



CLABSI Validation – Form E CLABSI Validation Findings

Validation results can be displayed using 2x2 tables and the accuracy and completeness of HAI surveillance and reporting can be calculated. Quantitative findings of data validation include sensitivity, specificity, and positive predictive value (defined below).

		Validation Review (Considered “Gold Standard” or truth)	
		CLABSI	Not CLABSI
Identified and Reported by Hospital	CLABSI	True positives	False positives
	Not CLABSI	False negatives	True negatives

Positive Predictive Value (PPV) =

$$\frac{\text{True positives}}{\text{True positives} + \text{False positives}} \times 100$$

Sensitivity =

$$\frac{\text{True positives}}{\text{True positives} + \text{False negatives}} \times 100$$

Specificity =

$$\frac{\text{True negatives}}{\text{True negatives} + \text{False positives}} \times 100$$

Sensitivity

- Answers question “How likely are all true infections found?”
- For CLABSI surveillance, sensitivity is defined as the proportion of CLABSI identified and reported from the total of all patients who had a CLABSI.
- If sensitivity is high, it means CLABSI are being identified during surveillance. If sensitivity is low, it means CLABSI are being missed and the hospital’s CLABSI rate could be higher than what is being reported.
- Measures **completeness** and implies effective surveillance methods for case-finding.

Specificity

- Answers question “How likely are patients without an infection accurately identified as not having an infection?”
- For CLABSI surveillance, specificity is defined as the proportion of CLABSI not reported from the total of all patients who did not have a CLABSI.
- If specificity is high, it means CLABSI are being ruled out appropriately among patients with positive blood cultures. If specificity is low it means that CLABSI are being reported that are not really CLABSI. The hospital’s CLABSI rate may actually be lower than what is being reported.

Positive Predictive Value (PPV)

- Also called the precision rate.
- For CLABSI surveillance, PPV is the proportion of CLABSI reported that met the case definition.
- If PPV is high, it means the identified and reported CLABSI really *are* CLABSI. If PPV is low, it means CLABSI being reported do not meet the case definition.
- Measures **accuracy** in applying surveillance definitions and following protocols.



CLABSI Example

Positive blood cultures events reviewed for validation = **100**

		Validation Review ("Gold Standard" or truth)	
		CLABSI	Not CLABSI
Identified and Reported by Hospital	CLABSI 5	4	1 <i>Reported in error</i>
	Not CLABSI 95	2 <i>Missed</i>	93

Positive Predictive Value (PPV) =

$$\frac{4 \text{ True positives}}{4 \text{ True pos.} + 1 \text{ False pos.}} \times 100$$

80%

Sensitivity =

$$\frac{4 \text{ True positives}}{4 \text{ True pos.} + 2 \text{ False neg.}} \times 100$$

67%

Specificity =

$$\frac{93 \text{ True negatives}}{93 \text{ True neg.} + 1 \text{ False pos.}} \times 100$$

99%

Interpretation:

For the 100 blood culture events reviewed for CLABSI, the validation reviewers found **3** disparities compared to the hospital surveillance report.

The hospital had identified and reported 5 CLABSI. The validation reviewers determined only 4 should have been reported; **1** did not meet the surveillance criteria.

The calculated **positive predictive value (PPV)** reveals that what routine hospital surveillance identifies as CLABSI meets the CLABSI surveillance criteria only 80% of the time.

For the other 95 positive blood culture events reviewed in which routine hospital surveillance identified no CLABSI, the validation reviewers identified **2** additional CLABSI.

The calculated **sensitivity** reveals routine hospital surveillance is identifying only 67% of the CLABSI occurring (1/3 are being missed).

The calculated **specificity** reveals hospital routine surveillance accurately "rules out" CLABSI 99% of the time.



Data Validation for CLABSI

Hospital: _____

Surveillance time period: _____

From BSI Events Table, Form 4

positive blood culture events reviewed = _____

		Validation Review	
		CLABSI	Not CLABSI
Identified and Reported by Hospital	CLABSI _____ <i>Form B, total Q1 = Yes</i>	A	B <i>Reported in Error</i>
	Not CLABSI _____ <i>Form B total Q1 = No</i>	C <i>Missed</i>	D

Sensitivity = $\frac{A}{A + C} \times 100 =$ _____

Specificity = $\frac{D}{D + B} \times 100 =$ _____

Positive Predictive Value = $\frac{A}{A + B} \times 100 =$ _____