Maryland Health Care Commission Quality Review and Chart Audit

MARY ANDRUS, BA, RN, CIC
PATTY LEEMAN, MBA
APIC CONSULTING SERVICES, INC.

Objectives

- To assess the accuracy and completeness of selected central line-associated bloodstream infections (CLABSI) reported to the National Healthcare Safety Network (NHSN) on patients in critical care hospital locations (e.g., adult and pediatric intensive care units and neonatal care units) during the time period between July 1, 2008 and June 30, 2009
- To determine whether selected cases reported to MHCC meet NHSN criteria
- To evaluate current surveillance methods used to detect infections and associated denominators

Responsibilities

- **Project Coordinator**
  - Design the audit and interview questionnaire
  - Train the auditors
  - Provide support during the audit
  - Collect findings
  - Reconcile disparate and incomplete cases
  - Collate and submit summary results and suggest training opportunities
  - Present findings to the HAI Advisory Committee
- **Auditors (5)**
  - Attend training workshop
  - Perform audit at each selected ICU
    - Patient record audit
    - Summary data (denominator collection) interview

Responsibilities (cont.)

- **Maryland Health Care Commission**
  - Communicate with hospitals
    - Collection of microbiology data
    - Arrange for site visits
    - Follow up with results
  - Create sampling framework based on Audit Plan
    - Positive Blood Culture List
    - ICU Ranking List
    - Individual ICU CLABSI Line List
  - Select facilities and patient records for review based on Audit Plan

Options for Record Selection

Option	# records reviewed	Details
Review of every ICU (87)	2 – 3 per ICU	Review 3 charts in ICUs falling in the top and bottom 22 of the ranking list and 2 charts in all others.
Review every hospital (46)	4 – 5 per facility	Review 5 charts in ICUs falling in the top and bottom 11 of the ranking list and 4 charts in all others. If one location from a facility has been selected, do not include second location from the same facility.
Review of 1/3 sample of all ICUs (29). Facilities will be selected if they are in the top or bottom, 14 facilities on the ranking list	7 per ICU selected	Review 7 records in each ICU

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There were **47** acute care hospitals in MD

- 45 hospitals included in final audit
- Two hospitals excluded
  - One 8 bed hospital had no ICU
  - One hospital had no positive blood cultures

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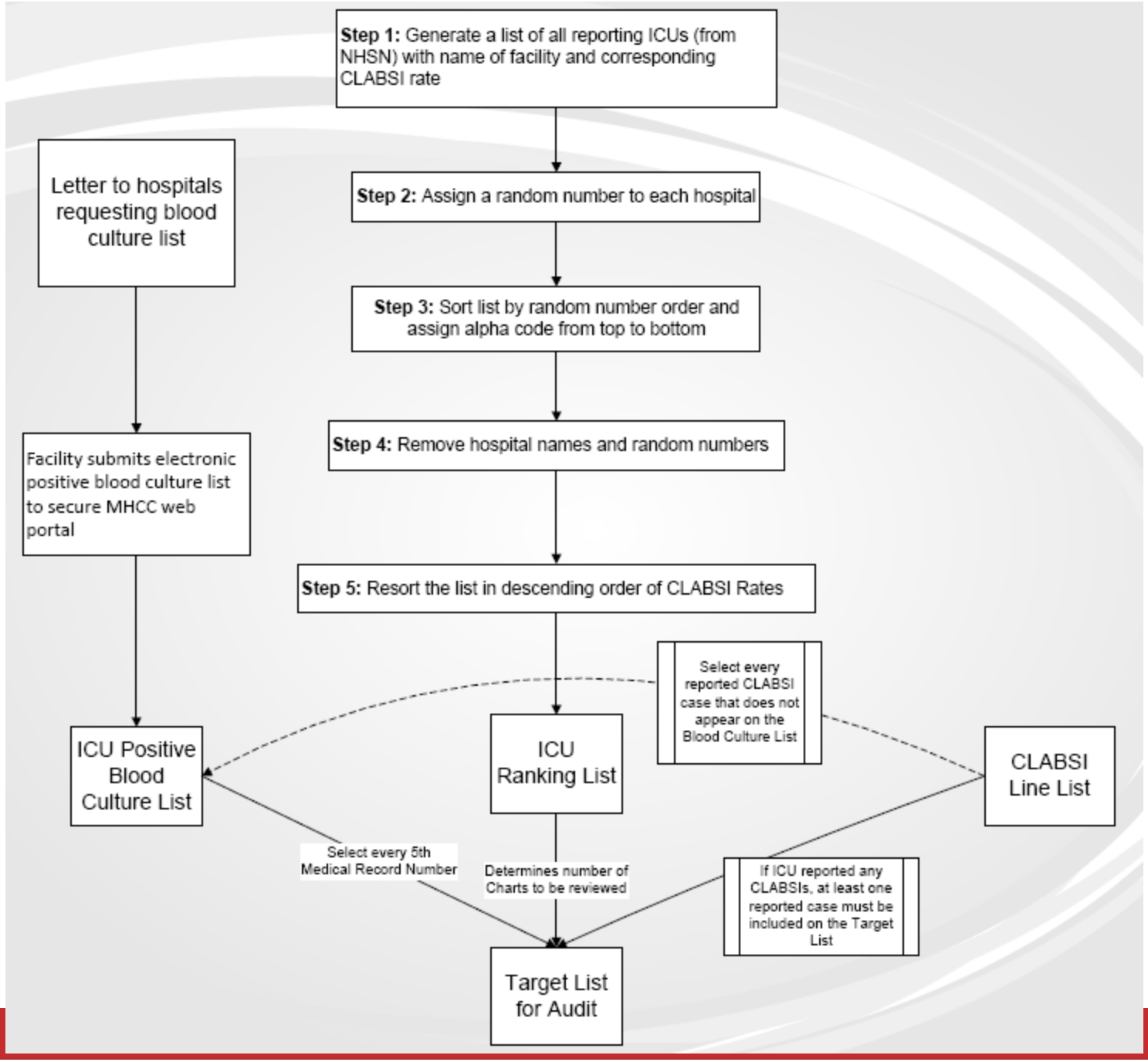
Letter to Facilities

- **Provide Background Information**
- **Specify Objectives**
- **Request List of Positive Blood Cultures**
  - July 1, 2008 through June 30, 2009
  - Submitted in electronic format to a password-protected website portal developed by the Commission
  - Only positive blood cultures for ICU/NICU patients
  - Data Elements include:
    - Medical record number
    - Date and time of specimen
    - Organism grown (include pathogens and common skin contaminants)

Steps for Selection of Patient Records for Review

- **Generate Positive Blood Culture List**
  - Remove facility and ICU identifiers, assign alpha codes
  - Medical record number, date/time of specimen collection, organism
- **Generate ICU Ranking List**
  - List of ICUs by reported rates
  - Randomly assign alpha codes
  - Remove facility and ICU identifiers
- **Generate CLABSI Line List**
  - For each selected ICU, all CLABSI reported during the time period
  - Remove facility and ICU identifiers, assign alpha code


Step 1: Generate a list of all reporting ICUs (from NHSN) with name of facility and corresponding CLABSI rate
Letter to hospitals requesting blood culture list
Step 2: Assign a random number to each hospital
Step 3: Sort list by random number order and assign alpha code from top to bottom
Facility submits electronic positive blood culture list to secure MHCC web portal
Step 4: Remove hospital names and random numbers
Step 5: Resort the list in descending order of CLABSI Rates
Select every reported CLABSI case that does not appear on the Blood Culture List
ICU Positive Blood Culture List
ICU Ranking List
CLABSI Line List
Select every 5th Medical Record Number
Determines number of Charts to be reviewed
If ICU reported any CLABSIs, at least one reported case must be included on the Target List
Target List for Audit

Audit Training – December 8, 2009

- Organized by APIC Consulting Services, Inc. (ACSI)
- Conducted by Project Director
- Auditors and MHCC staff participated
- Content:
  - NHSN overview
  - BSI definition and protocol
  - Audit format and direction
  - Interview process
  - Other CDC/NHSN definitions
  - Case studies and practice

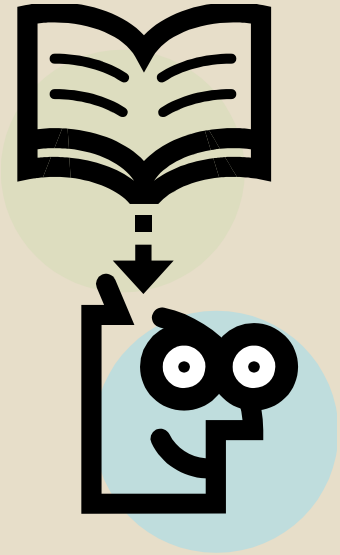


Chart Audit

December 2009

Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1	2	3	4	5
6	7	8 Training	9 Audit →	10	11	12
13	14 Audit →	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

January 2010

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					1	2
3	4 Audit →	5	6	7	8	9
10	11	12				

Chart Audit

- **MHCC**
  - Arrange appointment for audit
- **Facilitator provided by hospital**
  - Access to appropriate hospital areas and medical records including security issues
  - Open and navigate electronic medical records where necessary
  - Arrange interview with data collection staff at the end of the review
- **Auditor**
  - Conduct chart review
  - Interview staff for determination of appropriate collection of denominator data

Reporting

- # Patient records reviewed (~200)
- # CLABSIs identified by both ICU and Auditor
- # CLABSIs identified by ICU, but not confirmed by Auditor
- # CLABSIs identified by Auditor, but not reported to NHSN by ICU
- Interview Results – summary for each question
- Training issues identified

Results

Comparison of CLABSIs identified by Hospital IP staff reported to NHSN and MHCC Audit

Audit Determination	CLABSI Reported to NHSN by ICU	No CLABSI Reported to NHSN by ICU	Total
CLABSI Identified	67	8	75
No CLABSI	6	121	127
Total	**73**	**129**	**202**

Results

Comparison of CLABSIs identified by Hospital IP staff reported to NHSN and MHCC Auditors

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Auditors reviewed a total of 73 patients that were reported to NHSN by the hospitals as CLABSI

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Bloodstream infections that were reported by the hospital and confirmed by the audit

91.7%

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Bloodstream infections that were reported by the hospital and not confirmed by the audit
8.21%

Results

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Total number of non-CLABSI positive blood cultures reviewed by auditors

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Positive blood cultures that were identified as CLABSI by audit, but were not reported by the hospital to NHSN **6.21%**

Results

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Positive blood cultures that were not identified as CLABSI by audit, and were not reported by the hospital to NHSN

93.8%

Resolution

- The Project Manager reviewed each audit report for completeness and accuracy.
- A letter was sent to each hospital describing the results of the audit and offered the opportunity to dispute the results
- 15/202 records required resolution following the audit

Resolution (cont.)

- 4 of the 14 were cases where the hospital reported the CLABSI to NHSN, but the auditor identified the BSI as secondary to another infection
  - 2 of the cases were determined to be correctly reported by the hospital as CLABSI
  - 2 were determined to be BSIs that were secondary to another infection (incorrectly reported by the hospital)
- 2 of the 14 cases showed agreement between the hospital and the auditor, but the audit record did not have complete evidence to support the decision
  - Both cases were determined to have been correctly reported

Resolution (cont.)

- One case involved an organism (one isolate) that was identified by the hospital as a common skin contaminant, but was not on the NHSN list of common skin contaminants.
  - Although clinically a common skin contaminant, using the CDC/NHSN surveillance definition, it should have been reported as a recognized pathogen
  - Consulted with NHSN to determine
  - Same case – question of whether or not the "venous sheath" was actually a central line. Determination that the line in question met the criteria for a central line.

Resolution (cont.)

- One case involved an organism (one isolate) that was identified by the hospital as a common skin contaminant, but was not on the NHSN list of common skin contaminants.
  - Although clinically a common skin contaminant, using the CDC/NHSN surveillance definition, it should have been reported as a recognized pathogen
  - Consulted with NHSN to determine
- Same case – question of whether or not the "venous sheath" was actually a central line.
  - Determination that the line in question met the criteria for a central line.

Resolution (cont.)

- One CLABSI was identified by the auditor as not meeting the criteria on 1/6/09, but a CLABSI was reported.
- Upon further investigation, the CLABSI was not reported on 1/6/09, but was reported on 2/6/09 (based on a separate culture).
- Since the latter date was not a selected blood culture date, the case was resolved in favor of the hospital (Appropriately not reported)

Resolution (cont.)

- One CLABSI that was reported by the hospital was determined by the auditor not to meet the signs/symptoms criteria.
- The hospital had identified hypotension as the sign/symptoms criteria used (101/56 and 102/46).
  - Since the hypotension criteria are not clearly defined in NHSN, the Project Director agreed with the hospital that LCBI Criterion #2 was met and that the CLABSI had been appropriately reported

Resolution (cont.)

- 4/14 cases that were reported by one facility were identified by the auditor as not meeting CLABSI criteria:
  - 2 audit records indicated the patient did not have a central line
  - One audit record indicated that "MD diagnosis" was the only criteria used
  - One audit record indicated that the infection was present on admission and that the infection was community-associated
  - All four of these cases were reviewed by the Project Director with the hospital. Appropriate document was provided to indicate that all cases were appropriately reported by the hospital.

Resolution (cont.)

- One case was identified by the auditor as a CLABSI using Criterion #2. Two separate isolates were identified (Coag neg staph and *S. epidermidis*)
- The auditor indicated that the *S. epidermidis* isolate was tested susceptible to vancomycin, but the hospital indicated that no susceptibility record was available
  - The case was determined to be a CLABSI that should have been reported to NHSN. The difference in the susceptibility reporting between the auditor and the hospital does not change the fact that the case meets the criterion for LCBI.

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Analysis

Sensitivity measures the proportion of actual positives which are correctly identified

Specificity measures the proportion of negatives which are correctly identified

Positive Predictive Value (PPV): the proportion of patients with positive test results who are correctly reported

Negative Predictive Value (NPV): the proportion of patients with negative test results who are correctly not reported

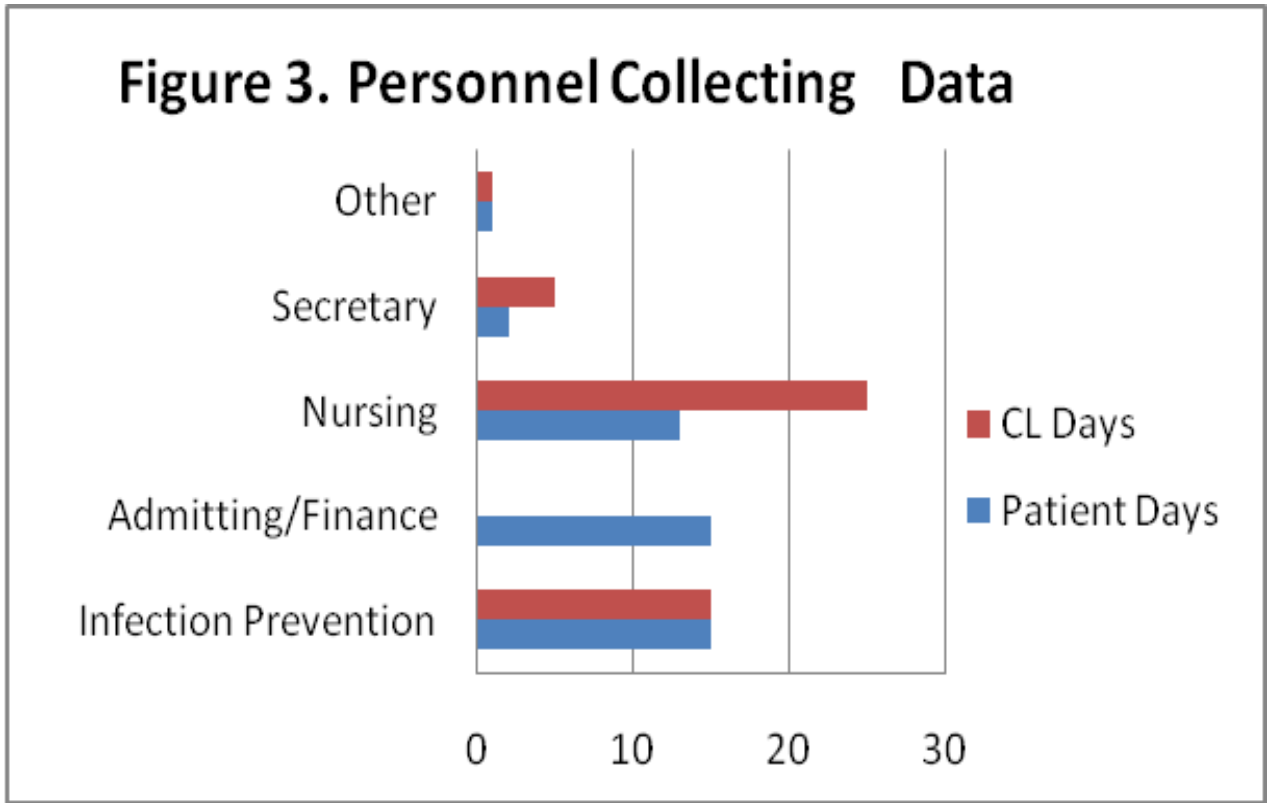
	Estimated Value
Sensitivity	91.78
Specificity	93.8
Positive Predictive Value (PPV)	89.33
Negative Predictive Value (NPV)	95.28

Interview

- Purpose – to document methods used by hospital staff collecting patient days and device days
- Representatives from each monitored ICU were interviewed by the auditor using a standard interview questionnaire
- 21 questions included
  - collection of data and facility size and structure.

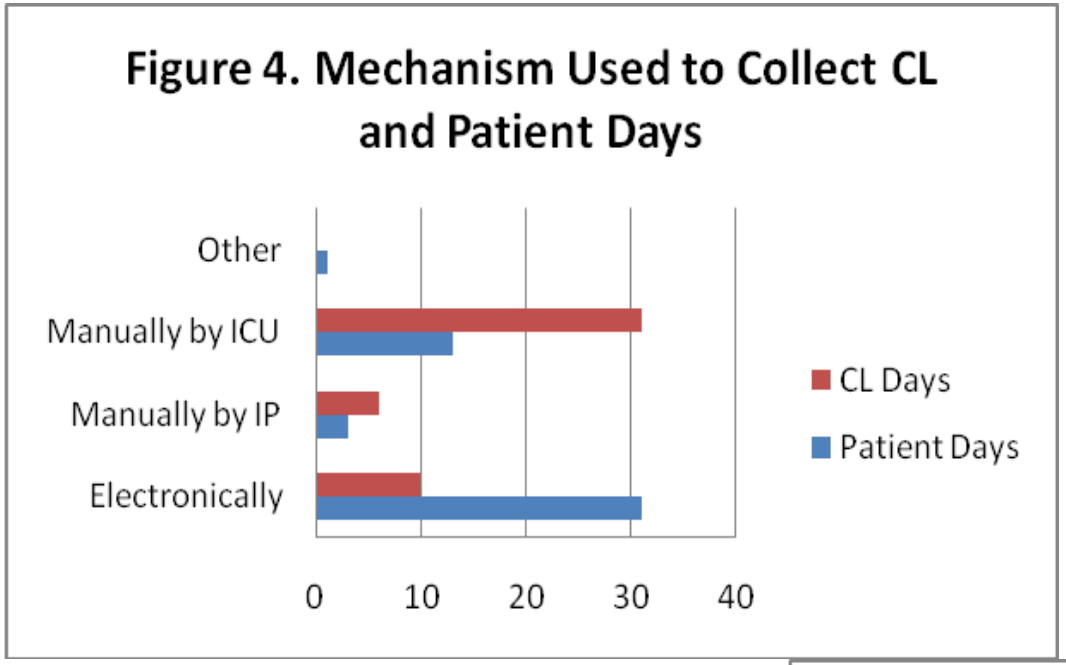
Responses to Survey Questions about Facility Size and Structure

Survey Question	Results`	Comments
1. Number of beds in ICU monitored a. As of July 1, 2008 b. As of June 30, 2009	 691 672	
2. Where there any changes in the number and/or organization of ICU units during the reporting period?	Six facilities reported changes	•Merger of two hospitals •Merger of two ICUs (2) •One ICU split in two •Number of ICU beds reduced (2)
3. Do you have more than one Medical/Surgical ICU? How do you report these to NHSN?	Six facilities reported more than one ICU; one of these combined units together for reporting	Each MSICU should be reported to NHSN separately



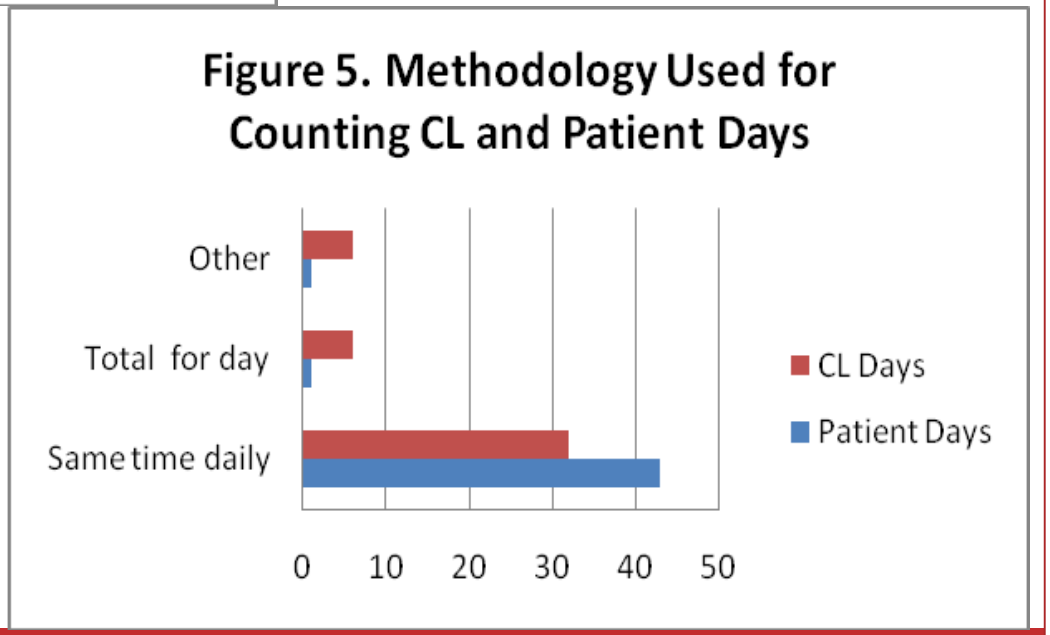
NHSN Patient Days is the number of patients on the unit counted every day at the same time. The total is entered into NHSN at the end of the month.

NHSN Central Line Days is the number of patients with one or more central line(s) counted every day at the same time. The total is entered into NHSN at the end of the month.



Electronically usually means that each staff nurse records details about the patient central line during the course of his/her shift. Nursing staff collecting data commonly did not collect data at a specific time; data collected electronically typically includes all central lines identified during the day.

10 of the 45 facilities report that the time of day collection takes place is not static. This is not the correct method for collecting central line days.

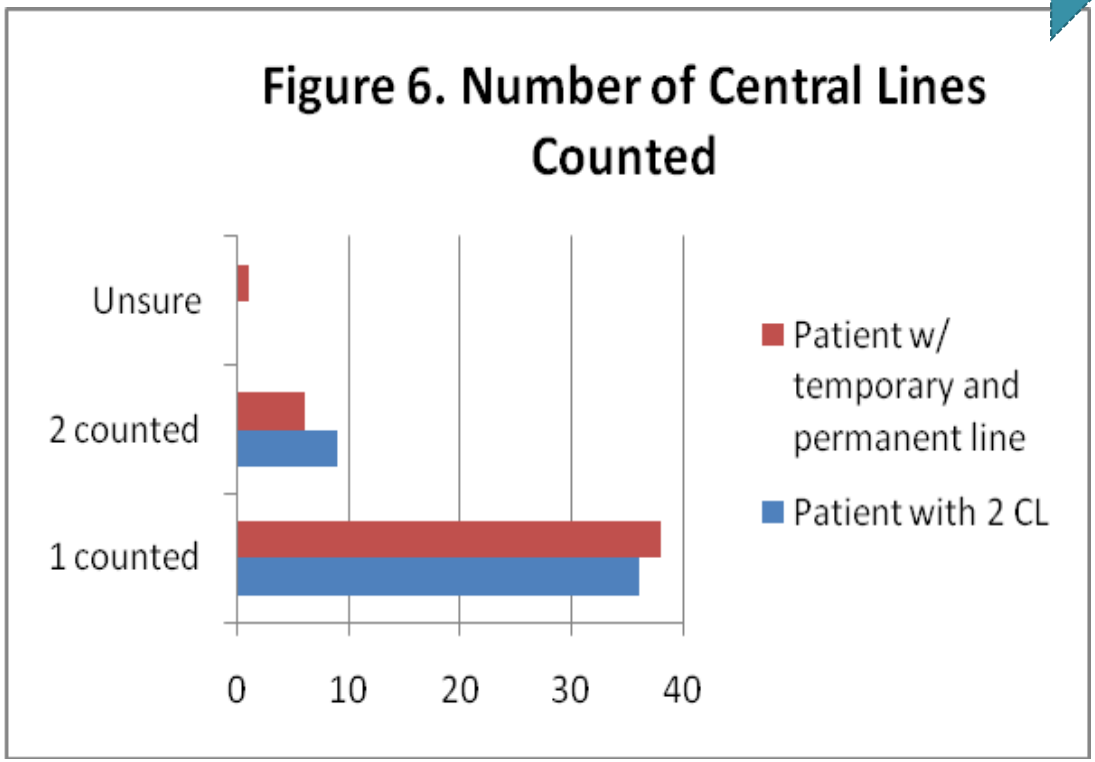


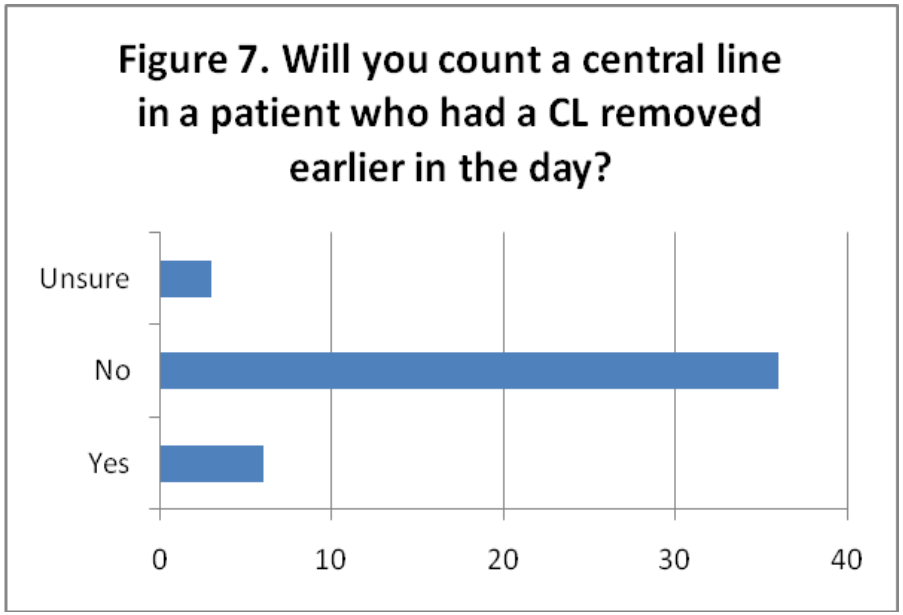
If a patient has 2 separate central lines, how many central line days are counted?

If a patient has more than one central line, only one central line per patient should be counted each day. Nine hospitals are incorrectly counting these days.

If a patient has a temporary central line and a permanent central line, how many central line days are counted?

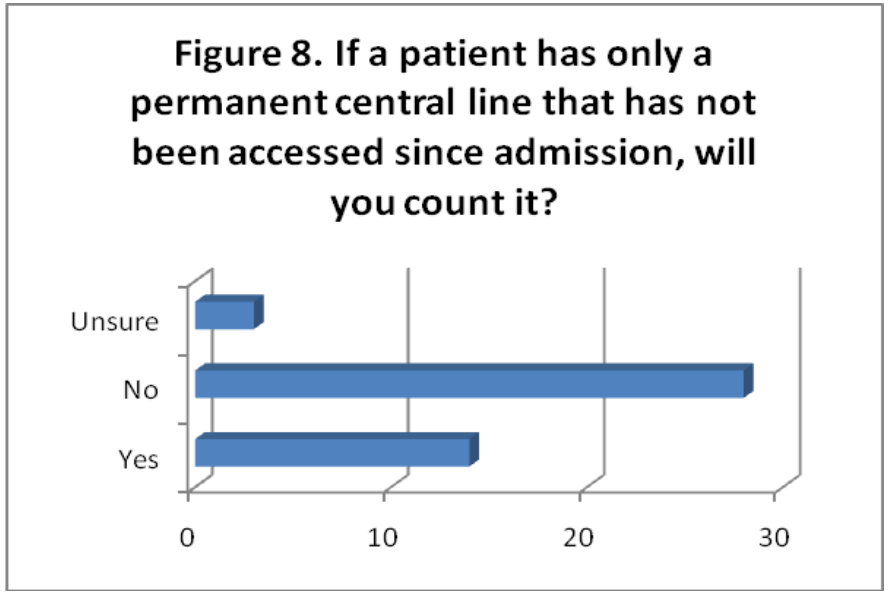
If a patient has both a temporary and a permanent line, only the temporary line is counted. Seven facilities are counting incorrectly or are not sure how to count these patients.





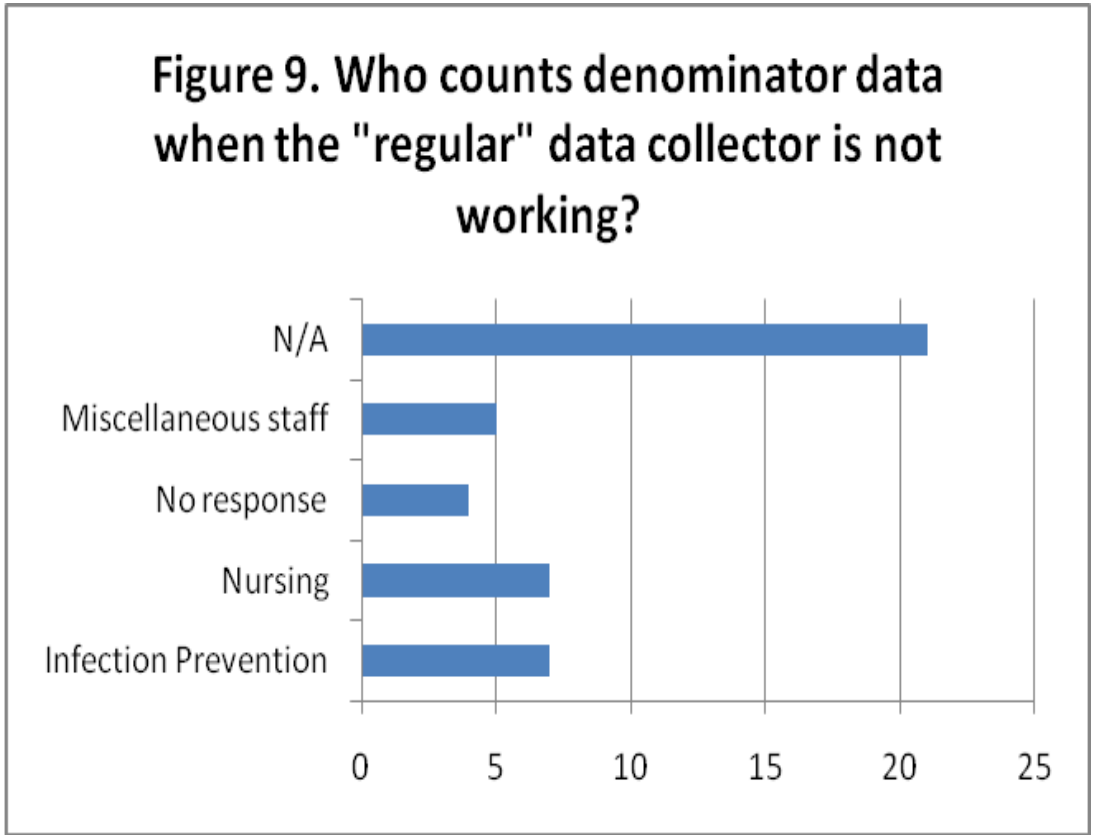
Only patients that have one or more central lines at the time the count is done should be included.

Nine hospitals are unsure or counting incorrectly.



If a patient has only a permanent central line that has not been accessed (for any reason), it is not counted as a line day. On the first day it is accessed and each day after during the admission, it is counted.

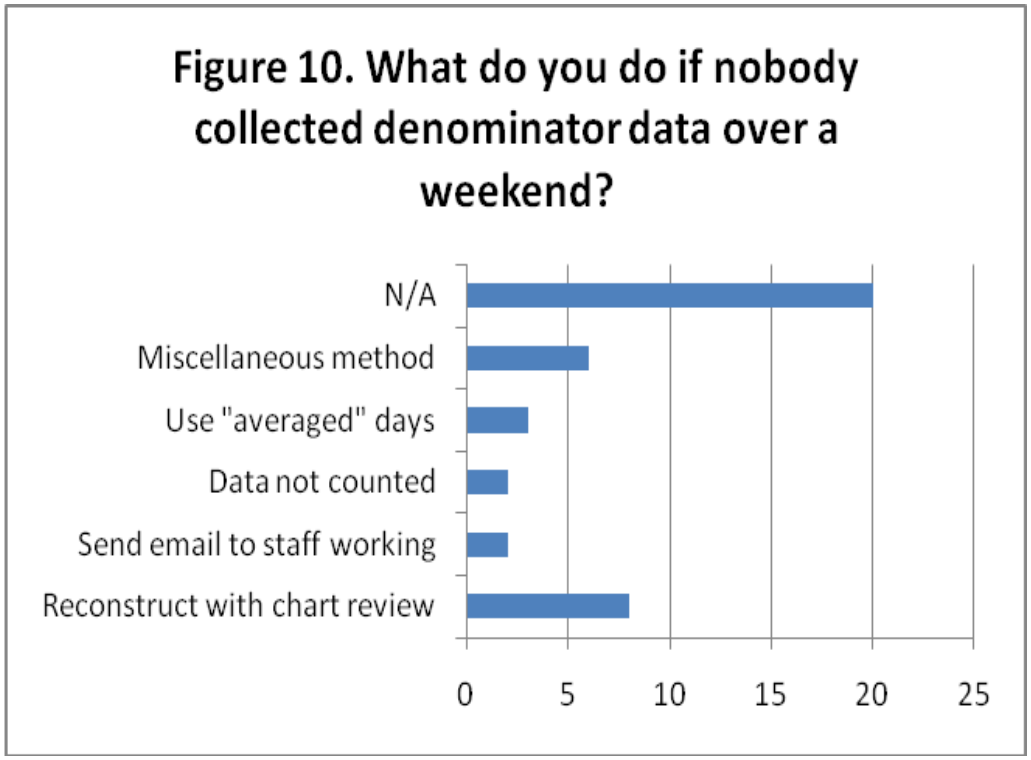
Seventeen hospitals are counting incorrectly or are not sure how to count these patients.



Hospitals in the Not Applicable category included facilities that have the Charge Nurse or the Unit Secretary collect the data as someone in this job description is always working. Hospitals that collect data electronically were also in this category.

Responses in the “Miscellaneous staff” category included

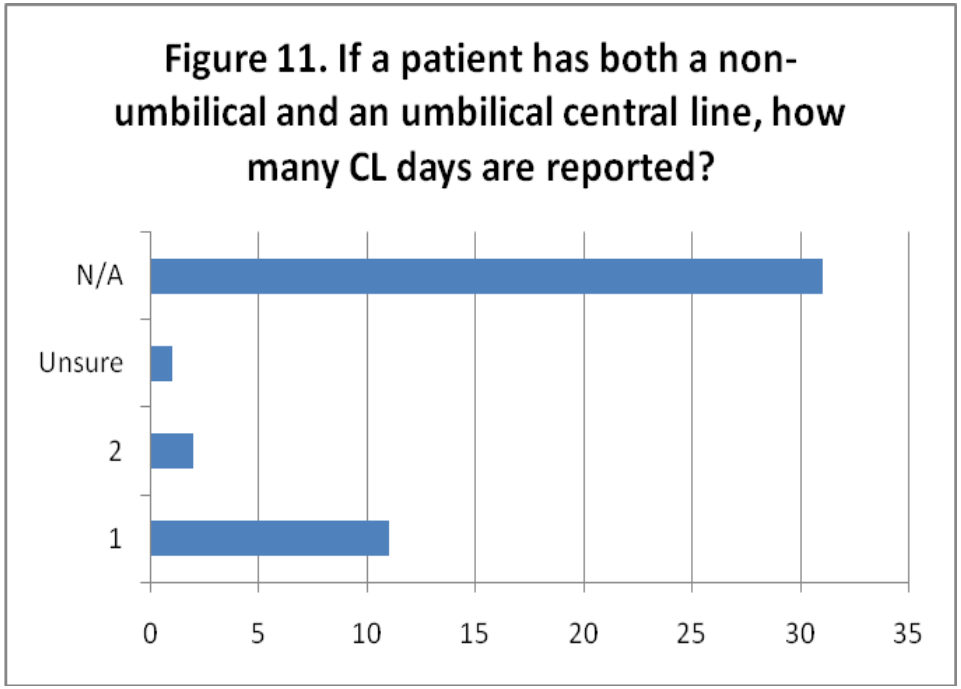
- Any nurse
- Running tally from Patient Care Coordinator
- Several people



These responses reflected the same line of thinking as the responses in the previous question. Note, however, that 3 facilities indicated that no lines were counted over the weekend if the data collector is not there.

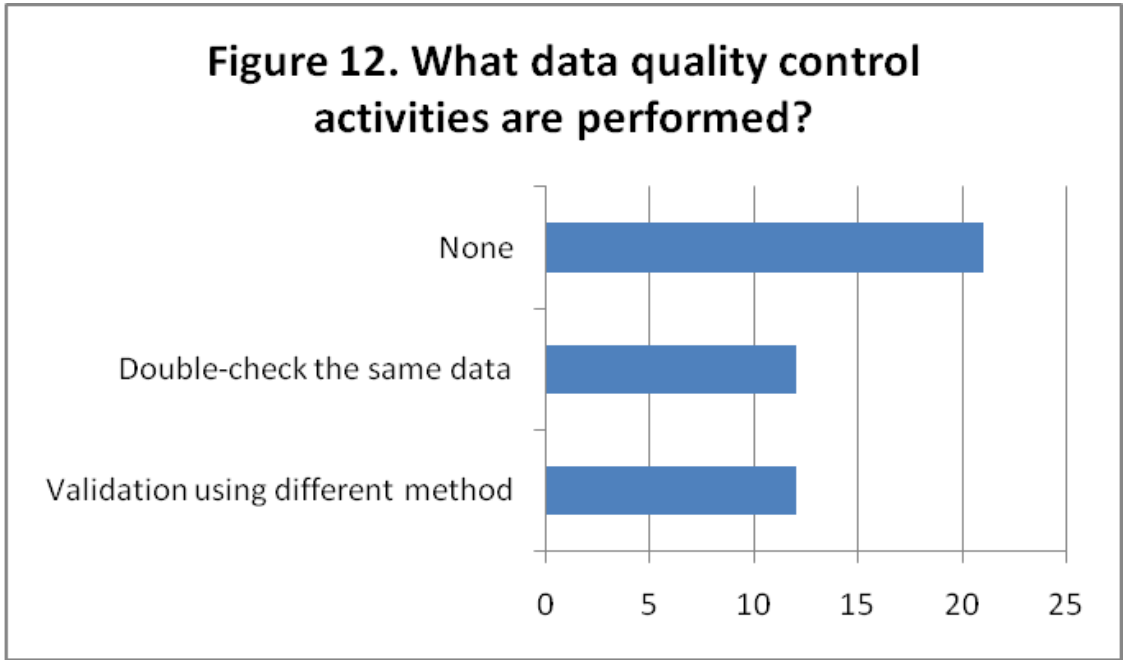
Miscellaneous methods cited included:

- Check daily activity sheet
- Charge nurse sheet
- IV treatment sheet
- IP does it on Monday
- Nurse Manager log book



NA – all facilities that had no NICU

Only one central line per patient should be counted each day. If a patient has both an umbilical central line and a non-umbilical central line, only the umbilical central line is counted. Three hospitals are reporting this incorrectly or are unsure of how to report.



Many facilities "double check" the data using the same method as the original data collector. Most indicated that they were confident that the data was collected appropriately. Some responded with respect to the BSI, not the denominator. Twenty-one hospitals do not perform quality control on the data.

Of the facilities that responded "Yes", the following methods were identified:

- During orientation (8)
- Ongoing training with annual review (7)
- Unspecified (3)

Facilities were counted as "No", if their response included:

- Discussions with staff
- Reports to committee
- None

Six facilities indicated that they participated in the NHSN web training.

Discussion of Results

- Some interview questions were poorly framed
- Individuals answering questions did not always have a good understanding of the principles and rules used by NHSN for collection of denominators
- Auditors suggested that discussions held with IP staff prior to the formal interview may have “given away” some of the answers.

Discussion of Interview

- Electronic collection of patient days seems appropriate and corresponds with NSHN protocol.
- Collection of central line days is inconsistent and incorrect in many hospitals interviewed
  - Reporting central line days electronically
  - Training for data collectors (Staff Nurses, Charge Nurses, and Secretaries) is limited and inconsistent. IPs in general had a good understanding of protocol, but did not follow through with staff training
  - Some hospitals have good methods to validate the collection of denominator data, but most do not

Audit Preparation Comments

- A few facilities did not have electronic resources to easily prepare blood culture report to submit to MHCC website
  - Most reported no difficulty
  - Some systems required merging of databases
  - One facility did not have electronic format
- Several comments that more time was needed to prepare for the audit
- Preparation for the visit was more complex in hospitals that have both electronic and paper patient records
- Directions governing hospital staff responsibilities was confusing

Comments from the Auditors

- Most hospitals had made arrangements, as instructed, for an individual with knowledge of the patient record to help them
  - A few hospitals had made no preparation for the audit and the auditor had to request the patient records after arriving
- At least one hospital IP claimed to have not received the letter from MHCC with the list of patient records for review
- A few hospitals had EMR, but most were a combination of EMR and paper

Comments from Auditors (cont.)

- Auditors were impressed with the professional level of Infection Preventionists in Maryland hospitals
  - Some had been working in NHSN for longer periods of time with advanced knowledge of the system
  - Others were new to Infection Prevention and were learning about NHSN reporting protocols

Limitations

- Resources for this audit were limited to a review of 200 patient records. The sample size is probably much too small to draw statistically significant conclusions about the validity of CLABSI data reported.
- Ideally, each patient record should have been reviewed by two separate individuals.
- Selection of ICUs for audit was not risk adjusted. Neither the location type for ICUs not birthweight categories for NICUs were considered when creating the initial ICU ranking list.

Recommendations

- Allow additional time to test interview questions in sample population and to allow facilities to prepare for the audit
- Increase sample size and audit resources to allow for inter-rater resolution of discrepant cases
- Opportunities for education and training
  - Review primary vs. secondary bloodstream infection
  - Create training module for collection of device (central line) days with emphasis on using electronic data sources
  - Methods of quality control for counting central line days

Questions?