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W I N T E R 2 0 0 0

PREVENTION VS. TREATMENT OF VAD OCCLUSIONS

C H E R Y L L E N H A R T , R N

Introduction

The management of central venous access device occlusions became a significant patient, physician and nursing staff dissatisfier two years ago in our medical outpatient center. On average, twelve patients per day received blood products, intravenous (IV) medications and solutions, and/or blood analysis via central venous access devices (CVADs). The center's nursing policy dictated that patency of the CVAD had to be verified by blood return prior to the beginning of any infusion. If blood return could not be obtained, the registered nurse (RN) caregiver was directed to reposition the patient to relieve any pressure on the cannula of the device, instill a normal saline solution, instill an antithrombotic agent

(twice, if the first instillation was not successful), perform a venogram, and (if all the previous procedures did not clear the obstruction) remove and/or replace the CVAD.

A review of records noted that an occlusion rate of 3% was realized in patients provided for by the outpatient center. Since the treatment of an occluded CVAD caused delays in continuing with the patient's treatment, increased the cost of the treatment with the purchase of supplies needed to re-establish device patency, increased the risk of device-related infection due to multiple entries into the device, and increased the potential of problems associated with removal or replacement of the device, both patients and physicians began to question the nurs-

ing policy on occlusions. While the RN caregivers were sympathetic to these concerns, the RNs believed that the consequences of not confirming patency of a CVAD contained a higher risk to the patient.

Even though mechanical and non-thrombotic occlusions were present in the patient population served by the outpatient center, the majority of the occlusions were caused by thromboses, either fibrin sleeves or tails, blood clots occurring within the cannula of the CVAD or blood clots occurring along the wall of the device's cannula.

Recently an anti-reflux device, the CLC2000 Adapter (ICU Medical, San Clemente, CA), has become available. This small, inexpensive device creates positive pressure when a flushing

syringe is removed from the cannula of the CVAD, forcing the flushing solution through the catheter. This action prevents venous blood from being drawn into the cannula of the CVAD when the flushing syringe is disconnected. The nursing staff of the outpatient center decided to assess the results of using this device component against the historical pattern of occlusion rates for CVADs.

Pilot Study

Nurses began using the CLC2000 Adapter in the outpatient center and over a short period of time began to notice a reduction in the incidence of CVAD occlusions, including occlusions associated with implanted ports. Based upon these results, use of the adapter was expanded to all inpatient nursing units (excluding pediatrics and neonatal intensive care units). While preliminary results did not mirror those seen with the outpatient center patients (possibly due to inconsistency in placement of the device and/or premature removal of the device in these other parts of the hospital), efforts were made to increase hospital-wide use of the CLC2000 Adapter to all nursing staff, physician office personnel, and homecare nurses. The hospital's nursing division approved a policy and procedure for use of the adapter.

Nursing Research Study

With the occlusion rate, number of venograms performed for confirmation of device placement, and number of device replacements continuing to decline in the outpatient center, interest came to initiate a Nursing Research Project to determine whether the CLC2000 Adapter would reduce the incidence of occlusions in CVADs used in the Medical Short Stay Center (MSSC) by preventing the retrograde flow of blood in the lumen of cannulae of devices. A data collection form was developed and 49 patients with intermittent-use CVADs were followed for a total of 500 access procedures in 180 implanted ports, 160 peripherally inserted central venous catheters (PICCs), and 160 central venous catheters (CVCs).

Results

Occlusion Rate

A considerable decrease in the incidence of cannula occlusion, venograms, line removal/replacement, and total complications was noted with the use of the CLC2000 Adapter. Prior to the use of the Adapter, the MSSC recorded an occlusion rate of 3% (3 occlusion events for every 100 accesses or 98 events per year) as contrasted to an occlusion rate of 1% (1 occlusion event for every 100 accesses) with the use of the CLC2000 Adapter. Similarly, with the use of the Adapter no venograms for line patency, no line replacements, and no complications were noted in these 49 patients.

Infection Rate

In the midst of the Nursing Research Project, infection control monitoring noted a reduction in the incidence of device-related infections in the MSSC. During the monitoring period the only change in procedure was use of the CLC2000 Adapter. Infection control was asked to perform a retrospective review of the infection events and reported that in the year prior to the use of the CLC2000 Adapter, 19 patients had device-related infections as contrasted to only 9 patients with a line infection during the year that the CLC2000 was used. Certainly there is insufficient data to determine whether the Adapter directly prevented CVAD infections; however, use of the Adapter did reduce the number of manipulations and the amount of handling of the devices. For example, in order to dislodge or lyse a thrombus, typically one needs to instill saline, heparin or antithrombolytic agents repeatedly. The increased incidence of manipulation of CVAD increases the potential for introduction of infectious agents, so any reduction in the need to gain access to the CVAD line may have a positive effect on infection control.

Cost-Savings

Prevention of CVAD occlusions has a direct impact upon the cost of IV therapy. Based upon the use of the

CLC2000 adapters in the MSSC, we estimate that there has been a savings of over \$40,000 per year, and this figure does not include any savings realized by not treating (that is preventing) line sepsis. Hospital savings for inpatient units in the hospital are estimated at double that found in the outpatient center, while savings in the oncology clinic and home care units are estimated to at least match the savings in the MSSC; therefore, an overall savings of up to \$200,000 is projected (as long as compliance in using the CLC2000 devices is maintained throughout the course of the patients' treatments, as has been done in the MSSC). The ability to reduce patient care costs in a fixed pricing payment environment benefits all associated with the patient's care.

Conclusion

The impact that the CLC2000 Adapter has had on patient and physician satisfaction of catheter occlusion has been large. Manager involvement in nursing and physician disagreement on management of occluded catheters has disappeared. Not one telephone call has been received from an unhappy patient or family member due to occlusion-related treatment delays, and no longer does someone ask who will pay for the techniques necessary to clear clotted catheters. Two years ago these situations and responses were a weekly event and accounted for much time and energy spent in attempting to solve the complex problems associated with managing occlusions of vascular access devices.

The much easier task of preventing catheter occlusions can be accomplished through astute nursing observation of the catheter itself, using correct and consistent flushing techniques, and, most importantly, using the CLC2000 Adapter on all intermittent-use central venous access devices. ♥

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