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Project #24: Reducing Blood Culture Contamination Rates in the Emergency Department

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Background

Sepsis and Septic Shock is one of the leading causes of death in the United States. Blood cultures are an important diagnostic tool for identifying pathogens responsible for infection. Blood culture contamination is a significant problem which can result in unnecessary antibiotic exposure, extended length of stay, and increased hospital expense. Recent studies associate 1 false positive blood culture with \$4,162 avoidable cost and 3.7 extended hospital days¹. A national benchmark recommends blood culture contamination rates should not exceed 3%.

AIM

Problem Statement: HFH Emergency Department (ED) blood culture contamination rate averaged 4.1% from October 2021 – October 2022.

AIM: Implement a quality improvement project at HFH ED to reduce blood culture contamination rates below the national benchmark of 3% within 6 months.

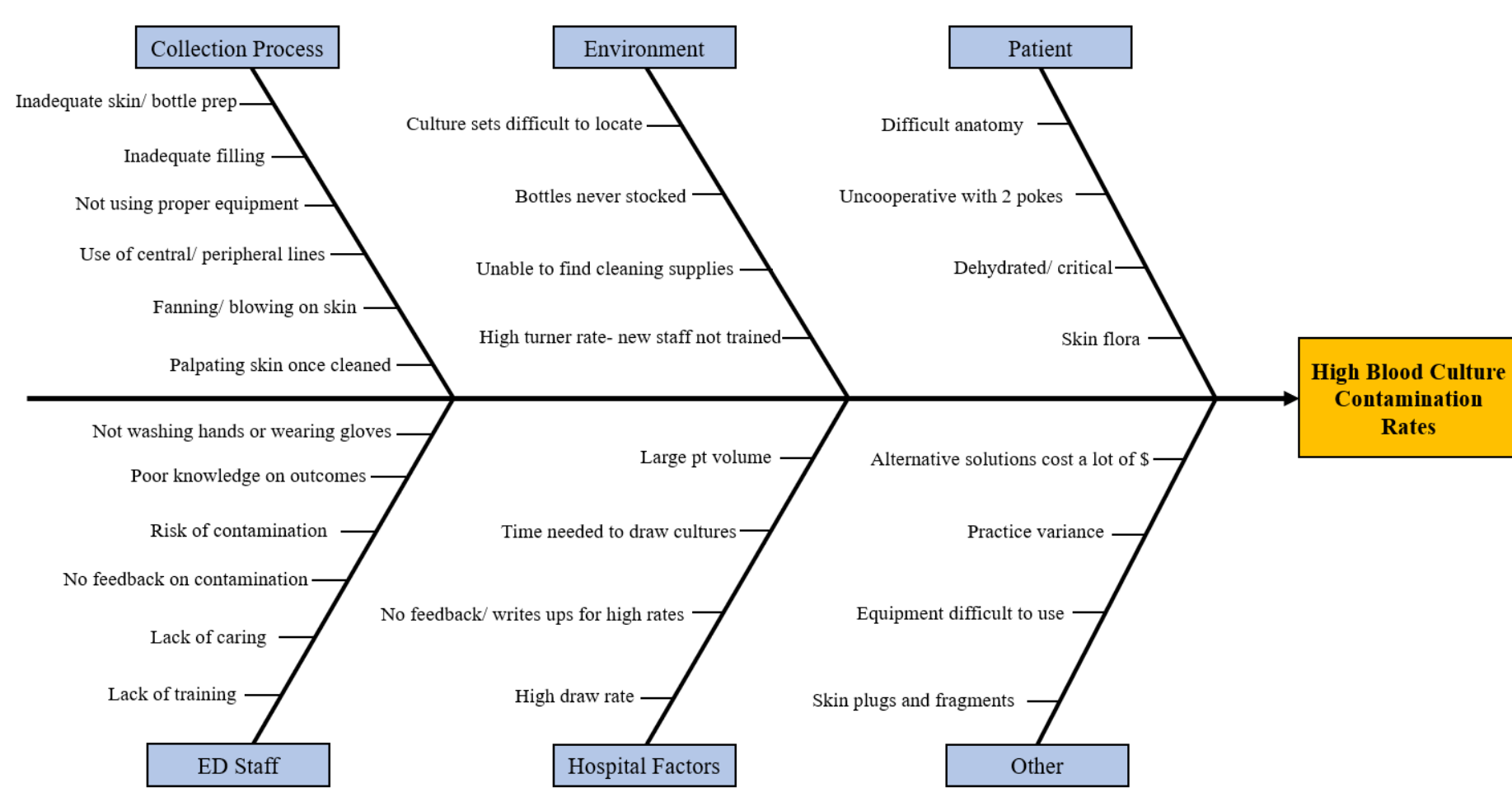
This will improve patient safety by reducing the misdiagnosis of patients, decreasing unnecessary antibiotic treatment and decreasing hospital stays. With the reductions, it will also improve healthcare costs.

Teamwork

The collaborative team consisted of:

- Leadership:
 - HFH ED Director: Rebecca Lenz MBA, BSN, RN
 - HFH ED Clinical Nurse Specialist: Kelly Ashcraft MSN, RN, AGCNS-BC
- Subject Matter Experts:
 - Business Director, Magnolia Medical Technologies: Mark Maki
 - Vice President of Sales, Magnolia Medical Technologies: Carrie Miller
- Local Team:
 - HFH ED Educator: Marlene Green BScN, RN
 - HFH ED Staff: Matthew Fabian BSN RN, Georgia Scholl BScN RN, Donna Bondy BScN RN, Adam McGruther ADN RN, Tom McMahon BSN RN & Mary Luckhardt BSN RN
- Other Operating Unit:
 - Associate Director Microbiology: Robert J. Tibbetts, Ph.D. D(ABMM), F(CCM), FIDSA
- Patient:
 - HFH ED patients requiring blood cultures as part of treatment plan

Cycle of Learning (PDCA)



Plan:

- August 2022 – Blood culture diversion device, Steripath, identified as an evidenced based intervention to decrease blood culture contamination
- Key ED stakeholders met with vendor to review evidence and discuss trial
- September 2022- Developed new workflow that included Steripath

Do:

- October 2022 – 100% of ED registered nurses (RNs) received didactic education
- Steripath ordered & stocked
- November 1, 2022: Go-Live date (3month trial)

Check:

- Monthly Review: Blood culture contamination results
- Rates consistently remained below the 3% national benchmark post implementation
- Each blood culture contamination reviewed to identify potential challenges
- RNs responsible for contaminated specimens were tracked & reeducated
- Results emailed, huddled & posted on Quality Board monthly for staff to review.

May Blood Culture Contamination Rate was **1.3%**!
This is a new record for us & our department was recognized Gwen Gnam this morning.
Keep up the Amazing work – You truly are making a difference.



Figure1: email sent to staff



Figure 2: Blood Culture Quality Board

Act:

- Feb 2023: ED administration committed to using Steripath device as a standard of care in the ED
- Nursing feedback using the device was positive
- Oct 2023: Version #2 Micro-Steripath implemented, with education provided to 100% of staff
- New workflow included in new hire orientation



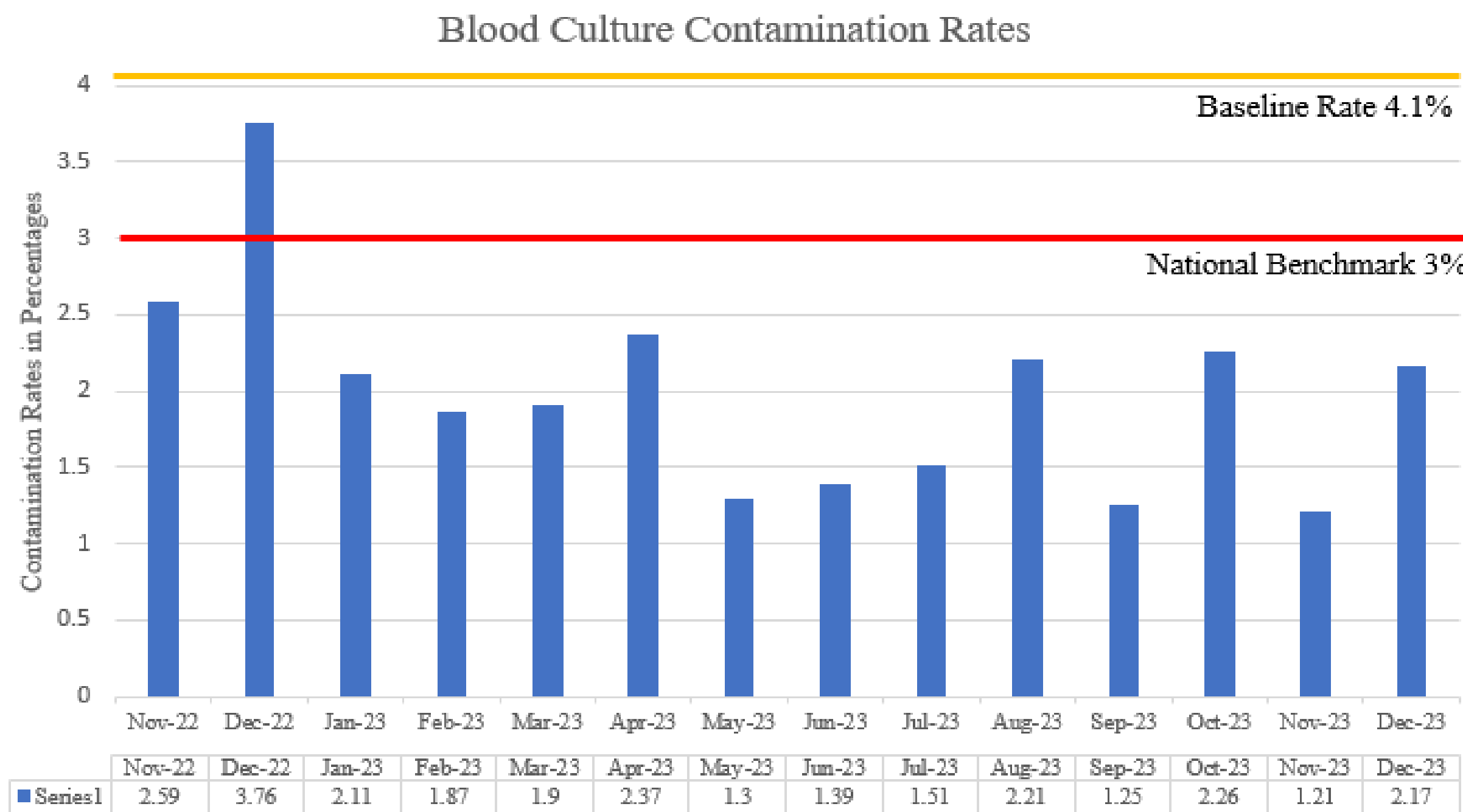
Version #1: Steripath



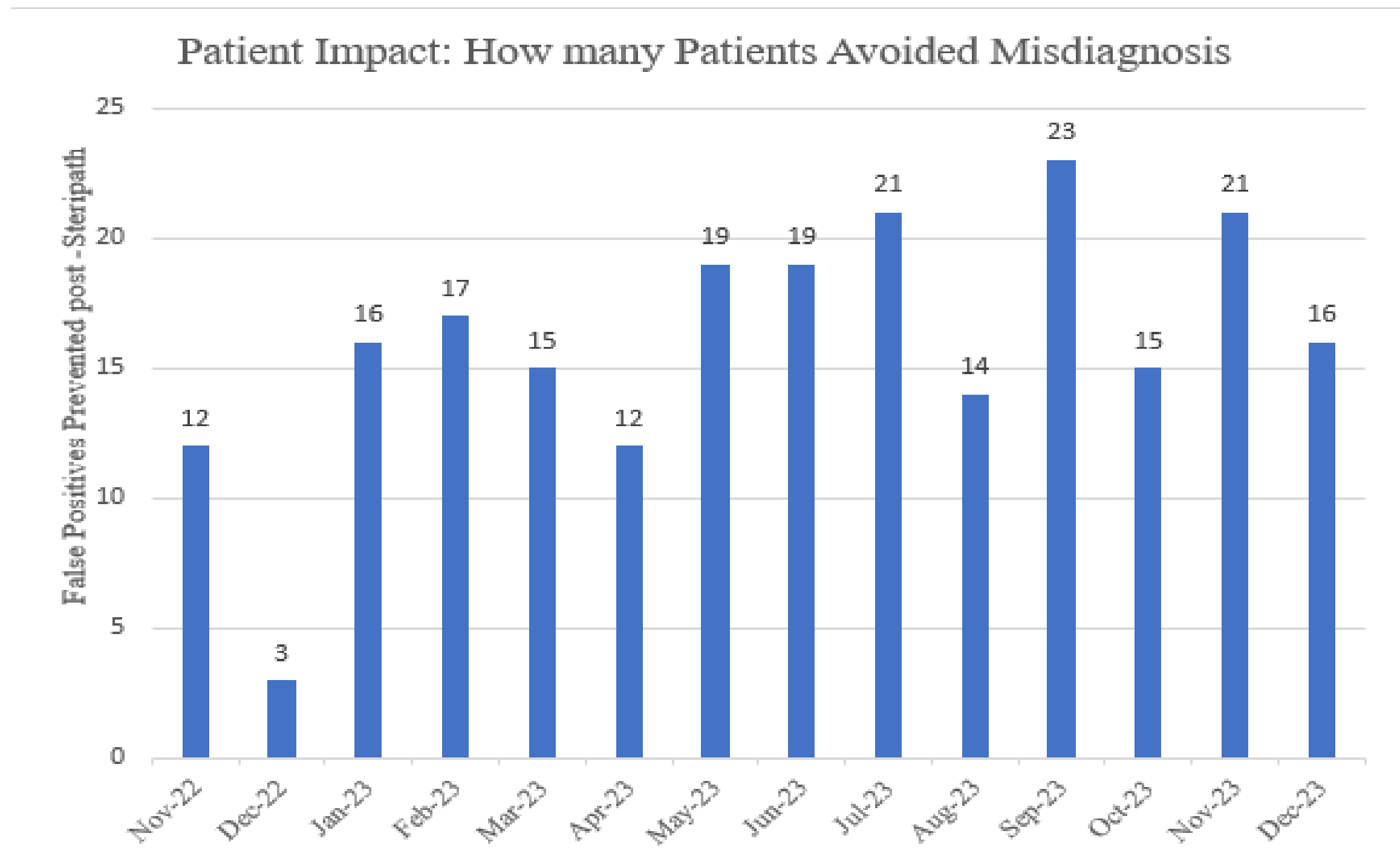
Version #2: Micro-Steripath

Results

| Month | Total Draws | Total contaminants | Rate | Projected False Positives at baseline 4.1 BCx Rate | False Positives Avoided | Cost Savings False Positives Avoided X Cost /False Positive \$4162 |
|----------------|-------------|--------------------|-------|--|-------------------------|--|
| November 2022 | 771 | 20 | 2.59% | 32 | 12 | \$49,994 |
| December 2022 | 851 | 32 | 3.76% | 35 | 3 | \$12,486 |
| January 2023 | 804 | 17 | 2.11% | 33 | 16 | \$66,592 |
| February 2023 | 747 | 14 | 1.87% | 31 | 17 | \$70,754 |
| March 2023 | 686 | 13 | 1.90% | 28 | 15 | \$62,430 |
| April 2023 | 718 | 17 | 2.37% | 29 | 12 | \$49,944 |
| May 2023 | 692 | 9 | 1.30% | 28 | 19 | \$79,078 |
| June 2023 | 717 | 10 | 1.39% | 29 | 19 | \$79,078 |
| July 2023 | 795 | 12 | 1.51% | 33 | 21 | \$87,402 |
| August 2023 | 723 | 16 | 2.21% | 30 | 14 | \$58,268 |
| September 2023 | 797 | 10 | 1.25% | 33 | 23 | \$95,726 |
| October 2023 | 797 | 18 | 2.26% | 33 | 15 | \$62,430 |
| November 2023 | 741 | 9 | 1.21% | 30 | 21 | \$87,402 |
| December 2023 | 828 | 18 | 2.17% | 34 | 16 | \$66,592 |
| | | | | | | |
| Total | 10,667 | 215 | 2.02% | 438 | 223 | \$928,126 |



Decreased from an average of 4.10% to an average of 2.02%
Reduction Rate: 50%
Below national benchmark of 3% by 6 months



Pre-Implementation: Projected # of false positives= 438
Post-Implementation: Total # of false positives avoided= 223
Reduction of pts misdiagnosed: 51%

Financial Impact:

| | |
|-------------------------------|-----------|
| Total False positives Avoided | 223 |
| Total cost / 1 false positive | \$4162 |
| Total Cost Savings | \$928,126 |

Spread

The results were shared with:

- ED staff and Leadership through monthly emails & Quality Board
- HFH Nurse Executive Council: Leadership of HFH
- CLABSI Council: Hospital Council- Reviewed results & are developing a plan to initiate workflow to the rest of HFH
- HFHS ED Education Council: Systems council (HFHS ED's)- West Bloomfield ED started trail in May 2023 & Wyandotte ED will start in the next 3 months

Reference:

1. Centers for Disease Control and Prevention. (2020). *Blood Culture Contamination: An Overview for Infection Control and Antibiotic stewardship Program Working with the Clinical Laboratory*. Retrieved from: Blood Culture Contamination: An Overview for Infection Control and Antibiotic Stewardship Programs Working with the Clinical Laboratory (cdc.gov).