



Maintaining Central Venous Catheter Patency in Oncology Patients with Pulsatile Push-Pause Saline Flush Technique: A Pre-Post Intervention Study

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Introduction

- Central venous catheters (CVC) are crucial in cancer patients, as they facilitate medication administration and provide convenient intravenous access. However, these port sites may become occluded which requires intervention and has the potential to cause delays in treatment.
- Traditionally, patients at the AtlantiCare Cancer Care Institute (ACCI) received indwelling heparin with a saline flush to maintain CVC patency. However, heparin can lead to serious complications such as heparin-induced thrombocytopenia, and some people prefer not to receive heparin due to religious beliefs.
- In the event of an occlusion, in order to restore normal functioning of the CVC, the ACCI administers thrombolytic agent Alteplase (Cathflo) injections.
- The ACCI transitioned from indwelling heparin with saline flushes to saline flushes alone utilizing pulsatile push-pause technique in October 2023.

Objectives

The objective of this retrospective study is to assess the effectiveness and financial impact associated with the transition from indwelling CVC heparin with saline flushes to saline flushes alone utilizing pulsatile push-pause technique at ACCI.

Methods

- A drug utilization report was generated by Cerner Discern Analytics, which identified and included patients who received the thrombolytic agent Alteplase to restore catheter patency, pre-transition from October 2022 to September 2023 or post-transition from October 2023 to September 2024. Alteplase use for catheter clearance indicated the presence of a CVC occlusion.
- Included patients were those with a CVC being followed at the ACCI within the studied timeframes. The data will be compared pre and post intervention utilizing a chi-squared statistical analysis with $\alpha = 0.05$. and non-inferiority margin at 5%. Approval by the institutional review board was obtained.

Methods: Push Pause Technique

- Registered nurses were educated on the proper technique and the instructions below were given.
- Before each flush, providers must put on non-sterile gloves and scrub the injection cap for 15 seconds with a new alcohol wipe, using friction.
- Allow to dry for 15 seconds until completely dry.
- A 10 mL syringe or larger should always be used, as smaller syringes may cause too much pressure and damage the line.
- First, push a little solution, pausing for 1 to 2 seconds, then push a small amount of solution, pause, and so on. Leave about 1 to 2 mL in the syringe to prevent reflux.

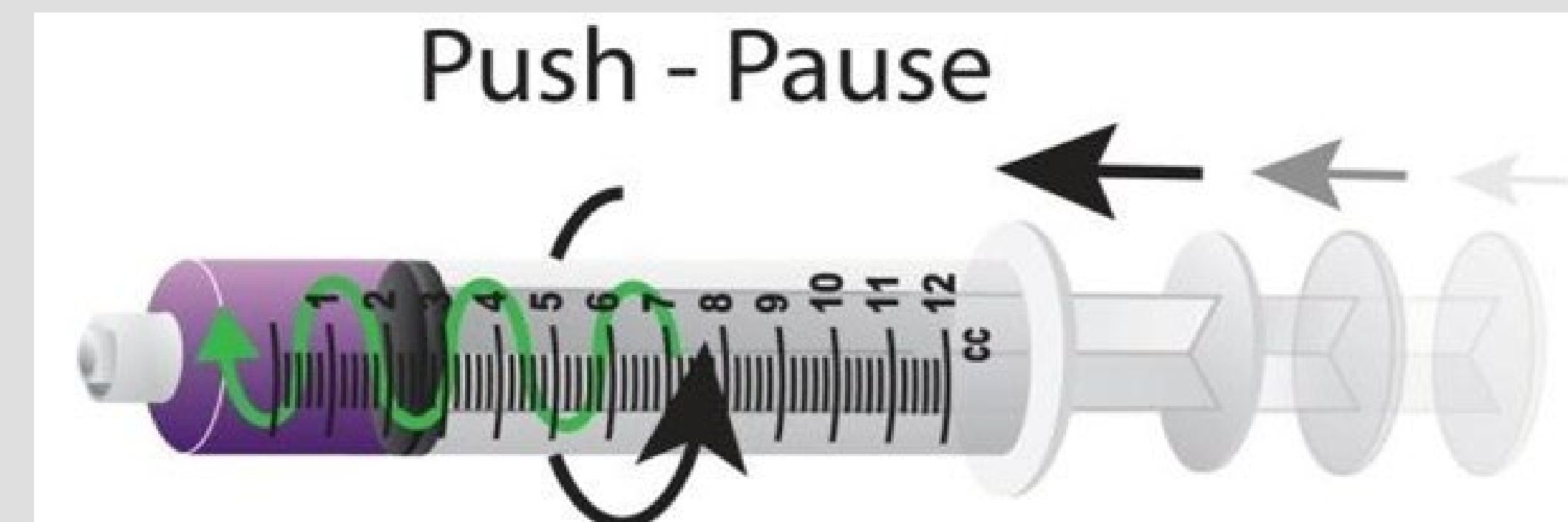


Figure 1: Economic Evaluation

	Pre Intervention (n=16,699)	Post Intervention (n=17,296)
Flush Cost (heparin \$0.84/syringe)	\$18,052 heparin & saline	\$4,151 saline alone
Alteplase Cost (\$165.96 dose)	\$8,132	\$8,962
Total Cost:	\$26,184	\$13,113

Cost Savings with Intervention: \$13,071

Results

Table 1: Pre and Post Intervention Results

	Pre intervention	Post intervention	Analysis
CCI Encounters	16,699	17,296	↑ 3.5%
CVC Occlusions	49	54	p = 0.75
Occlusion per encounter	0.3%	0.3%	

Discussion

- The incidence of CVC occlusions was determined by the number of Alteplase administrations. No difference was found for CVC occlusions between the pre-intervention and post-intervention groups, $p = 0.75$. Overall, the rate of occlusions per encounter was the same before and after our intervention, at 0.3%, determined non-inferior. (**Table 1**)
- A total of \$13,071 was saved following the implementation of saline flushes with a pulsatile push-pause technique. (**Figure 1**)
- By employing the pulsatile push-pause method at the ACCI, we successfully reduced costs for both our patients and the institution. There was no increase in CVC occlusions after the transition while avoiding potential heparin-related adverse events and maintaining efficacy.

Conclusion

Study findings demonstrate that our intervention was successful in reducing costs to both patients and the institution while maintaining efficacy as there was no increase in CVC occlusions post-intervention.