



## Peripherally Inserted Central Catheter (PICC) Use

### **Magnitude of the Problem**

Like traditional central venous catheters, PICCs are vascular access devices that terminate in the great vessels of the chest adjacent to the heart. However, unlike traditional central venous catheters, PICCs can be placed in veins of the upper extremity and are increasingly inserted by trained vascular access nurses. These properties allow for PICCs to be safely and conveniently inserted at the patient's bedside. As a result, use of PICCs has grown dramatically in hospitalized patients in the US and across the world.<sup>1, 2</sup> With growing use of PICCs has come the realization that some might not be placed for appropriate reasons.<sup>3</sup> For example, several studies have reported that PICCs placed in hospitalized patients are often idle (i.e., unused), forgotten about or placed for inappropriate reasons.<sup>4-6</sup> The goal of the HMS Peripherally Inserted Central Catheter Use Initiative is to improve the appropriateness of PICC use in medical patients at participating hospitals.

### **Complications Associated with PICCs**

The project is highly relevant given the potential complications associated with PICCs and widespread use in HMS hospitals. Based on survey data reported by HMS hospitals, approximately 40,000 PICCs were placed in a recent 12-month period, which results in an estimated 1,440 VTEs and 1,280 CLABSIs. Recent peer-reviewed literature suggests that PICCs are associated with CLABSI at rates that parallel those of traditional central venous catheters in both critical care and general ward settings. Since CLABSI is costly and associated with high morbidity and mortality, prevention of this complication should lead to significant safety and cost improvements. Similarly, published evidence suggests that PICCs are among the most important risk factor for deep vein thrombosis (DVT) in hospitalized medical patients. A systematic review of 62 studies found the risk of thrombosis related to PICCs to be 2.5-fold greater than that of CVCs. This risk is greatest in patients with cancer and those in critical care settings<sup>7-8</sup>. A key approach to preventing CLABSI and DVTs with PICCs and CVCs is limiting the number of lumens. Consideration should be given to using single lumens whenever possible.

### **Short Term Use**

Recent data from HMS shows that approximately 25% of the 10,000 PICCs placed in the consortium dwell for 5 days or less.<sup>9</sup> These findings of short-term use suggest that some PICCs might be unnecessary and potentially avoidable. Avoiding short-term PICCs may improve patient safety as a substantial proportion have been linked to complications.<sup>10</sup>

### **Use in Patients with Advanced Kidney Disease**

The use of PICCs in patients with advanced kidney disease (Stage IIIb or worse (estimated GFR < 45 ml/min), per the National Kidney Foundation), is contraindicated as these patients are more likely to progress to hemodialysis. PICC placement in such patients is the strongest risk factor for subsequent fistula failure and is contraindicated if renal replacement therapy is likely.<sup>11</sup> Exploring other options and working closely with Nephrology before using a PICC in a patient with advanced kidney disease is recommended.

### **Catheter Occlusion**

Catheter occlusion is one of the most common complications associated with PICC use. Although considered minor, catheter occlusion can have important consequences for patients including inability to use the device, delays in tests or treatment, and sometimes the need to remove and replace the device. Recent data from HMS shows that approximately 12% of the 14,000 PICCs placed in the consortium experienced a catheter occlusion during the life of the PICC.<sup>12</sup> These findings suggest that efforts to identify those at risk for catheter occlusion and prevent such events can not only help reduce costs, but might also substantially improve patient safety. Minimizing multiple lumen use is also an effective strategy to prevent rates of catheter occlusion.

### **Vascular Access Committee**

Numerous studies from the central venous catheter, CLABSI and VTE literature suggest audit and feedback of data regarding utilization and outcomes of central lines (including PICCs) can improve clinical outcomes. A multi-disciplinary team consisting of key stakeholders such as vascular access nursing, interventional radiology, critical care physicians, hematologists/oncologists, emergency room physicians, hospitalists, and leadership is suggested for maximal impact. Review of outlier cases (e.g., PICC < 5 days) as well as complications to understand how practice or safety can be improved is recommended.



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### References

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