Proposed Methods to Validate Central Line Associated Bloodstream Infections

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ABSTRACT

BACKGROUND

MedStar Washington Hospital Center is a 940 tertiary care center with 77 ICU beds.
Our ICUs have mirrored the national trend of decline in Central Line Associated Bloodstream Infection (CLABSI) rates with a decrease from 14.5 infections/1000 catheter days in 2001 to a current rate of 1.5. CDC NHSN data demonstrate a continued decrease in CLABSIs from most hospitals, with some sustaining a rate of zero for extended periods.
Several papers have addressed problems with inter-rater agreement, variation between surveillance and clinical definitions, and extreme pressure on teams accountable for classification of CLABSIs. In 2012, the CDC published a CLABSI Validation Guidance and Toolkit.
Our internal validation includes review by the entire infection prevention team and hospital epidemiologist. When needed cases are also reviewed with clinical staff, and/or NHSN staff before a case is submitted to NHSN. Our experience has shown that triggers for blood culture collection can be heavily influenced by the patient population treated and local or regional practice standards. Classification of a positive blood culture as primary or secondary is also somewhat subjective, despite NHSN standardization efforts. Validation efforts vary by state and, when performed, show a clear trend toward higher rates..

METHODS

To improve validity we have instituted a process of increased review for those cases considered probable CLABSIs, to minimize misclassification in the numerator. We have improved validity by an additional review of bloodstream infection (BSI) classified as secondary, community, or contaminant. The rate of secondary BSIs is contrasted with that of CLABSI to assure that there is not a trend of increased secondary as CLABSI decreases.

RESULTS

Linear trend lines of quarterly healthcare associated BSI rates since January 2009 confirm that as CLABSI rates decrease (negative slope = -0.0262x) the secondary BSI rates approach level (positive slope = 0.0011x).

BACKGROUND

- The introduction of mandatory reporting of most Healthcare Associated Infections is associated with an overall decrease, mainly through the adoption of best-practices, bundles etc.
- While most of the decrease is real and sustained, some is likely due to changes in the way we count these infections.
- Linking hospital reimbursement to these rates has placed extreme outside and inside pressure on IC teams and clinicians to reach sustained zero rates for CLABSIs in particular. Various institutions have reported sustained rates of zero CLABSIs.
- Elimination of all CLABSIs, while desirable, is not biologically plausible, especially in large, tertiary-care hospitals.
- Several "loopholes" in the NHSN definitions of CLABSIs, and other HAIs, such as VAP, SSIs etc, can allow reclassification of a primary as a secondary BSIs. Classification of bloodstream infection uses these loopholes, rather than looking for true interpretations.
- NHSN definitions that are not validated and that reported cases with predictable poor inter-observer reliability make interagency rate comparisons flawed
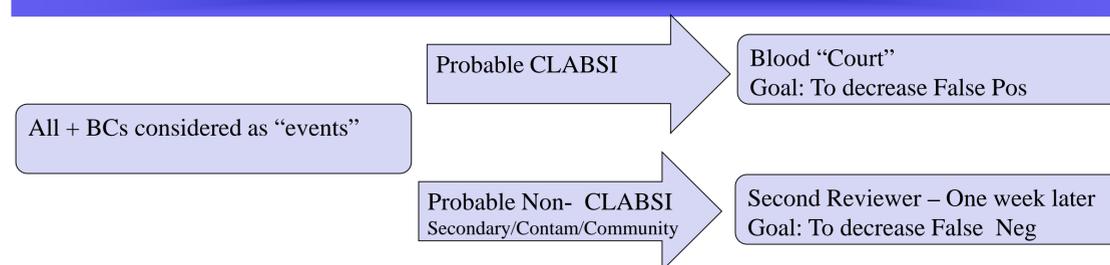
We propose several internal validation methods to decrease errors:
1. INTER-OBSERVER VALIDATION – currently done
2. QUANTITATIVE VALIDATION trending primary and secondary BSIs- currently done
3. AUTOMATED SURVEILLANCE METHODS – proposed only
4. ANALYSIs OF BCs PER EPISODE OF CARE – proposed only

"To assign, by default, all such BSIs to a category of 'central-line associated' simply because a central line has been inserted is not only folly, it is also intellectually and operationally incorrect"
      Daniel Sexton et al. Infection Control and Hospital Epidemiology – December 2010

INTER-OBSERVER VALIDATION

All + BCs considered as "events"

Probable CLABSI → Blood "Court" Goal: To decrease False Pos

Probable Non- CLABSI Secondary/Contam/Community → Second Reviewer – One week later Goal: To decrease False Neg
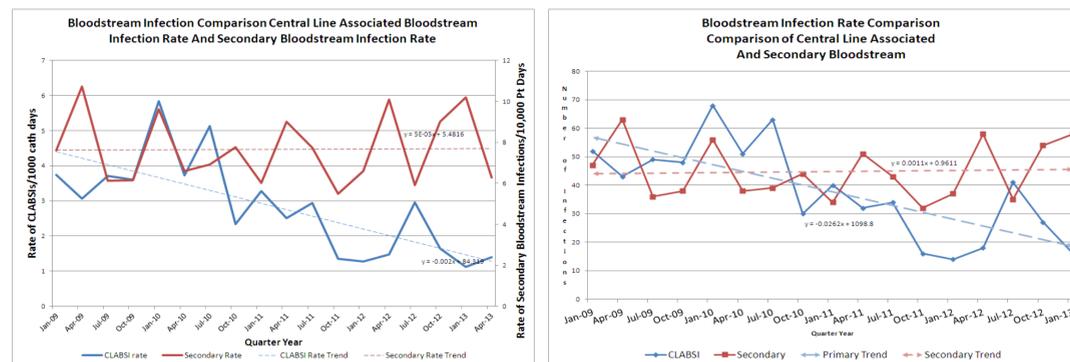
Advantages
- Includes assessment of all NHSN infection parameters
- Allows exploration of multiple data sources for cath days, clinical symptoms, etc
- Allows interpretation - "case- by- case"

Disadvantages
- Very time consuming
- Bias toward undercount

QUANTITATIVE VALIDATION

Bloodstream Infection Comparison Central Line Associated Bloodstream Infection Rate And Secondary Bloodstream Infection Rate

Bloodstream Infection Rate Comparison Comparison of Central Line Associated And Secondary Bloodstream
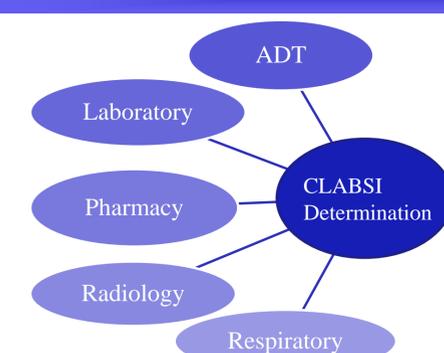
Advantages
- Easy to do – not time demanding
- Objective
- May be a way to increase inter-hospital interpretation

Disadvantages
- Need to correct denominator for rate. Either express rates as n/10,000 pt days, or perform analysis only on those with central lines

ANTICIPATED AUTOMATED SURVEILLANCE METHOD

Interfaces feed algorithms to determine when definitions are met

Current electronic surveillance programs allow for screening, but not final determination

Future CDC definitions likely to become more categorical; future programs likely to provide more complex algorithms

Anticipated Advantages
- Unbiased
- Easy to perform
- Interagency comparisons on "level playing field"

Anticipated Disadvantages:
- Clinical interpretation of trends is likely to suffer

DISCUSSION

1. Because NHSN CLABSI reporting is used as surrogate for quality care, validation methods should be routinely required.

2. Internal validation methods and results should become a required element in NHSN reporting.

3. Monitoring the numbers of BCs obtained per episode of care, adjusted for severity of illness, presence of multiple CVCs and multiple lumens would add to inter-agency rate interpretation

4. Electronic surveillance, at least for BSIs should become standard in the future. This would increase sensitivity but decrease specificity, and eliminate the inordinate amount of time and manpower spent on CLABSI determination. There may also be a decrease animosity and mistrust

5. As long as surveillance data is linked to hospital reimbursements or incentives, bias toward underclassification.