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Impact of Switching From an Open to a Closed Infusion Container on Incidence of Microorganisms Associated with Central Line-Associated Bloodstream Infection in Latin America and Europe

Victor D. Rosenthal, MD, MSc, CIC, Bernal Medical Center, Buenos Aires, Argentina
Fabio Franzetti, MD, Sacco Hospital, Milan, Italy
Reinaldo Salomao MD, PhD, Santa Marcelina Hospital, Sao Paulo, Brazil
Manuel Sigfrido Rangel-Frausto, MD, Specialties IMSS Hospital, Mexico City, Mexico
Francisco Higuera Ramirez, MD, General Hospital, Mexico City, Mexico
Jose Martinez Soto, MD, Gabriel Mancera IMSS Hospital, Mexico City, Mexico
Kerry Barker, PhD, Statistics, Baxter, Round Lake, IL, USA

Background: The objective of this study was to determine the effect of switching from an open to a closed infusion container on the incidence of microorganisms associated with central line-associated bloodstream infection (CLAB) in 15 ICUs from Latin America and Europe.
Methods: An open label, prospective cohort, active device-associated infection (DAI) surveillance, sequential study was conducted in adults with central lines (CLs) in place ≥24 hours. CDC-NNIS definitions were used for DAIs. CLAB rate and incidence of microorganisms were compared between the open and closed infusion container periods.
Results: From August 1999 to April 2005, a total of 4,373 patients participated in the open and closed infusion container periods of the study with 28,735 central line (CL) days. Patient demographics were similar over both periods. A total of 198 patients experienced CLAB during the open and closed infusion container periods.
The incidence rate of CLAB during the closed infusion container period was significantly lower than during the open infusion container period (3.3 versus 10.1 CLAB/1000 CL days, RR=0.33, 95% CI = 0.24 - 0.46, P<0.0001).

The incidence of microorganisms associated with CLAB was reduced significantly as shown in the table below.

Incidence of Microorganisms Associated with CLAB

	Number of CLAB (CLAB per 1000 CL days)				
Classification	**Open Period**	**Closed Period**	**RR**	**95% CI**	**p-Value**
Number of CL Days	15,189	13,546			
Gram Positive	56 (3.7)	22 (1.6)	0.44	0.27-0.72	0.0008
Gram Negative	35 (2.3)	7 (0.5)	0.22	0.10-0.50	<0.0001
Fungi	5 (0.3)	2 (0.1)	0.45	0.09-2.31	0.32
Clinical Sepsis	57 (3.8)	14 (1.0)	0.28	0.15-0.49	<0.0001
TOTAL	153 (10.1)	45 (3.3)	0.33	0.24-0.46	<0.0001

Incidence reductions from the open to the closed infusion container periods were noted both for Gram positive organisms, including Enterococcus spp. (6 vs. 2), S. aureus (20 vs. 15), coagulase negative Staph (22 vs. 3), S. epidermis (10 vs. 1), and Staphilococcus spp. (8 vs. 2); And for Gram Negative organisms, including Acinetobacter spp. (7 vs. 3), Klebsiella spp. (5 vs. 2), E. coli (4 vs. 0), Pseudomonas spp. (3 vs. 0), Alcalige (2 vs. 0), Enterobacter spp. (9 vs. 0), Proteus spp. (3 vs. 0), and non-specific Gram negatives (1 vs. 0). In the open vs. closed container periods, the incidence of Serratia spp. and Haemophilus spp. were 1 vs. 1 and 0 vs. 1, respectively. No incidence reductions were noted for Haemophilus spp. and Serratia spp.

Conclusion: Adoption of closed infusion containers resulted in a significant reduction in the incidence rate of CLAB and a significant reduction in the incidence of both Gram-positive and Gram-negative bacteria.