

Increased catheter-related bloodstream infection rates after the introduction of a new mechanical valve intravenous access port

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PURPOSE

The Johns Hopkins University Hospital, a 934-bed tertiary institution, used the Clave® connector, a split septum, internal cannula intravenous access port for 10 years. The hospital decided to switch to the SmartSite Plus®, a positive pressure, mechanical valve device to decrease the use of heparin flushes in central venous catheters (CVCs). After the change, the hospital's ICUs experienced a 60% increase in catheter-related bloodstream infections (CRBSIs). Pediatric units experienced even greater increases (79%), prompting the hospital to discontinue the SmartSite Plus and reinstate the Clave connector. This study compares the rate of CRBSIs in the two products over time.

MATERIALS AND METHODS

This descriptive, observational study analyzes the increased rate of CRBSIs in six adult ICUs and the Children's Center ICUs at Johns Hopkins over the period of April 1, 2004 to December 6, 2004 when the SmartSite Plus was in use. Results from this period were compared to the preceding period of January 2003 to March 2004 when the Clave was in use and the months following the reintroduction of the Clave in the Children's Center. Before and after rates of CRBSIs were compared by calculating an incidence rate ratio (IRR).

RESULTS

Over the period of SmartSite Plus use, CRBSIs increased by 79% in the Children's Center ICUs. Polymicrobial CRBSIs increased significantly. After the Clave system was reinstated, the CRBSI rate in the Children's Center decreased by 49%.

TABLE

Increase in CRBSIs after changing to SmartSite Plus and decrease after reintroduction of Clave connector system					
Rate of CRBSI's/1000 catheter days					
Connector	All ICUs	Children's Center	Pediatric ICU	Neonatal ICU	Pediatric Oncology ICU
Clave (1/03–3/04)	1.5	1.6	5.4	0.5	2.6
SmartSite Plus (4/04–12/6/04)	2.4	2.8	17.5	1.3	4.7
Clave (12/7/04–3/31/04)	NA	1.4	NA	NA	NA

CONCLUSION

Further study is needed to determine the association of internal mechanical valves with increased CRBSIs. The authors' finding of increased polymicrobial CRBSIs during the period the SmartSite Plus was in use "suggests that a reservoir of microbial contamination exists in or on these PPMV devices." Intricate access surfaces make such devices more difficult to disinfect and offer more opportunities for contamination than the split septum, internal cannula models. Despite the limitations of the study, the temporal association between the introduction of the PPMV device and the increase in CRBSIs is striking, particularly in the Children's Center. As well, discontinuing the device was temporarily associated with a 49% decrease in CRBSIs. Greater infection rates in pediatric populations may be the result of smaller volumes being infused to flush the catheter or more frequent use of CVCs to obtain blood samples from this population. The authors recommend carefully monitoring CRBSI rates after any change in infusion technology.