Reducing blood culture contamination by an educational intervention

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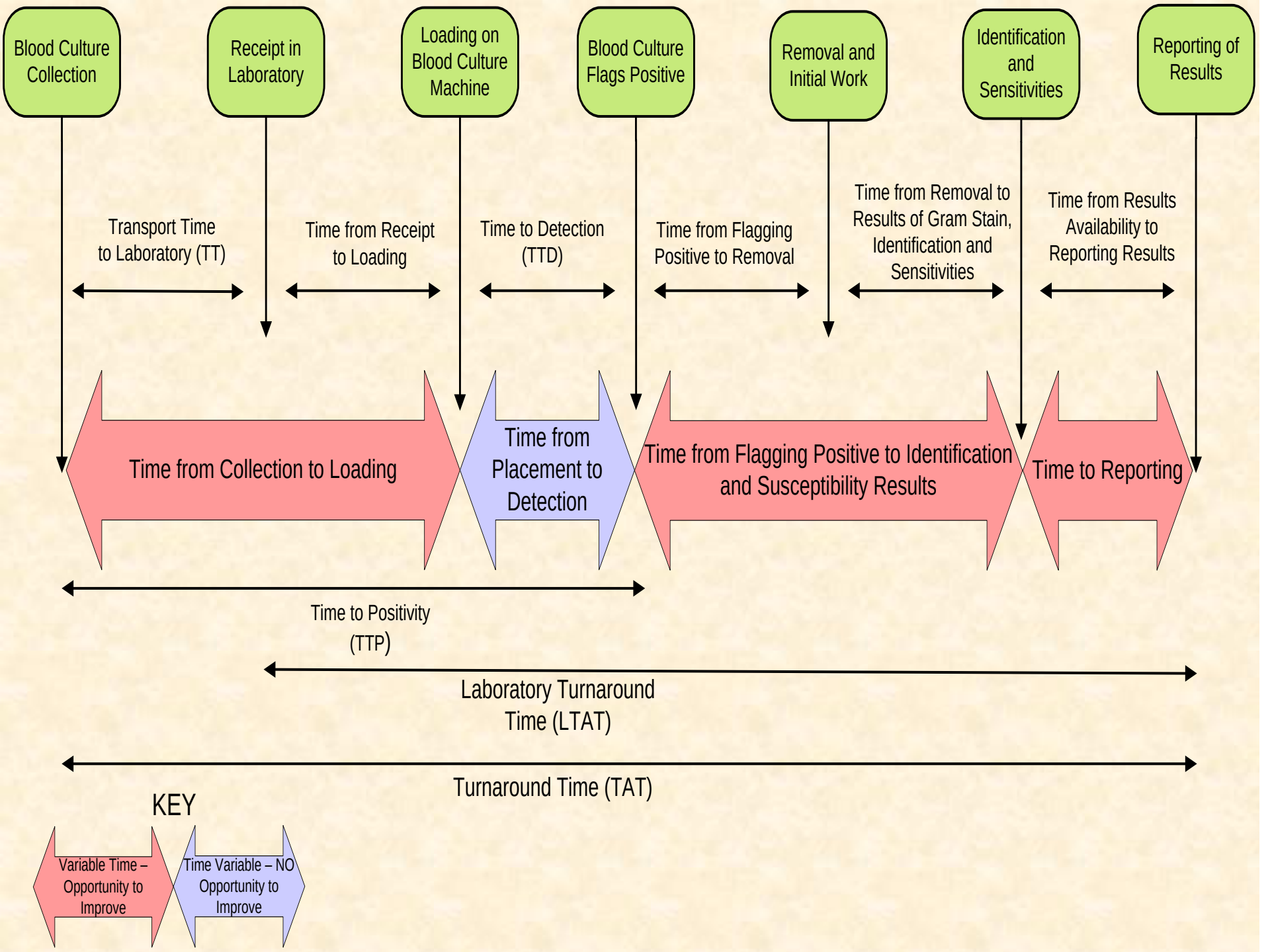
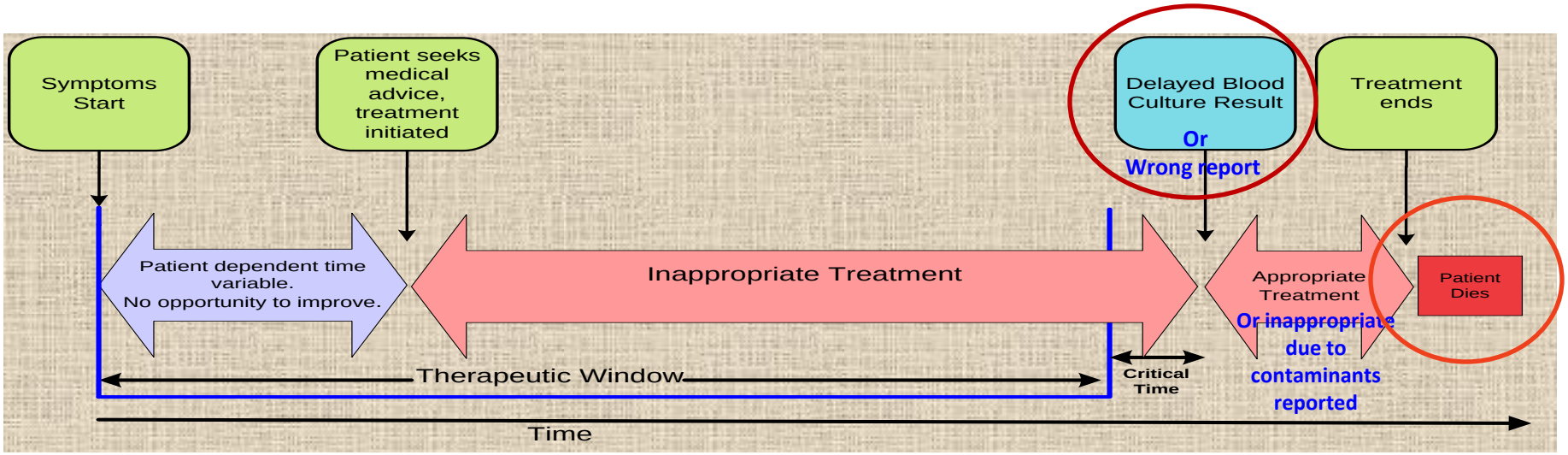
INTRODUCTION.

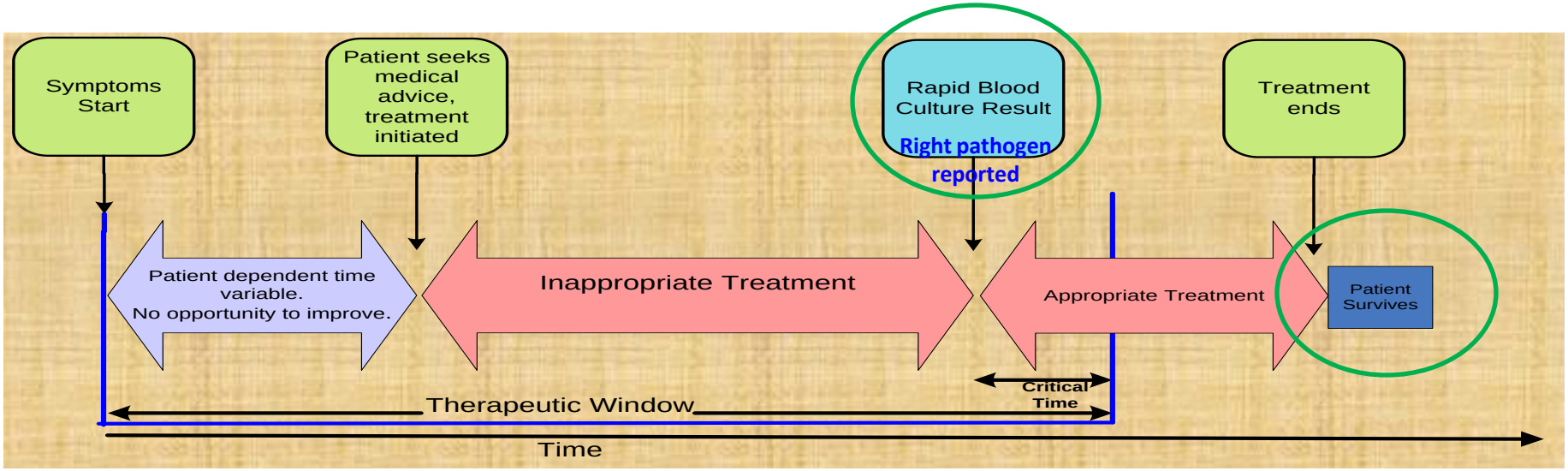
- **Blood culture represents a critical tool and a positive blood culture prior to antibiotic initiation can suggest a definitive diagnosis.**

- **It is the "*standard of care*" in sepsis management .**

- **False-positive results often lead to diagnostic uncertainty in clinical management and are associated with increased health care costs due to unnecessary treatment and testing .**


Blood Culture Collection
Receipt in Laboratory
Loading on Blood Culture Machine
Blood Culture Flags Positive
Removal and Initial Work
Identification and Sensitivities
Reporting of Results
Transport Time to Laboratory (TT)
Time from Receipt to Loading
Time to Detection (TTD)
Time from Flagging Positive to Removal
Time from Removal to Results of Gram Stain, Identification and Sensitivities
Time from Results Availability to Reporting Results
Time from Collection to Loading
Time from Placement to Detection
Time from Flagging Positive to Identification and Susceptibility Results
Time to Reporting
Time to Positivity (TTP)
Laboratory Turnaround Time (LTAT)
Turnaround Time (TAT)
KEY
Variable Time – Opportunity to Improve
Time Variable – NO Opportunity to Improve


Symptoms Start
Patient seeks medical advice, treatment initiated
Delayed Blood Culture Result
Or
Wrong report
Treatment ends
Patient dies
Patient dependent time variable.
No opportunity to improve.
Inappropriate Treatment
Appropriate Treatment
Or inappropriate due to contaminants reported
Therapeutic Window
Critical Time
Time


Symptoms Start
Patient seeks medical advice, treatment initiated
Rapid Blood Culture Result
Right pathogen reported
Treatment ends
Patient dependent time variable.
No opportunity to improve.
Inappropriate Treatment
Appropriate Treatment
Patient Survives
Critical Time
Therapeutic Window
Time

Objectives

1. To identify the **rate of contamination** of blood culture for each clinical area.

2. To know the **type of microorganism** commonly isolated as contaminants.

3. To review the same **(1 & 2)** post educational intervention .

Methodology

This Prospective – Observational **Outcome audit** was conducted after obtaining IHEC approval.

Methodology

1. **Standard of care -** Blood culture contamination rate should be **≤ 3%** of all blood cultures done.

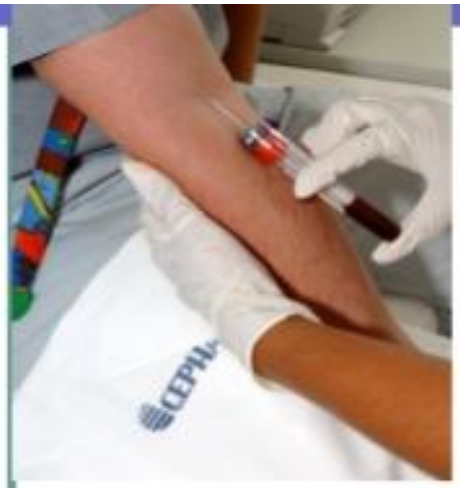
2. **Prepare an audit plan** - Data collection tool

3. **Audit**: Three Months. (August to October-2015)- **2582** blood cultures studied

4. **Educational Intervention** – (April – 2016) – *onsite orientation program* for nurses & phlebotomists on proper sample collection for blood culture .

5. **Re- audit / Post Audit** - Three months (May to July-2016) – **3818** blood cultures studied

Methodology

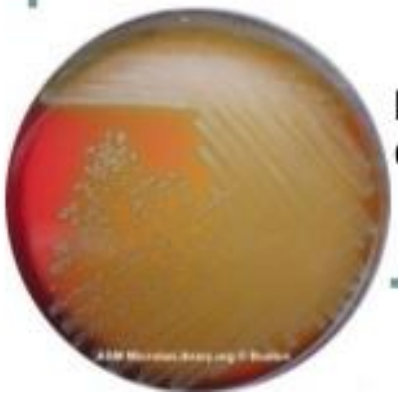


(1)

5 – 10 ml blood

(2)

Added to
50 – 100 ml
fluid medium
(broth)



(4)
Bacterial
Growth

(3)

Subculture on
Solid medium

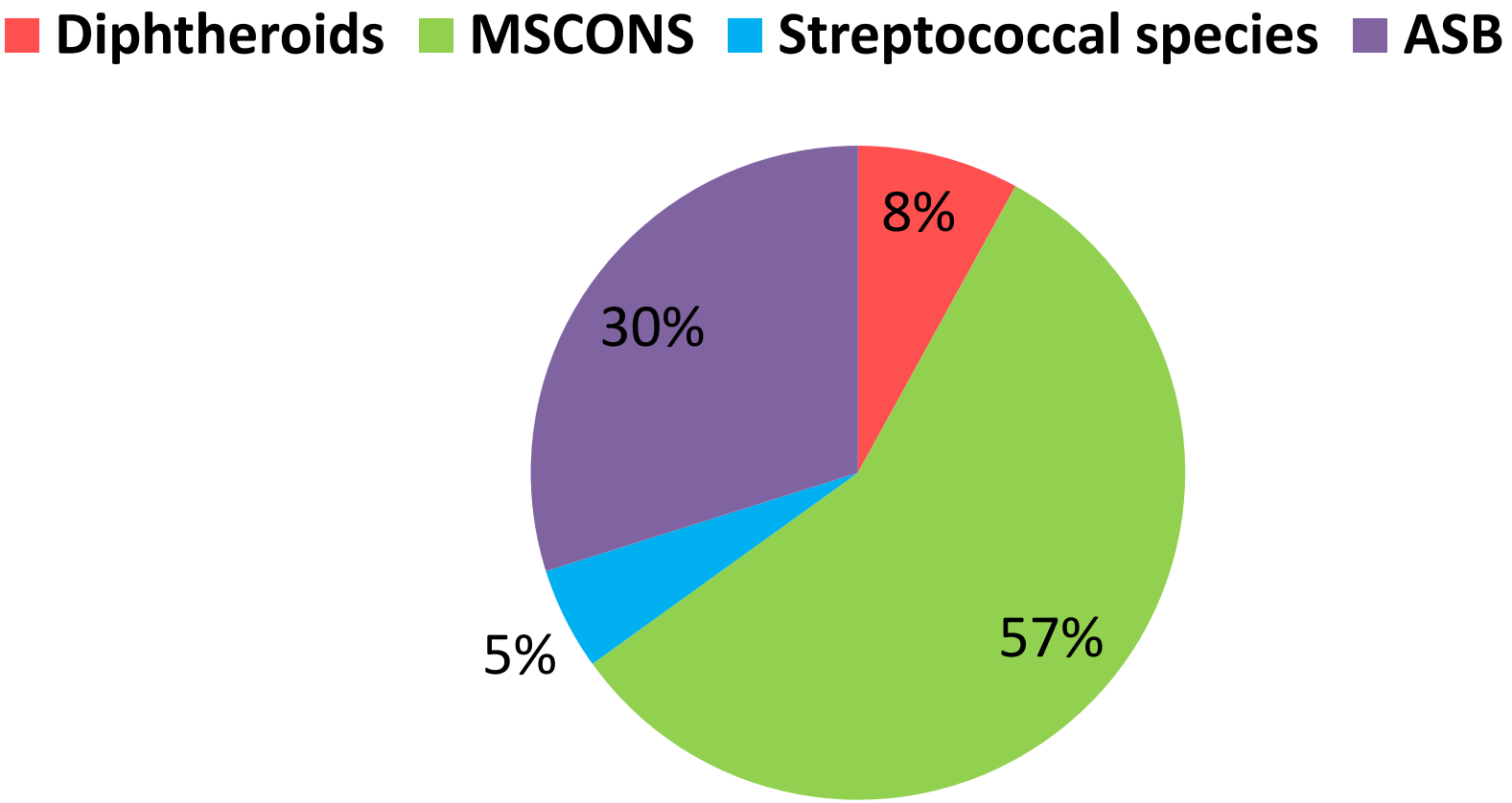
MONTHWISE DISTRIBUTION OF BLOOD CULTURE +ves & CONTAMINANTS.

MONTH	NO OF BLOOD CULTURES	CULTURE POSITIVE (%)	NO OF CONTAMINANTS (%)
AUGUST-15	799	119 (14.89)	103 (**13.01**)
SEPTEMBER-15	851	139 (16.31)	123 (**14.45**)
OCTOBER -15	932	187 (19.97)	149 (**15.98**)
TOTAL	**2582**	**445 (17.23)**	**375 (14.52)**

Area wise Isolation of blood culture contaminants

Various clinical areas	No Of Contaminants Isolated (%)
ICUs	117(11.1)
GENERAL WARDs	100 (18.9)
EMD	46 (31.72)
OPD / Central collection	52 (32.71)
OTHER WARDs	60 (8.63)
TOTAL	375 (14.52)

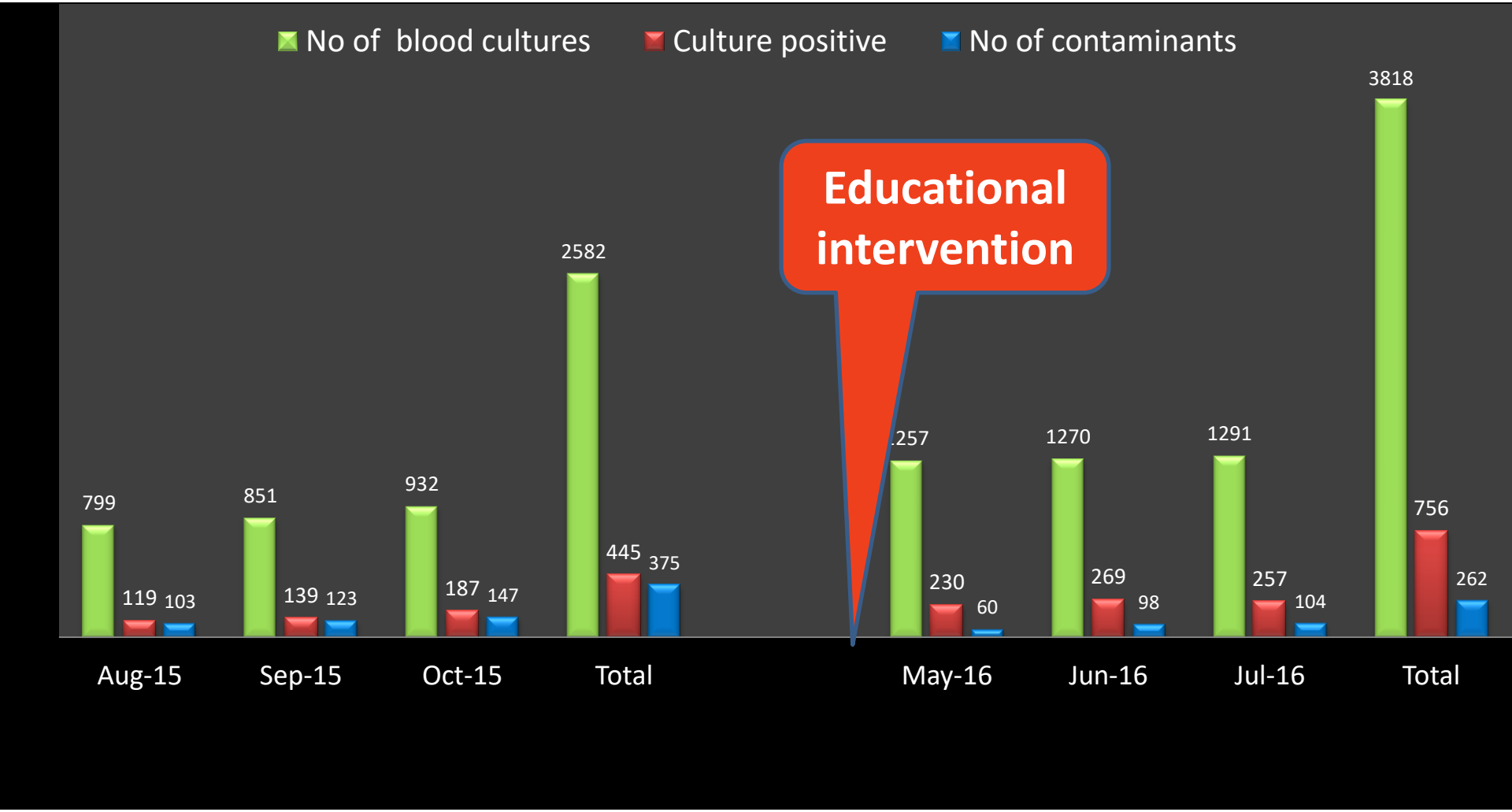
Various contaminants isolated



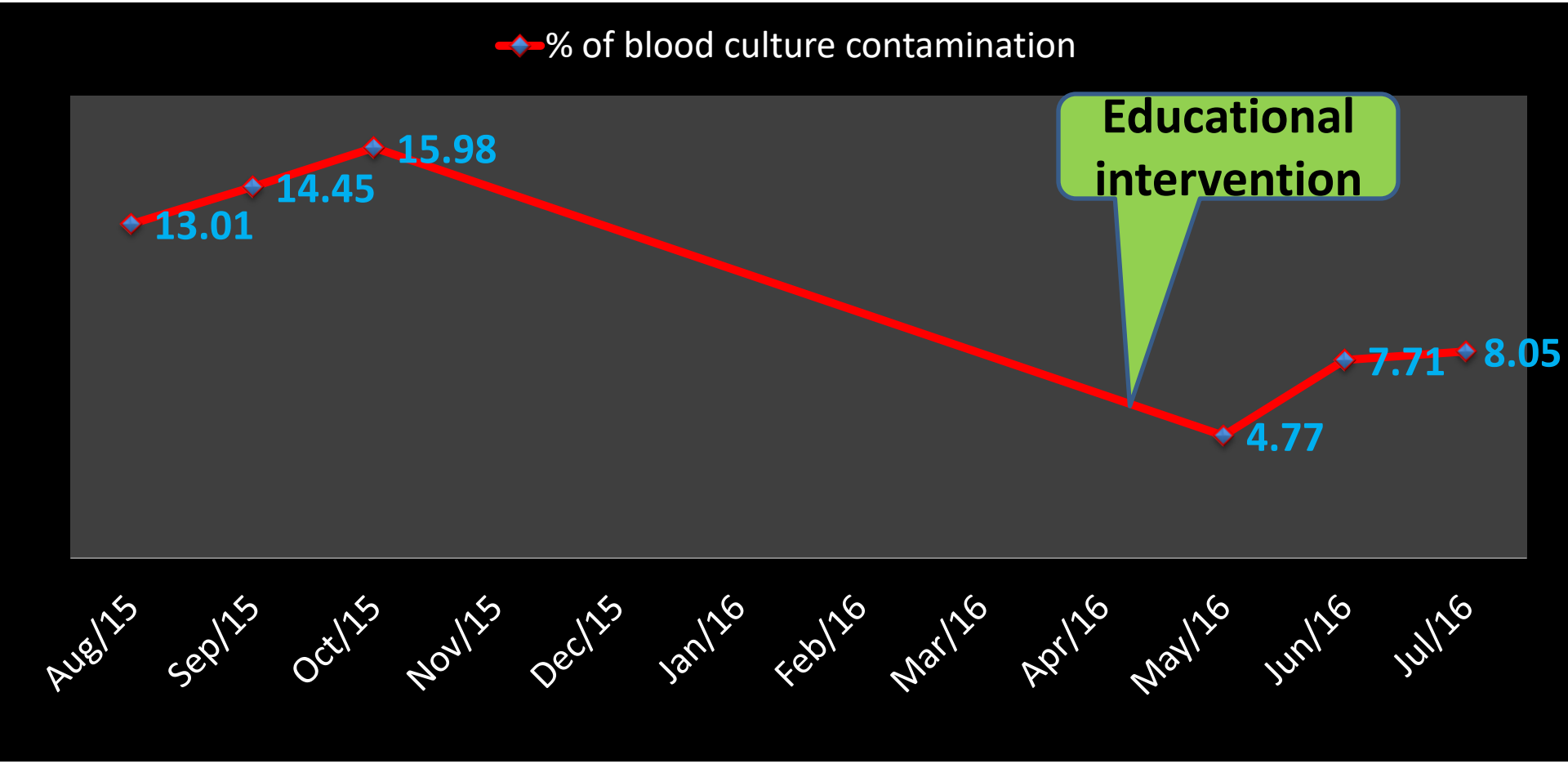
Skin flora predominates

Educational intervention – Staff nurses & Phlebotomists

Month-wise distribution of blood culture positives & contaminants



Month-wise blood culture contamination rates



Pre vs Post

Area-wise blood culture contaminants (%)

Various clinical areas	No Of Contaminants Isolated (%)	
	PRE AUDIT	POST AUDIT
ICUs	117(11.1)	40 (3.47)
GENERAL WARDs	100 (18.9)	58 (5.93)
EMD	46 (31.72)	69 (13.42)
OPD / Central collection	52 (32.71)	20 (5.98)
OTHER WARDs	60 (8.63)	75 (8.91)
TOTAL	**375 (14.52)**	**262 (6.8)**

53% reduction in the contamination rates post intervention

Statistically significant -0.001

Conclusion

- **Contaminations may outgrow** the pathogens and may delay appropriate management & increases cost.

- **Education intervention** was found to reduce blood culture contamination significantly (**53%**).

- With **higher staff attrition** – Frequent training is required to further reduce contamination and sustain the change demonstrated.

Recommendations

1. To emphasize **proper pre sampling skin preparation** and decontamination of the blood culture bottle tops.(*posters displayed at all clinical areas)*

2. At **induction and periodic hands-on training** to improve aseptic sample collection technique for blood culture.

3. Sample collection only by trained phlebotomists (?!!!?) .

4. To provide monthly **feedbacks** on the contamination rates to the wards / units / Dept.


Thank You