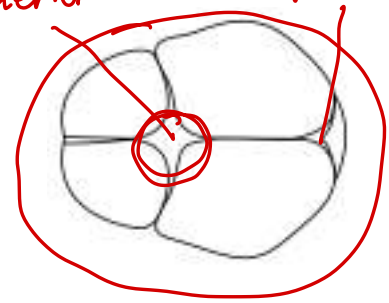
HOUSE RULES

- No further than MCQ in this lecture!
- Be proactive
- Any questions are welcome – some questions I might not have the answer at hand, so I will do my own research and get back to you
- Recalls are key but always focus on the handbook

GROWTH AND DEVELOPMENT

Physical Characteristics of The Newborn

- Head – Posterior fontanelle closes at 1-2 months, anterior fontanelle closes at 12-18 months
- Abdomen – Normal to palpate the liver by 2-3cm until around 3yo; the spleen lower edge when infant
- Skin – Many neonates develop jaundice at 2-3 days old.



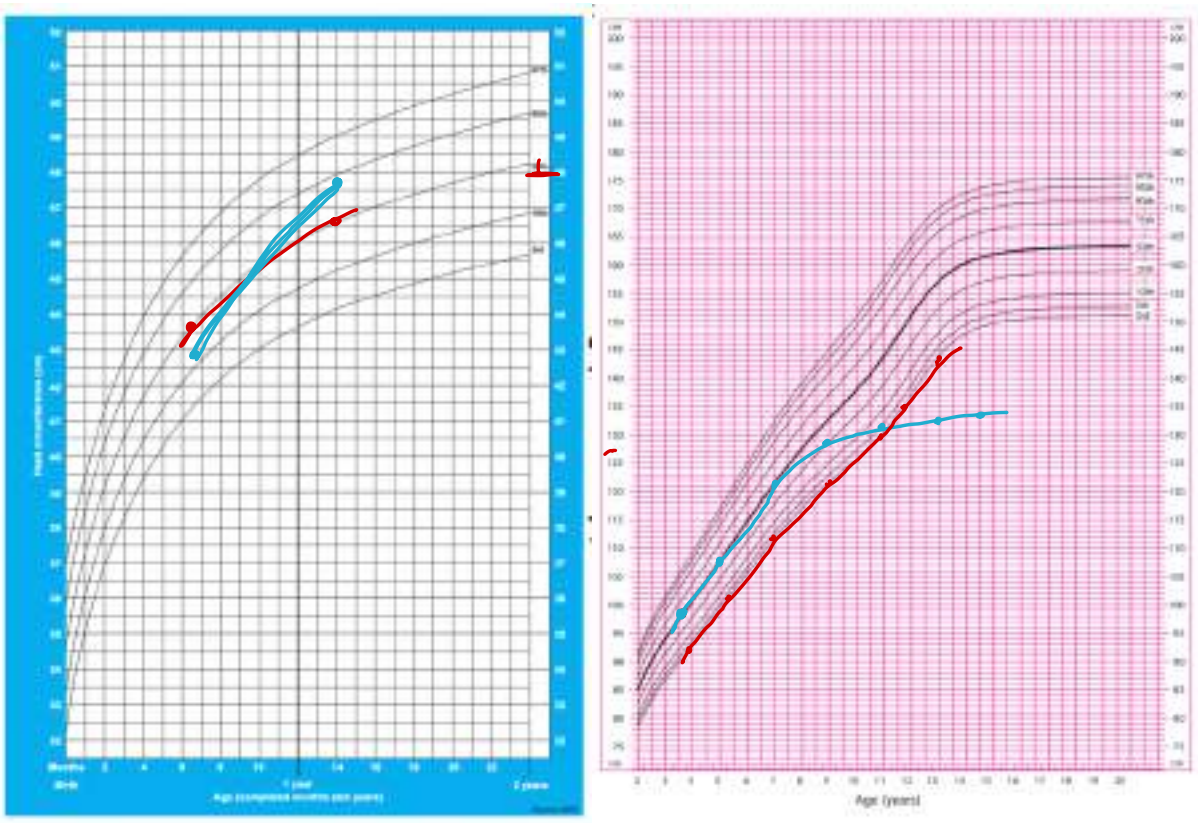
Developmental Milestones

Age	Gross Motor	Fine Motor	Language	Social/Cognitive
6 weeks	Some head control		Coos	Social Smile
4 months	Hand regard		Laughs and squeals	Prolonged eye contact
6 months	Sits with support		Babble	Stranger anxiety
9 months	Sits without support (8 mo)	finger pincer-grasp	"mama/dada"	Waves bye-bye
12 months	cruises	2 finger pincer-grasp	Uses 1-3 words	separation anxiety, follows 1-step command
18 months	walking well established	tower 2 blocks		
2 years	walks up and down stairs	scribble	Uses 2-word phrases	Follows 2-step command
3 years	rides tricycle	copies a circle	Uses 3-word sentences	brushes teeth with help
4 years	hops	copies a square		cooperative play eg. boardgames
5 years	skips	copies a triangle	Use 5-word sentences	domestic role-playing eg. dress-up

[Major Developmental Milestones]

Routine Growth Monitoring

At routine growth monitoring checks, height, weight and head circumference are plotted on **growth charts** specific for gender and age. The measurements are routinely recorded in the Child Personal Health Record Book.



[Growth charts: head circumference for boys up to 2yo; height for girls up to 20yo]

- When are the checks?
  - After birth
  - 2 months, 4 months, 6 months
  - 12 months, 18 months
  - 2.5-3.5 years
  - 4-5 years
- The use of growth charts
  - Head circumference is measured and plotted up to 2yo, height and weight can be plotted up to 20yo
  - Serial measurements are essential to assess growth
  - The pattern of the growth is more important than raw numbers – many healthy children grow on percentile lines at the top or the bottom of the growth chart.
  - It is common to have small "dips" above or below a particular percentile line or growth curve.
  - Not a diagnostic tool – used for overall clinical impression
  - Correct for prematurity (<37 weeks) until 4 months of age.
- Head Circumference
  - ↑Head Circumference - hydrocephalus or tumour
  - ↓Head Circumference - microcephaly e.g. TORCH infections
- Weight and Height
  - Birth weight doubles by 4-5mo, triples by 12mo

0-3 months	3-6 months	6-9 months	9-12 months
180g	120g	80g	70g

[Average weight gain per week]

Nutrition

Guidelines For Feeding Infants

- It is best to breastfeed for the first 12 months.
- Cow's milk-based formulas should be used if baby is not breastfed until baby is at least 12 months.
- Cow's milk should ideally be left until 12 months.
- In the first 3-4 months 'baby knows best'.
- Formula choice for healthy term infants can be based on cost.
- The rule is 150 ml/kg per dose.

Toilet Training

- Children should be fully toilet trained by daytime – between 2.5yo and 4yo, night time – by 8yo
- Parents should not nag or punish. Positive-reinforcement approach is far better.

Immunisation

L NOT mandatory

- Immunisation schedules are outlined in the National Immunization Program

Age	Disease
Birth	• Hepatitis B (usually offered in hospital)
2 months Can be given from 6 weeks of age	• Diphtheria, tetanus, pertussis (whooping cough), hepatitis B, polio, *Haemophilus influenzae* type b (Hib) • Rotavirus • Pneumococcal • Meningococcal B (Indigenous children)
4 months	• Diphtheria, tetanus, pertussis (whooping cough), hepatitis B, polio, *Haemophilus influenzae* type b (Hib) • Rotavirus • Pneumococcal • Meningococcal B (Indigenous children)
6 months	• Diphtheria, tetanus, pertussis (whooping cough), hepatitis B, polio, *Haemophilus influenzae* type b (Hib) • Pneumococcal (All children with specified medical risk conditions) • Pneumococcal (Indigenous children living in WA, NT, SA, Qld) • Meningococcal B (Indigenous children with specified medical risk conditions)
12 months	• Meningococcal ACWY • Measles, mumps, rubella • Pneumococcal • Meningococcal B (Indigenous children)
18 months	• *Haemophilus influenzae* type b (Hib) • Measles, mumps, rubella, varicella (chickenpox) • Diphtheria, tetanus, pertussis (whooping cough) • Hepatitis A (Indigenous children in WA, NT, SA, Qld)
4 years	• Diphtheria, tetanus, pertussis (whooping cough), polio • Pneumococcal (All children with specified medical risk conditions) • Pneumococcal (Indigenous children living in WA, NT, SA, Qld) • Hepatitis A (Indigenous children in WA, NT, SA, Qld)

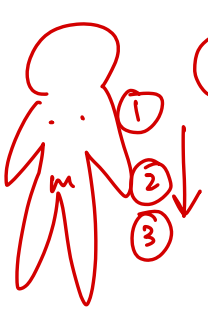
https://www.health.gov.au/sites/default/files/documents/2021/10/national-immunisation-program-schedule-for-all-people.pdf

- Preterm babies should be vaccinated according to the recommended schedule of the usual chronological age starting at two months of age if no contraindications

Puberty

- First signs are around 10-12 yo
- Girls – top to bottom, Boys – Bottom to top

GIRLS	BOYS
Breast buds enlargement	Enlargement of testes and scrotum
Growth Spurt	Pubic hair growth
Pubic hair growth	Axillary and facial hair, voice changes
Menarche	Growth Spurt





[order of changes during puberty: girls vs boys]

- The 2° sexual development is staged in Tanner Staging.

Tanner stage	Male genital appearance	Male genital description	Female pubic hair appearance	Pubic hair description	Breast appearance	Breast description
1		Testicular volume <3ml		No pubic hair		Elevation of papilla only
2		Testicular volume <3ml, change in texture to scrotal skin		Sparse growth chiefly along the labia/base of penis		Breast bud stage
3		Increase in size of penis with further testicular enlargement		Darker, coarser, more curled hair		Enlargement of breast and areola
4		Further enlargment of penis and testicles with development of glans penis		Adult type hair over a smaller area		Projection of the areola and papilla
5		Adult size and shape		Spread to the medial surface of the thighs		Recession of the areola to the contour of the breast, projection of papilla only

(https://www.paediatricpearls.co.uk/wp-content/uploads/2021/05/Pubertal-stages-and-timings.pdf)

RECALLS - GROWTH AND DEVELOPMENT

1

A 15 month child is noticed by parents not to be babbling & has no words. Child appears to turn in response to sounds. Was born at 36 wks gestation weighing 2.6kg. He passed the neonatal hearing screen. WOF is the most appropriate next step in Mx?

A. Arrange MCH hearing screen
B. Arrange an audiological assessment
C. Reassure that this is a normal variant in development
D. Repeat developmental assessment at 18 mos
E. Check for dysmorphic features

2

In the assessment of a child who has turned 3 years old. Which of the following skills should he have already acquired?

A. Dress without supervision
B. Draw a recognizable man
C. Tie shoelaces
D. Hop on one foot
E. Climb stairs



3

Child of the age of 2 is normally able to perform WOF?

A. Build a tower of 2 or 3 blocks
B. Button his shirt
C. Count to five
D. Name a colour
E. Control the bladder day & night

4

11 mo girl brought to see GP. She cannot sit without support. She was born at 32 week and stayed in hospital for 6wk in the postnatal period where she was treated for prematurity. WOF questions will help you in the diagnosis?

A. asking when supine to prone
B. asking when she socially smiled
C. h/o of prolonged jaundice
D. when his older brother sat unsupported
E. family hx of epilepsy

5

14 month baby who has history of roll over on 4 month, sitting without support from 8 month , claps hand, plays peak a boo, now has started walking without support, moves things from one hand to other , babbling but no words. This is?

A. normal development
B. Gross motor delay
C. Fine motor delay

D. Social delay
E. Speech delay

6

A mother presents her 10 month old infant. The infant was on the 50th percentile for weight and height on birth with head circumference at 25th. At 10 months the height & weight are still at 50th percentile & head circumference is at 75th percentile now. On examination child is hypotonic with open large anterior fontanelle. WOF will help establish the most likely Dx?

A. Head CT ✓
B. Head US
C. TSH ✓
D. CMV serology
E. Rubella Serology

Causes of large fontanelles & delayed closure: Achondroplasia, Congenital hypothyroidism, Down syndrome, rickets, Raised ICP

7

A male infant has following measurements recorded in his infant welfare book.

Age	Birth	6 weeks	3 months	6 months
Head circumference	35cm	39cm	43cm	45cm

His parents are concerned that his head looks too big. His general development has been normal. WOF is the best course of action?

A. Reassure the parents
B. Monthly monitoring of head circumference
C. Brain CT
D. Brain MRI
E. Refer to neurosurgeon

8

Mother presents with 2yo son complaining of poor appetite. On questioning she tells that he is very well with no past history of illness & he has plenty of energy. His general development is normal & he has had no vomiting or diarrhoea but the single bowel motion he passes each day is loose. WOF would be the most appropriate next step in Mx?

A. Arrange a stool specimen to exclude giardiasis
B. Plot his current height & weight on percentile charts
C. Suggest he remain at the table until food served is eaten
D. Prescribe a small dose of iron mixture as an appetite stimulant
E. Suggest that he be given just the food that the mum knows he enjoys

9

2 yo who attends day care 4days a wk is brought to see you by his mum who is worried about his poor appetite, frequent URTI & poor energy levels. P/E reveals no abnormality. He is on 25th percentile for height, wt & head circumference. Ix shows

- Hb 143g/l
- WCC 5.5 x 109 /L
- Serum Na 143mmol/L
- Serum K 4.4mmol/L
- Serum Cl 107 mmol/L
- Blood Glucose 5.8 mmol/L
- LFT normal
- Serum Iron 5 µmol/L (10-33)
- Serum Ferritin 41 µmol/L

WOF is the most appropriate management?

A. Remove from day care
B. Reassure
C. Refer to immunologist
D. Commence iron supplements
E. Coeliac disease serology

Serum iron is the iron content of the blood at the time when the blood was being drawn. this can fluctuate. ferritin is the level of ferritin in the blood, and ferritin itself is an iron storage protein in the body tissues. Ferritin can also fluctuate as it can be raised in inflammatory responses.

10

Mum brings a 2 yo son to the clinic. She is concerned that her child has stopped growing. Child is on the 50th centile for height & weight & previous records who he has remained on this growth curve for height & wt. You notice his height hasn't changed from 3 mos ago. WOF is the most appropriate next step in Mx?

A. Reassure mum & review in 3mos
B. Order growth & hormone studies
C. Order bone films of hand & wrist
D. Order thyroid studies
E. Advise the mum to increase child's caloric intake

11

An 8wo baby girl is brought to GP for advice regarding timing of commencement of routine vaccinations. She was born prematurely at 32-weeks gestation, birth weight 1665g. she has respiratory distress requiring supplemental oxygen for one week. She is now healthy with a weight of 3kg. WOF is the appropriate advice on the timing of commencing vaccinations?

A. Now
B. In 4 weeks
C. In 8 weeks
D. When weight >4kg
E. When weight >5kg

12

8 weeks premature infant At 10 months brought in by parents because his development seems to be delayed: can roll over but can't sit propped up. He was in hospital for 6 wks after birth and also his prematurity was due to maternal PIH. His centiles on corrected scales are 3% height, 20% wt(cant remember that well).How can this delay be explained.

A. normal due to 8 weeks prematurity
B. Cerebral Palsy
C. Duchenne muscular dystrophy
D. Spinal muscular atrophy

Helpful Links

https://www.health.gov.au/sites/default/files/documents/2021/10/national-immunisation-program-schedule-for-all-people.pdf

https://www.childrens.health.qld.gov.au/wp-content/uploads/PDF/brochures/personal-health-record-booklet.pdf

NEONATOLOGY

Apgar score

- Apgar score – a score to check the wellbeing (esp. respiratory distress) in a newborn

Sign	0	1	2
Appearance	Blue and pale	Body pink, limbs blue	All pink
Pulse	Absent	Less than <100	More than >100
Grimace	No response	Grimace	Coughing and crying
Activity	Limp	Weak	Strong
Respiration	Absent	Irregular and slow	Good, crying

- Scoring
  - 7 – 10: Well
  - 4 – 7: Needs assistance
  - 0 – 3: Severe cardiorespiratory depression

• 1 minute + 5 minutes

9 9
7 10
7 7

Common presentations in neonates include the following.

- Respiratory Distress
- Jaundice ✓
- Congenital Heart Defects ✓
- Bowel Obstruction ✓
- Infections ✓

→ urine later

Newborn screening

Newborn Bloodspot Screening

"Heel Prick Test"

- Aimed to screen for rare but serious genetic and metabolic conditions.
- Blood sample is taken from the neonate's heel within 48-72 hours after birth.
- Conditions screened includes
  - Congenital hypothyroidism
  - Cystic fibrosis
  - Galactosemia
  - Phenylketonuria (PKU)
  - Congenital Adrenal Hyperplasia
  - Other genetic and metabolic conditions

Vision and Hearing Screening

- Hearing screen is conducted for all newborn babies in their first few weeks of life. Usually completed at the mothers bedside while the baby is asleep in hospital or at outpatient.
- Significance
  - Hearing loss may not be obvious in the first few weeks of life
  - Without a hearing screen, a baby with hearing loss is often not diagnosed until at least 1yo, sometimes up to 3yo.
  - This is past the critical period for speech and language development.

Hearing → speech & language

  - Children with hearing problems is at much higher risk of language, social and academic delays and impairments later in life.
- Causes of newborn hearing loss
  - TORCH infections
  - Measles and mumps
  - Recurrent otitis media
- Vision screen/Red reflex should be checked in the first few weeks of life for retinoblastoma.

↳ Fundoscopy



(-) Red Reflex

Sudden Infant Death Syndrome (SIDS)

- Major cause of death in infants between 1-12 months (peak incidence 4 months)
- Unknown pathogenesis. Investigation from the coroner is essential to identify possible causes. **Only if there is no identifiable cause, SIDS can be the cause of death.**
- Risk factors
  - Prone position
  - Smoking of the carer
  - Pre-maturity <32wks
  - Boys
  - Hyperthermia or excess warmth
  - Soft bedding
  - sleeping with family in same bed

RECALLS - GROWTH AND DEVELOPMENT

1

A 15 month old child is brought to you by his parents. He was born at 36 weeks by normal vaginal delivery and his birth weight was 2500 gms. At 8 months a mother and child health centre test for hearing was done, which was normal. The parents say that he babbles but does not speak any words yet. On P/E, the child appears normal. What will you suggest?

A. Reassure the parents that this is a normal variant
B. Reassess at 18 months
C. Repeat mother child test for hearing
D. Arrange for audiometry testing

2

Neonate found apnea in sleeping brought by parents to ER. On PE, no HR, apnea, with no bruises. His death is pronounced. WOF is the next step?

A. Mention on his death paper as cot death (sids)
B. Inform child protection service
C. Refer him to forensic autopsy
D. Call the coroner — first call coroner and notify police then autopsy done
E. Arrange funeral for neonate instead of parents

3

Regarding Sudden Infant Death Syndrome (SIDS), which of the following statements is correct?

A. Positioning a baby prone (on its front) to sleep may reduce the risk
B. The incidence is greater in female infants
C. Maternal smoking has not been shown to be a risk factor
D. Breastfed infants are at greater risk
E. Infant overheating may be a risk factor

ENDOCRINE AND METABOLIC CONDITIONS

Newborn Bloodspot Screening

Hypothyroidism

- Commonly presents by the finding of an elevated TSH detected on the Newborn Screening Test taken at 48-72 hours
- Cause
  - Congenital
  - Auto-immune disease
  - Mother's diet and medication Hx can be key
- Clinical Features
  - Hypothermia, bradycardia, FTT, dry skin
  - Listlessness
  - HEENT – **Large anterior fontanelle**, Puffy face, prominent tongue, hoarse cry
  - Neck – goitre
  - GI – constipation, umbilical hernia
  - Skin – dry, jaundice (due to unconjugated hyperbilirubinemia)
- Inx
  - T4 and TSH levels
  - serum bilirubin (SBR) if clinically indicated
  - thyroid scan (showing absent, lingual or increased uptake of radioisotope)
- Mx
  - Referral to Endocrine team
  - Thyroxine replacement therapy ASAP
  - Close monitoring of growth and development
  - Hearing test should be done
  - Prognosis is usually normal intellectual and physical development if Tx is commenced promptly and monitored closely

Cystic Fibrosis

- Most common genetic disorder – Autosomal recessive. Heel prick test detects 90% of cases.
- Cause – Defect in ion channel protein CFTR
  - Cl ions transport affected
  - ↓Na & Water transfer
  - Viscid secretions effecting lungs, pancreas, gut
- Clinical Features
  - FTT (failure to thrive)
  - Resp – Chronic lung disease, cough, recurrent pneumonia, bronchiectasis
  - GI – Steatorrhea, pale bulky stools, jaundice, meconium ileus, rectal prolapse
  - Genital – Infertility in males: vas deferens atrophy
  - ↑sweat Cl: Hyponatremic hyperchloremic metabolic alkalosis
  - **Triad – FTT, Cough and repeated chest infections, diarrhoea**
- Inx
  - Immunoreactive assay – this measures serum trypsinogen & tests for 12 CF gene mutations

- If >2 mutations refer to CF clinic
- If one mutation then do **sweat chloride test**
  - Sweat chloride +ve → refer to CF clinic
  - Sweat chloride -ve → healthy carrier

- Management
  - Non-curable. Symptomatic treatment and preventive measures.
    - Nutrition: high fat and high protein
    - Salt supplementation and pancreatic enzymes
    - Pulmonary care: PT, bronchoalveolar lavage, Tx infections therapeutic & prophylactic.

Galactosemia

- Metabolic abnormality where the body isn't able to metabolise galactose to glucose. Autosomal recessive. 1/60000 births.
- Clinical Features
  - Jaundice and anorexia withing the first few days or weeks of life, after taking breast milk or lactose containing formula. (lactose is the main source of galactose)
  - Bilateral cataract
  - Drowsiness due to hypoglycaemia. Can be rapidly fatal
- Dx is with Newborn bloodspot screening test. Inx can include Total and Direct Bilirubin.
- Mx
  - Lactose free formula with added soy and calcium
  - Family screening
  - Ophthalmologic consultation

Obesity and FTT

Obesity

- Obesity in childhood can increase the risk of adult obesity
- Causes –nutritional or endocrine

FTT (Failure To Thrive)

- Poor weight gain in <5yo; Weight less than 3rd percentile on 2 separate occasions. However, it is important to consider contextual issues.
- **Growth chart plotting is useful in screening but does not give a definitive diagnosis.**
- Causes – multifactorial, including biological, psychosocial an environmental factors.

Inadequate caloric intake (most common)	• Inadequate amount of food provided • Breastfeeding issues • Physical reasons baby can't feed (cleft palate) • Persistent vomiting • Chronic disease causing anorexia
Inadequate absorption	• Coeliac disease • Chronic liver disease • Pancreatic insufficiency (CF)

	• Chronic Diarrhoea
Excessive caloric Utilisation	• UTIs • Chronic Respiratory disease (severe asthma, bronchiectasis) • Congenital Heart Disease • DM • Hyperthyroidism
Medical Causes	• Genetic Disorders • Errors of Metabolism
Psychosocial Factors	• Parental neglect • Coercive feeding(feeding becomes a battle) • Distraction at meals time • Poverty • Behavioural disorders • Poor social support • Neglect and abuse

[Causes of FTT]

- Evaluation
  - Hx and PE
  - Inx
    - FBE/CRP, UCE/LFT, iron studies
    - Urine MCS
    - Coeliac Screen if on solid with gluten
    - Stool for fat globules and fatty acid crystal
- Management
  - **Watch child feed**
  - Consultation with MCHN (maternal and child health services)
  - Community based resources – general paediatrician, MCHN, General Practitioner, dietician, lactation consultant, speech pathologist and psychologist.
  - **Children should be hospitalised when there is evidence of neglect or severe malnourishment.**

Short and Tall Stature

Short Stature

- Below the 3rd percentile
- Causes
  - Familial short stature
  - Constitutional delay in maturation
  - Pathological causes e.g. Coeliac disease, Crohn's disease, chronic kidney failure, hypopituitarism, GH deficiency

Familial short stature	Constitutional delay in maturation
Bone age = Chronological age	**Bone age < Chronological age**

- Inx
  - **Bone age X-ray (left hand wrist).**

- If the growth velocity is <25th percentile for bone age, then further tests are indicated.
  - TFT
  - Hb and ESR (IBD).
  - KFT and urinalysis.
  - Serum Ca, Ph, ALP
  - Coeliac disease tests (antiendomysial Abs)
  - Chromosomes (all short girls) regardless of features
  - Growth hormone (GH) studies – exercise test and Glucagon stimulation test

pathological causes

- Mx
  - **Growth Hormone therapy** indicated for height <1st percentile; GV <25th percentile; bone age <13.5 yo (girls) or <15.5yo (boys)

no other abnormalities

Tall Stature

- Above the 97th percentile
- Causes
  - Familial tall stature
  - Precocious puberty
  - GH excess (pituitary gigantism)
  - Hyperthyroidism
  - Syndromic: Marfan, Klinefelter, XYY males, homocystinuria

= early puberty

Familial tall stature	Precocious puberty
Bone age = Chronological age	**Bone age > Chronological age**

Family trend

maturity

Puberty

Delayed puberty

- No pubertal changes by 13-14yo in females; 15yo in males
- Bone age < Chronological age
- Causes – check the gonadotropins

Serum Gonadotropin normal or ↓	• Constitutional delay • Chronic illness/poor nutrition • Endocrine causes: Hypopituitarism, Kallman syndrome (hypogonadotropic hypogonadism and anosmia), Hyperprolactinemia
Serum Gonadotropin↑	• primary gonadal failure: Genetic abnormality = Turner (one x chromosome- short stature and infertility), Klinefelter (XXY- infertility, low testosterone and breast tissue in males) • Gonadal destruction

Slow starter

pituitary → hypothalamus → Gonads

Gonadotropin ↑ → Gonad → Hormones

- Inx

Sexual hormones

  - FSH, LH, Testosterone or Estradiol; serum Prolactin; other pituitary function tests (e.g. GH studies)

  - FBE, ESR, UCE
  - TFT
  - Chromosomes
  - Bone age
- Mx
  - Referral to a specialist
  - Testosterone in boys, estradiol in girls may be used
  - Excess or too early use of sex hormones for pubertal management will result in stunting of final height
  - **Growth hormone therapy** may be offered to girls with Turner's syndrome

Precocious (Early) Puberty

- Appearance of true puberty by 8yo in girls, 9.5yo in boys. 4x more common in girls.
- Bone age > Chronological age
- Causes
  - Hypothalamic hamartoma
  - CAH
  - Adrenal, ovarian or testicular neoplasms
  - Familial
  - Tumours secreting HCG
- Inx
  - FSH, LH, testosterone, estradiol
  - Bone age
  - MRI of cranium
  - Beta hCG (if indicated)
  - Pelvic and testicular U/S
- Mx
  - Refer to endocrinologist

Note: In isolated breast development (premature thelarche) in girls <8yo and isolated pubic hair growth (premature adrenarche) in children <8yo is a normal variant, if they have no features or virilisation or oestrogenisation.

RECALLS - ENDOCRINE AND METABOLIC CONDITIONS

1

6 wk old infant seen due to irritability & difficulty feeding, wanting to feed every hour & a half. He's breast fed but gaining only 60g/wk. He's not had any vomiting & his bowels open every 2nd day & are curdy greenish-yellow. O/E he's alert & looks hungry but scrawny. Rest of examination is normal. WOF would be most appropriate next step in Mx?

A. Test his stools for reducing substances
B. Supplement his feeds with soy formula
C. Suggest that his mother abandon breast feeding
D. Supplement his feeds with cow milk based formula
E. Arrange for a series of test feeds in a parent baby unit

2

Mother presents with 2yo son complaining of poor appetite. On questioning she tells that he is very well with no past history of illness & he has plenty of energy. His general development is normal & he has had no vomiting or diarrhoea but the single bowel motion he passes each day is loose. WOF would be the most appropriate next step in Mx?

A. Arrange a stool specimen to exclude giardiasis
B. Plot his current height & weight on percentile charts
C. Suggest he remain at the table until food served is eaten
D. Prescribe a small dose of iron mixture as an appetite stimulant
E. Suggest that he be given just the food that the mum knows he enjoys

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3

2 yo child with persistent day time & night time cough over many months. His wt is on the 10th centile & height on 25th centile. O/E his chest has generalised wheeze & coarse crepitations. Previous weight centiles were on 90th at birth & 40th at 1 yr. He's developmentally normal. WOF is the most appropriate course of action?

A. Prescribe a course of oral amoxycillin
B. Commence chest physiotherapy
C. Order antigliadin antibodies
D. Order a sweat electrolyte test
E. Prescribe a course of inhaled steroids

CF
1. FTT 2. Cough + infection
3. diarrhea

FTT
huge decline in weight

4

2 yo child presents with day time & night time cough. His wt is on 10th centile & ht on 25th centile. He was on 90th centile for wt at birth & on 50th centile for wt at 1yo. O/E of his chest there is generalised wheeze & coarse crepitations. He is developmentally normal. WOF is the most appropriate diagnostic test?

A. Bronchoscopy
B. Inspiratory & expiratory films
C. Pulmonary function tests
D. Duodenal or small bowel biopsy
E. Sweat chloride estimation

CF.

5
4mo baby has Hx of frequent sloppy & bowel motions since birth with poor wt gain. He was born by forceps delivery at 39wks gestation after a normal pregnancy. Birth wt was 3125 gm. He had no neonatal problems & remains fully breast fed.
O/E his wt is 5225gm (<3rd centile) length 60cm (10th centile). P/E reveals no abnormality. Feces examination: 1+ fat globules, no organisms. WOF is the most appropriate next investigation?

A. Screening antibodies for coeliac disease
B. Colonoscopy
C. Small bowel biopsy
D. Assay of breast milk quality
E. Sweat chloride

CF

6
2 yo child presents in the ED with rectal prolapse. Parents say he had been suffering from abdominal pain on & off. Previously he suffered from an URTI. His records show his height & weight at 25th centile. WOF will help you in establishing the Dx?

A. Duodenal biopsy
B. Antigliadin antibody
C. Sweat chloride test
D. stool microscopy & culture

7
An infant aged 2 weeks is noted to be vomiting and losing weight and has recently become jaundiced. The mother states that her first infant had similar symptoms and developed bilateral cataracts. Which one of the following is the most likely diagnosis?

A. Neonatal diabetes mellitus
B. Galactosemia
C. Rubella embryopathy
D. Congenital glaucoma ✓
E. Neonatal hepatitis ✓

8
Pubertal sign in females include a growth spurt, development of pubic & axillary hair, breast bud enlargement & onset of menstruation. WOF signs of puberty should be expected during observation in a 9yo girl?

A. Growth spurt as reflected by an inc in height
B. Development of pubic hair
C. Development of axillary hair
D. Enlargement of breast buds
E. Onset of menstruation

Girls top → bottom

9
Mum brings 13yo son to clinic concerned that he is not developing like his older brother. Asks if he is reaching puberty yet? WOF is the earliest signs of puberty you would expect in assessing whether his puberty has commenced?

A. Growth of pubic hair
B. Growth of axillary hair

guys bottom → top

C. Penile enlargement
D. Testicular & scrotal growth
E. Deepening of voice

10

15 yo boy presents with concerns regarding his short stature. He has been previously healthy. His parents & siblings are of average height. O/E weight is 43.5 kg (1st – 3rd centile) height 154 cm (<1st centile) & BP 100/60 mmHg. Both testes measure 3ml in size, his genitals & pubic hair are at Tanner stage 1. His bone age corresponds best with 12yrs. P/E is otherwise normal. WOF is most appropriate Ix?

A. Plasma growth hormone after exercise
B. Karyotype
C. Antiendomysial & tissue transglutaminase assay
D. Testosterone & gonadotrophin levels
E. CT of head

11

Pubertal events occur in a sequential manner. Knowledge of these events is useful in determining parental concerns about abnormal development. WOF progression of events is correct?

A. Breast budding, pubic & axillary hair, acceleration of growth
B. Acceleration of growth, breast budding, pubic & axillary hair
C. Breast budding, acc of growth, pubic & axillary hair
D. Pubic & axillary hair, acc of growth, breast budding
E. Acc of growth, pubic & axillary hair, breast budding

12

Mother brings her 16 yo daughter. She is a ballet dancer. She has not started menstruating yet unlike many of her class mates. O/E Breast bud is enlarged to Tanner Stage 2. Other P/E also corresponds to Tanner Stage 2. WOF is your next step in Mx?

A. USG
B. FSH/LH
C. Diet program
D. Reassure
E. TFT

13

13.5 years old boy is the smallest player of his soccer team, his parents are an average height. On P/E his testes measure <2.5cm in size and there is hardly any pubic and axillary hair growth. X ray of left wrist shows bone age is 11.5 years old, what is the Dx?

A. constitutional delay
B. precocious puberty ✗
C. delayed pubertal growth due to endocrine abnormality ✗
D. familial short stature ✗

14

A 7 year old child with short stature presented to you. You examined that he has normal growth velocity but bone age is equivalent to chronological age. WOF is the likely diagnosis?

A. Familial short stature
B. Constitutional delay in growth & puberty
C. Coeliac disease
D. Hypothyroidism
E. Chronic kidney disease

GENETIC CONDITIONS

Common Generic Diseases

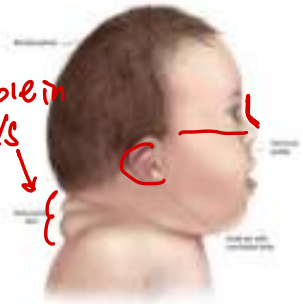
Multidisciplinary Team

Down Syndrome (Trisomy 21)

- The most common chromosomal disorders and cause of intellectual disabilities. Associated with advanced maternal age.
- Clinical Features
  - Flat facial profile, up slanted eyes and low-set ears
  - Extra neck folds → Down Syndrome Screening
  - Single palmar crease
  - General hypotonia = floppy babies
  - Intellectual disabilities
- Cxn
  - Atlantoaxial instability
  - Duodenal atresia → imperforated gut.
  - Hirschsprung disease, imperforated anus
  - Congenital heart disease – most commonly AS canal
  - Increased risk of ALL, hypothyroidism and early-onset Alzheimer's
- Children with Down Syndrome are able to have a healthy and happy life with proper support and care.

40yo 1/100
mum 35yo ≤ 1/500
"





visible in U/S

ASD
VSD
AVSD

Dx - karyotyping

Edwards Syndrome (Trisomy 18)

- Clinical Features
  - Rock-bottom feet, low-set ears
  - Micrognathia
  - Clenched hands (overlapping 4th and 5th digits)
  - Death usually occurs within the 1st year of life

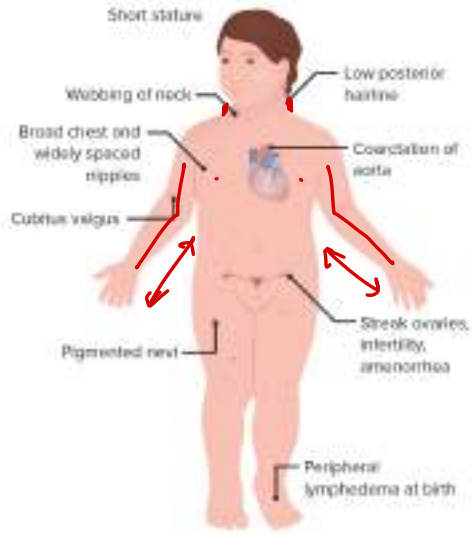
• genetic defects
1st common reason of miscarriages in the 1st trimester

Turner Syndrome

- Sex Chromosome abnormality, where 1 X chromosome is missing (45, XO).
- Not associated with advanced maternal age.
- Most common presentation is 1° amenorrhea.
- Clinical Features
  - **Short stature**
  - **Webbed neck**
  - Widely spaced nipples
  - Coarctation of Aorta
- Cxn
  - Lymphedema of hands and feet in the neonate period

XO
XY

"
no periods



Klinefelter Syndrome

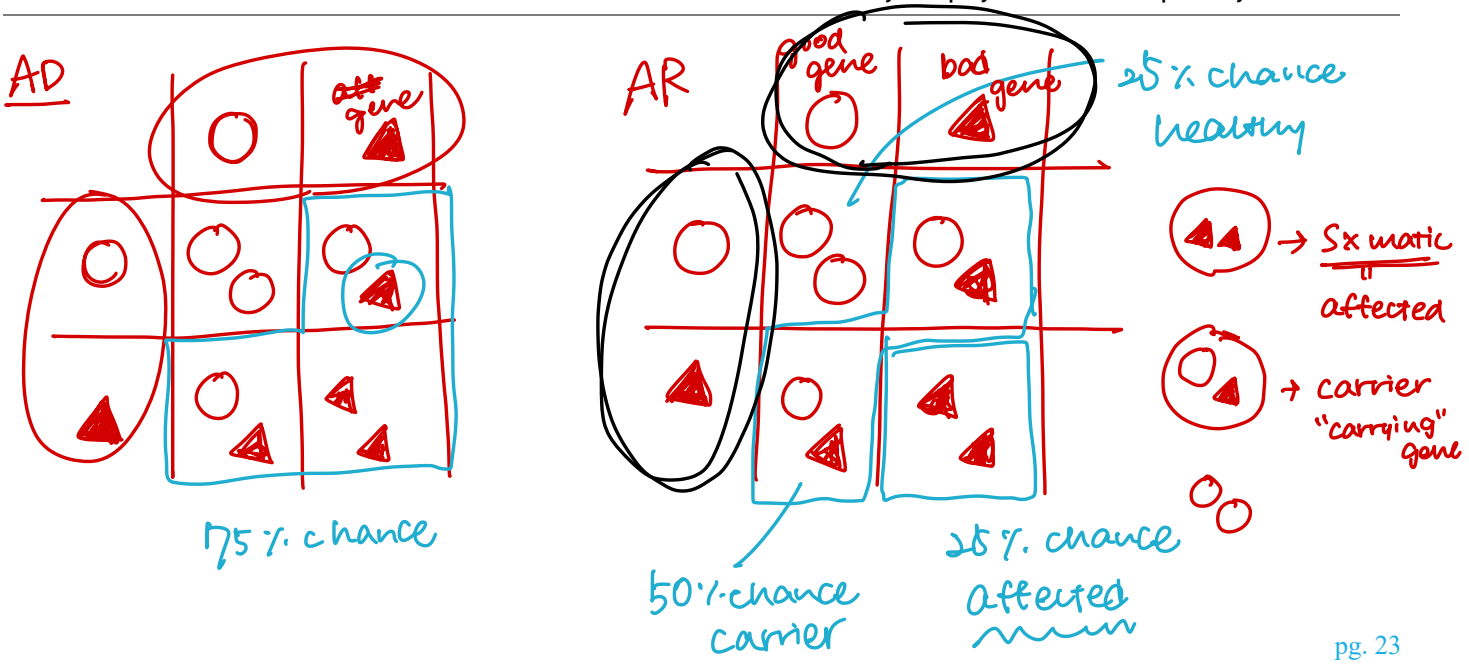
- Sex Chromosome abnormality, where an inactivated X chromosome is present (most commonly 47, XXY)
- Associated with advanced maternal age.
- Clinical Features
  - **Tall stature with long extremities**
  - Gynecomastia, female hair distribution
  - Testicular atrophy, hypogonadism
- Mx
  - Testosterone – prevents gynecomastia and improves 2° sexual characteristics

Marfan Syndrome

- Mutation or defect in the gene that produced fibrillin-1. Affects the connective tissues of the body.
- Autosomal Dominant.
- Clinical Features
  - **Tall stature with long extremities**
  - Funnel chest/pectus excavatum, kyphosis
  - CVS – Aortic dilation, aortic aneurism, mitral valve prolapse, aortic regurgitation
  - Eye – myopia, astigmatism, lens subluxation, blue sclerae
  - ENT - Micrognathia, high-arched palate
- Mx
  - Symptomatic. Frequent monitoring.
  - Prevention of aortic conditions.

Major congenital abnormalities and hereditary type

	Autosomal Dominant	Autosomal Recessive	X-linked Dominant	X-linked Recessive
Metabolic Conditions	Marfan Syndrome MEN	Wilson Disease CAH	Fabry Disease Hunter Disease	Vit D deficiency
Other	Huntington disease		Duchenne muscular dystrophy	Fragile X Syndrome Alport Syndrome



RECALLS – GENETIC CONDITIONS

1

15 y/o presented with syncope during playing basketball at school. O/E he has hyperflexable joints. Next investigation for long term management?

A. Echo
B. ECG
C. Karyotyping
D. Joint xray

Marfan → Aorta

connective tissues

2

9 year old boy complains of having difficulties in playing sports at school. His height is at 97th percentile for his age and weight is at 3rd percentile. What is your next step in management?

A. Karyotyping
B. Bone scan
C. Growth hormone test
D. CT Scan
E. Cardiac ultrasound = echo

higher than 97% of the people



3

Patients with genetic disorders or those affected by specific teratogens in utero, typically have certain characteristic dysmorphic features. Match this physical description with the genetic or teratogenic abnormality: a 6yo girl with cognitive delay, a blowing systolic heart murmur, short stature, round face, bilateral trans palmar crease, up slanting palpebral fissures, small ears, and epicanthal folds.

Single palmar

A. Holt-Olaam syndrome
B. Foetal alcohol syndrome
C. Diabetic embryopathy
D. Trisomy 18
E. Trisomy 21 = Down's

4

Which of the following shows an autosomal dominant hereditary pattern?

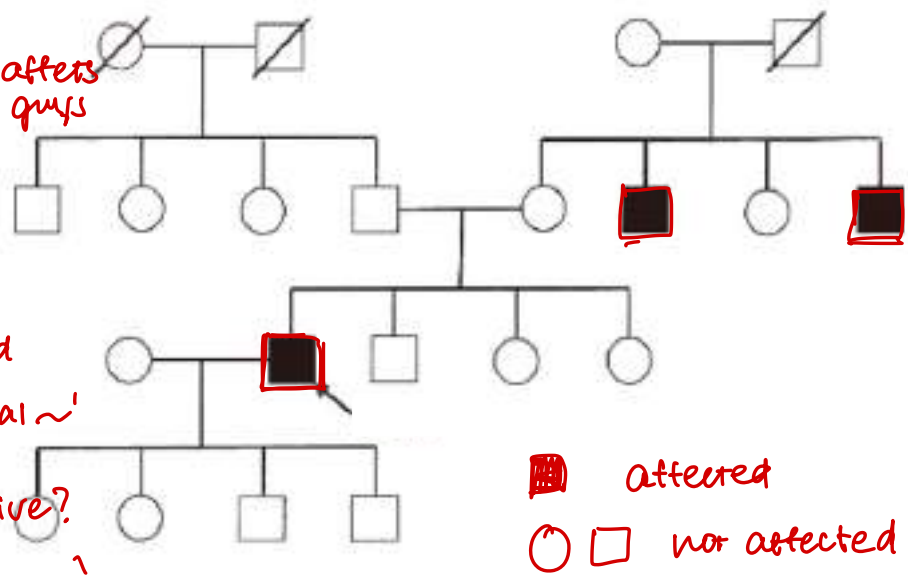
A. Duchenne Muscular Dystrophy → X-linked dominant
B. Cystic fibrosis
C. Huntington disease
D. Minor thalassemia
E. Wilson's Disease → AR

→ autosomal Recessive

5

The pattern in the figure shows?

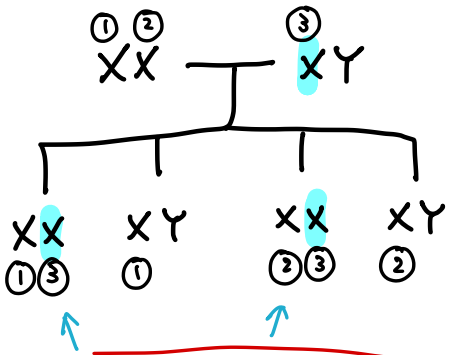
A. Y linked
B. X linked dominant
C. X linked recessive
D. Autosomal dominant
E. Autosomal recessive



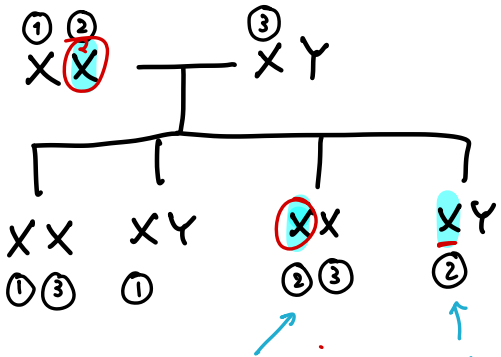
1. who is affected?
only ☐ → X-linked
both ○·☐ → autosomal

2. X-dominant? recessive?
dominates!
if not, X-link recessive

X-link recessive

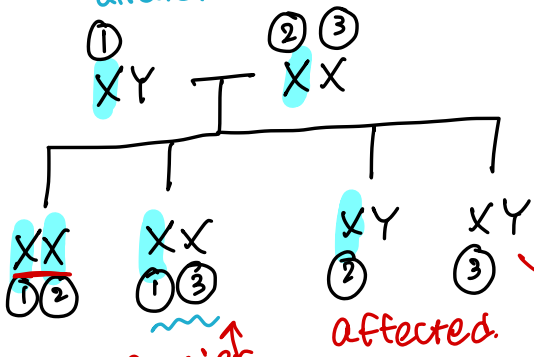


if there is 2 Xs, the other "normal" X chromosome is dominant!
→ the girls will be carriers and not affected



2 Xs → the "normal" X chromosome is dominant
⇒ this girl is NOT affected

1 X → this guy doesn't have the dominant X
⇒ he will be affected

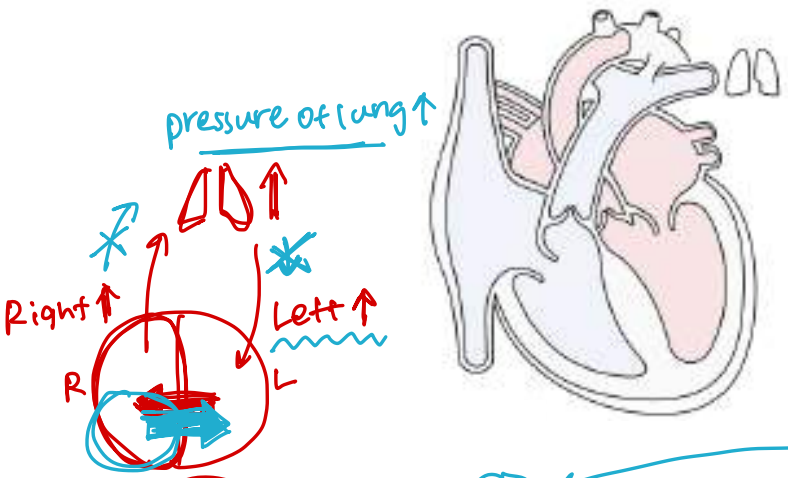


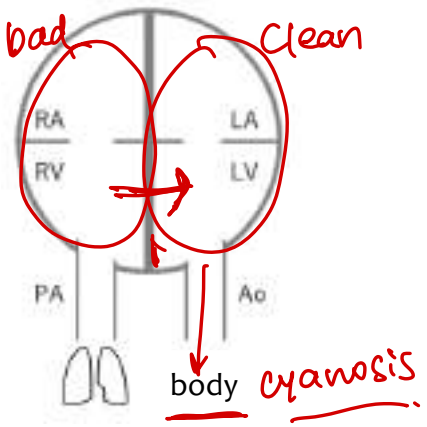
CARDIOLOGY

Congenital Heart Conditions

Common congenital heart conditions include the following.

Acyanotic conditions "pink babies"	**Cyanotic conditions "blue babies"**
L-R shunt • ASD (Atrial Septic Defect) • VSD (Ventricular Septic Defect) • PDA (Patent Ductus Arteriosus) • AVSD (Atrioventricular Septic Defect)	R-L shunt • ToF (Tetralogy of Fallot) • TGA (Transposition of the Great Arteries) – SEVERE cyanosis within the first few hours of life • Tricuspid Atresia • Total anomalous pulmonary venous return
Constrictive conditions • Pulmonary stenosis • Coarctation of Aorta	





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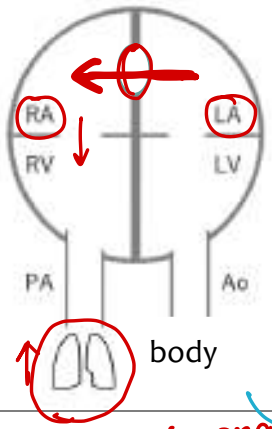
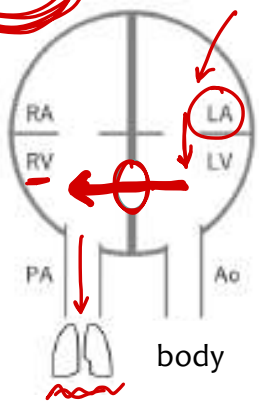
- Eisenmenger syndrome – RL shunt due to pulmonary hypertension secondary to LR shunt conditions.

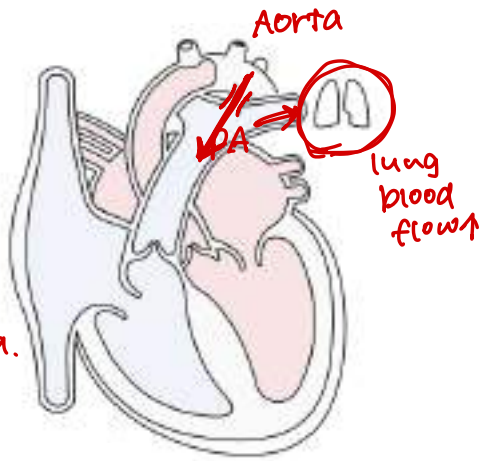
Septic Defects

	ASD	**VSD**
Patho-physiology	 1. ↑RA pressure 2. ↑RV pressure 3. ↑pulmonary blood flow	 1. ↑ pulmonary blood flow 2. ↑ LA pressure 3. ↑ LV pressure

Clinical Feature	Small defects: Asymptomatic Large defects: Recurrent respiratory infections, Easy fatiguability, FTT, CHF	Small defects: Asymptomatic Large defects: Recurrent respiratory infections from childhood, dyspnea, FTT, CHF from childhood
Ausc. Findings	• **Wide and fixed split S2** • Systolic ejection murmur at Lt upper sternal edge • Mid-diastolic rumble at the Lt lower sternal edge	• **Harsh holosystolic murmur** at Lt lower sternal border • ↑P2 • Mid-diastolic apical rumble
Dx	• ECG – Rt ventricular hypertrophy, Rt bundle block • Echo – defect and blood flow across atrial septum • Oxygen step-up in RA	• ECG – Lt ventricular hypertrophy • Echo – defect and blood flow across ventricular septum • Oxygen step-up in RV
Mx	• Most small ASD/VSDs close spontaneously. Follow up is essential. • Antibiotic prophylaxis is not routinely recommended. • Surgical repair is indicated in symptomatic patients esp. those who failed medical management and large defect patients with no spontaneous closure. • Once Eisenmenger syndrome develops, surgical repair is not indicated.	

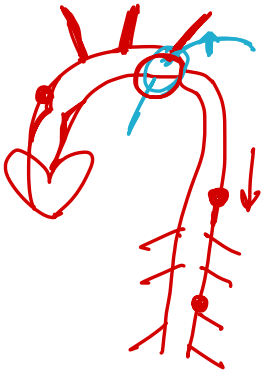
Patent Ductus Arteriosus

- Failure of the ductus arteriosus to close in the first few days of life. PDA → LR shunt → ↑ PA, LA and LV blood flow
- Clinical Features
  - Typically asymptomatic
  - Children with large defects may present with FTT, easy fatigue, recurrent respiratory infections, CHF
  - Risk Factors – pre-term babies, Congenital rubella syndrome
- PE
  - Ausc – continuous "machinery murmur" at 2nd ICS at sternal border
  - Wide pulse pressure, bounding peripheral pulses
- Inx
  - Dx with echocardiogram – colour Doppler shows blood flow from aorta to PA
  - ECG – may show LVH
  - CXR – may show cardiomegaly
- Mx
  - Indomethacin, unless the PDA is needed dur to other congenital heart defects (RL shunts.) Surgery may be needed if indomethacin fails

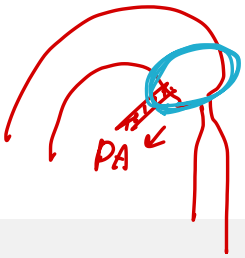


Coarctation of Aorta

- Constriction of a position in the aorta. 98% occurs just distal to the subclavian artery.

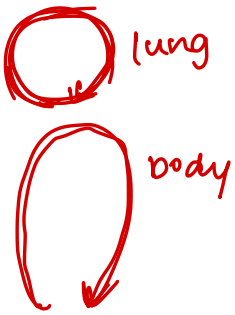


- Clinical Features
  - Asymptomatic hypertension – Systolic BP is higher in the upper extremities.
  - Lower extremity claudication
  - Syncope
  - Epistaxis and headache
  - Association with Turner syndrome, often complicates a bicuspid aortic valve.
- PE
  - Weak femoral pulses
  - **Radio-radio delay, radio-femoral delay**
  - Ausc – Short systolic murmur in the left axilla, forceful apical impulse
- Inx
  - Dx with echocardiogram
  - ECG and CXR may show signs of cardiomegaly and pulmonary congestion
- Mx
  - If there is severe CoA in infancy, the PDA should be kept open by PGE1
  - Close monitoring for complications



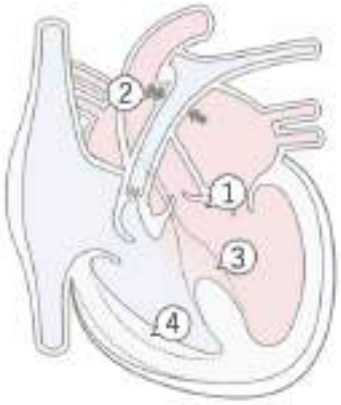
Transposition of the Great Arteries

- Most common cyanotic congenital heart condition in the newborn.
- Aorta is connected to the RV, and the pulmonary artery to the LV. Incompatible with life.
- Clinical Features
  - **Cyanosis within the first few hours of life**
  - Congenital heart failure
  - Can complicate VSD
- PE
  - Tachypnoea, progressive hypoxia, extreme cyanosis
  - Ausc – Single loud S2
- Inx
  - Dx with echocardiogram
  - CXR may show an "egg-shaped silhouette" and increased pulmonary vascular markings
- Mx
  - Commence PGE1 to maintain or open the PDA
  - Surgery is the one single ultimate treatment



Tetralogy of Fallot

- Most common cyanotic congenital heart condition in the children
- Clinical Features
  1. Shifting of the aorta
  2. Pulmonary valve stenosis
  3. Ventricular septic defect
  4. Right ventricular hypertrophy
  - Cyanosis is absent at birth but develops over 2-3yo. CHF may develop at ~~4~~ 6 mo.
- PE
  - Progressive hypoxia, cyanosis later in life



- Ausc – systolic ejection murmur at Lt upper sternal border, right ventricular heave, single S2
- Inx
  - Dx with echocardiogram and catheterization
  - CXR show a "boot-shaped heart"
  - ECG may show right axis deviation and RVH
- Mx
  - If symptomatic in infants, commence PGE1 to maintain the PDA
  - Temporary palliation by artificial shunt (Blalock-Taussig Shunt), then definitive treatment by surgical repair of VSD and pulmonary valve stenosis.

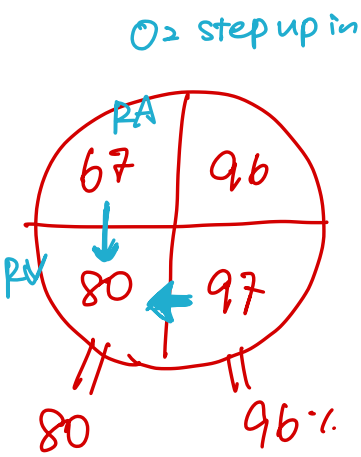
RECALLS – CARDIOLOGY

1

A 6mo infant with systolic murmur and FTT has a cardiac catheterisation for possible CHD. The following oxygen saturations were obtained with the infant breathing air. WOF is the most likely Dx?

Oxygen saturation

- Right Atrium 67% (67)
- Right Ventricle 80% (69)
- Pulmonary Artery 80% (69)
- Left Atruim 96% (>95)
- Left Ventricle 97% (>95)
- Aorta 96% (>95)



A. ToF
B. ASD
C. PDA
D. VSD
E. TGA

2

A 5yo girl was found to have a cardiac bruit when she presented with an URTI. When reviewed the following week, the murmur is still present and grade 2-3/6, mid-systolic in timing, maximal at the Lt upper sternal edge. WOF associated features would suggest that her murmur is most likely of an organic origin warranting investigation?

A. Her infant brother has Down Syndrome ✓
B. A mid-diastolic murmur is also present
C. Her pulse rate increases when she takes a deep breath. ✓
D. Her hands and toes go blue after she has been swimming. ✓
E. She has had five URTIs in her first year at school/kindergarten. ✓

Murmur
↓ innocent
↓ pathological

12/yr. → 8/yr.

3

A 18mo girl is brought to your GP by the parents for routine check-up. This is the first time your are seeing her. Mum had an uneventful pregnancy and has had no major medical problems so far. O/E, you hear a cardiac murmur. WOF suggests that this is an innocent murmur?

A. The murmur is associated with a thrill
B. The murmur is pansystolic = holosystolic.
C. The murmur is associated with reduced exercise tolerance
D. The murmur is diastolic
E. The murmur increases when the child is positioned supine

The 7 S of innocent murmurs

1. Sensitive (changes with child's position or with respiration)
2. Short duration (not holosystolic)
3. Single (no associated clicks or gallops)
4. Small (murmur limited to a small area and nonradiating)
5. Soft (low amplitude)
6. Sweet (not harsh sounding)
7. Systolic (occurs during and is limited to systole).

4

1 yo child growing well , good feeding , stand with assistance , sits unsupported , say some sound like mama. O/E, he had a systolic murmur. WOF is the appropriate action?

A. Refer him to paediatric cardiologist
B. Reassure her
C. Send for urgent echo
D. Tell her that he may have a CHD

5

A neonate few hours after birth developed cyanosis which was not responding to oxygen. There is no murmur. WOF is the most likely Dx?

A. TGA
B. ToF
C. VSD
D. ASD

6

40% of children with trisomy 21 have congenital heart defects. WOF is not associated with Down's syndrome?

A. ToF
B. ASD
C. VSD
D. AVSD
E. TGA

7

A child is cyanotic, apex beat on left axillary line, loud murmur on the left sternal border. WOF is the most likely Dx?

- A. ToF
- B. ~~ASD~~
- C. ~~VSD~~
- D. ~~AVSD~~
- E. TGA

8

14 years old has clinically apparent Marfan syndrome. Which of the following cardiac murmurs would you expect to hear on cardiac auscultation?

A. Decrescendo high pitched diastolic murmur at left sternal edge –(aortic regurg in Marfan synd)
B. Midsystolic ejection murmur at 2nd right intercostal space- HOCM and AS
C. Low pitched rumbling diastolic murmur at the apex – ~~aortic regurg~~ (Austin flint) ???
D. Pansystolic murmur at left sternal edge with no radiation - VSD
E. Continuous machinery murmur at 2nd left intercostal space- PDA

GASTROENTEROLOGY

Overview of Conditions

Jaundice	• Physiological jaundice • Biliary atresia • Kernicterus
Malabsorption	• Coeliac disease • Lactose intolerance • Cow's milk protein allergy • Toddler's diarrhoea
Constriction and obstruction	• Oesophageal atresia • Pyloric stenosis • Duodenal atresia • Congenital small bowel atresia • Hirschsprung disease • Imperforated anus
Vascular/Circulation	• Necrotizing enterocolitis • Malrotation/Volvulus • Intussusception
Hernias	• Bochdalek hernia = Diaphragm hernia • Umbilical hernia • Inguinal hernias (Indirect)
Malignancies	• Neuroblastoma • Hepatoblastoma • Wilms Tumour
Other	• Gastroesophageal reflux • Infantile Colic • Constipation/Encopresis

Jaundice

in neonates
- pathological
- physiological

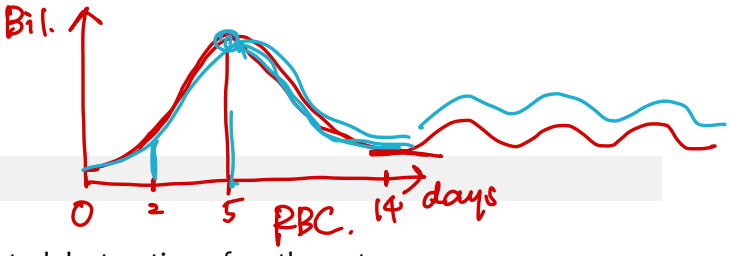
dehydration in baby

Dx of exclusion

RBC → ↑unconj Bil → liver → ↑conj Bil

	-24hrs	2days – 2wks	2wks-
↑unconj Bil	▪ Haemolysis (eg. blood group incompatibility)	▪ Physiological jaundice ▪ hematomas	▪ Breastmilk jaundice ▪ Congenital hypothyroidism
↑conj Bil	▪ Infections (eg. TORCH)	▪ Metabolic conditions (eg. Galactosemia)	▪ Biliary atresia ▪ Neonatal hepatitis

Jaundice within 24 hrs of life and elevation in conjugated Bil is always pathological



Physiological Jaundice

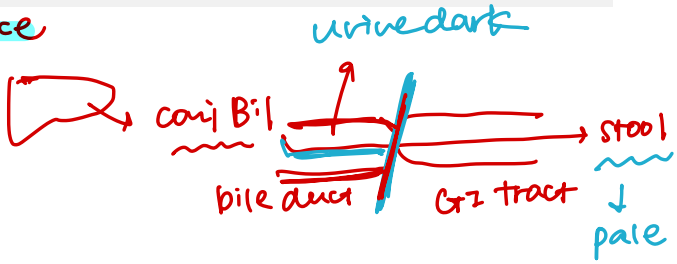
Dx of exclusion

- Cause due to;
  - Increase in bilirubin production 2° to accelerated destruction of erythrocytes (RBC.)
  - Delay in clearing bilirubin in immature liver
- Blood tests are conducted routinely for children who has jaundice within 14 days of life
- If no pathological cause, reassurance and follow up

Bil Total Conj Unconj

Biliary Atresia

- Atresia of the biliary duct
- Clinical Features
  - Dark urine, pale stools (obstructive jaundice)
  - Can progress to cirrhosis/liver failure
- Inx
  - Abdominal U/S – atrophy of gallbladder
  - Cholangiography – No visualization of the common or hepatic bile ducts
  - Liver biopsy is diagnostic but not routinely done
- Mx
  - Surgery within the first few months of life is critical



Kernicterus

- Bilirubin-induced neurological damage in infants, due to unconjugated Bil (brain damage)
- Clinical Features (unwell & floppy)
  - Poor feeding, hypotonia, drowsiness, dental dysplasia
  - High fever, convulsions, opisthotonos (arching of back)
  - Athetotic cerebral palsy, hearing loss
- For prevention phototherapy or exchange transfusion can be considered
  - days of birth
  - jaundice extent
  - clinical Sx

Note: In direct Bil↑ conditions, phototherapy is not indicated

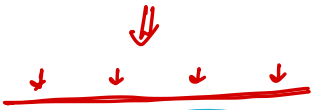
Malabsorption

Coeliac Disease

autoimmune condition
hypersensitivity of small gut to certain foods (Gluten)

- Clinical Features
  - Poor weight gain in the first 2years of life – esp. after introduction of solids (weight drop)
  - Chronic diarrhoea – greasy, stick to the pan stool (fatty)
  - Pallor due to iron deficiency anaemia (IDA)
  - Anorexia and abdominal distension
  - Apathy and other behavioural changes
  - Associated conditions – **Type 1 DM**, Addison disease, Downs syndrome
- Inx (Hb. W BC. Plt)
  - FBE and iron studies – IDA
  - IgA antibody to tissue transglutaminase (Anti-TTGs)
  - Anti-endomysial antibody and antigliadin antibody tests were used previously
  - Dx – Duodenal Biopsy is gold standard. Look for villous atrophy
- Mx
  - Exclude gluten from the diet – BROW group. barley, rye, oats, wheat





Screening of Coeliac
- Abs. TTG
  - endomysial
  - antigliadin

Lactose Intolerance

- Clinical Features
  - Watery, frothy stool. Farty baby
  - Excoriation of the buttocks
  - Typically infant appears well
- Inx
  - Dx – Reducing substances in stool
- Mx
  - Breast-feeding should continue (unless severe excoriation or inadequate weight gain)
  - Formula-fed infants should be placed on a lactose-free formula (e.g. soy based)

Cow's Milk Protein Allergy

- Clinical Features
  - Non IgE mediated
  - Diarrhoea, malabsorption, FTT
  - Soy allergy may co-exist
- Inx
  - Dx is by complete thorough Hx and reactions to cow's milk protein elimination/challenge test
  - RAST and skin test not useful
- Mx
  - Elimination of cow's milk protein from diet

Toddler's Diarrhoea

- Clinical Features
  - Chronic diarrhoea, with undigested food particles in stool
  - Presents at 8 – 20mo
  - Child otherwise well, no FTT
- Dx of exclusion
- Mx is reassurance

Constriction and Obstruction

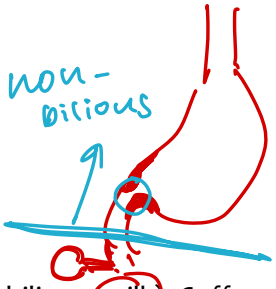
Oesophageal Atresia



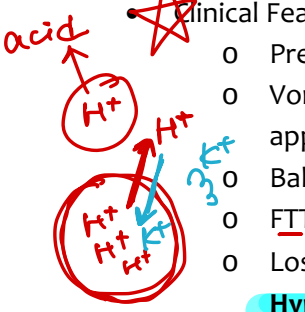
- Abnormality of separation of oesophagus and trachea during foetal life.
- Clinical Features
  - Vomiting with first feed
  - Drooling of frothy secretions from mouth just after birth
  - Cxn – malformation of the heart and urinary system
- Inx
  - Dx – Pass a 10F catheter by mouth. "Coil up sign"
- Mx – surgery

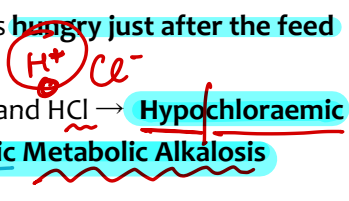


Hypertrophic Pyloric Stenosis

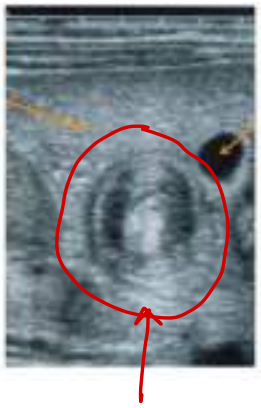


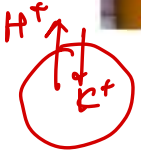
- Hypertrophy of the pyloric sphincter, leading to gastric outlet obstruction
- Clinical Features
  - Presents at 2-6 weeks of age
  - Vomiting is progressively more forceful and maybe **projectile**, non-bilious (milk). Coffee ground appearance.
  - Baby appears **hungry just after the feed**
  - FTT
  - Loss of fluid and HCl → **Hypochloraemic Hypokalaemic Metabolic Alkalosis**



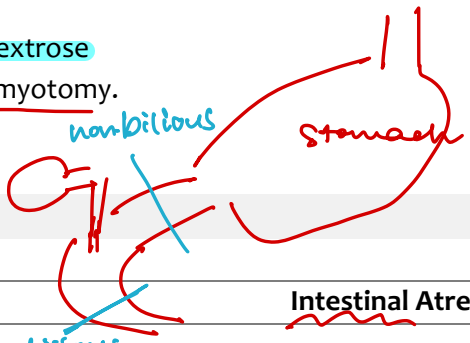








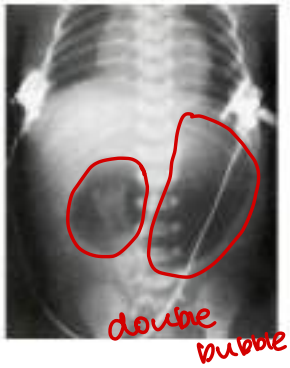
- PE
  - Assess the degree of dehydration
  - Palpable **olive-shaped mass** in the epigastrium
  - Gastric peristalsis in abdominal wall in RUQ
- Inx
  - Inx – FBE, UCE, Acid-Base
  - Dx – **1st do a test feed.** During the test feed a mass is palpable
  - If Dx is not clear on test feed, U/S can also be considered – "Doughnut sign"
- Mx
  - Admit – dehydration.
  - IV fluid replacement 0.9% NS with 5% dextrose
  - Refer to paediatric surgeon for pyloromyotomy.
  - Prognosis is excellent



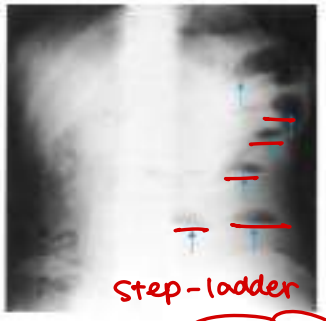
Congenital Duodenal/Intestinal Atresia

	Duodenal Atresia	Intestinal Atresia
Clinical Features	• **Often complicated with Down Syndrome** and other malformations (GI, CVS) • Vomiting – just after birth. Can be bilious or non-bilious • Abdominal bloating • Delay in first passage of meconium	• Caused by vascular insufficiency in foetal stage. Complications with genetic abnormalities and malformations are rare • Vomiting – 1-2days after birth. Bilious. • Abdominal bloating • Delay in first passage of meconium
Inx	CXR – **Double Bubble sign**	CXR – Multiple bubble sign, step-ladder sign (niveau)
Mx	NG tube to decrease pressure, Surgery	

Note: U/S during foetal stage can show hydramnios or dilation in GI tract



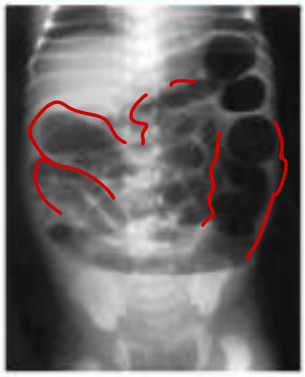




Hirschsprung Disease

- Congenital lack of ganglion cells in the distal. Uncoordinated peristalsis.
- Clinical Features
  - Constipation, bilious vomiting, and abdominal bloating within 48 hours of birth
  - Failure to pass meconium
- PE
  - Explosive discharge of stool on rectal examination
- Inx
  - AXR – dilated bowel
  - Barium enema shows narrow distal colon and proximal dilation
  - Dx is confirmed by rectal biopsy. Absence of the Auerbach plexus and Meissner plexus. AchE stain +ve.
- Mx
  - Proper defecation management with enema. This is essential to prevent perforation and intestinal necrosis
  - Tx – Two-stage surgical repair







Imperforated Anus

- Congenital abnormality where the anus is imperforated.
- Clinical Features
  - Constipation, bilious vomiting, and abdominal bloating within 48 hours of birth
  - Failure to pass meconium
  - Defaecation through fistula can occur
  - Often complicates Trisomy 21, Trisomy 18, and other malformations
- PE
  - Inspection of the anus. Dx is by PE
- Mx – surgery

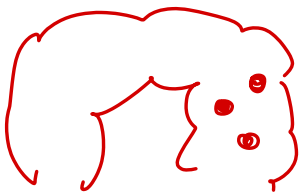


Vascular/Circulation

Necrotizing Enterocolitis

- One part of the bowel undergoes necrosis. Most commonly in the terminal ileum/proximal colon.

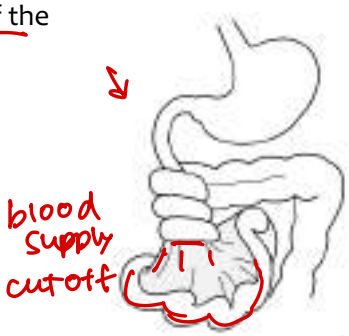
- Premature bowel is a risk factor – premature babies, low birth weight
- Clinical Features
  - Bloody diarrhoea, abdominal distension, constipation within first few weeks of life
  - Cxn
    - Intestinal perforations
    - Peritonitis
    - Shock

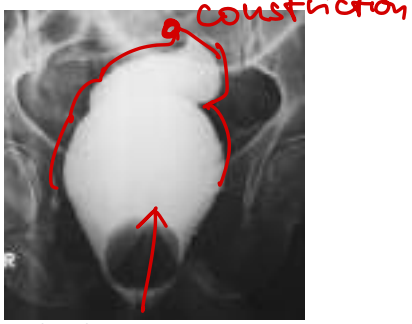


- Inx
  - FBE can show signs of DIC
  - AXR – dilated bowel loops, immature air bubbles in the bowel (gas produced from bacteria.) AXR should be repeated regularly
  - U/S
- Mx
  - NPO, NG tube for decompression
  - IV ABx
  - Correct if dehydrated
  - Perforation is an indication for surgical repair

Malrotation/Volvulus

- Congenital malrotation of the midgut, resulting in abnormal positioning of the small intestine. This leads to constriction and obstruction
- Most common GI emergency in neonates – prematurity, low birth weight, formula-fed is a risk factor
- Clinical Features
  - 80% presents within the 1st month of life
  - Bilious vomiting, abdominal distension, blood or mucous in stool
  - Can lead to shock
- Inx
  - AXR can show air-fluid levels but can also be normal
  - GI series with contrast shows "bird beak sign"
- Mx
  - NPO, NG tube for decompression
  - Emergency surgical repair

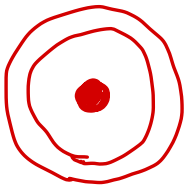


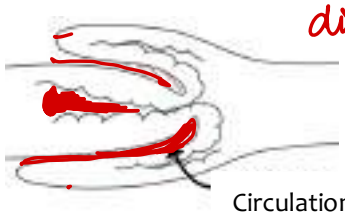


https://radiopaedia.org/cases/sigmoid-volvulus-bird-beak-sign

Intussusception

- Condition where one part of the bowel "telescopes" to another part of the bowel. Most commonly occurs in the ileocecal valve.
- Most common cause of bowel obstruction in children between 6 mo -3yo





- Clinical Features
  - Sudden, episodic severe abdominal pain
  - Knees drawn up to the chest
  - Can turn pale during episodes, but child is well in between the episodes
  - Triad – severe abdominal pain, vomiting, "red currant jelly stool" (blood and mucous in stool)
- PE
  - Abdominal tenderness
  - Palpable "sausage-shaped mass" in the RUQ
- Inx
  - U/S – "target sign"
- Mx
  - Reduction with air enema
  - If unwell or peritoneal signs, surgical repair

Hernia

Bochdalek Hernia = Diaphragmatic Hernia

- Congenital abnormality where an opening exists in infant's diaphragm. Intra-abdominal organs can herniate through the diaphragm to chest walls, leading to pulmonary hypoplasia
- Clinical Features
  - dyspnea, cyanosis just after birth
- PE
  - Chest is scaphoid shape
  - Resp – decreased lung sounds in affected side
  - Abd – Abdominal depression
- Inx
  - Most cases are found in foetal U/S
  - AXR shows gas
- Mx
  - Surgical repair



Umbilical Hernia

- Herniation of abdominal content through the umbilical region, caused by weakness of the area
- Very common. Complications are rare
- Most spontaneously close by 4yo. Surgery considered if persists.

Inguinal Hernia (Indirect)

- Herniation of abdominal contents through the inguinal canal, when it fails to close during foetal development
- The younger the child, the greater risk of strangulation
- Mx
  - If reducible "6 to 2 rule"
    - <6wk – surgery in 2 days
    - 6wk to 6mo – surgery in 2 weeks

- 6mo< - surgery in 2 months
  - If non-reducible, emergency surgical repair

Abdominal Tumours

	Neuroblastoma	Hepatoblastoma	Nephroblastoma/Wilms Tumour
Age	<3yo	<3yo	<5yo
Tumour	• Non-smooth surface • May cross midline		• Smooth surface • Never cross midline
Clinical Features	• Most common • Fever, toxic child • Bony tenderness • Periorbital ecchymosis	• Abdominal distension, mass and pain, LOW • Jaundice is rare	• Triad – haematuria+ weight loss+ abdominal mass
Metastasis	Bone, Bone marrow, Eye		Lung
Dx	Bone scan, CT	CT, MRI is considered	U/S, CT
Tx	Surgery followed by chemo and RT	chemotherapy → surgery	Nephrectomy + chemo
Prognosis	Good **if Dx<18mo**	Good	Good if detected early

Other Conditions

Gastroesophageal Reflux (GOR)

- NOT GORD. This is a common and normal presentation in infants.
- Clinical Features
  - Irritability and crying: sole manifestation
  - Vomitus: Just ingested milk
  - Vomitus may be projectile BUT NOT persistent
  - The Majority of babies continue to thrive and gain weight. FTT is uncommon
  - Cxn
    - Peptic oesophagitis. GORD → FTT, unwell
    - Peptic strictures.
    - Pulmonary complications: Persistent cough, wheeze due to aspiration
- Dx of exclusion
- Mx
  - If the baby is gaining weight ok, no more than reassurance is needed.
    - Small and frequent feeds
    - Head-up after feeds
  - If Sx persist or FTT occurs, Inx needed. - GORD
    - Inx – Barium oesophagram, endoscopy and biopsy
    - Tx – Antiacids, PPI. Surgery or severe or anatomical abnormalities.

Infantile Colic

- Clinical Features
  - 2-16 wks old
  - Prolonged crying for 3hrs/day, 3 days/wk, more than 3wks
  - Can cry anytime of the day – not associated with hunger or sleepiness
  - Flexing legs, clenching fists appears in pain
  - Otherwise well and thriving
- Dx of exclusion
- Mx
  - Reassurance
  - Can try Infacol

Constipation

- Hard stools, or failure to go to the toilet regularly
- Very common condition in children, particularly around the time of toilet training or starting solids.
- It can also become a problem after a child has had a **painful or frightening bowel movement.**
- Causes
  - Natural tendency – some children have a slow gut movement, which causes constipation.
  - Bowel habits – Ignoring the urge of passing stool
  - Holding-on behaviour – a child may begin to 'hold on' after pain or frightening experience e.g. sexual abuse
  - Change in toilet environment – such as new or undesirable school toilets
  - Diet – Low fibre such as less vegetables and fruits. Large amount of cow's milk
  - Pathological conditions – hypothyroidism, Hirschsprung, Celiac disease, IBS, Spina bifida
- Constipation can cause
  - Stomach cramps
  - Anal fissures
  - Less hunger and irritable behaviour
  - **Long-term constipation can cause encopresis**
- PE
  - Faecal mass is palpated on abdominal examination (commonly in LLQ)
- Mx
  - Immediate Mx
    - Empty the bowel with enema or strong laxatives
    - In anal fissure cases, Mx the pain first – anusol cream
  - Long-term Mx
    - Healthy diet with high fibres, reduction in cow's milk if excessive intake
    - Activities and exercise
    - Laxatives may be considered

RECALLS – GASTROENTEROLOGY

1

WOF is the most common cause of jaundice in a neonate within 24 hrs of life?

A. Haemolysis due to blood group incompatibility
B. Hereditary spherocytosis
C. Glucose-6-phophate dehydrogenase deficiency
D. Sepsis
E. Gilbert's Syndrome

2

A 1wo neonate developed severe jaundice and mother is quite concerned about the long-term risk of severe hyperbilirubinemia. WOF is not a possible consequence of kernicterus in this baby?

A. Dental dysplasia
B. Hearing deficit
C. Athetoid cerebral palsy
D. Paralysis of upward gaze
E. Hypothyroidism

3

A 20 mo baby is brought in by his parents with chronic diarrhoea and weight loss. O/E, the baby has growth retardation, muscle wasting and distended abdomen with hyperactive bowel sounds. Chest examination is clear. Lab Inx show decreased serum iron or folate levels. Pt has been on lactose-free diet without resolution of symptoms. WOF is the most likely Dx?

A. Chronic liver disease
B. Cystic fibrosis
C. Bacterial overgrowth
D. Coeliac disease
E. Primary lactose intolerance

4

A mother brings her 12mo male child to your clinic. The child has been more lethargic and pale recently. The child passes offensive stools, 5-6 times a day. He is irritable and not active as he used to be. O/E you notice mild abdominal distension. Blood test shows low Hb and low mean corpuscular volume. WOF is the most likely Dx?

A. Vit A deficiency
B. Beta thalassemia
C. Iron deficiency anaemia
D. Lactose Intolerance
E. Coeliac disease

5

A 13yo girl is brought to your office with her mother with a Hx of fatigue, poor weight gain, bloating and bouts of diarrhoea. Her mother has been giving her a gluten-free diet for the last 3mo, which improved her Sx. The mother has Hx of coeliac disease and is worried about the possibility of her daughter. WOF is the most appropriate next step to assess the pt?

A. Refer to see gastroenterologist for gastroscopy

B. Oral gluten challenge for 6mo and perform coeliac serology
C. Oral gluten challenge for 6wks and perform coeliac serology
D. Perform coeliac serology now
E. No further testing required

6

A 15yo child is brought to the ED with n/v. Inx confirmed the Dx of DKA. He is well-managed and now ready to go home, WOF is the most important Inx to consider for this pt?

A. Urine drug screen
B. Coeliac serology
C. Serum cholesterol
D. FBE
E. Nerve conduction studies

Note: Type 1 DM in a child should trigger Inx for associated autoimmune conditions such as coeliac disease and autoimmune thyroiditis even in the absence of Sx.

7

A 2 yr child is brought to you for having loose bowel motions for 3 days. The stool contains peas and vegetables for the last few days. The child is gaining weight well and has no vomiting. WOF is he most likely suffering from?

A. Cystic fibrosis
B. Coeliac disease
C. Gastroenteritis
D. Toddlers diarrhoea
E. IBS

8

WOF if present in an infant, is an indication for an urgent surgical referral?

A. Green vomiting
B. Projectile vomiting
C. Non-bile stained vomiting
D. Vomiting of ingested food
E. Vomiting without nausea

9

4 wk old baby boy presents with a 10day hx of vomiting that has increased in frequency & forcefulness. The vomitus is not bile stained but has a coffee ground appearance. The child feeds avidly & looks well but he has been losing weight. WOF is the most likely Dx?

A. Hypertrophic pyloric stenosis
B. SBO
C. GE
D. Intususception
E. Brain tumour

10

Couple presents with their 4wk old baby saying he has been vomiting since age 2 wks. Has become more severe over last 3 days occurring after every feed. They describe the vomiting as being quite forceful & he has lost 300gm of wt in 2 days. Vomitus contains milk taken in the feed & is becoming continually hungry. His urine output has reduced in last 24hrs. O/E he is active & looks scrawny & mildly dehydrated. Examination of abdomen is difficult as he is continually crying but appears normal. WOF metabolic abnormality is most commonly seen in this clinical situation?

dehydrated.

pyloric stenosis

A. Hypoxia
B. Hyperchloremic acidosis
C. Hyperkalaemia
D. Hypochloraemic Hypokalaemic Metabolic Alkalosis
E. All of the above

11

Couple presents with their 4wk old baby saying he has been vomiting since age 2 wks. Has become more severe over last 3 days occurring after every feed. They describe the vomiting as being quite forceful & he has lost 300gm of wt in 2 days. Vomitus contains milk taken in the feed & is becoming continually hungry. His urine output has reduced in last 24hrs. O/E he is active & looks crawny & mildly dehydrated. Examination of abdomen is difficult as he is continually crying but appears normal. WOF is the most appropriate next step in assessing this infant?

dehydration

A. Arrange estimation of serum electrolytes
B. Abdominal palpation during a test feed → olive-shaped mass
C. Arrange a barium swallow
D. Perform a suprapubic aspiration of his bladder
E. Arrange for a flat & erect abdomen Xray

1st — test feed

12

A mother brings her 4wo child who vomits after each feed. The child is hungry and lethargic. O/E, no epigastric mass is found. WOF is the Inx of choice to confirm the Dx?

1st already done

A. Stool culture
B. Barium meal
C. Urine analysis
D. AXR
E. U/S

doughnut sign

13

A 4wo infant is brought to the ED with Hx of projectile vomiting for last 3 days and FTT. Gastric peristalsis are visible from Lt to Rt during feeding. O/E, the infant is clinically mildly dehydrated. Blood test show low serum sodium (128mmol/L), low chloride (95mmol/L) and metabolic alkalosis. WOF is the appropriate fluid to correct electrolyte deficiency in this condition?

A. Plasma-lyte 148 and 5% Glucose with 20mmol/L potassium
B. 0.45% sodium chloride and 5% dextrose
C. 0.9% sodium chloride and 5% dextrose
D. 10% dextrose
E. Ringer lactate

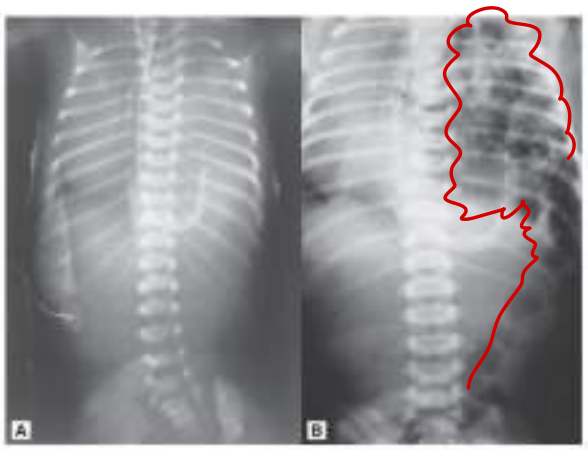
14

Baby born at 37 wks gest wt 2.55kg has many C/F suggestive of Down Syndrome. 8hrs after birth he starts vomiting milk & bile stained material. He is noted to have mild upper abdominal distension. WOF is most likely cause of his vomiting?

A. Meconium plug syndrome
B. Hirschprung Disease
C. Duodenal atresia = Down Synd
D. NEC
E. Volvulus of the large gut

15

A newborn infant develops respiratory distress immediately after birth. His abdomen is scaphoid. No breath sounds are heard on the left side of his chest, but they are audible on the right. Immediate intubation is successful with little or no improvement in clnical status. Emergency CXR is shown (A) along with CXR 2hrs later (B). WOF is the most likely Dx?



A. Diaphragmatic hernia
B. Pneumothorax
C. Pneumonia
D. Cystic adenomatoid malformation
E. Choanal atresia

16

A 4wk infant was brought to your clinic for a checkup. The baby is feeding well and gaining weight, but the mother says she notices a bulge in his inguinal area everytime he cries. You examined the boy but found no abnormality. WOF is the most appropriate next step?

hernia? → ↑ intraabdominal pressure

6 to 2 rule → Surgery

A. Admit to hp
B. Reassure the mother
C. Ask her to come back when the bulge occurs
D. Request for an U/S
E. Refer for surgical consult

17

Child with intermittent abdominal pain. Between attacks he is ok. Attacks usually last couple of hours and subside. This time he came with same pain on RUQ and also has a mass. Pain lasted for 12 hours this time, no fever. There is also blood in his pee. No n/v. He is losing weight. What is your diagnosis?

haematuria + mass + LOW

A. Hepatoblastoma
B. Neuroblastoma
C. Wilms tumour = Nephroblastoma
D. Pyelonephritis

18

A 18mo boy is brought by his mother, who is concerned about the abdominal distension of her child. She informs you that the pt has also been suffering from low-grade fever, lost appetite and seems to be in pain in his limbs

↳ bony tenderness

often. O/E, the child is very pale and there is a firm, non-tender irregular abdominal mass that crosses the midline. EOF is the most likely cause?

A. Wilms tumour
B. Neuroblastoma
C. Hepatoblastoma
D. Polycystic kidney disease
E. Acute lymphocytic leukemia

19

8 week old girl is brought to ED because she persistently spits out curdled milk. Which of the following features suggests the need for further investigation?

A. She is underweight for her age
B. She regurgitates after every meal
C. She has episodes of uncontrollable crying
D. She arches her back on occasion and stops feeding
E. She was born 2 weeks premature

20

4-week-old baby boy brought in by very anxious parents. He's been crying incessantly for several hours, drawing legs up, clenching fists & face is going red. Completely inconsolable; several other episodes over past few days, seems to be getting worse. Otherwise feeding well, 6 wet diapers/day, stooling well, no fever. Previously well. WOF is your initial Dx?

A. Intussusception
B. Otitis Media
C. GE Reflux
D. CMP allergy
E. Infantile Colic

21

A mother brings her 3yo child with a Hx of uncomfortable defecation and minical bright bleeding on toilet paper after defecation. On rectal examination with mother's consent, hard stools and anal fissure is noticed. WOF is immediate Mx?

A. Abdominal U/S
B. Apply anusol cream on the fissure
C. AXR
D. Laxatives and high-fibre diet
E. Reassurance

22

WOF is the most common cause of bleeding per rectum in 2.5yo?

A. Acute gastroenteritis
B. Crohn's Disease
C. Anal fistula
D. Ulcerative colitis
E. Anal fissure

23

An 8yo boy is brought to your office with abdominal pain. The pain is worse during the week and seems to be less prominent during the weekends and during summer. The pt's growth and development are normal. O/E, everything is normal. Lab screening including occult blood, FBE, urinalysis, UCE is normal. WOF is the next step?

A. Observe the pt and reassure the family
B. Perform an upper GI series
C. Recommend a lactose-free diet
D. Perform CT of the abdomen
E. Administer a trial of H2 blockers

24

A 12yo has several weeks of abdominal pain and black stools. WOF study is most likely to be diagnostic?

A. Modified barium swallow
B. Upper GI fluoroscopy (Upper GI series)
C. Upper GI endoscopy
D. 24hr pH probe
E. Oesophageal manometry

GI bleed
↳ GI endoscopy
colonoscopy

25

A 10yo boy is brought to hp by his mother with fever, nausea, vomiting and diarrhoea. The family visited India 1 wk ago. The child is clinical dehydrated, and you commenced IV fluids. The stool culture reports as positive for Salmonella Typhi. WOF is the appropriate next choice of ABx?

A. Doxycycline
B. Azithromycin ← Salmonella Typhi
C. Ciprofloxacin
D. Metronidazole
E. Amoxicillin

RESPIRATORY

Respiratory Distress in the Neonate

- Signs of respiratory distress → nasal flaring, intercostal/subcostal recession, tracheal tug, lippursing
- Causes
  - Respiratory Distress Syndrome
  - Transient Tachypnoea of the Newborn (TTN)
  - Meconium Aspiration Syndrome (MAS)
  - Sepsis → signs, Mx
  - Congenital Heart Failure
  - Blood loss
- Inx
  - CXR is 1st line
  - ABG, FBE
  - Echo if indicated

Signs of sepsis
- toxic child
- drowsy, not eating well
- → decreased nappies
- PE – High fever (39c), HR↑, BP↓
- Rashes (+/-)

Mx – septic workup
1. Blood culture
2. CxR
3. Urine MCS
4. lumbar puncture

Respiratory Distress Syndrome

- The most common cause of respiratory distress in preterm infants. (lung is immature, <35wk)
- Cause is surfactant deficiency. This leads to poor lung compliance, alveolar collapse, atelectasis.
- Risk Factors
  - Preterm – affects 70%< of infants born at 28-30 weeks gestation
  - Maternal diabetes
  - Male



- Clinical Features
  - Presents in the first 48-72 hours of life
  - Progressive hypoxemia, cyanosis
  - Signs of respiratory distress

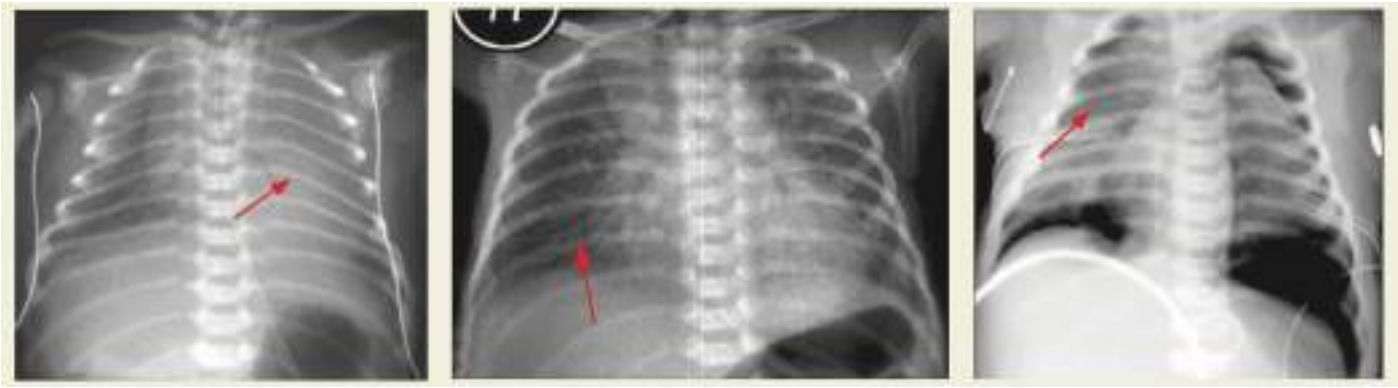
O2 >92% mild hypoxia
90-92% moderate "
<90% severe hypoxia

- Inx
  - Blood gas, FBE, CRP to r/o infection
  - Dx is clinical, confirmed with CXR
- Mx
  - CPAP (Continuous positive airway pressure.) Intubation and mechanical ventilation if severe. (support breathing)
  - Artificial Surfactant
  - It is important to treat mothers who is at risk of delivering pre-term (<35wks) to treat with corticosteroids to promote lung maturity, e.g. PPROM (preterm premature rupture of membranes)

Comparison of Conditions That Cause Respiratory Distress in Neonates

Respiratory Distress Syndrome (RDS)	Transient Tachypnoea of the Newborn (TTN)	Meconium Aspiration Syndrome (MAS)

	RDS	TTN	MAS
Cause	Surfactant deficiency	delay in clearance of foetal lung fluid after birth → ineffective gas exchange	Meconium aspiration → airway obstruction
Risk Factors	Pre-term babies	Term or overdue babies, meconium staining of amniotic fluid	~~Caesarean Section-born babies~~
CXR	Ground-glass appearance, air bronchograms and lack of focal opacities	Perihilar streaking in interlobular fissures	Coarse, irregular infiltrates, lung hyper expansion and pneumothorax
Mx	• Artificial surfactant • Mechanical ventilation	• Artificial surfactant • Mechanical ventilation • Tracheal lavage	• Supplemental oxygen • Often self-limiting • Tracheal lavage

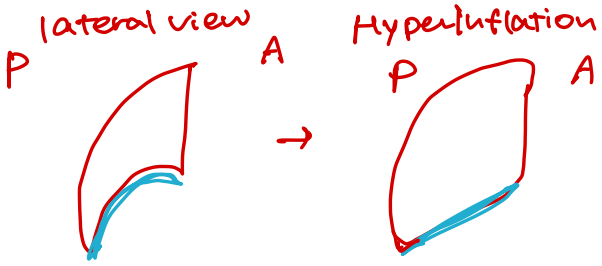


[RDS | TTN | MAS Xray findings]

Respiratory Distress in the Neonate

Bronchiolitis

- Acute inflammatory illness of the small airways of the lower respiratory tract.
- Common in children <1yo. Cause is RSV.
- Clinical Features
  - Low grade fever, progressive rhinorrhoea, dry cough and expiratory wheeze
  - Respiratory distress, tachypnoea, hypoxia
  - Severe: Respiratory failure, poor feeding, apnoea, altered mental status
- Risk factors for severity
  - Age under 6 weeks
  - Premature birth
  - Chronic lung disease
  - Congenital heart disease
  - Immunodeficiency
- PE
  - ↑RR, tachypnea, hypoxia, respiratory distress signs

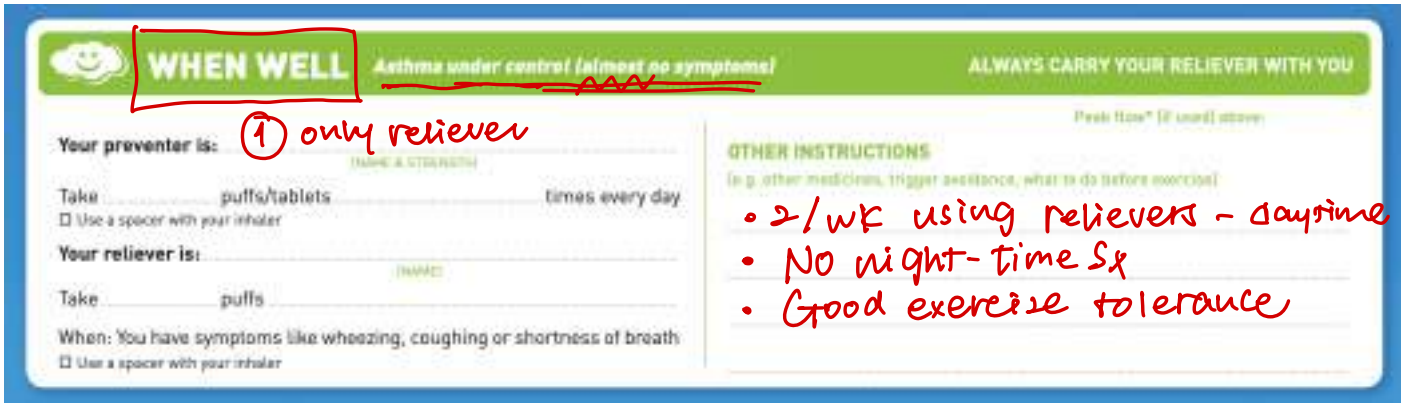


- Ausc – **inspiratory crackles** ± wheeze
- Inx
  - Dx is clinical
  - CXR – Hyperinflation of the chest with flattened diaphragms, patchy areas of atelectasis and collapse. Air trapping and perihilar infiltrates.
- Mx
  - **Tx is supportive** – hydration, suctioning and supplemental oxygen
  - **Corticosteroids and ABx are not indicated**

Asthma

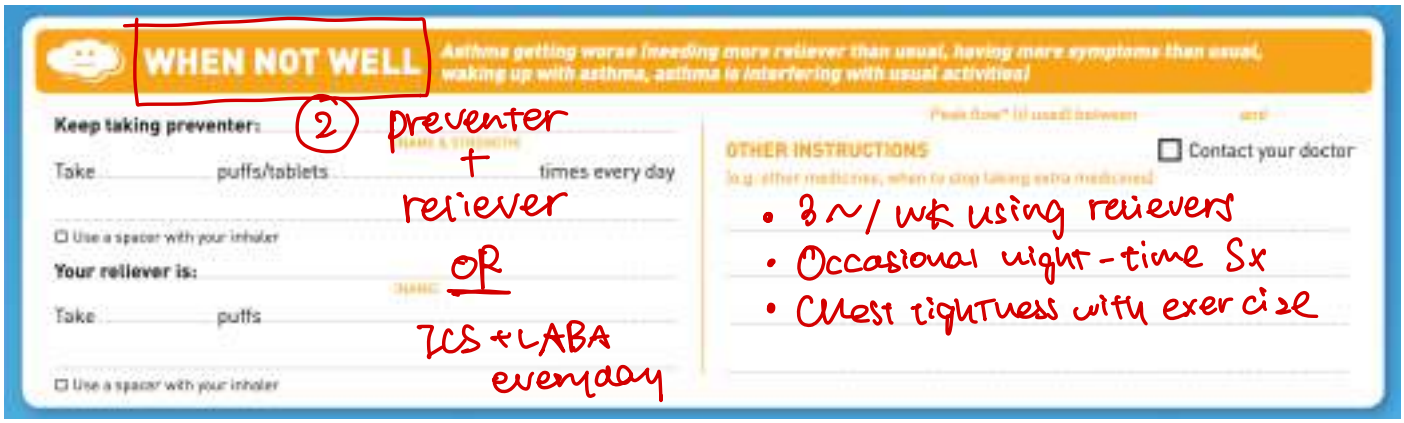
- Chronic inflammatory disease of the airways characterised by **reversible** airway obstruction (bronchospasm)
- Clinical Features
  - Dyspnoea and wheezing
  - Dry cough
  - Chest tightness
  - Severe: Respiratory failure, hypoxia, tachypnoea
- Common trigger factors
  - Viral infection (very common in children)
  - Dust and mite, pet hair
  - Seasonal change
  - Allergy
  - Passive smoking
- PE
  - Respiratory distress signs
  - Ausc – **wheezing** and prolonged expiration
  - Decreased breath sounds, cyanosis, ↓O2 and altered mental status is a late sign – Red Flags!
- Inx
  - Dx by spirometry
    - Obstructive pattern (↓FEV1/FVC)
    - More than 12% AND 200 mL change in FVC with bronchodilators
  - ABG – respiratory acidosis
  - CXR – normal appearance
  - **However, CXR, ABG, spirometry are NOT required in the assessment of acute asthma in children. Clinical status is the most important.**
- Mx
  - Step-up approach
    - Relievers – SABA (Salbutamol), ICS+LABA combinations (Budesonide/Formoterol, Symbicort®)
    - Preventers – ICS (Fluticasone), leukotriene receptor antagonists (Monteleukast), ~~Cromoglycate~~
    - Add on Sx controllers – LABA (Salmetrol)
    - Others – MgSO4

ASTHMA ACTION PLAN



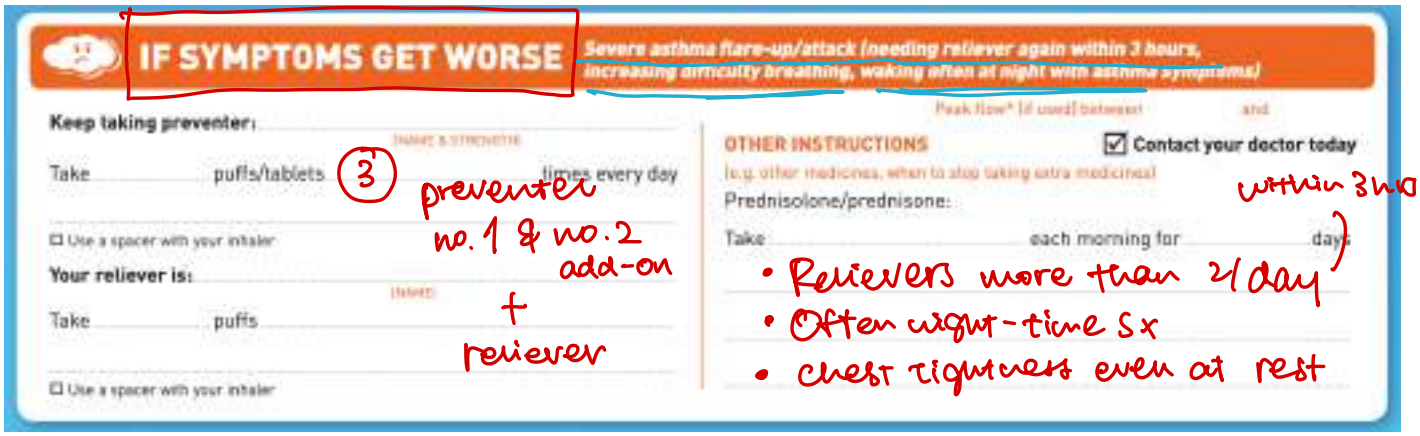
① only reliever

- 2/wk using relievers - daytime
- No night-time Sx
- Good exercise tolerance



② preventer + reliever OR ICS+LABA everyday

- 3~/wk using relievers
- Occasional night-time Sx
- Chest tightness with exercise

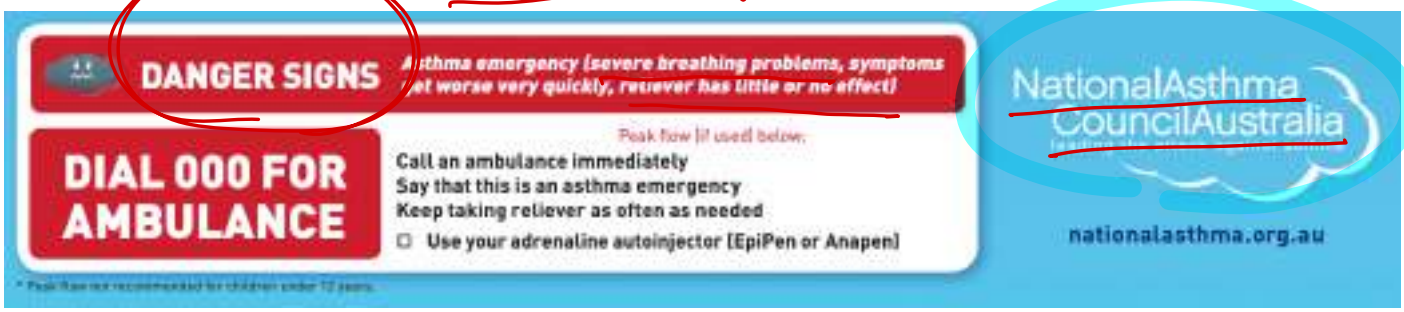


③ preventer no.1 & no.2 add-on + reliever

(within 3wks)

- Relievers more than 2/day
- Often night-time Sx
- chest tightness even at rest

CURRENTLY having an attack



Note: In little children, LABA is not recommended as it can increase the likeliness of sever exacerbation.

4x4x4 rule for adults. 6x6x6 Rule for children

press → 4 breaths → 4 min wait

4 times

ASTHMA ACTION PLAN
what to look out for

WHEN WELL



THIS MEANS:
- you have no night-time wheezing, coughing or chest tightness
- you only occasionally have wheezing, coughing or chest tightness during the day
- you need reliever medication only occasionally or before exercise
- you can do your usual activities without getting asthma symptoms

WHEN NOT WELL



THIS MEANS ANY ONE OF THESE:
- you have night-time wheezing, coughing or chest tightness
- you have morning asthma symptoms when you wake up
- you need to take your reliever more than usual
- your asthma is interfering with your usual activities

THIS IS AN ASTHMA FLARE-UP

IF SYMPTOMS GET WORSE



THIS MEANS:
- you have increasing wheezing, cough, chest tightness or shortness of breath
- you are waking often at night with asthma symptoms
- you need to use your reliever again within 3 hours

THIS IS A SEVERE ASTHMA ATTACK (SEVERE FLARE-UP)

DANGER SIGNS



THIS MEANS:
- your symptoms get worse very quickly
- you have severe shortness of breath, can't speak comfortably or lips look blue
- you get little or no relief from your reliever inhaler

CALL AN AMBULANCE IMMEDIATELY: DIAL 000
SAY THIS IS AN ASTHMA EMERGENCY

DIAL 000 FOR AMBULANCE

ASTHMA MEDICINES

PREVENTERS

Your preventer medicine reduces inflammation, swelling and mucus in the airways of your lungs. Preventers need to be taken **every day**, even when you are well.

Some preventer inhalers contain 2 medicines to help control your asthma (combination inhalers).

RELIEVERS

Your reliever medicine works quickly to make breathing easier by making the airways wider.

Always carry your reliever with you – it is essential for first aid. Do not use your preventer inhaler for quick relief of asthma symptoms unless your doctor has told you to do this.

To order more Asthma Action Plans visit the National Asthma Council website. A range of action plans are available on the website – please use the one that best suits your patient.

nationalasthma.org.au

Developed by the National Asthma Council Australia and supported by GSK Australia.

National Asthma Council Australia retained editorial control. © 2015

National Asthma Council Australia
leading the attack against asthma

- Types of inhalers

MDI	Accuhaler®	Nebulizer+Pump
Low cost Easy for everyone	Easy for everyone	No need to hold breathing Convenient for those who cannot hold breath long eg. elderly
Need to coordinate breathing Difficult for little children – **in children, use it with a spacer**	Needs to hold breath Not suitable for children	Expensive More difficult than MDI + spacer so not used for children

Note: In children less than 12 months of age presenting with wheeze, consider the diagnosis of bronchiolitis.

Epiglottitis and Croup

	Epiglottitis	Croup
Peak age	6mo – 3yo	3yo – 7yo
Clinical Features	• Toxic child • Drooling of saliva • Tripod posture	• Non-toxic child • Hoarse voice • Barking cough
Cause	*H. influenzae*	Parainfluenza virus, RSV etc.
PE	• High fever • ✓Sever respiratory distress • ✓Inspiratory retractions	• Low-grade fever • Mild respiratory distress • Inspiratory stridor
Inx	CXR – "Thumbprint sign" on lateral neck view But Dx is with clinical impression	CXR – "Steeple sign" on PA view
Mx	• Pure emergency – time should not be wasted by CXR • Secure airway 1st	• Mild cases – fluids • Moderate cases – nebulized/oral corticosteroids • Sever cases – consider nebulized adrenaline before corticosteroids

Pneumonia

- Lung infection. Respiratory viruses are the most common cause of pneumonia in young infants
- Causes
  - *Group B streptococci* – most common in neonates. 2nd *E. Coli*
  - ***Mycoplasma pneumoniae* – most common in children >5 years old**
  - *Streptococcus pneumoniae* – most common in all age groups. 2nd non-typical *Haemophilus influenzae* and 3rd *Staphylococcus aureus*.
- Clinical Features
  - Classic Sx – Sudden onset tachypnoea, fever and productive cough. Signs of respiratory distress
  - Atypical Sx – Gradual onset, dry cough, non-specific Sx like headache and GI Sx

- **Severe:**
  - **More than 2 out of severe respiratory distress, severe hypoxia/cyanosis, marked tachycardia, altered mental state**
  - **empyema**

- PE
  - Tachycardia, ↑RR, fever if not atypical
  - Percussion – dullness
  - Auscultation – ↓lung sounds. Rales and wheezes

    Note: in children <2yo, auscultation findings are difficult to hear due to grunting
- Inx
  - Blood test – FBE (r/o sepsis), UCE (r/o SIADH)
  - Swabs, sputum culture, blood culture if indicated. Always consider atypical pathogens.
  - Dx is usually by CXR – consolidation. CXR does not distinguish viral from bacterial pneumonia. (although lobar changes are more likely to be caused by *Streptococcus pneumoniae*)
- Mx

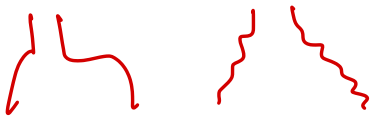
No admission	If respiratory distress, admit	
Mild pneumonia	**Non-severe pneumonia**	**severe pneumonia**
oral amoxicillin	oral amoxycillin or IV benzylpenicillin if cannot tolerate oral intake	IV ceftriaxone (or cefotaxime) AND flucloxacillin

Note: Most <24 months should be admitted to hospital.

Pertussis

- Bacterial infection caused by *Bordetella pertussis*. Highly contagious.
- Clinical Features
  1. Catarrhal stage (7 - 14 days) – Mild URTI Sx
  2. Paroxysmal stage (4 weeks) – Paroxysms of cough, whoop or vomiting
  3. Convalescent stage – less sever cough. Coughs can persist for months (100-day cough)
  - Child can be totally healthy in between the attacks
  - Cxn – pneumonia, apnea
- Vaccination
  - Tdap vaccination is given at 6wks, 4mos, 6mos.
  - Adults who get in contact with children <6wks should get the vaccine
  - Febrile fever is not a contraindication
- PE
  - Tachycardia, ↑RR, fever if not atypical
  - ~~Percussion – dullness~~
  - ~~Auscultation – ↓lung sounds. Rales and wheezes~~

    ~~Note: in children <2yo, auscultation findings are difficult to hear due to grunting~~
- Inx
  - Dx is clinical
  - FBE – High-grade lymphocytosis
  - **Nasopharyngeal swab and PCR**– sensitive only in the first 3weeks
  - Pertussis serology (IgA)



- CXR usually show no change. Sometimes "shaggy heart appearance" is seen.

- Mx
  - Tx by ABx – azithromycin for 7 days. If cannot swallow, Clarithromycin liquid for 7 days
  - Exclusion from school/childcare until 5 days. Esp avoid contact with
    - Children <6mo
    - Pregnant females
  - If contacts are not up to date with vaccine, they should get it asap
  - Prophylaxis (erythromycin) should still be given to
    - Children <6mo
    - Pregnant females
    - Adults who get in contact with children
  - Notify to Department of Health Services
  - Children <6mo should be admitted

→ easily Cxn

Note: All of the above applies only if; the initial case has had Sx for <21 days, had ABx treatment for <5days; and contacts had their first contact within 14 days.

FEV1 → amount of air you forcefully breathe out in 1st 1 sec.

FVC → " in total

" lung capacity

bronchodilator

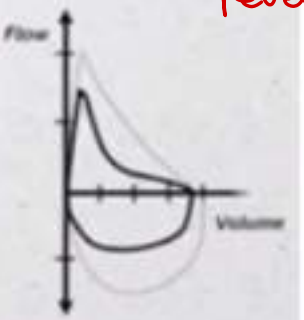
		Ref	Pre	% Ref	Post	% Ref
Spirometry		normal			pt results	
→ 2 FVC	Liters	3.8	2.3	61	vs 2.5	66
FEV1	Liters	3.1	1.2	39	1.3	42
→ 1 FEV1/FVC	%	82	52 ↓		52	
PEF	L/sec	5.9	3.9	66	4.2	71

↳ obstructive

0.2L ↑ AND × 12% ↑

definition of reversible

Lung Volumes				
TLC	Liters	5.9	7.1	120
VC	Liters	4.0	3.0	75
IC	Liters	3.2	2.5	78
FRC	Liters	2.7	4.6	170
RV	Liters	1.9	4.1	216
RV/TLC	%	32	58	



Diffusing Capacity				
DLCO	mL/mmHg/min	31	23	73
DL Adj	mL/mmHg/min	31	23	73

Comments: Tests are pre and post 4 puffs albuterol

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RECALLS – RESPIRATORY

1

Newborn with respiratory distress. She was born by elective C-section at 38wks. Apgar scores were 7 at 1 minute and 9 at 5 minutes. Birth weight was 3180g. Respiratory distree started at 1hr of age. She was place on oxygen, but after 2hrs she is tacypnic with RR 30with subcostal recession. Est is clear to auscultation, heart sounda re normal. SpO2 91% with 30% O2. WOF is Mx?

A. ABx
B. Increase O2
C. CXR
D. Insert umbilical arterial line
E. Insert umbilical venous catheter

2

Newborn with respiratory distress. She was born by elective C-section at 38wks. Apgar scores were 7 at 1 minute and 9 at 5 minutes. Birth weight was 3180g. Respiratory distree started at 1hr of age. She was place on oxygen, but after 2hrs she is tacypnic with RR 30with subcostal recession. Est is clear to auscultation, heart sounda re normal. SpO2 91% with 30% O2. WOF is Mx?

A. ABx ✓
B. Increase O2
C. CXR ✓
D. Insert umbilical arterial line
E. Insert umbilical venous catheter

3

A 6 month old child with a 3 day history of URTI presented with tracheal tug and expiratory wheeze. WOF is your Inx of choice helpful for Dx?

A. ABG ✓
B. FBE ✓
C. CXR
D. USG ✓

4

A 4 year old boy presents with severe asthma. Which of the following will help you predict the severity of his asthma at bedside?

A. Tachycardia
B. Tachypnoea
C. Peak flow meter
D. Use of accessory muscles
E. Loudness of wheeze

5

6 year old boy with previous history of eczema presented with wheezing. WOF is the most likely Dx?

A. Asthma
B. Bronchiolitis
C. Pneumonia

D. Croup
E. Epiglottitis

6
5yr old boy with cough from 12 months before was on salbutamol and also taking oral prednisolone, he has an eczema history, both parents are smokers. Which one is the best medicine for prevention used in inhalation mode?

A. Montelukast
B. ~~Cromoglycate~~
C. Salbutamol
D. Fluticasone
E. Salmeterol

ICS > oral prednisolone

SABA
ICS
LABA

7
6 yr old boy not relieved by 6 puffs of salbutamol by spacer. What's next?

A. Nebulised salbutamol
B. Give total of 12 puffs
C. Oral prednisolone
D. Inhaler fluticasone
E. intubation

Salbutamol 6x6x6 rule.
other meds can be 4x4x4 rule.

6 puffs if < 6 years old, 12 puffs if ≥6 years old

Choice of device
- >3 yo : mask + spacer + MDI
- 3-5 yo : small volume spacer + MDI
- 5-8 yo : large volume spacer + MDI
- 8< yo : MDI

8
Child aged 10 months presents with fever and respiratory distress. On exam there are wheeze, crepitations. Which inhalation agent would be perfect for her?

<1yo

A. Salbutamol
B. Adrenaline
C. Oxygen
D. Corticosteroids

9
12 month old child presents with fever and cough. On exam has tracheal tug and wheeze. WOF is the most likely Dx?

A. Croup
B. Epiglottitis
C. Bronchiolitis
D. Asthma

10

A child comes with harsh cough and stridor with intercostal muscle indrawing. Mx?

- A. O2
- B. Nebulised salbutamol
- C. Oral prednisolone
- D. Reassure
- E. Vaccination

11

6 year old child presenting with 10 days of low grade fever and dry cough. RR 20, no respiratory distress. On auscultation he has respiratory crackles in both of his lung bases. CXR shows patchy infiltrates more marked in the upper lobe. On blood test, WBC is elevated. WOF is the most likely case for his condition?

- A. *Haemophilus influenzae*
- B. Adenovirus
- C. RS virus
- D. *Mycoplasma pneumoniae*
- E. *Streptococcus viridans*

12

2 year old child presenting with high fever of 39.8 degrees, chills, abdominal pain. On examination looks unwell but no cyanosis, RR 30/min, HR: 120. He is alert. What is the appropriate treatment?

- F. Oral amoxicillin
- G. Oral roxithromycin
- H. IV penicillin
- I. IV flucloxacillin

13

2 year old child, fever 38, abdominal pain, vomiting. Xray shows consolidation. You made a Dx of moderate pneumonia. What's next?

- A. Oral amoxicillin
- B. Oral roxithromycin
- C. IV penicillin
- D. IV flucloxacillin

14

Child 4 year with fever 39C and history of cough unwell for 3 days. He has a wheeze but minimal lung signs on PE. Which investigation could orientate your diagnose?

- A. Pneumococcal PCR
- B. Pleural aspirate
- C. Blood culture
- D. FBE
- E. CXR

15

18mo present with 36hr Hx of spiking fever, tachypnoea with grunting respirations and slight cough. On PE, temp is 39.5C, she looks ill and pale with shallow respirations. Chest auscultation is normal. WOF is the likely Dx?

- A. Acute bronchitis

B. Bronchiolitis
C. Lobar pneumonia
D. Asthma
E. Foreign body inhalation

16

Australian indigenous woman with 3 weeks of cough presents with her 3 month old baby. She is coughing and sometimes vomiting after the cough. What will you do next?

A. Throat culture
B. IgA Serology
C. PCR
D. Xray chest
E. Contact CPS

pertussis

INFECTIOUS DISEASES

Overview

- In the Hx look for
  - **Relationship of rash and fever. Which came first?**
  - **Characteristic of the rash**
  - Contacts
- Most will have a viral infection. But the potential for significant bacterial infection must be evaluated.
- **In children it is common to have no obvious focus of infection**: 'fever without focus'. Source of infection can be anywhere;
  - Meningitis, septicaemia.
  - URTI, pneumonia
  - Hepatitis, gastro
  - UTI
  - Bone and joint infections
  - Occult bacteraemia (Usually non-toxic and appear well).
- **Look out for signs of sepsis!!**
  - **Toxic unwell child**
  - **Not eating well**
  - **Excessively drowsy**
  - **Decrease in nappy numbers**

early-onset	late-onset
• <48hrs	• ≥ 48hrs
• GBS	• artificial tubes . drains
	• Extreme prematurity

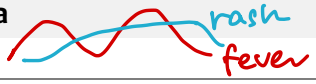
Common Conditions with Rash and Fever

Erythema Infectiosum and Roseola Infantum

	Erythema Infectiosum	Roseola infantum
Cause	Parvovirus B19	HHv-6 and HHv-7
Age group	5 – 15 yo	6mo – 2yo
Incubation period	4 – 21 days	7 – 17 days
Timing	Fever → Rash (after 2-5 days)	Fever → Rash (after 1-3 days)
Rash	• Maculopapular/Erythematous, pruritic rash • Mainly at the face ("slapped cheek", spreads to the arms, then to trunk and legs • Can worsen with sun exposure	• Maculopapular rash as fever settles • Starts from trunk, quickly spreads to face and extremities • Do not last long <24hrs
Clinical Features	• Non-specific (runny nose, headache, nausea) • Can have nothing	• Acute onset of high fever (can be >40C) • Other Sx are non-specific
Cxn	• Arthropathy in children • Rarely aplastic crisis in anaemic children eg. Sickle cell anaemia, IDA	• Febrile seizures

Inx	Not routinely done	Not routinely done
Tx	Supportive	Supportive
Exclusion	No need (If rash already occurs, patients are no longer infectious)	No need (If rash already occurs, patients are no longer infectious)

Measles, Rubella and Varicella

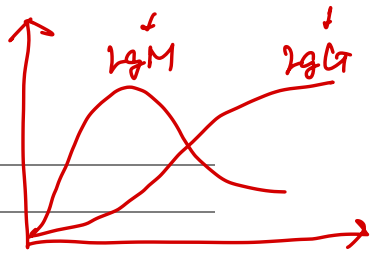


	Measles	Rubella	Varicella
Cause	Paramyxovirus	Rubella virus	VZV
Age Group	2 – 6 yo	5 – 14 yo	2 – 6 yo
Incubation period	10 – 14 days	14 – 21 days	10 – 21 days
Timing	Fever → rash → fever (bimodal fever)	Rash = Fever	Fever → rash (1day)
Rash	• Erythematous, maculopapular rash • Spreads from head to toe	• Erythematous, maculopapular rash • Starts from head to toe • Rash is tender	• Vesicles at different stages of healing • Starts from the face and spreads to the rest of body, **sparing the palms and soles**
Clinical Features	• Low-grade fever • Cough, Coryza and conjunctivitis • Koplik spots after 1-2 days	• Can be ASx. Sx are mild compared to measles • Tender lymphadenopathy	• Low-grade fever, anorexia, malaise
Cxn	• Otitis media, pneumonia • Rarely encephalitis	• Rarely encephalitis • **Congenital rubella syndrome is mostly life-threatening**	• Rarely encephalitis • Skin lesions can develop 2° bacterial infections
Inx	Serology, or not done	Serology, or not done	Serology, or not done
Tx	Supportive	Supportive	Supportive
Exclusion	4 days after onset of rash (Contact exclusion is needed for only those who has never been vaccinated)	4 days after onset of rash	Until vesicles all dry out

*Note: Varicella zoster is the **reactivation** of the VZV that the pt has been affected from already in the past. Presents more when the pt is immunocompromised or have low immunity. **It is not contagious.** Except for immunocompromised children, no need for exclusion.*

Measles, Rubella and Varicella: Exclusion in pregnant female contacts

- Do a serology to confirm the contact and to confirm the vaccination/pre-infection status of the female



- **MMR vaccine is contraindicated to pregnant females – live-attenuated**
- Measles

IgG	IgM	Implication
(+)	(-)	• Past-infection or vaccination • If same, continue with pregnancy
(-)	(+)	• Possible current infection, without past-infection or vaccination • Retest in 3wks to confirm result • **If IgG +ve in retest, NHIG (natural human immunoglobulin) is available but the effectiveness is not so high** • MMR vaccine after delivery
(-)	(-)	• Possible non infection, without past-infection or vaccination • Retest in 2wks to confirm result • If same, continue pregnancy with caution not to get into contact with possible infections

- Rubella

IgG	IgM	Implication
(+)	(-)	• Past-infection or vaccination • If same, continue with pregnancy
(-)	(+)	• Possible current infection, without past-infection or vaccination • Retest in 3wks • **If IgG +ve in retest, refer to high risk pregnancy clinic – medical termination may be offered due to possible congenital rubella syndrome** • MMR vaccine after delivery
(-)	(-)	• Possible non infection, without past-infection or vaccination • Retest in 2wks to confirm result • If same, continue pregnancy with caution not to get into contact with possible infections

- Varicella

IgG	IgM	Implication
(+)	(-)	• Past-infection or vaccination • If same, continue with pregnancy
(-)	(+)	• Possible current infection, without past-infection or vaccination • Retest in 3wks • **If IgG+ve in retetst, If contact <96hrs, VZIG is available for prophylaxis. If not,** acyclovir may be indicated to some with PMHx but **usually supportive measures and close monitoring** • MMR vaccine after delivery
(-)	(-)	• Possible non infection, without past-infection or vaccination • Retest in 2wks to confirm result • If same, continue pregnancy with caution not to get into contact with possible infections

- Congenital rubella syndrome
  - Caused when mother is not-immune to rubella in the past and had rubella contact during 1st trimester
  - Clinical features
    - Miscarriages and stillbirth
    - Foetal malformation – limbs, hearing loss and vision loss
    - Congenital heart disease
    - Microcephaly
    - Thrombocytopenic **purpura**
    - Intellectual disabilities



Erythema infectiosum, measles, rubella, varicella

Hand Foot Mouth Disease

- Cause is Coxsackie A virus
- Clinical Features
  - Rash – oral ulcers. Vesicular rash **that involves the palms and the soles.**
  - Fever, anorexia and oral pain
  - No serious Cxn
- Dx is clinical. Inx is not indicated.
- Children are infectious until the blisters have disappeared, but exclusion is not routinely recommended
- Mx is supportive

Mumps

- Cause is paramyxovirus
- Clinical Features
  - High fever, headache and malaise
  - Salivary glands involved – **parotid enlargement**, dry mouth, discomfort on eating or opening the mouth.
  - Cxn
    - Orchitis in post pubertal males, developing 3 - 4 days after parotitis
    - Mumps in early pregnancy occasionally causes abortion or foetal abnormalities
- Inx – serology can be done
- Mx is supportive. Exclusion till Sx subside.

Herpes Simplex

- Cause is HSV. 90% of the population acquire HSV infection subclinical or clinical before 4-5yo.
- Clinical Features

- Acute gingivostomatitis – painful ulcers on gums, tongue and palate
- Fever and **refusal to feed, thus prone to dehydration,**
- Cxn – HSV encephalitis is rare but can occur

- Inx – serology can be done but usually clinical Dx
- Mx is supportive, by oral lignocaine gel. Watch out for 2° infection. IV/oral acyclovir is indicated in severe infections, immuno-suppressed individuals.

Scarlet Fever and Kawasaki Disease

Note that Kawasaki Disease is not an infectious disease!!!

	Scarlet Fever	Kawasaki Disease
Cause	*Group A Streptococcus*	Autoimmune
Age group	5 – 15 yo	6mo – 4yo
Incubation period	1 – 7 days	n/a
Timing	Fever → Rash (after 12 – 24 hrs)	Fever → Rash
Rash	• Appears at neck, and spreads to limb • More prominent at the flexors • Sunburnt or boiled lobster appearance • Sandpaper like on palpation	• Erythematous, maculopapular • Starts suddenly on the trunk, limbs and around the buttocks, groin area
Clinical Features	• Fever can be high-grade, responds to medication • Sore throat • Perioral pallor • Strawberry tongue	• Prolonged high fever (>40C) not responding to medication • Dry cracked lips and strawberry tongue • Conjunctivitis • Lymphadenopathy, tender • Hand and foot oedema
Cxn	• PSGN • Rheumatic heart disease	• Aneurysm formation • Risk of heart disease, ACS is high both in short-term and long-term
Inx	• Throat swab → MCS • RFT • Echo may be indicated	• Manage with early referral • Cardiac investigation – ECG, echo • Tx – IVIG, aspirin • Long term follow up (echocardiography after a couple of weeks)
Tx	• No need to refer if child is not toxic • ABx – Penicillin for 10 days • Exclusion for 24hrs after start of ABx	• Avoid corticosteroids

Note: Reye Syndrome is a rare but life-threatening Cxn of influenza, varicella and other viral infections. Clinical features include seizures and coma. ***Aspirin should not be used in children <16yo, except for Kawasaki disease and juvenile arthritis****. Tx is supported, targeted to manage cerebral oedema.*

RECALLS – INFECTIOUS DISEASES

1

WOF is a risk factor of early onset neonatal sepsis?

A. Previous baby with GBS infection
B. Artificial ventilation with an endotracheal tube
C. Extreme prematurity
D. Total parental nutrition

2

5yo is brought to clinic by mother with acute onset of high fever for the last 5days, with inadequate response to paracetamol. O/E, you noticed redness and crackling of the lips, maculopapular rash, non-exudative conjunctivitis, anterior cervical LAD, erythema of oral cavity, palms and soles oedema. CRP is 240. WOF is correct?

A. Vascultis leading to coronary aneurysm is a leading complication.
B. Coronary aneurysm has a fatality rate of 20%
C. Early Tx with aspirin and immunoglobulin does not reduce the risk of cardiac Cxn
D. Use corticosteroids as soon as possible
E. Tender mass in right hypochondrium is one of the signs related to this condition

---

3

Mother brings in 18mo child with a 3day Hx of high-grade fever that resolved abruptly, followed by the development of rash starting on the neck and the trunk, spreading to the face and extremities. WOF is the most likely Dx?

A. Roseola infantum
B. Measles
C. Scarlet fever
D. Rubella
E. Erythema infectiosum

4

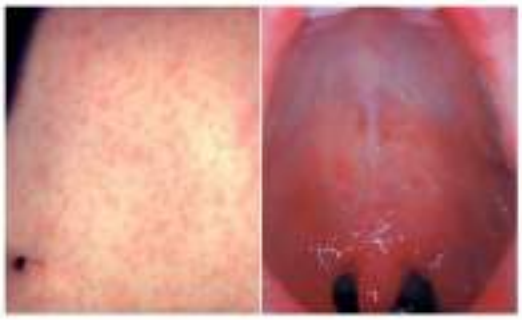
A 42yo woman develops chicken pox 5 days before her expected date of delivery. She is at 39 wks of gestation. WOF is the appropriate Mx for the infant?

A. Antiviral therapy
B. Follow up for early onset sepsis
C. VZIG to the mother before delivery
D. Infection disease consultation
E. VZIG to the baby after the delivery

5

This child is 4yo, presenting with a 3-day Hx of malaise, fever to 41.1C, cough, coryza, and conjunctivitis. He developed a erythematous maculopapular rash after this as shown in the piture. He is noted to have white pinpoint lesions on a bright red buccal mucosa. WOF is the likely Dx?

A. Parvovirus
B. Varicella



C. Herpes
D. Measles
E. Rubella

6

14yo girl came in your GP with 3-dayss of sore throat and fever. Her temperature is 38C. O/E you find there is tonsillar erythema and exudates, and there are multiple swollen lymph nodes. There is no uvula deviation, and the girl is well other than the sore throat, being able to eat and drink well. WOF is your next step in Mx?

A. Admission to hospital
B. Start antiviral medication
C. Advice for throat swab
D. Start ABx
E. reassurance

Criteria	Points
Temperature >38°C	1
Absence of cough	1
Swollen, tender anterior cervical nodes	1
Tonsillar swelling or exudate	1
Age	
3-14 yr	1
15-44 yr	0
45 yr or older	-1

Score	Risk of Streptococcal Infection	Suggested Management
≤0	1%-2.5%	No further testing or antibiotics
1	5%-10%	
2	11%-17%	Culture all; Antibiotics only for positive culture results
3	28%-35%	
≥4	51%-53%	Treat empirically with antibiotics and/or perform culture

CENTOR score for strep throat

7

10yo boy has fever, muscular pain esp in the neck, headache and malaise. He describes that the back of his mandible toward the mastoid space is being full and tender. Hid earlobe on the affected side appears to be sticking up and outward. Drinking sour liquid causes him sever pain. His father has refused to give him vaccination in the past due to religious reasons. WOF preventable diseases has this child acquired?

A. Rubella
B. Varicella
C. Diptheria
D. Measles
E. Mumps

VACCINATIONS

Contraindications to vaccinations

- All vaccinations are contraindicated to
  - **Acute febrile illness (if fever >38.5°C, postpone vaccination)**
  - **Previous anaphylaxis contraindicates further dosage of the same vaccine**
- DTPa
  - Contraindicated if **encephalopathy within 7 days of previous DTP vaccination**
- Live attenuated vaccines
  - Usually contraindicated in **immunosuppressed children**, e.g. chemotherapy or high-dose corticosteroids
  - MMR and varicella vaccines should be deferred if <3 months after injection of a blood product (immunogenic response may be diminished)
- Other vaccinations
  - Severe adverse reactions (non-specific)

Specific Vaccinations

Influenza Vaccine

- Recommended every year. Subcutaneous administration.
- Contraindication – previous anaphylaxis to the vaccine is the only contraindication. **Egg allergy, even with anaphylaxis to egg Hx, is not a contraindication!** However, when the 1st administration to those who had anaphylaxis to eggs, it is clever observe for 30 mins for anaphylactic reactions.
- It is not mandatory but most of the childcare require flu vaccination to be a member now.

Tetanus Prophylaxis

- Consider a tetanus prophylaxis when the pt had an injury

History of tetanus vaccination	Time since last dose	Type of wound	DTPa, DTPa combinations, dT, dTpa, as appropriate	Tetanus immunoglobulin
≥3 doses	<5 years	Clean, minor wounds	No	No
≥3 doses	<5 years	All other wounds	No	No (unless person has immunodeficiency)[a]
≥3 doses	5–10 years	Clean, minor wounds	No	No
≥3 doses	5–10 years	All other wounds	Yes	No (unless person has immunodeficiency)[a]
≥3 doses	>10 years	Clean, minor wounds	Yes	No
≥3 doses	>10 years	All other wounds	Yes	No (unless person has immunodeficiency)[a]
<3 doses or uncertain[b]	Uncertain	Clean, minor wounds	Yes	No
<3 doses or uncertain[b]	Uncertain	All other wounds	Yes	Yes

https://immunisationhandbook.health.gov.au/resources/tables/table-guide-to-tetanus-prophylaxis-in-wound-management

- Antibiotics are not indicated for simple lacerations. In wounds with extensive damage, 1st decontaminate the wounds, then consider ABx (1st choice amoxicillin clavulanate)

DTPa

- Primary dose (DTPa) given at 6wks/2mo, 4mos, 6mos
- Booster dose (DTPa) at 18mo, 4yo.
    - Catch-up vaccinations – if dose 4 given after 3yo, dose 5 at 12-13yo (dTpa).
    - Booster (dTpa) is recommended for pregnant females in the 3rd trimester

DTPa and dTpa is not that different – it's just that we use DTPa for <8yo and dTpa for 8yo and older.

- Completing the first three doses on time is important + full protection once you get all 3 doses
- Infection itself is not a contraindication if afebrile

RECALLS – VACCINATIONS

1

Mother is coming to you with her 8 month old child, he is mildly feverish and already on PCM. You prescribed amoxicillin. After asking about the vaccinations, you realised mother is against vaccinations so you talk to her about the benefits and the details of vaccinations. She still refuses and tells you that she has searched online for a long time before she made that decision. What to do next?

A. Report to child protective services
B. Try to contact her partner
C. Wait till she brings him next time and talk to her again
D. Agree to the parent's wishes
E. Co-Sign the conscientious form after explaining the details and benefits of vaccinations

---

2

Your next pt is a health care worker pregnant now. She has been vaccinated against Influenza 5-10 years back. WOF is your recommendation?

A. She should take the vaccine now
B. She is immune from the last time she took the vaccine
C. Check Igg before giving the vaccine
D. Vaccine is teratogenic after her pregnancy started

3

A lady presenting concerned about her egg allergy history and the chances of interaction with the MMR vaccine her son was about to receive, your advice would be?

A. To reassure her that there's no interaction and it's not a contraindication
B. To delay the vaccine
C. To admit it's a contraindication
D. Vaccine under close observation

4

5 yo boy with clean lacerated wound and vaccination Hx of 2 doses of tetanus needles as a child. Which of the following will you consider in this child?

incomplete

1. tetanus toxoid and penicillin
2. DTPa vaccine
3. Tetanus toxoid
4. Immunoglobulin
5. Tetanus Ig

5

55yo

Grandmother looks for advise regarding vaccination before the birth of her granddaughter. You should encourage?

A. DTPa vaccination
B. MMR vaccination
C. Influenza vaccination → yearly
D. Pneumococcal vaccination → 65yo < 5yrly

DTPa - IPV

6

Somalian kid comes with mother for vaccinations. Has taken 3 doses of oral polio vaccine in his country and now asking for next polio vaccine. You don't have oral but injection polio vaccine is available now. Next step?

A. Give IPV one dose
B. Polio vaccine is not required
C. Start his vaccination again with IPV
D. Give IPV 2 doses

2, 4, 6 mo
DTPa
hepB
IPV
Hib

4yo
DTPa
IPV

HAEMATOLOGY

Overview

Bleeding conditions	• Idiopathic thrombocytopenic purpura (ITP) • IgA vasculitis (HSP) • Thrombotic thrombocytopenia purpura (TTP) • Von Willebrand disease • Haemophilia
Anaemia	• Iron deficiency anaemia • Haemolysis - Heredity spherocytosis - G6PD deficiency - Thalassemia - sickle cell disease - Hemolytic-uremic syndrome (HUS)
Malignancies	• Acute lymphocytic leukemia (most common) • Acute myelogenous leukemia • Chronic myelogenous leukemia • Lymphoma

TTP vs HUS

(1) blood clot formation → mini-stroke

(2) aplastic crisis by parvo B19 virus

Bleeding Conditions

Idiopathic Thrombocytopenic Purpura

ITP

- Autoimmune condition characterised by decrease in platelets
- Causes
  - IgG Abx formed against the pt's Plt, and then destroyed by the spleen
- Clinical Features
  - Mostly ASx
  - Minor bleeding, easy bruising and petechiae, haematuria, blood in stool can occur
  - Can present acutely following URTI or chronically
- PE
  - Non-specific signs of easy bruising
  - Generally no splenomegaly
- Inx
  - Dx of exclusion.
  - Other conditions should be excluded by FBE, peripheral blood smear
    - ↓Iron, ↓ferritin, ↑TIBC
  - Blood film shows hypochromic microcytic RBCs and low reticulocyte count
- Mx
  - The decision to treat a child should be based on the clinical symptoms and not the platelet count
  - Low risk pts do not need active intervention. Prognosis is good.
  - The below pts need admission and active Tx
    - Active bleeding – epistaxis, haematuria, hematochezia. Oral corticosteroids (1st line), IVIG.

Antibodies starts attacking plt

self-limiting

IV

- Suspected internal haemorrhage e.g. intracranial, joints, life-threating bleeding – IVIG and IV steroids

IgA Vasculitis (Henoch- Schönlein purpura)



- Small vessel vasculitis
- Causes
  - IgA mediated allergic reaction damages the blood vessel walls, leading to easy bleeding
- Clinical Features
  - **Triad – Palpable purpura, arthralgias, abdominal pain**
  - Haematuria (IgA nephropathy)
  - Can complicate intussusception
- PE
  - Consistent to clinical features
- Inx
  - Serology – ↑IgA
- Mx
  - Tx is supportive
  - ACE inhibitor for renal Cxn can be used
  - In severe cases, corticosteroids and immunosuppressants for inflammation

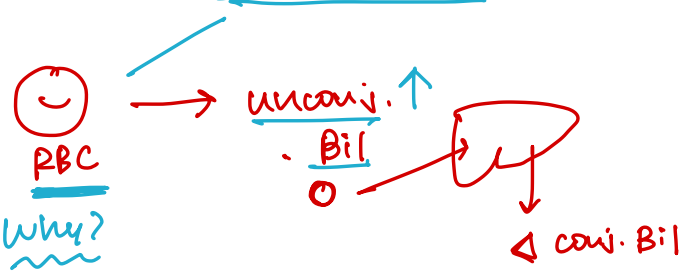
Anaemia

Iron Deficiency Anaemia

- Iron loss exceeds iron intake
- Causes
  - Low intake – inadequate nutrition, fussy eating, psychosocial issues, vomiting and sick
  - Malabsorption – Celiac disease, Lactose intolerance, CMPA, diarrhoea
  - Excessive usage – chronic conditions e.g. Cystic fibrosis, congenital heart diseases
- Clinical Features
  - Fatigue, dyspnea, tachycardia can be seen.
  - Pica – dirt and ice are common
  - Also often subclinical
- PE
  - Conjunctival pallor
  - Glossitis
  - Koilonychia = spoon nails
- Inx
  - Dx by FBE with iron studies.
    - ↓Iron, ↓ferritin, ↑TIBC
  - Blood film shows hypochromic microcytic RBCs and low reticulocyte count
- Mx
  - Tx – iron supplements (ferrous gluconate)
  - Diet changes – Infant milk formulas, red meat , green vegetables, fruit, fortified cereals are good sources for iron. Avoid excessive cow's milk.
  - If there is an underlying cause, fix the underlying cause first.

Haemolysis Overview

- Occurs when bone marrow production is unable to compensate for increasing destruction of blood cells.
- Clinical Features
  - Pallor, fatigue
  - Tachycardia and tachypnoea
  - Jaundice
  - Dark urine = hemoglobinuria
- Inx
  - FBE and blood film – ↑reticulocyte count
  - ↑Unconjugated Bil
  - ↓haptoglobin



Thalassemia

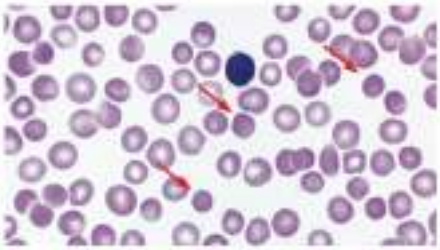
- Hereditary anaemia conditions. Autosomal recessive
- More common in Mediterranean, African and Middle Eastern, Asian ethnicity
- Causes
  - Decreased/absent production of normal the chains of Hb gene
  - The affected chain and the number of gene mutations determine the types of thalassemia (β-thalassemia and α-tthalassemia)
- Clinical Features and PE – typical cases can be ASx (β-thalassemia minor and α-tthalassemia trait) However in β-thalassemia major, severe microcytic anaemia happen the 1st years of life and need chronic transfusion or marrow transplant to survive.
- Inx
  - Dx by Haemoglobin electrophoresis
- Mx
  - Most pts do not require Tx

	IDA	Thalassemia
Serum Iron	↓	↓
Ferritin	↓	↑
TIBC or transferrin	↑	Normal or ↓

Comparison of IDA and Thalassemia

Hereditary Spherocytosis

- Chronic haemolytic anaemia. Autosomal dominant.
- Causes
  - Characterised by abnormality in the RBC membrane, leading to RBC being spherical. Destruction of the RBC at spleen increases.
- Clinical Features and PE are those of haemolysis
- Inx
  - Blood smear shows spherocytes
  - Most accurate Dx test is osmotic fragility test
- Mx



not routinely done

- Tx – splenectomy around 5-6yo. Children with splenectomy should receive influenza, pneumococcal and Hemophilus influenzae b vaccines. Prophylactic long acting penicillin.
- Red cell transfusion as indicated

Note: Pts with erythematosus infectiousum should be avoided contact because it can lead to aplastic crisis (The bone marrow is suppressed by the viral infection and the number of new red blood cells produced is decreased.)

G6PD Deficiency

- X-linked recessive.
- More common in Mediterranean or African ethnicity
- Causes
  - Follows oxidant stress or trigger factors
    - Fava beans
    - Infections esp. viral infection
    - DKA
    - Medication – aspirin, sulfa drugs, antimalarials etc.
  - Characterised by abnormality in the RBC membrane, leading to RBC being spherical. Destruction of the RBC at spleen increases.
- Clinical Features
  - Acute presentation following oxidant stress
  - Spontaneous recovery from the attack is common
- Inx
  - Blood smear shows Heinz bodies and bite cells
- Mx
  - Supportive. Avoid triggers

Malignancies

Acute Lymphocytic Leukemia

- More common childhood malignancy
- Clinical Features
  - Rapid onset and progression "since 2wks"
  - Anemia – pallor and fatigue
  - thrombocytopenia – petechiae and purpura,bleeding
  - Bone pain
- PE
  - Anemia and thrombocytopenia signs
  - Gum hypertrophy and bleeding
  - Hepatosplenomegaly
  - Bony tenderness at the sternum
- Inx WBC↓ . Hb↓, Plt↓
  - FBE and blood film – Pancytopenia. Normochromic normocytic anemia. Lymphoblasts.
  - Bone marrow
- Mx
  - Multidisciplinary team
  - Chemotherapy
  - Indicators of poor prognosis

- Age <1yr or >10yrs
- WBC >50, 000
- Presence of Philadelphia chromosome t(9, 22)
- CNS involvement at Dx

RECALLS – HEMATOLOGY

1

Two weeks after a viral syndrome, a 2-year-old child develops bruising and generalized petechiae, more prominent over the legs. No hepatosplenomegaly or lymph node enlargement is noted. The examination is otherwise unremarkable. Laboratory testing shows the patient to have a normal haemoglobin, haematocrit, and white blood cell count and differential. The platelet count is 15,000/µL. Which of the following is the most likely diagnosis?

A. Von Willebrand disease (vWD) ✓
B. Acute leukemia ✓
C. Idiopathic thrombocytopenic purpura (ITP)
D. Aplastic anemia ✓
E. Thrombotic thrombocytopenic purpura ✓

1

An 8yo sickle-cell pt arrives at the ED in respiratory distress. Over the previous days, the child has become progressicely tired and pale. Hb is 31 g/L (130-180.) WOF viruses commonly cause this?

A. CMV
B. Coxsackie A16
C. Echovirus 11
D. Roseola
E. Parvovirus B19

ORTHOPEDICS

Overview

- Key is to focus on the age group!

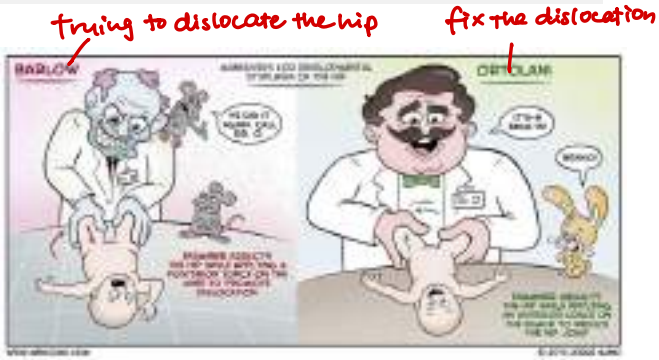
Newborn	• **DDH**
Pre-school, younger school age	• Transient synovitis • Perthes disease
Older school age, teens	• SCFE • Osgood Schlatter Disease • Juvenile Rheumatic Arthritis

- Always keep in mind of septic arthritis – the toxic child

Conditions in newborn and pre-school age

Developmental Dysplasia of the Hip

- Congenital hip dislocation
- Clinical Features
  - Excessive flexion of the hip
  - Risk Factors are 5F: **F**irst born, **F**emale, **F**amily history of DDH, **F**eet (breech position), **F**luid (oligohydramnios)
  - Can lead to early OA
- PE
  - Barlow manoeuvre – posterior force + abduction
  - Ortholani manoeuvre – anterior force + abduction
  - Allis sign – leg length below the knee are asymmetrical
- Inx
  - Dx by PE, no Inx needed
  - In older ages, U/S or X-ray can be done
- Mx
  - Early Tx is key
    - <6mo – Palvik harness
    - 6-15mo – Spika cast
    - 15-24mo – open reduction followed by spika cast



Duchenne Muscular Dystrophy

- X-linked recessive genetic condition that affects the muscles, resulting in muscle weakness.
- Clinical Features
  - Onset is 3-5 yo
  - Axial and proximal muscles are affected
  - clumsiness, difficulty standing or walking, difficulty walking on toes
  - Gower's sign (pushing up himself from the floor with the hands to stand up)

- Intellectual disabilities
- PE
  - Atrophy of the muscles, esp proximal
- Inx
  - Dx by genetic tested
  - CK is elevated
- Mx
  - Aimed to prevent Cxn
  - Short life-span is a reality

Osteomyelitis vs Septic Arthritis

- These two can affect any age group

	Osteomyelitis	Septic Arthritis
Cause	Mostly *Staph. aureus*	Mostly *Staph. aureus*
Clinical Features	• Fever • Local swelling can be seen over joint • Painful bone	• Toxic child, unwell • Painful bone and joint
PE	• Mild swelling in the overlying skin can be present • Limited ROM can be present • Point tenderness over the bone	• Swollen and reg angry looking joint • All movements are painful and limited • Generalised tenderness of the bone
Inx	• X ray can be done	• Joint aspiration • Blood culture and workup
Mx	ABx - flucloxacillin	ABx – flucloxacillin and escalate/de-escalate

Common conditions in school age and adolescent

Transient Synovitis = Irritable Hip

- Most common cause of limp in pre-school age
- Clinical Features
  - 3-8 yo
  - Acute pain in joint
  - Hx of recent URTI (1-2wks)
  - Able to bear weight but painful joint
  - Otherwise well
- PE
  - Afebrile
  - Skin over the joint can be red and swollen but usually normal
  - Moderate decrease of ROM esp. internal rotation
- Inx
  - Dx of exclusion – r/o other conditions by Xray
  - If joint fluid +present, U/S or joint aspiration can be done but not routinely done
- Mx
  - Observation. Self-limiting condition
  - f/u in 4-6 mo to r/o Perthes disease

kids can present with knee pain even if hip problem

Perthes Disease

- Idiopathic avascular necrosis of the femoral head
- Clinical Features
  - 4-10 yo
  - **Painless** limp
  - Can present as knee pain, hip pain and antalgic gait
  - Usually unilateral
- PE
  - Skin changes over the area can be non-prominent
  - Limited abduction and internal rotation
- Inx
  - Dx is by Xray – flattened and/or fragmented femoral head
- Mx
  - ~~If full ROM is present, observation~~
  - If limited ROM, urgent referral. Bracing, cast or surgical reduction

pre-school / young + painless limp + smoking

Risk – parents smoking



Slipped Capital Femoral Epiphysis

- Displacement of the femoral epiphysis from the femoral neck . It's not the epiphysis that slips from the acetabulum
- Clinical Features
  - 10-16yo
  - Common in obese and active children
  - **Painful** limp – difficulty bearing weight
  - Can present as knee pain, hip pain and antalgic gait
  - Bilateral in about half of the cases
- PE
  - ✓ Skin changes over the area can be non-prominent
  - ✓ Limited internal rotation and abduction of the hip
- Inx
  - Dx is by Xray – posterior and inferior displacement of the femoral head
- Mx
  - **Urgent surgical referral** – surgical screw fixation to prevent avascular necrosis
  - No weight bearing till the defect is stabilized – wheelchair

older / teen + obese + painful limp



Osgood Schlatter Disease

- Osteochondritis of tibial tubercle
- Clinical Features
  - 10-14yo
  - Common in active children
  - Painful knee esp after physical activity
  - Usually able to bear weight
- PE
  - Localized swelling and tenderness at the tibial tubercle

teens + active + ± limping able to bear weight



- Pain in knee movement against resistance

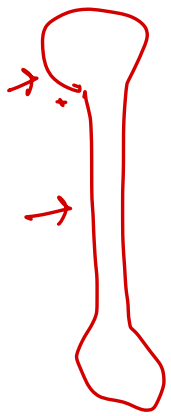
- Inx
  - Dx is by Xray – widening of apophysis, fragmentation of bone
- Mx
  - Refrain from active sports.
  - Gentle quadriceps stretching can help prevent the condition
  - In an acute attack, ice packs and simple painkillers
  - Self-limiting. Can take up to 1 year

supportive

Malignancies

Bone Malignancies in children

	Osteosarcoma	Ewing Sarcoma
Common in	Male adolescents	Caucasian male adolescents
Hx/PE	• Local pain, swelling • Systemic Sx are rare	• Local pain, swelling • Systemic Sx present - malaise, anorexia
Location	• Long bone metaphysis • Can metastasise to the lung	• Long bone mid shaft
Inx	• ↑ALP • X ray shows "Sunburst" bone lesion	• ↑ESR • X ray shows "onion skin" peri-osteal reaction
Mx	Surgery (local excision), chemo	Surgery (local excision), chemo, RT





Osteosarcoma | Ewing sarcoma

RECALLS – ORTHOPEDICS

1

14yo boy, brought to ED. He has fever, tender and warm knee joints. He does not move his knee joints at all, and he does not allow anyone to touch his limbs. WOF is the most likely Dx?

A. Osteonecrosis
B. Septic arthritis
C. Osteomyelitis
D. Perthes disease
E. Traumatic injury

2

12yo boy brought to clinic by his mother complaining of localised pain in right tibial tubercle during and after activity. Pain is worse when kneeling down and going up and down the stairs. O/E, pain is reproduced by attempts to straighten the leg. Localised tenderness is there at right tibial tubercle area.X ray of the knee showed widening of apophysis and fragmentation of the bone, but there is no fracture. WOF is true about this condition?

A. Corticosteroid injection into the apophysis is helpful
B. Immediate surgical referral is required
C. Electrotherapy is helpful
D. Gentle quadriceps stretching can help to prevent the condition
E. Condition itself is self-liming within 4 weeks

3

20 mo brought to the ED because of fever and irritability. He refuses to move his right lower extremity. O/E, he has a swollen tender right knee that resists passive movements. WOF is the most likely to yield the Dx in this pt?

A. Blood culture
B. ESR
C. FBE
D. Joint fluid examination
E. Knee Xray

4

5yo boy with Hx of aches and pains in his calf, behind the knee and in front of the thigh mainly for the last few weeks. Moving the legs does not make it better or worse. There is no pain during the day. O/E, there is no focal tenderness and child can walk and run without any restriction. WOF is you most likely Dx?

A. Transient synovitis
B. Cellulitis
C. Legg-Perthes disease
D. Growing pain
E. JRA

5

2yo child with limping for a few months, affecting his left leg. Ther are unsure if it's painful or not. O/E when he is standing, his left leg is shorter than the other, he has limited abduction of the left hip. WOF is the most likely Dx?



A. DDH
B. Perthes disease
C. JRA
D. SCFE
E. Postviral synovitis

6

4yo boy comes in limping on the left leg. For the last 10 days he has been complaining of on and off knee pain. Parents smoke at home. O/E, he is afebrile. He complains of slight pain when his left hip is abducted. X ray is done. WOF is the most likely Dx?



A. Perthes disease
B. Vit D deficiency
C. JRA
D. SCFE
E. Postviral synovitis

NEUROLOGY

Cerebral Palsy

Cerebral Palsy

- Non-hereditary, Non-progressive. Most common movement disorder in children.
- In most cases the cause is unknown
- Risk factors
  - Lowbirth weight
  - Maternal infection
  - Prematurity
  - Trauma
  - Brain malformation
  - Neonatal cerebral haemorrhage.
- Clinical Features
  - Gross motor and fine motor delay
  - Seizures, behavioural problems, hearing or vision impairment, learning disabilities, and speech deficits may be there
- PE
  - Hyperreflexia, pathologic reflexes (eg, Babinski)
  - Tone – hypertonia or hypotonia (normally hypertonia)
  - Scissoring of the legs
- Inx
  - Dx by clinical impression
  - Imaging like U/S, CT, MRI and EEG may be useful in identifying the underlying cause
- Mx
  - No cure
  - Mx in MDT – Physiotherapy, occupational therapy, speech therapy if speech delays

Seizures

- Sudden changes in neurologic activity caused by abnormal electrical activity in the brain that can often be detected on EEG.
- Causes in children can include, tumors, trauma, infections, hypoglycemia, hypocalcemia and other electrolyte/metabolic conditions, anemia, drugs, stress. If no cause is identified for the seizure, Dx of unprovoked seizure is made.
- **Epilepsy is never diagnosed if you have not done an EEG!**

Febrile Seizures

- Seizure that occurs in children who have no evidence of other causes. Benign condition with no brain damage.
- Clinical Features and PE
  - 5mo – 5yo
  - High fever (usually acute), otherwise healthy
  - Family Hx often +ve
  - Generalised

- Do not last more than 5 minutes
- no evidence of acute intracranial disease, metabolic disturbance or CNS infections.
- High rate of recurrence – 30% in 24hrs. The younger the age, the higher chance of recurrence

Note: 3% of the pts will have epilepsy in the future but the direct association of febrile seizures and epilepsy is unknown. Risk factors of seizures/epilepsy in the future are seizures >10min; multiple convulsions during 1 episode; FHx of epilepsy

- Dx is clinical. Inx can be done to r/o other causes of the seizure.
- Mx
  - Reassurance only. Prognosis Is excellent.
  - If seizures occur during consultation, observe. If the seizure lasts more than 5-10 min, rectal diazepam

Key Words in other seizures

- Absence seizure
  - 5-8yo, hyperventilation
  - EEG – 3Hz Spike and wave complex
- West Syndrome = Infantile spasm
  - 6mo – 1yo
  - Triad – salaam spasms (flexion of trunk and extended limbs), delay in motor development, hypsarrhythmia
  - Very resistant to Tx
- Lennox-Gastaut Syndrome
  - 3 – 5yo
  - EEG – diffuse SLOW spike and wave complex
- Juvenile Myoclonic Epilepsy
  - Sleep deprivation and light stimuli (TV, smartphones at night)
  - Triad – myoclonic jerks, tonic-clonic seizure (contractions, arching of back, upward rolling of eyes), LOC, absence seizure
  - Mx – valproate acid only

TIcs

- Tourette Syndrome
  - 3-8yo
  - Multiple motor tics and 1 or more vocal tics that are recurrent within a day for >1yr
  - Starts with motor tics or echolalia. Coprolalia can be there
  - Any stress can exacerbate it
  - Tx is by clonidine, risperidol, haloperidol
- Habit tics
  - recurrent tics > 1yr
  - NO echolalia, coprolalia

Note: The side effects of phenytoin includes drowsiness, vomiting, skin rash, **nystagmus, ataxia**, liver failure

Infections

Meningitis

- Causes include *meningococcus*, *streptococcus pneumoniae*, *listeria*, virus etc.
- Clinical Features
  - Fever and vomiting
  - Generalised headache
  - Photophobia
  - Localised cranial nerve palsies or seizures may occur
- PE
  - Look out for the sick neonate
  - **Neck stiffness may not always be positive in little children!!**
  - Rash and fever
  - early signs - meningococcemia
    - muscle pain
    - pallor
    - cold hands and feet
    - vomiting
  - Late signs – meningococcemia
    - Petechial rash (non-blanching)
    - Impaired consciousness
- Inx
  - Blood culture
  - CT scan to look for raised ICP
  - Lumbar puncture should be done after ruling out raised ICP! Dx by lumbar puncture.
    - CSF findings
      - bacterial meningitis: ↑WBC, ↑protein, ↓Glu
      - Viral: ↑WBC, normal Glu
      - Tb: ↑WBC, ↓Glu
      - GBS: ↑Protein, cells normal
  - Septic workup if septic
- Mx
  - Oxygen and fluids
  - **Tx should be commenced at the time of suspicion of Dx, not confirmation!!**
  - ABx – IV ceftriaxone (+ IV Benzylpenicillin in listeria and immunocompromised.) If hypersensitivity, vancomycin and ciprofloxacin
  - In bacterial meningitis, dexamethasone (decreases cerebral oedema)
  - If meningococcemia, prophylaxis to contact is necessary – ciprofloxacin or rifampicin

Neoplasms

Medulloblastoma

- Neuroectodermal tumour that arises from the 4th ventricle. Most common malignant CNS tumour in children.
- Clinical Features
  - Highly malignant

- Raised ICP – headache worse at early morning waking the child up from sleep, vomiting often without nausea. Visual field abnormalities, behavioural changes may present.
- Malignancy – LOW, LOA, breathing difficulties if severe

- PE
  - Tone, reflexes can be affected
- Inx
  - Imaging – CT head
- Mx
  - Surgical resection with RT and chemotherapy

Note: supratentorial tumours predominate in the 1st year of life, but brain tumours in children 1 – 10ys are more frequently infratentorial.

RECALLS – NEUROLOGY

CP – motor delay

Global Developmental Delay 2/4 ~ modules affected

1

Parents of a 4yo boy bring their child to see you. The child has been diagnosed with cerebral palsy, and the parents do not really understand what this mean. What is your explanation to them?

A. It is a static encephalopathy because the EEG exhibits a disorganised pattern or rhythm ✗
B. It is a static encephalopathy because injury to the brain does not progress
C. It is a static encephalopathy because affected persons have resting tremors ✗
D. It is a static encephalopathy because deficits do not appear after birth. ✗
E. It is a static encephalopathy because affected persons fail to reach any developmental milestones on time.

Non-progressive

motor ✗

2

Parents come to your GP with 10 mo baby with high fever, lethargy, neck stiffness and one episode of seizure. O/E, anterior fontanelle is bulging and rash is seen on the lower leg. WOF is most likely Dx?

F. Brain abscess
G. Acute meningitis
H. Acute viral illness
I. Trauma
J. epilepsy

↳ ICP ↑

3

5yo brought to GP due to 3 day fever associated with generalised weakness and LOA. O/E, he is lethargic, neck rigidity is present, immediate transfer to the hp is done. WOF is the ABx to commence?

A. Oral phenoxymethylpenicillin
B. IV erythromycin
C. IV ceftriaxone
D. IV gentamicin
E. Oral amoxicillin

4

6yo boy is observed in the ED because he lost consciousness for 30 secs after a fall from the playground swing. He has developed unilateral pupillary dilation, focal seizures, recurrence of depressed consciousness. WOF is your Inx of choice at this time?

A. CT scan
B. Gastric decontamination with charcoal
C. Naloxone
D. Spinal tap
E. Rapid fluid hydration

LOC possibility of head injuries

CT scan when mental status is low/fluctuating

5

7yo boy has recurrent staring episodes while at school. His school performance is poor. The episodes never lasts more than 30 seconds, and afterwards he immediately resumes normal attention. No lip-smacking or other automations. He is walking or eating during the episode, but he is unaware of this behaviour. WOF is the appropriate diagnostic study?

A. Skull Xray

absence seizures

B. EEG 3Hz spike & wave complex.
C. Serum creatinine phosphokinase
D. Myelography of the spinal canal
E. Nerve conduction studies

6
6yo boy has eye-twitching and echolalia. This has been going on for 15 months now. WOF is your Dx?

A. Cerebral palsy
B. Sydenham chorea
C. Tourette Syndrome
D. Transient tic disorder of childhood
E. dystonia

>1yr.

7
Which is not included in the immediate Mx of bacterial meningitis?

A. IV ceftriaxone ✓ 1st ABx.
B. IV 5% dextrose 2mL/kg
C. Intravenous fluids
D. Blood cultures r/o septicemia
E. IV dexamethasone → prevent ICP ↑

---

8 Sx can be non-specific.
A 6mo child is brought to the ED after having a generalised seizure at home. She is found to have a temp of 39C. WOF correctly reflects why she should be Inx with a spinal tap? lumbar puncture

A. Febrile seizures cause increased intracranial pressure that must be relieved by withdrawing CSF ✗
B. Children at this age may have meningitis with no manifestation other than seizures and fever.
C. Most febrile seizures are due to bacterial infection ✗
D. All febrile seizures justify spinal taps. ✗

9
9yo child has developed headaches that are more frequent in the morning, following by vomiting. On the previous few months, his family has noted a change in behaviour, and his school performance has begun to drop. He also started to have slurred speech, stumbling, falling and incoordination. Imaging of this child is most likely to reveal a lesion in WOF?

A. Intraventricular
B. Infratentorial
C. Spinal canal
D. Peripheral nervous system
E. supratentorial

1–10yo infratentorial tumors are most common

GENITOURINARY

Urinary Tract

Urinary Tract Infection

- 2% of young children will have asymptomatic bacteriuria. Cause – 85% is *E.Coli*. 10-15% is viral (enterovirus)
- Clinical Features/PE
  - In infants
    - Fever
    - Irritability esp when changing nappies
    - Lethargy
    - Diarrhoea and vomiting
    - Decreased wet nappies
  - In children (around >2yo)
    - Dysuria
    - Abdominal pain
    - Fever
    - Increased frequency and urgency
- Inx
  - Urine dipstick is just a screening test – poor sensitivity and specificity
  - Urine MCS
    - 0-1 years: supra pubic aspiration
    - 1-3 years: catheterisation
    - >3 years: mid-stream urine
  - US – r/o vesicoureteral reflux (40%, most common complication)
  - DMSA scan – r/o Renal scarring (30%, more common in recurrent UTI)
- Mx
  - Trimethoprim is 1st line. Other – cephalexin, Amoxicillin
  - Admission if unwell, or <6mo

Enuresis

- Daytime wetting after 4 years, night-time wetting after 6 years
  - Primary enuresis – delayed maturation of achieving bladder continence. Most common cause is small bladder capacity. More common in boys, can have a genetic predisposition
  - Secondary enuresis – wetting after normal continence of at least 3 months. Most common cause is anxiety and stress
- Underlying disorders to be excluded
  - urinary tract infection
  - diabetes mellitus
  - diabetes insipidus
  - neurogenic bladder
  - urinary tract abnormalities
- Inx
  - Urine MCS to r/o UTI
  - At 6yo< , intravenous urogram or ultrasound to r/o urinary tract abnormalities

- Mx
  - If no cause is found, reassure. Do not scold the child
  - Tx by alarm method or if urgent, desmopressin. Alarm method can take 6 – 8 wks to see improvement

Nephritic Conditions

PSGN and IgA nephropathy

	Post-streptococcal glomerulonephritis	IgA nephropathy
Timing	Associated with streptococcal infection (sore throat or skin infection) 2 – 3 wks after the infection	Associated with IgA vasculitis 2 – 3 days after URTI
Clinical Features	• Oliguria • Hypertension • Oedema • Tea- or cola- coloured urine	• Oliguria • Hypertension • Oedema • Gross haematuria that is episodic or persistent microscopic haematuria
Inx	↓C3, ↑ASO Throat swab	Normal C3
Tx	• Supportive • Diuretics and antihypertensives may be used for hypertension • Most patients have a complete recovery	• Supportive • ACE inhibitors for HTN, corticosteroids can be used for inflammation • Prognosis is normally good, but f/u is essential

Nephrotic Conditions

- Definition
  - Hyperproteinuria (≥ 3.5 g/day).
  - Hypoproteinemia/Hypoalbuminemia – albumin levels fall caused by protein loss
  - Hyperlipidaemia
  - Oedema

Minimal change disease

- The most common cause of nephrotic syndrome in children
- Idiopathic, cause is unknown
- Clinical Features/PE
  - Triad – Proteinuria, Hypo albuminemia, Generalised oedema (sudden)
  - Frothy urine, haematuria is rare
- Inx
  - Alb, RFT
  - Urinalysis
  - Renal biopsy to r/o other nephrotic conditions e.g. Focal segmental glomerulosclerosis, Membranoproliferative nephropathy
- Mx
  - Tx by steroids. Response is good, but can recur
  - Dietary advice: high protein, high carb and low salt diet

Testicular Conditions

Undescended Testis (normally congenital)

- The testis is not completely descended to the scrotum, due to incomplete migration of the gubernaculum to the scrotum
- 2nd common cause in paediatric surgery (1st is inguinal hernia)
- Clinical Features/PE
  - No testis palpable in the scrotum. Apparent at birth or found ar 6-8wk check.
  - Cxn - Testicular dysplasia , infertility, risk of malignant change (5-10x risk of seminoma)
- Dx is by PE, no Inx needed
- Mx
  - Surgery. Orchidopexy at 6 – 12 mo

testis should be cooled always

1yoc the testis will never come down

Testicular Torsion

- Twisting of the spermatic cord, leading to cut off of blood flow to the testis. Cause is unknown.
- Clinical Features
  - Can occur at any age, most common in babies and adolescents
  - Sudden, severe pain in the scrotum or the groin
  - Scrotum will be red, swollen and tender
  - Vomiting
  - Cxn - Testicular infarction may occur in 8-12 hrs

medical emergency

- PE
  - Red, swollen, tender scrotum
  - **Phren sign +ve** → raising scrotum aggravates pain
  - **Cremaster reflex -ve**
- **Dx is clinical, NO NEED FOR INX!** If you NEED to do one Inx, U/S
- Mx
  - Surgery. 6hours from onset is the golden time, otherwise can lead to irreversible damage
  - During surgery, the other testis may be fixed due to increased risk or torsion on the other side

RECALLS – GENITOURINARY

1

WOF is the most common pathogen in UTI?

A. *E.coli*
B. *Staph. Aureus*
C. *Streptococcus*
D. *Listeria*
E. *Chlamydia*

2

7yo girl came with frequency of urination. She denied any fever. Urine MCS shows E.coli 10^6. WOF is the 1st line Tx recommended?

A. Ceftriaxone
B. Trimethoprim
C. Norfloxacin
D. Ciprofloxacin
E. Nitrofurantoin

3

Mother brings her 4 year old child concerned about his bed wetting?

A. Reassure
B. Start alarm method
C. Desmopressin
D. Study further
E. Send child to CBT

4

7 yo child going for over night camp stay with school, he is complaining about not yet being completely dry at night with the alarm method?

What will you do next?

A. Nasal desmopressin → hyponatraemia
B. Reassure
C. Take the Alarm method with him
D. Start oral desmopressin now to ensure dryness
E. Stress will likely make him be continent, because of the embarrassment

---

5

In the case of Nocturnal enuresis in a 6 yo child. What is the most appropriate initial investigation?

A. urine analysis – MCS
B. urine dipstick
C. USG
D. Check for signs of child sexual abuse
E. No tests are required

6

10 yo who has recent onset of enuresis. Doctor calls his parents for assessment. They have been separated for 3 months, due to family violence. What would you do in this situation?

A. Refer the child for counselling
B. Do nothing
C. Inform family court
D. Tell the father its his fault the boy is affected
E. Inform the police regarding child abuse.

7

A 5-year-old boy presents with a three-day history of bilateral knee and ankle pain. On examination he is afebrile, his joints are tender without swelling, inflammation or synovial thickening. There is a full range of joint movements. He has a palpable purpuric rash on his legs and buttocks with some ecchymotic lesions around his ankles. He has no lymphadenopathy nor hepatosplenomegaly, and heart sounds are normal. Full blood count, blood urea, electrolytes and liver function tests are normal. ESR is 11mm/hr (2-15). Which one of the following is a known complication of this boy's condition?

A. Pleurisy
B. Fasciitis
C. Nephritis
D. Thrombocytopenia
E. Diabetes mellitus

8

3yo boy is admitted with 1wk Hx of increasing generalised swelling and periorbital puffiness following an URTI 2wks before. O/E, he has generalised oedema, with ascites and marked scrotal oedema. His BP is normal. UDT protein 4+, there is no glycosuria or haematuria. WOF is the most likely cause?

A. IgA nephropathy
B. Acute glomerulonephritis
C. Reflux nephropathy
D. Interstitial nephritis
E. Nephrotic syndrome

9

Young girl, 9 years of age with history of recurrent URTI presented after sore throat. Urinalysis showed blood(+), protein (+),. Now she came after 1 week. Urine analysis is unchanged except for blood (+), which is non-glomerular in origin and there are no casts in the urine. WOF is the next best investigation?

F. urine culture
G. DMSA scan
H. US
I. Intravenous pyelogram
J. ASO titres

10

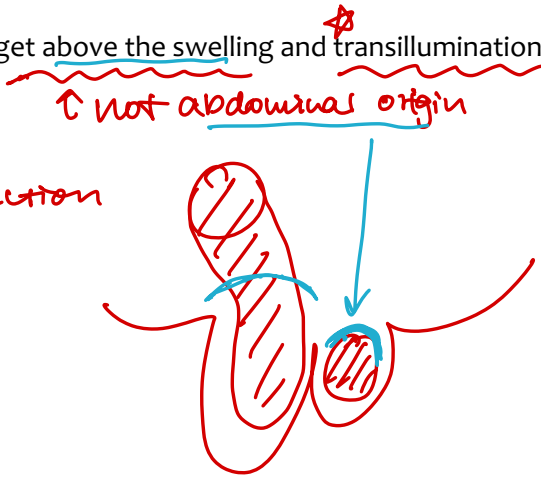
With regards to undescended testes, WOF is correct?

A. It is essential that the testes are returned to their normal position in the scrotum by the time the boy is five years old
B. Bilateral undescended testes is a more common occurrence than unilateral undescended testes
C. The lower the arrest in the line of descent of the testes the more hypoplastic it is
D. Malignancy is 4-10 times more common
E. Inguinal hernia is associated with undescended testes in <50% of cases

11

2yo boy with scrotal swelling. O/E, you can get above the swelling and transillumination test is +ve. WOF is the most likely Dx?

A. Varicocele
B. Hydrocele
C. Testicular torsion
D. Testicular cancer
E. Undescended testis



RECALLS – OTHER CONDITIONS

1

Mother brings a 10 days old baby who's eye lids are glued with yellow dry crusts. There is no redness or tearing in the eyes. Condition developed 1 day ago. WOF is your Dx?

A. Chlamydia Conjunctivitis
B. Gonorrhoea Conjunctivitis
C. NLD obstruction
D. Viral conjunctivitis

signs of infections

common in neonates, infants.

2

3yo girl has had fever & swelling of her right eye for 24hrs. O/E she looks unwell, fever 38.8C, right periorbital oedema with swollen erythematous eyelids. Extraocular eye movements are full with no evidence of chemosis or proptosis. She has no neck stiffness. WOF is the most appropriate next step in Mx?

A. Urgent CT of orbital fossae
B. Lumbar puncture
C. Topical chloramphenicol ointment
D. Oral predinisolone & antihistamines
E. IV flucloxacillin & ceftriaxone

PERI orbital cellulitis

Periorbital cellulitis vs orbital cellulitis

- Periorbital cellulitis
  - Infection in the soft tissues of the eyelids
  - Can arise from sinusitis, URTI, local trauma or insect bite
  - Swelling and redness, usually unilateral, otherwise healthy
  - r/o allergic reaction
  - Tx – flucloxacillin +/- cefotaxime. Can be treated outpatient if stable.
- Orbital cellulitis
  - Infections behind and around the globe
  - **Eye movement restriction and decrease in visual acuity**
  - **Orbital cellulitis is a medical emergency!!!**
  - Potential for loss of vision, intracranial Cxn
  - ABx, Head CT, Urgent ENT and ophthalmology referral

1. eye movements.
2. visual acuity.

Head CT is not indicated.

3

has a cleft lip. This baby

This baby was born to a mother who was epileptic and was taking carbamazepine throughout her pregnancy. She also did not stop drinking wine during her first trimester, sometimes taking up to 1 SD per day. She did not take folic acid supplements. WOF is the most likely cause of the lesion on the baby's face?

A. Sporadic or familial
B. Alcohol intake
C. Carbamazepine

D. Lack of folic acid supplement

- Cleft lip – surgery around 3mos
- Cleft palate – surgery around 6-12 mos
- Cxn – hearing, speech, feeding can be affected

~2yo

4

3mo boy brought to GP with a skin lesion on his buttock. The lesion has been present since birth, and increasing in size. WOF is the most likely Dx?



A. Cavernous malformation
B. Nevus simplex
C. Spider angioma
D. Superficial hemangioma
E. Cherry hemangioma

5

A 6 year old child came with respiratory difficulty, wheeze and urticaria while playing in the garden. Parents suspect he has been stung by a bumble bee while playing near a tree. What would be your next best management?

Anaphylaxis treatment action plan.

☆ Identifying the anaphylaxis signs
- resp – wheeze
- GI – n/v. diarrhea
- skin

F. IV Corticosteroid
G. Nebulized Salbutamol
H. IM Promethazine
I. SC Adrenalin 1:1000
J. IM Adrenalin 1:1000

6

3 yo girl presents after being bitten on foot by an insect. She developed a rash on the limb as pictured. All other vital signs are stable. What's the best Mx?

urticarial rash

simple allergic reaction → antihistamine.

A. IV promethazine
B. Oral promethazine
C. IM adrenaline 1:1000
D. IV Dexamethasone
E. Oral prednisolone

7

4yo child ingested 1 pack of 500mg paracetamol tablets about 4 hours ago. Brought to ED by parents, vitals stable. What's the next step in Mx?

A. paracetamol level ← < 8hrs.
B. NAC ← > 8hrs

RCH guideline chart

C. Gastric lavage
D. Activated charcoal
E. Give milk

8

4yo child ingested 50 tablets of his grandfather's medication about 4 hours ago. Brought to ED by parents, vitals stable. WOF if present, is not a contraindication to gastric lavage?

- Chemical ingestion never do gastric lavage

A. Ingestion of acids
B. Ingestion of petrochemicals
C. Ingestion of Alkali
D. Coma
E. Presence of gag reflex

9

8yo child fell down from bicycle . helmet indented. No loss of consciousness at time of injury. Child returns with mum after 7 days & complains of headache. O/E there is a painful swelling over parietal region. All the other neurological examination is normal. Mom is a nurse & urges to investigate further. WOF is your mx?

intracranial
extracranial

Right after injury head CTes ≥14 observe 4hrs

A. CT head
B. Xray skull
C. Reassure that no inx needed
D. MRI head
E. Observe for 4 hours in ED

---

encopresis : constipation.

10

13 year old boy soils his pants, he is 1 year behind in school. He has had loose motions for 3 years without any Ix being done. The Mother is not sure if there has been any weight loss. What is the most likely Dx?

A. Sexual abuse
B. IBD
C. Developmental delay
D. ~~Paternal~~ Parental abuse- neglect
E. Parasitic diarrhoea

11

Mother came with her 9 year old boy complaints of progressive decline in his school records up on which mother started to beat him by wooden spoon and isolate him for hours as punishment. Mother has a past history of depression. What will you do?

physical
Sexual
abuse to child
→ Notify CPS

A. Treat mother depression
B. Talk with child
C. Notify Child protection services
D. Send her for a course of right parenting

12

Mother brings her 7 months old son with complaints of bleeding from mouth and gums. On examination there is torn frenulum, old bruises on shin and forehead. No hepatosplenomegaly. No petechiae.
Diagnosis asked:

A. Factor 8 deficiency
B. Non accidental injury
C. Von Willebrand disease
D. Haemolytic anemia
E. Leukemia

forceful eating
bruises in different stages
little spot bruising
fingerprint
torn frenulum
the child is standing away from the mum
retinal hemorrages / hematympanum

13

18yo mum brings her 5mo child to ED. She is concered that the child is crying excessively. O/E, you find she is unable to move her left arm. On Xray, you find a fracture in the humerus. WOF is the most appropriate next step?

A. Social worker review ✔
B. Discharge and f/u with GP
C. Admission of the child
D. Analgesia and external manipulation in ED
E. Notify police

humerus / femur fx
Social worker
doctor
everything outside medical
· paperwork
· interviews to mum

14

A 13-year-old girl presents to your clinic asking for termination of pregnancy. Three weeks ago she participates in a party where she is coerced to have unwanted sex with a stranger who she says was around 20 yo. Yesterday, using a home pregnancy test, she realised that she is pregnant. She is a school girl and lives with her parents.
Which one of the following is the most appropriate next step in management?

A. Inform the Child Protection Service
B. Inform her parents of the event
C. Terminate the pregnancy
D. Inform the police
E. Inform the Sexual Assault Services

Gillick's competency
17yo : it's up to her what she wants to do

15

A 13-year-old girl presents to your practice asking for an abortion. Eight weeks ago, she is a raped in party. After missing her due period, she performed a home pregnancy test which showed she is pregnant. The girl had left home 2 years ago and lives by herself. Which one of the following is the most appropriate next step in management?

A. Refer her for an abortion as she wishes
B. Inform the police
C. Inform the Child Protection Service
D. Inform the Sexual Assault Services
E. Inform her parents

"mature minor"

pt	partner	
≤ 16 yo	≤ 18yo	→ OK
≤ 16yo	> 18yo	→ illegal.

16

12 year old girl at foster care. She's having difficult time in school in reading and writing. She has a collection of her own toys and plays with them with her imaginary friend. Her foster parents/carers are irritated because she's a picky eater. What immediate danger is there to her in future?

A. OCD ✔

→ psychosis.

B. sexual abuse ✓
C. drug abuse ✓
D. anorexia nervosa ✓
E. schizophreniform psychosis ✓

schizophrenia → Dx
psychosis → condition.

17

3 yo came to GP. The child follows a fixed routine, does not answer any questions you ask and just utter 2 or 3 random words. He seems to be detached from the world but very busy with his toys. When asked something, he just bangs his head to the wall, and start playing with the toys again. WOF is the most likely Dx?

Speech delay

A. Asperger syndrome ← ASD with normal language development
B. Rett syndrome ✓
C. Tourette disorder ✓
D. Autism spectrum disorder ASD
E. Attention deficit hyperactivity disorder ADHD

- ASD (Autism Spectrum Disorder)
  - Genetic condition characterised in delay in social skills
  - Rituals and repetitive behaviours
  - Can have speech delay or motor coordination problems
  - **Does not have association to fostering environment or vaccination!**
- ADHD (Attention Deficit Hyperactivity Disorder)
  - Genetic conditions characterised by
    - Impulsiveness – cannot wait in line
    - Attention deficit – not paying attention, forgetfulness
    - Hyperactivitiy – running moving around
  - Headbanging during earlier childhood is common
- Before diagnosing ASD or ADHD, r/o the following
  1. Hearing and vision problems
  2. Learning problems
  3. Sleeping problems esp. Obstructive sleep apnea
- Dx is done by child psychiatrist after interviews and tests. Mx by MDT of child psychiatrist and psychologist, speech pathologist, occupational therapist, physiotherapist, etc.

ASD
Gross Motor | Fine Motor | Language | Social
if no speech delay. we (used to) call it Aspergers.
← this can also be seen in ASD.