



IMPROVING ADHERENCE TO NEONATAL SEPSIS SCREENING PROTOCOL: A CLINICAL AUDIT ON EARLY IDENTIFICATION AND MANAGEMENT

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Abstract

Background: Neonatal sepsis remains a major cause of morbidity and mortality worldwide, particularly in low- and middle-income countries. Early identification using standardized screening protocols is critical for improving outcomes.

Objective: To assess baseline adherence to neonatal sepsis screening protocol and evaluate the effectiveness of structured training.

Methods: A prospective interventional clinical audit was conducted in a tertiary care neonatal unit in Gujarat, India. Pre-training observations were performed in 30 neonates with suspected sepsis. A structured training session was conducted for healthcare workers, followed by post-training observations in 80 neonates. Key parameters included sepsis screening, blood culture before antibiotics, and timely antibiotic initiation. Statistical analysis was performed using chi-square test.

Results: Baseline adherence to complete sepsis screening protocol was 36.6% (11/30), which improved significantly to 85% (68/80) post-training ($p < 0.001$). Timely antibiotic initiation improved from 60% to 92%.

Conclusion: Structured training significantly improves adherence to neonatal sepsis screening protocols. Regular audit cycles are essential to sustain improvements.

Keywords: Neonatal sepsis, clinical audit, screening protocol, NICU, quality improvement

1. Introduction

Neonatal sepsis is a leading cause of neonatal mortality, accounting for a significant proportion of deaths in developing countries (1). Early diagnosis is challenging due to nonspecific clinical presentation, making standardized screening protocols essential for timely management (2,3).

The use of sepsis screening tools—including C-reactive protein (CRP), total leukocyte count, and blood culture—is widely recommended to guide early diagnosis and treatment (4). Delays in recognition or inappropriate initiation of antibiotics are associated with increased mortality and complications (5).

Despite established guidelines, adherence to neonatal sepsis protocols remains inconsistent in routine clinical practice (6). Clinical audits provide an effective mechanism to identify gaps and implement targeted interventions for quality improvement (7).

This audit was conducted to assess adherence to neonatal sepsis screening protocols and evaluate the impact of structured training among healthcare workers.

2. Objectives

1. To assess baseline adherence to the neonatal sepsis screening protocol
2. To implement structured training for healthcare workers
3. To evaluate post-training improvement in adherence

3. Methodology

3.1 Study Design and Setting

Prospective interventional clinical audit conducted in the NICU of a tertiary care teaching hospital Dr. M.K Shah Medical College and Smt. S.M.S Hospital, Ahmedabad in Gujarat, India

3.2 Participants

All neonates with suspected sepsis admitted during the study period were included.

3.3 Audit Criteria and Standards

Based on national and international neonatal sepsis guidelines (2,4):

Audit Criteria	Standard	Acceptable Compliance
Complete sepsis screen (CRP, CBC, blood culture)	As per protocol	≥ 90%
Blood culture before antibiotics	Mandatory	100%
Antibiotics within 1 hour	Early initiation	≥ 90%

3.4 Pre-Training Phase

Baseline observations were conducted in 30 neonates.

3.5 Intervention

A one-day structured training session included:

- Protocol-based teaching
- Case-based discussions
- Interpretation of sepsis markers

3.6 Post-Training Phase

80 neonates were observed over two weeks.

3.7 Data Analysis

Data analysed using chi-square test. A p-value < 0.05 was considered statistically significant.

4. Results

Baseline adherence to complete sepsis screening protocol was 36.6%, improving significantly to 85% post-training ($p < 0.001$).

Table 1: Pre- and Post-Training Comparison

Parameter	Pre (n=30)	Post (n=80)	p-value
Complete sepsis screen	11 (36.6%)	68 (85%)	<0.001
Blood culture before antibiotics	18 (60%)	75 (93%)	<0.001

Timely antibiotic initiation	18 (60%)	74 (92%)	<0.001
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5. Discussion

This clinical audit demonstrated suboptimal baseline adherence to neonatal sepsis screening protocols, with only 36.6% of cases meeting complete screening criteria. This finding aligns with observations from other resource-limited settings, where adherence to standardized neonatal care protocols is often inconsistent due to systemic and operational challenges (6,8). Factors such as high patient load, time constraints, lack of structured training, and variability in clinical judgment contribute significantly to these gaps in practice.

Neonatal sepsis remains a time-sensitive medical emergency, and early identification is often complicated by subtle and nonspecific clinical signs. Therefore, reliance on protocol-based screening—including laboratory parameters such as C-reactive protein, complete blood count, and blood culture—is essential for guiding timely intervention (2,4). However, in busy clinical environments, these protocols may not be uniformly followed, particularly in the absence of reinforcement mechanisms such as audits and feedback systems.

The intervention in this study—a structured, one-day training program—resulted in a substantial and statistically significant improvement in adherence across all evaluated parameters. The increase in compliance from 36.6% to 85% highlights the effectiveness of focused educational interventions in improving procedural and decision-making skills among healthcare providers. Similar improvements have been reported in previous audit-based studies, which emphasize that targeted training combined with feedback can rapidly bridge gaps in clinical practice (7,9).

An important observation from this audit was the improvement in obtaining blood cultures prior to antibiotic administration. This step is critical not only for confirming diagnosis but also for enabling targeted antimicrobial therapy and reducing unnecessary broad-spectrum antibiotic use. Failure to obtain cultures prior to antibiotic initiation compromises diagnostic accuracy and contributes to the growing problem of antimicrobial resistance (4). The post-training compliance of over 90% in this parameter reflects improved awareness and adherence to antimicrobial stewardship principles.

Timely initiation of antibiotics is another cornerstone of neonatal sepsis management. Evidence suggests that even short delays in antibiotic administration are associated with increased mortality and adverse outcomes (5). In this audit, the proportion of neonates receiving timely antibiotics improved from 60% to 92% following training. This underscores the importance of reinforcing the concept of the “golden hour” in neonatal sepsis care and ensuring that clinical teams are equipped to act promptly.

The findings of this audit also highlight an important behavioral aspect of clinical practice—skill decay and protocol fatigue. In the absence of periodic reinforcement, healthcare providers may deviate from standard guidelines over time. Structured training sessions, especially those incorporating case-based discussions and practical components, help in refreshing knowledge and improving retention of critical skills.

From a systems perspective, this audit reinforces the value of clinical audits as a tool for continuous quality improvement. Unlike passive dissemination of guidelines, audit cycles actively engage healthcare providers, promote accountability, and create opportunities for feedback and learning (7). The relatively simple and low-cost nature of the intervention used in this study makes it highly scalable and applicable to similar healthcare settings.

However, certain limitations must be acknowledged. The pre-intervention sample size was relatively small, which may affect generalizability. The post-training assessment was conducted over a short duration, and long-term retention of improved practices was not evaluated. Additionally, the study focused on process indicators rather than clinical outcomes such as mortality or duration of hospital stay. Observer bias may also have influenced the results, although standardized checklists were used to minimize variability.

Future research should focus on evaluating the sustainability of these improvements over time and assessing the impact on clinical outcomes. Integration of digital checklists, automated reminders, and

protocol-based order sets may further enhance adherence. Expanding such audits across multiple centers could provide broader insights into systemic gaps and inform policy-level interventions.

6. Conclusion

This clinical audit identified significant gaps in baseline adherence to neonatal sepsis screening protocols, underscoring the need for targeted quality improvement initiatives in neonatal care. The implementation of a structured, hands-on training program resulted in a marked and statistically significant improvement in adherence to key components of sepsis management, including timely screening, blood culture collection, and early initiation of antibiotics.

These findings highlight that adherence to clinical protocols is not solely dependent on knowledge availability but requires continuous reinforcement through training, supervision, and audit mechanisms. Simple, low-cost interventions such as periodic training sessions and structured audit cycles can lead to substantial improvements in clinical practice and have the potential to positively impact neonatal outcomes.

In high-burden settings, where neonatal sepsis contributes significantly to mortality, strengthening protocol adherence through institutionalized quality improvement strategies is essential. Incorporating regular refresher training, checklist-based monitoring, and continuous audit-feedback loops into routine NICU practice can help sustain these improvements over time.

Ultimately, this audit reinforces the principle that improving the quality of care delivery, rather than merely increasing service coverage, is critical for achieving better health outcomes in neonatal populations.

7. Recommendations

- Conduct periodic training sessions
- Display sepsis management protocols in NICU
- Implement checklist-based monitoring
- Repeat audit every 6 months

8. Acknowledgments

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9. Conflict of Interest

None declared.

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