PURPOSE:
To ensure neonatal Total Parenteral Nutrition (TPN) is ordered, monitored and administered in a safe, consistent manner to increase positive patient outcomes and ensure the appropriate utilization of resources.

POLICY:
Parenteral nutrition should be used for the compromised neonate that is unable to tolerate enteral feeds or as a supplement to enteral feeds. It is commonly used in patients with necrotizing enterocolitis. Neonates unable to have oral intake for greater than 3 days after birth should be considered.

A Paediatrician may order neonatal parenteral nutrition. They will initiate this by completing the **Neonatal Total Parenteral Nutrition Order Set**

Completed order sets must be faxed to pharmacy no later than 1300h for same day administration.

TPN must be refrigerated after manufacturing but removed from fridge 30-60 minutes prior to administration.

TPN will be inspected by the nurse at the time of administration and periodically throughout administration for any signs of separation, discolouration or oily appearance (cracking)

Administration of TPN starts at 1700h daily. TPN must be administered via a dedicated infusion port and filtered using a 1.2 micron in-line filter at all times. Discard any unused volume after 24 hours. TPN solutions will be changed q24hrs. IV sets infusing Lipids will be changed q24hrs. IV sets infusing Amino Acids will be changed q96hrs. The two lines are joined with a Y-connector that will be changed q24h. All bags and tubing disposal can be in regular garbage container and fluids will be disposed of in the hopper not the sink.

TPN will be administered preferably via an Umbilical Venous (UV) line or PICC line but a peripheral line may also be used. TPN will be set up using strict aseptic technique. TPN will be administered with an infusion pump.

Pre TPN blood work may be done before the infusion is started. Routine blood work as ordered on the TPN order set or as otherwise ordered by the Paediatrician. Urine for Glucose will be collected times 3 days after start of TPN and sent to lab. Monitoring of lipid level is by triglyceride level as ordered.

Multi-12/K1 paediatric multivitamin 5 mL added to one 250 mL bag every 24 hours, if infused in less than the 24 hour period a bag of Amino Acids without the Multi-Vit will be made available for remainder of 24 hour period. Pharmacy will call daily for TPN infusion rate. (Neonate to receive only 1 bag of Amino Acid with Multi-Vit in 24 hour period) Lipids are available as a 20% oil-based emulsion.

Responsibility:
The Paediatrician will:
- Complete the Neonatal Paediatric Total Parenteral Nutrition Order Set on initiation and with any changes made to TPN constituents or rates
- Review and assess patients ongoing TPN needs

Registered Nurses will:
- Complete Central Venous Access Device Learning Package and Competency Assessment
- Complete Peripheral Vascular Access Therapy Learning Package and Competency Assessment

Equipment:
1. Sterile towel, gloves and mask
2. TPN solutions prepared from Pharmacy ie: Amino Acids and 20% Lipids (fat emulsion)
3. 2 IV Solusets
4. 1 IV 1.2 micron filter
5. TPN extension set (Y tubing)
6. Chlorhexidine 2% swab

Method:

1. Review physician's orders, eMAR and content label of TPN solution and rate of infusion. Each component must be verified with physician's orders
2. Gather all supplies and equipment
3. Wash hands and don mask
4. Place sterile towel on surface
5. Open IV sets, filter, and Y-tubing and set on to sterile towel
6. Put on sterile gloves
7. Connect IV tubing to TPN solutions and flush lines
8. Attach filter to Amino Acid line
9. Flush each line through y-connector
10. If changing TPN solution, pause infusion device, remove old TPN administration set, and cleanse IV connector port.
11. If starting TPN for the first time, flush and cleanse IV connector port.
12. Insert TPN infusion tubing into infusion device and start TPN infusion rate as ordered.
13. Attach to patient IV site
14. Discard old supplies and perform hand hygiene
15. Document the procedure in the patient health record
16. Complete daily assessments and monitoring for patient for signs and symptoms of TPN related complications

Special Considerations:

All IV bags will be labelled with date and time when hung. Labels will be double checked by 2 staff and signed electronically on eMAR.

All Amino acid/dextrose solutions to be stored in the refrigerator in NICU. Remove from refrigerator approximately one hour prior to hanging. Lipids are stored at room temperature.

Ensure no drugs or additives other than those on order set be added to TPN solutions or lines. Medications should be added as close as possible to the entry site. Flush Y-connector pre and post medication infusion. **IV Compatibility Chart:** Go to LEXICOMP and select IV compatibility on toolbar and search by entering medication in space provided.

Ensure a constant TPN rate as ordered using infusion pump. If the infusion slows down for any reason, adjust the rate as ordered but do not attempt to catch up.

Ensure blood samples are not obtained from the same port as TPN.

The insertion site will be inspected hourly. Report any signs of infection, phlebitis, edema or abnormal blood results to physician. Check and record volume infused q1h.

Complications of TPN: 1) Sepsis
2) Extravasation of fluids
3) Metabolic Complications - metabolic acidosis
- hyperammonemia
- increased serum osmolality with hyperglycemia and glycosuria
- mineral deficiencies

Associated Documents:

Neonatal Total Parenteral Nutrition Order Set
Neonatal/Paediatric Heparin Infusion and /or Saline Flushing of Vascular Devices Clinical Protocol

References:

CDC, (2011) *Guidelines for the Prevention of Intravascular Catheter-Related Infections.* Retrieved from https://www.cdc.gov/hicpac/bsi/bsi-guidelines-2011.html

CDC, (2002) *Appendix B, Summary of Recommended Frequency of Replacements for Catheters, Dressings, Administration Sets, and Fluids.* Retrieved from *http://www.cdc.gov/MMWR/preview/mmwrhtml/mm5132a9.htm*

Hospital for Sick Children. (2007). *Guidelines for the Administration of Enteral and Parenteral Nutrition In Paediatrics*. 3rd ed. Retrieved from http://www.sickkids.ca/pdfs/Clinical-Dietitians/19499-Enteral_Parenteral_Nutrition.pdf

Perry, A., Potter, P., & Ostendorf, W. (2017) Clinical Nursing Skills and Techniques (9th ed.) Mosby.

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