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Determination of Quality Control of Blood Culture Contamination of Cancer Patient with Sepsis: A Retrospective Study at Dr. B. Barooah Cancer Institute

Sonia Kindo

Abstract: ***Background**: Bloodstream infections (BSIs) are a leading cause of morbidity and mortality in immunocompromised cancer patients. Blood culture is the gold-standard diagnostic test for BSI, but yields may be compromised by contamination. A contaminated culture (false-positive) can trigger unnecessary antibiotics and adversely affect patient care, thereby optimizing antibiotic stewardship in critical patient management. The study aims to determine the prevalence of blood culture contamination and evaluate quarterly trends of contamination among cancer patients with sepsis. **Methods**: A retrospective observational study was conducted in the Department of Microbiology at Dr. B. Barooah Cancer Institute (BBCI), Guwahati, Assam from January-December 2025. A total of 2565 blood culture samples received from patients were included in the study. Blood cultures were processed using standard microbiological techniques and interpreted according to Clinical and Laboratory Standard Institute (CLSI) guidelines. Organisms commonly associated with skin flora, including coagulase-negative staphylococci, Micrococcus spp., Bacillus spp., and diphtheroids, were considered contaminants when supported by microbiological and clinical findings. Quarterly contamination rates were calculated and compared using chi-square analysis. **Results**: The study period was divided into four quarters to assess temporal trends in contamination rates. Among 2565 blood culture samples processed, 104 yielded positive growth. 56 isolates were identified as contaminants, while 48 were classified as true bloodstream infections. Quarter-wise analysis demonstrated variation in the number of contaminated isolates throughout the year. The highest contamination rate occurred in July–September, with 24 contaminated samples out of 763 cultures processed (3.15%). This was followed by October–December (12/649; 1.85%), April–June (11/603; 1.82%), and January–March (9/550; 1.64%). Data were entered in Microsoft Excel and analyzed and the test yielded $\chi^2(3) = 4.68$, $p = 0.197$, indicating no statistically significant difference across quarters. **Conclusion**: Blood culture contamination remains an important quality concern in oncology healthcare settings despite contamination rates remaining near recommended limits overall. Increased contamination during specific quarters highlights the influence of procedural compliance, staff competency, and adherence to aseptic blood collection protocols, regular surveillance, and periodic quality audits are essential to further reduce contamination rates and improve diagnostic accuracy and patient care outcomes.*

Keywords: Blood culture contamination, bloodstream infection, oncology patient, sepsis, aseptic technique, clinical microbiology, quality control, hospital infection surveillance

1. Introduction

Bloodstream infections (BSIs) are a leading cause of morbidity and mortality in immunocompromised cancer patients. Blood culture is the gold-standard diagnostic test for BSI, but yields may be compromised by contamination which is known as Blood culture contamination (BCC) (Lamy et al., 2016). Blood culture contamination occurs when normal skin or environmental flora are inadvertently introduced into blood culture specimens, leading to false-positive results. This is typically due to collection errors (e.g. inadequate skin antisepsis or drawing from catheter hubs) and is not rare-well-run labs still report contamination rates up to 1-3% of cultures. The most common contaminants are coagulase-negative staphylococci (70-80% of contaminants) and other skin commensals (Corynebacterium, Bacillus spp., Cutibacterium, etc.) (Chandrashekar et al., 2021). These false positives have major clinical and economic consequences: they lead to diagnostic confusion, unnecessary antibiotics, longer hospital stays, and higher costs. For example, contaminated cultures often prompt 1 extra week of antibiotics (Schinkel et al., 2024), prolong hospital stays (one study found 2 days longer) and encounter thousands of dollars in avoidable costs per case. To prevent these issues, guidelines emphasize strict aseptic technique and monitoring: for instance, skin preparation with chlorohexidine-alcohol (rather than povidone-iodine), use of sterile gloves and trained phlebotomy teams, avoidance of catheter draws, and use of blood diversion devices have all been shown to reduce contamination. Overall, blood culture contamination undermines both patient care and antibiotic stewardship and current best practices aim to drive contamination rates toward 1% or lower (Doern et al., 2020). Blood culture contamination is defined as the growth of organisms in a blood culture that do not reflect true bacteremia but were introduced during specimen collection or handling (Callado et al., 2023). Because blood is naturally sterile, any detected organism typically indicate infection; contaminants undermine this assumption. Modern reviews note that virtually all contamination occurs at the time of collection, most often from skin flora or the hub of an IV catheter, often due to poor venipuncture technique or insufficient disinfection (CDC 2024). The fraction of positive blood cultures that are contaminants can be very highSchinkel et al. report that up to 40-50% of positive cultures were contaminants in their study and other sources note contamination may account for half of positives in some hospitals (Schinkel et al., 2024), and other sources note contamination may account for half of positives in some hospitals (Weinstein et al., 2008). Clinical guidelines therefore emphasize strict collection procedures.

Typical contaminants are organisms ubiquitous on human skin (CDC 2024). Common examples include:

- Coagulase-negative staphylococci (CoNS), by far the most frequent contaminant (70-80% of contaminated cultures) (Chandrashekar et al., 2021);

- Corynebacterium spp.,
- Bacillus spp. (non-anthracis);
- Micrococcus spp.

These contrast with true pathogens (e.g. Staphylococcus aureus, Enterococci, Gram-negatives) which are rarely contaminants. The organism's identify thus guides interpretation: isolation of a typical skin commensal from only one of multiple cultures usually indicates contamination, whereas a typical pathogen in multiple sets suggests true bacteremia (Weinstein et al., 2008). The clinical and economic consequences of contamination are substantial. False positives often trigger unnecessary interventions: patients may receive prolonged empiric antibiotics (risking C. difficile infection or drug toxicity) and undergo extra tests or procedures. For instance, Schinkel et al. found contaminated cultures led to roughly one extra week of antibiotics on average and more ancillary testing (Schinkel et al., 2024). Contamination also drives longer hospital stays and costs: one report found contaminated cases had 2 days longer mean stay and $4,500 higher costs than culture-negative controls (CDC 2024). In pediatrics, Childress et al. observed that contamination was associated with a 32% longer length of stay, numerous repeat blood draws, and millions in excess ED/hospitals costs (Childress et al., 2026). These downstream effects burden patients and systems (unneeded catheter removals, etc.) and can distort infection surveillance. Consequently, major agencies now consider a target contamination rate ≤1-3% as a quality benchmark (Chandrashekar et al., 2021).

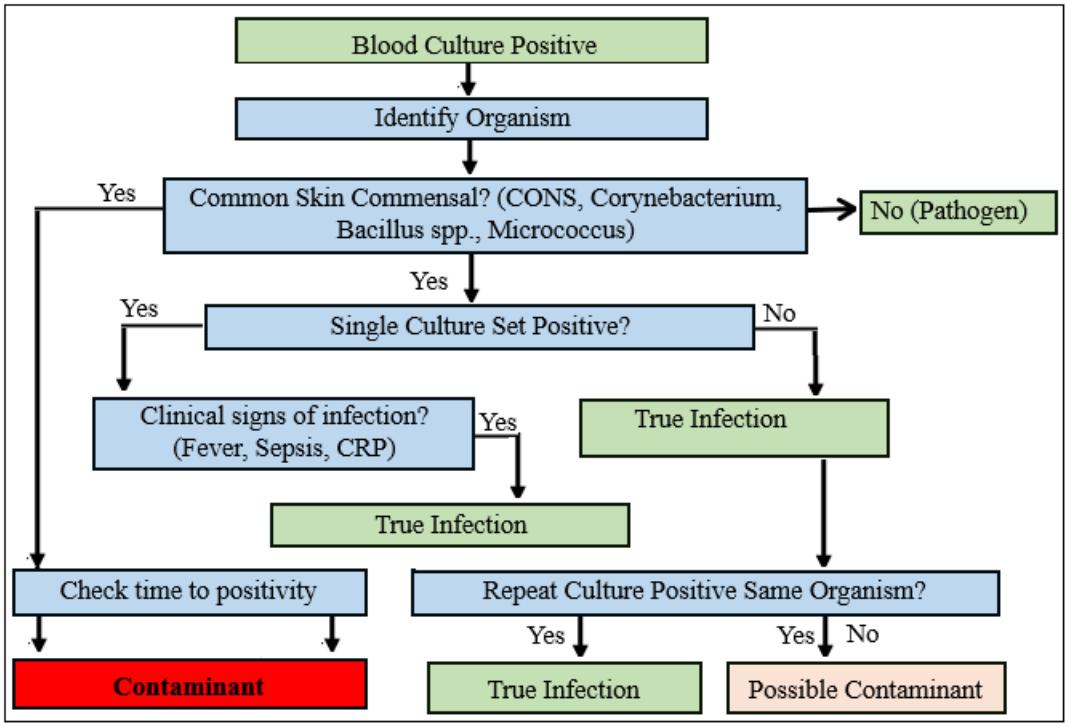

Figure 1: Classification of Blood Culture Contamination vs. True Infection. Accurate differentiation between Blood Culture Contamination vs. True Infection requires a multifactorial approach. Key considerations include the number of positive blood cultures sets, the type of organism isolated, time to positivity, and correlation with clinical findings such as patient commodities, presence of intravascular devices, and prior antibiotic exposure further interpretation (Weinstein et al., 2008)

Despite the availability of established guidelines, there is limited data on blood culture contamination rates and associated factors specifically in oncology settings in resource-limited tertiary care centers. Therefore, the present study aims to assess the rate of blood culture contamination and identify associated factors among cancer patients with suspected sepsis at Dr. B. Barooah Cancer Institute.

2. Methodology

Study Design and Setting: A retrospective observational study was conducted in the Department of Microbiology at Dr. B. Barooah Cancer Institute (BBCI), Guwahati, Assam. It is a regional cancer center dedicated to the prevention, diagnosis, treatment and research of cancer. The institute serves patients from Assam and other northeastern states of India and provides comprehensive oncology services, including medical, surgical, and radiation oncology. The Department of Microbiology plays an important role in supporting patient care through diagnostic microbiology services, including blood culture processing and antimicrobial susceptibility testing. The study was carried out to evaluate blood culture contamination rates and associated microbiological patterns among patients attending the institute during the study period from January 2025 to December 2025.

Study Population: All blood culture samples received in the microbiology laboratory during the study period were included in the study. Blood culture samples obtained from both inpatient and outpatient departments were analysed. A total of 2565 blood culture samples documented in the Electronic Medical Record (EMR) system were included for analysis.

Data Collection: Relevant demographic, clinical, microbiological, and laboratory data were collected retrospectively from laboratory records, blood culture

registers, microbiology reports, and the Electronic Medical Record (EMR) system. The collected variables included patient age, sex, hospital identification number, department, number of blood culture sets, isolated organisms, Gram staining characteristics and final interpretation of culture results.

Blood Culture Processing: Blood culture samples were collected under aseptic precautions by trained healthcare personnel according to institutional standard operating procedures. Skin antisepsis was performed prior to venipuncture using recommended disinfectants. Collected samples were transported promptly to the microbiology laboratory and processed using standard microbiological techniques. Positive blood culture bottles were subjected to Gram staining and subculture on appropriate culture media. Organisms were identified based on colony morphology, Gram staining characteristics, and standard biochemical identification methods followed in the microbiology laboratory.

Definition: Blood culture contamination was determined based on microbiological findings together with clinical correlation. Isolates commonly considered skin commensals, such as Micrococcus spp., diphtheroids, and Bacillus spp., and CoNS (Staphylococcus epidermidis, Staphylococcus hominis, Staphylococcus haemolyticus) isolated from a single blood culture bottle without supportive clinical evidence or repeat culture positivity, were considered contaminants. Organisms isolated repeatedly from multiple culture sets along with compatible clinical findings were categorized as true bloodstream infections. Burkholderia cepacia, Acinetobacter baumannii, Enterococcus faecium, Sphingomonas paucimobili were considered contaminants because they were isolated from a single culture bottle without supportive clinical evidence or repeat isolation.

Inclusion criteria: All blood culture samples received during the study period. The positive blood cultures with complete microbiological records. Samples from both pediatric and adult oncology patients.

Exclusion criteria: Incomplete laboratory or clinical records. Duplicate entries with insufficient microbiological confirmation. Fungal isolates included as true infections but excluded from contamination rate analysis.

Statistical Analysis: The study period was divided into four quarters to assess temporal trends in contamination rates. The collected data were entered into Microsoft Excel and analyzed with a chi-square test for independence to compare contamination proportions across quarters. Frequencies and percentages were calculated for positive cultures, contaminated cultures, and true bloodstream infections.

$$\textit{Blood Culture Contamination Rate}\ (\%) = \frac{\textit{Number of Contaminated Cultures}}{\textit{Total Number of Blood Cultures Collected}} x100$$

Ethical Consideration

This study was conducted as a retrospective analysis of anonymized laboratory and hospital records. Patient identifiers were removed prior to data extraction to protect confidentiality. The study protocol complied with institutional guidelines and applicable national regulations on the use of medical data for research. Because data were secondary and non-identifiable, informed consent was waived by the institutional ethics committee. No additional interventions or modifications to patient care were performed as part of this study.

3. Results

A total of 2565 blood culture samples were processed during the study period. Among 104 positive blood culture isolates analyzed during the study period, 56 isolates were identified as contaminants, while 48 were classified as true bloodstream infections. Quarter-wise analysis demonstrated variation in the number of contaminated isolates throughout the year. The highest contamination rate was observed during July-September, with 24 contaminated samples among 763 blood cultures processed (3.15%). This was followed by October-December with 12/649 (1.85%), April -June with 11/603 (1.82%), and January-March with 9/550 (1.64%) (Table 1).

The highest true infection rate was observed during April-June, with 18 true infections among 603 blood cultures processed (2.99%), followed by January-March with 14/550 (2.55%), July-September with 12/763 (1.57%), and October-December with 4/649 (0.62%). Figure 1 illustrates the distribution of positive blood cultures, showing 56 (53.8%) contaminants and 48 (46.2%) true bloodstream infections.

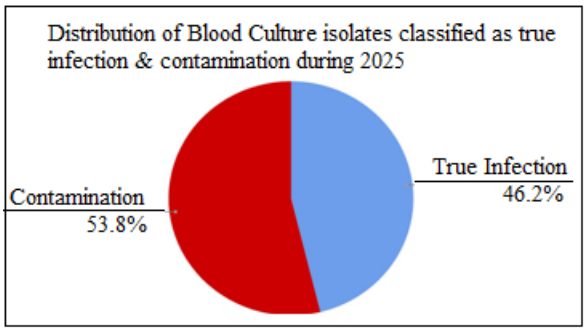

Figure 2: Distribution of blood culture isolates classified as true infection and contamination during 2025. The pie chart illustrates the proportion of positive blood culture isolates categorized as true bloodstream infections and contaminants among all positive blood cultures processed between January and December 2025. Classification was based on microbiological and clinical established in the study protocol.

Table 1: Blood culture contamination rates varied across the four quarters, with the highest contamination rate observed during July-September (3.15%) and the lowest during January-March (1.64%).

Quarter	Total	Contaminants n (%)	True infection n (%)
January-March	550	9 (1.64)	14 (2.55)
April-June	603	11 (1.82)	18 (2.99)
July-September	763	24 (3.15)	12 (1.57)
October-December	649	12 (1.85)	4 (0.62)
Total	2565	56 (2.18)	48 (1.87)

This finding highlights the continued need for strict adherence to aseptic venipuncture techniques, staff training, and regular monitoring of contamination rates. Reducing contamination would improve diagnostic accuracy and antimicrobial stewardship efforts within the institution.

The highest true bloodstream infection rate was observed during April–June (18/603; 2.99%), followed by January–March (14/550; 2.55%), July–September (12/763; 1.57%), and October–December (4/649; 0.62%). The decline in true bloodstream infections during the final quarter may reflect changes in patient demographics, disease prevalence, or healthcare utilization patterns during the study period.

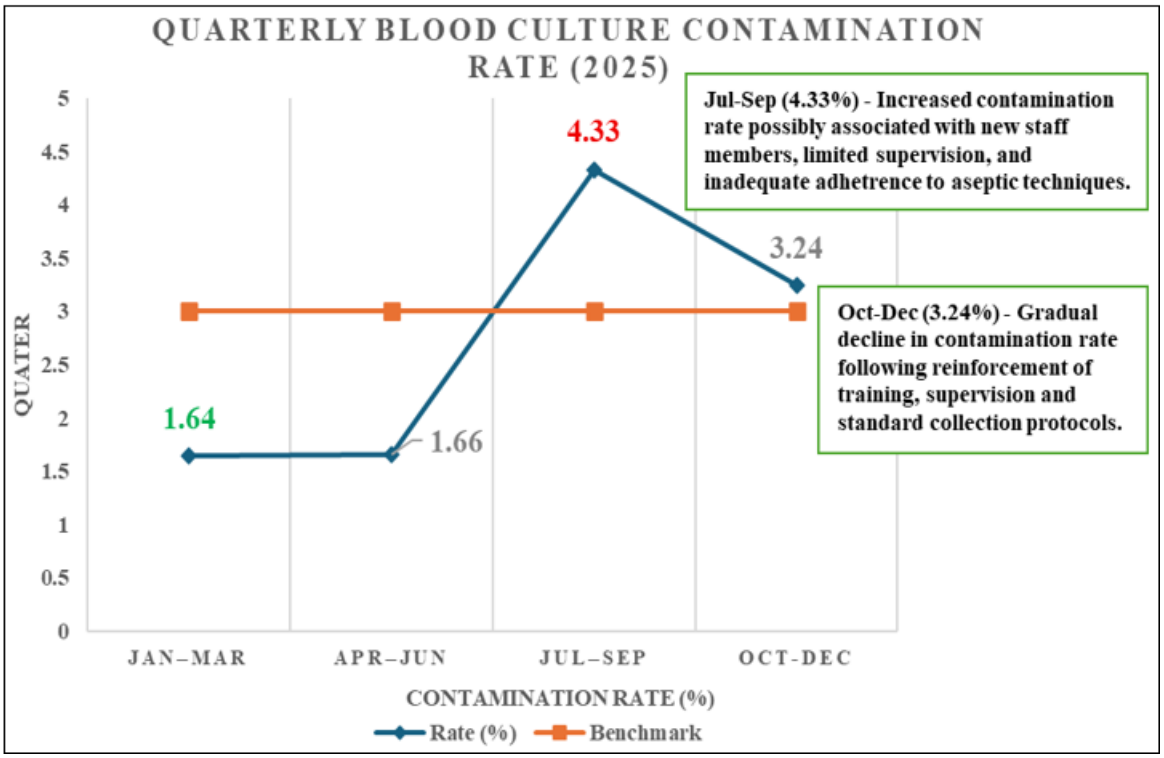

Figure 3: The percentage of blood culture contamination rates that changed over the course of a year, from January to December 2025, in a tertiary care oncology center. The horizontal dashed line shows the recommended benchmark of less than 3% for acceptable contamination rates

The predominance of Gram-positive skin commensals among contaminants further supports contamination during specimen collection as a major source of false-positive blood culture results. Micrococcus spp. and Staphylococcus hominis were the most frequently isolated contaminants, suggesting inadequate skin antisepsis or breaches in aseptic technique during venipuncture. These findings are consistent with previous studies identifying normal skin flora as the principal contributors to blood culture contamination.

Overall, the study demonstrates that although the institutional contamination rate remained within acceptable limits, contaminants constituted more than half of all positive blood culture isolates. Continuous quality improvement measures, including reinforcement of aseptic blood collection practices, regular staff training, and ongoing surveillance of contamination rates, are essential to further reduce contamination and enhance the clinical utility of blood culture testing.

Table 2: Frequency distribution of blood culture contaminants isolated during the study period

Contaminant Organism	No. of Isolates (n)	Percentage (%)
Micrococcus spp.	18	32.1
Staphylococcus hominis	11	19.6
Bacillus spp.	10	17.9
Diphtheroids	4	7.1
Staphylococcus haemolyticus	3	5.4
Sphingomonas paucimobilis	2	3.6
Burkholderia cepacia	1	1.8
Acinetobacter baumannii	1	1.8
Staphylococcus warneri	1	1.8
Rothia kristinae	1	1.8
Pseudomonas stutzeri	1	1.8
Kocuria rhizophila	1	1.8
Staphylococcus spp.	1	1.8
Enterococcus faecium	1	1.8
Total	56	100.0

Note: Burkholderia cepacia, Acinetobacter baumannii, Enterococcus faecium, Sphingomonas paucimobili were considered contaminants because they were isolated from a single culture bottle without supportive clinical evidence or repeat isolation.

Table 3: Distribution of Gram-positive and Gram-negative organisms among contaminated and true bloodstream infection isolates

Organism Category	Contaminants n (%)	True Infections n (%)
Gram-positive organisms	50 (89.3)	12 (25.0)
Gram-negative organisms	6 (10.7)	36 (75.0)
Total	56 (100)	48 (100)

Table 4: Distribution of contamination among pediatric and adult patients.

Age Group	Contaminants n (%)	True Infections n (%)
Pediatric patients (<18 years)	28 (50.0)	11 (22.9)
Adult patients (≥18 years)	28 (50.0)	37 (77.1)
Total	56 (100)	48 (100)

Statistical Analysis

Table 5: Chi-square Analysis of Blood Culture Contamination Rates Across the Four Quarters (2025)

Quarter	Contaminants	Non-Contaminants	Observed Frequency	Expected Frequency (Contaminants)	Expected Frequency (Non-Contaminants)
Jan–Mar	9	541	550	12.00	538.00
Apr–Jun	11	592	603	13.15	589.85
Jul–Sep	24	739	763	16.65	746.35
Oct–Dec	12	637	649	14.16	634.84
Total	56	2511	2565	-	-

Note: Non-contaminants include both true infections and negative culture bottles to represent the total background pool of cultures handled.

Table 5. Chi-square analysis of blood culture contamination rates across four consecutive quarters (2025) at Dr. B. Barooah Cancer Institute. The overall blood culture contamination rate was 2.18% (56/2565). Quarterly rates were 1.64% (9/550) in January–March, 1.82% (11/603) in April–June, 3.15% (24/763) in July–September, and 1.85% (12/649) in October–December. The goodness-of-fit test showed no statistically significant difference across quarters (χ^2= 4.68, df = 3, p = 0.197), the Chi-square test confirmed that this temporal variation was not statistically significant. This indicates that quarterly fluctuations fall within expected statistical boundaries and cannot be definitively tied to systemic collection failures or seasonal operational shifts.

Table 6: Summary of Chi-square test metrics for Quarterly contamination variation.

χ^2 Statistic	Degrees of Freedom (d*f*)	Probability Value (p-value)	Significance Threshold	Statistical Significance
4.6756	3	0.197	<0.05	Not significant (p>0.05)

Conversely, Table 6 Chi-square test metrics for quarterly contamination variation. (χ^2 = 4.68, df = 3, p = 0.197). Significance: not significant (p > 0.05).

Table 7: Chi-square Analysis of Age Group (Pediatric vs. Adult) vs. Blood Culture Classification. Chi-square Test Metrics: $\chi^2(1) = 7.75$; p = 0.0054. Pediatric positive cultures showed a higher proportion of contaminants (71.8%) compared with adults (28.2%), indicating a significant age-related difference in contamination risk.

Patient Age Group	Contaminants	True Infection	Observed Frequency (Total)	Expected Frequency (Contaminants)	Expected Frequency (True Infections)
Pediatric (<18 years)	28	11	39	21.00	18.00
Adult (≥18 years)	28	37	65	35.00	30.00
Total	56	48	104	-	-

Table 8: Summary of Chi-square test metrics for Demographic age group (Pediatric vs Adult ward) vs Blood culture classification. $\chi^2(1) = 7.75$; p = 0.0054. Significant at p < 0.05.

χ^2 Statistic	Degrees of Freedom (d*f*)	Probability Value (p-value)	Significance Threshold	Statistical Significance
7.75	1	0.0054	<0.05	Significant (p<0.05)

4. Discussion

This retrospective study evaluated blood culture contamination in a tertiary care cancer setting, where contamination remains a persistent clinical and microbiological concern. The overall blood culture contamination rate observed in the present study was 2.18%, which remained within the recommended benchmark value of <3% proposed by international guidelines (Hall & Lyman, 2006). Quarterly analysis showed contamination rates of 1.64% during January–March, 1.82% during April–June, a peak of 3.15% during July–September, and a decline to 1.85% during October–December. The temporary increase observed during July–September may be attributed to factors such as newly inducted healthcare personnel, inadequate adherence to aseptic blood collection techniques, increased patient workload, or seasonal operational challenges. Despite these fluctuations, the contamination rates remained relatively low throughout the study period.

Comparable findings have been reported in several Indian and International hospital-based studies evaluating blood culture contamination rates. The contamination rate observed in the present study was lower than several older tertiary-care studies reporting contamination rates exceeding 4-6%, suggesting relatively improved adherence to aseptic blood collection practices and infection control measures in the study setting (Bekeris et al., 2005). A study by Arora et al., (2010) reported contamination rates ranging between

2% and 4% in tertiary care healthcare settings, emphasizing the importance of proper skin antisepsis and aseptic precautions during blood collection.

The contamination rate observed in the present study therefore falls within the range reported in previous Indian studies. Similarly, Bekeris et al., (2005) demonstrated that institutions with strict adherence to standardized blood culture collection protocols consistently maintained contamination rates below 3%, supporting the importance of continuous quality monitoring. The present study also demonstrated notable quarterly variation in contamination rates, with the highest contamination rate observed during July-September (3.15%). Similar increases associated with inadequate staff training, increased workload, and procedural non-compliance have been described by Gander et al. (2009) and Self et al. (2013). These studies reported that newly recruited personnel, lack of supervision, and inconsistent adherence to aseptic techniques significantly contribute to elevated contamination rates. Unlike studies reporting persistently high contamination rates throughout the year, the present study demonstrated quarter specific spikes followed by gradual reduction, suggesting that institutional corrective measures and staff familiarization may have positively influenced subsequent contamination rates.

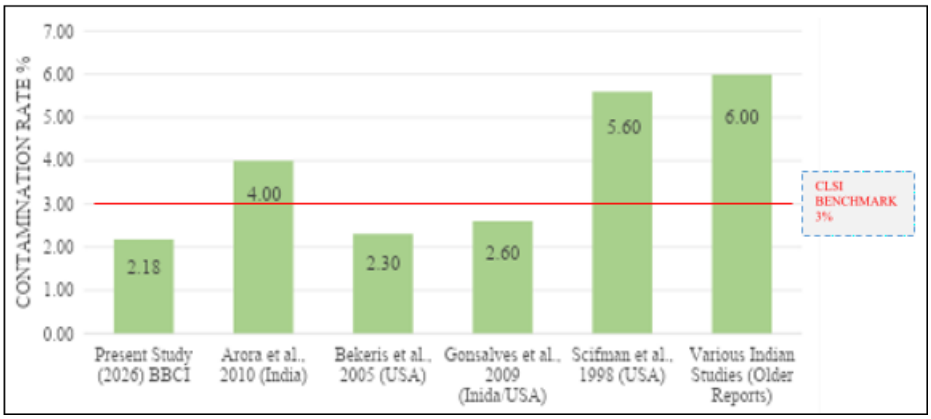

Figure 4: Comparative Blood Culture Contamination Rate (%): Present study vs previous studies.

Most contaminants isolated in the present study were Gram-positive skin commensals, including Staphylococcus hominis, Staphylococcus epidermidis, Micrococcus spp., Bacillus spp., and diphtheroids. Similar observations were reported by Gonsalves et al. (2009), who identified coagulase-negative staphylococci and other skin flora as the predominant blood culture contaminants. These findings strongly suggest that contamination primarily occurs during sample collection due to inadequate skin disinfection or improper venipuncture technique. The predominance of skin commensals among contaminants further supports contamination during venipuncture rather than true bloodstream infection. In contrast, the predominant true bloodstream pathogens identified in the present study were Gram-negative bacilli, particularly Klebsiella pneumoniae, E. coli, and Pseudomonas aeruginosa (Weinstein et al. 2008). Similar findings have been reported in oncology and tertiary care settings where multidrug-resistant Gram-negative organisms remain major causes of bloodstream infections among immunocompromised patients (Freifeld et al. 2011). The predominance of Gram-negative pathogens in the present study is clinically significant because such organisms are frequently associated with hospital-acquired infections, prolonged hospitalization, antimicrobial resistance, poor clinical outcomes in cancer patients. Establishing objective clinical thresholds to distinguish true bacteremia from specimen contamination is vital for accurate quality control, particularly in immunocompromised cancer patients who frequently lack classic leukocytic responses. In their extensive evaluation of blood culture kinetics, Berksoy et al. (2023) demonstrated a stark, statistically significant divergence in systemic inflammatory responses between true infections and false positives, noting a median C-reactive protein (CRP) level of 38.5 mg/L in patients with true bacteremia compared to just 6.3 mg/L in those with contaminated cultures ($p < 0.001$). Applying these quantitative parameters as a quality control baseline allows clinicians to cross-reference the isolation of ubiquitous skin flora with the patient's actual systemic inflammatory state. In oncological cohorts- where mucosal barriers are easily breached, and skin commensals can masquerade as high-risk pathogens- this vast divergence in CRP values serves as an invaluable diagnostic gatekeeper. By implementing a high-sensitivity CRP filter, clinical teams can safely identify isolated contamination events when inflammatory markers remain minimal, preventing the misclassification of false positives as active sepsis and drastically reducing the unnecessary administration of toxic, broad-spectrum antimicrobials. The implementation of C-reactive protein (CRP) as an objective quality control filter to elevate Blood culture contamination is strongly supported by recent regional data. In a tertiary care hospital study evaluating early-versus late-onset sepsis, Karanjit et al. (2026) demonstrated that baseline CRP testing yielded a sensitivity of 97.2%, a specificity of 94.0%, and an overall diagnostic accuracy of 95.0%. Crucially, the authors noted that these high concordance statistical parameters are highly effective in helping clinicians rule out true systemic infection and identify potential contamination of CoNS in vulnerable groups.

The present findings further support previous reports indicating that implementation of continuous staff education, competency-based training, dedicated phlebotomy teams, routine surveillance, and periodic audits significantly reduce blood culture contamination rates (Snyder et al., 2012). The gradual reduction in contamination rate observed during October-December in

the present study may therefore reflect improvement in staff familiarity with institutional blood culture collection protocols, reinforcement of infection control practices, increased supervision, and ongoing practical exposure among healthcare workers.

Prevention strategies aim to minimize contamination without compromising pathogen recovery. Core measures include:

- Strict aseptic technique: Proper hand hygiene, use of sterile gloves, and full adherence to collection protocols.
- Effective skin antisepsis: Using alcohol-based chlorhexidine (or tincture of iodine) for ≥30 seconds contact; povidone is discouraged because it requires longer drying.
- Optimal collection practice: Peripheral venipuncture is preferred over drawing through IV lines; if lines must be used, proximal drawing and cleansing of the hub are critical (Doern et al., 2020).
- Trained phlebotomy teams: Dedicated collectors (vs. random nursing staff) consistently achieve lower contamination rates (Weinstein et al. 2008).
- Specimen management: Adequate blood volume (20-30mL per set) improves yield, and techniques like first-draw diversion devices (which discard the initial 1-2 mL) can trap skin organisms before entering cultures bottles (Callado et al., 2023).
- Feedback and education: Ongoing monitoring of contamination rates and periodic staff training help maintain low rates.
- Together, these practices have driven many hospitals to achieve contamination rates near 1%, whereas centers ignoring best practices may see rates ≥4–6% (Chandrashekar et al., 2021). Maintaining low contamination is crucial: it ensures that positive cultures reliably indicate real infections, thereby protecting patients from unnecessary treatments and preserving healthcare resources (Childress et al., 2026).

5. Conclusion

Blood culture contamination remains an important concern in a tertiary care oncology settings. The overall blood culture contamination rate observed in the study was 2.18% (56/2565), which was within the internationally recommended benchmark value of <3% (Hall & Lyman, 2006). Quarterly analysis showed contamination rates below the benchmark during January-June, a peak during July-September (3.15%), and a decline during October-December (1.85%). The contamination rate % increase may be attributed to factors such as newly inducted healthcare personnel, inadequate adherence to aseptic techniques, and increased workload. Although contamination rates varied across quarters, statistical analysis did not demonstrate a meaningful associated between quarterly distribution and contamination rates. The findings emphasize the importance of strict aseptic blood collection practices, regular staff training, continuous surveillance, and periodic audits to maintain contamination rates below recommended levels and improve patient care outcomes (Fabre et al., 2020).

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References

[1] Lamy, B., Dargere, S., Arendrup, M. C., Parienti, J. J., & Tattevin, P. (2016). How to optimize the use of blood cultures for the diagnosis of bloodstream infections? Clinical Microbiology and Infection, 22(7), S33-S41. https://doi.org/10.1016/j.cmi.2015.09.030

[2] Callado, G. Y., Lin, V., Thottacherry, E., Aporta Marins, T., Martino, M.D.V., Salinas, J. L., & Marra, A. R. (2023). Diagnostic stewardship: A systematic review and meta-analysis of blood collection diversion devices used to reduce blood culture contamination and improve the accuracy of diagnosis in clinical settings. Open Forum Infectious Diseases, 10(9), ofad433. https://doi.org/10.1093/ofid/ofad433

[3] Centers for Disease Control and Prevention. (2024). Blood culture contamination: An overview for infection control and antibiotic stewardship programs working with the clinical laborator [PDF]. https://www.cdc.gov/lab-quality/media/pdfs/2024/08/fs-bloodculture -508.pdf

[4] Centers for Disease Control and Prevention. (2026). Prevent adult blood culture contamination.https://www.cdc.gov/lab-quality/php/prevent-adult-blood-culture-contamination/index.html

[5] Childress, K., Hartmann, M., Kwan, M. L., & Cooch, P. (2026). Blood culture contamination and subsequent unnecessary health care utilization in pediatrics. Hospital Pediatrics, 16(4). https://doi.org/10.1542/hpeds.2025-008960

[6] Chandrashekar, M. A., Narayanaswamy, V., Iyer, C. R., Vijayashankara, C. N., Chandran,G. P., Vishnuvardhan, O., & Sahithi, P. (2021). Blood cultures from a neonatal intensive care unit of a rural teaching hospital: A quasi-experimental study. Indian Journal of Neonatal Medicine & Research, 9(3), PO06-PO11. https://www.doi.org/10.7860/JCDR/2021/49449/2303

[7] Doern, C. D., Carroll, K.C., Diekema, D. J., Garey, K. W., Rupp, M. E., Weinstein, M. P., & Sexton, D. J. (2020). A comprehensive update on the problem of blood culture contamination and a discussion of methods for addressing the problem. Clinical Microbiology Reviews, 33(1), e00009-19. https://doi.org/10.1128/CMR.00009-19

[8] Hall, K. K., & Lyman, J. A. (2006). Updated review of blood culture contamination. Clinical Microbiology

Reviews, 19(4), 788-802. https://doi.org1128/CMR.00027-06

[9] Fabre V., Sharara, S.L., Salinas, A. B., Carroll, K. C., Desai, S., Cosgrove, S. E., & Tamma, P. D. (2020). Does this blood culture represent a true infection? A systematic review of blood culture contamination. Clinical Infection Diseases, 70(3), e13-e21. https://doi.org/10.1093/cid/ciz191

[10] Snyder SR, Favoretto AM, Baetz RA, et al. (2012) Effectiveness of practices to reduce blood culture contamination: a Laboratory Medicine Best Practices systematic review and meta-analysis. Clinical Biochemistry, 45(13-14), 999-1011.

[11] Self WH, Speroff T, Grijalva CG, et al. Reducing blood culture contamination in the emergency department: An interrupted time series quality improvement study. Academic Emergency Medicine. 2013;20(1):89-97.

[12] Schinkel, M., Boerman, A., Carroll, K., Cosgrove, S. E., Hsu, Y.-J., Klein, E., Nanayakkara, P., Schade, R., Wiersinga, W.J., & Fabre, V. (2024). Impact of blood culture contamination on antibiotic use, resource utilization, and clinical outcomes: A retrospective cohort study in Dutch and US hospitals. Open Forum Infectious Diseases, 11(2), ofad644. https://doi.org/10.1093/ofid/ofad644

[13] Weinstein, M.P. (2008). Contaminated or Not? Guidelines for Interpretation of Positive Blood Cultures. Patient Safety Network (AHRQ).

[14] Arora U, Devi P, Chadha A, Malhotra S. Blood culture contamination in a tertiary care hospital: a clinical and microbiological study. Indian Journal of Medical Microbiology. 2010;28(2):123–125.

[15] Bekeris LG, Tworek JA, Walsh MK, Valenstein PN. Trends in blood culture contamination: A College of American Pathologists Q-Probes study of 356 institutions. Archives of Pathology & Laboratory Medicine. 2005;129(10):1222-1225.

[16] Gonsalves WI, Cornish N, Moore M, et al. Effects of volume and site of blood draw on blood culture results. Journal of Clinical Microbiology. 2009;47(11):3482–3485.

[17] Scifman, R. B., Strand, C.L., Meier, F. A, & Howanitz, P. J. (1998). Blood culture contamination: A college of American Pathologists Q-probes study. Archives of Pathology & laboratory Medicine, 122(3), 216-221.

[18] Berksoy, E., Karadağ Öncel, E., Bardak, Ş., Demir, Ş., Bozkaya Yılmaz, S., Demir, G., Çiçek, A., Yılmaz, N., Gökalp, G., Anıl, M., & Yılmaz Çiftdoğan, D. (2023). True Bacteremia or Contamination? Predictive Factors for Contamination in Blood Cultures Obtained in the Pediatric Emergency Room. Eurasian Journal of Emergency Medicine, 22(1), 7-13. https://doi.org/10.4274/eajem.galenos.2022.90582

[19] Karanjit, R., Sharma, S., Mishra, S.K., Kattel, H.P., Suwal, S., Baidya, S., makaju, S., & Twanabasu, S. (2026). Bacteriological profile of early versus late-onset neonatal sepsis at tertiary care hospital in Nepal. BMC Infectious Diseaases, 26(1), Article12645. https://doi.org/10.1186/s12879-026-12645-8

[20] Fabre V., Sharara, S.L., Salinas, A. B., Carroll, K. C., Desai, S., Cosgrove, S. E., & Tamma, P. D. (2020). Does this blood culture represent a true infection? A systematic review of blood culture contamination. Clinical Infection Diseases,