



Effective use of Extended Dwell Peripheral Intravenous Catheters in Neonatal Intensive Care Patients

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- We have no financial relationships

Early Obstacles and Challenges of Vascular Access Team

Minimal options for vascular access devices

Untrained specialty practitioners

Minimal understanding of the products and techniques

Lengthy 2-year process to develop each team member

Changes in neonatal population



Types of Vascular Access Devices Used in the NICU

- Peripheral Intravenous Catheter (PIV)
 - Placed at bedside by RN
 - Average dwell time is 24 hours
- Umbilical Venous Catheter (UVC)
 - Placed using maximum sterile barriers (MSB) at the bedside typically on DOL 1 by physician or neonatal nurse practitioner (NNP)
 - Remains indwelling for up to 10 days
 - Average dwell time is 7 days
- Peripherally Inserted Central Catheter (PICC)
 - Placed using MSB at the bedside by trained RN or physician/NNP
 - Can be in place for entire length of treatment
- Surgically placed CVC
 - Placed surgically in the OR
 - Can be in place for entire length of treatment

Complications of Vascular Access Devices in the NICU

- PIV
 - High risk of infiltration, leakage, occlusion, or dislodgement
 - Inability to infuse vital vesicant nutrition and/or medications
- UVC
 - High incidence of inability to insert catheter to proper position
 - Open insertion site increasing risk of infection
 - Potential of migration in or out
 - Can only remain indwelling for a short period of time
- PICC
 - Inability to insert catheter due to vascular depletion or vascular size
 - Risk of blood stream infection
 - Potential for mechanical phlebitis that doesn't resolve
- Surgically placed CVC
 - Requires transport to OR for insertion
 - Risk of central line infection

EPIV: Extended Dwell PIV

- Used for infants with difficult vascular access (DIVA) who need short term IV fluids or medications
- Placed using maximum sterile barriers (MSB) but NOT a central line
- Can be placed by a trained RN at the bedside
- Decreased number of IV attempt sticks
- Less risk of blood stream infection
- Less risk of infiltration when compared to PIV
- Less risk of mechanical and chemical phlebitis
- Can be in place for up to 29 days

Outcomes Associated with EPIV Catheter Implementation PIV vs. EPIV

Initial Hospital-based Study

- 61 newborns total
- 376 total intravenous catheters placed (PIV and EPIV)
- 306 PIV vs 70 EPIV catheters

Results

- 15% of PIV catheter placements required 3 or more attempts compared to 1% of EPIV catheter placement attempts
- EPIVs had longer dwell time when compared to PIV (3.5 vs. 1)
- EPIVs had fewer complications overall when compared to PIVs ($p < 0.001$)
- EPIVs had a higher incidence of leakage vs PIV (24% vs 17%)
 - Implementation of cyanoacrylate glue decreased incidence to 8%
- No weight or gestation age requirements: If the vein diameter can accommodate a 1.9/2.0 Fr catheter an EPIV can be used

EPIV Limitations

- Requires specialized training for placement
 - the wide range of inclusion criteria increases the number of placements however there are fewer practitioners qualified to place catheter
- High incidence of leaking
 - Implemented use of securement device to prevent movement at the insertion site
 - Implemented to use of cyanoacrylate glue at the insertion site during insertion and with each dressing change

How to Choose the Right Vascular Access Device

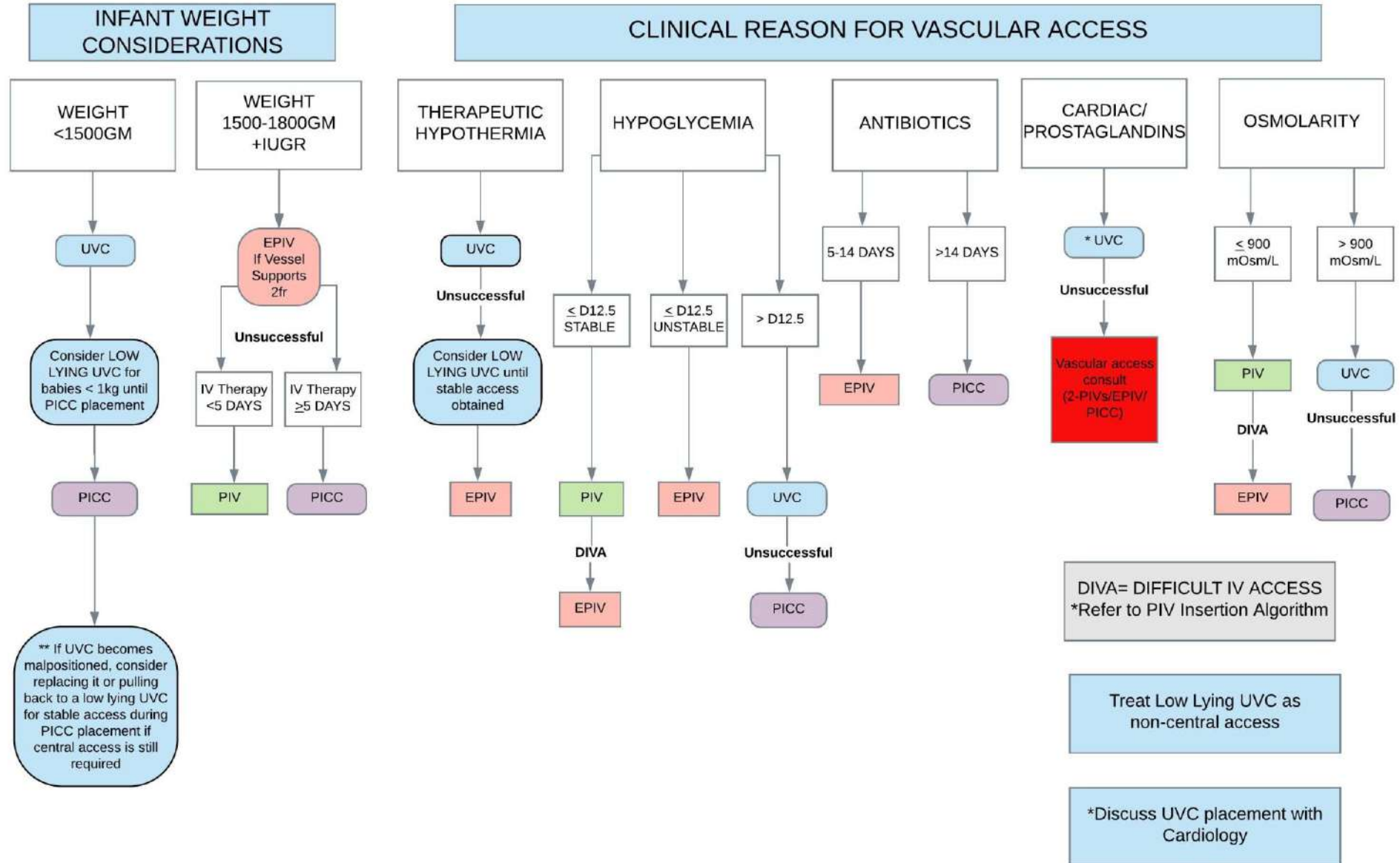
- Utilize the NICU Vascular Access Decision Tree
 - Weight considerations for Vascular Access
 - Clinical Reasons for Vascular Access

Appropriate Vascular Access Device Choice

- Originally all infants got a 1.1 Fr. PICC line no matter age/weight
- Now can chose the right device for the right patient
- Current toolbox of Vascular Access Devices
 - 26-gauge PIV
 - 24-gauge PIV
 - 1.9/2.0 Fr EPIV Catheter 4cm or 6cm
 - 1.4Fr single lumen
 - 2.0 single and double lumen (polyurethane and silicone)
 - 2.6Fr double lumen (blood drawing)



NICU VASCULAR ACCESS DECISION TREE



This is a guideline. While the guideline is useful in approaching decisions about venous access, clinical judgement and/or new evidence may favor an alternative plan of care.

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Infant Weight Considerations for Vascular Access

- Infants born less than 1500 grams
 - Require long-term vesicant parenteral nutrition => UVC/PICC
- Infants born between 1500-1800 grams
 - Anticipate slower introduction to enteral feedings
 - Duration of parenteral nutrition variable =>EPIV

Clinical Reasons for Vascular Access in the Neonate

- Therapeutic Hypothermia
 - UVC
 - EPIV if unable to place UVC
- Hypoglycemia
 - EPIV unless needed for higher than 12.5% dextrose
- Antibiotic Use
 - 0-14 days => EPIV
 - 14 days or greater => PICC
- Congenital Cardiac Anomalies
 - UVC
 - 2 PIVs/EPIV if cannot place UVC due to time restraints for transfer
- Need for Hyperosmolar nutrition or medications (unit based)
 - Less than 900 mOsm/L => PIV/EPIV
 - Greater than 900 mOsm/L => PICC

Future Implications

- Further research needed
 - Innovative placement strategies
 - Optimal maintenance and infection control
 - Prevention of complications

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