



A STUDY ON SECONDARY BLOODSTREAM INFECTIONS IN TERTIARY CARE SETTINGS: AN UNATTENDED ISSUE

Microbiology

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ABSTRACT

Background: The Blood Stream infection (BSI) is one of the most common causes of morbidity in the intensive care units. While many studies focus on the BSI and factors associated; a specific, widely accepted benchmark for secondary bloodstream infection (BSI) rates in India is not readily available making it an unattended issue. Studies are needed to demonstrate the prevalence of secondary BSIs in various settings, including ICUs, and highlight the importance of primary sources and organism wise distribution. This research article addresses the prevalence of various sources of Secondary BSI in a tertiary care setting. **Methods:** This study was initiated with an aim to analyze the primary and secondary BSI for a period of one year. All primary sources of secondary BSI cases were determined by studying the Blood culture results in microbiology department from January 2023 to December 2023. During the analysis secondary BSI were determined by NHSN definitions for Secondary BSI events. Primary specimen sources were determined for all secondary BSIs. Organisms isolated from positive cultures were also studied. **Results:** All patients from the tertiary care hospital were included in the study for the time period of Jan 2023–December 2023. Blood culture specimens were received from 5857 unique patients with 31% culture positive, amongst which 5.13% (94 cases) were Secondary BSI. The main primary sources of infections causing secondary BSI are wounds and drain fluids 37%, respiratory tract 26%, urinary tract 19%, central line catheter 7%, CSF 9%, gastrointestinal tract 2%. The organisms isolated from the secondary BSI cases were *Klebsiella pneumoniae* 26%, *Acinetobacter baumannii* 23%, *Staphylococcus aureus* 14%, *Pseudomonas aeruginosa* 19%, *Escherichia coli* 9%, *Enterococcus* spp. 7%, *Proteus mirabilis* 2%. **Conclusions:** Prompt identification of source of secondary BSI is significant for targeting the patient treatment.

KEYWORDS

Secondary Blood stream infections; blood stream infection; blood cultures, WHONET

INTRODUCTION

The Blood Stream infection (BSI) is one of the most common causes of morbidity and mortality in the intensive care units. While many studies focus on the BSI and factors associated; a specific, widely accepted benchmark for secondary bloodstream infection (BSI) rates in India is not readily available making it an unattended issue. The absence of a specific benchmark highlights the need for robust surveillance systems in Indian hospitals to track the incidence of secondary BSIs. Surveillance of Hospital acquired infections (HAIs) can help identify trends and potential sources of these infections, which is crucial for developing effective prevention and control strategies. Studies are needed to demonstrate the prevalence of secondary BSIs in various settings, including ICUs, and highlight the importance of primary sources and organism wise distribution. This research article addresses the prevalence of various sources of Secondary BSI in a tertiary care setting.

Bloodstream infections (BSIs) can be primary or secondary, with significant associated morbidity and mortality. Primary bloodstream infections (BSIs) are defined as infections where no clear infection source is identified, while secondary BSIs originate from a localized infection site. These may be central line associated, respiratory tract, wounds, urinary tract, abdomen, etc. The accurate identification of primary site is very crucial from clinical perspective to initiate targeted treatment. ⁽¹⁾ Several factors can influence BSI rates, including patient demographics, severity of illness, duration of central venous catheter use, and adherence to infection prevention and control practices. ⁽²⁾

Methodology

This study was initiated with an aim to analyze the trends of primary and secondary BSI for a period of one year. All primary sources of secondary BSI cases were determined by studying the results of Blood culture specimens and other specimens from the suspected primary site received for culture in microbiology department from January 2023 to December 2023. During the analysis secondary BSI were determined by NHSN definitions for Secondary BSI events. Primary specimen sources were determined for all secondary BSIs ⁽³⁾. Organisms isolated from positive cultures were also studied.

Secondary BSI: A BSI that is thought to be seeded from a site-specific infection at another body site. The NHSN defines criteria as at least one organism from the blood specimen matches an organism identified

from the site-specific specimen that is used as an element to meet the NHSN site-specific infection criterion and the blood specimen is collected during the secondary BSI attribution period (infection window period + repeat infection timeframe). If genus and species are identified in both specimens, they must be the same. If not then, the organisms must at least match to the genus level and at that level the organisms must be the same. ⁽³⁾. Therefore, total number of BSIs, Secondary BSI were determined. The organism wise distribution of secondary BSI was studied using the WHONET the microbiology laboratory database software. The most common primary sources were analyzed by studying the site-specific specimen received.

RESULTS

All patients from the tertiary care hospital were included in the study for the time period of Jan 2023–December 2023. Blood culture specimens were received from 5857 unique patients with 31% culture positive (1831), amongst which 5.13% (94 cases) were Secondary BSI. Around 3961 were sterile and 1.1% were contaminated specimen. This is within acceptable limit of the generally accepted benchmark for blood culture contamination rates which is less than 3% as per CLSI Standards. ⁽⁴⁾ (CLSI. Principles and Procedures for Blood Cultures. 2 nd Ed. CLSI Guideline M47. Clinical and Laboratory Standards Institute; 2022.)

The figure 1 depicts the trends of secondary BSI cases over the period of year 2023 with more positivity in second quarter of the year.

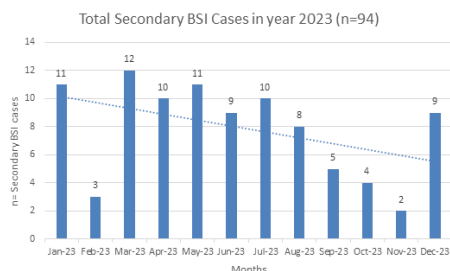


Figure1: Total Secondary BSI Cases in year 2023 (n=94)

Primary Sources Of Secondary BSI

The most common primary sources of infections causing secondary

BSI are wounds and drain fluids 37%, respiratory tract 26%, urinary tract 19%, central line catheter 7%, CSF 9%, gastrointestinal tract 2% as shown in figure 2 below.

Microorganisms Isolated From Secondary BSI

The organisms isolated from the secondary BSI cases were *Klebsiella pneumoniae* 26%, *Acinetobacter baumannii* 23%, *Staphylococcus aureus* 14%, *Pseudomonas aeruginosa* 19%, *Escherichia coli* 9%, *Enterococcus* spp. 7%, *Proteus mirabilis* 2% (figure 3). Most of these were hospital acquired infections caused by multidrug resistant organisms warranting the need of robust infection prevention practices.

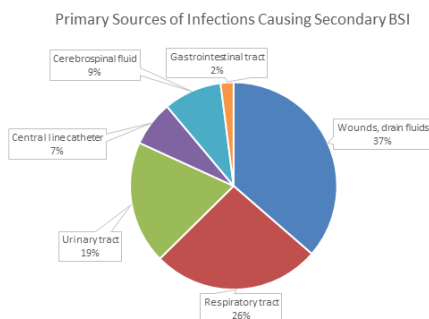


Figure 2: Primary Sources of Infections Causing Secondary BSI (n=94)

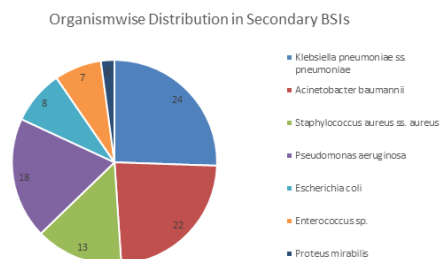


Figure 3: Organisms Causing Secondary BSI (n=94)

DISCUSSION

This study underscores the distinct clinical and economic challenges of primary versus secondary BSI and emphasizes the need for prompt diagnosis and tailored antimicrobial therapy. Further research should focus on developing specific management guidelines for primary BSI and exploring interventions to reduce BSI burden across healthcare settings.

CONCLUSION

Prompt identification of source of secondary BSI is significant for targeting the patient treatment. Implementation of prevention bundle, trainings & reminders for frontline doctors and staff for sending the specimen from suspected primary sources of BSI, improving the blood culture practices are important role players for increasing the reporting of secondary BSIs.

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