

Increasing Vein Preservation in the NICU using Extended Dwell Peripheral IVs

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Disclosure



- We have no financial disclosures

Fiona the Premature Hippo



- Born 6 weeks early at the Cincinnati Zoo, Ohio
- Birth weight was 29 lbs, 25 lbs smaller than a full term hippo

Fiona the Premature Hippo



- Veterinarians were able to place standard PIVs but the device was only working for 1 day
- Veterinarians called the local children's hospital Vascular access team and they placed an extended dwell peripheral IV (EPIV) that survived the length of treatment

Types of Vascular Access Devices used in the NICU

- Peripheral Intravenous Catheter (PIV)
 - Placed at bedside by RN
- Umbilical Venous Catheter (UVC)
 - Placed sterilely at the bedside typically on DOL 1 by physician or Neonatal NP
 - Remains indwelling for up to 10 days
 - Average dwell time is 7 days
- Peripherally Inserted Central Catheter (PICC)
 - Placed sterilely at the bedside by trained RN or physician
 - Can be in place for entire length of treatment
- Broviac
 - 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
 - Unable 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
- Broviac
 - Requires transport to OR for insertion
 - Risk of central line infection

Additional Vascular Access Device



- Extended Dwell Peripheral Intravenous Device (EPIV)
 - Can be used for infants with difficult vascular access (DIVA) who need short term IV fluids or medications
 - Placed by trained RN and/or physician at bedside
 - Can be inserted often without sedation
 - Do not require an x-ray for placement verification thus reducing radiation exposure
 - Can remain in place for up to 29 days
 - 4-6cm in length
 - Catheter material softens after insertion reducing vessel irritation

Initial Patient Population Inclusion Criteria for EPIV



- Near-term and full term infants
- Potential Diagnosis
 - Therapeutic Hypothermia (TH) treatment
 - Any infection requiring more than 5 days of antibiotic treatment
 - Infant with difficult vascular access (DIVA)

Case Study 1



- 29 week gestation female born at 1600 gm
- UVC placed on DOL 1 and removed at 7 days
- PICC line inserted on DOL 7
- PICC Line removed after 8 dwell days for positive blood cx
- PIV inserted for antibiotics
- After 7 days of antibiotic treatment the Infection control team increased treatment to 21 days
- Infant had received over 14 PIVs with multiple IV stick attempts
- Medical team advised against another CVC
- EPIV was inserted and remained in place for 13 days
 - Removed for leaking at insertion site
- Infant only required an additional 2 days of treatment; a PIV was placed

Case Study 1 Analysis



- Decreased the potential of multiple additional PIVs and IV sticks attempts over the course of 13 days
- Decreased the risk of another CLABSI
- Placed at the bedside, no transport needed to OR

- Did not remain in place for entire course of treatment
- Required continuous heparinized fluid infusion

Reassessment of Inclusion Criteria for EPIV



- Any infant who has a vessel that can support a 2.0 Fr catheter size
 - with inadequate vascular access
 - requiring IV antibiotic therapy and/or IV fluids but unable to place a CVC
 - requiring IV non-vesicant antibiotics and/or IV nutrition for up to 29 days

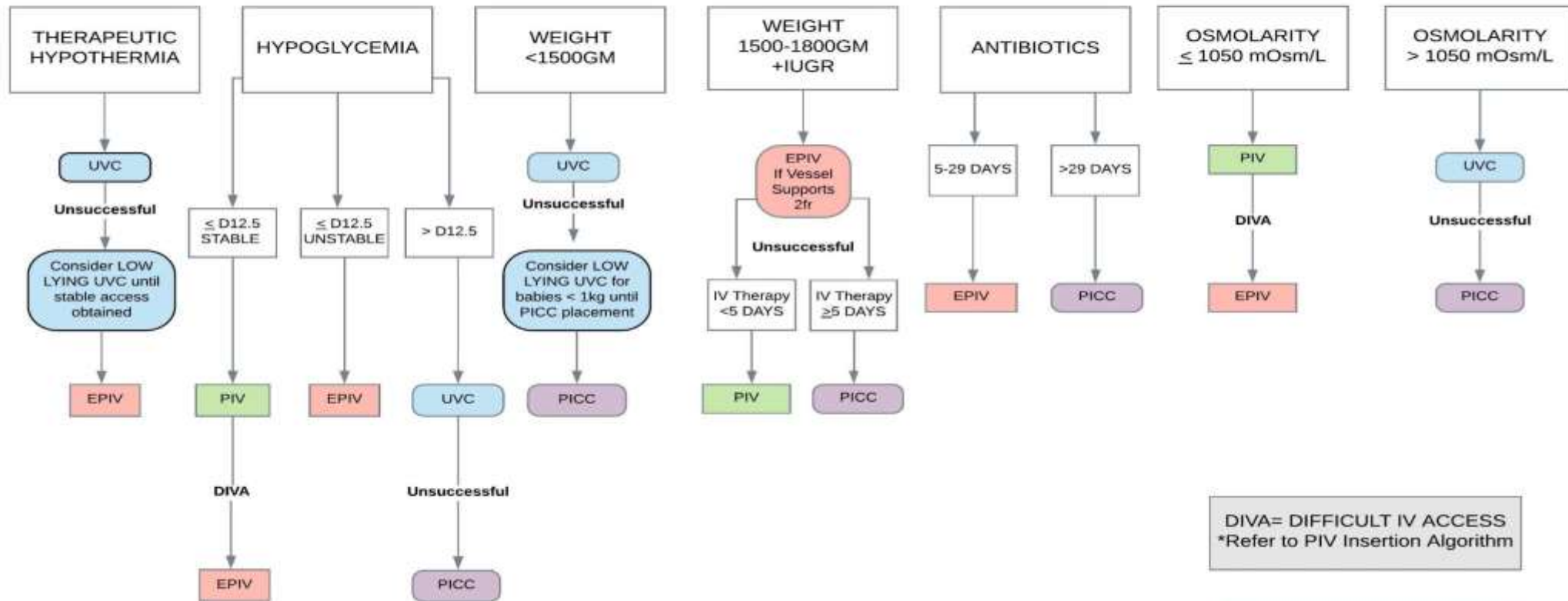


Insertion Procedure

Vascular Access Device Algorithm



VENOUS ACCESS DECISION TREE

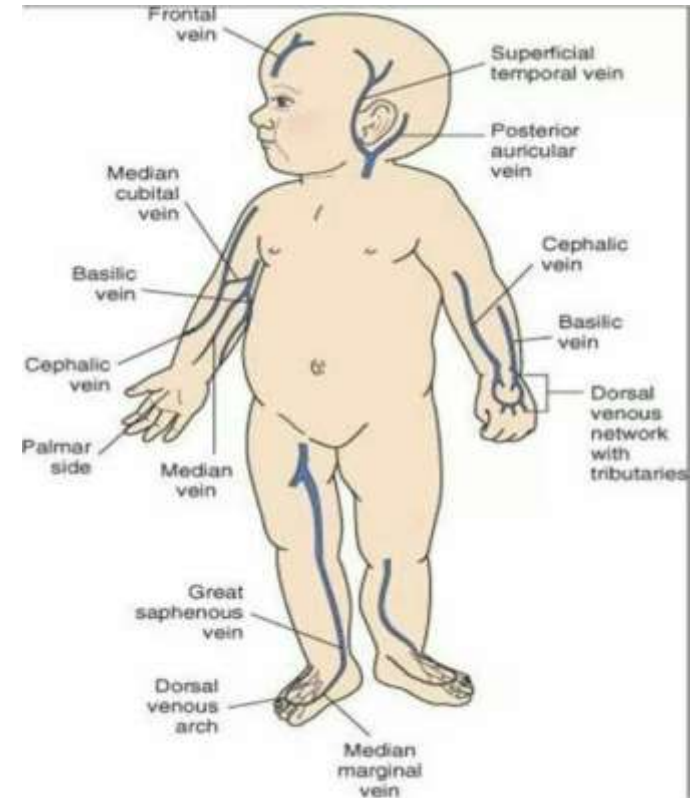


DIVA= DIFFICULT IV ACCESS
*Refer to PIV Insertion Algorithm

Treat Low Lying UVC as

Optimal Sites for EPIV

- EPIVs can be placed in both the upper and lower extremities
- EPIV catheter tip should not terminate within central circulation or over joints
- Suggested order of preference
 - Forearm
 - Leg
 - Scalp



Insertion Procedure

- Placed under sterile technique using Maximum Sterile Barrier (MSB) but not considered a central line
- Placed using Seldinger technique
 - Vessel is accessed with either 22G angiocath or EPIV kit introducer needle
 - The guidewire requires at least a 22G introducer
 - Use ultrasound guidance or transilluminator









Preliminary Descriptive Analysis for EPIV

Preliminary Descriptive Analysis for EPIV



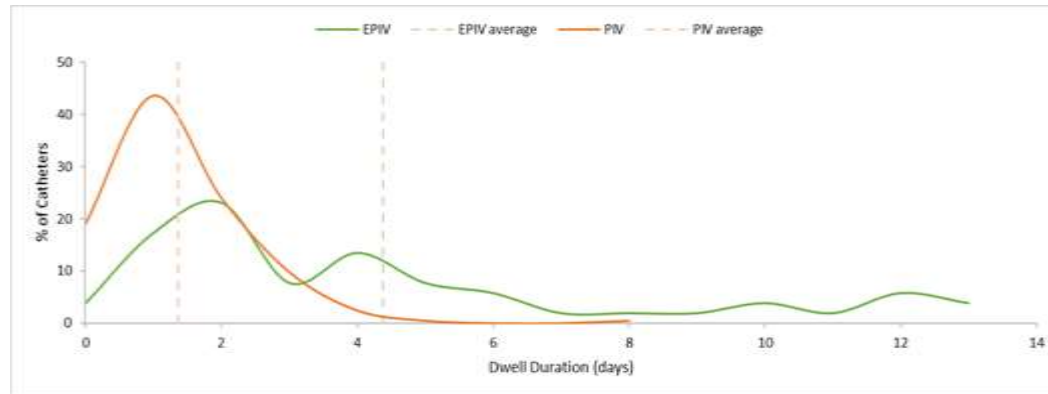
- Dates: November 2016-April 2018
- Sample Size: 50 EPIVs
- Total Number of Patients: 45
- Total Number of PIVs placed in these patients: 207

EPIV Placement Sites



- Wrist/forearm/hand: 23
- Antecubital: 14
- Lower Extremity: 9
- Basilic: 4
- Scalp: 1

Average number of Dwell Days: EPIV vs. PIV




EPIV

Days	# of catheters	% of catheters
0	2	4
1	9	17
2	12	23
3	4	8
4	7	13
5	4	8
6	3	6
7	1	2
8	1	2
9	1	2
10	2	4
11	1	2
12	3	6
13	2	4
Avg. days: 4.38	Total: 52	Total: 100

PIV

Days	# of catheters	% of catheters
0	39	19
1	89	44
2	49	24
3	20	10
4	5	2
5	1	0
6	0	0
7	0	0
8	1	0
Avg. days: 1.37	Total: 204	Total: 100




Number of stick attempts: EPIV vs. PIV

EPIV

- 1st attempt: 62.2 %
- 2nd attempt: 35.6%
- 3⁺ attempts: 2.2%

PIV

- 1st attempt: 62.8%
- 2nd attempt: 20.9 %
- 3+ attempts: 16.9%



Complications: EPIV vs. PIV

EPIV

- None: 60 %
- During use: 40%
 - Infiltration: 14%
 - Leaking: 22%
 - Occlusion: 4%

PIV

- None: 7%
- During Use: 93%
 - Infiltration: 81%
 - Leaking: 7%
 - Occlusion: 5%



Care and Maintenance

Care and Maintenance



- Transparent semi-permeable dressing per hospital central line policy
- EPIV dressing must be changed every 7 days or if the dressing becomes soiled or non-occlusive
- A chlorhexidine-infused disc or hemostatic disc can be used per hospital protocol
- EPIV catheters can remain in place for up to 29 days
- To prevent line occlusions, EPIV catheters require continuous infused heparinized fluids only if the fluid rate is at the recommended rate of 1.0 ml/hr. Fluid rates above 1.0 ml/hr DO NOT need continuous heparinized fluids
- IV fluid line changes should be changed per hospital central line change policy

Sterile Dressings



Benefits of the use of an EPIV



- Placed at the bedside by trained RN or physician
- Decreased number of IV sticks reducing the number of painful exposures
- Decreased need for a central line
- Less risk of blood stream infection
- Less risk of infiltration when compared to PIV
- Less risk of mechanical and chemical phlebitis
- May be used up to 29 days

What we have learned from the contraindications



- Patient Populations
 - If the vessel supports a 2.0 Fr. Catheter size, the patient size does not matter
 - Recognize patients who would benefit from this vascular access device before vein depletion occurs
- EPIV patency management
 - If there are continuous IV fluids infusing for nutrition and hydration purposes, the addition of heparin is not needed
 - Only a KVO rate of 1.0 ml/hr requires the addition of heparinized fluid
- Migration and Leaking issues
 - Have begun to use a securement device under the sterile dressing
 - At insertion, a hemostatic disc is used to help facilitate a clot to prevent migration

Future Implications



- Continue to educate physicians and nurses on the importance of vein preservation and the need for early recognition of vascular access need
- Permanently implement the use of other solutions to prevent migration and/or leaking (cyanoacrylate glue)
- Collaborate with the U.S. Association of Vascular Access PediSig “One Million Pokes Saved” Campaign to raise awareness about the use of EPIVs

Resources



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