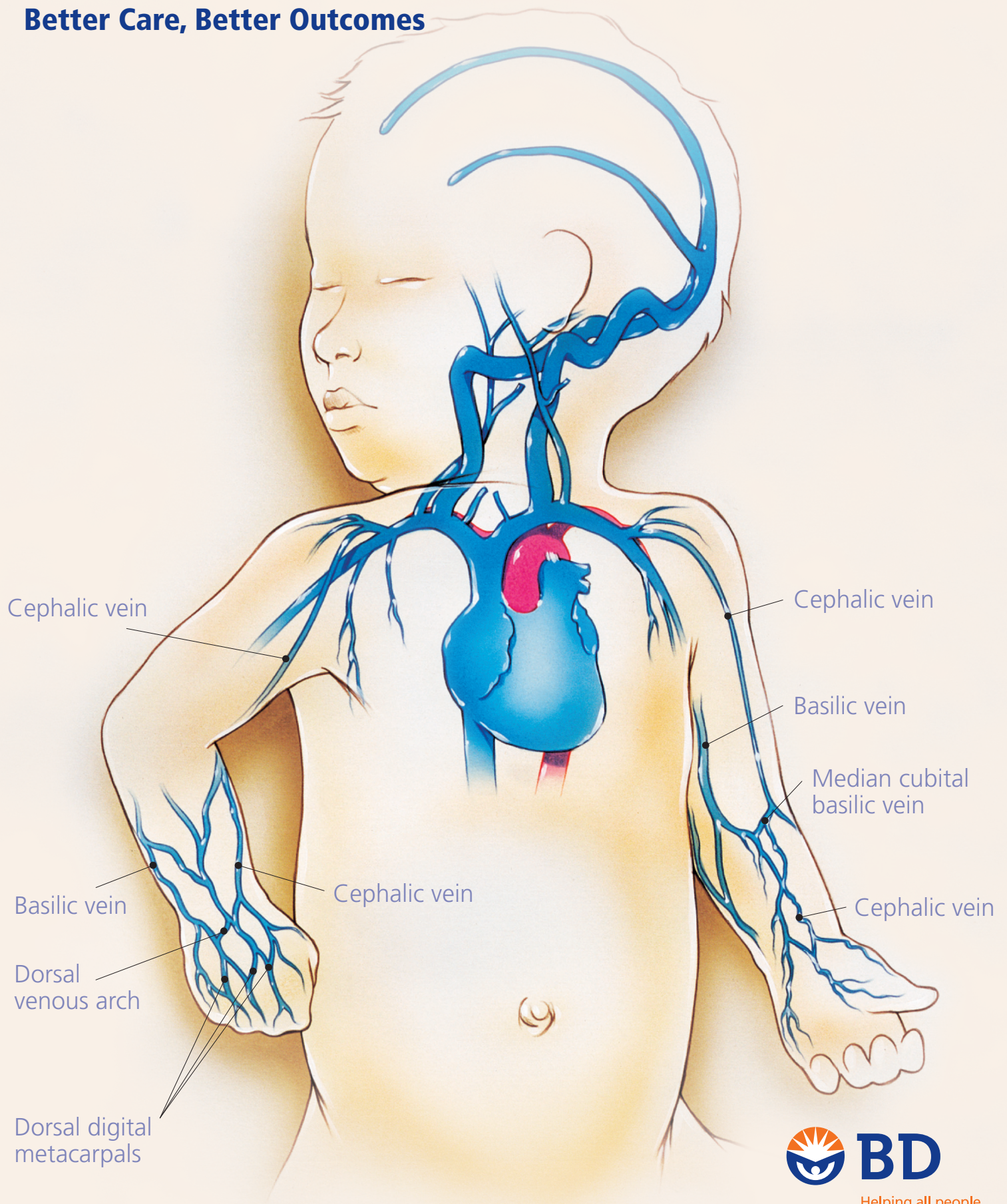


Neonatal and Pediatric Vessels

Better Care, Better Outcomes



Helping all people
live healthy lives

Neonatal and Pediatric Vessels

- The use of peripheral intravenous catheters should be considered for infants who require intravenous access for no more than seven days and in whom access is attained within three attempts.
- Utilize the smallest gauge and shortest length catheter that will accommodate the prescribed therapy.

Vessel Specifics

Forearm

- Basilic Vein
- Cephalic Vein

Advantages

- Easily accessible
- Readily visible
- Distal location
- Keeps hands free

Disadvantages

- Difficult to observe in chubby infants and toddlers

Hand

- Dorsal Digital Metacarpals
- Dorsal Venous Arch

Advantages

- Easily accessible
- Readily visible
- Distal location
- Bones act as natural splints

Disadvantages

- Increased nerve endings
- Difficult to anchor on infant
- Interferes with child's activity

Antecubital

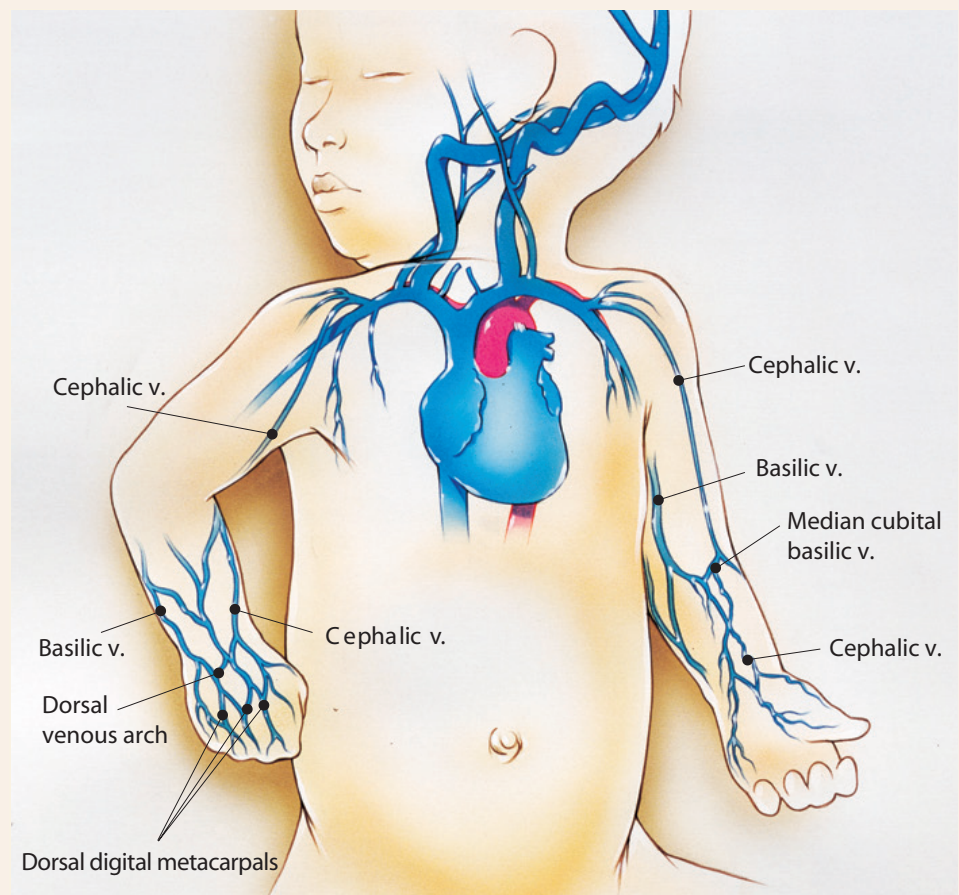
- Basilic Vein
- Cephalic Vein
- Median Cubital Veins

Advantages

- Large and readily visible
- Easily palpable
- Preferred sites in infants
- Preferred sites for PICC insertion

Disadvantages

- Elbow joint must remain extended
- Limits activity
- Limits phlebotomy



Leg

- Femoral Vein
- Greater Saphenous Vein
- Popliteal Vein

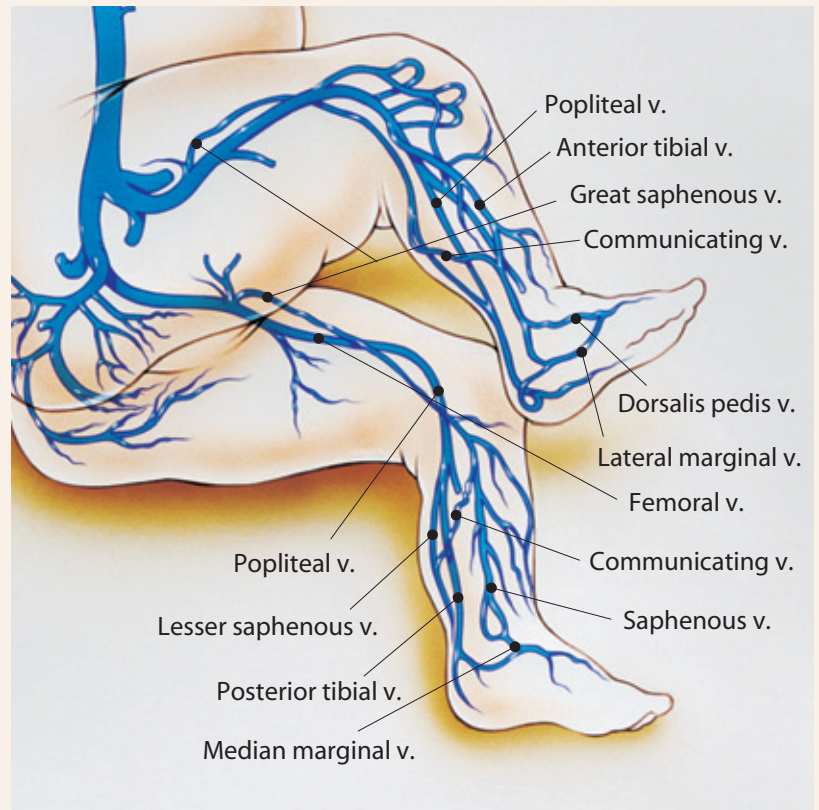
These veins should only be used for central line insertion.

Advantages

- PICC and CVC insertion
- Keeps hands free
- Can accommodate larger catheter

Disadvantages

- Possible arterial puncture
- More difficult to access



Foot and Ankle

- Greater Saphenous Vein
- Lesser Saphenous Vein
- Dorsal Venous Arch

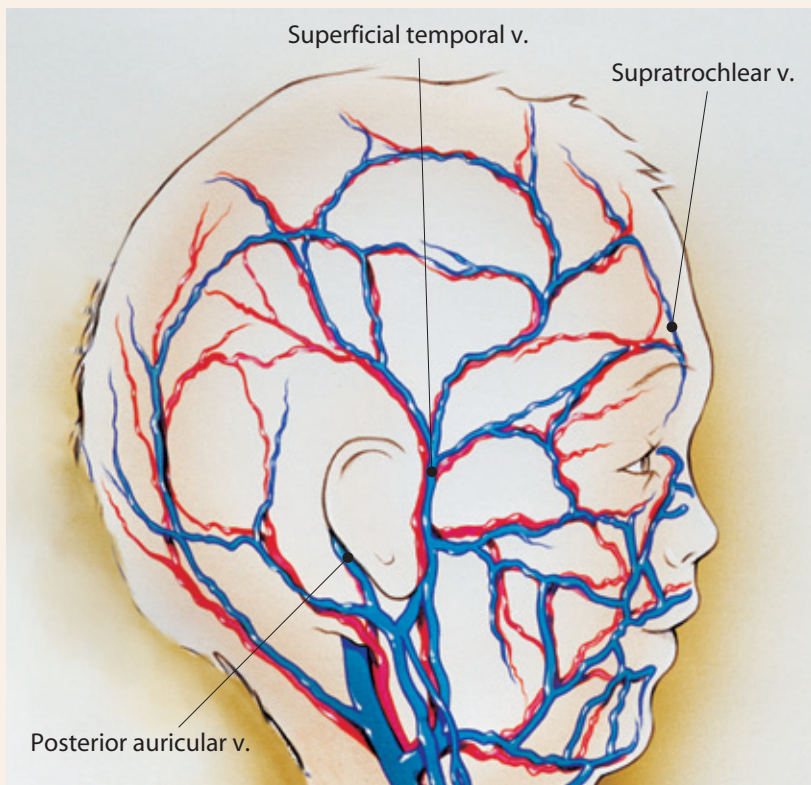
Commonly used in children not yet walking.

Advantages

- Highly visible
- Readily accessible
- Keeps hands free
- Easy to splint

Disadvantages

- Decreases mobility
- Risk of phlebitis in older patients
- More difficult to advance cannula



Scalp

- Superficial Temporal Vein
- Posterior Auricular Vein
- Supratrochlear Vein

Scalp veins can be used in children up to 18 months; after that, the hair follicles mature and the epidermis toughens

Advantages

- Easily observed
- Readily dilates
- No valves present
- Allows use of extremities

Disadvantages

- Hair must be removed
- Infiltrates easily
- Difficult to secure catheter
- Greater family anxiety

Key Points and Considerations

- Neonates are at higher risk of infiltration injuries due to the use of infusion pumps, the need for resuscitation and their inability to communicate pain
- Mean dwell times have been reported between 36 and 50 hours
- IV site checks should be documented at a minimum of hourly

Vessel Location and Condition

- Straight, soft, elastic veins are preferred
- Prominent veins may not always be the best choice as they may be positioned in an unsuitable location
- Accidental removal may be less likely if placed in the upper arm, however recognition of phlebitis may be difficult
- The lower the gestational age, the less mature the skin will be; additionally, subcutaneous tissue around vessels is less obvious as gestational age decreases; therefore, vessels will be closer to the surface

Infusion Purpose and Characteristics

- Medications and solutions with high osmolarities and high or low pH irritate the vein wall
- Trauma to the vein is related to the composition of the infusate

Solution Osmolality	Phlebitis Potential
<450 mOsm/kg	Low
450-600 mOsm/kg	Medium
>600 mOsm/kg	High

- Commonly administered hyperosmolar solutions:
 - Parenteral dextrose concentrations \geq 10%
 - Parenteral nutrition
 - Ampicillin
 - Cefotaxime
 - Sodium bicarbonate
 - Phenobarbital
- pH level <5 or >9 can lead to vein irritation
- Increased irritation occurs with rapid administration and inadequate time for the blood to buffer the infusate

Therapy Duration

- Preservation of the veins is essential if prolonged therapy is anticipated, therefore a PICC should be considered

Site Selection

- Select the appropriate and most distal vein first. If the medication/solution has high potential for vein irritation, select the most appropriate and largest vessel to accommodate the infusion
- Perform the venipuncture proximal to a previously cannulated site, injured vein, bruised area or site of a recent complication
- Rotate access sites to the opposite extremity when possible

Catheter Material and Size

- Softer materials are less irritating to the intimal lining of the vein
- Select the smallest gauge appropriate to accommodate the prescribed therapy

Patient Activity

- Arm boards/immobilization devices should be used to secure and protect vascular access sites in areas of flexion; regular site and circulatory checks should be performed, and removal of these devices may be indicated on occasion
- Avoid the lower extremities in the walking pediatric patient if possible

Complications

Catheter-Related Bloodstream Infection (CRBSI)

- Inherent with the use of any vascular access device
- Can be due to migration of skin flora from the insertion site along the catheter tract, with colonization of the catheter
- Catheter colonization can also occur from contamination of the catheter hub, insertion site during placement, infusates or hematogenous seeding from a distant site
- Premature infants are at higher risk due to deficiencies in their immune system and the number of invasive procedures they undergo

Phlebitis

- Definition: inflammation of the vein. Causes can be mechanical, chemical or bacterial.
- Signs and symptoms
 - Pain
 - Erythema or edema
 - Red streak over venous pathway
 - Palpable venous cord
 - Purulent drainage
- INS Standards provide a phlebitis scale to quantify observations in documentation

Mechanical Phlebitis

- Associated with movement of the catheter against the vein wall causing irritation to the intimal lining of the vein
- Risk factors:
 - Rapid or traumatic insertion
 - Large catheter in relation to the size of the vein
 - Inadequately secured catheter
 - Extensive movement of the cannulated extremity
 - Inexperienced inserter

Chemical Phlebitis

- Most commonly associated with peripheral devices
- Erythema often within two (2) hours of infusing irritating medications or solutions

Catheter Occlusions

- Can be partial, one-way or total
- Caused by inadequate flushing, incompatible medications or lipid residue
- Large catheters with insufficient venous flow increase the risk of thrombus formation

Indications for PICC Placement in Infants

- Premature infants weighing <1,500 g
- Unable to take enteral nutrition to achieve growth and need IV fluids for ≥ 7 days
- Require hyperosmolar or irritating solutions or medications
- Infections requiring intravenous antimicrobial therapy
- Gastrointestinal disorders
- Congenital cardiac disorders
- Limb anomalies
- Lack of adequate peripheral venous access
- Require vasoactive medications
- Medical provider's or parent's preference

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