

# Today's Challenges in Vascular Access

- **leading cause of hospitalization in the ESRD population (Feldman et al., 1993)**
- **annual cost approaching \$1 billion (Feldman et al., 1996)**
- **aging population with diabetes as the leading cause of ESRD**
- **our patients need an access that works better and lasts longer**
- **WITH LESS PAIN AND SUFFERING!!!**

# Pros and Cons of Catheter Access

- **pro** - no cannulation  
can be dialyzed immediately  
allows for long-term fistula maturation
- **con** - high risk of bacteremia  
endothelial damage / risk of central vessel occlusion  
?lower flow volume (through dialyzer ml/min)  
fibrin sheath formation  
cannot shower / swim

- **Temporary catheters**

- 3 weeks or less

- **Acute renal failure**
- **Maturing AV access**
- **Intoxication**
- **Plasmapheresis**
- **Volume control**

- **Chronic catheters**

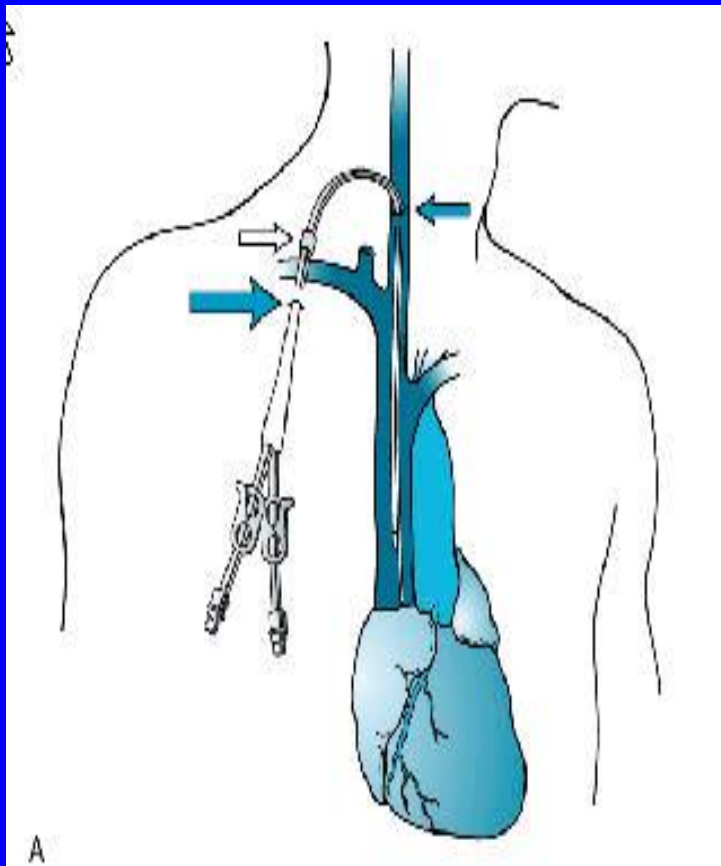
- 3 weeks or more tunneled cuffed

- **Same as temporary catheters**
- **Maturation of PD access**
- **Maturing AV access**
- **Failure of AV access**
- **Bridge following infection and removal of access**

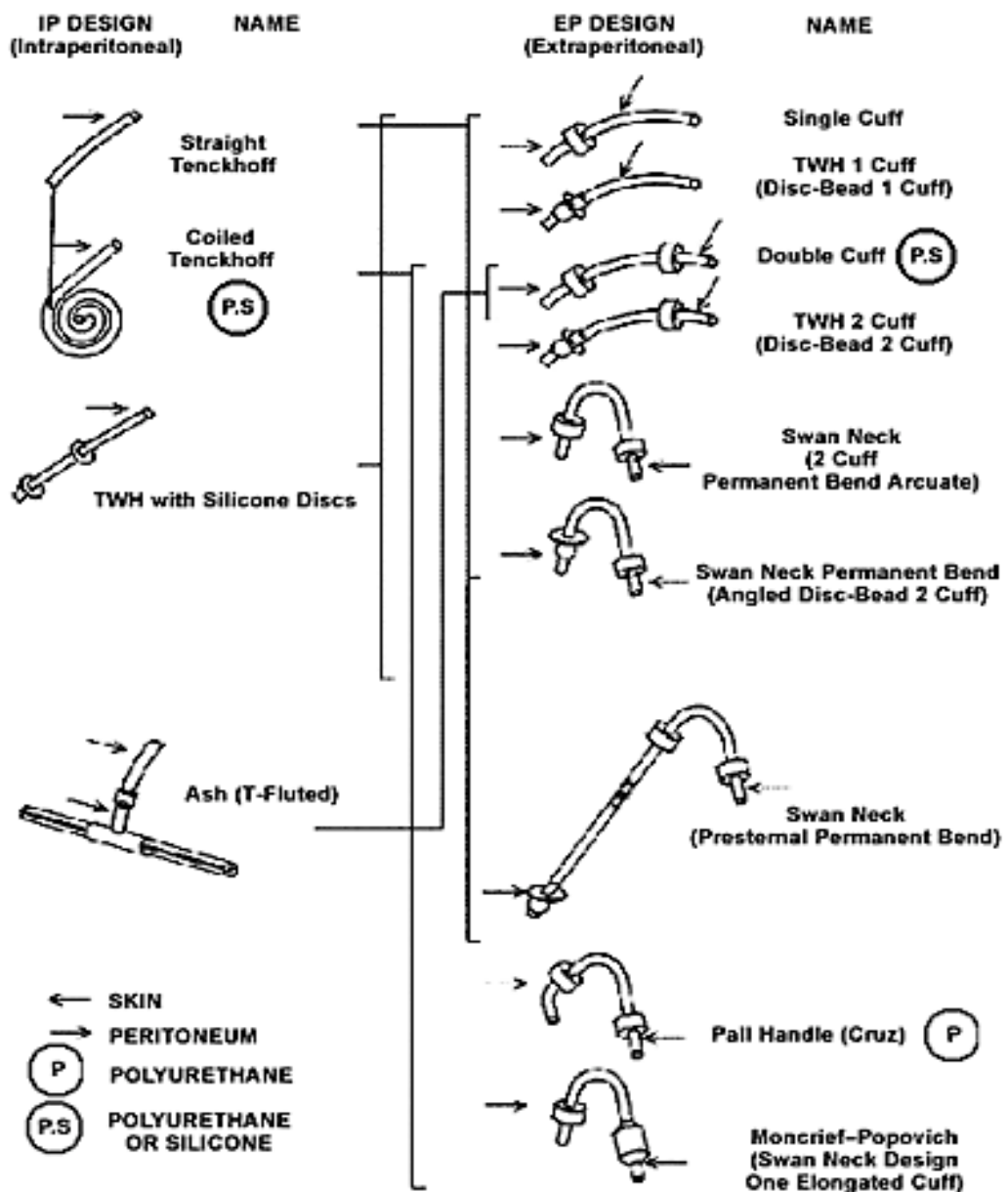
# Catheters

- **Why place a catheter? AND if you do**
- **What kind of catheter - cuffed or uncuffed?**
  - acute or chronic renal failure
  - ?bacteremic
  - you want to start dialysis when????
  - for LRD transplant soon
  - waiting to start PD or get over peritonitis
  - peripheral vascular disease
  - no more surgical access sites
  - no more surgeries thankyou!

# Hemodialysis access catheters



**CURRENTLY AVAILABLE CHRONIC PERITONAEAL CATHETERS  
COMBINATIONS OF IP AND EP DESIGNS**



## Hemodialysis associated infections

Am J Inf Control 30/5 2002

- Infection rate 100 pt/month

• Native (AV) fistula	0.56
• AV graft	1.36
• Cuffed catheter	8.42
• Non cuffed catheter	11.98
• Overall	3.2

# Indications for vascular access removal

- **Proven infection of graft or shunt**
- **Repeated positive blood cultures**
- **Exit site or tunnel infection unresponsive to treatment**

# Indications for PD catheter removal (absolute)

**Abdominal perforation\***

**Fungal peritonitis \***

**Tb peritonitis\***

**Exitsite infection**

**Pseudomonas**

**S. aureus with  
tunnel infection**

# Indications for PD catheter removal (absolute)

**Abdominal perforation\***

**Fungal peritonitis \***

**Tb peritonitis\***

**Exitsite infection**

**Pseudomonas**

**S. aureus with  
tunnel infection**

# Indications for PD catheter removal (elective)

Repeated peritonitis with same organism

Frequent peritonitis relapse

Peritonitis unresponsive to treatment

Disfunctional catheter

(copious proud flesh, extruded cuff, obstruction, etc.)

# PD catheter replacement

## Same day

All elective replacements

Peritonitis ( treated, cell count < 100 )

Exit site infection ( under antibiotic coverage )

## 2-3 weeks wait

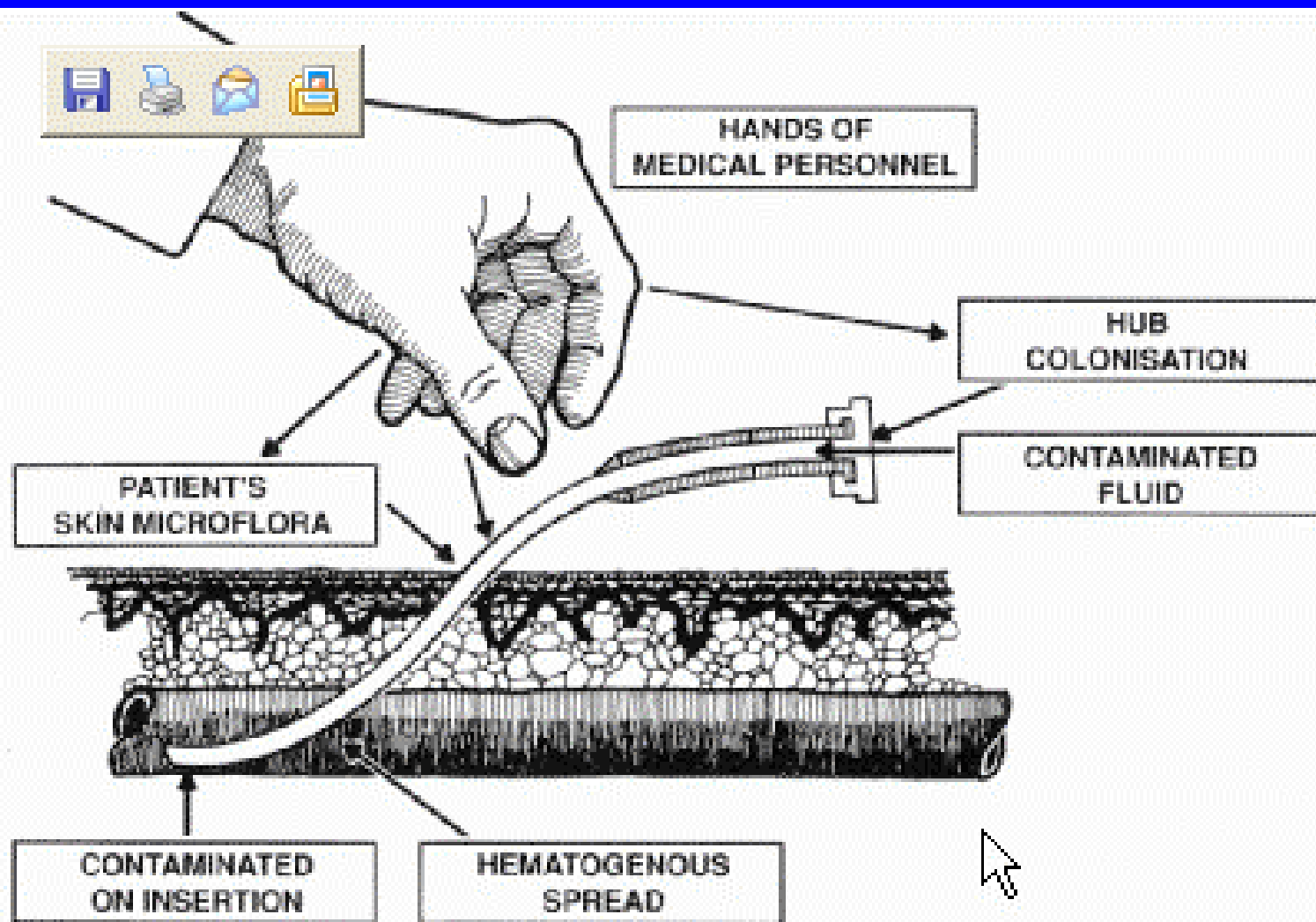
Unresponsive peritonitis

## 4-6 weeks wait

Tb or fungal peritonitis

# Antibiotic Lock Therapy

- **Which antibiotic?**
  - vancomycin, cefazolin, ceftazidime, & gentamycin
- **How much?**
  - 10mg/ml 1,2,3 & 5mg/ml for gentamycin
- **With heparin 5000 u/s per ml**
- **all 4 stable in vitro - some adsorbency in CVCs**
- **Need clinical study in vivo**  
(Vercaigne et al, Pharmacotherapy, 7/2000)



**Fig. 1. Potential sources for contamination of intravascular devices.**

## External Catheter Care

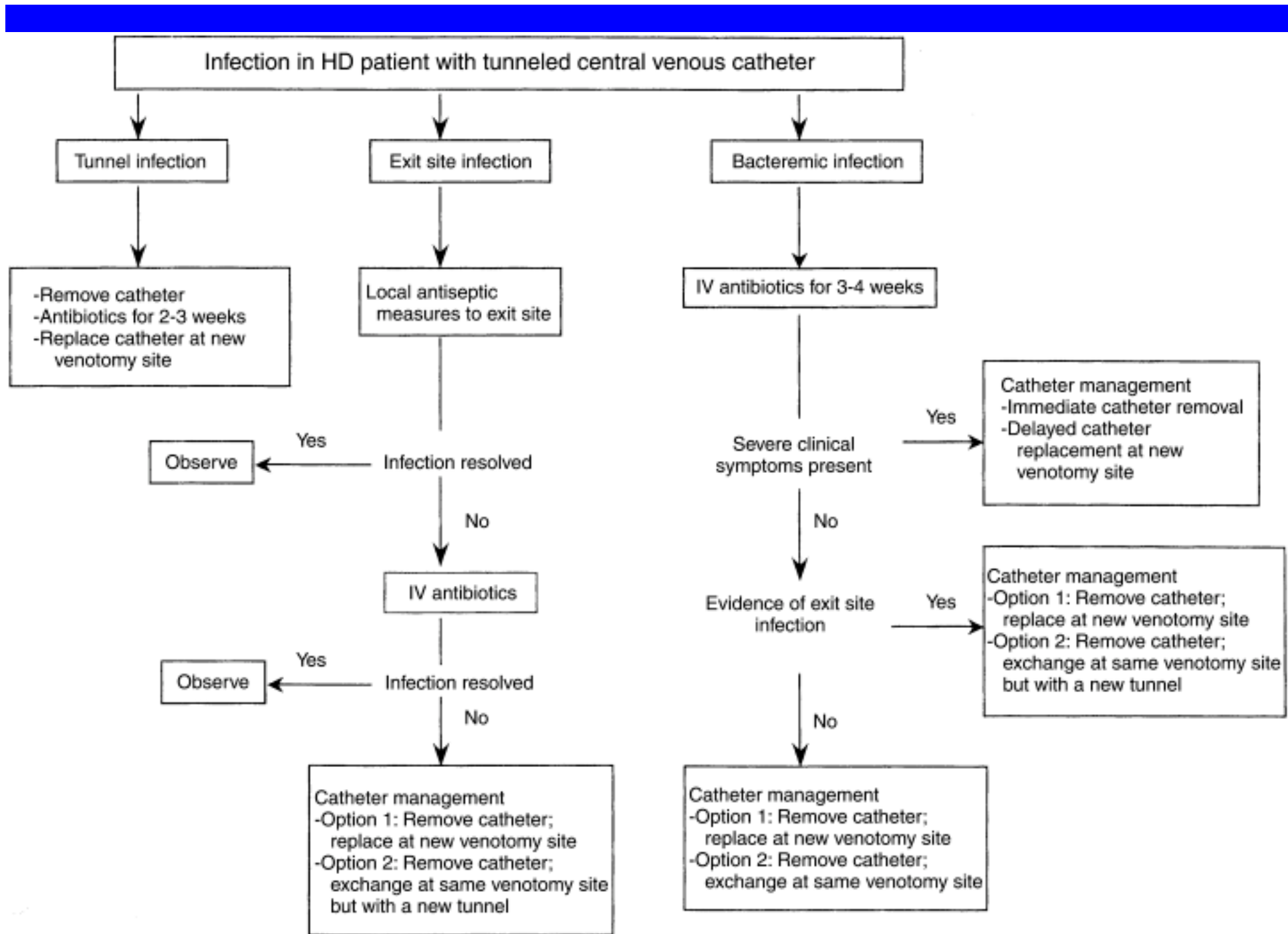
- **Is there a universal bactericide for catheter port soaking and exit site cleaning?**
- **Exit site - to dress or not to dress? And with what? And how often?**
- **Can the patient shower or swim?**
- **Securing the catheter for safety**
- **Catheter repairing**

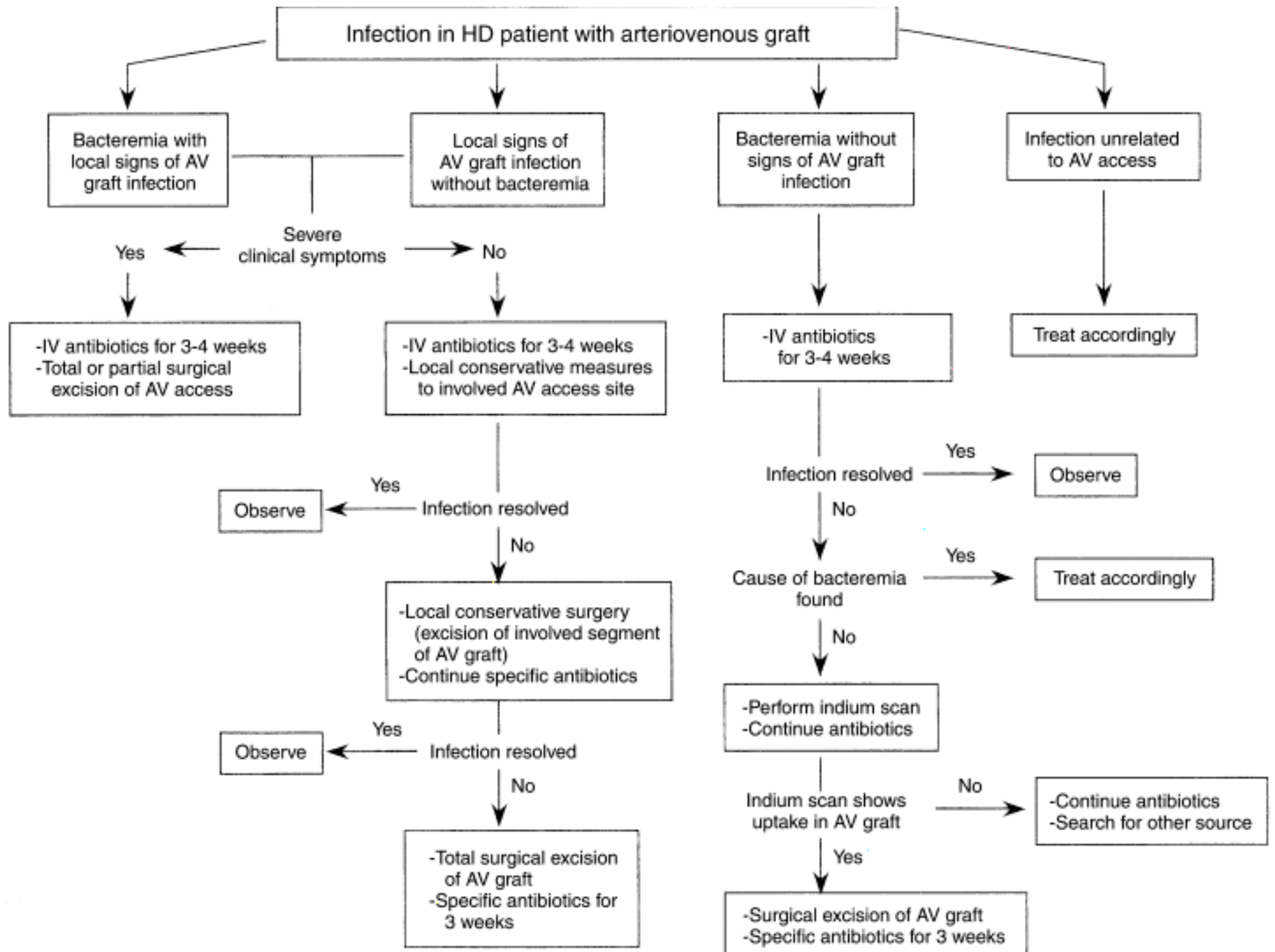
# Use the Proper Precautions!

- **Face masks for you and the patient**
- **Gloves**
- **Aprons**
- **Aseptic technique**

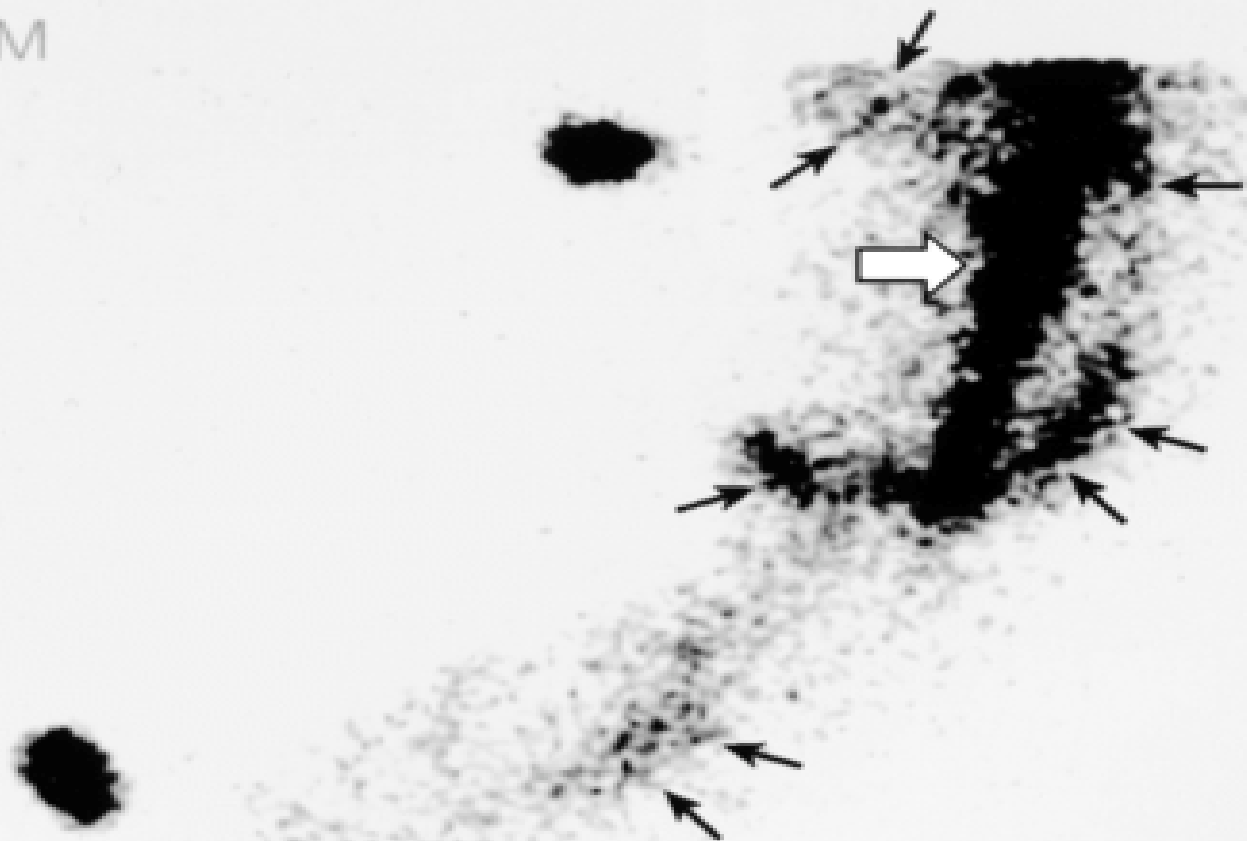
# Catheters in the Future

- **Antibiotic locking therapy standard**
- **Antimicrobial locking solutions such as taurolidine prophylactically (Neutrolin by Biolink)**
- **Subcutaneous catheter ports**
  - **Dialock by Biolink**
  - **Lifesite by Vasca**
- **FDA approved and reimbursed lytic therapy**
- **cohesive collaborative care to increase catheter safety and effectiveness**





LEFT ARM



**→ = Bone Uptake**  
**→ = Upper & Lower Arm  
AVG Uptake**

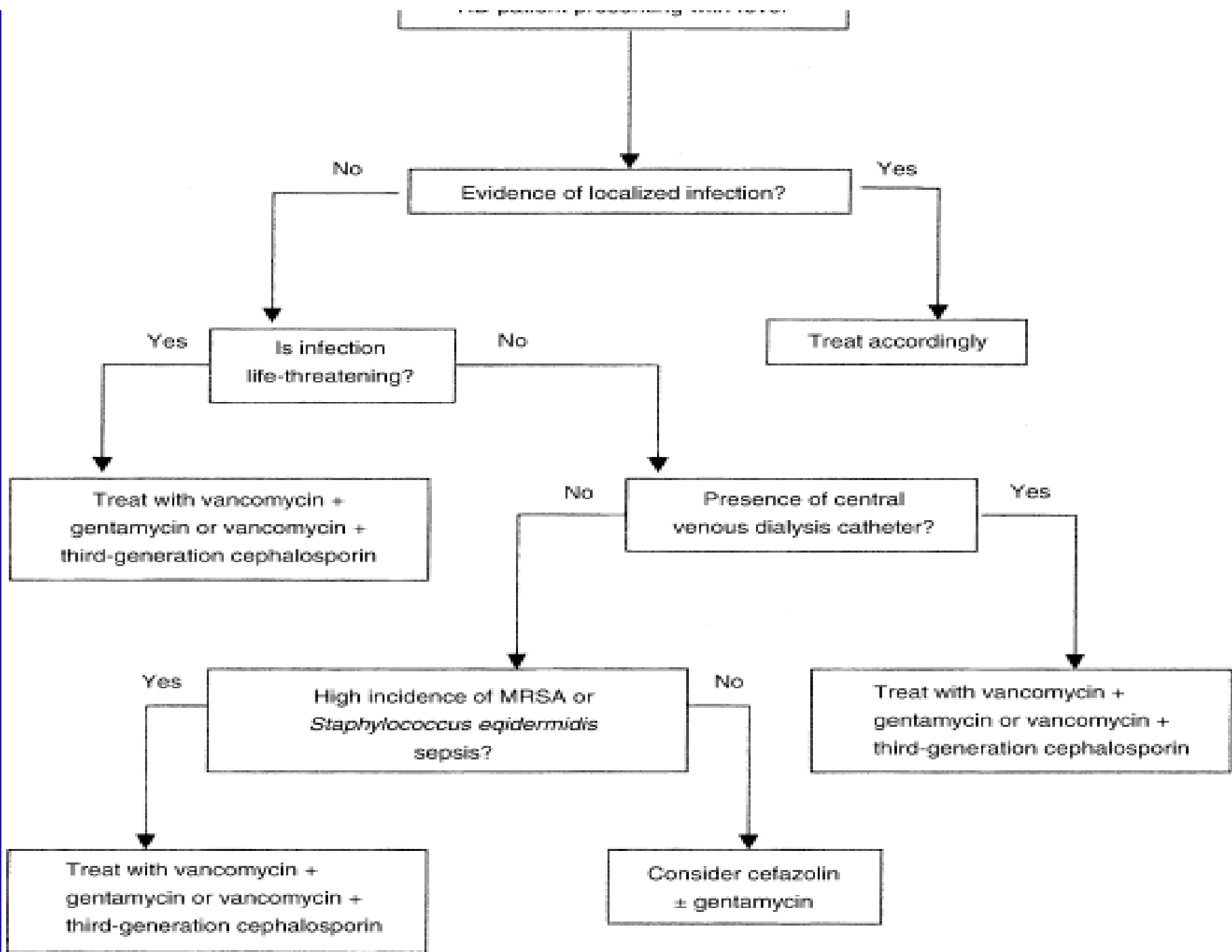


Table 1. Incidence of bacteremia in hemodialysis patients

Source [reference]	Country	Year	N	Incidence of bacteremia per 100 patient-years	Bacteremia due to vascular access	% bacteremia due to gram-positive cocci
Dobkin et al. [13]	USA	1978	N/A	15	73%	70% <sup>a</sup>
Kessler et al. [8]	France	1993	1455	8.4	51%	69.80%
USRDS [1]	USA	1996	USRDS	7.6	48%	N/A
Marr et al. [9] <sup>b</sup>	USA	1998	445	14.4	89%	100%
Kaplowitz et al. [18]	USA	1988	71	8.4	27%	50% <sup>c</sup>
Hoen et al. [20]	France	1998	988	11.2	N/A	68%

N denotes number of hemodialysis patients during the study period. N/A denotes data not available.

<sup>a</sup>Rate applies if bacteremia is vascular access-related

<sup>b</sup>A study on *staphylococcal aureus* bacteremia

<sup>c</sup>Percent of combined bacteremic and nonbacteremic infections related to vascular access

Nassar, George M. & Ayus, Juan Carlos  
 Infectious complications of the hemodialysis access.  
*Kidney International* **60** (1), 1-13.  
 Available from:  
<http://dx.doi.org/10.1046/j.1523-1755.2001.00765.x>

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Table 2. Incidence of catheter-related bacteremia (CRB) in hemodialysis patients


Source [reference]	Country	Year	<i>N</i>	Incidence of CRB per 1000 catheter-days	% CRB due to gram-positive cocci
Moss et al. [28]	USA	1990	131	0.7	N/A
Marr et al. [29]	USA	1997	102	3.9	63%
Kairaitis and Gottlieb [21]	Australia	1999	105	6.5	100%
Beathard [30]	USA	1999	387	3.4	84.5% <sup>b</sup>
Saad [31]	USA	1999	101	5.5	67.4% <sup>c</sup>
Cuevas et al (abstract) <sup>a</sup>	Spain	1999	189	1.54	84%
Cuevas et al (abstract)	Spain	1999	45	1	84%

*N* denotes number of patients with hemodialysis catheters; N/A denotes data not available.

<sup>a</sup>A study on temporary dialysis catheters

<sup>b</sup>Includes 9.8% of cultures due to mixed gram-positive and gram-negative infections

<sup>c</sup>Includes 12.8% cultures with mixed gram-positive and gram-negative infections

**Table 3.**  Risk factors for arteriovenous graft infection

Diabetes mellitus

Immuno-incompetency

Renal transplantation

Indwelling central venous catheter

History of bacteremia

Previous major infection in any organ system

Previous arteriovenous graft-related infection

Previous arteriovenous graft-related surgery

Fever of unknown origin

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