



# Comparison of NHSN-Defined Central Venous Catheter Day Counts with a Method that Accounts for Concurrent Catheters

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## Abstract

**Background:** The current National Healthcare Safety Network (NHSN) definition for central venous catheter (CVC) days does not account for the presence of multiple concurrent CVCs, which may indicate an increased risk for developing a central line-associated bloodstream infection (CLABSI). We used an electronic surveillance system to compare CVC day counts calculated using the NHSN definition ( $\geq 1$  CVC in place = 1 CVC day, "conventional method") to counts that accounted for concurrent CVCs (x concurrent CVCs in place = x CVC days, "unique method").

**Methods:** For all inpatient units at an academic medical center, CVC days using CVCs documented in place at midnight each day for the years 2010 and 2011 were calculated via electronic nursing documentation. Differences in conventional counts and unique counts were assessed, including a comparison of intensive care units (ICUs) vs. non-ICUs and adult vs. pediatric units. CLABSI events were determined by trained infection preventionists using NHSN definitions. Units with an annual CLABSI rate greater than zero were ranked into CLABSI rate decile strata, and the impact of accounting for multiple CVCs on unit rankings was assessed.

**Results:** For all units combined, mean monthly CVC day counts increased using the unique method by 8.5% (conventional method: 7093.9 [95% CI 6942.0-7245.8] CVC days vs. unique method: 7693.5 [95% CI 7522.5-7864.6] CVC days for the study period). The percent change in CVC days was greater among ICUs (12.7% increase) compared with non-ICUs (4.6%), and among pediatric units (9.5%) compared to adult units (7.9%). The pediatric ICU was impacted the greatest, with total CVC days increasing 23.8%. CLABSI rates were mildly impacted, with 81.3% of units with at least 1 CLABSI event during 2010 having no change in the 2011 CLABSI rate decile compared to decile rankings of rates calculated using the unique CVC day count. All decile ranking changes were within 1 decile (e.g. a change from decile rank 5 to 6).

**Conclusions:** Changing to a CVC day definition that accounts for multiple concurrent CVCs increased device day counts and mildly impacted CLABSI rate rankings. ICUs were particularly affected, but the degree of impact varied by ICU type.

## Introduction

- The current National Healthcare Safety Network (NHSN) definition for central venous catheter (CVC) days does not account for the presence of multiple concurrent CVCs, which may indicate an increased risk for developing a central line-associated bloodstream infection (CLABSI).
- Aslakson RA et al (ICHE 2011;32:121+) noted a significant increase in CVC days when concurrent CVCs were included to calculate central line days. This study, however, was limited to a single month and only 2 intensive care units (ICUs).
- We used an electronic surveillance system to compare CVC day counts calculated using the NHSN definition ( $\geq 1$  CVC in place = 1 CVC day, "conventional method") to counts that accounted for concurrent CVCs (x concurrent CVCs in place = x CVC days, "unique method").

## Methods

- For all inpatient units at an 800+ bed academic medical center, CVC days using CVCs documented in place at midnight each day for the years 2010 and 2011 were calculated via electronic nursing documentation.
- Differences in conventional counts and unique counts were assessed, including a comparison between ICUs vs. non-ICUs and adult vs. pediatric units.
- CLABSI events were ascertained by trained infection preventionists using NHSN definitions.
- Units with an annual CLABSI rate greater than zero were ranked into CLABSI rate decile strata, and the impact of accounting for multiple CVCs on unit decile rankings was assessed.

## Results

Figure 1: Comparison of Mean Monthly Central Line Day Counts Calculated Using Conventional NHSN Definition (red bar) to Counts Using Modified Definition Accounting for Concurrent Unique Central Lines (blue bar), January 2010-December 2011 Combined, by Unit Type. Bracket above each set of bars notes percent change between unique and conventional counts.

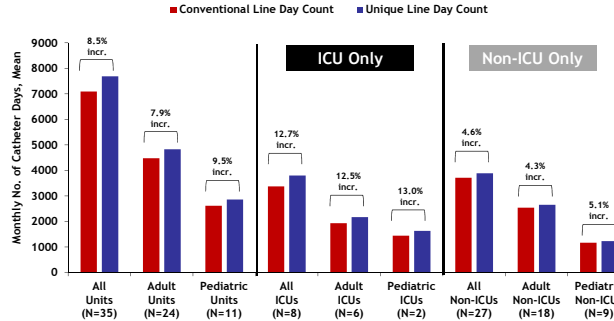


Figure 2: Comparison of Mean Monthly Central Line Day Counts Calculated Using Conventional NHSN Definition (red bar) to Counts Using Modified Definition Accounting for Concurrent Unique Central Lines (blue bar), January 2010-December 2011 Combined, by Specific Intensive Care Unit (ICU). Bracket above each set of bars notes percent change between unique and conventional counts.

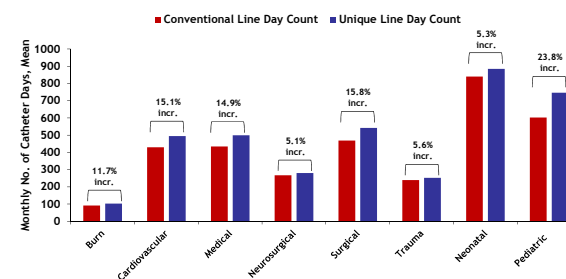


Table: Unit CLABSI Rates per 1000 Central Line Days and Associated CLABSI Rate Decile Rank. Calculated Using Conventional NHSN Definition and a Modified Definition Accounting for Concurrent Central Lines (Unique) A: 2010, B: 2011; Green highlight denotes a positive change in decile rank with the modified definition while red highlight denotes negative change in rank. Units with zero CLABSI events for each year are excluded.

	2010			
	CLABSI Rate		Decile Rank	
	Conventional	Unique	Conventional	Unique
Pods ICU A	0.89	0.78	1	1
Adult Ward A	0.87	0.81	1	1
Adult Ward B	0.88	0.85	1	1
Pods Ward A	0.97	0.97	2	2
Adult Ward C	1.07	1.01	2	2
Adult ICU A	1.18	1.02	2	2
Pods Ward B	1.27	1.23	3	3
Adult Ward D	1.33	1.24	3	3
Adult ICU B	1.32	1.25	3	4
Adult ICU E	1.42	1.63	4	3
Adult Ward F	1.43	1.87	4	4
Pods Ward C	2.06	2.09	4	4
Pods ICU B	2.26	1.78	4	4
Adult Ward G	2.31	2.28	5	5
Pods Ward D	2.33	2.35	5	5
Pods Ward E	2.44	2.38	5	5
Adult ICU C	2.71	2.54	6	6
Adult Ward H	2.72	2.57	6	6
Pods Ward F	2.84	2.93	6	7
Adult Ward I	3.03	2.93	7	7
Pods Ward G	3.08	2.88	7	6
Adult Ward J	3.37	3.50	7	7
Pods Ward H	4.03	3.62	7	7
Adult Ward K	4.09	3.91	8	8
Adult ICU D	5.08	4.26	8	8
Adult ICU F	5.21	5.03	8	9
Adult ICU G	5.26	4.99	9	8
Adult Ward L	5.33	5.29	9	9
Adult Ward M	6.52	6.77	9	9
Adult Ward N	9.41	8.83	10	10
Adult Ward P	14.63	14.80	10	10
Adult ICU I	18.70	17.27	10	10

	2011			
	CLABSI Rate		Decile Rank	
	Conventional	Unique	Conventional	Unique
Pods Ward I	0.32	0.29	1	1
Pods ICU A	0.38	0.28	1	1
Adult Ward J	0.59	0.54	2	2
Pods ICU B	0.61	0.51	2	2
Adult Ward D	0.64	0.43	3	1
Adult Ward A	0.75	0.72	3	3
Adult Ward G	0.77	0.74	3	3
Adult Ward B	0.93	0.87	4	4
Pods Ward E	0.94	0.93	4	5
Adult ICU C	0.96	0.89	4	4
Adult ICU D	1.10	1.07	5	5
Adult ICU G	1.18	1.03	5	5
Adult Ward O	1.40	1.36	6	6
Adult Ward M	1.44	1.55	6	6
Adult Ward E	1.76	1.84	7	8
Adult Ward L	1.76	1.89	7	8
Adult Ward I	1.76	1.84	8	7
Adult Ward K	1.79	1.85	8	7
Adult Ward F	2.00	1.95	8	8
Pods Ward H	3.00	2.80	9	9
Adult Ward P	5.73	5.43	9	9
Adult Ward N	5.79	5.76	10	10
Adult ICU I	10.87	9.47	10	10

- CLABSI rates were mildly impacted, with 81.3% of units with at least 1 CLABSI event during 2010 having no change in the 2010 CLABSI rate decile and 82.6% of units with at least 1 CLABSI event during 2011 having no change in the 2011 CLABSI rate decile compared to decile rankings of rates calculated using the unique CVC day count.
- All decile ranking changes were within 1 decile (e.g. a change from decile rank 5 to 6).

## Conclusions

- Accounting to a CVC day definition that accounts for multiple concurrent CVCs increased device day counts and mildly impacted CLABSI rate rankings.
- ICUs were particularly affected, but the degree of impact varied widely by ICU type.