



Vascular Access Complications

Rae Mello-Andrews, RN- BC, BSN, MS



Objectives

- Discuss the rationale or early recognition of vascular access complications
- Identify causes of complications from vascular access
- Establish interventions that could be applied to reduce complications

History

- 1492 Blood given to the Pope
- 1656 Sir Christopher Wren
- 1687 Ban on blood transfusions
- 1818 First man to man transfusion
- 1831 Cholera epidemic
- 1832 Dr Latta – saline
- 1860s Pasteur – Germ Theory

- 1910 Heat sterilization
- 1940s Mass General 1st team, nurse
- 1945 Plastic cannula
- 1950 Rochester Needle – over the needle catheter
- Vietnam War Subclavian access
- 1980s Central Venous access / ports
- 1990s PICCs
- 2000s CDC / IHI infection control
Middle East conflicts – IO

Why is early recognition of complications important?

Failure to recognize can lead to legal implications

Smoltz (2004)
Levine (2000)

4 D's

Delays
Dollars
Dissatisfaction
Discomfort

So what causes complications ?

Infection Control

- Why is it important?
 - 250,000 – 500,000 intravascular related blood stream infections per year
 - 12 – 25% mortality rate (CDC)
 - October 2008 = NO MONEY (CMS)
 - 2.3 – 28 Billion annual cost (CMS)

Infection Control

- Health status at time of insertion
- Gloves worn
- Proper skin cleansing techniques
- Shaving vs. clipping
- Stopcocks
- Access points

Infection Control (18)

Site Care

Chlorhexadine vs. alcohol & betadine
ANTT – United Kingdom

Insertion

Asepsis vs. Sterile
Central line insertion audit tool
CLABSI goal 0%

Restarts

Environment in which it was placed
Femoral vs. Neck vs. Arm

Securement

Tape vs. Adhesive anchor device

Adhesive anchor devices

- ↓ infiltration
- ↓ occlusion
- ↓ Site leakage

Proof

VA Hospital – Seattle Washington (2002)

	Tape	Securement Device
Initial Starts	105	41
Unscheduled restarts	43 (41%)	6 (15%)
Phlebitis	1	0
Infiltration	2	1
Dislodgement	17	5

National Study

2006
83 Hospitals
10,000 patients

67% reduction complications
76% reductions in restarts

\$277,000 per hospital – supplies, nursing time, complications

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Phlebitis

- Mechanical
Securement devices
- Chemical
Medication

Phlebitis Scale	
Grade	Clinical Criteria
0	No symptoms
1	Erythema at access site with or without pain
2	Pain at access site with erythema or edema
3	Pain at access site with erythema or edema Streak formation Palpable venous cord
4	Pain at access site with erythema or edema Streak formation Palpable venous cord > 1 inch in length Purulent drainage

Infusion Nurses Society

Skill



- INS Standard 6
Competency
Annual vs. Once

Patient type

NOTE: Performance of invasive procedures on peers is discouraged due to health risk.

Vein Quality / Location

Basic Rules

- What and how long?
- Previous access ?
- Complications?
- Accommodation?

Location Location Location

YEA

Dorsum / Ventral Surfaces
Neck Area
Lower extremity – IO ONLY

NEA

Wrist area
Antecubital
Femoral Area
Feet (unless not walking)
Upper arm (stage 4/5 chronic kidney disease)
Jugular (NH Nurses Practice Act)



Infiltration

Where ?

Why ?

What ?

Kagal and Ryan, 2004
Most symptomatic
Simple to complex





Figure 3. Phenylephrine Extravasation Causes Gangrene in Bart's Finger, Image provided courtesy of ISMP

Infusion Nurses' Society Standards of Practice – Infiltration Scale

0	No symptoms
1	Skin blanched Elevate 1 inch in any direction Cold to touch With or without pain
2	Skin blanched Elevate 1 to 6 inches in any direction Cold to touch With or without pain
3	Skin blanched, translucent Gross edema > 6 inches in any direction Cold to touch Mild-moderate pain Possible numbness
4	Skin blanched, translucent Skin pale, tender Skin discolored, bruised, swollen Gross edema > 6 inches in any direction Droop/pitting gross edema Circulatory equipment Moderate-severe pain Infiltration of any amount of blood product, irritant, or vesicant

Vesicants

Know your pH

Dilantin

Vancomycin

High Dose / Frequent Dose Antibiotics

Vasopressors

Know the osmolarity

Potassium Chloride

Choosing the Right Catheter

- How long ?
- What kind ?
- Patient Condition ?
- Discharge criteria ?

Dressings

- Type
 - Peripheral
 - PICC / Midline
 - Central line
- Changes
- Assessment

Tubings

New Recommendations (2011 – INS)

Primary & secondary *continuous* sets other than blood, blood products, lipids should be changed no more than frequently 96 hours

Secondary sets – if disconnected every 24 hours

PPN non-lipid containing solution changed *no more than 96 hours*.

IV Fats – not continuous every new bottle consecutively – every 24 hours
 Propofol every 12 hours
 Blood every 4 hours
 Hemodynamic monitoring every 96 hours unless contamination

Flushes & Locks

Flushes – before & after
 SINGLE USE

Aspiration

Occlusion

Needleless Connectors

Montana State University 2007

The need for good port hygiene





Catheter Occlusion

Results – lack of standardized flushing

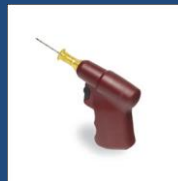
Increase in infections

Remove

Declott – CVC only

Intraosseous

- Emergency procedure
 - Pain management
 - No more than 24 hours
 - Low complication rate
 - Rare osteomyelitis
 - Extravasation
 - › Most common
 - › Poor Insertion technique
 - › Inadequate stabilization



Documentation (14)

- Device, length, gauge/size of device
- Date & time of insertion / by whom
- Number of attempts
- Local anesthetic
- Insertion site
- Site assessment

Continued Documentation

- At least every 8 hour assessment documentation.
 - Site
 - Infiltration / Phlebitis
 - Dressing
 - Circumference – if applicable
 - Amount external

Complications Noted

- Consider an incident report
- Nursing Diagnosis
- Physician Notification

Removal

- Length
- Tip
- Site Care
- Patient Education

Patient Education

- Post removal education
 - Phlebitis
 - Infection
 - Dressing removal
 - When to call
 - How to care for it

Do you have this information in your discharge instructions ?

Remaining current in your practice on new standards decreases your chances of IV issues.



What can do I ?

- Assess frequently
- Use good technique
- Follow policies
- Stay current in practice
- Document
- Educate

