Central Vascular Access Device Selection

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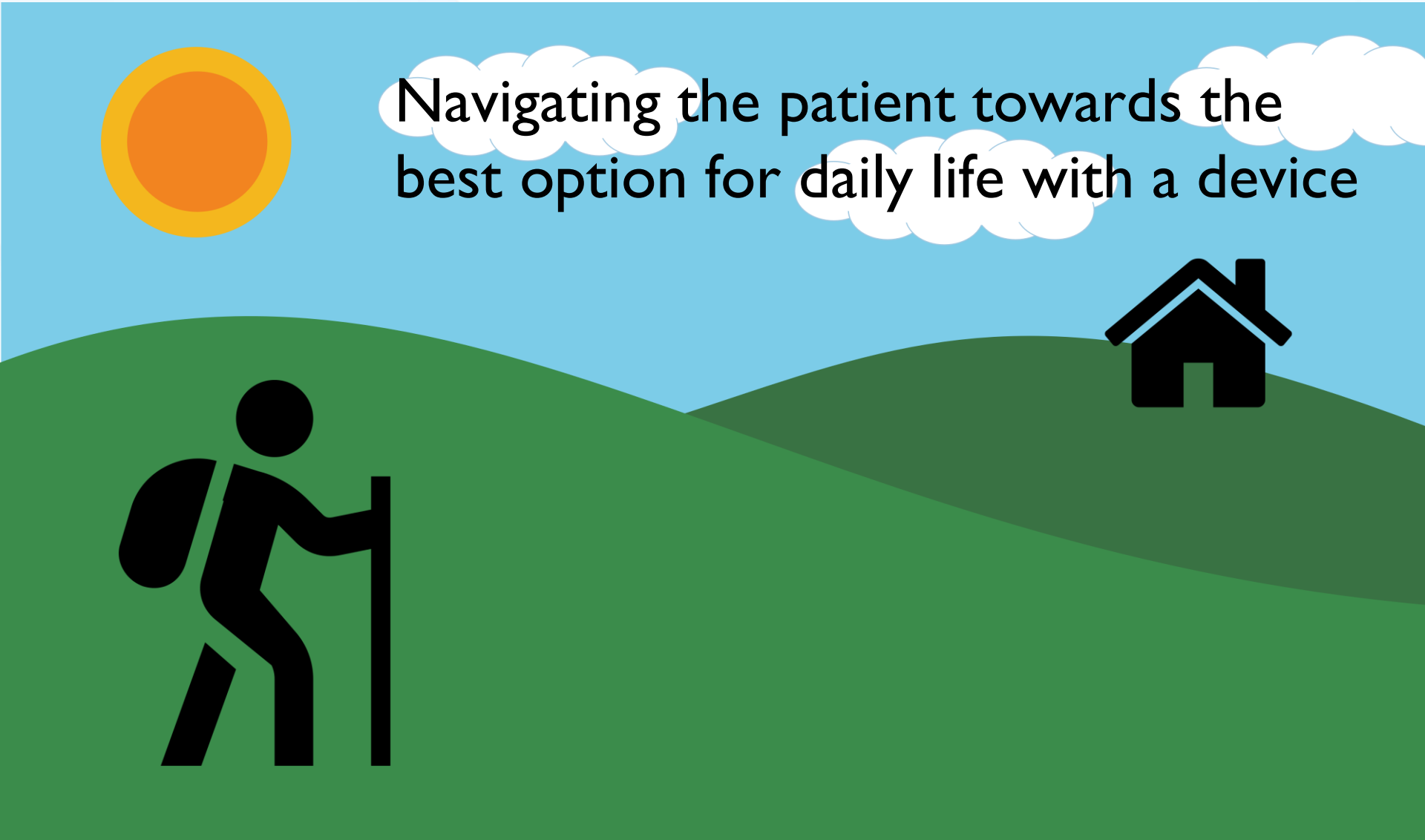
Venous Access Required:



Disclosures

- Northern Colorado Vascular Access Coordinator for Banner Health
- Per Diem Educator - Bard Access Systems
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Other things you should know about me

- STRONG patient advocate:
  - "*The secret to caring for the patient is caring for the patient,*" Dr. Jack Breen
- Health Care related biases:
  - "*The BEST care IS the least expensive care,*" Dr. Robert Groves
  - *"If something needs changing, don't complain about it…DO something about it,"* Linda Zuroski, pharmacist

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Objectives

- Describe the role of the infusion or vascular access nurse in the choice of a CVAD

- Identify factors in the selection of a CVAD

First Case Study

- 45 year old man with stage 11B (T1, N1, M0) pancreatic cancer
  - Eight weeks status-post Whipple
  - Six month Chemotherapy / Radiation treatment plan
  - Active, intelligent, working machinist

Second Case Study

- 37 year old woman with left arm cellulitis from a cat scratch
  - Failed PO therapy
  - Now extends from mid-upper arm to wrist
  - Based on culture sensitivities, infectious disease anticipates a minimum of 4 week antibiotic infusion therapy
  - Active, intelligent, mother of 2 children

Third Case Study

- 64 year old grandmother a few hours post cardiac surgery that was unsuccessful
  - Condition is imminently (within hours to a few days) terminal
  - Currently has right IJ tunneled HD catheter, right femoral arterial sheath, and right non-tunneled femoral venous triple lumen

Fourth Case Study

- 42 year old diabetic woman with recurrent left stump infection
  - Failed oral antibiotics
  - 2 weeks IV Ceftriaxone anticipated
  - History of multiple PICC lines, multiple failed midlines, and tunneled catheter
  - SNF physician has consulted for outpatient line placement

Roles of the Nurse

- ex·pert [ˈekˌspərt] - **NOUN**
  - a person who has a comprehensive and authoritative knowledge of or skill in a particular area
  - synonyms: specialist · authority · pundit · adept · maestro · virtuoso · master · past master · wizard · connoisseur · aficionado · ace · buff · pro · techie · whiz · hotshot · crackerjack · maven

Retrieved 2-25-2016 from: http://www.bing.com/search?q=expert&src=IE-SearchBox&FORM=IESR02

Which means…

- Know venous access devices and the alternatives
- Know the properties of infusates
- Know how to place devices (or know who can)
  - and do it very well
- Know venous anatomy
  - including surrounding structures
- Know available assessment methods
- Know venous pathology, how to recognize it, and how to treat it

And…

- Use ultrasound to:
  - assess vessel health
  - guide insertion for all advanced catheters
  - when needed for short peripheral insertions
- Know how to use an algorithm
  - Create algorithms
- Attend courses, conferences
- Teach courses

And…

- Know where the catheter tip belongs
  - and get it there
- Know your local politics
- Get credentialed!
  - CRNI
  - VA-BC
  - OCN
  - CCRN[1]

Central Venous Access

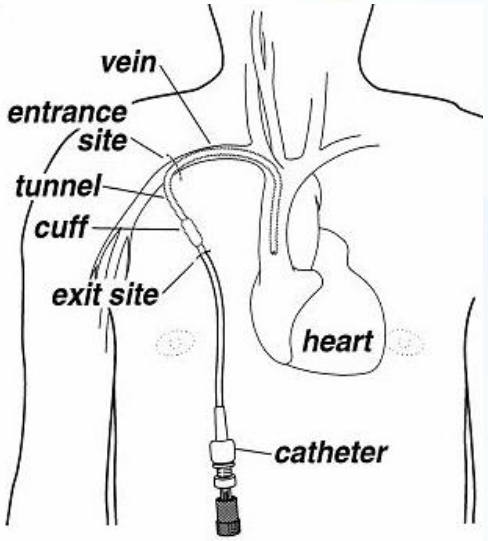
- Central Venous Catheter:
  - Distal tip is located in the:
    - Superior Vena Cava
    - Right Atrium
    - Common Iliac
    - Inferior Vena Cava
  - Includes: CICC, PICC, Tunneled, Implanted

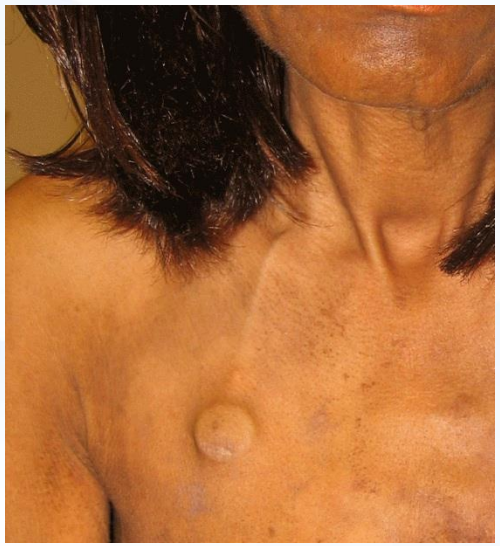
Central Venous Access

- CICC: Centrally inserted central venous catheter (IJ, SVC, Femoral, Axillary/Chest approach)
- PICC: Peripherally inserted central venous catheter (Basilic, Brachial, Cephalic, Axillary/Upper arm approach)
  - Includes additional sites in neonates and infants

Central Venous Access

- Tunneled catheter: Vascular catheter that is threaded through a subcutaneous tissue tract prior to vessel cannulation
- Implanted port: Tunneled vascular catheter implanted completely under the skin that originates in a reservoir that must be tapped to gain access to the catheter





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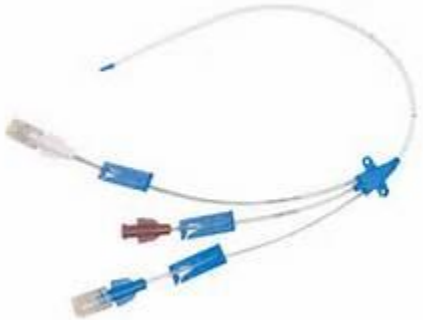
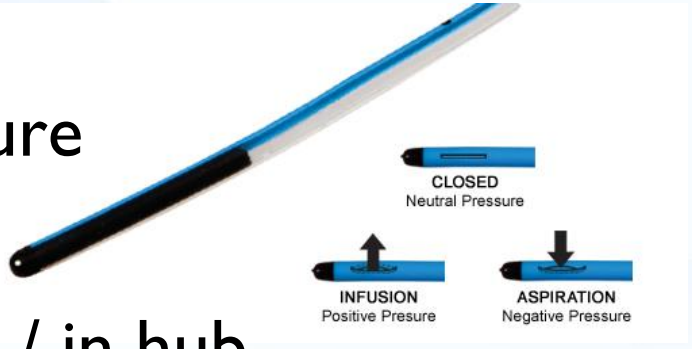
Central Venous Access

- Open-ended (non-valved)
  - Think of a straw
  - Requires a clamp at rest
- Valved (closed at rest)
  - Valve opens with pressure
  - May be at distal end
  - May be at proximal end / in hub





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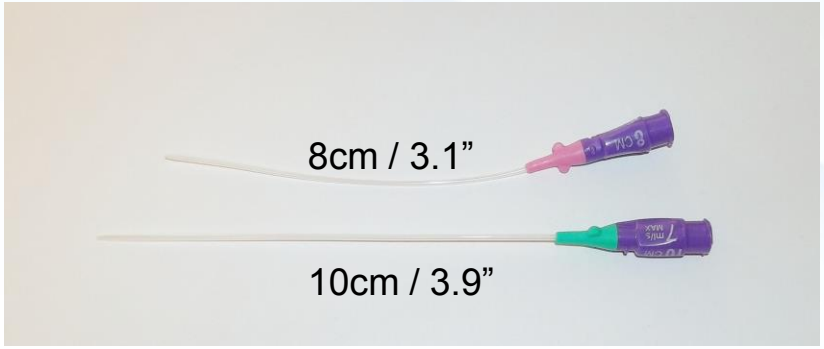
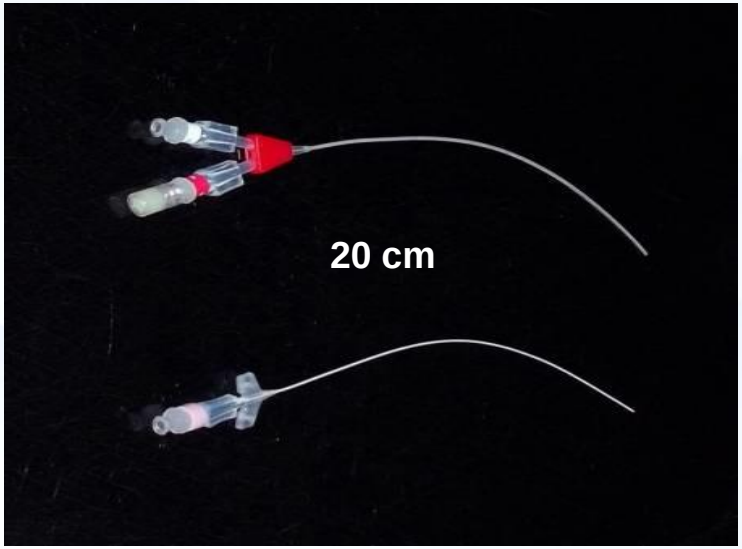
Peripheral Venous Access

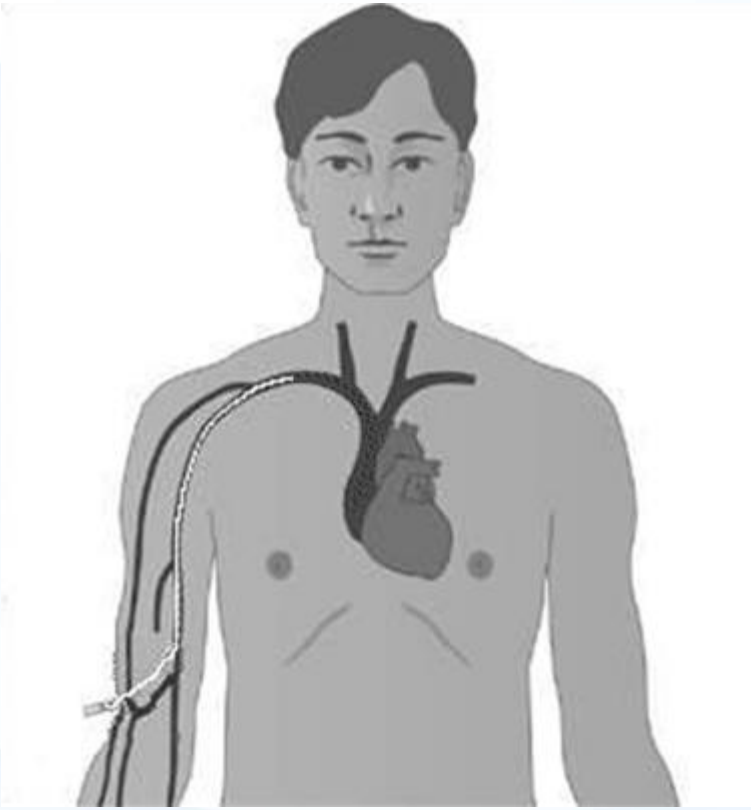
- Peripheral Venous Catheter
  - Distal tip located outside of the trunk
  - Short PIV, Midline





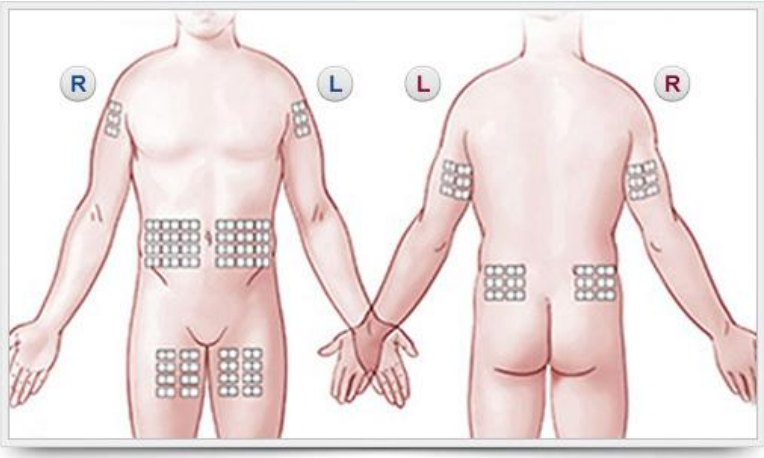
Truncal Venous Access

- Suboptimal "Central" Venous Catheter
  - Distal tip located in truncal vein not previously listed (e.g. subclavian, innominate/ brachio-cephalic)



Alternatives: Fluid Delivery

- Hypodermoclysis: Subcutaneous fluid administration
  - Limit 2L per site, 3L (over 2 sites) in 24 hours
  - Sodium chloride or sodium chloride with glucose solutions only

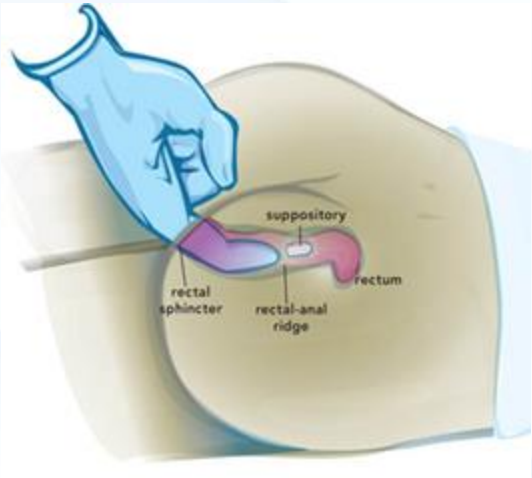


  - No medication except hyaluronidase, when used[2] to increase tissue permeability to fluids[3]

Image Retrieved 2-25-2016 from: http://www.hizentra.com/infusion-administration/home-scig-therapy.aspx

Alternatives: Medication Delivery

- Buccal / Sublingual
  - Pain management
  - Anti-emetics
  - Anxiolytics
- Rectal
  - Anti-emetics
  - Anti-pyretics



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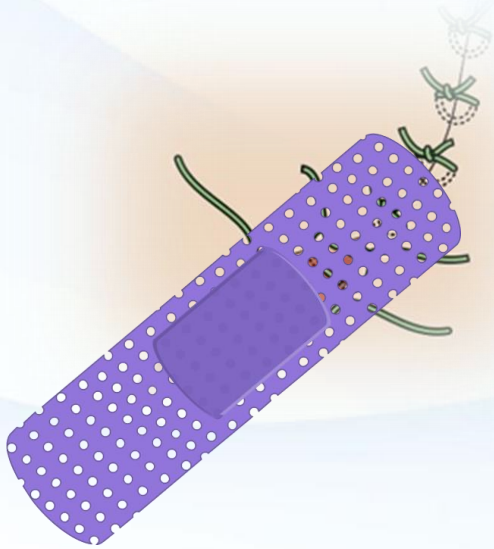
Access Pros and Cons

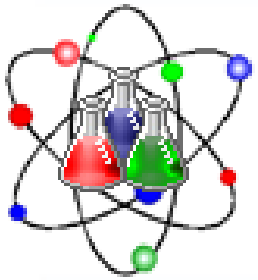
- Freedom of activity
  - External line or tubes
- Frequency of care
  - Implanted port
  - Valved verses open catheter
- Ease of insertion and removal
- Risk of infection
  - Lowest in implanted ports and midlines

Access Pros and Cons

- Limitations
  - Infusate
  - Dwell or life of catheter expectancy
- Risk of complication
  - Continuous vesicant
- Cosmetic considerations
- Expense
  - Initial and ongoing



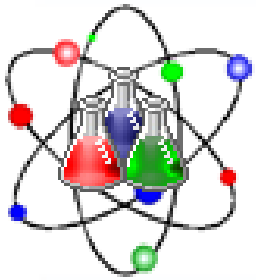
Infusate Properties



(Per in text citation of Alexander, et al 2010):

- Vesicant [ves′ikənt] Infusate
  - Intravenous medication capable of causing blistering, tissue sloughing, or necrosis when infiltrating the surrounding tissue.
- Irritant (ir'i-tănt) Infusate
  - An intravenous medication that may cause pain or reactive change to the tunica intima of the blood vessel.[4]

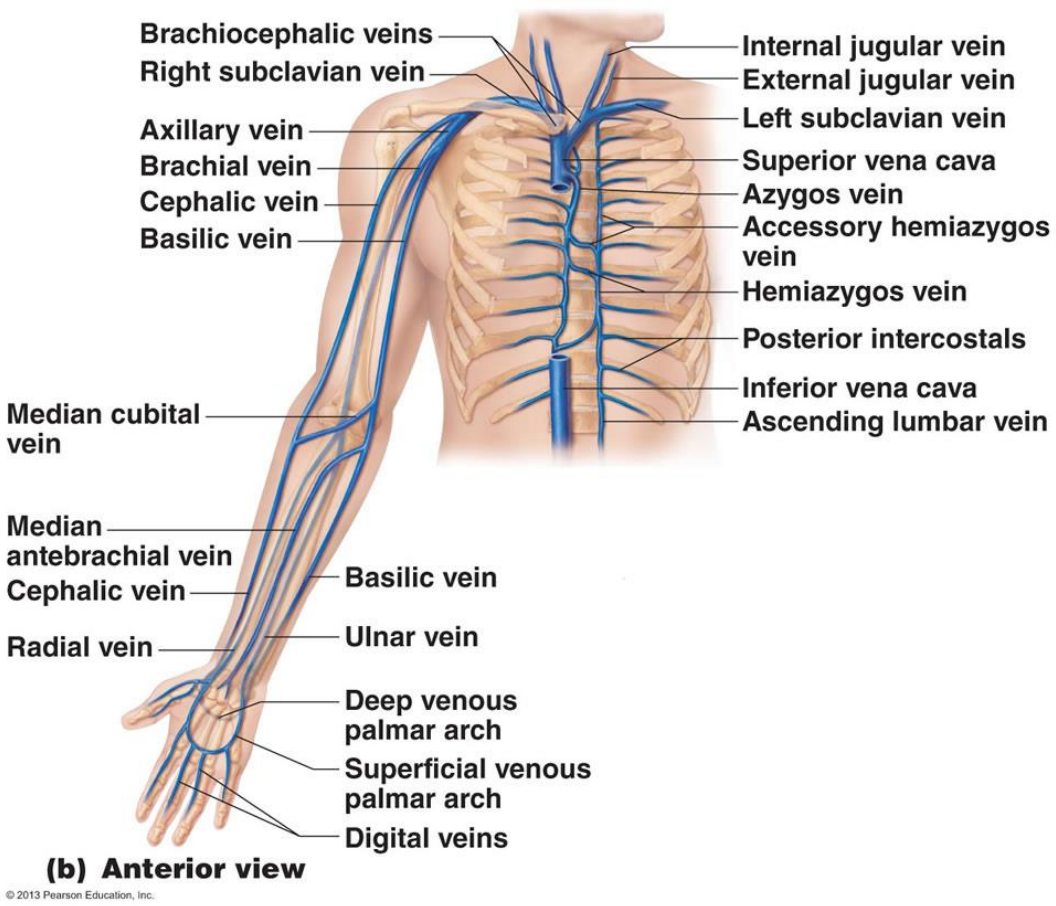
Infusate Properties



- Factors that influence the vein or tissues
  - pH <5 or >9
  - Osmoality >600

  (Per in text citation of Di Giacomo, 2010 and Sauerland, et al 2006):
  - Vasoactive agents
    - Severe vasoconstriction may lead to tissue injury
  - High concentration of electrolytes
    - Stimulates vasoconstriction may lead to ischemia[4]

Vessel Anatomy



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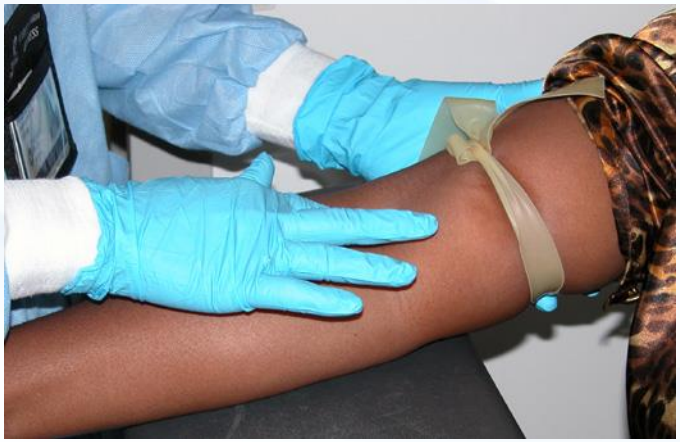
Vessel Anatomy

- Assessment methods
  - Visualization



  - Palpation

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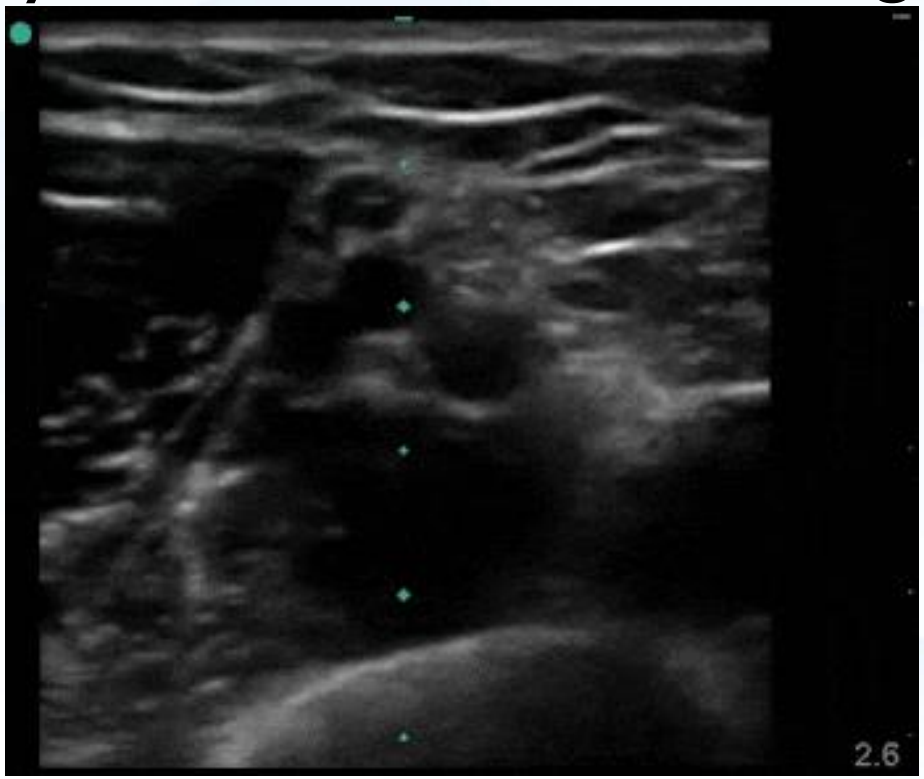
Vessel Anatomy

- Ultrasound

- Healthy vessels and surrounding structures



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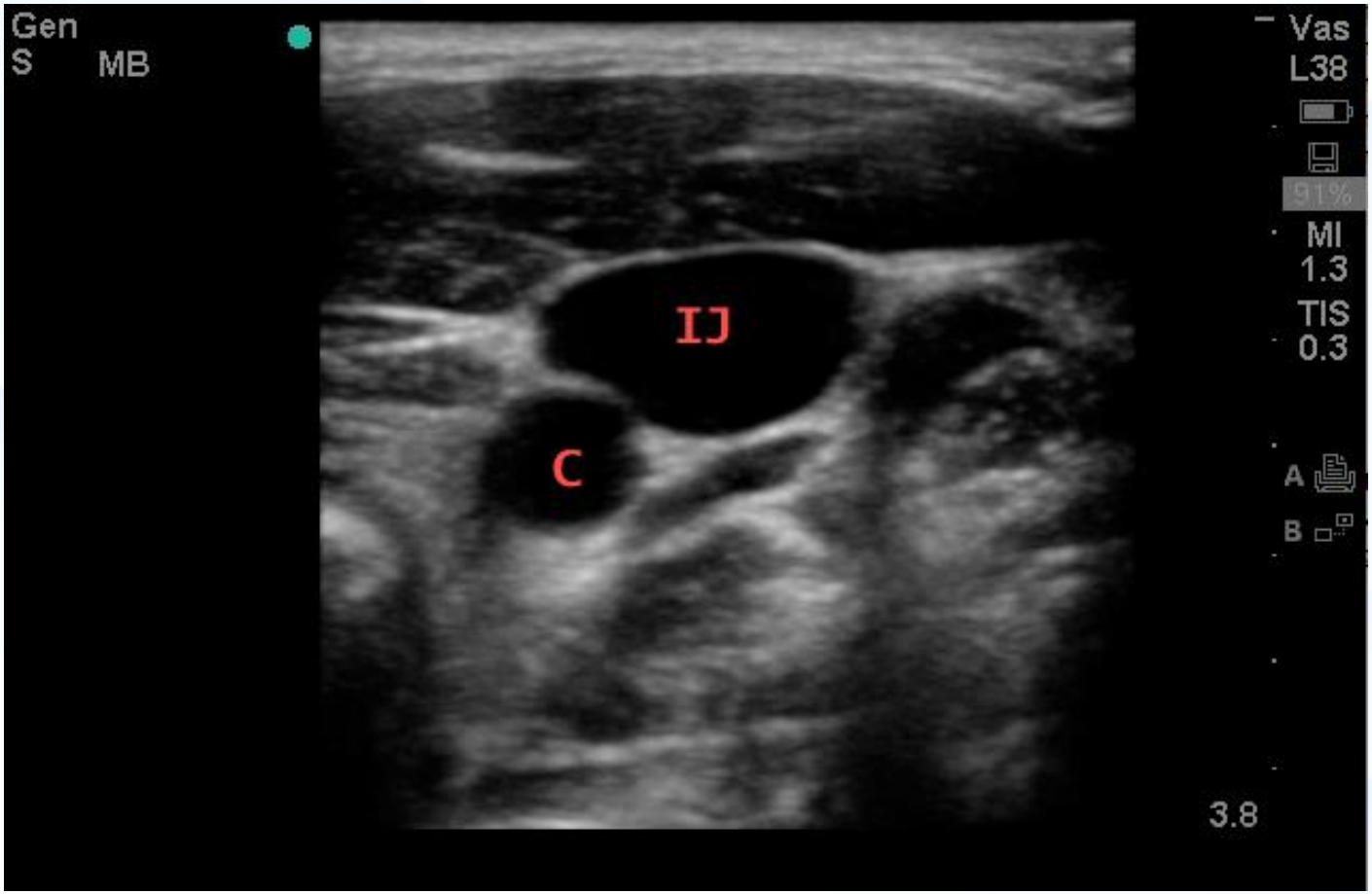
Vessel Anatomy



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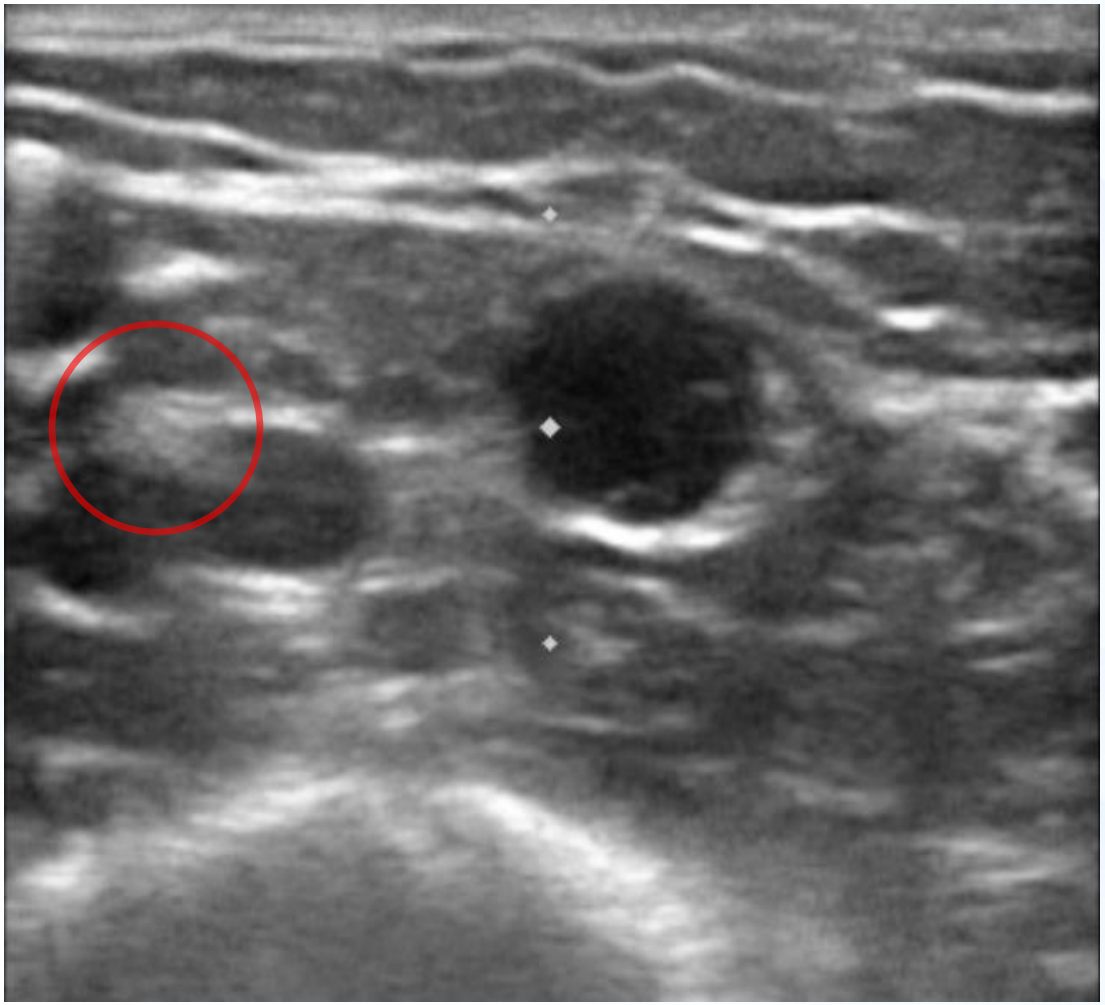
Vessel Anatomy

Image Retrieved 3-31-2016 from: https://www.youtube.com/watch?v=IBmbc1ak5fY

Vessel Anatomy

- Nerve



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Vessel Health Assessment

- Thickened walls / thrombosis

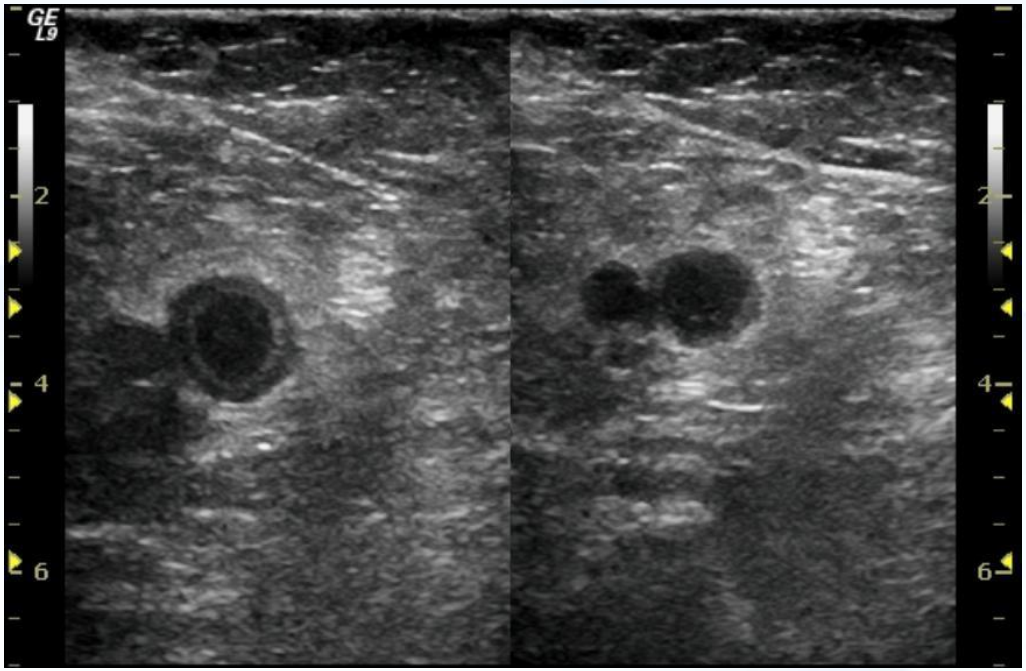
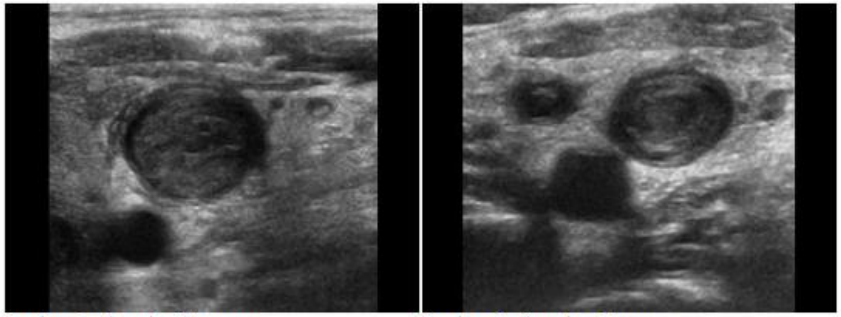


Image Retrieved 3-18-2016 from: http://www.angiologist.com/thrombosis-section/deep-vein-thrombosis-and-thrombocytosis/

Vessel Health Assessment



Jugular vein thrombosis transverse
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Jugular vein thrombosis transverse
ID: /40677-Afbeelding2.jpg

Jugular vein thrombosis longitudinal
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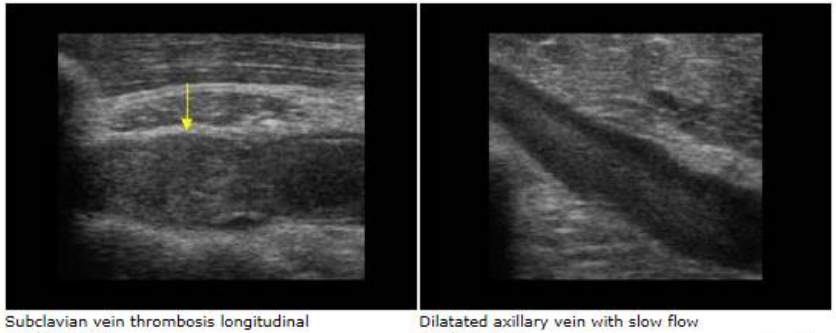
Jugular vein thrombosis longitudinal
ID: /40679-Afbeelding4.jpg



Subclavian vein thrombosis longitudinal
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Dilatated axillary vein with slow flow
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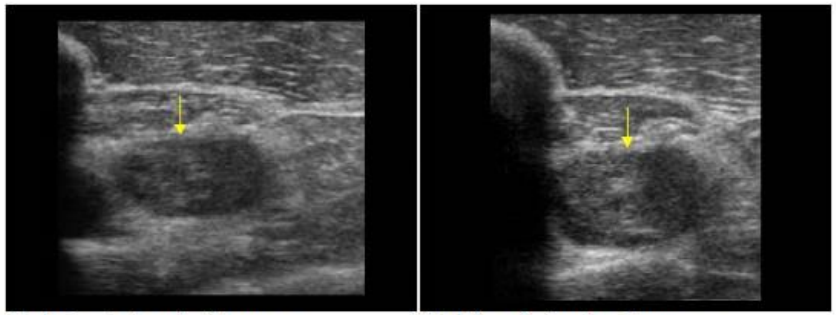
Dilatated axillary vein with slow flow



Subclavian vein thrombosis transverse
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Subclavian vein thrombosis transverse
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Algorithms

- Based on evidence for general and specific patient populations
  - Will work for most patients
  - Pay attention to individual patient circumstances and needs
- Next slides are recently developed, evidenced based algorithms from V. Chopra, et al[5]

Algorithms: Chopra, et al[5]

Figure 3. Venous access device recommendations for infusion of peripherally compatible infusate.

Device Type	Proposed Duration of Infusion			
	≤5 d	6–14 d	15–30 d	≥31 d
Peripheral IV catheter	No preference between peripheral IV and US-guided peripheral IV catheters for use ≤5 d			
US-guided peripheral IV catheter	US-guided peripheral IV catheter preferred to peripheral IV catheter if proposed duration is 6–14 d			
Nontunneled/acute central venous catheter	Central venous catheter preferred in critically ill patients or if hemodynamic monitoring is needed for 6–14 d			
Midline catheter	Midline catheter preferred to PICC if proposed duration is ≤14 d			
PICC		PICC preferred to midline catheter if proposed duration of infusion is ≥15 d		
Tunneled catheter				PICC preferred to tunneled catheter and ports for infusion 15–30 d
Port				

Appropriate | Neutral | Inappropriate | Disagreement

IV = intravenous; PICC = peripherally inserted central catheter; US = ultrasonography.

Algorithms: Chopra, et al[5]

Figure 4. Venous access device recommendations for infusion of non-peripherally compatible infusates.

Device Type	Proposed Duration of Infusion			
	≤5 d	6–14 d	15–30 d	≥31 d
Peripheral IV catheter				
US-guided peripheral IV catheter				
Nontunneled/acute central venous catheter	Central venous catheter preferred in critically ill patients or if hemodynamic monitoring is needed for 6–14 d			
Midline catheter				
PICC		PICCs rated as appropriate at all proposed durations of infusion		
Tunneled catheter		Tunneled catheter neutral for for use ≥15 d	No preference between tunneled catheter and PICC for proposed durations ≥15 d	
Port				No preference among port, tunneled catheter, or PICC for ≥31 d

Appropriate | Neutral | Inappropriate | Disagreement

IV = intravenous; PICC = peripherally inserted central catheter; US = ultrasonography.

Algorithms: Chopra, et al[5]

Figure 5. Venous access device recommendations for patients with difficult venous access.

Device Type	Proposed Duration of Infusion			
	≤5 d	6–14 d	15–30 d	≥31 d
Peripheral IV catheter	No preference between peripheral IV and US-guided peripheral IV catheters for use ≤5 d			
US-guided peripheral IV catheter	US-guided peripheral IV catheters preferred to peripheral IV catheters if proposed duration is 6–14 d			
Midline catheter	Midline catheters preferred to PICC if proposed duration is ≤14 d			
Nontunneled/acute central venous catheter	Central venous catheter preferred to PICC for use ≤14 d in critically ill patients			
PICC	Disagreement on appropriateness of PICC for durations <5 d	PICC use appropriate if proposed duration is ≥6 d; PICCs preferred to tunneled catheters for durations of 15–30 d		
Tunneled catheter			Tunneled catheter neutral for difficult IV access for use ≥15 d	No preference between tunneled catheter or port for use ≥31 d
Port				

Appropriate | Neutral | Inappropriate | Disagreement

IV = intravenous; PICC = peripherally inserted central catheter; US = ultrasonography.

Algorithms: Chopra, et al[5]

Figure 6. Venous access device recommendations for patients who require frequent phlebotomy.

Device Type	Proposed Duration of Infusion			
	≤5 d	6–14 d	15–30 d	≥31 d
Peripheral IV catheter	No preference between peripheral IV and US-guided peripheral IV catheter for use ≤5 d US-guided peripheral IV catheter preferred if venous access difficult			
US-guided peripheral IV catheter				
Midline catheter	Midline catheter preferred to PICCs if proposed duration is ≤14 d		Midline catheter neutral for frequent phlebotomy at this duration	
Nontunneled/acute central venous catheter	Central venous catheter preferred to PICC for use ≤14 d in critically ill patients			
PICC	Disagreement on appropriateness of PICC for durations <5 d	PICC use appropriate if proposed duration ≥6 d; PICC preferred to tunneled catheter for durations of 15–30 d		
Tunneled catheter			Tunneled catheter neutral for difficult intravenous access for use ≥15 d	
Port	Ports inappropriate for frequent phlebotomy, regardless of proposed duration of use			

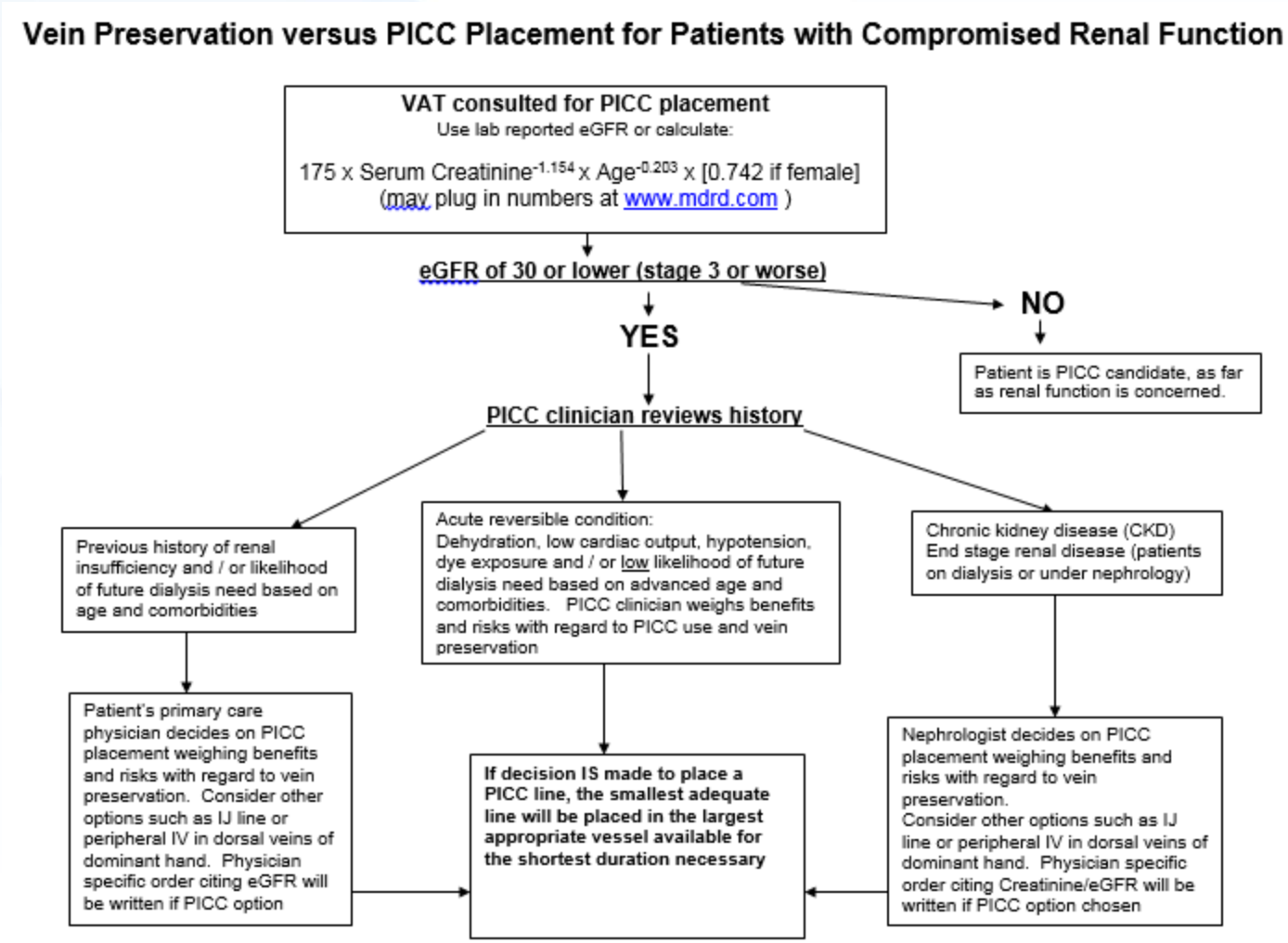
Appropriate | Neutral | Inappropriate | Disagreement

IV = intravenous; PICC = peripherally inserted central catheter; US = ultrasonography.

Algorithms: Create

- At NCMC, we wanted to provide consistent care, compatible with both vein preservation and immediate patient needs
  - Based on literature review[6, 7]
  - In conjunction with our local Nephrologists
- Finding no algorithm that met our need, we created our own!

Algorithms: CKD



Roles of the Nurse

- ad·vo·cate - **NOUN**
- a person who publicly supports or recommends a particular cause or policy
- synonyms: champion · upholder · booster · supporter · backer · promoter · crusader · proponent · exponent · spokesperson · campaigner · fighter · propagandist · apologist · flag-bearer

Which means…

- Know pertinent patient information
  - Co-morbidities
    - Device limiting conditions
    - Infusion / intravascular device history
    - Relevant diagnostics
  - Individualized Treatment plan
    - Infusate(s) characteristics
    - Length and frequency of infusion therapy
    - Medically anticipated outcome

And…

- Get to know the patient and any caregivers
  - What is their goal for therapy?
  - What lifestyle do they aspire to during therapy?
  - What level of engagement do they display?
  - What is an achievable level of participation?
  - What MATTERS most to them?
    - May be finance driven

And…

- Explain the recommended option(s) first, but be ready to discuss all venous access devices, including doing nothing
- Verify that they understand you
- Be honest when they ask you, “what would you do?” (Because they will)
- Champion your patient’s decision

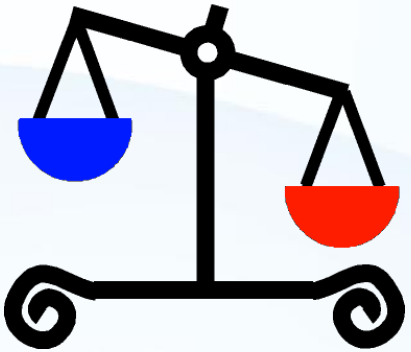
Co-morbidities

- Device Limiting Conditions:
  - Lymph node dissection
  - Limited limb mobility or limb deformity
  - Bone fractures
  - Diagnosed great vessel occlusions
  - Morbid body habitus
  - Skin conditions
  - Potential for device misuse
  - Patient / Caregiver restrictions
  - Fistula, graft, or HD catheter
  - Medications affecting coagulation

Co-morbidities

- Infusion / Intravascular Device History
  - Infusates that alter vessel health (e.g. Chemo)
  - Previous long term venous catheter(s)
  - Temporary or permanent pacemaker wires
- Relevant Diagnostics
  - Platelets, eGFR, INR
  - Applicable radiographs
  - Vessel health evaluation

Knowing the Patient



- Requires awareness of self
  - Know your biases
  - Understand the need for hope
- The patient's goal are their own
  - May not be what you or I would choose
  - May not feel extremely realistic
  - But, probably allows them to get up in the morning

First Case Study

- 45 year old man with stage 11B (T1, N1, M0) pancreatic cancer
  - Eight weeks status-post Whipple
  - Six month Chemotherapy / Radiation treatment plan
  - Active, intelligent, working machinist
  - *Goal: TO LIVE*
  - *Wife is a Vascular Access Specialist (VAS) nurse*

First Case Study

- Patient received *thorough* education regarding long term access for chemotherapy post-op, but prior to meeting with oncologist
- Biases clashed:
  - Oncologist expected implanted port placement
  - Patient preferred PICC placement
- What is the right CVAD for this patient?

First Case Study

- CHAMPION YOUR PATIENT'S DECISION
  - Stand up for what is right for him!

More on Knowing the Patient

- Assess:
  - Patient / caregiver engagement
    - How interested in the choice are they
  - Ability to participate / provide CVAD care
    - Physical ability of patient
    - Availability of caregiver
    - Level of comprehension / demonstration

Second Case Study

- 37 year old woman with left arm cellulitis from a cat scratch
  - Failed PO therapy
  - Now extends from mid-upper arm to wrist
  - Based on culture sensitivities, infectious disease anticipates a minimum of 4 week antibiotic infusion therapy
  - Active, intelligent, mother of 2 children
  - *History of right side mastectomy with lymph node removal*

Second Case Study

- VAS nurse consulted for PICC placement
  - Patient immediately voices concern regarding venous access in either arm
  - VAS agrees with high functioning, knowledgeable patient
- Political clash:
  - IR group wants their PA to place a PICC
- What is the right CVAD for this patient?

Second Case Study

- CHAMPION YOUR PATIENT'S DECISION
  - Help the patient advocate for themselves

Third Case Study

- 64 year old grandmother a few hours post cardiac surgery that was unsuccessful
  - Condition is terminal (within a few days)
  - Has right IJ tunneled HD catheter, right femoral arterial sheath, and right non-tunneled femoral venous triple lumen
  - *Cardiologist wants PICC "to remove sheath"*
  - *Nephrologist says no PICC "to preserve arm vessels"*
  - *Family yet to be informed of patient's imminent mortality*

Third Case Study

- Dialogue:
  - VAS nurse: “Peripheral IV?”
  - Cardiologist: “No!”
  - VAS nurse: “Patient condition is not survivable…PICC”
  - Nephrologist: “Place whatever you bleep-bleep want!”
- What is the right line for this patient?

Third Case Study

- Conflicting orders; disagreeing physicians
- Patient and family NOT fully informed
- Advocate for the patient and her family
  - Activate chain of command
  - Bring focus back to the patient

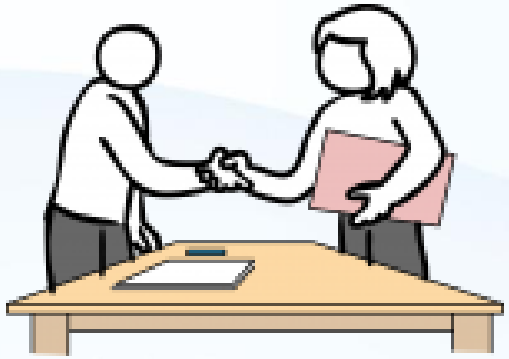
Fourth Case Study

- 42 year old diabetic woman with recurrent left stump infection
  - Failed oral antibiotics
  - 4 weeks IV Ceftriaxone anticipated
  - History of multiple PICC lines, multiple failed midlines, and tunneled catheter
  - *History of manipulation of her lines and wound*
  - *Largest gap in ED visits and hospitalization was after tunneled catheter insertion*

Fourth Case Study

- Primary care physicians insist on nursing home placement throughout infusion therapy course
- Patient has been fired from nursing home service and must leave at the end of the week
- What is the right line for this patient?

Fourth Case Study



- Referral, referral, referral
  - Single lumen tunneled catheter
  - Notify PCP of SNF dilemma
  - Consult social work / care coordination
    - Explore care options
    - Avoid gap in infusion therapy
- One more referral!
  - To facility / organization readmissions team

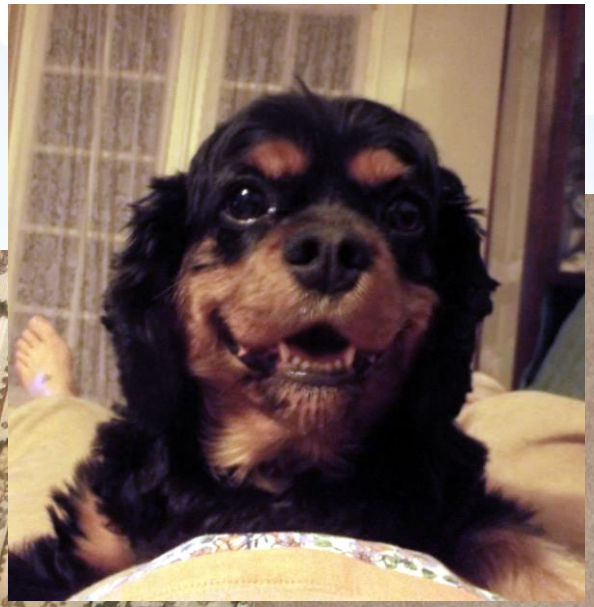
Fourth Case Study

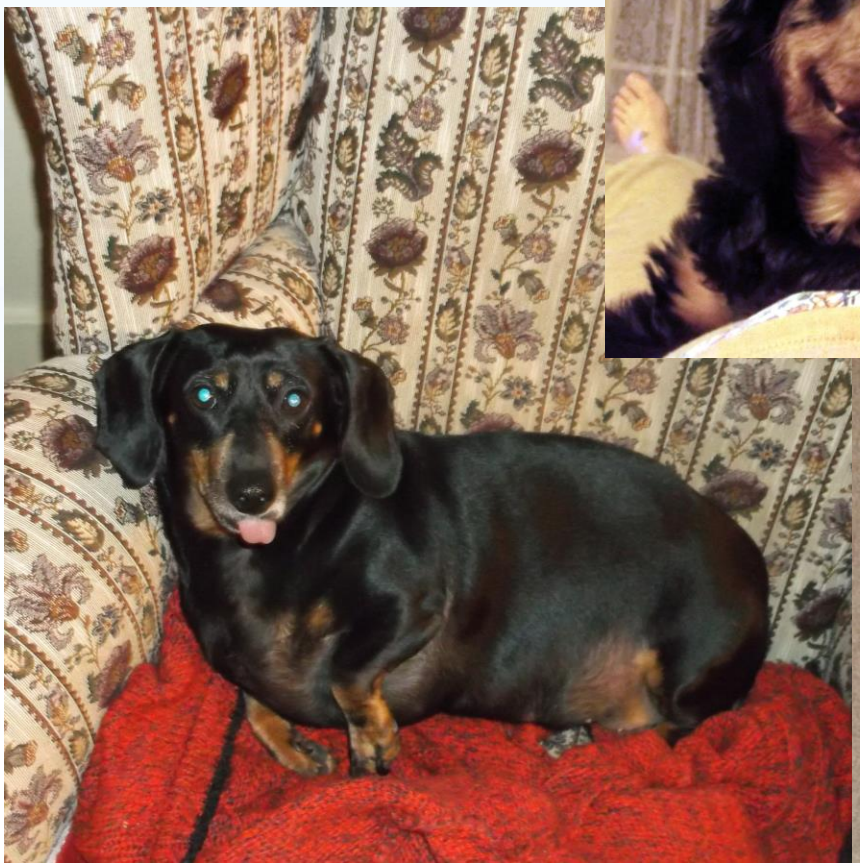
- And most importantly
  - CARE for the patient
    - Listen
    - Be honest
    - Do not *display* judgment towards the patient
  - CARE for yourself
    - Be aware of your own perceptions of blame
    - Talk it through with other health team members

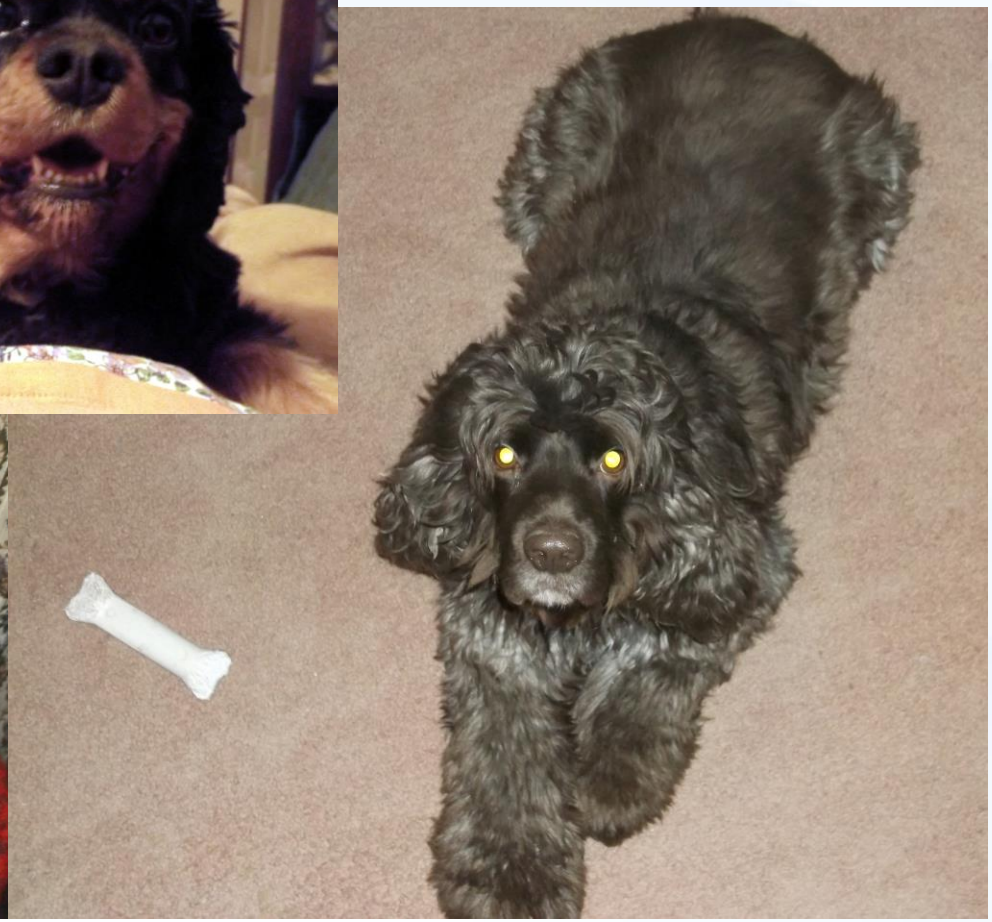
Summary

- Infusion Nurse:
  - Expert
  - Advocate
- Device Selection: Best fit
  - Least invasive adequate
  - Pros outweigh cons
  - Patient / caregivers on board, if not driving

Thanks for ALL you do!







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Additional Reference Material

- 2016 Infusion Nursing Standards of Practice.
- Infusion Nurses Society. Policy and Procedures for Infusion Nursing, 5th edition.
- Oncology Nurses Society. Access Device Guidelines: Recommendations for Nursing Practice and Education, 3rd edition.
- National Kidney Foundation: KDOQI Guidelines for Chronic Kidney Disease.
- Association for Vascular Access National Scientific Meeting Proceedings, past five years.
- Infusion Nurses Society National Conference Proceedings, past five years.