Observational in-vivo evaluation of the Neutron™ needlefree neutral displacement connector and its effects on catheter occlusions in a home care setting

Background

To help reduce the incidence of catheter occlusions among central line patients in a home care setting, Sharp Home Care in San Diego, CA implemented a three-month trial of the Neutron™ needlefree neutral displacement connector (ICU Medical, Inc.). The Neutron needlefree vascular access device is designed to prevent fluid displacement from the four known causes of displacement associated with needlefree connectors: Connection or disconnection of a luer, syringe plunger compression, patient vascular pressure changes (ie, coughing or sneezing), and IV solution container run-dry, which may cause multiple forms of reflux into a catheter.

The innovative design of the Neutron device utilizes a unique design that integrates anti-reflux technology into an intuitive, easy-to-use, needlefree connector design. Other technologies currently on the market are limited in their ability to effectively address all causes of reflux. Positive displacement needlefree IV connectors, for example, only impact blood reflux caused by connecting and disconnecting a syringe or an administration set.

Methods

Sharp Home Health is part of the Malcolm Baldridge Quality Award-winning Sharp Health System. The group serves a more elderly and high acuity patient population than that of its sister group, Sharp Home Infusion Services. In addition to chronic pain management therapy, IV antibiotics administration, and total parenteral nutrition (TPN) patients, Sharp Home Health treats many patients, including chemotherapy patients and those suffering from Crohn's disease, whose treatments leave them more susceptible to blood clotting and catheter occlusions.

Prior to converting from the MaxPlus™ positive displacement needlefree connector to the Neutron needlefree connector on all central line catheters, the clinical team at Sharp tracked occlusion management patients and reported three months of baseline data that included both the total number of occlusion patients and the percentage of the total population that these patients represented. When converting to Neutron, there were no other changes made to clinical protocol—such as clamping, flushing, or swabbing—and no additional technology changes were made so that the only variable pre- and postconversion would be the connector itself. After converting to Neutron, the clinical team gathered three months of occlusion data in the same way they had prior to conversion.

Evaluation Outcome

In the three months following conversion to the Neutron catheter patency device, Sharp Home Health experienced a 50.7% reduction of catheter occlusions. In the three months prior to conversion, the average catheter occlusion rate with MaxPlus was 32.9%. The average occlusion rate in the four months following conversion to Neutron was 16.2%. The transition month of July was not counted in these results because during that month patients had a mix of MaxPlus and Neutron connectors attached to their catheters.

Table

	Max Plus				Neutron		
	April	May	June	July	August	September	October
Occlusion Management Patients	7	7	12	6	8	7	8
Total Patients	22	31	27	26	52	43	47
Occlusion Percentage Rate	31.8	22.6	44.4	23.1	15.4	16.3	17.0
Average MaxPlus Occlusion Percentage Rate			32.9%				
Average Neutron Occlusion Percentage Rate			16.2%				
On Average Neutron Lowered Occlusion Rates			50.7%				

The clinicians leading the Neutron connector trial reported that there is a 1:1 relationship between the reduction of catheter occlusions and the use of a tissue plasminogen activator (tPA) to break down blood clots and maintain catheter patency. Accordingly, the Neutron was able to contribute to a 50.7% reduction in the use of tPA with this patient population.

Conclusion

The Neutron needlefree neutral displacement connector can help enhance patient care and safety by reducing the risk of catheter occlusions, allowing clinicians to minimize delays in therapy and procedures and decreasing the need for and risks of expensive declotting agents such as tPA to maintain catheter patency.

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human connections