Protected Clinical Indication of Peripheral Intravenous Lines: Successful Implementation

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Abstract

Background: *A large, urban community hospital developed an insertion bundle to support the safe implementation of a policy of extended dwell time (clinical indication) for inpatient peripheral intravenous lines (PIVs).*

Methods: *Internal evaluation of practices through direct observations as well as evidence-based guidelines and historic data on PIV-related bloodstream infections helped drive the bundle elements. A surveillance plan was in place to continue measurement of these outcomes during the postimplementation period.*

Results: *At 12 months following implementation, the organization documented a 37% reduction (P = .03) in primary bacteremias (combining PIV and central line-associated bloodstream [CLABSI] infections) and a 19% percent reduction in PIV bloodstream infections. CLABSI rates were also reviewed, as 20% of CLABSI were noted to also have peripheral access present during the year prior to implementation. CLABSI standardized infection ratios for the publicly reported intensive care units decreased from 1.3 to 0.32 (P = .02). In addition, intravenous line start kit use decreased 48% during the year following bundle implementation.*

Conclusions: *Careful planning and development of an education bundle and an insertion bundle in a community hospital setting allowed for longer dwell times and a trend of decreased bloodstream infections.*

Keywords: *bacteremia, bloodstream infection, clinical indication, infection prevention and control, peripheral IV, prevention bundle*

Background

In February 2014, a community hospital located in northwest Indiana with 625+ beds launched a policy update on peripheral lines to extend the permissible dwell time from 72 to 96 hours to clinical indication for replacement. Infection control and nursing staff members collaborated closely to develop a policy and insertion bundle as well as an education bundle to support the goal of allowing extended dwell without increasing the risk of bloodstream infection.

The opportunity to address peripheral intravenous lines (PIVs) was identified based on internal infection control data. The 2011 versions of the Centers for Disease Control and Prevention Guidelines for the Prevention of Intravascular Device Associated Infections[1] and the Infusion Nurses Society Standards of Practice[2] served as the main sources to guide this change, as did both Cochrane reviews on the topic[3,4] and a review of existing literature performed by the authors. The hospital had 11 years of surveillance data regarding PIV-associated bloodstream infections to serve as baseline data and provide information regarding risk reduction opportunities. A cluster of primary bacteremias occurred on a unit of the hospital during the preimplementation phase. This highlighted additional prevention opportunities within the organization regarding PIV risk reduction.[5] Unlike many of the hospitals mentioned in the literature, our hospital does not have a vascular access team responsible for inserting and maintaining peripheral lines, so consideration of applicability to the bedside staff was imperative.

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The potential benefits of a switch from routine intravenous line restarts to those based on clinical indication are numerous, beyond our initial intent of improving the risk of bloodstream infection by implementing a protected clinical indication approach. Therefore, our bundle centered on reducing the unnecessary needle sticks associated with a 72-96 hour restart policy. Others have described cost savings in materials as well as staff time after implementing such a policy.[6] We also saw an opportunity for improvement in patient satisfaction by reducing the number of intravenous line restarts based solely on elapsed time.

Care and maintenance issues were addressed before implementation of the extended dwell time. Use of alcohol-impregnated caps had been added to policies for both central and peripheral lines 2 years prior.[7] Audits identified other opportunities for improvement, including dressing adherence and blood traces found in the bifurcation of the hubs. Staff members expressed difficulty with using the negative pressure caps. Infection control surveillance data were consistent with the literature findings identifying *Staphylococcus aureus* as a frequent pathogen[8] as well as emergency departments as targeted focus opportunities.[9]

Methods

Infection control and nursing staff members collaborated with key stakeholders throughout the organization to identify any concerns or possible barriers to implementation of this policy change. Members of the materials management team collaborated in developing an intravenous line start kit that met the goal of allowing safe extension of dwell time by providing products that address concerns regarding safe insertion and maintenance of a protected, intact dressing. This team also assisted in procuring catheters and related components that allow reduced manipulation and add-on devices as well as enhance safety (Table).

Preparation for the launch took approximately 6 months, during which time the organization reviewed existing professional standards and literature as well as internal policies and conducted practice audits to further refine implementation strategies.[1-13] PIV insertions were observed, staff huddles took place in case of the occurrence of infections, and patients with PIVs were rounded on by members of the infection control team, a nurse educator, and unit champions. Rounds included observations of dressing integrity and the presence of blood in connectors before the new policy was implemented. Follow-up monitoring included monitoring of appropriate product use for the new catheter, chlorhexidine gluconate sponge dressings, and securement dressings.

An education bundle was developed in conjunction with vendors of products included in the intravenous line start kit. Its purpose was to help staff members become confident and competent in implementing the changes made to the products being used. Intravenous line basics training for bedside staff was also provided leading up to the changes. Patient care leadership received education in advance of the policy launch to help reinforce the "why" behind the changes so they would be champions for staff as questions arose.

During the implementation, vendor clinicians assisted with product-specific training to bedside staff on every shift on each campus. Before the launch, continuing education intravenous line basics classes were offered that focused on insertion technique and site selection considerations. Additionally, during the early stages of policy development, we had an extensive practice audit conducted as a gap analysis between practice, policy, and evidence to further identify areas for improvement.

Our hospital is composed of 2 hospital facilities located 8 miles apart that operate under a single provider number. Implementation was launched first at 1 site and the following month at the other site to allow an intensive education presence for all staff throughout the hospital, on all shifts. The same process of collaborative rounding by content experts on the products being introduced took place at each campus. Follow-up monitoring for compliance and addressing questions continued postimplementation by hospital staff as well as vendor clinicians and representatives.

Bloodstream infection surveillance is conducted at our hospital following the Centers for Disease Control and Prevention National Healthcare Safety Network protocols. Bloodstream infections meeting the Laboratory Confirmed Bloodstream Infection event definitions were reviewed to determine which line types were present in the days before the infection. Those infections with only peripheral access were categorized as PIV-associated bloodstream infections using all the same attribution requirements that are in place for central line-associated bloodstream infections (CLABSIs) within the protocol.[11]

The medical staff and board of directors of our hospital are responsible for approving all infection control surveillance at the institution. The approval process takes place on an annual basis. The data reported are within the scope of this approval and did not require additional formal approval by an institutional review board.

Throughout the weeks and months following the policy change, members of the infection control team monitored any occurrence of bloodstream infection involving patients with peripheral access, as had been done at our institution for more than 10 years. Each infection was assessed to identify whether the policy of allowing extended dwell time was causing harm, or whether there were identified gaps in compliance with the expected policy elements that could represent continued needs for education or compliance monitoring. Each opportunity was addressed with the involved departments for clarification of any concerns and a review of the findings.

At the 12-month point (February 2014-January 2015), a statistical analysis was conducted to assess the influence of the policy outcomes. At 18 months, a further review of the process findings was undertaken to assess whether the policy actually resulted in practice changes at the bedside.

Results

Infection control surveillance data for primary bacteremia, which includes bacteremia with central lines as well as peripheral lines, showed a 37% ($P = .03$) reduction from 0.052 out of 100 patient-days to 0.033 out of 100 patient-days. When data were reviewed involving only peripheral lines (a smaller