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Retrospective, Multicenter Study of Catheter Complications in Outpatient Parenteral Therapy with Known Vesicant Properties

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Introduction/Background

Catheter-related complications (CRCs) are commonly reported as access device events (ADEs) in outpatient settings that require attention and management by healthcare providers and pharmacists. There are debates about whether parenteral therapy with known vesicants have direct correlation to CRCs, including both central line-associated bloodstream infections (CLABSI) and non-infectious CRCs (Non-CLABSI) such as venous thromboembolism (VTE), catheter occlusion, dislodgement, leaking, skin integrity impairment, or unplanned removal.[1]

According to CDC and IDSA practice guidelines, CRCs are considered a preventable measurement if providers can recognize infusion agents with known vesicant or potential irritant properties, and deliver these agents via appropriate intravenous catheters for administration.[2-4] Vesicants are defined as medications capable of causing blistering, tissue sloughing, or necrosis when they escape from the intended vascular pathway into surrounding tissue, typically with pH ≤ 5 or ≥ 9 or osmolarity ≥ 900 mosmol/L.[5]

Purpose/Objectives

This study will examine ADEs in relation to 5 investigated parenteral medications or therapies, namely, parenteral nutrition (TPN), doxycycline, vancomycin, piperacillin/tazobactam, and daptomycin. The purpose of this study is to improve patient centered care among healthcare providers, and to increase safety in a home-based outpatient setting of patients who receive parenteral therapy with known vesicant properties. Another objective of this study is to compare catheter-related complications between peripheral and central venous accesses, and parenteral medications

Original Research Study Methods

A retrospective randomized analysis was performed with a total of 29 states with 39 care management centers (CMCs). Data was obtained from electronic medical records with dates ranging from September 1st of 2018 to September 1st of 2019. Inclusion criteria include patients who are of age 18 or older, who had peripheral catheters (e.g. PIV or midlines) or central venous catheters (e.g. PICC), and were administered at least one of the 5 parenteral medications. Exclusion criteria included pediatrics, patients on chemotherapy, and with no catheter access information.

Mann Whitney U-test was used to compare CLABSI and Non-CLABSI events in patients on parenteral medications. Additionally, incidence of adverse events was compared between patients with central line vs. peripheral line catherizations using the same non-parametric statistical test.Chi-Squared comparisons were performed to evaluate if patients with central or peripheral catheterizations were more susceptible to CLABSI or Non-CLABSI adverse events. Statistical significance was set at p<0.05.

Figure 1: Summary of Events based on Catheter-Related Complications

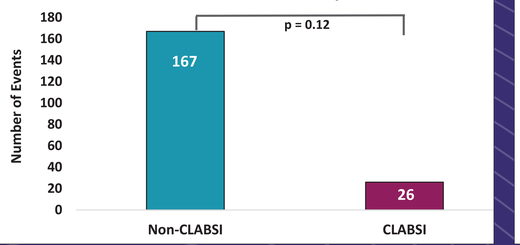


Figure 2: Summary of Events based on Line Type

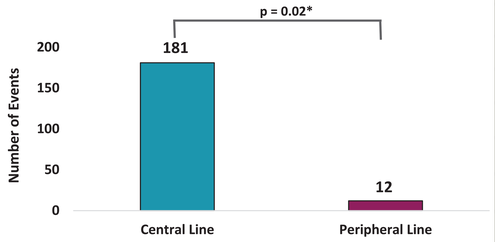


Figure 3: Summary of Events based on Central Line Administration and Onset of Events

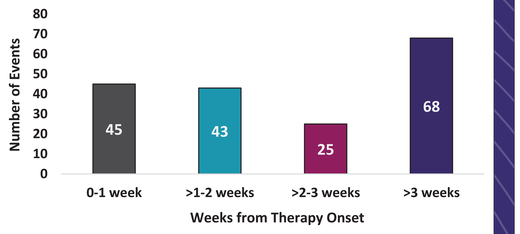
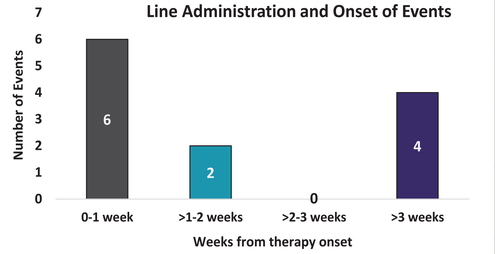


Figure 4: Summary of Events based on Peripheral Line Administration and Onset of Events



Results

A total of 193 ADEs (mean age, 54 years), randomly selected between CLABSI and non-CLABSI in patients with central and peripheral lines were evaluated. Overall, 26 out of 193 ADEs were categorized in CLABSI group and 167 ADEs were in non-CLABSI group. Our results indicated that adverse events in CLABSI vs. Non-CLABSI patient groups were not significantly (p=0.12) different [Figure 1]. Of the 193 recorded ADEs, 181 ADEs had central line, and 12 ADEs had peripheral line, patients with peripheral line catheters demonstrated significantly (p<0.05) lesser number of adverse events as compared to patients with central line catheterization [Figure 2]. Interestingly, both central and peripheral lines did not impact incidence of CRCs significantly (p=0.23).

Based on 181 ADEs in central line group, 24.8% (45) ADEs occurred in ≤ 1 week, 23.8% (43) ADEs occurred between >1 to 2 weeks, 13.8% (25) ADEs occurred between >2 to 3 weeks, and 37.6% (68) ADEs occurred >3 weeks [Figure 3]. For peripheral line cohorts (12), 50% (6) had reported events within ≤ 1 week, another 16.7% (2) reported events between >1 to 2 weeks, and 33.3% (4) ADEs occurred >3 weeks after onset of therapy [Figure 4].

Discussion

No associations were observed between non-CLABSI catheter-related complications and the 5 investigated therapies. However, our results suggest that these therapies seem to exacerbate and promote adverse outcomes in patients with central line catheters. Although statistical significance was not achieved in CLABSI group, ADE reports show that a majority of cases were found with vancomycin, daptomycin and piperacillin/tazobactam patients.

Conclusion

In this study, the majority of ADEs found in patients who had central lines occurred 3 weeks from therapy onset. Due to lack of association between the non-CLABSI CRCs group and the 5 investigated therapies, short-term use of a peripheral line (less than 1 week) could be considered if the drugs have osmolarity < 900 mOsmol/L, no precautionary information already available, and/or after assessment for potential for tissue damage.[5] A future study should be performed to evaluate more patients and closer examination of catheter care regimens used.

References

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Disclosures

Authors of this presentation have the following to disclose concerning possible financial or personal relationships with commercial entities that may have a direct or indirect interest in the subject matter of this presentation: Titpisot Vorn, Gene B. Decaminada, Maria Giannakos, Darcy Schreier, Ibtissam Ouardani, Uddyalok Banerjee; Nothing to disclose.

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