Empiric management of suspected Infective Endocarditis (IE)

CONSULT ID

DEFINITION AND RISK FACTORS

IE refers to an infection of the endocardial surface of the heart, generally heart valves or intracardiac device. Risk factors for IE include IV drug use, chronic IV access (e.g. hemodialysis), poor dentition, and predisposing comorbid conditions: prosthetic valve(s), congenital or acquired valvular or structural heart disease, implantable cardiac device and a history of prior endocarditis.

PATHOGENS

Gram-positive bacteria (most common)

- *Staphylococcus aureus*
- Viridans Group Streptococci (*S. sanguis, S. oralis, S. mitis, S. salivarius,* etc.)
- *S. gallolyticus (formerly S. bovis – association with colonic cancer or polyp)*
- *Enterococcus sp*
- Coagulase-negative *Staphylococcus sp* (in prosthetic valve endocarditis (PVE))

Gram-negative bacteria (less common)

- HACEK* group
- Other Gram-negative infections are very rare outside of early prosthetic valve

*HACEK: *Haemophilus sp*, *Aggregatibacter sp*, *Cardiobacterium hominis*, *Eikenella corodens, Kingella sp*

Fungi (rare, occur in IVDU or severe immunocompromise)

- *Candida sp*
- *Aspergillus sp*

Culture negative (up to 1/3 of cases)

- Most commonly due to ***administration of antibiotics before blood culture***
- **"True" culture-negative**: *Coxiella burnetii (Q fever)*, *Tropheryma whipplei (Whipple's disease)*, *Bartonella sp*, other intracellular pathogens

DIAGNOSTIC CONSIDERATIONS

- **Blood cultures (BC) x 3 sets (2 bottles = 1 set)** from at least 2 distinct venipuncture sites **BEFORE** starting antibiotics
  - ideally ≥ 1 hour between first and last set
  - avoid sampling from central venous catheter (high risk of contaminant)
- **Cardiac echocardiography** (if TTE negative, TEE may be indicated)
- **Modified Duke criteria** https://www.mdcalc.com/duke-criteria-infective-endocarditis

If initial BCx negative and high clinical suspicion, 2 more BCx sets before empiric therapy

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EMPIRIC PHARMACOLOGIC TREATMENT

If clinically stable and no heart failure: **do not start antibiotics unless diagnosis probable or confirmed IE**; adjust antimicrobial treatment as soon as possible after a pathogen has been identified (maximal bactericidal activity, minimal toxicity, narrowest coverage).

VALVE TYPE	PENDING BLOOD CULTURE RESULTS	If *S. aureus* identified in BCx
Native valve *(Staphylococci (~30%), Streptococci (~25%) Enterococci (~10%), HACEK (~2%)*	**Ceftriaxone** 2 g IV q24h **+ Vancomycin**[1] 25 mg/kg IV (x 1) then 15-25 mg/kg IV q8h-12h	**ID consultation mandatory** **Early surgical consulation advised** **MSSA:** Cloxacillin 2 g IV q4h *If penicllin allergic: Cefazolin 2 g IV q8h* **MRSA:** Vancomycin[1] 15-25 mg/kg IV q8h-12h
Prosthetic valve endocarditis (PVE) – Early (< 12 months post-op) *(S. aureus, coagulase-negative Staphylococcus sp, Enterococci, rarely Gram-negative)*	**Vancomycin**[1] 25 mg/kg IV (x 1) then 15-25 mg/kg IV q8h-12h **+ Cefazolin 2 g IV q8h** **+ Gentamicin**[2] 1 mg/kg IV q8h + Rifampin[3] 300 mg PO TID to be added only once bacterial inoculum reduced (after BCx show no growth)	**IMMEDIATE INFECTIOUS DISEASES AND CARDIAC SURGERY CONSULTATION** **MSSA:** **Cloxacillin** 2 g IV q4h **+ gentamicin**[2] 1 mg/kg IV q8h (maximum 2 weeks) + rifampin[3] 300 mg PO TID (after BCx negative) **MRSA**: **Vancomycin**[1] 15-25 mg/kg IV q8-12h **+ gentamicin**[2] 1 mg/kg IV q8h (maximum 2 weeks) + rifampin[3] 300 mg PO TID (after BCx negative)
PVE – Late (≥ 12 months post-op) (*S. aureus. coagulase-negative Staphylococcus sp, S. viridans group, Enterococci)*	**Vancomycin**[1] 25 mg/kg IV (x 1) then 15-25 mg/kg IV q8h-12h **+ Ceftriaxone** 2 g IV q24h + **+ Gentamicin**[2] 1 mg/kg IV q8h	

[1]Dosing of antibiotics assume normal renal function; consult pharmacy for dosing adjustments. For vancomycin, see Vancomycin Therapeutic Drug Monitoring guideline.
[2]Therapeutic drug monitoring: peak level after 3rd dose, trough before 4th dose; consult pharmacy for dosing adjustments; initial dosing assumes NORMAL renal function. If impaired eGFR need to adjust dose accordingly.
[3]Multiple drug interactions via cytochrome P450 induction; consult pharmacy for management of interactions. **Most notably major interaction with WARFARIN and other ORAL ANTICOAGULANTS which should be dealt with.**

REFERENCES

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