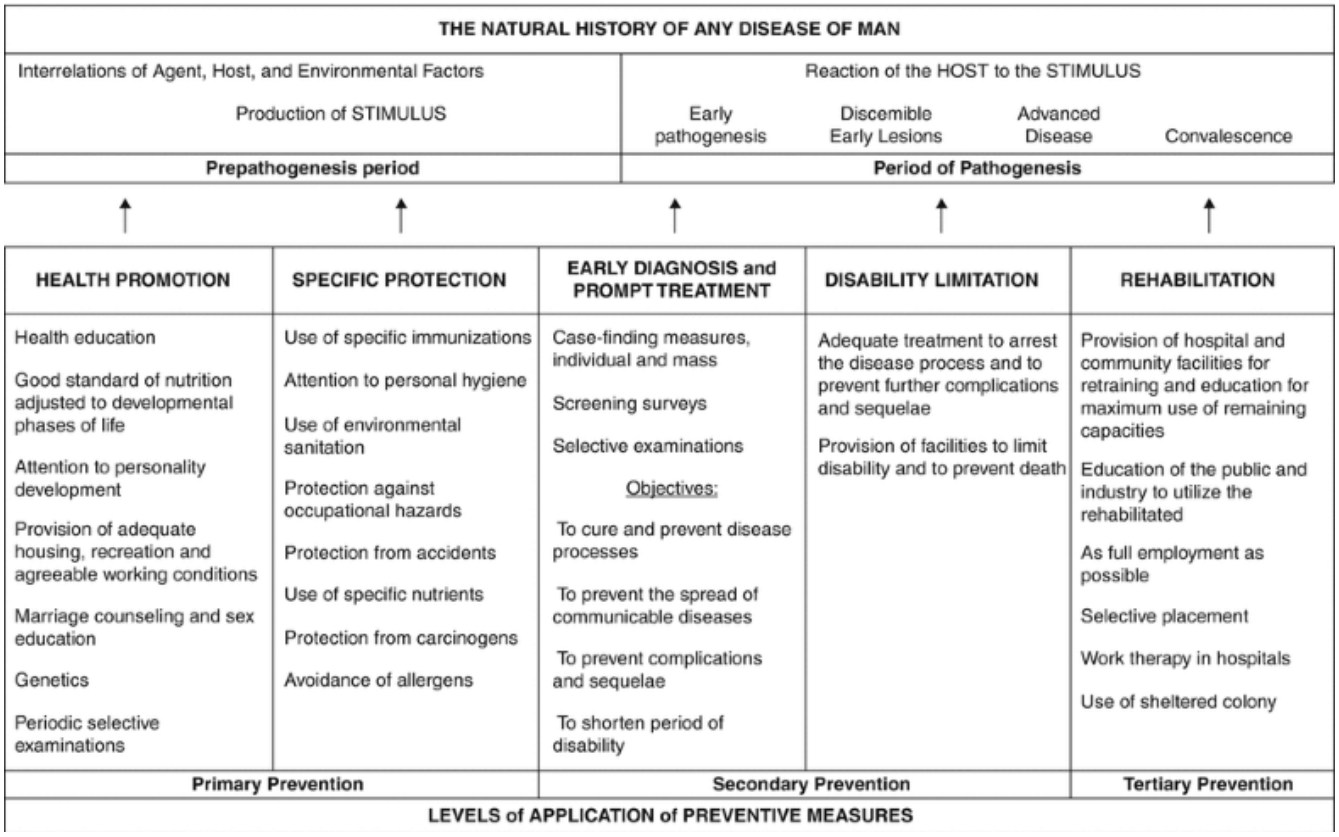
PAEDIATRIC INFECTIOUS DISEASES

- + Vaccination Programs
- + Screening Programs
- + Illness and Injury Prevention Programs



THE NATURAL HISTORY OF ANY DISEASE OF MAN				
Interrelations of Agent, Host, and Environmental Factors Production of STIMULUS	Reaction of the HOST to the STIMULUS Early pathogenesis	Discernible Early Lesions	Advanced Disease	Convalescence
Prepathogenesis period	Period of Pathogenesis			

HEALTH PROMOTION	SPECIFIC PROTECTION	EARLY DIAGNOSIS and PROMPT TREATMENT	DISABILITY LIMITATION	REHABILITATION
Health education Good standard of nutrition adjusted to developmental phases of life Attention to personality development Provision of adequate housing, recreation and agreeable working conditions Marriage counseling and sex education Genetics Periodic selective examinations	Use of specific immunizations Attention to personal hygiene Use of environmental sanitation Protection against occupational hazards Protection from accidents Use of specific nutrients Protection from carcinogens Avoidance of allergens	Case-finding measures, individual and mass Screening surveys Selective examinations Objectives: To cure and prevent disease processes To prevent the spread of communicable diseases To prevent complications and sequelae To shorten period of disability	Adequate treatment to arrest the disease process and to prevent further complications and sequelae Provision of facilities to limit disability and to prevent death	Provision of hospital and community facilities for retraining and education for maximum use of remaining capacities Education of the public and industry to utilize the rehabilitated As full employment as possible Selective placement Work therapy in hospitals Use of sheltered colony
Primary Prevention		Secondary Prevention		Tertiary Prevention
LEVELS of APPLICATION of PREVENTIVE MEASURES				

URGENT NOTIFIABLE (PHONE)	ROUTINE NOTIFIABLE (EMAIL)
• Avian Flu, • Foodborne (≥2x linked cases) • Gastro (within institution) • **Coronavirus strains (SARS, MERS-CoV, SARS-CoV-2)** • Smallpox • Measles • **viral haemorrhagic fevers.**	• **Acute rheumatic fever** (GAS) • Acute viral hep A/B/C • **Rheumatic heart disease - (< 35 yo)** • **ADR to vaccinations** • **CJD** → UK 1980 -1997 (bovine spongiform encephalopathy) • **HIV** • **Pertussis** • **Leprosy** – *mycobacterium leprae – affects skin, URT mucosa and eyes → red skin patch w/ NO sensation* • **Syphilis** • **TB**

Describe <u>global</u> causes of childhood morbidity / mortality → assess the impact of social determinants of health on children.

Global causes for childhood morbidity and mortality

- War and conflict
  - Drowning, road traffic injuries (lack of road safety programs and adequate road infrastructure)
- Unable to access clean drinking water
  - Increased risk of diarrhoea associated illnesses (e.g. cholera, ETEC – traveller's diarrhoea)
- Malnutritious diet (nil fortified foods – iodised salt in the making all breads)– increased risk of vitamin and nutrient deficiencies → **high risk of marasmus (def. in all nutrients) and kwashiorkor (mainly low protein)**
- Poor health literacy
- Ineffective or absent primary prevention programs (e.g. CST screening or HPV vaccination in India not implemented unlike in Australia)
  - Unprotected sex → increased Tx of STIs, TORCH → birth defects
  - No vaccination plan
- Reliance on voluntary aid – MAFs (doctors without borders) – they come and go (may pass on some knowledge but

Social determinants

- Low SES
- Geographical location
- Unequal access to medical resources and expertise
  - Higher rates of pre-term baby deaths (e.g. HIE – birth asphyxia, aspiration pneumonia etc.)
  - Unable to manage congenital abnormalities effectively
- Prioritisation of healthcare is non-existent in war-torn conflict nations
- Low education – do not understand human rights to standard healthcare

Vaccine Preventable Diseases

	PP	Sx	Vaccine Route + Rx
Rotavirus (non-enveloped RNA virus)	➢ Replicated in mature enterocytes in GI lumen ➢ Osmotic shifts	significant childhood mortality ➔ vomiting (1), diarrhoea (2), fever ➢ Shed in large quantities during diarhoea ➢ 5-7 days duration	Oral live vaccine (before 6/12) to prevent ISS ➢ Rx and prevent dehydration (oral and IV fluids)
Polio (Poliovirus)	(faecal-oral)	➢ 95% asymptomatic ➢ 4% mild illness = GE + influenza-like illness (LRTi) ➢ 1% aseptic meningitis (non-paralytic) – spasm of neck, back, lower limb ➢ <1% = paralytic poliomyelitis - spinal, bulbar, bulbospinal (painful in back and lower limbs)	IM 6 wks, 4 and 6 mths (eliminated in Aus.) ➢ Inactivated poliomyelitis vaccine (need multiple doses to generate immunit
Hepatitis B (dsDNA virus)	→ damage hepatocytes (vertical and horizontal – bodily fluids)	• Acute HBV = asymptomatic → subclinical → Sx (Nausea, jaundice, liver fail) • 90% neonates acquire Hep B vertically transmitted develop chronic = cirrhosis, HCC ➔ fatigue, milkd RUQ discomfort, jaundice	• Acute HBV infection = HbsAg +ve = no Rx • Chronic HBV infection = HbsAg +ve for 6/12 ➔ antivirals or HBV Ig (pregnant) • Hep B vax **within 12 hrs of birth**
HiB (Gram -ve anaerobic coccobacilli)	• Adhere to resp. epithelium → • IgA proteases stop opsonization • disseminating into blood (mets)	• *epiglottitis* = stridor, drooling, tripoding, hot potato voice • *bacterial meningitis* = fever, photophobia	**IM 6 wks, 4 and 6 mths (eliminated in Aus.)** • Acute = Anaesthetists consult + IV 1g ceftriaxone (or 400mg moxifloxacin / 10mg dex) • Transitoin from IV to oral Abx • *Ix: Slide agglutination or PCR*
Meningococcus (N. meningitidis) = Gram -ve cocci	• Adhere → colonise → tissue damage via *Lipoligosaccharide* (Il-1,6,8,,TNF-a) • rans-epithelial /endothelial transport • Bacteraemia (infection of blood stream)	• **Mainly Men B+C (w/ rise in subtype W and Y)** • **Severe/life threatening sepsis** - bacterial meningitis = fever, photophobia, neck stiff, non-blanching rash **RF:** immunocompromised • Usu. children < 2yo & adolescence • Endemic (Middle East) • Overcrowding	➢ Resus - ABCD → Empirical Abx: BenzylPenicillin / ceftriaxone - blood and CSF culture Vaccinate: ➢ MenACWY funded at 12 mths ➢ MenB is funded at 2, 4 and 12 months for ATSI
Strep. Pneumococcus Gram +ve cocci (respiratory droplets)	Adhere → colonise → tissue damage (Il-1,6,8,,TNF-a)→ trans-epithelial /endothelial transport → Bacteraemia (infection of blood stream)	• **RF:** ATSI, young age, lack of BF, seasonal (spring/autumn) • **AOM, meningitis, osteomyelitis, or pneumonia** • **Nephrotic syndrome – ascites – peritonitis**	Vax 2, 4 and 12 months ➢ Prevanar = 13 valent vaccine ➢ Pneumovax– 23 valent vaccine (ATSI) ➢ Abx – amoxicillin
Varicella – chicken pox (VZV (HHV3))	➢ Airborne droplets ➢ Direct contact	Prodrome = fever + coryza + pharyngitis followed by • widespread vesicular rash • *after recovery* it hides dormant in nerve root → reactivated as shingles at a later date • **pneumonia and neurological issues** (transverse myelitis, cerebral ataxia or encephalitis)	➢ Vaccinate at 18 months ➢ Notifiable disease Acute: ➢ PPE + infection precautions (PPE + isolation) ➢ Simple analgesia + cool compresses
Rubella (togavirus) mild and self-limiting	German measles ➢ Airborne ➢ Maternal to foetus (may be infectious for 7 days)	➢ 1-5 day Prodrome of o low grade fever + o LN of occipital and post-auricular ➢ Pinpoint pink maculopapular rash (face → trunk but does not darken or coaelece like measles) +/- arthralgia, conjunctivitis	➢ Live attenuated MMR at 1 and 4 years (as teratogenic) ➢ Isolate → notify → test (nasopharyngeal/buccal swab, urine and blood tests – serology IgG, IgM for measles, mumps or rubella)
Measles (highly contagious paramyxovirus)	➢ Person-person contact ➢ airborne	➢ ***Prodrome***: cluster of fever, cough, coryza, conjunctivitis ➢ Koplik spots (white spots in the mouth) **before** maculopapular rash (from face then downwards to chest – palms/soles spared) ➢ Late sign = pneumonia (LRTi signs = cough), meningitis	Acute Mx: ➢ ALL infection precaustions (PPE + ISOLATION) ➢ Rubella → analgesia, warm/cold packs ➢ Measles → supportive (antipyretics, fluids), Vit A, ribavirin (for measles pneumonia) ➢ Mumps → analgesia, warm/cold packs ➢
Mumps (highly contagious paramyxovirus)	➢ School- or college children (respiratory droplets)	**Fever, respiratory and constitutional** symptoms 1. 1/3rd patients = asymptomatic 2. ***parotitis*** in 70%, (uni or bilateral) – 10days swelling 3. ***orchitis*** in 15-30% of post pubertal males, **oophoritis** (5%) *Brain damage, deafness and male infertility are rare complications **> check IgM, IgG serology**	
Tetanus Clostridium tetani (gram + ve rod) From dirty wounds	➢ Tetanus spores from faeces of domestic animasl → toxin (tetanospasm) → carried in PNS to CNS (BLOCK inhibitory neurotransmitter)	muscle spasms beginning: 1) at jaw (trismis) 2) generalised muscle spasms (hyperreflexia) 3) seizures 4) difficulties with SOB and swallowing	➢ 5xDPT at 6 wks, 4, 6, 18/12 and 4 years
Diptheria (Corynebacterium diphtheriae (gram +ve rod) via respiratory droplets)	Colonise in pharynx → Diphteria exotoxin → exudate → coagulates to form grey pseudo-membrane	Diphtheria toxin causes: ➢ Life threatening Sore throat + fever ➢ Progresses to swollen bull neck (tonsillar pseudomembranous)	➢ 5xDPT at 6 wks, 4, 6, 18/12 and 4 years ; Respiratory swab: ➢ ABCD (ensure patent away) ➢ Parenteral benzylpenicillin or erythromycin (as patient cannot swallow properly) ➢ Vax after recovery (inc. close contacts who also may need ABx)
Pertussis (Bordetella pertussis gram—ve bacteria) – airborne	Colonise brush border of bronchial epitheliuam → pertussis toxin → inhibit neutrophils/macrophage → paralyse cilia + apoptosis of macrophage (via ↑cAMP)	(1) **Catarrhal stage** = coryza (URTI) – like illness (2) **Paroxysmal stage** = persistent whoop cough >2 wks → may develop apnoea and cyanosis (3) Post-tussive vomits → beware of severe pneumoniia and apnoea	➢ 5xDPT at 6 wks, 4, 6, 18/12 and 4 years ➢ Vax antenatally at 28 weeks GA ➢ Exclude from school and social distance ➢ Macrolides (azithromycin) to reduce Tx (but not the disease severity)

**TORCH = benign for mother, but congenital infection will be teratogenic for foetus who is imm unocompromised*

***Other viruses that cause issues: Parvovirus (slapped cheek, erythema infectiosum →foetal BMF and subsequent hydrops),*

**** vaccination CI: previous reaction (anaphylaxis), immunocompromised, concurrent NSAID usage (COVID)*

NEONATE ID: TORCH

- Most TORCH infections are **asymptomatic** at birth
  - Symmetrical IUGR and small head (hydrops fetalis)
- Mothers display only generalised Sx e.g. fevers, mild sweats etc.

	CNS	Cardiac	Hearing loss	Vision loss	Skin Changes	GI	Screened routinely + Rx
Toxoplasmosis (Toxoplasma gondii parasite)	➢ Hydrocephal ➢ Microenceph ➢ Intracranial calcifications ➢ Seizures		**Sensorineural Hearing loss**	chorioretinitis	**Rash** **Jaundice**	HSM	No SCREEN → Anti-parasitic (1 year regime) = pyrimethamine + sulfadazine ➢ Hydrops, IUGR
Other (syphilis – old) (zika – new)	Seizures	**myocarditis**	**Late syphilis (> 2yo)**	**Interstitial keratitis**	**Maculopapular rash** *Early syphilis (< 2yo)* **frontal bossing and saddle nose** (if late)	H-M Early syphilis (< 2yo)	Yes – antenatal screen to give penicillin to reduce congenital syphilis in foetus
Rubella (togavirus) **"mild and self-limiting disease"**	Mental retardation Microencephaly	**PDA** **Pulm. Artery stenosis**	**Sensorineural Hearing loss**	**Cataracts**	**Blueberry muffin rash** (blue dots on the babies skin from extramedullary erythropoiesis) **LN of occipital and post-auricular glands**	HSM Jaundice	Yes – extra precautions during pregnancy and vax post-natally if infected ➢ Supportive care
CMV (most common) *"pregnant woman in contact w/ sick child at daycare"*	Cerebral palsy and intellectual disability ➢ Pre-term ➢ Microencephaly ➢ Seizures	myocarditis	**Sensorineural Hearing loss**	**chorioretinitis**		HSM Jaundice	➢ No - glandular fever-like illness → sore throat, lethargy, fever and LN ➢ ***Anti-virals = IV ganciclovir or oral valganciclovir***
HSV Childbirth (95%) "skin-eye-mouth"	Seizures	Myocarditis Myocardial dysfn		**XS lacrimation conjunctivitis**	**Vesicular lesions** **Mouth ulcers**	H-M	➢ **If untreated with acyclovir:** ➢ **CNS with or w/o mouth → *mimic neonatal sepsis or meningitis*** ➢ **Disseminated disease**

*Listeria = (raw milk) → granulomatous infantisepsis

**5th disease → severe anaemia + fetalis hydrops (infects reticulocytes)

	INFECTIOUS MONONUCLEOSIS	MUMPS	HIV	HEPATITIS B	HEPATITIS C
PP	EBV secreted in saliva by infected patients where heterophile antibodies are produced after 6 weeks	Viral infection	HIV is a **RNA retrovirus** (HIV-1= most common) that damages and destroys the CD4 T helper cells - immunocompromised	**DNA virus - integrate into host cell** ➢ **Produce viral proteins**	**RNA virus**
Tx	• Young teenagers – **spread by salvia** (kissing, sharing toothbrush, cups) AKA • Kissing disease • Glandular fever • Mono	• Spread via respiratory droplets • Incubation 14-25 days	➢ Spread via unprotected oral, vaginal or anal sex ➢ **Vertical Tx** – birth, BF, ➢ IVDU, sharing needles. Low SES ***Increased viral load** = ↓ CD4 cell count = ↓adaptive immune	➢ Direct contact with blood or bodily fluids ➢ Vertical transmission	➢ Direct contact with blood or bodily fluids ➢ Vertical transmission (5-15%)
Sx	• Fever • Sore throat / pharyngitis • Fatigue • LN + HSM • Enlarged tonsils • Diffuse Itchy maculopapular rash after taking amoxicillin	• Fever • Muscle aches • Lethargy • LoA • Headache • Dry mouth • Parotidomegaly (may be unilateral or bilateral)	• **Stage 1** = asymptomatic +/- LN • **Stage 2 = HSM, recurrent URTi** • **Stage 3** = **unexplained malnutrition** (FTT, dev. delay), oral candida, pulmonary TB • **Stage 4** = **Opportunistic infection (AIDS defining illness)** • extrapulm. TB, Kaposi sarcoma, oeseophageal candida, CMV retinitis	➢ Fever ➢ Abdo pain ➢ Hepatomegaly ➢ Jaundice / pruritus ➢ **Fatigue** ➢ **LoA** ➢ **Dark urine**	➢ Fever ➢ Abdo pain ➢ Hepatomegaly ➢ Jaundice / pruritus ➢ **Fatigue** ➢ **LoA** ➢ **Dark urine**
Comp.	➢ Splenic rupture	➢ **Pancreatitis** (epigastric pain) ➢ **Orchitis** (testicular pain) ➢ **Meningitis or encephalitis** (confusion, neck stiffness and headache) ➢ **Sensorineural hearing loss**	**CD4 > 500**: • Gullian-barre • Reactive arthritis • ↓plt **CD4 > 200**: • TB • HZV • HSV • Candida • Bell's **CD4 < 200**: • Kaposi's (HHV8) • CMV retinitis • NHL • PJP	*Most become chronic Hep B carriers* ➢ 90% neonates ➢ 30% child < 5yo *Late complications* ➢ Liver cirrhosis ➢ HCC	➢ *1 in 4 = full recovery* ➢ *3 in 4 = chronic hep C* *complications* ➢ Liver cirrhosis ➢ HCC
Ix	➢ **Monospot test** – 100% **specific** (uses RBC from horses to react with any heterophile antibodies) ➢ EBV antibodies → IgM (acute infection) → IgG (immunity or post-infectino)	• **PCR testing** – saliva swab • **Bloods** – test for antibodies to mumps virus	**Test for HIV antibodies if:** ➢ Babies in HIV +ve patients ➢ Immunodef. Suspected ➢ Sexually active young ➢ **RF: IVDU, sexual abuse** ➢ Test infant (wk 1, wk 2 and 2 mths after ART stopped) **HIV viral load** ➢ Monitor Rx response	**Viral Hep B serology** *Also Hep C and HIV* Test in: ➢ Children from Hep B +ve mums ➢ Migrants from endemic areas ➢ Close contacts with hep B	**Viral Hep C serology (antibody + RNA testing for viral lod)** *Also Hep B and HIV*
Mx	➢ Avoid contact sports (i.e. stop splenic rupture)	➢ **Supportive Rx** – self-limiting condition lasting 1 week o Rest o Fluids o Analgesia ➢ **Notify publish health**	**Prevent vertical transmission** ➢ **1⁰ =** safe sex + preconception advice ➢ **Do NOT breastfeed** ➢ **LSCS for all babies of all HIV mothers** (unless undetectable viral load) **Refer to paediatric HIV specialist** ➢ **Lifelong ART or PrEP for mother + child** –until normal CD4 count undetectable viral load (HIV RNA < 50 ➢ **Delay childhood vaccines** if immunocompromised ➢ **Prophylactic co-trimoxazole** – protect against PJP ➢ **Rx opportunistic infection**	**Self-resolves within 2 mths** ➢ Check vax status **Hep B +ve mother** ➢ Hep B vaccine ➢ Hep B Ig IV **Breastfeeding** ➢ Safe	**Curative intent w/** ➢ pegylated IFN and ribavirin ➢ Direct acting antivirals (adults) **Hep C +ve mother** ➢ Test baby at 18/12 **Breastfeeding** ➢ Safe

Paediatric Parasites (Helminths):

Helminth	PP	Sx / Complications	Tx
Pinworm	*Threadworm* (most common in developed world) via faecal oral route esp. in daycare	Asymptomatic → itchy bottoms and vulvovaginitis in girls ➢ **Sticky tape bum and send to lab**	**Mebendazole 100mg once daily oral (2-7d)**
Schistosomiasis	**Flatworm larvae** from freshwater snails = enter skin and migrate into BV to produce eggs in either the: ➢ **Bladder OR Bowel OR CNS**	➢ General = Katayama fever + LN + swimmer's itch ➢ **Hamatobium ➔ Bladder**: LUTS (haematuria, dysuria, bladder cancer if chronic), ➢ **Mansoni ➔ Bowel**: GI symptoms (bloody diarrhoea, malnutrition, Portal HTN and liver failure).	**Praziquantel 20mg/kg bd oral (once-off)**
Strongyloidiasis	1) Hookworm/roundworm larvae penetrates skin → blood → R heart 2) pulm capillaries → alveoli → climbs up trachea (cough) → 3) swallowed and matured in small intestine 4) eggs excreted in feaces for Tx	Causes **localised popular dermatitis rash** and cough initially 1. **Intestinal blood loss + Fe def** a. Pale (dehydrated), fatigue, dark smelly stools 2. **Protein malnutrition** → hypoalb → ascites, oedema 3. **Disseminate and cause MOF** in immunocompromised host RF: children, pregnant women, young women of child bearing age **(all have low baseline Fe)**	**Albendazole 400mg oral w/ food** + corticosteroids and chemo to reduce immune response
Tapeworm	➢ Hydatids (via dog faeces eaten by grazing animal or human accidentally) ➢ Worm embryo → penetrates intestinal wall and migrates to vital organs	➢ Multisystemic e.g. ➢ Abdo pain, diarrhoea, weight loss, anaemia, fatigue, liver failure ➢ **Vit B12 and Fe def.**	**Surgery** to remove hydatid cysts (full of tapeworms)
Scabies	➢ Spread by direct human contact (overcrowded, unhygienic places) ➢ Eggs laid under skin	➢ Acral distributed rash – fingertips, scalp, toes, genitals ➢ Itchy papules and plaques	1. **Skin scrape –** eggs under Microscope 2. **Topical Permethrin 5% OR Benzyl benzoate**

Paediatric Chronic Infections (OR prolonged fever):

	TB (Tuberculosis)	Kawasaki	Typhoid
Epi	➢ Any age (usu. < 5yo) ➢ Endemic in SE Asia, Middle East	➢ Asian ➢ 75% under 5yo	➢ Endemic region
PP	**Aerosolised → mycobacterium tuberculi inhaled** ➢ Young child have not developed alveolar macrophages → TB contained in granuloma (**ghon focus**)→ may develop latent TB ➢ At any point → TB can rupture → bacteremia	TRIGGERED by ➢ stress: ➢ DKA	➢ Salmonella typhi (8-14 day incubation period)
Clinical Sx	➢ Pulmonary TB → cough +/- haemotypsis, ➢ Poor wt gain,fever, NS, poor feeding ***+/- extra-pulmonary disease (30-40%)*** ➢ Meningitis, Skeletal TB (Pott's), Abdo TB (*pneumatosis intestinalis*), heart **Imaging**: ➢ Young: Hilar LN + ghon focus ➢ Adolescent /adult = cavitatory lesions	5- day fever+ ➢ Conjunctivitis ➢ Maculopapular rash ➢ Oedema ➢ Adenopathy - ➢ Mucocutaneous ulcers, RED friable tongue (**strawberry tongue)** ➢ Skin desquamation (late)	➢ Fever ➢ Rash (rose spots) ➢ Abdo pain + N/V ➢ HSM ➢ Bradycardia ➢ Bowel perforation (after 3 wks)
Dx	**(1) MANTOUX or Tuberculin Skin Test** for < 5yo – using PPD - >15mm induration is positive **(2) IFN Gamma Release Assay (IGRA)** only for >5yo ➢ Both high false +ve and false -ve *AND* cannot differentiate between latent and active TB (e.g. BCG will cause +ve TB skin test) ➢ **Imaging (CXR/CT)** = assess for active disease ➢ **Biopsy + sputum M/C/S** (acid-fast bacilli) - hard to obtain as children generally swallow sputum	➢ FBC – anaemia, ↑plt, WCC ➢ ↑CRP, ESR ➢ LFT –↑ALT, ↓albumin ➢ Abnormal ECHO **Exclude:** ➢ GAS, viral, SJS, drug reaction, malignancy or (SSSS)	➢ FBC - ↑eosinophils ➢ Blood film = thick and thin ➢ LFT – jaundice (↑bilirubin) ➢ BSL ➢ Measles serology ➢ Urine M/C/S **Exclude:** ➢ Malaria, dengue, hep A
Rx	Acute = PPE + isolation 1º prevention = BCG for child travelling to endemic area. (reduce risk of disseminating disease by 80%) 2º prevention (must ensure compliance) ➢ Rx ***latent TB*** with 6 months of isoniazid od ➢ Rx ***active TB*** with 4 drug regimen (isoniazid, rifampicin, pyrazidamine and ethambutol) for 2/12 then 2 drug for 4/12(and for 10/12 if meningeal) ➢ Test for HIV and contact trace anyone <5yo	➢ Admit → analgesia → IVF ➢ **IVIg 2g/kg** (earlier the better) ➢ **3-5mg/kg aspirin** (Reye's = fatty liver and encephalopathy) ➢ Refer to paeds F/U in 6 wks D/C if: ➢ Afebrile > 36 hrs ➢ Daily aspirin dose tolerated ➢ Repeat ECHO (coronary artery aneurysm)	Paeds referral ➢ *Rx w/ ceftriazone + IVF* ➢ Outpatient Mx and GP F/U

Paediatric Non-focal fevers

	UTI	Malaria	Febrile Neutropenia
Cause	Facealis Enterococcus	➢ Parasite (falciparum, vivax)	➢ **CNS = Meningitis / encephalitis** ➢ **URTI** = pharyngitis, otitis media, sinusitis ➢ **LRTI** = PJP, pneumonia, (cough, tachypnoea, hypoxia) ➢ **Abdo** = UTI, C. difficile (recent Abx esp. macrolides) ➢ **Skin** = cellulitis, vesicular lesions, fissures ➢ **BMF/Chemo** = anaemia, thrombocytopenia, leukemia
PP	TB infection initially contained following primary infection (usu. respiratory) → may develop latent TB ➢ At any point → mycobacterium tuberculi can rupture into the blood stream (56% of children < 5yo risk of active TB)	➢ Attack liver then RBC ➢ 1-2 days Falciparum (more severe disease) ➢ Many months (vivax)	
Clinical Sx	➢ Flank/suprapubic (loin-groin) pain ➢ Fever, dysuria, frequency, polyuria ➢ Poor feeding and lethargy	➢ Impaired LOC → seizures ➢ Jaundice + spontaneous bleeds ➢ Pallor + splenomegaly	➢ Septic signs = hypoTN, ↑HR, febrile, ↑RR, reduced UO
Dx	➢ **FBC, EUC** ➢ **MSU urine = dipstick and M/C/S** ○ Nitrites, leucocytes (pyuria)	➢ **FBC –** *Haemolytic anaemia* ➢ **BSL –** *hypoglycaemia* ➢ **EUC/VBG –** *metabolic acidosis (high lactate)* ➢ **Blood thick/thin films**	➢ FBC = neutropenia < 5000/mm² ➢ EUC / VBG / Lactate ➢ Blood/swab /Urine culture - M/C/S
Rx	➢ Oral cefalexin (cystitis 3-7days, pyelo 7-10 days) ➢ Empirical Abx (if unwell) – benzyl + gentamicin ➢ D/C if tolerating fluids and Abx	➢ **Doxy or malarine (BEFORE/AFTER trip)** ➢ G6PD screen ➢ D/C if afebrile > 24 hrs (tolerate oral meds) ➢ Protective = sickle cell ➢ AVOID NSAIDs = increased bleeding risk	➢ Consult onco or local paeds ➢ ABCD – IV access → **Abx within 30mins** (tazocin 100mg/kg IV 6H) or cipro/vanc ➢ **IV bolus 20mL/kg NS** ➢ **Vanco =** *cellulitis, MRSA* **| Metro =** *C. difficile*

Paediatric Sepsis & CNS fevers

	SEPSIS	MENINGITIS	PAEDIATRIC ENCEPHALITIS
PP	**Results of SIRS** ➢ The younger the child = less specific the Sx ➢ Causative pathogens recognised by macrophages lymphocytes and mast cells ➢ Release cytokines (e.g. NO) - vasodilatation	Inflammation of meninges and CSF surrounding CNS due to: *Bacterial: infection* ➢ **Neonates** = GBS ➢ **Children + adults=** N. meningitidis – gram-ve diplococci ➢ **Children + adults=** Strep pneumoniae *Viral: infection* ➢ HSV ➢ Enterovirus ➢ VZV	**Inflammation of the brain** ➢ **Infective cause – mainly viral** o Neonates – HSV2 (genital herpes) o Children – HSV1 o Others – VZV, adeno, entero, EBV, MMR, ➢ **Non-infective –** *autoimmune (antibodies attacking*
RF	➢ Immunocompromised (HIV baby, prolonged steroid usage)		
Sx	• Looks toxic / unwell • Fever OR hypothermia • Altered mental status / behaviour • Poor feeding • Inconsolable crying (high-pitched or weak) • Reduce body tone • Skin changes (cyanosis, mottled pale) Check for signs of hypovolameic shock ➢ Dehydration signs (prolonged CRT, tachycardia, hypoTN, dry MM, sunken fontanelle)	• **Headache** • **Fever** • **Non-blanching purpuric rash** = DIC and subcutaneous haemorrhages • **Photophobia** • **Raised fontanelle** (neonates) **Meningeal irritation:** • **Kernig's sign +ve** = flex hip and knee = spinal pain • **Brudzinski sign +ve** = flex neck (bring chin to chest) - involuntary flexion of hips and knees	➢ **Altered LOC** ➢ **Unusual behaviour** ➢ **Altered cognition** ➢ **Acute focal seizures** ➢ **Acute FND** ➢ **Fever**
Comp.	➢ DIC – complement system activation causes: o fibrin deposition → organ hypoperfusion o Plt consumption → low plts, haemorrhages	➢ **Hearing loss (main)** ➢ **Cerebral palsy –** FND – limb weakness or spasticity ➢ Seizures +epilepsy ➢ Cognitive and learning impairment ➢ Memory loss	➢ Persistent fatigue, prolonged recovery ➢ Altered memory or cognition ➢ Altered personality ➢ Headaches ➢ Learning disability ➢ Sensory disturbance ➢ Movement disorder ➢ Seizures ➢ Hormonal balance
Ix	➢ FBC ➢ EUC ➢ LFT ➢ CRP ➢ ABG – raised lactate ➢ Coags – DIC? **Identify cause** ➢ Blood cultures ➢ CXR ➢ Urine culture + dipstick ➢ Abdo-pelvic USS and CT ➢ CT brain before LP ➢ Serum cortisol - ?adreanl crisis	• FBC • EUC • LFT • Blood cultures • CT brain (before LP) • LP – CSF M/C/S, cytology, BSL, proteins, viral PCR **Sample / Glucose / Protein / Cells** **Bacteria**: Cloudy / Low / High / PMN **Viral**: Clear / normal / Normal / Lympho	• LFT • Blood cultures • CT brain (before LP) • **LP → viral PCR and bacterial M/C/S** • MRI (after LP - • Swab – causative organism (throat, vesicles) • HIV testing
Mx	***Indications for treatment*** ➢ Infant < 3/12 old = temp> 38 deg ***Acute Mx:*** ➢ **A** – maintain patency ➢ **B** – FiO2, chest sounds ➢ **C – IVF bolus 0.9% NS 20ml/Kg** (send to ICU for ionotropes and vasopressors if fluid resuscitation ineffective) ➢ **C – Empirical ABx** ➢ **D – GCS, tone, PEARL** **Post-acute Mx** ➢ Continue empirical ABx for 5-7 days until sensitivities comes back ➢ Stop ABx if: o Low suspicion of bacteria o Well patient o Blood cultures and 2x CRP results negative at 48 hrs	*ABCD* ➢ Empirical ABx within 1 hr o **Under 3/12 old** = IV cefotaxime + amoxicillin for listeria coverage o **Over 3/12 old** = IV ceftriaxone o *__Vancomycin__ = if possible penicillin resistant pneumococcal infection (e.g. recent foreign travel or prolonged ABx exposure) ➢ IVF – 0.9% NS ➢ IV anti-pyretics and anti-emetics ➢ Dexamethasone – PO qid for 4 days – reduce risk of hearing loss and neurological damage *If viral meningitis confirmed* ➢ Acyclovir *Post-exposure prophylaxis* ➢ **RF**: For prolonged close contact within 7 days ➢ Guided by public health ➢ Single dose PO ciprofloxacin (given within 24 hrs)	ABCD – empirical IV acyclovir ➢ HSV → Acyclovir ➢ VZV → Acyclovir ➢ CMV → Ganciclovir F/U – support and rehab ➢ Minimise complications