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Improving Life on Nutrition Support



Venous Access and Complications in Home Parenteral Nutrition

Objectives

- Name/describe the types of IV access used in PN therapy.
- Describe the etiology of line infections and the most common pathogens associated with them
- List other major complications associated with central lines
- List the preventative measures that can be taken to avoid line infections/complications.
- Name/describe the types of IV caps that are used on IV lines

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Long Term: PICC Lines

- Long (14-20”) line placed above antecubital fossa, extending into central circulation
- For mid range therapy (6-12 weeks)
- X Ray confirmation necessary: preferred position in distal SVC or SVC/RA junction
- Inserted at bedside with/without US guidance or via IR
- Easy to remove:at bedside or in home setting
- Higher risk occlusion, dislodgement, malposition than Tunneled CVCs

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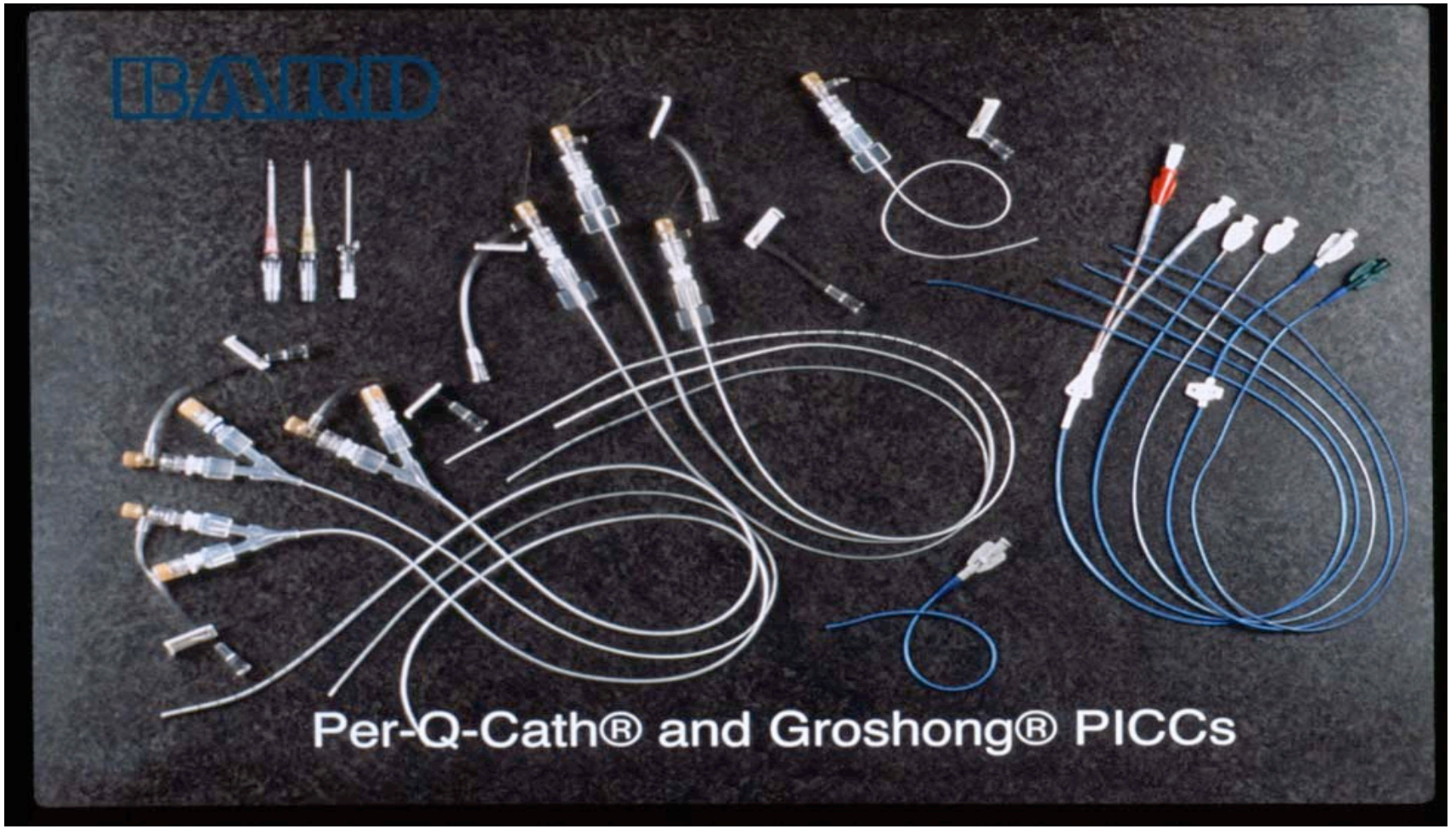
PICCs



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Long Term: Tunneled Catheters

- Long line surgically tunneled under skin, extends into central circulation
- For long term therapy
- X Ray confirmation necessary
- Catheter tubing extends out from the skin level (approximately 1 foot extension)
- Brand names: Groshong, Hickman (adult), Broviac (pediatric)
- Requires experienced MD to insert
- Can be used for PN

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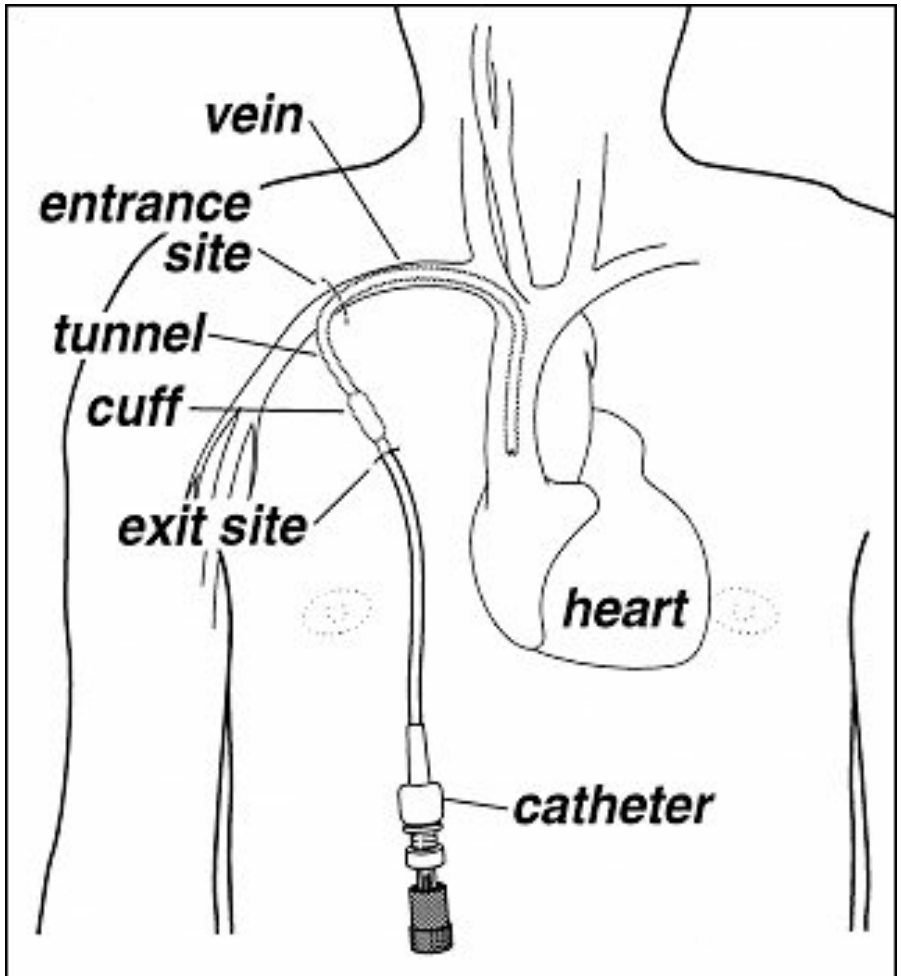
Tunneled Catheter



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Tunneled

- Hickman™ (BARD)
- Broviac™ (BARD)
- Groshong™ (BARD)

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Hickman® Cuffs

VitaCuff Antimicrobial Cuff

SureCuff Tissue Ingrowth Cuff

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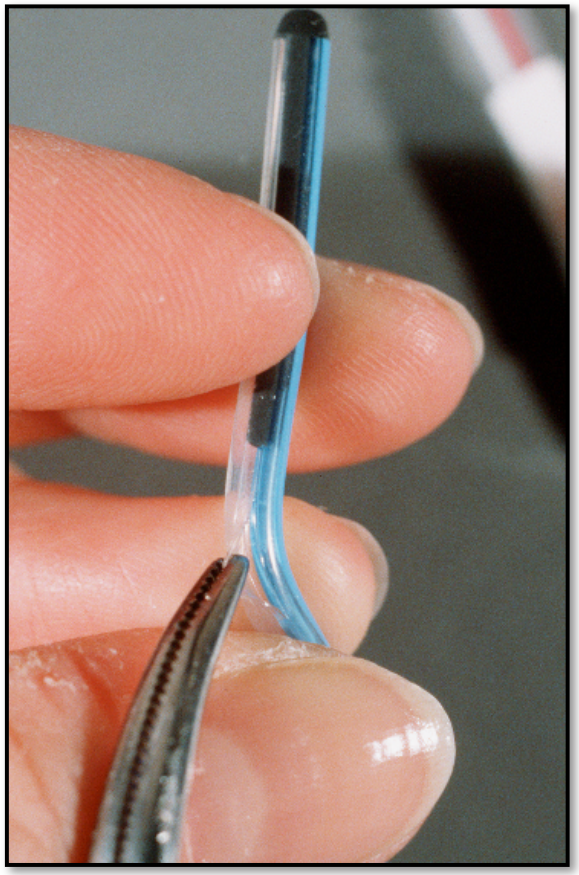
Device Tips

Hickman



Groshong

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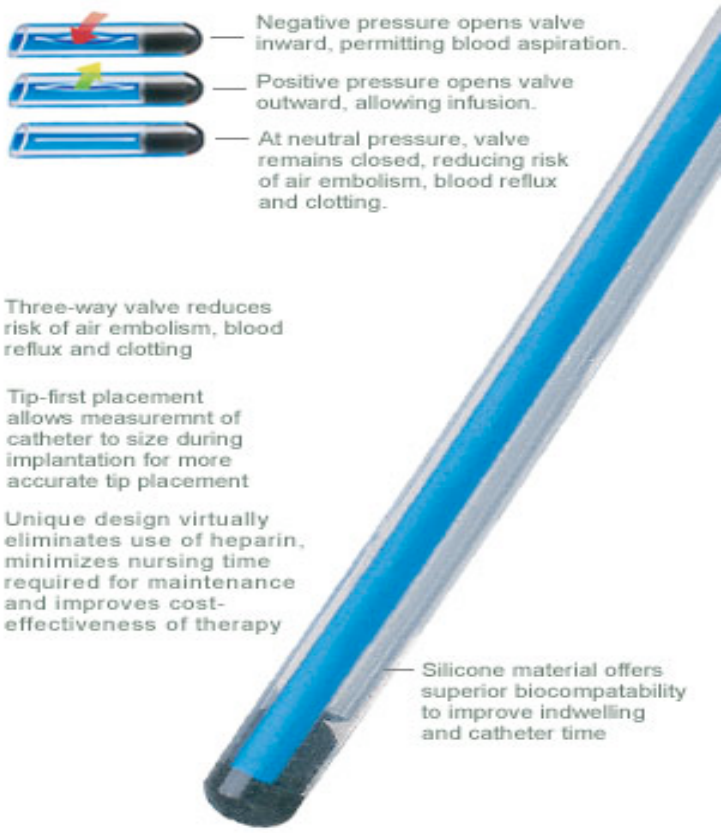
Groshong® Valve

BARD® Groshong®



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Long Term: Implanted Ports

- Short catheter (6”) surgically placed under the skin of the chest or abdomen extending into central circulation
- Indicated for long term, intermittent therapy
- Port access using a non coring needle: Huber
- Weekly Huber needle change required
- Best used for intermittent therapies (chemotherapy, antibiotics)
- Seldom inserted for PN alone

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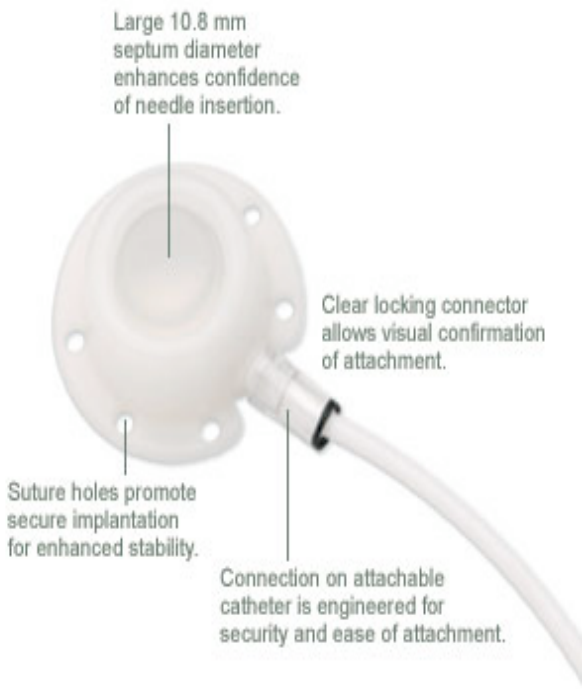
Ports

- M.R.I.™ Low-Profile Implanted Port

(BARD Access Systems)



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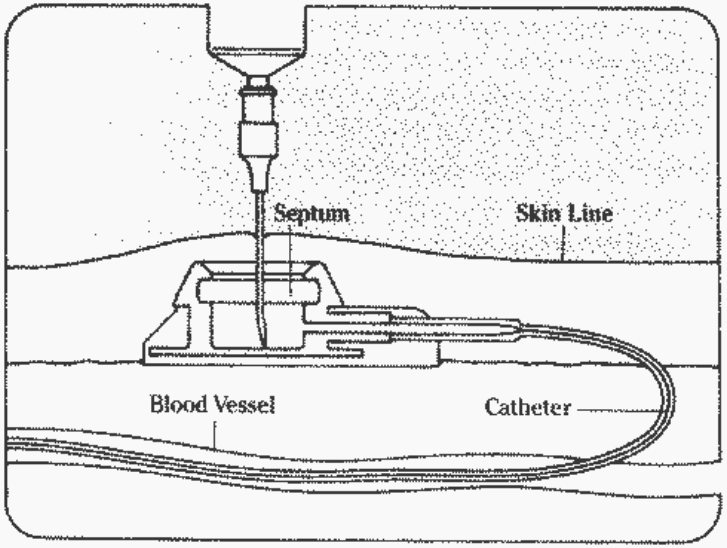
Port a Cath Accessing



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Catheter Complications

- CRBSI's
- Occlusions
- Thrombosis

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Catheter Related Blood Stream Infections

Setting		Infections/1000 catheter days
• Pediatric ICU	→	7.9
• Medical ICU	→	6.1
• Surgical ICU	→	5.6
• Coronary ICU	→	4.8
• Home Infusion	→	1.0

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Cost of CRBSI's

- 80,000 CRBSIs in ICU's.
- Based on average of 5.3 per 1,000 catheter days…..
  …*Estimated* 250,000 CRBSI's annually in US hospitals

- Attributable mortality is 12-25%

- Estimated cost:
  $34,508-$56,000 per line infection
  $296 mill-2.3 billion per year in US!!!

CDC, Morbidity and Mortality Weekly Report (MMWR) Aug 9, 2002

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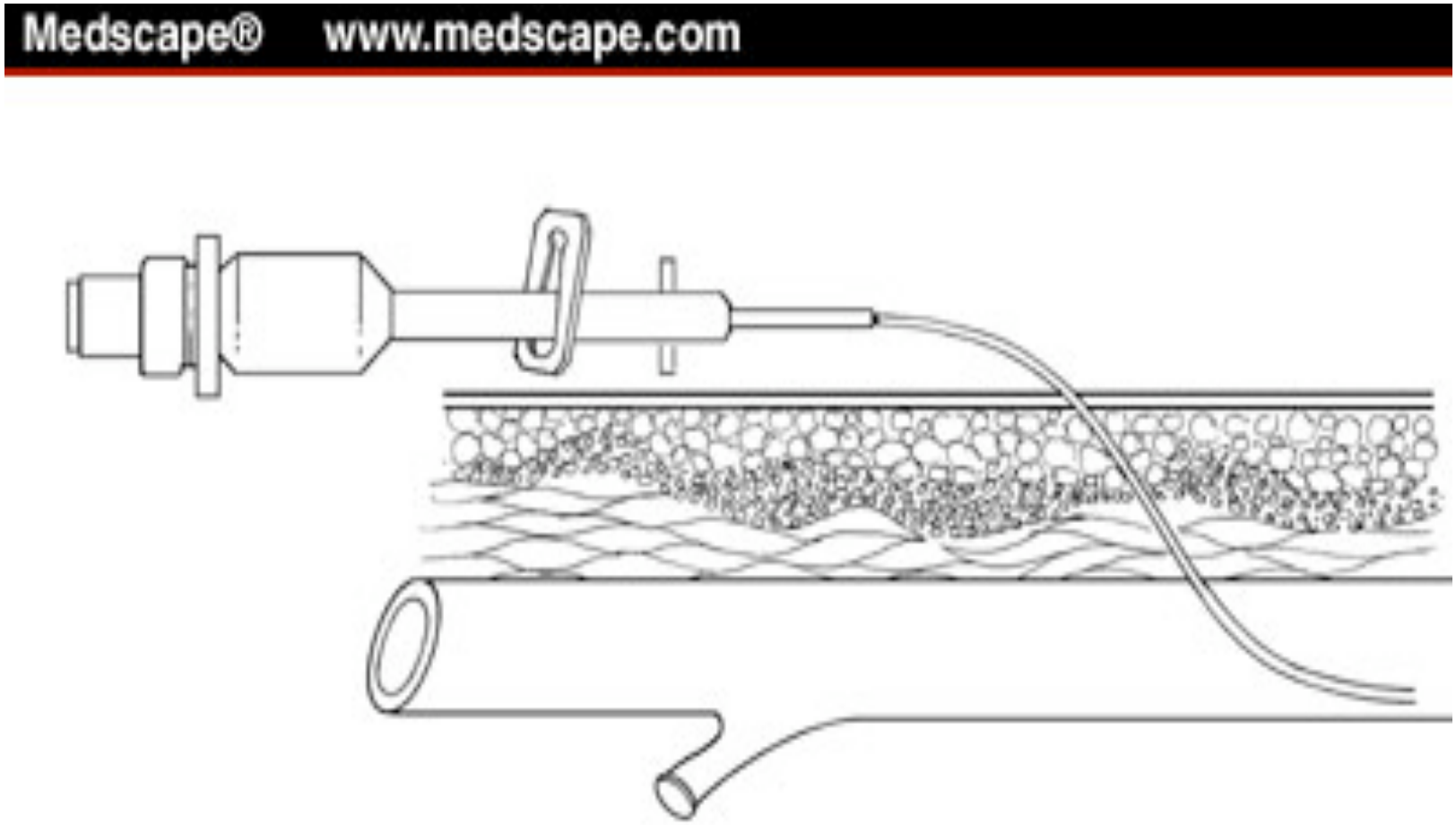
Etiology of a Line Infection……



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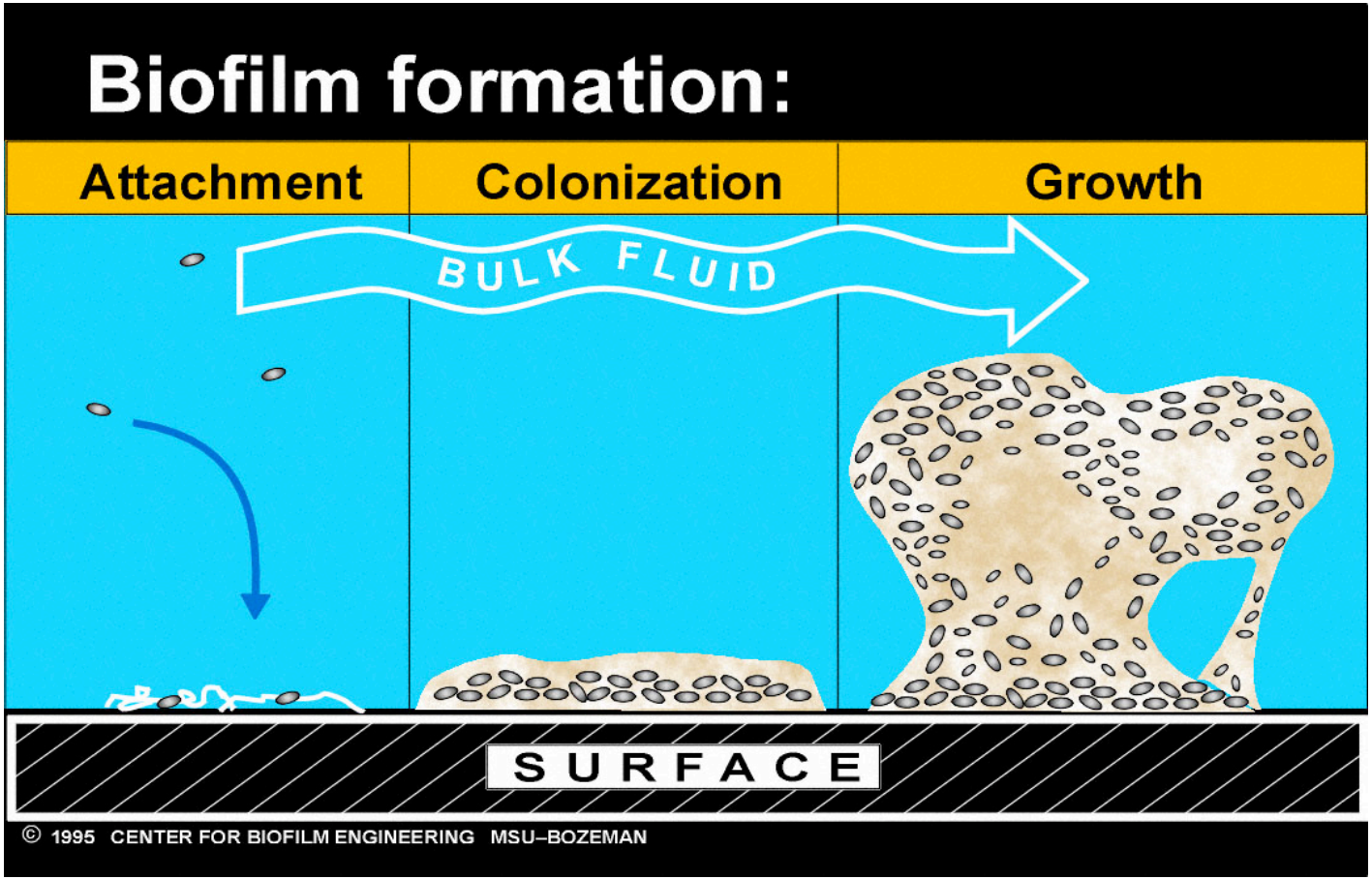
Biofilm: What is it ???

- BIOFILM!



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CRBSI Pathogens

Common Pathogens Associated with CRBSI's….

- *Staph Epidermis….*
  - Low Mortality
  - Lines saved in 90% cases
  - Treated with Vanco systemically and possibly antibiotic lock
- *Staph Aureus*
  - Higher Mortality
  - Often treated with Penicillins or derivatives
  - If MRSA, much less likely to save line

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CRBSI Pathogens (cont)

- *Gram Neg Bacillus*

  GI Source/water (i.e. E.Coli)

  Resp Source: Klebsiella (treated with Cephalosporins) and Pseudomonas (variety of antibiotics can be used depending on Sensitivity)

  Attempts to treat usually made before line removal

- *Candida*

  Higher Mortality

  Catheter almost always removed

  Treated with Ampho, Ambisome,Fluconazole

Diagnosis of a CRBSI

1. Pull the line and culture the tip of the Catheter!

But what if we really need to save the line?

2.Blood Culture peripherally *and* from CVL

Indicative of CRBSI if……..

a) Cx from CVL has 5-10x more colonization than peripheral

or

b) Cx from CVL grows positive 2 or more hours before peripheral

*Up and coming… Intraluminal swab and Cx.

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Prevention of CRBSI's

- **Prophylactic Antibiotic Locks**
  - * Vanco, Amikacin, Ceftaz, Cefazolin in Heparin or NS
  - * dosed at 100-5,000x MIC (Minimum Inhibitory Concentration)
  - * allowed to dwell 12-24 hrs
  - * Stability of 72 + hrs at 37° C

**CDC does not recommend because of risk of resistant organisms

- **Ethanol Locks**:
  - * 25-98 % solution of Ethanol instilled into catheter and withdrawn after 1-2 hours.
  - * Has shown great promise in preventing infection, but is only being used in patients with a history of multiple line infections

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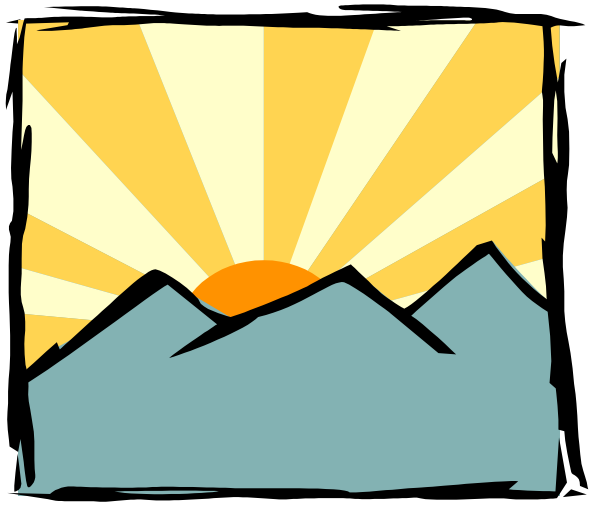
On the Horizon…..

Showing promise in the future:

- Tetrasodium EDTA
- Sodium Citrate
- Ethanol/Trisodium Citrate
- **Mostly studied in dialysis catheters because of both antimicrobial and antithrombolic properties
- Taurolidine (Europe)



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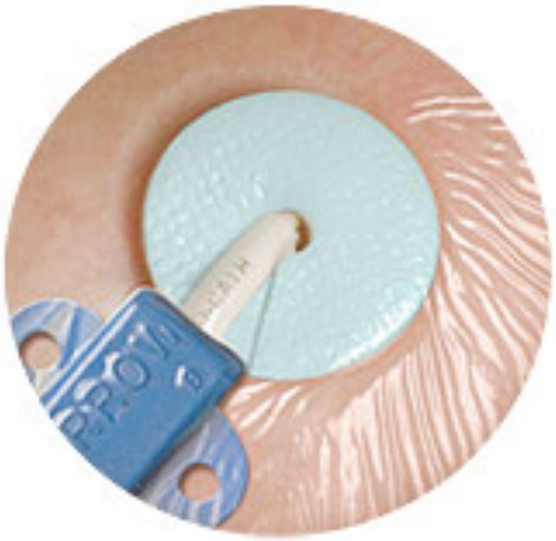
Innovations in Line Care

- BioPatch®



- Tegaderm™ CHG (3M)

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Swab Cap™ and Curos Port Protectors ™

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Catheter Occlusion

- 90% of CVL occlusions are thrombolytic in nature
- * Unique to TPN patients: Lipid or mineral occlusions.

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Catheter Stabilization

Important for Keeping Catheter from Moving!!

Grip Lock®

Stat Lock ®

Cath Secure®

Hub guard®

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Treatment for Occlusions

For Thrombolytic Occlusions:

CathFlo Activase®

(Alteplase)

For ≥ 30 kg : 2mg in 2ml (sterile H_2O)

For < 30 kg : 110% internal volume of catheter

(not to exceed 2mg in 2ml)

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Treatment for Occlusions , cont

- **For Lipid Occlusions**:

  3.0 ml of 70% Ethanol or NaOH

- **For Mineral Occlusions**:

  3.0 ml of 0.1N HCL

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Other CVL Complications:

- **Venous Thrombosis**

  Causes:

  a) Stasis

  b) Injury to vessel wall by trauma, infection or irritation by chemo or TPN

  c) hypercoagulability

Sx: Pain, edema, erythema

***May lead to pulmonary embolism, cerebral anoxia,**

Diagnosis/Treatment:

a) Venography

b) Anticoagulants, ? Clot lysis

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Other CVL Complications, cont.

- **SVC Syndrome (rare):**

  Causes:

  a) clot/fibrin

  b) tumor pressing against SVC

Sx: Upper Body edema, cyanosis. May lead to ↑ICP

Diagnosis/Treatment

a) Radiographic confirmation

b) anticoagulation

c) seek alternative access

d) supportive treatment of symptoms

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IV Line Caps…

- What is a Split Septum???
- What is a MV???
- What is a PPMV???
- What is a Neutral Valve???

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Split Septum Caps

- **Interlink (Baxter)**

- **Q Syte (BD)**

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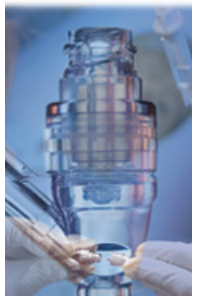
MV and PPMV Caps

Mechanical Valve

- *CLAVE (ICU Medical)*
- *Clearlink (Baxter)*
- *SmartSite (Alaris)*
- *Safesite (B Braun)*



Positive Pressure Valve

- *MaxPlus (Medegen)*
- *CLC2000 (ICU Medical)*
- *Posi-Flow (BD)*
- *UltraSite (B Braun)*
- *SmartSite Plus (Alaris)*
- *Flolink(Baxter)*

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Neutral Valve

- **InVision Plus (Rymed)**

- **MicroClave(ICU Medical)**

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More Innovations…….

- Baxter V-Link

•“The first **antimicrobial** IV connector with a unique coating designed to help prevent microbial contamination and growth of pathogens in the device.”*

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Preventing Catheter Related Complications

- EDUCATION IS THE KEY!

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Preventing Catheter Related

- Know the type of catheter the patient has.

  Is it a midline or a PICC? Where is the tip?

  Is it a Hickman or a Groshong?
- Follow manufacturer's recommendations for catheter flushing and maintenance
- Chlorhexidine to cleanse insertion sites
- Transparent semi permeable membrane dressing changes *at least once per week*

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Preventing Catheter Related Complications

- Know what kind of cap is on the end of the catheter and follow manufacturer recs.

Is it a split septum, mechanical valve or PP mechanical valve cap??

- ***Scrub*** caps with an alcohol wipe for 15 seconds before each connection. Friction!!
- Know the signs and symptoms of potential complications.

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SAVE THAT LINE!!!!!!

- **S**crupulous hand hygiene before and after contact with all vascular access devices and prior to insertion.
- **A**spetic technique during catheter insertion and care
- **V**igorous friction to hubs. Vigorous friction with alcohol wherever you make or break a connection to give medications, flush, change tubing or access injection port or add on device.
- **E**nsure Patency- flush all lumens with adequate amount of saline or heparinized saline to maintain patency per institution policy.

AVA (Association for Vascular Access)

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Conclusion

Thank you for you attention

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