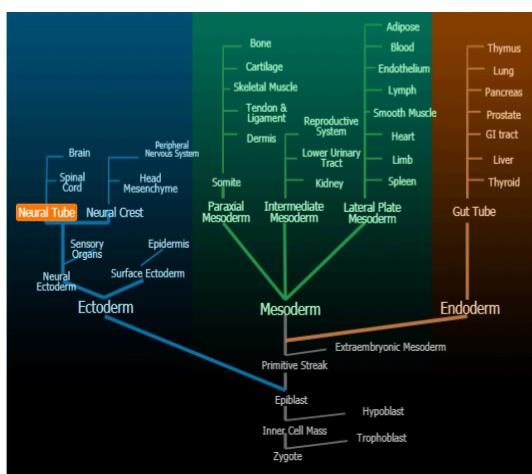
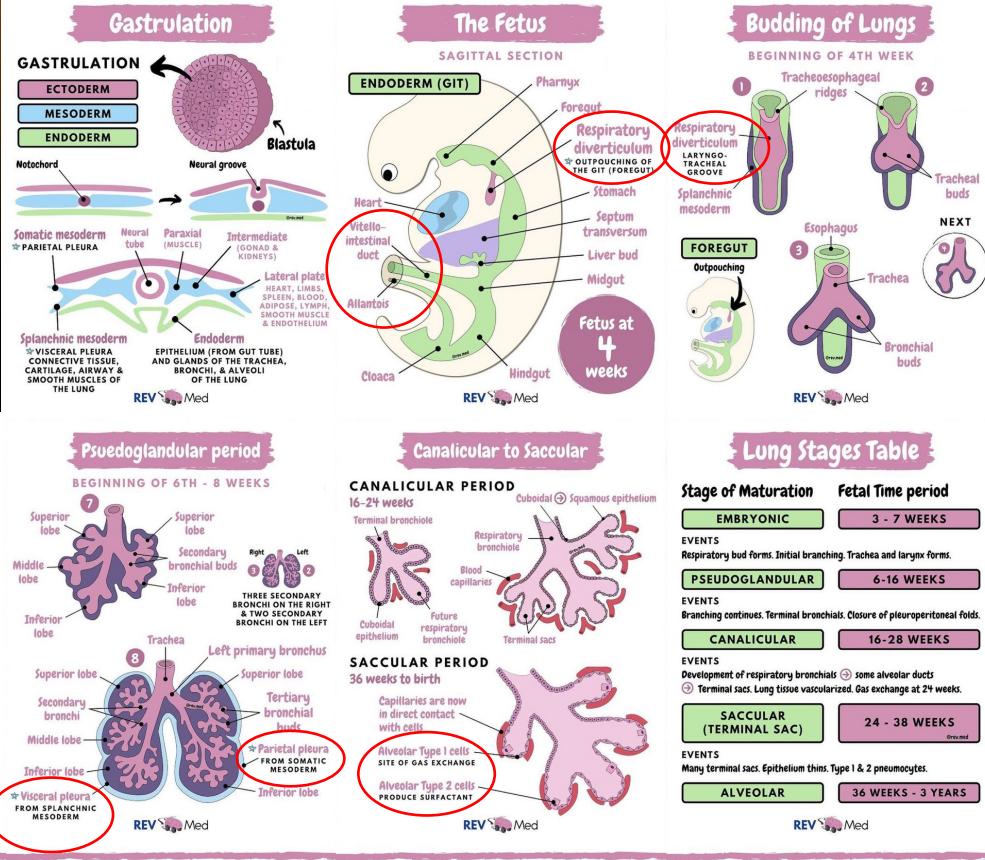


PAEDIATRIC RESPIRATORY



INCOMPLETE fusion of tracheoesophageal folds in 4th week leads to **TEF** – recurrent pneumonitis



Embryological Defects

DEVELOPMENTAL STAGE	EMBRYONIC	PSEUDOGLANDULAR	CANALICULAR	TERMINAL SAC	ALVEOLAR
Gestation	0-6 weeks	7-16 weeks	17-24 weeks	25-36 weeks	>37 weeks
Structural morphogenesis	Trachea, bronchi	Bronchioles, terminal bronchioles, lung circulation	Respiratory bronchioles, primitive alveoli	Alveolar ducts, thin-walled alveolar sacs, increasing functional type 2 cells ^a	Definitive alveoli and mature type 2 cells ^a
Disease manifestation	Tracheoesophageal fistula, pulmonary sequestration	Bronchogenic cyst, congenital diaphragmatic hernia, congenital cystic adenomatoid malformation	Pulmonary hypoplasia, RDS, BPD, alveolar capillary dysplasia	RDS, BPD	TTN, MAS, neonatal pneumonia, PPHN

BPD=bronchopulmonary dysplasia; MAS=meconium aspiration syndrome; PPHN=persistent pulmonary hypertension of the newborn; RDS=respiratory distress syndrome; TTN=transient tachypnoea of the newborn;

^aType 2 pneumocytes are surfactant-producing cells

Risk Factors of Respiratory Distress in the Newborn

RESPIRATORY DISEASE	RISK FACTORS
TTN	Caesarian section, precipitous delivery, late preterm or early term, maternal sedation or medication, fetal distress, gestational diabetes
Neonatal pneumonia	Maternal group B streptococcus carrier, chorioamnionitis, maternal fever, PROM, prematurity, perinatal depression
RDS	Prematurity, gestational diabetes, male infant, multiple gestation
MAS	MSAF, postterm gestation, fetal distress or perinatal depression, African American ethnicity
Pulmonary hypoplasia	Oligohydramnios, renal dysplasia or agenesis, urinary outlet obstruction, premature PROM, diaphragmatic hernia, neuromuscular disorder (loss of fetal respirations/bell-shaped chest)

QUICK QUESTIONS

What is one outcome of the lack of lymphatics in Reinke's space?

- Tumours don't metastasise

Difference between nasal cavity respiratory and olfactory epithelium

- No goblet cells
- No cilia

Do bronchioles have hyaline cartilage?

- No

What is the difference between terminal and respiratory bronchioles?

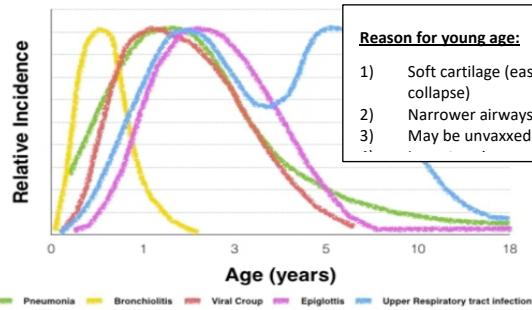
- Respiratory bronchioles have alveoli for gas exchange

RESP H+E

Resp. Hx

- **Age important** (< 3/12 most vulnerable to apnoea)
- **Feeding + drinking Hx**: sig. changes?
- **Activity levels + sleeping**: Quiet or clingy
- **PMHX**:
 - Pattern of wheeze (assoc. w/ bronchiolitis) OR
 - FHx of atopy (eczema, asthma, hayfever)
- **Red-flags**?
 - fevers,
 - pre-term, NICU,
 - Hx of apnoea, CV or resp. diseases
 - parents report sig. change
 - stridor at rest
 - quiet chest

Age distribution of acute respiratory infections in children



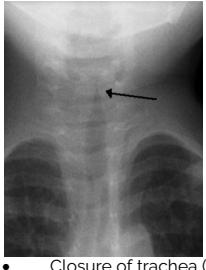
Reason for young age:

- 1) Soft cartilage (easier collapse)
- 2) Narrower airways
- 3) May be unvaxed



Exam (ABCDE)	Inspect	<ol style="list-style-type: none"> 1) ?Level of alertness – interactive/playful → agitated → lethargic/tired 2) Check for any vomit → aspiration pneumonia? 3) ?Posture – propped up (easier to breathe) or lying down 4) ?Ability to speak – normal → short sentences → cannot speak or complete sentences 5) Body / facial dysmorphia
	Hands	<p>Clubbing in Children</p> <ul style="list-style-type: none"> • Hereditary clubbing • Cyanotic heart disease • Infective endocarditis • Cystic fibrosis • Tuberculosis • Inflammatory bowel disease • Liver cirrhosis
	VITALS	<p>Check with child's age to determine if tachycardic, tachypnoeic</p> <ul style="list-style-type: none"> ➢ Tachypnoea → late sign (bradypnoea) → resp. arrest ➢ Detect hypoxia early (i.e. before it falls below 90% -- prevent decompensation) ○ Supp. oxygen given if sats < 92% → NP, HM, NRB, CPAP
	WoB	<ul style="list-style-type: none"> • Rib recession (mild-mod-severe) – tracheal tug, supraclavicular, sternal (=severe), intercostal, subcostal <ul style="list-style-type: none"> ○ Younger children show recession more frequently, due to their softer chest walls • Accessory muscles → head bobbing (SCM = severe), abdominal breathing, nasal flaring
	Abnormal airway noise	<ul style="list-style-type: none"> • Coryza (runny nose) – common in URTIs, bronchiolitis and well infants! • Wheeze (exp.) – narrowed lower airways during expiration – asthma, bronchiolitis, viral-induced wheeze • Stridor (insp. + exp.) – upper airway obstruction <ul style="list-style-type: none"> ○ Acute stridor → croup (+ hoarseness), anaphylaxis, FB inhalation ○ Chronic stridor → laryngomalacia, subglottic stenosis ○ 'THE SOFTER THE STRIDOR - THE WORSE THE NARROWING' • Grunting (exhaling while glottis is partially closed creating PEEP) OR crying in prolonged expiration – closed glottis to keep alveoli open - infants with severe respiratory distress • Hot potato voice = laryngitis
		<ul style="list-style-type: none"> • Cushingoid = steroid usage • Nasal flaring/grunting → increased WoB → congenital cyanotic HD or HF • Micrognathia (undersized jaw) → genetic issue (e.g. Marfan, Noonan, Pierre-Robin), • Ears = tympanic membrane (otitis media – URTI), hearing loss (primary ciliary dyskinesia) • Throat = tonsillitis, pharyngitis, quinsy (trismus), EBV (white exudates), poor dentition (caries)
	Auscult	<ul style="list-style-type: none"> • Audible wheeze (e.g. croup, viral-induced wheeze, bronchiolitis) • WET Crepitations (secretions = infection) → RHONCHI • Bronchial breathing (consolidation due to pneumonia) – coarse sound
	Ix	<ul style="list-style-type: none"> • VITALS, FiO₂, • UA (nephrotic, subacute bacterial endocarditis) • VBG • CXR • ECG (3-lead)
		<ul style="list-style-type: none"> • Sputum sample • PEFR + inhaler technique • Measure + plot height and weight on growth chart

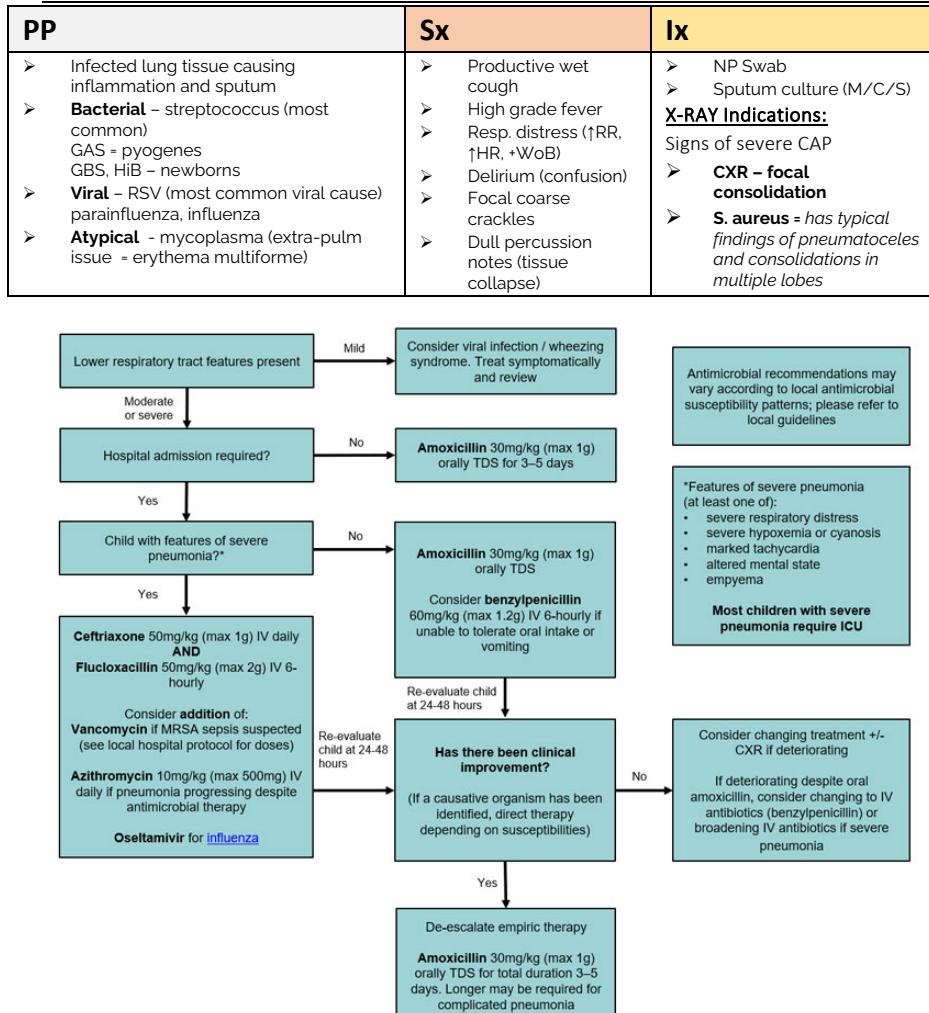
Respiratory Scenarios

<ul style="list-style-type: none"> 7 y.o. boy w/ 9/52 cough Persistent fevers No sig. pMhx A - patent B - mild increased WOB C - CR < 2 sec, strong pulse 	<ul style="list-style-type: none"> 18/12 y.o. girl waking up with sudden SOB Brought in by mother Assoc. w/ barking cough +/- stridor Salbutamol ineffective Intercostal and subcostal recession present 	<ul style="list-style-type: none"> Father brings in 10/12 daughter with cough and irritable 3-day Hx of runny nose and cough Bronchodilator ineffective 	<ul style="list-style-type: none"> 21-day infant presented cyanotic at home recovered in 30s after stimulation by mother 																																																																																																																									
TRIAGE SHEET <p>Triage Group: Emergency TPH Triage Category: 3 Triage Family Present: Father Triage Date/Time: 25/12/2020 22:31 AEDT Triage Visit Reason: Respiratory - Breathing Problem Espinosa, Carla I</p> <p>Type of Visit: Emergency Presentation Triage Author: Espinosa, Carla (RN) Respiratory Rate: 40 brpm Oxygen Saturation: 90% Room Air or Oxygen at Triage: Room Air Infectious Contact: No Peripheral Pulse Rate: 130 BPM Immunisations up to Date: Yes Temperature, Axilla: 38.9 DegC Pain: Assessed</p>	<p>DCP Generic code: Triage Group: Emergency TPH Triage Category: 2 Triage Family Present: Mother Triage Date/Time: 25/04/2020 02:02 AEDT Triage Visit Reason: Respiratory - Breathing Problem Espinosa, Cc</p> <p>Type of Visit: Emergency Presentation Triage Author: Espinosa, Carla (RN) Respiratory Rate: 54brpm Oxygen Saturation: 97% Room Air or Oxygen at Triage: Room Air Infectious Contact: No Peripheral Pulse Rate: 155 BPM Immunisations up to Date: Yes Temperature, Axilla: 37 DegC Pain: Assessed</p>	<p>Examination:</p> <ul style="list-style-type: none"> 38.7 deg fever Wheeze Crepitations throughout both lung fields 	<p>TRIAGE SHEET</p> <p>DCP Generic code: Triage Group: Emergency TPH Triage Category: 3 Triage Family Present: Mother Triage Date/Time: 21/01/2020 10:18 AEDT Triage Visit Reason: Respiratory - Breathing Problem Espinosa, I</p> <p>Type of Visit: Emergency Presentation Triage Author: Espinosa, Carla (RN) Respiratory Rate: 48brpm Oxygen Saturation: 99% Room Air or Oxygen at Triage: Room Air Infectious Contact: No Peripheral Pulse Rate: 136 Immunisations up to Date: No Temperature, Axilla: 37 DegC Pain: Assessed</p>																																																																																																																									
<p>Investigations:</p> <ol style="list-style-type: none"> FBC, EUC, LFT CRP blood culture M/C/S +/- sputum Nasopharyngeal swab CXR 	<p>DDx:</p> <ul style="list-style-type: none"> Croup (parainfluenza) - laryngotracheobronchitis Asthma (?wheeze) Anaphylaxis (?urticaria, trigger) Inhaled foreign body (?airway, choking) Bacterial tracheitis (?very sick) Epiglottitis (?Hib vax, ?drooling, sitting forward - tripodding) 	<p>DDx:</p> <ul style="list-style-type: none"> Bronchiolitis (RSV induced airway inflammation) Viral induced wheeze Asthma (no wheeze & never diagnosed in infants) Resp. distress (Steroids used in pre-term) Pertussis (immunisaed?) Pneumonia (no wheeze) Chronic lung disease 	<p>ISBAR: This is 21 day old baby Jag. He is having apnoea & presented cyanotic at home. While asleep, he became cyanotic and bradycardic to 48. I have ventilated him for about 30 s. He has good chest movements and pulse has recovered to over 100. The bag isn't connected to O2 yet & need resuscitation trolley</p>																																																																																																																									
<p>What's next?</p> <ol style="list-style-type: none"> Oxygen (nasal prongs, hudson mask) – no sig. PMhx but low Sats ?Nebulised adrenaline (airway obstruction) ?Salbutamol (wheeze) ?Cannulation – fluid bolus, meds ?paracetamol – fever to avoid tachycardia, tachypnoea <p></p> <ul style="list-style-type: none"> LLL = pneumonia mycoplasma pneumoniae as 1/3rd of school aged children = macrolide S. pneumoniae = most common CAP → amoxycillin 	<p>Rx for croup cough:</p> <ol style="list-style-type: none"> Call for senior help → discuss Mx esp. to prepare for deterioration → anaesthetics, intubation To treat airway obstruction: Nebulised adrenaline = more vasoconstriction mainly (0.5mg/kg – MAX 5ml) Steroids = reduce airway swelling <ul style="list-style-type: none"> Oral - dexamethasone 0.3mg/kg Inhaled - budesonide Unconscious → airway adjunct Low O2 sats → oxygen Unresponsive to Rx → CXR <p></p> <ul style="list-style-type: none"> Closure of trachea (steeple sign) 	<p>Rx/Mx:</p> <ul style="list-style-type: none"> No – no need medical intervention at this stage Usu. gets worse for 1-3 days before improving Feeding plan: offer half usual formula amount, twice as often Close contacts: esp. children at home (as RSV highly contagious) Reassure stressed parents <p>Other considerations:</p> <ul style="list-style-type: none"> Hydration – poor cap refill time, tachycardia, XS wet nappies Oxygenation? – not needed as saturating well 	<p>DDx:</p> <ul style="list-style-type: none"> Bronchiolitis Infection (pertussis, pneumonia) GBS sepsis ICH Meningitis Gastroenteritis <p>Investigation for apnoea</p> <ul style="list-style-type: none"> FBC EUC – arrhythmia, seizures CRP - ?sepsis Nasopharyngeal aspirate (can be assoc. w/ bronchiolitis, whooping cough) Suprapubic urine LP CXR (exc. pneumonia) 																																																																																																																									
<p>Regular medicines</p> <table border="1"> <tr> <td>Year 20</td> <td>Date and month</td> </tr> <tr> <td colspan="2">PRESCRIBER MUST ENTER administration times</td> </tr> <tr> <td>Date</td> <td>Medicine (print generic name)</td> </tr> <tr> <td>25/12</td> <td>Benzylpenicillin</td> </tr> <tr> <td>Route</td> <td>Dose</td> <td>Frequency and NOW enter times</td> </tr> <tr> <td>IV</td> <td>1000mg</td> <td>Q6H</td> </tr> <tr> <td colspan="3">Pharmacy/additional information</td> </tr> <tr> <td colspan="3">Indication Dose calculation (eg. mg/kg per dose)</td> </tr> <tr> <td colspan="3">Pneumonia 50mg/kg/dose</td> </tr> <tr> <td>Prescriber signature</td> <td>Print your name</td> <td>Contact/pager</td> </tr> </table> <p>Weight Method A: Daily requirements (mL/24hours)</p> <table border="1"> <tr> <td>3-10kg</td> <td>100mL/kg</td> <td>4mL/kg</td> </tr> <tr> <td>10-20kg</td> <td>1000mL + (50mL/kg for each kg over 10kg)</td> <td>40mL + (2mL/kg for each kg over 10kg)</td> </tr> <tr> <td>>20kg</td> <td>1000mL + (20mL/kg for each kg over 20kg)</td> <td>60mL + (1mL/kg for each kg over 20kg)</td> </tr> </table>	Year 20	Date and month	PRESCRIBER MUST ENTER administration times		Date	Medicine (print generic name)	25/12	Benzylpenicillin	Route	Dose	Frequency and NOW enter times	IV	1000mg	Q6H	Pharmacy/additional information			Indication Dose calculation (eg. mg/kg per dose)			Pneumonia 50mg/kg/dose			Prescriber signature	Print your name	Contact/pager	3-10kg	100mL/kg	4mL/kg	10-20kg	1000mL + (50mL/kg for each kg over 10kg)	40mL + (2mL/kg for each kg over 10kg)	>20kg	1000mL + (20mL/kg for each kg over 20kg)	60mL + (1mL/kg for each kg over 20kg)	<p>As per manufacturer's guidelines</p> <table border="1"> <tr> <td>DOCTOR</td> <td>Print</td> <td>DOCTOR</td> <td>Date</td> <td>25/4/20</td> <td>Weight (kg): 12kg</td> <td>Height (cm):</td> </tr> <tr> <td colspan="7">First prescriber to print patient name and check label co</td> </tr> <tr> <td colspan="7">Paediatric Medication chart number of</td> </tr> <tr> <td colspan="7">Facility/Service: Ward/unit:</td> </tr> <tr> <td colspan="7">Additional charts: IV fluid BGL/Insulin Acute pain Chemotherapy</td> </tr> <tr> <td colspan="7">Once only medicines:</td> </tr> <tr> <td>Date prescribed</td> <td>Medicine (print generic name)</td> <td>Route</td> <td>Dose</td> <td>Date/time to be given</td> <td>Signature:</td> <td>Print your name</td> </tr> <tr> <td>25/4/20</td> <td>Adrenaline 1:1000</td> <td>NEB</td> <td>5mL</td> <td>STAT</td> <td>Doctor</td> <td>0.5mL/kg</td> </tr> <tr> <td>25/4/20</td> <td>DEXAMETHASONE</td> <td>PO</td> <td>3.6mg</td> <td>STAT</td> <td>Doctor</td> <td>0.3mg/kg</td> </tr> </table> <ol style="list-style-type: none"> Observe for at least 4 hrs after NEB adrenaline Discharge ONLY if families live far away or have poor transportation options Repeat NEB adrenaline ONLY if stridor at rest or increase WoB (may need to admit to ICU) Repeat Oral steroids PM to reduce swelling and minimise risk of recurrence 	DOCTOR	Print	DOCTOR	Date	25/4/20	Weight (kg): 12kg	Height (cm):	First prescriber to print patient name and check label co							Paediatric Medication chart number of							Facility/Service: Ward/unit:							Additional charts: IV fluid BGL/Insulin Acute pain Chemotherapy							Once only medicines:							Date prescribed	Medicine (print generic name)	Route	Dose	Date/time to be given	Signature:	Print your name	25/4/20	Adrenaline 1:1000	NEB	5mL	STAT	Doctor	0.5mL/kg	25/4/20	DEXAMETHASONE	PO	3.6mg	STAT	Doctor	0.3mg/kg	<p>DOCTOR Print DOCTOR Date 21/1/20 Weight (kg): 3.8kg Date weighed: 21/1/20</p> <p>Regular medicines</p> <table border="1"> <tr> <td>Year 20</td> <td>Date and month</td> </tr> <tr> <td colspan="2">PRESCRIBER MUST ENTER administration times</td> </tr> <tr> <td>Date</td> <td>Medicine (print generic name)</td> </tr> <tr> <td>21/1/20</td> <td>Azithromycin</td> </tr> <tr> <td>Route</td> <td>Dose</td> <td>Frequency and NOW enter times</td> </tr> <tr> <td>PO</td> <td>38mg</td> <td>Daily</td> </tr> <tr> <td colspan="3">Pharmacy/additional information</td> </tr> <tr> <td colspan="3">Indication Dose calculation (eg. mg/kg per dose)</td> </tr> <tr> <td colspan="3">Pertussis</td> </tr> </table>	Year 20	Date and month	PRESCRIBER MUST ENTER administration times		Date	Medicine (print generic name)	21/1/20	Azithromycin	Route	Dose	Frequency and NOW enter times	PO	38mg	Daily	Pharmacy/additional information			Indication Dose calculation (eg. mg/kg per dose)			Pertussis			<p>Nb: Jag is 3.8kg → so correct dose is 38mg, but rounded up to 40mg for ease of administration</p> <ul style="list-style-type: none"> Pertussis - check for sick contacts → notifiable disease Pertussis - presents as apnoea in children + cough (lasts 100 days) Macrolide ABx for pertussis (but Vaccine preventable)
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Respiratory Illness: Stridor

	Foreign Body Inhalation	Croup	Epiglottitis	Laryngomalacia
PP		URTi causing larynx oedema due to pathogen (usu. <i>parainfluenza virus</i>) Others = influenza, adenovirus, RSV, diphtheria	Haemophilus Influenza Type B	Partial airway obstruction due to softer supraglottic larynx flopping across airway during inspiration
RF		6 months to 2 years	Unvaxed Foreign traveller child	Affects infants (esp. 6/12 yo)
Sx	<p>Suspected FB ingestion</p> <ul style="list-style-type: none"> High risk or unknown FB Child is unwell Child has or had GI abnormalities Unreliable history <p>Yes to ANY</p> <p>FB likely to be radio-opaque</p> <p>Yes</p> <p>X-ray (oesophagus to beyond pylorus)</p> <p>FB not seen</p> <p>FB in Stomach or beyond</p> <p>FB in Oesophagus</p> <p>Child <ul style="list-style-type: none"> Looks well Pain-free No respiratory distress Able to eat and drink </p> <p>Low risk FB</p> <p>High risk FB</p> <p>Upper obstruction OR High risk FB</p> <p>Lower obstruction AND Low risk FB</p> <p>Urgent referral for removal (ENT, Surgery or Gastroenterology)</p> <p>Observation</p> <p>Yes to ALL</p> <p>Discharge with advice</p> <p>HIGH-RISK FOREIGN BODIES</p> <ol style="list-style-type: none"> 1) BUTTON batteries in oesophagus 2) Large objects (>6cm long or 2.5cm wide) 3) 2 magnets OR 1 magnet + 1 metal object 4) Sharp object 5) Toxic objects (e.g. lead) 	<ul style="list-style-type: none"> Increased WoB "Barking cough" – clustered Hoarse voice Stridor Low grade fever <ul style="list-style-type: none"> Complete airway obstruction – death 	<ul style="list-style-type: none"> Sore throat - odynophagia Stridor Dysphonia Drooling + Tripoding position - sitting forward Scared/quiet child Unwell septic appearance <ul style="list-style-type: none"> Complete airway obstruction – death Epiglottic abscess 	<ul style="list-style-type: none"> Chronic inspiratory stridor (intermittent) → worse while feeding, upset or URTi
Comp.		None	None	
Ix			CXR = lateral neck (thumbprint sign) *helps to exclude FB	None
Mx		<p>Self-limiting within 48 hrs</p> <p>Conservative Mx (home)</p> <ul style="list-style-type: none"> Rest and analgesia Isolate and hand hygiene <p>If unwell, breathing difficulty</p> <ol style="list-style-type: none"> 1) Admit 2) 1mg/kg pred PO or 150mcg/kg dexamethasone 3) FiO₂ 4) Neb adrenaline 0.5mL/kg (if unresponsive) 5) I+V 	<p>Alert senior paediatricians and anaesthetists</p> <p>Keep child calm – NO exam</p> <ol style="list-style-type: none"> 1) Secure airway – preparations for intubations just in case → ICU most resolve without intubation 2) If airway secure → IV ABx (ceftriaxone) + steroids (dexamethasone) 	<p>Self-resolves as larynx matures</p> <p>DDx:</p> <ul style="list-style-type: none"> Subglottic stenosis
F/U		GP follow-up	National immunisation register	

Respiratory Illness: Community Acquired Pneumonia



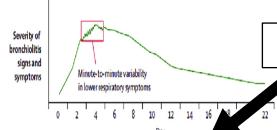
Respiratory Illness: Wheeze

Clinical Pearl

- Neither viral-induced wheeze or asthma cause a focal wheeze.
- Beware of a **focal wheeze** → a focal airway obstruction such as an inhaled FB or tumour.
- These patients will require an urgent senior review.

Pathophysiology of "wheasy" illness

1. Swelling/oedema → air trapping (worsened due to narrow airways of child)
2. Mucus secretion
3. Reactive component (only)



Exclude: anaphylaxis & foreign body
(MAY PRESENT AS STRIDOR)

Acute

Chronic

Bronchiolitis

- Most common in 6/12 old
- peak Sx at D2-3 (resolves over 7-10 days)
- Pre-term babies w/ chronic lung disease or CHD
- ATSI & Down's

AVOID bronchodilator or CS
(no reactive airways as unresponsive B2 receptors)

Unresponsive to bronchodilators

12-18 mths

> 12 mths

Bronchiolitis

Viral pneumonitis

Responsive to bronchodilators
(*VENTOLIN responsive wheeze)

Viral induced wheeze (80%)

Known trigger - allergen, pollen, dust, exercise

Reactive airway disease

Recurrent cyclical episodes of wheezes (>3-4x)
PLUS FHx of atopy

Asthma

Acute Asthma

Chronic Asthma

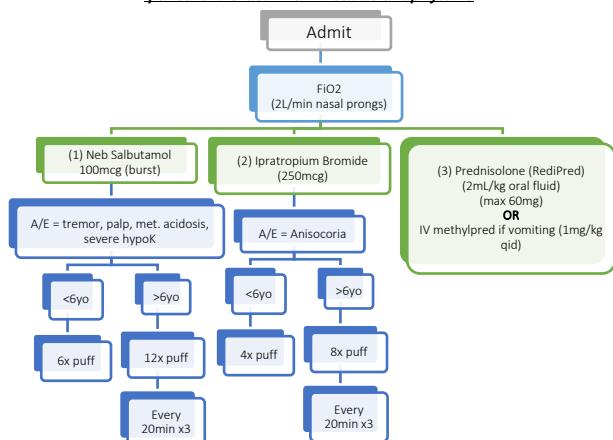
Supportive Mx - analgesia, keep calm, adequate PO intake/feeding

- Saline nasal drops + nasal suctioning - clear out secretions
- FiO2 if sats < 92%
- high flow humidified NP if breathing fatigue → provide PEEP (prevent airway collapse)
- CPAP via sealed nasal cannula
- I+V - ETT tube

- Episodic Sx w/ intermittent exacerbations
- Diurnal variability (worse PM and early AM)
- Triggers (dust, exercise, temp., animals, smoke)
- Assess control and severity

Mild	Moderate	Severe	Life-threatening
Wheeze	<ul style="list-style-type: none"> Wheeze (stethoscope) ↑ WoB ↓ sats - > 92% RR < 30 (>5yo) RR < 40 (< 5yo) 	<ul style="list-style-type: none"> Incomplete sentences Audible wheeze + grunting ↑ WoB - worse PEFR < 50% ↓ sats - <92%, RR > 40 Tachycardia (HR) <ul style="list-style-type: none"> > 125 (over 5's) > 140 (under 5's) 	<ul style="list-style-type: none"> PEFR < 33% Sats < 92% Cyanosis hypotN exhaustion - Tripoding - stationary Silent chest tachycardia
Ventolin D/C home	D/C home	T/F hospital	T/F ICU

If unsure it is asthma - treat as anaphylaxis

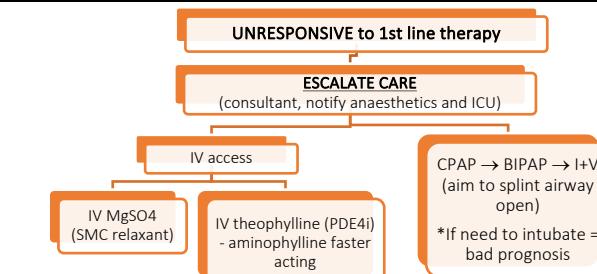


ONCE HAEMODYNAMICALLY STABLE:

1. TF to wards when clinically well and Ventolin needed every 1-2 hours → Stretch Ventolin to 3 hrly
 - MORE freq than every hr → ED → activate life-threatening protocol
 - 1-3 hrly → Ward + O2 ventilation
 - > 3hrly → home
2. Asthma action plan
 - Weaning pred dose (1mg/kg daily for further 1-2 days)
 - Stretch Ventolin (from 3 hourly to PRN)
 - Copy plan to GP, school and family
3. Inhaler technique and education (consider spacer + preventer usage)
4. Advise on avoiding triggers - pollen, dust, exercise,
5. Follow up w/ GP in 1 week

HANOVER POINTS (ISBAR)

- X-asthma - stable/unstable
- Meds - SABA, SAMA, ICS, Oral CS
- Hx of asthma, atopic features
- Previous hosp. ICU Ax
- Current meds - freq, regime O/E
- Plan - weaning, O2 supp. + asthma action plan

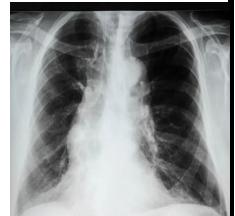


Investigations - ABG

- Respiratory acidosis (CO2 retention due to airway collapse)
- T2RF - as hypoxia also present

Investigations - CXR

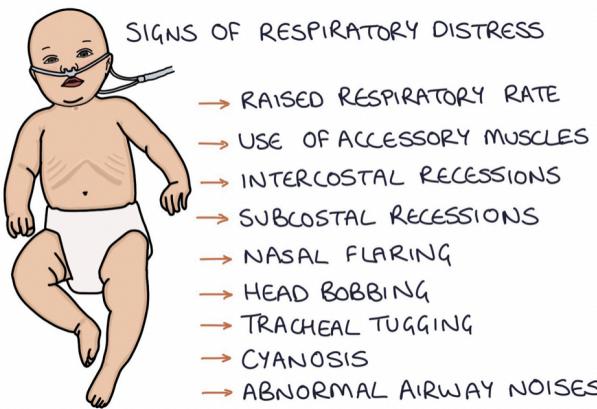
- Flattened rib - able to see posterior ribs
- Elongated heart due to air trapping in enlarged lungs
- Patchy opacification
- Peri-bronchial cuffing (swollen bronchioles)



Investigations - asthma: INO gold standard test

- Clinical diagnosis
- Spirometry (if > 5yo) - bronchodilator reversible
- Direct bronchial challenge with methacholine
- Fractional exhaled nitric oxide

IMPORTANT SIGNS OF RESPIRATORY DISTRESS



Assess Bronchiolitis severity & Management:

A	Behaviour	Normal Talks normally	Some / intermittent irritability Reduced or poor feeding	Increasing irritability and / or lethargy Cannot feed
B	Tachypnoea Signs of RDS ↓Sats	Normal / slight	Increased <ul style="list-style-type: none"> ➤ Head bobbing ➤ Nasal flaring ➤ RR > 50 ➤ Sats – slight increase 	Marked increase or decrease <ul style="list-style-type: none"> ➤ Stridor at rest ➤ Grunting (self-generated PEEP) ➤ RR > 60 ➤ Sats < 90% RA (decompensated)
C	<ul style="list-style-type: none"> • HR • BP • Pallor • hydration 	Normal	MILD Tachycardia Pallor Dry MM + reduced UO	HypoTN Pale/mottled Reduced skin turgor
D	Activity	Awake	Wake w/ stimulation	Reduced LOC + focal seizures
		MILD	MODERATE	SEVERE
	Do I admit?	<ul style="list-style-type: none"> • D/C • Admit (if RF present) 	<ul style="list-style-type: none"> • Admit → D/C, after period of observation (discuss with senior consultant) 	<ul style="list-style-type: none"> • Admit → organize early transfer to children's hospital/PICU
	Vital signs + AVPU/GCS	<ul style="list-style-type: none"> • 2 readings every 4 hrs • ED triage 	<ul style="list-style-type: none"> • 1-2 Hourly (not continuous) 	<ul style="list-style-type: none"> • Hourly with continuous CVS/RESP monitor (esp. sats)
	Hydration / nutrition	<ul style="list-style-type: none"> • Small frequent feeds 	<ul style="list-style-type: none"> • If not feeding adequately (<50% over 12 hours), administer NG hydration 	<ul style="list-style-type: none"> • If not feeding adequately (<50% over 12 hours), or unable to feed, administer NG hydration
	O2 Therapy (FiO2)	<ul style="list-style-type: none"> • Nil 	<ul style="list-style-type: none"> • Sats < 90%, → oxygen to maintain ≥90% • Discontinue if not requiring for 2hrs 	<ul style="list-style-type: none"> • Administer O2 to maintain sats ≥90%
	Respiratory support	<ul style="list-style-type: none"> • Nil 	<ul style="list-style-type: none"> • 1st line = nasal prong (2L/min) • 2nd line (if fails) = High flow nasal cannula (HFNC) 	<ul style="list-style-type: none"> • HFNC or CPAP
	Disposition / escalation	<ul style="list-style-type: none"> • Med review if RF present or child deteriorates after D/C 	<ul style="list-style-type: none"> • Admit based on logistics/geography, phase of illness (peak?) & RF 	ICU review/admission or HDU if: <ul style="list-style-type: none"> • Deteriorating → persistent desaturations + recurrent apnoea • has risk factors
	Parental education	<ul style="list-style-type: none"> ➤ Educate parents about expected course of illness ➤ safety net → return if worsening symptoms and inability to feed adequately) 		

Case Scenarios – 9/12 old w/ bronchiolitis:

	Scenario	Mx	What to do?
1	RR 70 Sats 88 mod ↑WoB HR 180 CRT 4 WN 0/10	Admit	High FiO ₂ Hydrate - oral vs NGT
2	RR 40 Sats 96 mild ↑WoB HR 140 CRT 2 WN 8/10	Admit (if day 2) D/C (if day 6)	<ul style="list-style-type: none"> ➤ If day 2 = borderline admission (?FU in PARC → admit if ↑WoB and ↓feeding) ➤ If day 6 = educate parents for safety netting (admit if tracheal tug, intercostal recession, febrile, ↑WoB, sicker child)
3	RR 60 Sats 91 mod ↑WoB HR 170 CRT 42 WN 6/10	Admit (if day 3)	FiO ₂ (aim for > 92%)
4	RR 50 Sats 94 mild ↑WoB HR 180 CRT 4 WN 4/10	Admit (conservative)	TOF (maintenance + resus) → delivered via: <ul style="list-style-type: none"> ➤ Oral (if tolerated via syringe using hydrolyte) ➤ NGT (able to provide BMS formula, calories, fats and proteins) <ul style="list-style-type: none"> ○ Risk of aspiration pneumonia ➤ IV cannula (last resort) → able to provide fluids, take bloods <ul style="list-style-type: none"> ○ Painful, cannot provide formula, infection risk
5	RR 60 Sats 93 mild-mod ↑WoB HR 160 CRT 2 WN 5/10	D/C (if happy) Admit (if miserable)	What causes irritability/miserable? → CO₂ retention → Acidosis <ul style="list-style-type: none"> ➤ Oxygenation issue (O₂ in) → O₂ sats + alveolar SA <ul style="list-style-type: none"> ○ Provide FiO₂ ➤ Ventilation issue (CO₂ out) → blood gases (VBG sufficient) <ul style="list-style-type: none"> ○ Provide HFNP (2L/kg/min) or PEEP (CPAP) → splint airways open to reduce air trapping

*WN = wet nappies (ask parents what is normal → if < 5/10 → indicates abnormal)

Respiratory Illness #3

	Pertussis "whooping cough"	Chronic lung disease of prematurity (CLDP)	Cystic Fibrosis	Primary ciliary dyskinesia (Kartagener's syndrome)
PP	URTi of bordetella pertussis bacteria (gram-ve)	Aka bronchopulmonary dysplasia - immature lungs causes respiratory failure	Autosomal recessive CFTR1 gene (Chr 7) affecting mucus glands (Cl channels) <ul style="list-style-type: none"> 1 in 25 = carriers 1 in 2500 children Median survival 40yo <ul style="list-style-type: none"> Thick pancreatic & biliary secretions that block ducts Thick airway secretions Bilateral absence of vas deferens 	Autosomal recessive affecting motile cilia – mucus accumulation
RF	<ul style="list-style-type: none"> Sick contacts Unvaxed 	Pre-term (esp. < 28 wks GA)	Consanguinity parents – higher risk of 2 mutant copies	
Sx	NONE usu. well between coughing fits <ul style="list-style-type: none"> Cough and coryza for one week (catarrhal phase). followed by a more pronounced cough in spells or paroxysms (paroxysmal phase) – vomiting occurs after 100 day cough even after recovery "whooping" sound due to air forcefully sucked back in air after coughing finishes 	SIGNS OF RDS <ul style="list-style-type: none"> Low O2 sats Increased WoB FTT – poor wt gain and feeding Crackles and wheze on auscultation Recurrent infections 	<ul style="list-style-type: none"> Meconium ileus signs (V + C) Chronic cough Thick sputum production Steatorrhea Abdo pain +bloating FTT – low percentile Salty kiss Nasal polyps Finger clubbing Crackles and wheeze 	<ul style="list-style-type: none"> Kartagener's triad Paranasal sinusitis Bronchiectasis Situs inversus
Comp.	<ul style="list-style-type: none"> Pneumothorax (if cough too hard) Bronchiectasis Cyanosis Apnoeas 	<ul style="list-style-type: none"> cyanosis, apnoea cor pulmonale (HF) bronchiectasis (recurrent infections) 	<ul style="list-style-type: none"> Meconium ileus (1st sign – pathognomonic) Recurrent LRTi <ul style="list-style-type: none"> S. aureus, HIB Klebsiella E. coli Pseudomonas FTT Pancreatitis 	<ul style="list-style-type: none"> Recurrent LRTi FTT Bronchiectasis Infertility (dysfn cilia in fallopian tubes and flagella in sperm)
Ix	<ul style="list-style-type: none"> nasopharyngeal aspirate/swab for PCR – usually negative after 21 days, or 5-7 days after effective antibiotic therapy has been commenced Bacterial culture to confirm Anti-pertussis toxin IgG 	Diagnostic criteria: <ul style="list-style-type: none"> CXR – for diagnosis Overnight SpO2 and ECG monitoring If needing O2 therapy after 36 wks GA 	<ul style="list-style-type: none"> Newborn bloodspot test (IRT > 100) Sweat test (gold-standard) – pilocarpine skin patch to induce sweat → positive for CF if sweat Cl > 60mM Genetic test (CFTR gene) – amniocentesis or CVS 	<ul style="list-style-type: none"> CXR – situs inversus (50%) Semen analysis – male infertility Bronchoscopy + biopsy – examine ciliated epithelium
Mx	Supportive Mx <ul style="list-style-type: none"> Hand hygiene Avoid contact w/ immunosupp. Self-resolves in 8 wks ABx indication: (refer to guidelines) <ul style="list-style-type: none"> Admitted to hospital Macrolides (e.g. azithromycin 10mg/kg PO od for >5 days) Diagnosed in catarrhal or early paroxysmal phase (reduce severity) 	Ante-natal prevention <ol style="list-style-type: none"> Corticosteroids (betamethasone) for mothers with premature labour < 36 GA → accelerate lung maturation Post-natal (newborn Mx) <ol style="list-style-type: none"> CPAP Caffeine – stimulate resp. effort (refer to guidelines) Avoid over oxygenation Post-natal (toddler/child Mx) <ol style="list-style-type: none"> Formal sleep study – assess O2 sats IM injection of palivizumab (MAB) – to reduce risk and severity of RSV bronchiolitis Consider Audiology assessment if ototoxic aminoglycosides used to treat previous infections → may cause speech and language delay 	<ul style="list-style-type: none"> Daily chest PT – clear mucus Daily exercise High calorie diet – due to malabsorption CREON tablets (if pancreatic insufficiency) Prophylactic ABx → Flucloxacillin OR <ul style="list-style-type: none"> Nebulised tobramycin or PO cipro for pseudomonas SABA → for bronchoconstriction Mucolytics → Nebulised hypertonic saline or DNase (e.g. Dornase alpha) – break down DNA material in resp. secretions 	
F/U	<ul style="list-style-type: none"> SOURCE control – Isolate from school and others outside the home (esp. infants and young children) until received 5 days of therapy, or coughing for > 21 days VACCINATION – if not immunised (complete schedule) – for children and pregnant women DISEASE NOTIFICATION: (suspected or confirmed) of pertussis to the Communicable Diseases Section, ABx prophylaxis for close contacts (check immunisation status of close contacts) → aim to prevent spread to infants < 6/12 old 	Common Q: <p><i>A popular scenario is: both parents are healthy, one sibling has cystic fibrosis and a second child does not have the disease, what is the likelihood of the second child being a carrier? We know the child doesn't have the condition, so the answer is 2 in 3.</i></p>	<ul style="list-style-type: none"> IUTD – flu, varicella, pneumococcal Psychologist Bowel obstruction → flushout, lactulose or surgery Lung transplant – end-stage resp. failure Liver transplant – liver failure Fertility treatment – sperm extraction in infertile males Genetic counselling 	