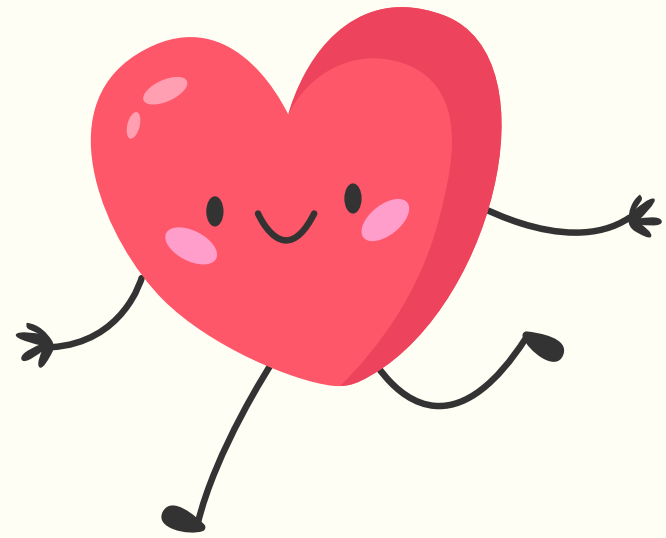
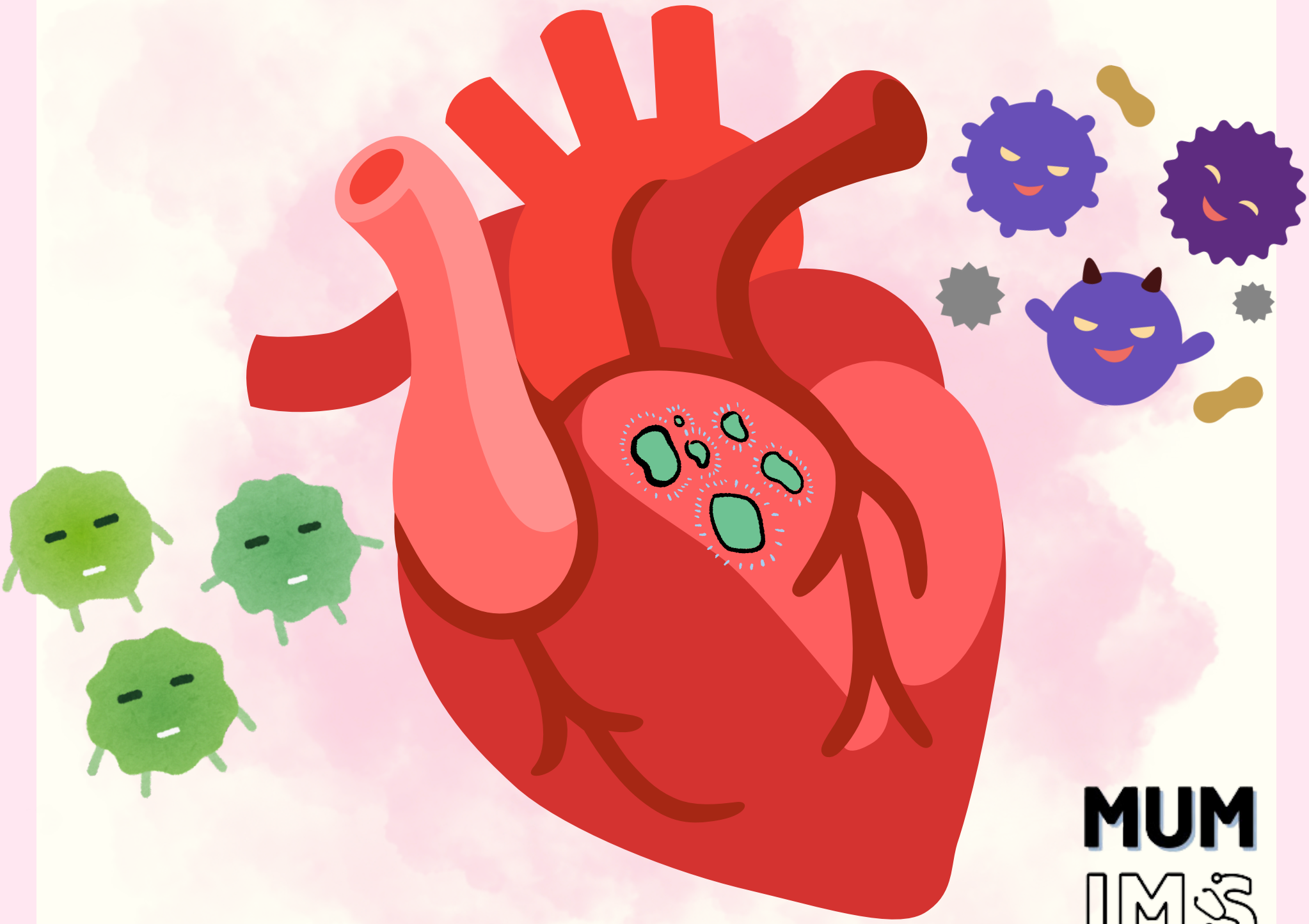
Matrix unlocked

INFECTIVE ENDOCARDITIS





MUM IMS

Definition

Endovascular infection of cardiovascular structures, large intrathoracic vessels, or intracardiac foreign bodies

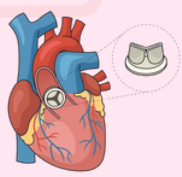
Risk Factors

Previous infective endocarditis

Dental Procedures

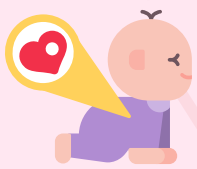
Pre-existing cardiac disease

History of IVDU



Prosthetic valves, cardiac material, or intracardiac devices

Chronic intravenous access

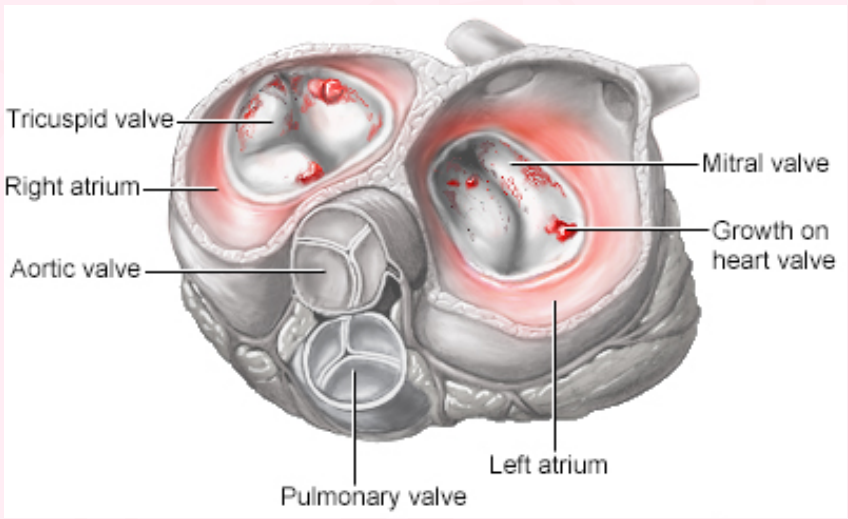


Congenital Heart Disease

Elderly or immunocompromised

Diabetes, HIV, infection, malignancy

- *In Non-IVDU, the common valve affected in order:*
  - *Mitral > Aortic > Tricuspid*
- *In IVDU, tricuspid valve (right sided lesion) is more common*



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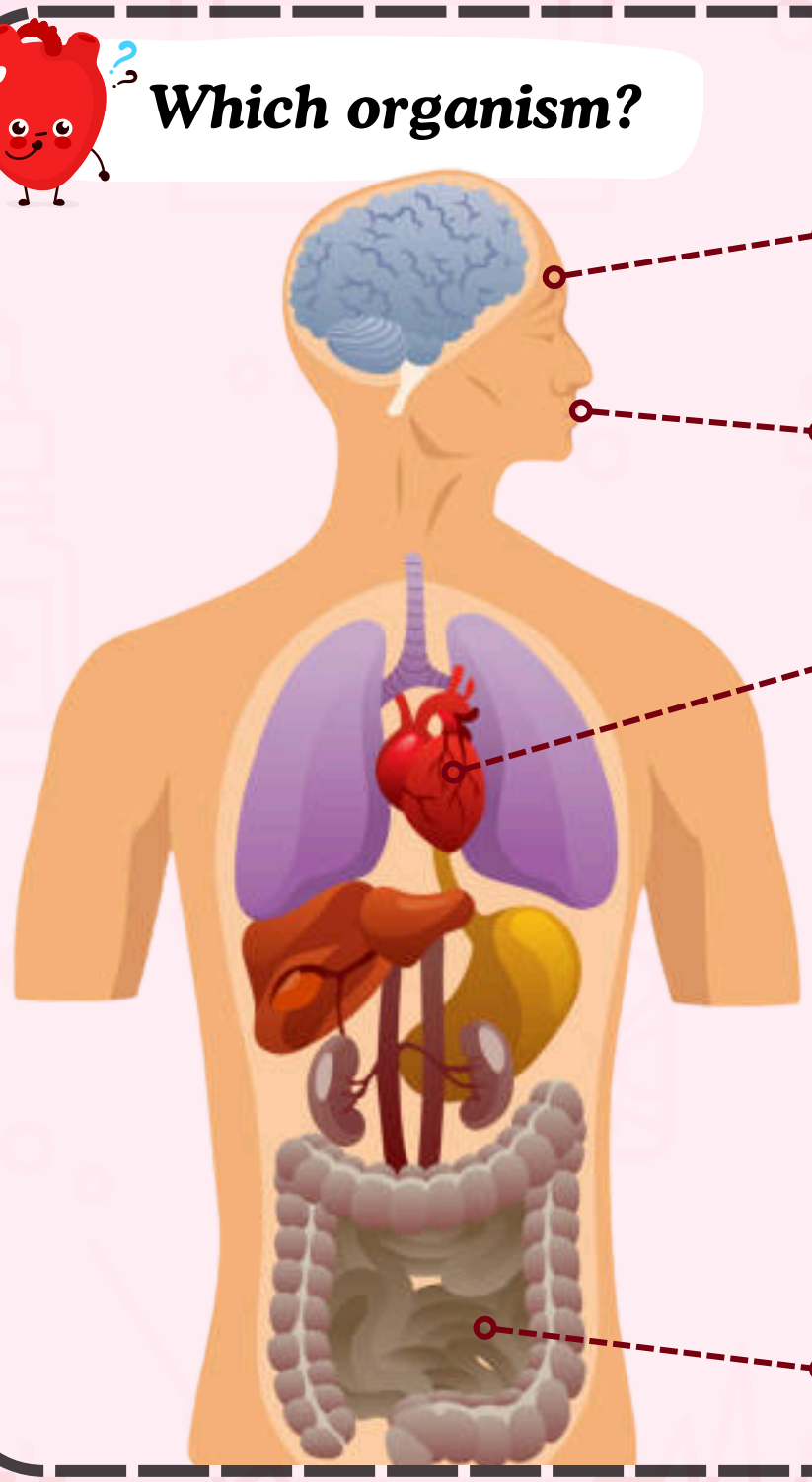
Aetiology

Consequence of two factors:

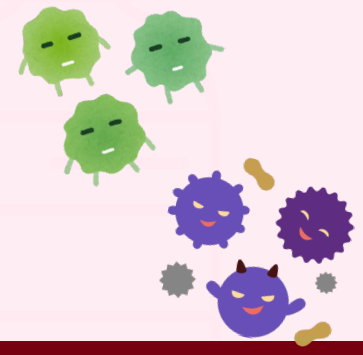
- Bacteremia
- Abnormal cardiac endothelium

Which organism?



Skin:

Staph. aureus



Mouth:

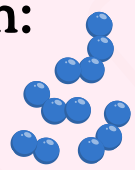
α-haemolytic viridans streptococci

Heart valve:

Prosthetic Valve	Native Valve
Early (within 60 days of valve surgery): • *Staph. aureus* • *Staph. epidermidis*	Acute (previously normal valve): • *Staph. aureus*
Late (more than 60 days after valve surgery): • *Strep. viridans* • *Staph. aureus*	Subacute (deformed valve): • *Strep. viridans*

Gut and perineum:

Enterococci



Rare causes:

- HACEK group (*Haemophilus, Actinobacillus, Cardiobacterium, Eikenella, Kingella)*

Culture-negative:

- Prior antibiotic therapy
- Fastidious organisms: *Coxiella burnetii, Chlamydia, Bartonella, Legionella*

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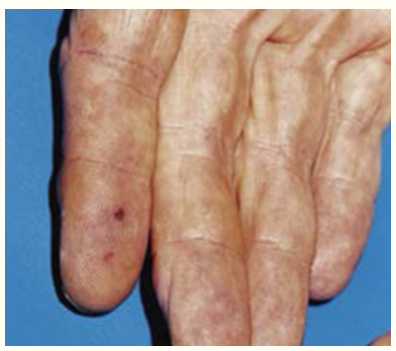
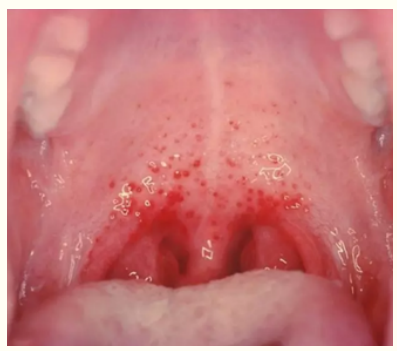
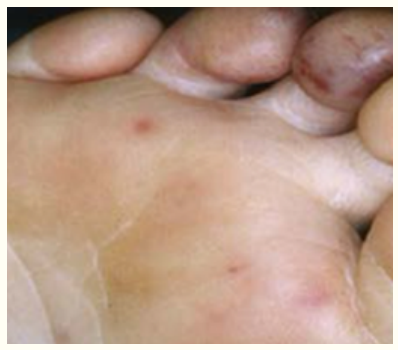
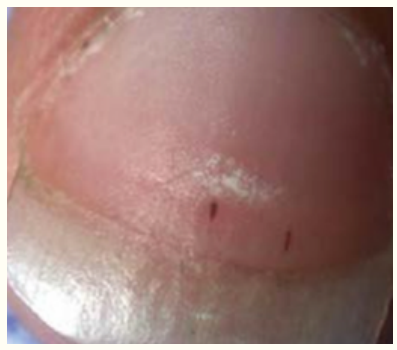
Clinical Features

1. *Cardiac manifestation:*

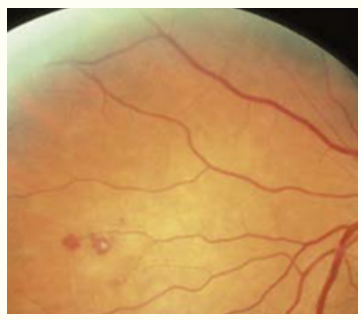
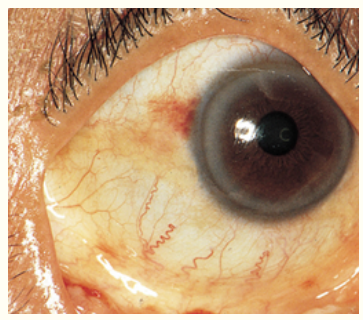
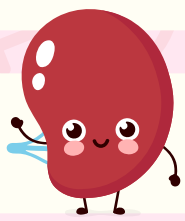
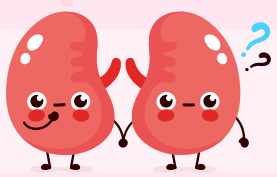
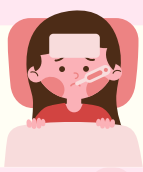
- **New Murmurs**
  - i. Mitral Regurgitation
  - ii. Aortic Regurgitation
  - iii. Tricuspid Regurgitation
- **Cardiac failure**

- **Bradycardia**

2. *Extracardiac Manifestation:*

System	*Features*
Skin	 • Osler nodes  • Petechiae  • Janeway Lesions  • Splinter haemorrhages

Clinical Features

System	Features
Eyes 	  • Roth spots • Conjunctival splinter haemorrhages
Musculoskeletal 	• Arthralgia
Gastrointestinal 	• Splenomegaly 
Neurological	• Cerebral emboli • Mycotic aneurysm 
Renal 	• Haematuria 
General	• Pyrexia  • Malaise • Clubbing

MUM IMS

Modified Duke's Criteria

REMEMBER: BE TIMER

Major Criteria

1. **B**lood culture
   - Persistently positive: >2 times
2. **E**chocardiographic evidence of endocardial involvement

Minor Criteria

1. **T**emperature ≥38°C
2. **I**mmunological phenomena
   a. Glomerulonephritis
   b. Osler nodes
   c. Roth spots
   d. Rheumatoid factor
3. **M**icrobiological evidence
   a. Positive blood culture but not meeting major criterion
4. **E**mbolic phenomenon
   a. Major arterial emboli
   b. Septic pulmonary infarcts
5. **R**isk factors
   a. Heart condition
   b. Intravenous drug use

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Modified Duke's Criteria

Definite IE

YES!

Clinical criteria:

- 2 major criteria OR
- 1 major and 3 minor OR
- 5 minor criteria

Possible IE

- 1 major criterion and 1 minor criterion OR
- 3 minor criteria

Rejected IE

- Firm alternative diagnosis explaining evidence OR
- With antimicrobial therapy for ≤ 4 days OR:
  - Resolution
  - No pathological evidence of IE
- Does not meet criteria for possible IE

2023 Duke-International Society for Cardiovascular Infectious Diseases (ISCVID) Criteria

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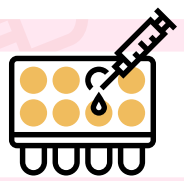
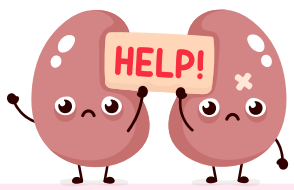
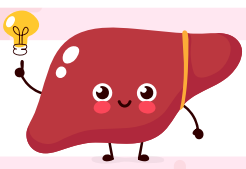
Investigations

Bedside Tests

Urinalysis 	Haematuria Proteinuria
Electrocardiogram (ECG)	Prolonged PR/Heart block (aortic root abscess)

Laboratory Tests

Blood cultures 	30-minute intervals between samples At least three sets Separate peripheral venepuncture sites
Serological tests	Consider in culture-negative cases 
Full blood count	↓ Haemoglobin ↑ White blood cells ↓/↑ Platelets 
Inflammatory markers	↑ Erythrocyte sedimentation rate (ESR) ↑ C-reactive protein (CRP) ↑ Procalcitonin (PCT) 
Serum creatinine and electrolytes	↑Urea ↑ Creatinine 
Liver biochemistry	↑ Serum alkaline phosphatase (ALP) 

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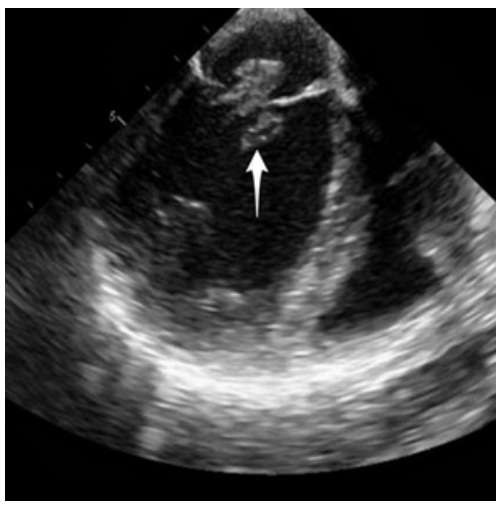
Investigations

Imaging

Echocardiography

Transthoracic (TTE): First-line, non-invasive

Transoesophageal (TOE): Second-line, invasive, higher sensitivity



Valve vegetation on echocardiogram

Chest X-ray

Left sided IE: Pulmonary oedema
Right sided IE: Pulmonary emboli/abscess

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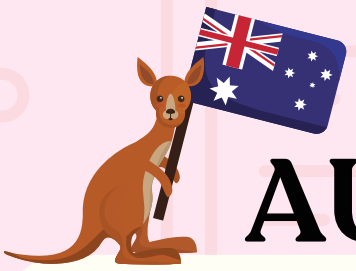
Management

-Empirical Treatment-



AUSTRALIA

Native valve endocarditis:

REMEMBER: Big Friendly Giant

- Benzylpenicillin, Flucloxacillin, Gentamicin

Prosthetic valve and cardiac implantable electronic device–associated endocarditis:

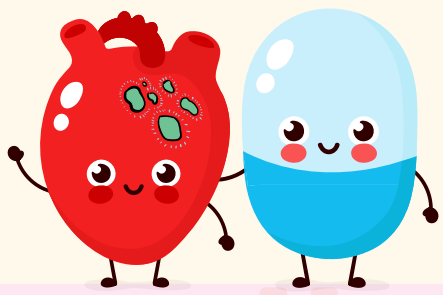
REMEMBER: Very Friendly Giant

- Vancomycin, Flucloxacillin, Gentamicin

Patients with immediate non-severe or delayed non-severe hypersensitivity to penicillins:

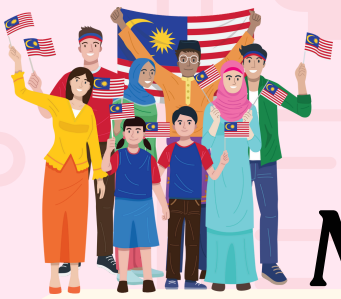
REMEMBER: Very Cool Giant

- Vancomycin, Cefazolin, Gentamicin



MUM IMs

Management



-Empirical Treatment-

MALAYSIA

Community-acquired native valves or late prosthetic valves:

REMEMBER: A Gentle Cat

- Ampicillin, Gentamicin, Cloxacillin

Early prosthetic valves or healthcare associated endocarditis:

REMEMBER: Very Gentle Red Cat

- Vancomycin, Gentamicin, ± Rifampicin, ± Cefepime

Some examples of directed treatment:

Methicillin-susceptible staphylococci	Flucloxacillin
Methicillin-resistant staphylococci	Vancomycin
Viridans streptococci and *S. bovis*	Benzylpenicillin, Gentamicin
HACEK	Ceftriaxone or Cefotaxime

MUM IMs

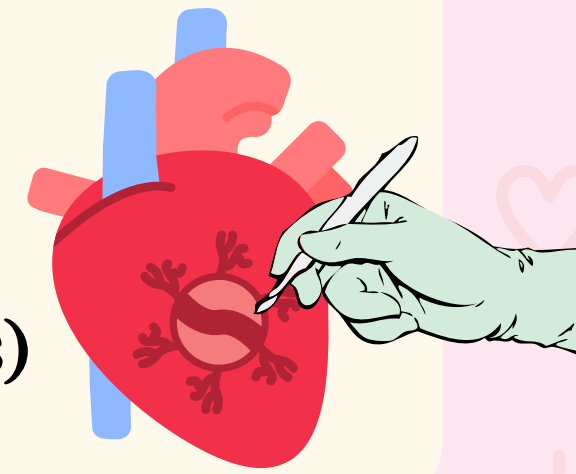
Management

-Surgical Intervention-

REMEMBER: V-HEART

Indicated in:

- **V**egetation >10mm and recurrent systemic embolisation
- **H**eart failure, severe valvular incompetence or haemodynamically instability
- **E**xtension to paravalvular (abscess, fistula, pseudoaneurysm)
- **A**V block
- **R**esistant organisms or fungi
- **T**reatment failure (uncontrolled sepsis)



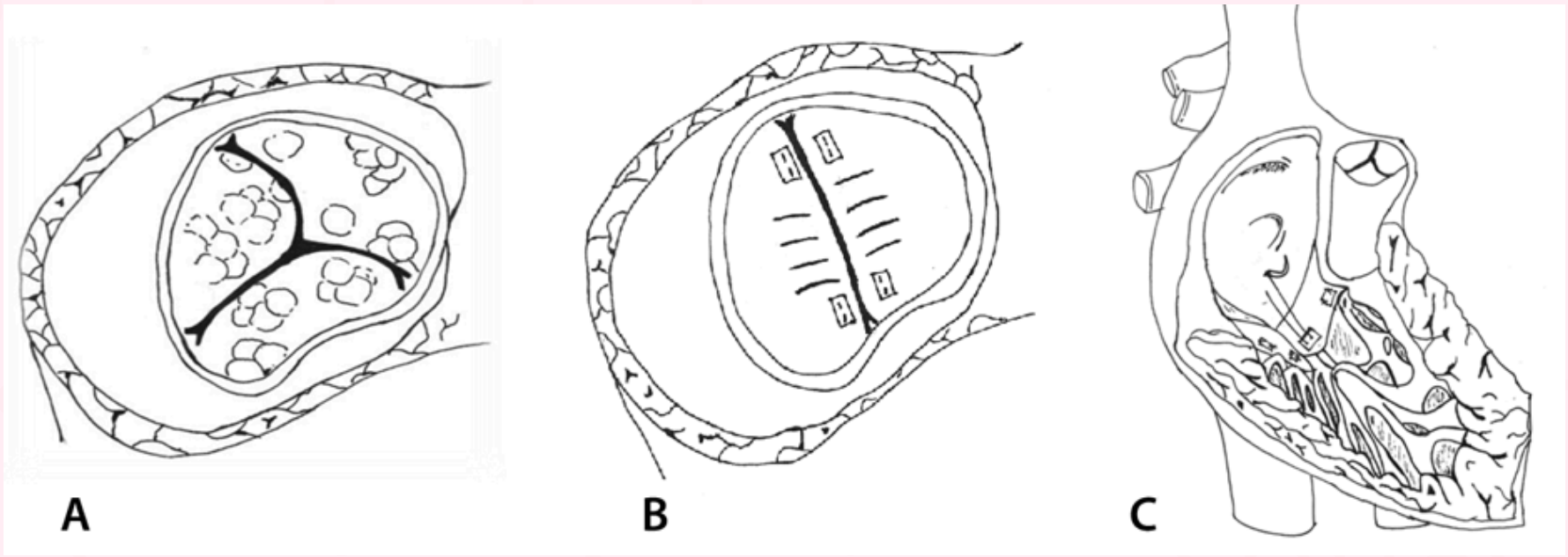
MUM IMs

Management

-Surgical Intervention-

Principles:

- Complete removal and radical debridement of all infected and necrotic material
- Valve repair when possible is preferred rather than replacement
- The choice of valve prosthesis type should be based on the standard considerations when deciding between a mechanical or bioprosthetic valve



(A) Vegetations on the tricuspid valve. (B) Neovalve with two rectangular segments of autologous pericardium with four fenestrations. (C) Neovalve patches were tacked into the papillary muscles with separated sutures, then in the tricuspid annulus with continuous suture

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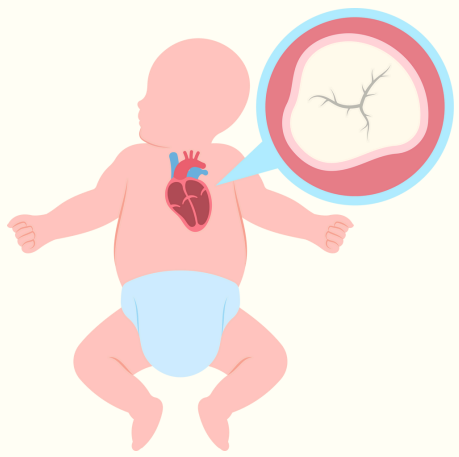
Prevention/Prophylaxis

Antibiotic prophylaxis

Only for patients who meet both of the following criteria:

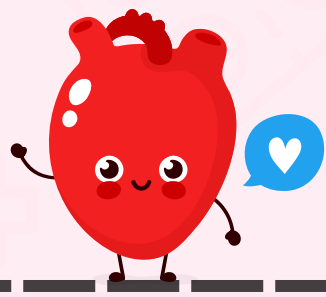
Cardiac condition with high risk of infective endocarditis and adverse outcomes *(Eg. Prosthetic Valve/ Congenital Heart Disease)*



Are undergoing a procedure with high risk of a bacteraemia *(E.g. Dental procedures: give Amoxicillin as prophylaxis)*

Additional recommendations

- Regular dental check- ups
- Disinfection of wounds and eradication of chronic bacterial carriage (skin, urine)
- Curative antibiotics for any focus of bacterial infection
- No self- medication with antibiotics
- Strict infection control during at- risk procedures
- Avoidance of piercing or tattoos
- Limitation of the usage of infusion catheters



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References

1. Kumar & Clark's Clinical Medicine (10th edition)
2. CLINICAL PRACTICE GUIDELINES FOR THE PREVENTION, DIAGNOSIS & MANAGEMENT OF INFECTIVE ENDOCARDITIS 2017 https://mymahtas2.moh.gov.my/files/Prevention,%20Diagnosis%20&%20Management%20of%20Infective%20Endocarditis.pdf
3. MED3100 & MED3200 Pathology Educational Materials 2025 Core Curriculum Lecture: Cardiac and Cardiovascular
4. https://www.mountsinai.org/health-library/diseases-conditions/endocarditis
5. www.lib.uiowa.edu/hardin/md/cdc/3184.html
6. https://healthjade.com/endocarditis/
7. https://radiopaedia.org/articles/infective-endocarditis
8. eTherapeutic Guidelines
9. Amórtegui HL, Cristancho JP, Donís-Gómez I. Tricuspid valve repair with autologous pericardium in a patient with infective endocarditis. Brazilian Journal of Cardiovascular Surgery. 2020 Jan 13;36:137-9.

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