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

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
- Chlorohexidine vs. alcohol & betadine
- ANTT – United Kingdom
Insertion
- Asepsis vs. Sterile
- Central line insertion audit tool
- CLABSI goal 0%
Restart
- 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)

<table>
<thead>
<tr>
<th></th>
<th>Tape</th>
<th>Securement Device</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Starts</td>
<td>105</td>
<td>41</td>
</tr>
<tr>
<td>Unscheduled restarts</td>
<td>43 (41%)</td>
<td>6 (15%)</td>
</tr>
<tr>
<td>Phlebitis</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Infiltration</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Dislodgement</td>
<td>17</td>
<td>5</td>
</tr>
</tbody>
</table>

National Study

2006
83 Hospitals
10,000 patients

67% reduction complications
76% reductions in restarts

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

Materials Management in Healthcare, June 2007 Volume 16 Number 6

Phlebitis

• Mechanical
Securement devices

• Chemical
Medication

Phlebitis Scale

<table>
<thead>
<tr>
<th>Grade</th>
<th>Clinical Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No symptoms</td>
</tr>
<tr>
<td>1</td>
<td>Erythema at access site with or without pain</td>
</tr>
<tr>
<td>2</td>
<td>Pain at access site with erythema or edema</td>
</tr>
</tbody>
</table>
| 3     | Pain at access site with erythema or edema
      | + Streak formation |
| 4     | Pain at access site with erythema or edema
      | + Streak formation
      | + Palpable venous cord
      | + 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 / Ventrall 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
Infusion Nurses’ Society Standards of Practice – Infiltration Scale

<table>
<thead>
<tr>
<th>Grade</th>
<th>Criteria</th>
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</thead>
<tbody>
<tr>
<td>0</td>
<td>No symptoms</td>
</tr>
<tr>
<td>1</td>
<td>Skin blanched, Edema &lt; 1 inch in any direction, Cool to touch, With or without pain</td>
</tr>
<tr>
<td>2</td>
<td>Skin blanched, Edema 1 to 6 inches in any direction, Cool to touch, With or without pain</td>
</tr>
<tr>
<td>3</td>
<td>Skin blanched, translucent, Gross edema &gt; 6 inches in any direction, Cool  to touch, Mild–moderate pain, Possible numbness</td>
</tr>
<tr>
<td>4</td>
<td>Skin blanched, translucent, Skin tight, leaking, Skin discolored, bruised, swollen, Gross edema &gt; 6 inches in any direction, Deep pitting tissue edema, Circulatory impairment, Moderate–severe pain, Infiltration of any amount of blood product, irritant, or vesicant</td>
</tr>
</tbody>
</table>

**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

Needless 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

Patient Education

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

Removal

- Length
- Tip
- Site Care
- Patient Education

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