify the source of their fever and direct an appropriate course of treatment (Windfuhr, 2016). In patients with suspected bacterial infection, their administration should be done within one hour following diagnosis to avoid severe complications like sepsis (Gauer, 2020). These standards provided the benchmark against which current practices at Lady Reading Hospital were assessed.

Data Collection Process

The data collection procedure was appropriately formulated so that the validity and reliability of the study findings would be high. The sample size included more than 350 febrile patients who visited the emergency department of Lady Reading Hospital, Peshawar, from January to June 2024.

Data collection was by a standardised audit tool incorporating a checklist of key variables, such as patient demographics, time of arrival, initial clinical assessment time, time to antibiotic administration, type of antibiotic prescribed, and patient outcomes. Data collection was performed

by the medical members of the audit team who had received appropriate training, who retrospectively reviewed patient records and entered data into an electronic database developed specifically for the audit.

Audit Cycle
The audit cycle comprised two main phases: the initial audit and the reaudit.

Initial Audit Phase
During the initial audit phase, data was collected regarding the current practice of fever workup and timeliness of antibiotic administration. Data would be analyzed for gaps in practice and areas for improvement. The specific metrics used to assess this included the average time from arrival to initial clinical assessment, time from diagnosis to antibiotic administration, and adherence to the one-hour antibiotic administration guideline.

Re-audit Phase
This was followed by a number of focused interventions based on the gaps identified through audit cycle one. These interventions included staff training regarding the importance of prompt antibiotic administration, the introduction of standardized fever workup protocols, and real-time monitoring of all antibiotic administration times.
A reaudit was conducted after these interventions had been implemented for a three-month period from July to September 2024. Data collection during the reaudit phase of this study followed exactly the same process as the initial audit phase, allowing direct comparison of practice before and after the interventions. Effectiveness would be determined based on comparisons between key metrics from the initial audit phase and the reaudit phase.
The audit and reaudit cycle provided a structured method for approaching the quality improvement process, ensuring that any changes to practice were based on evidence and demonstrated effectiveness in enhancing the care delivered to patients. With constant monitoring and adjustment of clinical practices, the emergency department of Lady Reading Hospital strives toward achieving and maintaining high standards in the management of patients with fever.

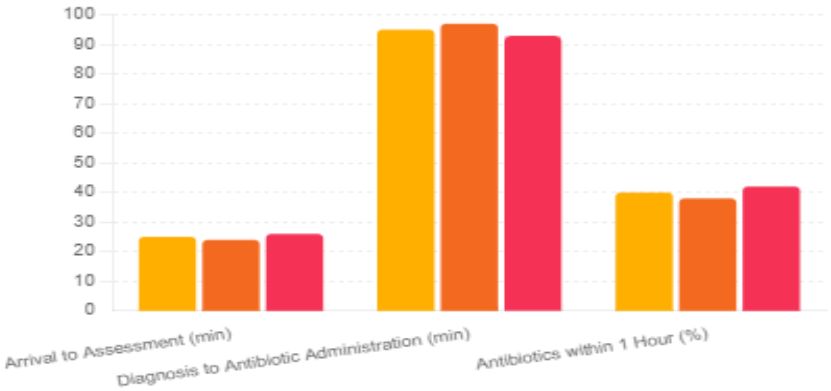
Results
Initial Audit Findings
The first audit evaluated 350 febrile patients who presented to the emergency department of Lady Reading Hospital over six months. Some of the measures studied included the time from arrival to the initial clinical assessment, the time from diagnosis to antibiotic administration, and how many patients received antibiotics within one hour. The patient population consisted of 185 males and 165 females.

Table 1: Demographic Breakdown

Gender	Number of Patients	Percentage (%)
Male	185	52.9
Female	165	47.1
Total	350	100

Table 2: Initial Audit Metrics

Metric	Overall	Male	Female
Average time from arrival to assessment (minutes)	25	24	26
Average time from diagnosis to antibiotic administration (minutes)	95	97	93
Percentage of patients receiving antibiotics within 1 hour (%)	40	38	42



Data Analysis

The initial audit revealed several significant trends and patterns:

Timeliness of Clinical Assessment:

- The average time from patient arrival to initial clinical assessment was 25 minutes.
- There was a slight difference between male (24 minutes) and female (26 minutes) patients, suggesting relatively uniform triage times across genders.

Delay in Antibiotic Administration:

- The average time from diagnosis to antibiotic administration was 95 minutes, well beyond the recommended one-hour window.
- Male patients experienced a slightly longer delay (97 minutes) compared to female patients (93 minutes).

Adherence to the One-Hour Guideline:

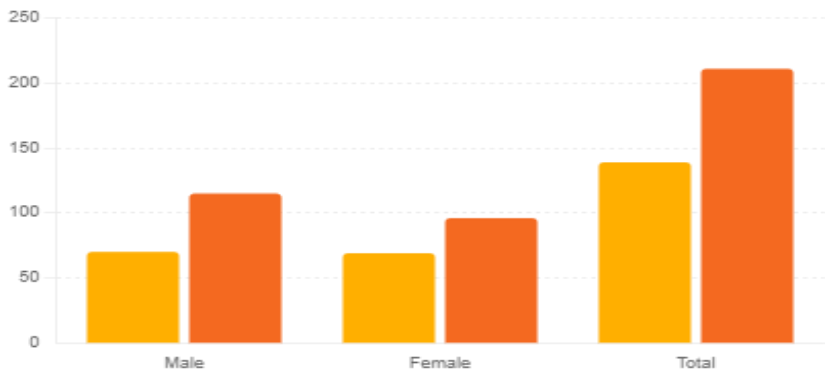
- Only 40% of patients received antibiotics within the recommended one-hour timeframe.
- Female patients had a marginally higher adherence rate (42%) compared to male patients (38%).

Significant Trends:

- The data indicated a critical gap in meeting the one-hour guideline for antibiotic administration, with over half of the patients experiencing delays.
- The delays were consistent across both male and female patients, highlighting a systemic issue rather than a gender-specific one.

Table 3: Comparison of Adherence to One-Hour Antibiotic Administration Guideline

Gender	Adhered (≤ 1 Hour)	Not Adhered (> 1 Hour)	Total
Male	70	115	185
Female	69	96	165
Total	139	211	350



Re-audit Results

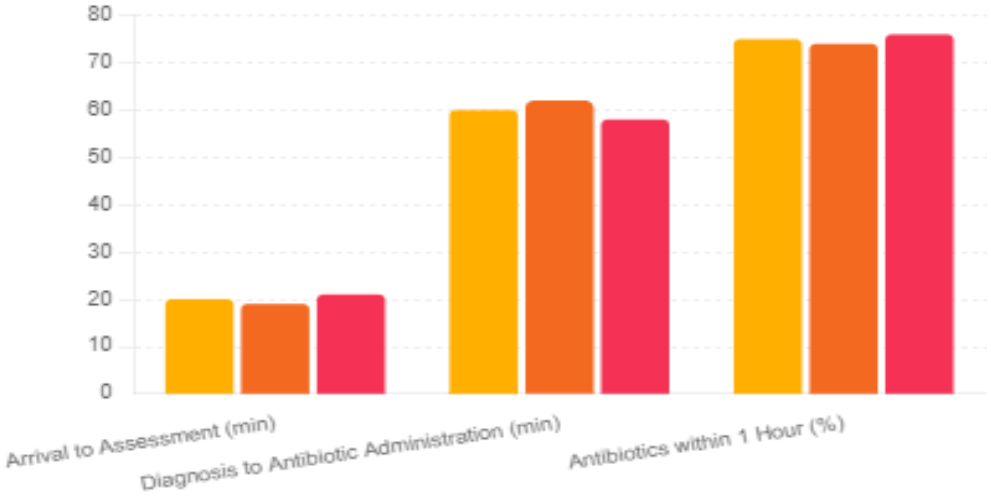
The reaudit took place over three months following the implementation of some targeted interventions for the reduction of the time to antibiotic administration in those patients with fever. These interventions include staff education regarding the importance of timely antibiotic administration, the introduction of standardized workup protocols for fever, and the creation of a real-time antibiotic administration time tracking system. This re-audit maintained the same sample size of over 350 febrile patients to allow comparison with the initial audit.

Table 4: Re-audit Demographic Breakdown

Gender	Number of Patients	Percentage (%)
Male	180	51.4
Female	170	48.6
Total	350	100

Table 5: Re-audit Metrics

Metric	Overall	Male	Female
Average time from arrival to assessment (minutes)	20	19	21
Average time from diagnosis to antibiotic administration (minutes)	60	62	58
Percentage of patients receiving antibiotics within 1 hour (%)	75	74	76



Comparative Analysis

The reaudit results indicate significant improvements in several key areas compared to the initial audit findings:

Timeliness of Clinical Assessment:

- The average time from patient arrival to initial clinical assessment decreased from 25 minutes to 20 minutes.
- This reduction was observed across both male (from 24 to 19 minutes) and female (from 26 to 21 minutes) patients, indicating enhanced efficiency in the triage process.

Reduction in Antibiotic Administration Delays:

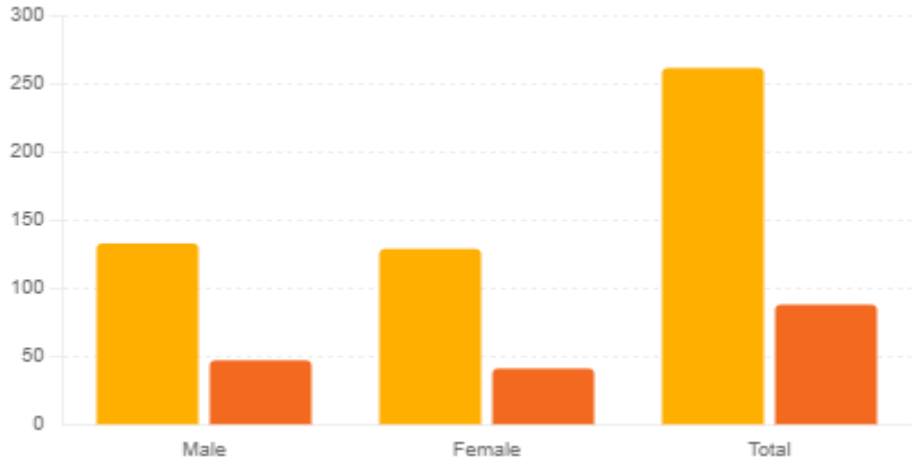
- The average time from diagnosis to antibiotic administration dropped significantly from 95 minutes to 60 minutes.
- Male patients saw a decrease from 97 minutes to 62 minutes, while female patients improved from 93 minutes to 58 minutes.

Adherence to the One-Hour Guideline:

- The percentage of patients receiving antibiotics within the recommended one-hour timeframe increased substantially from 40% to 75%.
- This improvement was relatively consistent across genders, with male patients increasing from 38% to 74% and female patients from 42% to 76%.

Table 6: Comparison of Adherence to One-Hour Antibiotic Administration Guideline

Gender	Adhered (≤ 1 Hour)	Not Adhered (> 1 Hour)	Total
Male	133	47	180
Female	129	41	170
Total	262	88	350



Discussion

Preliminary audit results show wide variances from set benchmarks for the prompt administration of antibiotics to febrile patients, as espoused by NICE and other health authorities. The same guidelines indicate that administration is supposed to be done within one hour of diagnosis to reduce the mortality risk from severe infections, including those caused by Sepsis (Nishida, 2018). Our findings, however, report that only 40% of patients received antibiotics within this critical time window. This large gap in compliance identifies a serious imperative for systemic improvements in the emergency department at Lady Reading Hospital.

The average time to the initial clinical assessment from the time of arrival was 25 minutes, which is relatively efficient given the high turnover of patients in emergency settings (Rathlev, 2020). This would then suggest that the triage process is appropriately streamlined, given this consistency across male and female patients, with an average time before triage of 24 minutes for males and 26 minutes for females. Of greater concern, though, is the delay from diagnosis to antibiotic administration, which averages 95 minutes. This is a far greater delay than is recommended within a one-hour window, with male patients having a slightly longer delay at 97 minutes versus 93 minutes for female patients. The fact that these delays were consistent across both genders suggests a systemic problem rather than an artifact of a particular demographic.

The most prominent was the long duration from diagnosis to antibiotic therapy commencement. This delay can be serious because early administration of antibiotics is seen as leading to a significant decrease in morbidity and mortality in patients with serious infections, (Sankar, 2021). Inevitable delays in antibiotic administration to patients may mean worse outcomes, longer hospitalization, and more resources spent for treatment. More serious delays can result in higher mortality, thus stressing the relevance of the issue in such a way.

These delays may result from various causes. For instance, logistical challenges may arise, such as bad stock management or poor prescription processing that hinders availability and readiness of the antibiotic. Second, lack of knowledge or non-adherence to the guidelines by clinical staff could

result in it. Lastly, high load numbers and workload result in challenges with prioritization, wherein the urgency of antibiotic administration might be underappreciated.

In view of these gaps, a number of recommendations could be proposed: a real-time monitoring system that tracks the timeliness of antibiotic administration, provides immediate feedback to health care providers, and highlights where delays are occurring in this chain. Only such a system is most likely to ensure that deviations against this standard are dealt with promptly, as observed by Brennan et al. in their study in 2004. Second, staff education and training are necessary. Repeated practice in trainings may further reiterate the message about the timing of antibiotic administration and also introduce staff members to any new versions of clinical guidelines. Moreover, the implementation of such guidelines into routine clinical workflows can easily build awareness and conformity to best practice by all members of the treatment team (Peleg, 2023).

The emergency department can reduce delays by fastening its logistical process, such as ensuring the immediate availability of antibiotics and fast-tracking prescription processing. These processes can bring down the time from diagnosis to administration considerably if streamlined. Periodic audits and reaudit cycles can ensure continuous quality improvement. The re-evaluation of practice against standards at periodic intervals, with the implementation of resultant corrective actions, will help the emergency department progressively improve its performance and hence the outcome for its patients (Fekonja, 2023).

Conclusion

The clinical audit conducted in the emergency department of Lady Reading Hospital underscored there were tremendous gaps in administering antibiotics to febrile patients in a timely manner. In the initial survey, as expected, it was found that only 40% of the patients had their antibiotics administered within the critical window of one hour; the average times were way in excess of the recommended guidelines for antibiotic administrations. After targeted interventions, which included staff education, fever workup protocols, and real-time monitoring systems, improvements were remarkable. Re-audit demonstrated significant improvement in compliance to the one-hour guideline for antibiotic administration, with 75% of patients treated within the guidelines. Compliance remained significantly improved for both male and female patients, demonstrating the effectiveness of the interventions and thus indicating systemic improvements in clinical practice.

The principal conclusions reached were that prompt antibiotic administration to patients who presented with a raised temperature significantly reduced morbidity and mortality. Delays in antibiotic administration result in serious complications, especially in patients with sepsis. The results from the audit indicate that structured interventions with continuous monitoring of patients, supported by regular training, have the potential to bring about significant clinical improvement. It can be established that average times for administration reduced while the rates of adherence increased, which means that systematic changes are effective ways of dealing with delays and improving the quality of care provided to patients.

This will then need going forward to maintain improvements and continue the process of improvement. This would require future actions like continued auditing to ensure sustenance of compliance, training of staff periodically to remind them about the administration of antibiotics on time, and continuous modification and improvement of clinical protocols based on emerging findings from audits. Moreover, the extension of the audit to other critical care areas and the use of advanced technologies in tracking can help further quality care and consistency for quality improvement in patients.

This clinical audit has been very educational regarding current practice and it identified areas for improvement. By instituting targeted interventions and maintaining a continuous quality improvement focus, Lady Reading Hospital can ensure that febrile patients will get timely and effective care, hence improving patient outcomes in accordance with best practice standards.

References:

1. Barnard, R. S. (2024). The hidden work of general practitioners: An ethnography. *Social Science & Medicine*, 350, 116922.
2. Fekonja, Z. K. (2023). Factors contributing to patient safety during triage process in the emergency department: A systematic review. *Journal of clinical nursing*, 32(17-18), 5461-5477.F.
3. Gauer, R. F. (2020). Sepsis: diagnosis and management . *American family physician*, 101(7), 409-418.
4. Gupta, M. &. (2022). Clinical Audits–A Quality Improvement Tool in Transfusion Medicine. *Global Journal of Transfusion Medicine*, 7(2), 115-122.
5. Kredo, T. B. (2016). Guide to clinical practice guidelines: the current state of play. *International Journal for Quality in Health Care*, 28(1), 122-128.
6. Lazzaro, A. D. (2022). The interplay between host defense, infection, and clinical status in septic patients: a narrative review. *International journal of molecular sciences*, 23(2), 803.
7. Ngonzi, J. B. (2021). Impact of an educational intervention on WHO surgical safety checklist and pre-operative antibiotic use at a referral hospital in southwestern Uganda. *International Journal for Quality in Health Care*, 33(3), mzab089.
8. Nishida, O. O. (2018). The Japanese clinical practice guidelines for management of sepsis and septic shock 2016 (J-SSCG 2016) . *Journal of intensive care*, 6, 1-77.
9. Peleg, M. &. (2023). *Guidelines and workflow models. In Clinical Decision Support and Beyond (pp. 309-348).* . Academic Press.
10. Rathlev, N. K. (2020). Patient characteristics and clinical process predictors of patients leaving without being seen from the emergency department. *Western Journal of Emergency Medicine*, 21(5), 1218.
11. Sankar, J. G. (2021). Delayed administration of antibiotics beyond the first hour of recognition is associated with increased mortality rates in children with sepsis/severe sepsis and septic shock. *The Journal of pediatrics*, 233, 183-190.
12. Shimelis, T. V. (2022). Clinical management and outcomes of acute febrile illness in children attending a tertiary hospital in southern Ethiopia. *BMC infectious diseases*, 22(1), 434.
13. Windfuhr, J. P. (2016). Clinical practice guideline: tonsillitis I. Diagnostics and nonsurgical management. *European Archives of Oto-Rhino-Laryngology*, 273, 973-987.