EXAMINATION: PAEDIATRIC RESPIRATORY SYSTEM

Diseases of the respiratory system cause a high proportion of childhood illness, with approximately a quarter of acute paediatric admissions due to a respiratory cause. Chronic respiratory conditions can cause signs and stigmata that may be picked up in an OSCE examination. Any paediatric OSCE will also be testing your communication skills with children, and your ability to adapt your examination to the child's understanding and temperament.

- **Wash** your hands
- **Introduce** yourself to the child and their parent
- **Permission** – ask both the child and their parent if you can examine their breathing and explain what the exam will entail
- **Expose** – the chest and back will need to be exposed but be sensitive to the child's age and gender; preserve modesty whenever possible
- **Reposition** – to 45 degrees (if preferred the child can be examined standing or sitting upright)

Peripheral examination:

- Around the bed – equipment suggestive of respiratory disease e.g. inhalers, spacers, peak flow meters, sputum pots, oxygen masks
- General appearance – dysmorphic features, respiratory distress, central cyanosis
- Hands:
    - Peripheral cyanosis
    - Clubbing – seen in cystic fibrosis (CF) or cyanotic congenital heart disease
    - Tremor – ask the child to hold their hands out and close their eyes; a tremor may indicate recent salbutamol use
    - Heart rate – at the radial pulse for 15s
        - in young patients, a central pulse may be easier to palpate
        - note that crying will cause an increase in heart rate so try to ensure the child is calm and settled when measuring
    - Respiratory rate – for 15-30s
        - don't forget that, as with heart rate, the normal range of respiratory rate varies considerably with a child's age
- ENT – offer to examine the patient's upper respiratory tract (this usually causes the most distress to the child and so should be left until the end):
    - Ears with an otoscope – looking for signs of otitis media or externa
    - Throat and tonsils (not if suspicious of croup or epiglottitis)
    - Nose for coryza and signs of allergic rhinosinusitis (swollen pale turbinates, nasal polyps)

Central examination:

- When examining the chest, inspect, palpate, percuss, and auscultate the front of the chest then move on to the back of the chest to avoid asking the child to sit forwards and backwards multiple times

Reference Ranges

	Age in years				
Observation	**<1**	**1-2**	**2-5**	**5-12**	**>12**
RR	30-40	25-35	25-30	20-25	15-20
HR	110-160	100-150	95-140	80-120	60-100
sBP	80-90	85-95	85-100	90-110	100-120

- Inspection:
  - Work of breathing / respiratory distress:
    - Tachypnoea (as measured above)
    - Nasal flare
    - Grunting
    - Accessory muscle use
    - Recessions – intercostal, subcostal and suprasternal (tracheal tug)
    - Difficulty speaking (if the child is verbal) or feeding (in infancy)
    - Paradoxical chest movement – in flail chest (section of ribs broken off)
    - Kussmaul's breathing (deep, laboured) – in severe DKA
    - See-saw breathing – in complete or near-complete airway obstruction
  - Chest wall
    - Hyperexpanded – e.g. in poorly-controlled asthma
    - Pectus carinatum (pigeon chest) – various causes
    - Pectus excavatum (hollowed chest) – congenital
    - Harrison's sulci – horizontal indentation of the ribs at insertion of diaphragm caused by diaphragmatic tug in e.g. poorly controlled asthma
  - Spinal deformities – e.g. kyphosis, scoliosis – may lead to restrictive lung disease
  - Scars – e.g. from previous lobectomy in CF
  - Portacath or central line – sometimes inserted in patients with CF
- Palpation
  - Chest expansion
    - Hands encircling chest with thumbs meeting at midline but off skin
    - Ask patient to breathe in deeply
    - Assess symmetry as well as breadth of expansion
  - Tactile vocal fremitus
    - Ask the child to say "blue balloon" with the medial edge of both your hands resting against the back at each level
    - Decrease in tactile fremitus suggests pleural fluid or pneumothorax
    - Increase in tactile fremitus suggests consolidation
- Percussion
  - Explain to the child that you will be tapping on your own finger on their chest and back, to make a sound like a drum and that it won't be painful
  - Percuss left and right at each level, comparing like to like
- Auscultation
  - Listen first without a stethoscope from beside the child for:
    - Stridor – inspiratory, from partial upper airway obstruction

        - Hoarse voice – laryngeal pathology
        - Audible upper airway sounds or wheeze
    - Then listen with a stethoscope, asking the child to take deep breaths in through their mouth, to all lung fields anteriorly and posteriorly for:
        - Transmitted upper airway sounds – upper airway noise can often be heard throughout the chest in infants
        - Breath sounds – vesicular, bronchial or reduced
        - Wheeze – polyphonic or monophonic; usually expiratory, may be both inspiratory and expiratory in severe disease
        - Crackles/crepitations – bronchioles snapping open
    - Vocal resonance - listen again at each level while the child says "blue balloon" repeatedly
        - Increased – in consolidation
        - Decreased – in collapse or pleural effusion

To finish:

- Thank the child and offer to help them dress
- Explain that to complete your examination you would like to:
    - Obtain a sputum sample and viral and bacterial throat swabs (if relevant)
    - Examine the ears, nose and throat (if not already done so)
    - Check the oxygen saturation
    - Check PEFR (if suspicious of viral induced wheeze or asthma)

OSCE-Aid Communication Tips for Examining Paediatric Patients

- Paediatrics encompasses patients from neonates all the way through to adolescence – adapt your questioning and approach to the child's age and level of understanding
- Squat down to the child's level so you are not intimidating
- Ask the child who they've brought with them
- Build a rapport by talking about something unrelated to the exam, such as a toy the child has brought with them
- It may help to demonstrate listening with a stethoscope or looking in the ears on a teddy or parent beforehand to show that it doesn't hurt
- Try to make the examination into a game as much as possible, e.g. "I want to see who can take the deepest breaths, you or teddy"
- For infants, have them sat on the parent's lap; they will feel more comfortable and parents will almost always be needed to help hold their head still for ENT examination
- For ears: "can I see if you have any golden treasure hiding in there?"
- For throat: "can you say a really loud "ah" like you're a famous singer?"
- For percussion: "can I tap on my fingers on your back/tummy to see if you would make a good drum?"
- For auscultation: ask the child what noise they think their heart is making, then if you can check if they're right; ask what they last ate, then if you can try to hear it gurgling around in their tummy

Further reading:

- Illustrated Textbook of Paediatrics Fourth Edition, Lissauer & Clayden
- APLS Edition 5
- Oxford Handbook of Clinical Specialties Eighth Edition, Collier et al.