Peripheral Venous Access

Devices/Use

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Indications for Vascular Access

- Hydration
- Medication administration
- Total or partial parenteral nutrition
- Chemotherapy
- Blood and blood component sampling/administration
- Clinical or diagnostic access
- Hemodynamic monitoring
- Arterial blood pressure monitoring/sampling
- Frequent blood sampling (DVA)
- Plasmapheresis/Aquapheresis/ Hemodialysis

Device Selection

- Collaborative Consultation (multi-disciplinary team, patient/caregiver)
  - Prescribed therapy or treatment regimen
  - Anticipated duration of therapy
  - Patient assessment
    - Vascular characteristics
    - Patient's age
    - Comorbidities
    - History of infusion therapy
    - Preference for VAD location
    - Ability and resources available to care for the device

Device Selection

Peripheral Devices

- Short Peripheral Catheters (SPC)
  - Open
  - Wire assisted
  - Closed
- Midline catheters
  - Traditional
  - Multi-lumen
  - Seldinger assisted

SPC Indications

- Indications
  - Infusions projected for 6 days or less
  - Non-irritant medications and solutions
  - Non-vesicant medications and solutions

SPC Contraindications

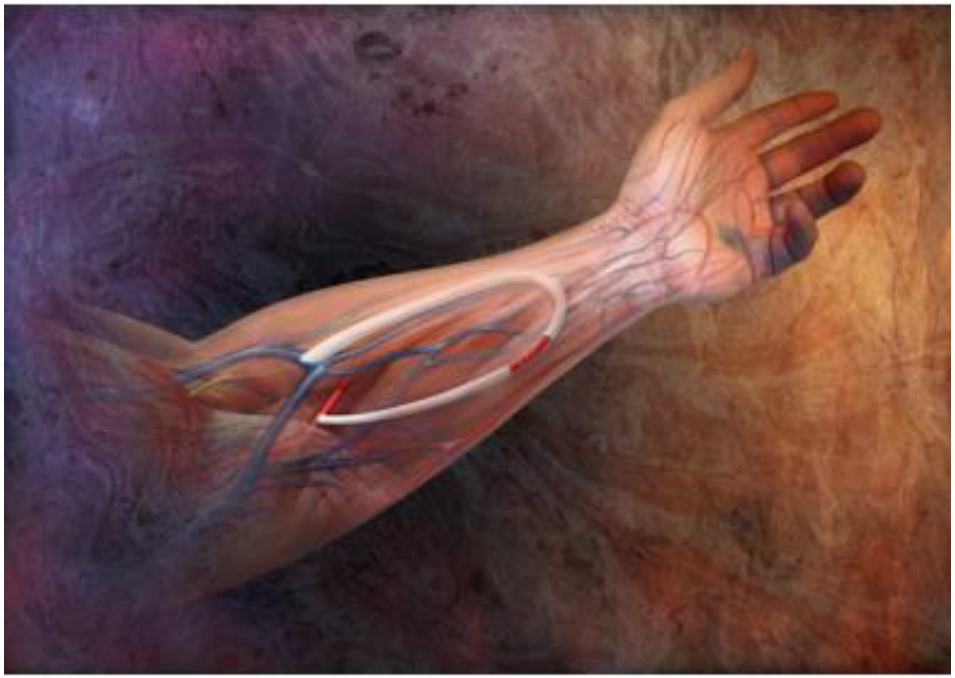
- Contraindications
  - Thrombosis
  - Fracture/trauma
  - Infection
  - Compromised circulation
  - Mastectomy/axillary lymph dissection
  - A/V fistula or graft

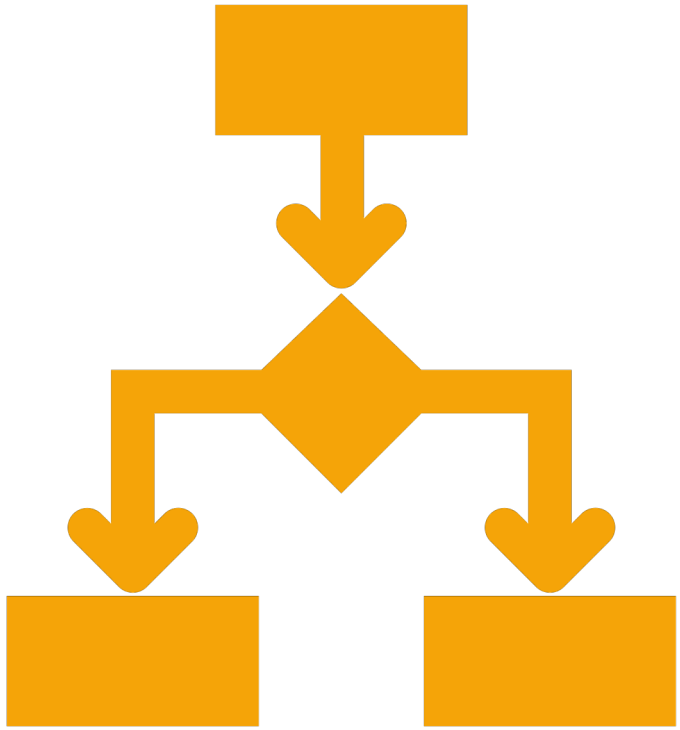
Midline Catheter Indications

- Indications
  - Infusions projected for 6 days and potentially up to 4 weeks
  - Non-irritating medications and solutions
  - Non-vesicant medications and solutions

Midline Catheter Contraindications

- Contraindications
  - Fracture/trauma
  - Infection
  - Compromised circulation
  - A/V fistula
  - Chronic kidney disease patients





Decision Process

Infusate Characteristics

- Irritant
- Vesicant
- Osmolarity

Definitions

- **Irritant:** An agent capable of producing discomfort (burning, stinging) or pain as a result of irritation in the internal lumen of the vein with or without immediate external signs of vein inflammation.
- **Vesicant:** An agent capable of causing blistering, tissue sloughing, or necrosis when it escapes from the intended vascular pathway into the surrounding tissues.

INS List of Non-Cytotoxic Vessicants

Red List	Yellow List
Calcium Chloride	Acyclovir
Calcium Gluconate	Amiodarone
Contrast Media – nonionic	Arginine
Dextrose containing ≥ 12.5%	Dextrose concentrations ≥ 10% to 12.5%
Dobutamine	Mannitol ≥ 20%
Epinephrine	Nafcillin
Norepinephrine	Pentamidine
Parenteral nutrition solutions exceeding 900 mOsm/L	Phenobarbital sodium
Phenylephrine	Potassium ≥ mEq/L
Phenytoin	Vancomycin hyrdrochloride
Promethazine	
Sodium bicarbonate	
Sodium chloride ≥ 3%	
Vasopressin	

Duration of Therapy

SPC
Up to 6 days

Midline
6 days to 4 weeks

CVC
4 weeks +

Patient Assessment

Patient's age
Nutritional status

Comorbidities

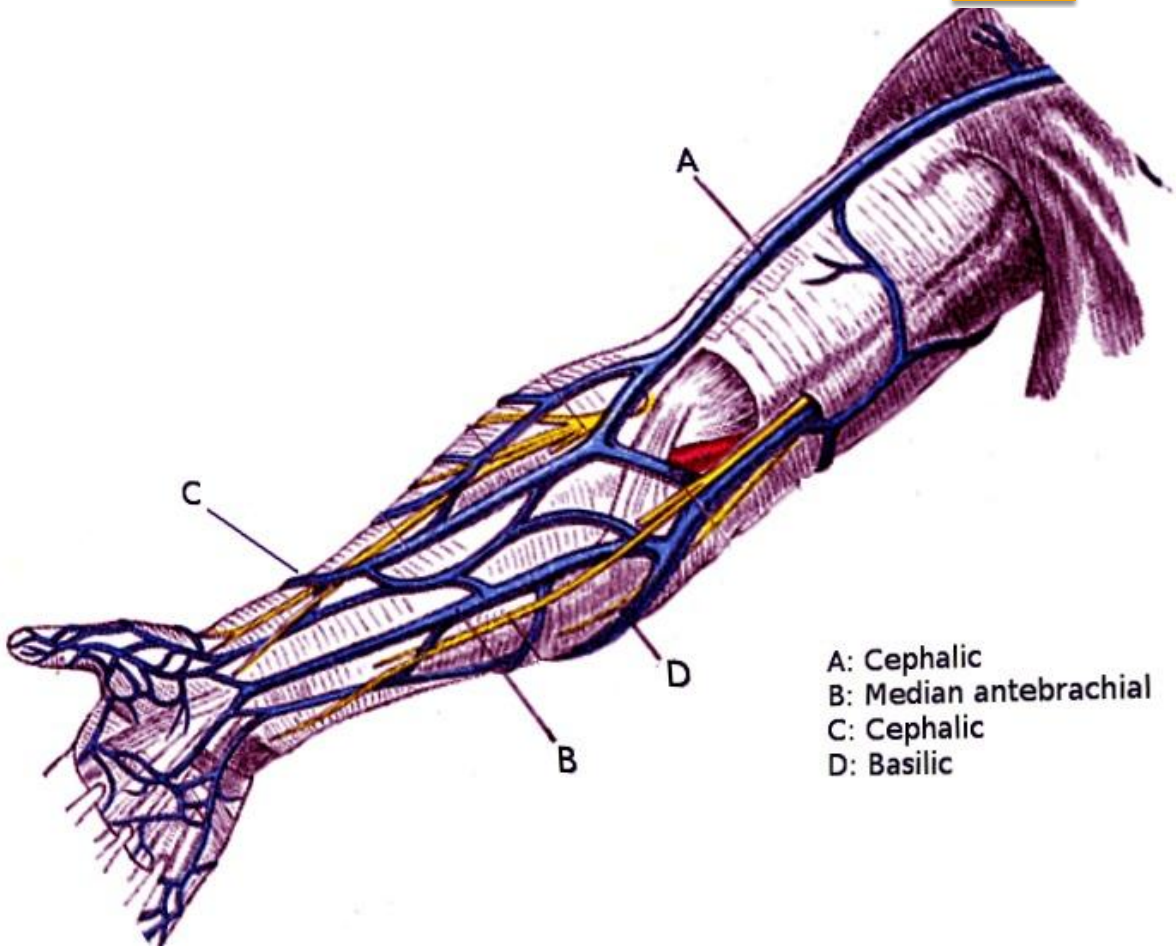
History of infusion therapy

Preference for VAD location

Ability and resources available to care for VAD

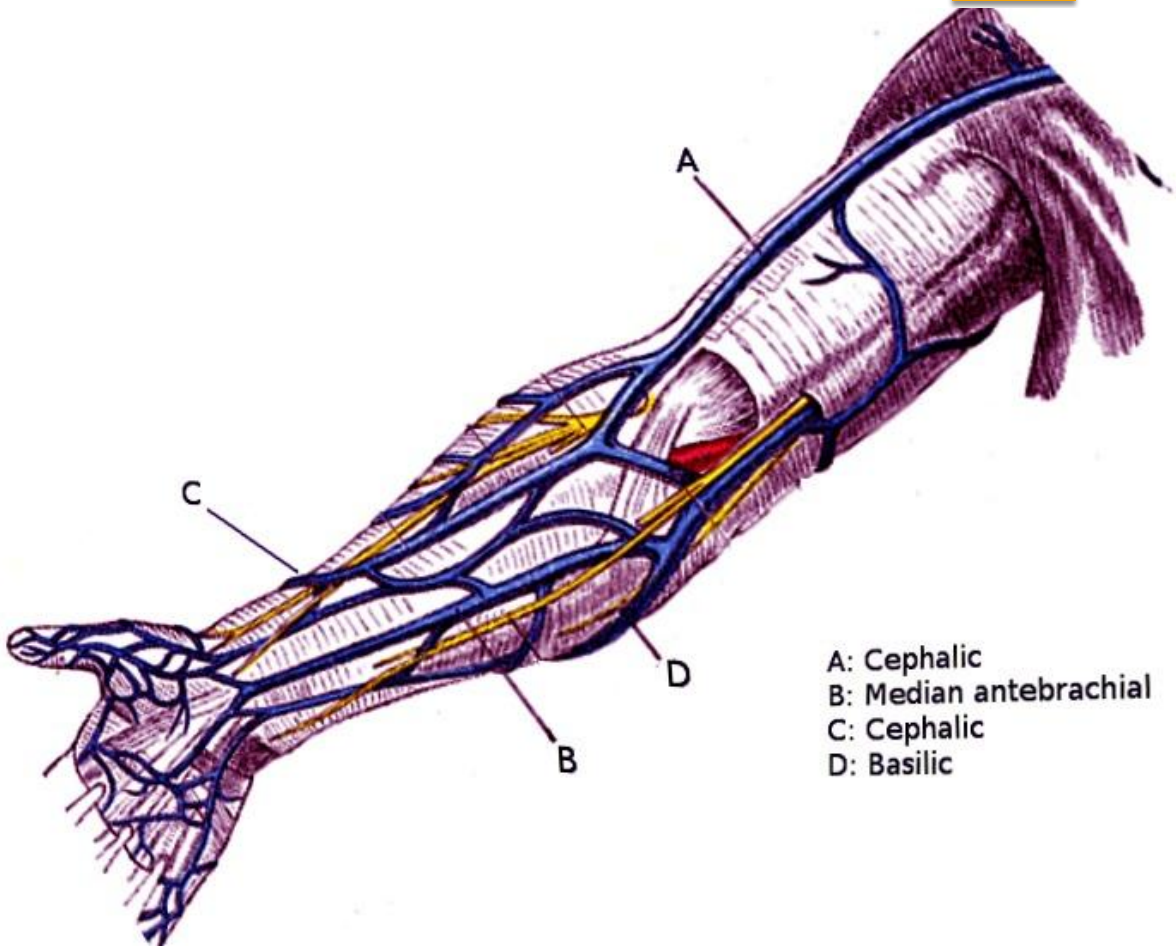
SPC Site Selection

- Most likely to last duration of therapy
- Use forearm to
  - Increase dwell time
  - Decrease pain
  - Promote self-care
  - Prevent accidental removal or occlusion
- Consider veins found on the dorsal and ventral surfaces of the upper extremities
  - Metacarpal
  - Cephalic
  - Basilic
  - Median



Midline Site Selection

- Select site in the upper arm (preferred) or
- Select site in the region of the antecubital fossa (secondary)
  - Basilic
  - Cephalic
  - Median Cubital
  - Brachial
- Avoid cannulation
  - Areas with pain on palpation
  - Open wounds
  - Infection
  - Compromised veins

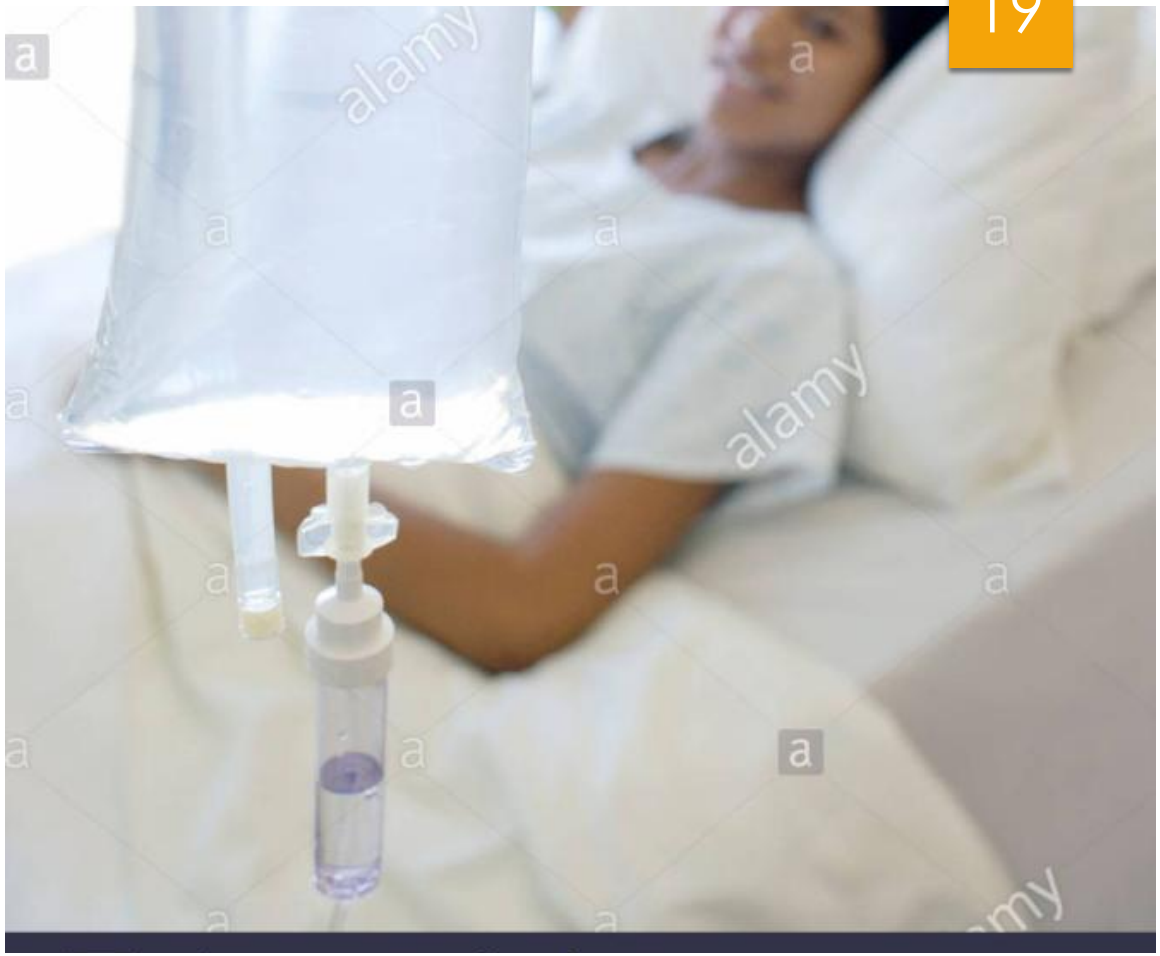


Other Considerations

- Clinically Indicated
- Common modes of SPC Failure
- Bundled approach

INS Recommendations

- Remove the SPC if it is no longer included in the plan of care or has not been used for 24 hours or more.
- Remove SPC and Midline catheters when *clinically indicated*, based on findings from site assessment and/or clinical signs and symptoms of systemic complications.



INS Recommendations

- Potential complications
  - Pain and/or tenderness with or without palpation
  - Change in color (erythema or blanching)
  - Changes in skin temperature (hot or cold)
  - Edema
  - Induration
  - Leakage of fluid or purulent drainage from puncture site
  - Resistance when flushing
  - Absence of a blood return

Accepted but Unacceptable: Peripheral IV Catheter Failure

Peripheral IV Catheter Failure Rates

TABLE 1

Peripheral IV Catheter Failure Rate, Assorted Studies, 1990-2014

Study Type	Incidence of Failure (%)	Median	Mean
Prospective randomized controlled	36,[18] 37,[58] 39,[50] 40,[6] 45,[59] 51,[19] 55,[20] 63[60]	43%	46%
Prospective observational	23.5,[61] 25.5,[62] 32,[63] 36.5,[64] 47.5,[65] 47.6,[51] 65,[66] 66,[54] 69.2,[55] 77[53]	48%	49%
Retrospective	22.4,[67] 95[68]	58.7%	59%

5 Modes of Peripheral IV Catheter Failure

TABLE 2

The 5 Modes of Peripheral IV Catheter Failure: Prospective Randomized Controlled Studies, 1990-2014[a]

Mode of Peripheral IV Catheter Failure	Range	Mean	Median
Catheter-related phlebitis	0.1%-63.3%	15.4%	9.0%
Catheter infiltration	15.7%-33.8%	23.9%	22.2%
Catheter occlusion/ mechanical failure	2.5%-32.7%	18.8%	22.8%
Catheter dislodgment	3.7%-9.9%	6.9%	7.0%
Catheter-related infection	0.0%-0.44%	0.2%	0.2%

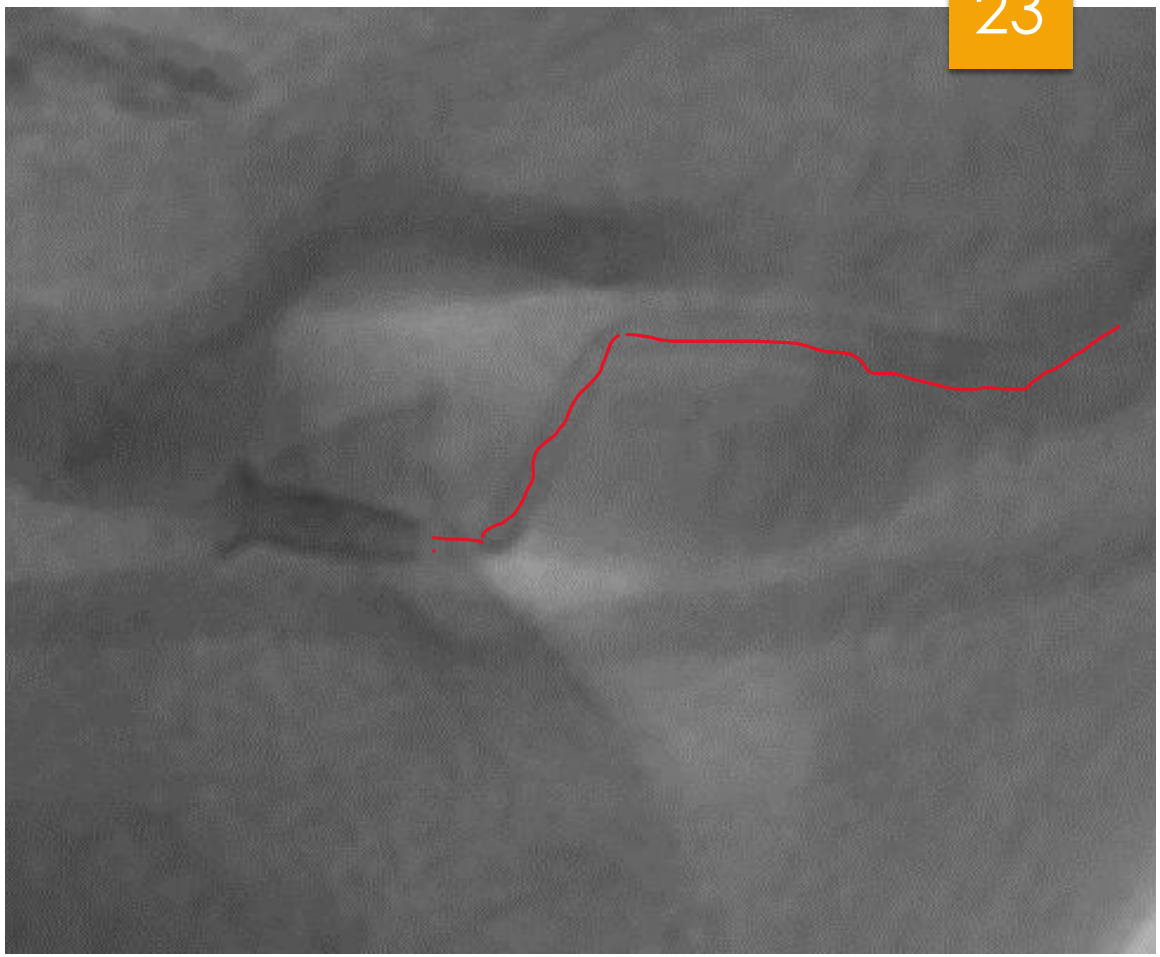
[a]Summary of data from Tables 4 to 8.

Modes of IV Catheter Failure

- Overall SPC failure rate lies between 35% - 50%
- Modes of failure
  - Phlebitis
  - Infiltration
  - Dislodgement
  - Mechanical failure (eg, occlusion, leakage)
  - Site or bloodstream infection

Approach to Improve SPC Dwell Time

- Minimize phlebitis
  - Smaller-gauge catheters
  - Longer catheters
  - Catheter material
  - Stabilize catheter
    - Avoid areas of flexion
  - Carefully select infusates
  - Improve first attempt insertion success
  - Avoid patient factors that affect vessel health



Short Peripheral Catheter Performance Following Adoption of Clinical Indication Removal

Short Peripheral Catheter Performance Following Adoption of Clinical Indication Removal

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ABSTRACT

Two years following the adoption of clinical indication policies for short peripheral catheters (SPCs), a large community hospital undertook 2 extensive point prevalence reviews at 1-year intervals to study the overall outcomes associated with the SPCs. The findings were used to enhance documentation as well as staff awareness. A bundled approach was taken, focusing on insertion as well as care and maintenance needs. Consistent outcomes included at least 20% of catheters remaining functional more than 7 days and 35% more than 5 days.

Key words: clinical indication, dislodgement, dressing disruption, infiltration, peripheral IV, short peripheral catheter, vascular access

Approach to Improve SPC Dwell Time

- Catheter Infiltration
  - Avoid areas of flexion
  - Secure the catheter
  - Use stabilization
  - Carefully select catheter material
  - Limit unnecessary additional venous perforation at the time of insertion
  - Consider patient characteristics

Approach to Improve SPC Dwell Time

- Catheter occlusion and mechanical failure
  - Avoid areas of flexion
  - Stabilize the catheter
  - Optimal care and use
    - Flushing
    - Dressing care and maintenance

Approach to Improve SPC Dwell Time

- Accidental catheter removal/dislodgement
  - Stabilize the catheter
  - Use transparent dressing
  - Improved catheter use and maintenance
    - Replace dressing when loose or soiled
- Catheter-related infection
  - Don't use tape in proximity to the SPC
  - Meticulous skin prep
  - Occlusive dressing
  - Strict aseptic technique

Using a Bundled Approach to Increse SPC Dwell time

- Bundle elements
  - CHG skin prep
  - Sterile gloves
  - SPC stabilization
  - Extension set
  - Dressing materials
  - Liquid adhesive (potentially)
  - SPC insertion in forearm

References

- Resource Guide for Vascular Access. Association for Vascular Access, 2019
- Infusion Therapy Standards of Practice. Infusion Nurses Association, 2016
- Accepted but Unacceptable: Peripheral IV Catheter Failure, Journal of Infusion Nursing, Helm, R. E., et al, Volume 42, Number 3, May/June 2019
- Short Peripheral Catheter Performance Following Adoption of Clinical Indication Removal, Journal of Infusion Nursing, DeVries, M, Volume 42, number 2, Mar/Apr 2019


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Thank you