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# Much Work Still to Be Done to Prevent Central Line-Associated Bloodstream Infections

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**Much Work Still To Be Done To Prevent Central Line Associated Bloodstream Infections**

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**Abstract**

Central Line Associated Bloodstream Infections (CLABSI) are all too common and often fatal events. To estimate the number of preventable CLABSIs, the authors analyzed SIR (Standardized Infection Ratio) and the number of CLABSI data from Hospital Compare. Several studies have suggested that an SIR of 0.35 may be achievable. If all institutions were able to perform at this level, then almost 50% of CLABSI would be prevented.

**Introduction:** Central Line Associated Bloodstream Infections are all too common and often fatal events. Unfortunately using the latest available data, it can be argued that the medical industry has not done nearly enough to implement effective safety protocols and checklists designed to prevent these infections. A National Benchmark was set using CLABSI data gathered between 2006 and 2008 before prevention protocols were implemented in the vast majority of institutions.<sup>1</sup> Using this data, the average performance was used to calculate Standardized Infection Ratio (SIR) and a National Bench-

mark was set which reflected average performance as a SIR of 1.0. Umscheid, et al.<sup>2</sup> estimated in 2011 that as many as 65 to 70% of CLABSIs are preventable, which would define obtainable performance of facilities to have an SIR of between 0.30 to 0.35. Similar reductions were observed in the Keystone project.<sup>3</sup> In a separate analysis, Saman, et al. used more recent CLABSI data and found the peak of the SIR distribution curve at 0.35 and advocated that this more accurately reflects the Obtainable SIR.<sup>4</sup> Arguably, the current National Benchmark is an example of using old standards to define current performance.<sup>4</sup>

**Methods:** To estimate the number of preventable cases, a dataset was downloaded from Hospital Compare which was comprised of CLABSIs that occurred in Hospital ICUs during a data collection period of 7/1/2011 to 6/30/2012. To be included in the analysis a hospital had to have at least one predicted CLABSIs using the National Benchmark of 1.0. 1899 facilities were included in the analysis, 1135 had an SIR of greater than 0.35.

The total number of Preventable Cases (PC) was then calculated from the number of Observed Cases (OC) in all facilities whose SIR was above that of the Obtainable SIR, using the following equation:

$$PC = OC - [(Obtainable\ SIR / Facility's\ SIR) * OC]$$

Three estimations of the obtainable SIR were used

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Table 1: Estimation of the Number of Preventable Cases in Hospital ICUs out of the 10799 CLABSIs observed in ICUs between 7/1/2011 to 6/30/2012

Source of SIR	SIR	Preventable Cases
National Benchmark Data – (2006 to 2008) <sup>1</sup>	1.000	990 (9.2%)
Average SIR 2011 Data - (7/1/11 to 6/30/2012)	0.594	1128 (10.4%)
Peak of the Curve SIR - Data (1/1/11 to 12/1/2011) <sup>4</sup>	0.350	5240 (48.5%)

in this study. The first was the National Benchmark (SIR = 1.0), the average SIR of the Dataset (0.594) and the Obtainable SIR of 0.35.

**Results:** The results shown in Table 1 revealed that almost 50% of the CLABSI could be prevented if facilities performed at the Obtainable SIR of 0.35. This represents 5240 patients and at a fatality rate up to 25%,<sup>5</sup> or 1310 potential lives lost.

**Discussion:** Wise, et al.,<sup>6</sup> estimated that in 2010 there were 15,000 CLABSIs in hospital ICUs, mainly at medium and large teaching hospitals. A targeted approach was suggested to achieve further reductions in central line infections. Our analysis also indicates that substantial improvement is still needed to prevent CLABSIs. In the 12 month period ending on June 30, 2012, there were 10799 CLABSIs in hospital ICUs that were reported to the National Healthcare Safety Network. It can be argued that almost half of these infections were preventable.

Some in the healthcare industry have argued that this large variation is due to differences in reporting and definitions. However, this factor should be mitigated, since CLABSIs are now reported through the National Healthcare Safety Network, which has rigorous definitions and standards for how adverse events are reported. In addition, Saman, et al.<sup>(7)</sup> have shown that high SIRs for CLABSIs in Intensive Care Units are correlated with facility wide patient safety measures found on CMS's Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) Survey, which may indicate problems in the culture of safety at the institution. In addition, over the last decade institutions have been treating and billing for these events, if there are existing problems with event diagnosis this would represent a significant failure of our healthcare system. The question which must be asked is can we do better and further improve our current results?

## References:

- 1) Edwards JR, Peterson KD, Mu Y, Banerjee S, Allen-Bridson K, Morrell G, Dudeck MA, Pollock DA, Horan TC. National Healthcare Safety Network (NHSN) report: data summary for 2006 through 2008, issued December 2009. *Am J Infect Control.* 2009 Dec; 37(10):783-805. doi: 10.1016/j.ajic.2009.10.001. PMID: 20004811
- 2) Umscheid CA, Mitchell MD, Doshi JA, Agarwal R, Williams K, Brennan PJ. Estimating the proportion of healthcare-associated infections that are reasonably preventable and the related mortality and costs. *Infect Control Hosp Epidemiol.* 2011 Feb; 32(2):101-14. doi: 10.1086/657912. PMID: 21460463
- 3) Pronovost P, Needham D, Berenholtz S, et al. An intervention to decrease catheter-related bloodstream infections in the ICU. *N Engl J Med* 2006; 355:2725--32. PMID: 17192537
- 4) Saman DM, Kavanagh KT, Abusalem SK. Redefining the Standardized Infection Ratio to Aid in Consumer Value Purchasing. *J Patient Saf.* 2013 Jan 30. [Epub ahead of print] PMID: 23370222
- 5) Vital Signs: Central line-associated bloodstream infections -- United States, 2001, 2008, and 2009. *MMWR* 2011 Mar; 60: 243-8. <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6008a4.htm>
- 6) Wise ME, Scott RD 2nd, Baggs JM, Edwards JR, Ellingson KD, Fridkin SK, McDonald LC, Jernigan JA. National estimates of central line-associated bloodstream infections in critical care patients. *Infect Control Hosp Epidemiol.* 2013 Jun; 34(6):547-54. doi: 10.1086/670629. Epub 2013 Apr 18. PMID: 23651883
- 7) Saman DM, Kavanagh KT, Johnson B, Lutfiyya MN. Can inpatient hospital experiences predict central line-associated bloodstream infections? *Plos One.* Accessed 23 April 2013. PMID: 23577195