Management of Catheter-related Bloodstream Infection (CRBSI)

CVC Care Bundle Workshop

Langkawi

14 -16th April 2008

Common pathogens in CRBSI

Coagulase-negative staph	37%	
S. aureus	13%	
Enterococcus	13%	
Gram-negative Rods		
- Enterobacter	5%	14%
- P. aeruginosa	4%	
- K. pneumoniae	3%	
- E. coli	2%	
Candida species	8%	

Guidelines for the prevention of intravascular catheter-related infections. O'Grady et al. Pediatrics. Vol 110, Num 5, Nov 2002

Management of CRBSI

- Suspected
- Confirmed

Management of suspected CRBSI

- Catheter removal or not
- Empirical antibiotics

Why removal of catheter

- Biofilm factor
- Thrombin sheath factor

Biofilm factor

- Staphylococci, *Candida* produce a slimy material rich in polysaccharides, resulting in the formation of a microbial biofilm
- biofilm helps these organisms adhere to and survive on the surfaces of foreign bodies in the bloodstream
- biofilm acts as a resistance factor to antibiotics

Thrombin sheath factor

- following catheter insertion, a thrombin layer covers the external and internal surfaces
- thrombin layer rich in fibrin, fibronectin, thrombospondin, and laminin, that act as adhesins
- Staphylococci, *Candida* are attached to adhesins on the surfaces of the catheter and are covered by a protective layer of biofilm
- coagulase-negative staphylococci binding to the polymer composite of catheters have also been identified

Management of suspected CRBSI

- Removal of a catheter (esp. non-tunnelled catheter) suspected to be infected is recommended
- Catheter with exit-site infection must be removed
- Situations when removal of the catheter may be witheld while awaiting culture results

  - poor venous access
  - bleeding diastesis
  - tunnelled catheters

Empirical antibiotics in suspected CRBSI

- Should be started early esp. in presence of haemodynamics instability

- Choice of antibiotics depends on:
  - severity of illness e.g. shock
  - risk factors e.g. neutropenia, immunocompromised states

Empirical antibiotics in suspected CRBSI

- IV cloxacillin (or IV vancomycin if MRSA is suspected)
- Add 4th gen. cephalosporin, pip/tazo or carbapenem in severely ill or immunocompromised. Also consider anti-fungal

Management of confirmed CRBSI

Depends on :

- Tunneled or non-tunneled catheter
- Complicated or non-complicated CRBSI
- Type of causative organism

Tunneled catheter

- surgically implanted CVC (e.g., Hickman, Broviac, Groshong catheter)
- tunneled portion exiting the skin and a Dacron cuff just inside the exit site; the cuff inhibits migration of organisms into the catheter tract by stimulating growth of surrounding tissue, thus sealing the catheter tract

Tunneled catheter

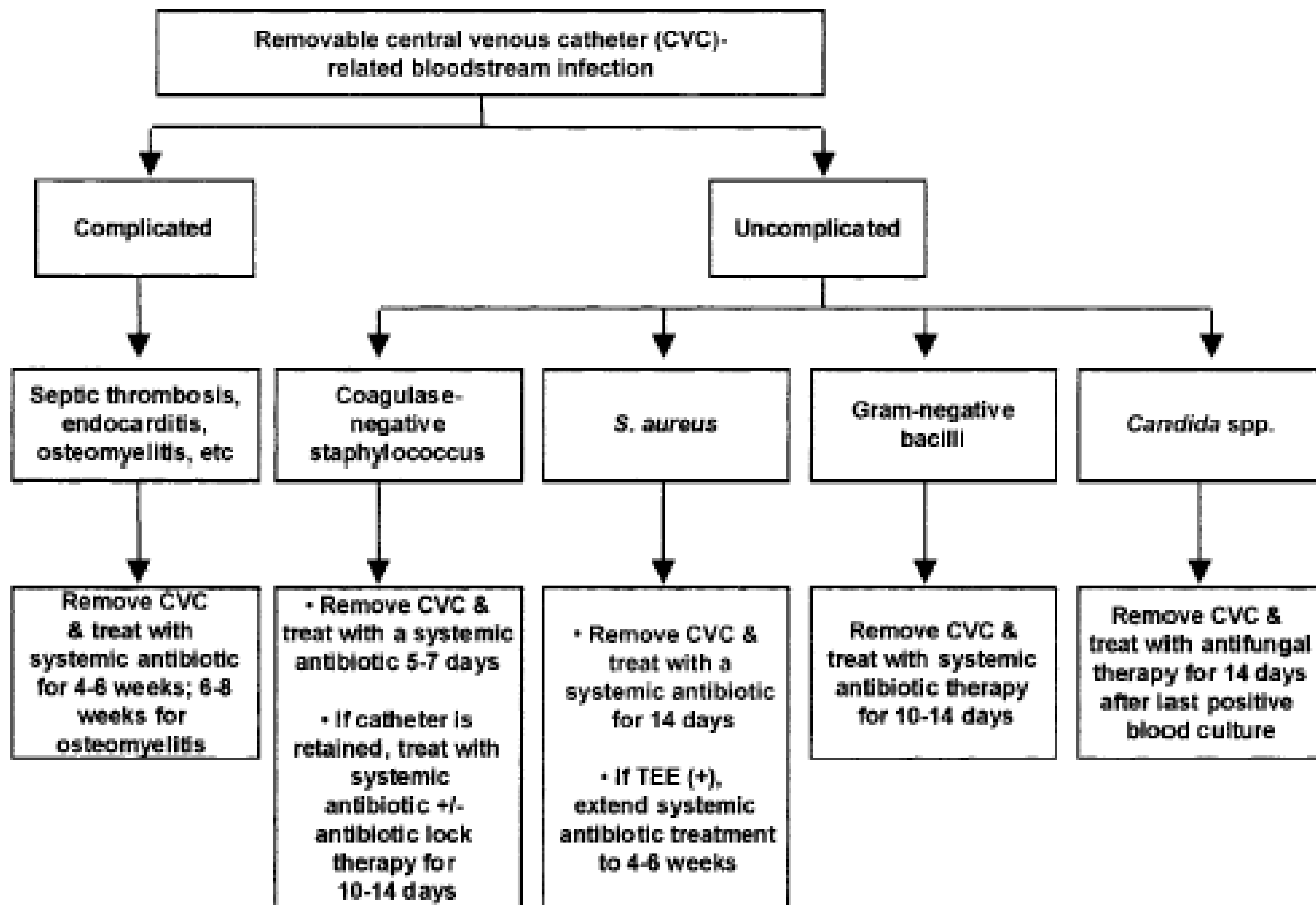
- some totally implantable where subcutaneous port or reservoir with self-sealing septum is tunneled beneath the skin and is accessed by a needle through intact skin

- used to provide vascular access to patients who require prolonged iv chemotherapy, home-infusion therapy, or hemodialysis

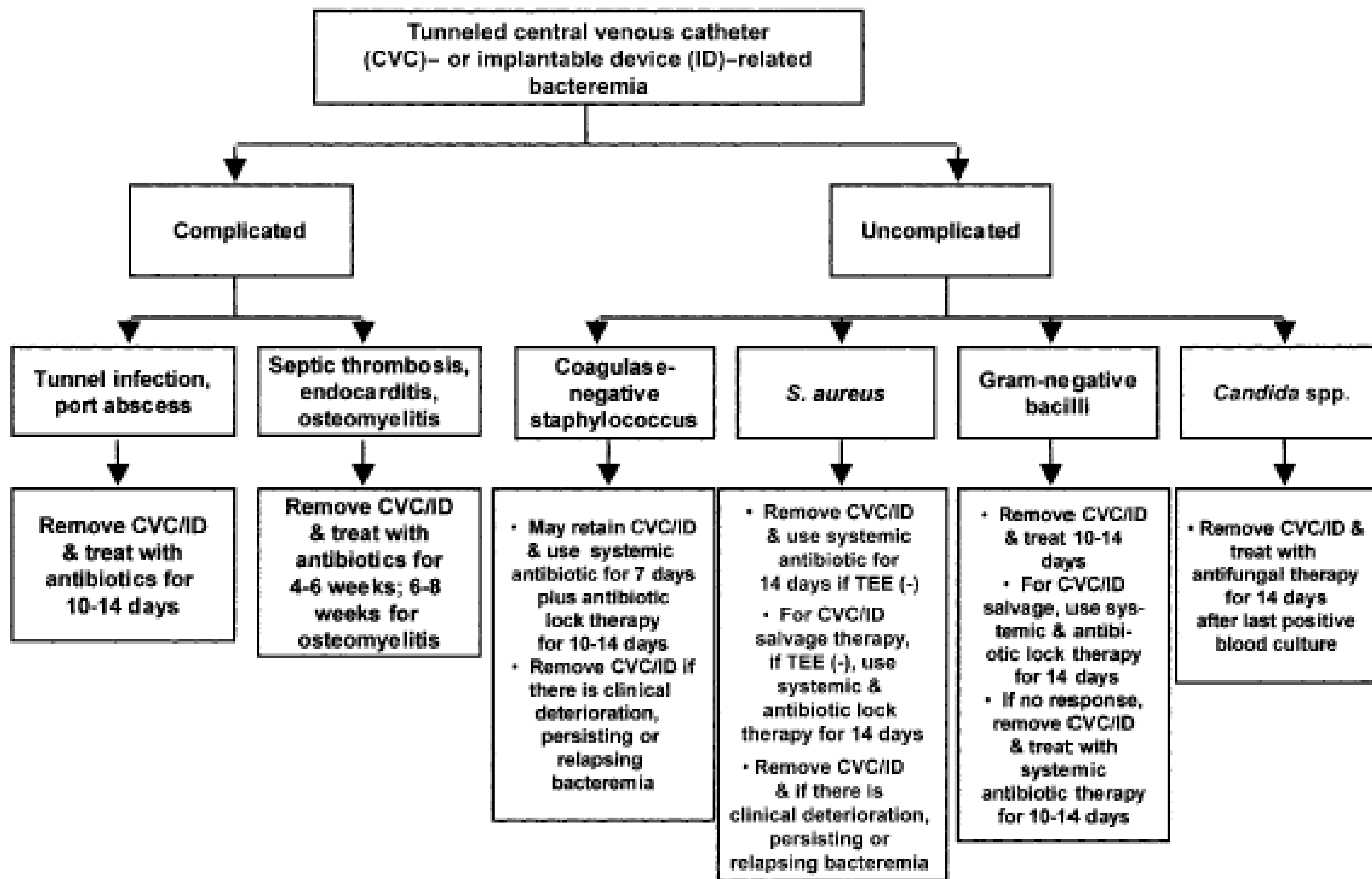
Complicated CRBSI

CRBSI with complications:

- septic thrombophlebitis
- endocarditis
- lung abscess
- brain abscess
- osteomyelitis
- endophthalmitis



Mermel LA et al. Guidelines for the Management of Intravascular Catheter–Related Infections. CID 2001; 32:1249–72



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Persistent CRBSI

- warrants removal of the catheter

- if there is persistent bacteremia or fungemia, or a lack of clinical improvement after 2-3 days after catheter removal and initiation of appropriate antimicrobial therapy, aggressive evaluation for septic thrombosis, infective endocarditis, and other metastatic infections should be taken

Persistent CRBSI

- in repeatedly positive blood culture results and/or unchanged clinical status for 3 days after catheter removal, treat presumptively for as complicated CRBSI with 4 weeks of antimicrobial. Surgical intervention may be indicated

- empirical therapy in this situation must include coverage for staphylococci

Persistent CRBSI

- in *Candida* endocarditis, surgical intervention may be required in addition to antimicrobial therapy