

PREVENTION OF PICC AND MIDLINE OCCLUSIONS WITH THE CLC2000™



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Introduction

Jefferson Hospital is a 397-bed community hospital in suburban Pittsburgh. This full-service facility handles all healthcare needs except obstetrics/ maternity care. The nursing staff numbers approximately 450 and there are close to 500 physicians on staff.

Background

As Team Leader of 4 North Oncology & Infusion Services, it is part of my responsibility to motivate all team members to look constantly for techniques and new products that can improve patient care. Part of every manager's responsibility is to develop new approaches to procedures that will meet that goal. While the Infusion Center itself is an outpatient-driven area, Infusion Center nurses are responsible for IV therapy throughout the hospital. There are eleven nurses specially trained to handle PICCs and midline catheters for advanced infusion therapy. These nurses perform almost all PICCs and midline procedures.

The problem

In early 1999, we noticed a sudden increase in PICC and midline occlusions that occurred within 24 hours of insertion. If we had started five PICCs on one day, by the next day one or two were occluded. Regardless of whether the nurses were using the PICCs for lab draws for blood samples, starting a new line, or performing routine procedures, the clots kept occurring.

Prior to that time, we had been able to remove clots and restore patency with an antithrombotic. Unfortunately, those agents are no longer available, which meant we frequently had to perform new insertions. These new starts are not without their own problems. In many cases, by the time a physician orders a PICC line, there are often few viable veins. So if the first PICC has to be replaced, it can be a real challenge to insert a new line. If Interventional Radiology is needed for placement, that further increases patient cost but, more importantly, it causes aggravation and discomfort for the patient. We were also concerned about the possibility of extended hospital stays to accommodate treatment delays due to malfunctioning lines. For these compound and related reasons, we began seeking alternative solutions to our occlusion problem.

Searching for solutions

Networking with local and nationwide colleagues revealed an ongoing problem with clots in vascular access devices. Generally, the perception was that the only recourse was to remove the line and insert a new one. However, research did turn up mention of the CLC2000™ from Abbott Laboratories.¹ This small device creates positive pressure when a syringe is removed from the line. It forces the flushing solution through the catheter distally and prevents venous blood from being drawn into the catheter when the syringe is disconnected.

¹The ICU CLC2000 is distributed by Abbott Laboratories.

Through my efforts as charge nurse in the Infusion Center (my position at the time I started the study), my manager, and in collaboration with Materials Management, the CLC2000 was brought in for demonstration. Afterward, the infusion staff obtained sample CLC2000 devices for evaluation purposes. Because the nurses responded favorably to the product, a performance improvement monitoring tool was developed for evaluating the CLC2000 under study conditions.

Monitoring CLC2000 performance

A monitoring tool was devised for tracking dwell time and end result of PICCs and midlines inserted by the Infusion Center nurses. A sample size of 50 was agreed upon, with the results to be analyzed every quarter. Of these 50 patients, approximately 95% were inpatients. The percent ratio of PICCs to midlines was 80:20. Lines were usually placed in the hospital setting, but some patients continued to be evaluated as outpatients in the Infusion Center.

Before the study began, in-service sessions were held to demonstrate the use of the CLC2000. The product was easy to learn. The main differences were the need to prime the device ahead of time and the need for slightly more manipulation to attach a syringe. Daily use allowed the nurses to

become comfortable with the product in a short period of time.

As with all new products, there was some initial resistance to change. Today, the nurses cannot imagine functioning without CLC2000 because it has minimized labor, expense, and patient discomfort. It has virtually eliminated the inconvenience associated with PICC and midline reinsertions.

The evaluation process was started in the first quarter of fiscal year 2000 (July-September of 1999). In August, we started using the CLC2000 with all PICC and midline insertions. Data was collected for 2 quarters on every PICC and midline inserted by the Infusion Center nurses.

The cost story

Cost benefits were seen on many fronts. By eliminating catheter occlusions with CLC2000, we saved \$22,338 in the period from August to December 1999, including approximate savings of \$13,338 for materials and \$9,000 for labor.

As a result of this study, we added the CLC2000 to every PICC and midline procedure. In fact, the inexpensive device was incorporated into all central lines for infusion therapy in the hospital. The savings were tremendous because it costs on average \$2,000 for a surgeon to implant a port.

Monthly Summary of Data Collection: July through December, 1999

Vascular Access Devices (PICC and Midline Catheters)

Measurement of Outcomes after Insertion by Infusion Nurses

| Data Collected | July 1999 | August 1999† | September 1999 | October 1999 | November 1999 | December 1999 |
|---|-----------|--------------|----------------|--------------|---------------|---------------|
| PICCS & midlines inserted | 16 | 17 | 17 | 17 | 16 | 17 |
| VAD* clotted within 24 hours of insertion | 5 | 1† | 0 | 0 | 0 | 0 |
| Therapy completed or discharged to home for completion of therapy | 6 | 11 | 12 | 14 | 15 | 14 |
| Miscellaneous causes for VAD failure | | | | | | |
| —Pulled out by patient | 2 | 2 | 1 | 1 | 1 | 1 |
| —Patient death | 2 | 2 | 3 | 2 | 0 | 1 |
| —Leaking or painful | 1 | 1 | 1 | 0 | 0 | 1 |
| Total | 16 | 17 | 17 | 17 | 16 | 17 |

*VAD = Vascular Access Devices.

†CLC2000 was implemented in August, 1999. The single occlusion in August occurred just prior to CLC2000 use.

Our initial study focused solely on PICCs and midlines, so other data from central lines is not included in our study. However, we estimate the overall savings to the hospital from widespread use of the CLC2000 to be \$75,000 in that same six-month period.

Infection control issues

The infection rate at Jefferson has been historically low and was not tracked as part of this study. Since the introduction of the CLC2000, the infection rate has remained constant or slightly declined. The elimination of retrograde blood flow is a contributing factor. Less opening of the line and manipulation all around also reduce the chance to introduce infection.

Successful resolution

The addition of the CLC2000 had a significant impact on the clinical outcomes of our patients with Vascular Access Devices (VAD). In July 1999, prior to introducing the CLC2000, we removed six VADs due to occlusion. After adding the CLC2000, occlusions were not only eliminated in the first 24 hours, but these same results continued for the remainder of the quarter and into the next. These results have had a significant impact on improving patient care.

As a result of our experience with PICCs and midlines, we added the CLC2000 to every patient with central lines, and included the CLC2000 as a component of all implanted ports, tunnel catheters, and general triple lumen lines.

The CLC2000 is an easy, affordable, and extremely reliable device to use on PICC and midline procedures. The data support our conclusions and made a compelling case for adopting it throughout the institution for all central line infusion therapies. There is simply no reason not to use a device such as the CLC2000 to prevent a problem that can be dealt with so easily and affordably.

