Decreasing central line-associated bloodstream infections and associated costs using an in-house PICC-line team

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Context

The use of peripherally inserted central catheters (PICCs) has increased exponentially since they were first used to administer IV therapy in the 1980s. Today, PICCs are the second-most implanted central venous lines worldwide. There is risk of central line associated bloodstream infections (CLABSI) and an increased risk of deep vein thrombosis with the placement of PICCs. 1Furthermore, placing PICCs and treating ensuing infections or thromboembolic events are costly. Robinson et al. discovered that one in three PICC line requests was inappropriate, suggesting an opportunity exists to reduce costs and adverse health events. 2

Aim

This project aims to fulfill three goals:

1) Establish an in-house PICC line team comprised of currently employed, experienced nurses and give them the task of placing all PICC and PIV lines.

2) Decrease the number of PICC lines being placed and the CLABSI rates.

3) Determine the cost-effectiveness of interventions that could be used to reduce costs due to CLABSI associated with PICC line placement and then determine the benefit gained from employing the chosen intervention.

Intervention

An in-house PICC line team was created by working in conjunction with Bard, a medical device company and supplier of PICC line equipment, and a local hospital that had already established an in-house PICC line team. A timeline of this process is found on the upper right of the poster.

Three alternative models to reduce CLABSI rates associated with PICC and other central lines were developed and their costs and health benefit were assessed. A cost-effectiveness analysis of these three models was conducted. This study was conducted in a teaching hospital in Louisiana but the cost of treating a CLABSI was determined using national data. 2

✓ Model One: Continue to use the current outsourcing model where the hospital contracts with an external team to place the PICC lines by request 24/7.
✓ Model Two: Hospital trains an in-house team to place both PICC and PIV lines and also be responsible for the maintenance of these lines.
✓ Model Three: Hospital trains all of the nurses to insert PIV lines that can be placed in the upper arm. These would be an alternative for patients who are “hard sticks,” and would likely require a PICC line placement from the outsourced service.

Timeline

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<tr>
<th>April 2014</th>
<th>June 2014</th>
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<tr>
<td>- Developed policies, protocols, and dashboards necessary for an in-house PICC team</td>
<td>- Hired 3 experienced nurses already at Tulane to join PICC line team</td>
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<td>- Held interviews for PICC line team positions</td>
<td>- Team completed online and in person training with Bard, the medical device company</td>
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<td>May 2014</td>
<td>- Trained ER nurses in PIV placement using ultrasound</td>
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<td>- Worked with supply chain to identify necessary equipment</td>
<td>July 2014</td>
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<td>- All nurses competent in their respective roles</td>
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Results

This cost analysis suggests there are potentially significant cost reductions when employing models 2 and 3, compared to the current model. In this project, a combination of these two models were employed in creating the in-house team, so this analysis is not expected give a completely accurate prediction of the associated costs.

Conclusions

An in-house PICC line team was successfully created and initial data suggests there is already a decrease in the placement of PICC lines. However, more placement and infection rate data need to be collected before more solid conclusions can be drawn.

Based on our cost analysis, we found that:

Model 2 – the use of an in-house Vascular Access Team – could potentially bring some cost saving to the hospital, even in the worst-case scenario regarding the assumptions used.

Model 3 – training all hospital nurses to insert a new PIV line, - has some potential uncertainty especially when there is a low percentage of the inappropriate use of PICC line.

Next Steps

Monitor in-house team and CLABSI rates to determine the effectiveness of the new program.

Because of the potential uncertainty of Model 3, it is important to further investigate potential inappropriate uses of PICC lines.

Compare the in-house team’s PICC line placement rates to those of the outsourced team to determine the effects of differing incentive structures.

References