Pulmonology – emergency situations

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Schedule

- Dyspnea
- Pneumothorax
- Foreign body apiration

Dyspnea

- Subjective signs – feeling of not being able to get enough air, difficulties with breathing, breathlessness
- Objective signs – *tachypnoe*, *orthopnoe*, use of accessory respiratory muscles, flaring nostrils difficulties in feeding and talking, gasping, cyanosis

age	RR
<2 mo	<60/min
2-12 mo	<50/min
1-5 y	<40/min
6-8 y	<30/min

dyspnea

- inspiratory – cause lay in the upper respiratory tract (foreign body, epiglotitis, laryngitis)
- expiratory – the cause lay in the lower respiratory tract (asthma, obstructive diseases)
- mixed – related with lung parenhyma restriction (pneumonia, pneumothorax, foreign body, hypoinflattion, lung hypoplasia)

dyspnea – epiglotitis

- Life-threatning condition!
- cause – Hemofilus influenzae type b (Hib), Str. pneumoniae, Str. agalactiae, Staph. aureus, Str. pyogenes, M. catarrhalis
- Signs and symptoms:
  - feaver
  - difficulties swallowing
  - salivarrhea
  - hoarseness
  - stridor
  - cyanosis
  - tachypnoe, orthopnoe

  Symptoms can progress rapidly!

dyspnea – epiglotitis

- management:
  - calm the child down
  - Let the child sit
  - do not examine the throat!
  - treat the cause– antybiotic treatment!
  - if the general condition deteriorates– consider intubation (planned procedure, ICU!)

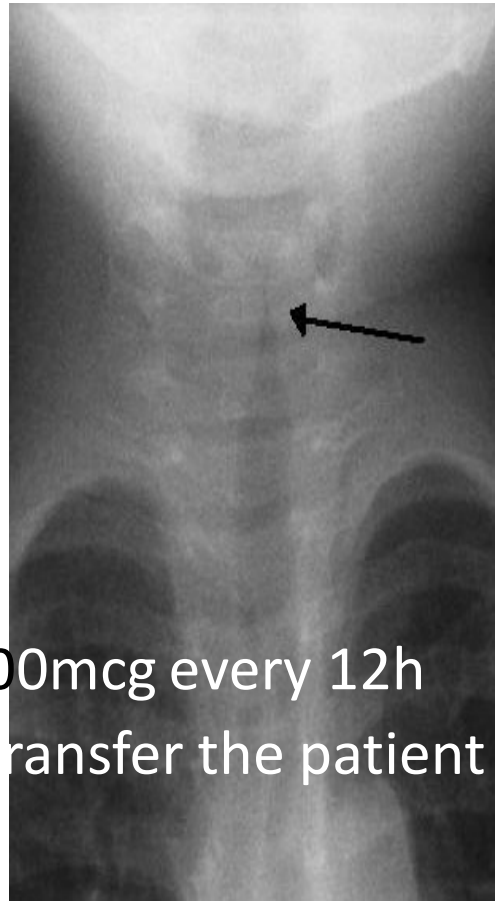
dyspnea – laryngitis

- Can be a life threatning condition!
- ethiology – parainfluenza virus(ok 75%), less frequently influenza, measles, RSV, adenovirus
- Signs and symptoms:
  - hoarsness
  - „barking” cough
  - stridor
  - dyspnea
  - deterioration during the night
  - age: 6 mo – 6 y
  - autumn-winter seson

dyspnea - laryngitis

Management:

1. Exposure to cool/cold air!
    1. go outside
    2. fridge/freezer
2. Antiinflammatory treatment
    1. Inhaled GKS – budezonid 1000-2000mcg every 12h
    2. No improvement/deterioration – transfer the patient to a hospital



Asthma exacerbations

Therapy	Dose and administration
Supplemental oxygen	24% delivered by face mask (usually 1 L/minute) to maintain oxygen saturation 94–98%
Short-acting beta$_2$-agonist (SABA)	2–6 puffs of salbutamol by spacer, or 2.5 mg of salbutamol by nebulizer, every 20 minutes for first hour*, then reassess severity. If symptoms persist or recur, give an additional 2–3 puffs per hour. Admit to hospital if >10 puffs required in 3–4 hours.
Systemic corticosteroids	Give initial dose of oral prednisolone (1–2 mg/kg up to a maximum 20 mg for children <2 years old; 30 mg for children 2–5 years) OR, intravenous methylprednisolone 1 mg/kg 6-hourly on day 1
Additional options in the first hour of treatment	
Ipratropium bromide	For children with moderate-severe exacerbations, 2 puffs of ipratropium bromide 80mcg (or 250mcg by nebulizer) every 20 minutes for 1 hour only
Magnesium sulfate	Consider nebulized isotonic magnesium sulfate (150mg) 3 doses in the first hour of treatment for children aged ≥2 years with severe exacerbation (Box 6-9, p.118)

*If inhalation is not possible an intravenous bolus of terbutaline 2 mcg/kg may be given over 5 minutes, followed by continuous infusion of 5 mcg/kg/hour[508] (Evidence C). The child should be closely monitored, and the dose should be adjusted according to clinical improvement and side-effects. See below for additional and ongoing treatment, including controller therapy.

7 years-old girl

Transfered to the ward after 5 days …

General condition – moderate
SpO2 without O2 – 91%, with O2 – 98%
RR 40/min
HR 50-70/min
Central cianosis
Rhales over both lungs
Diminished vesicular sound over the base of left lung
Prolonged exhalation

7 years-old girl

Received typical treatment with very good response

7 years-old girl

Received typical treatment with very good response

But…

7 years-old girl

Received typical treatment with very good response

But…

She couldn’t recognize members of her family, didn’t want to play with other kids, had difficulties speaking

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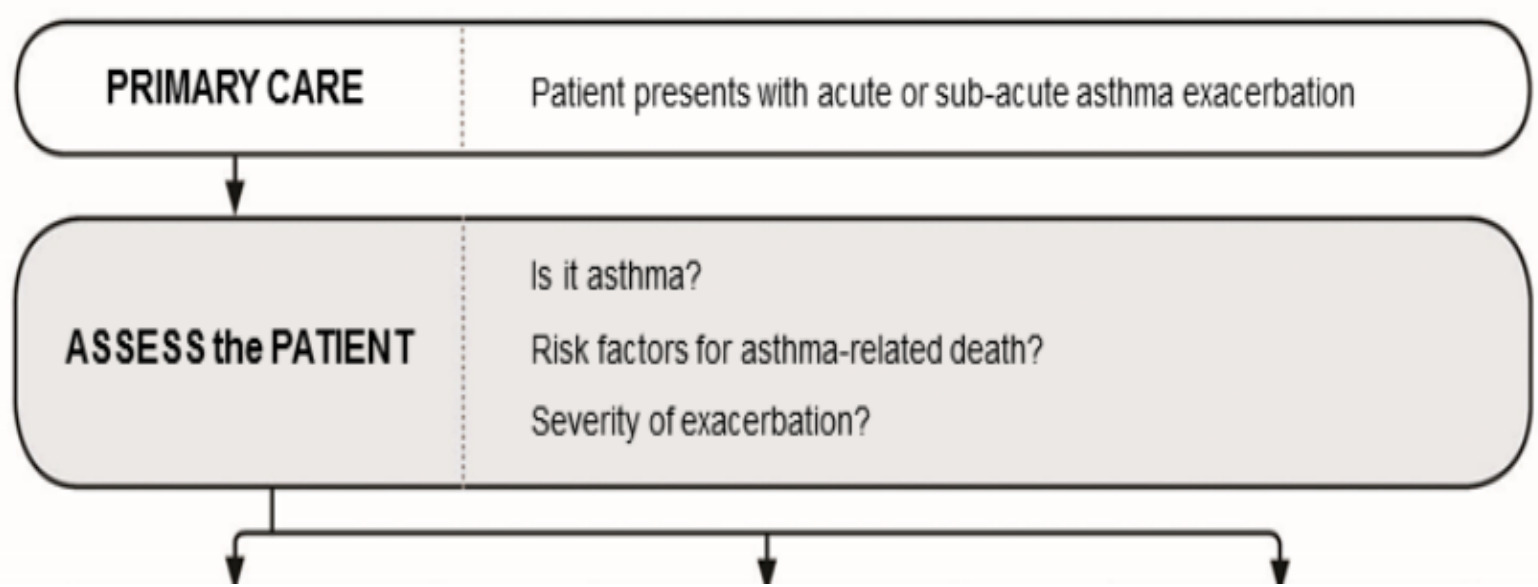
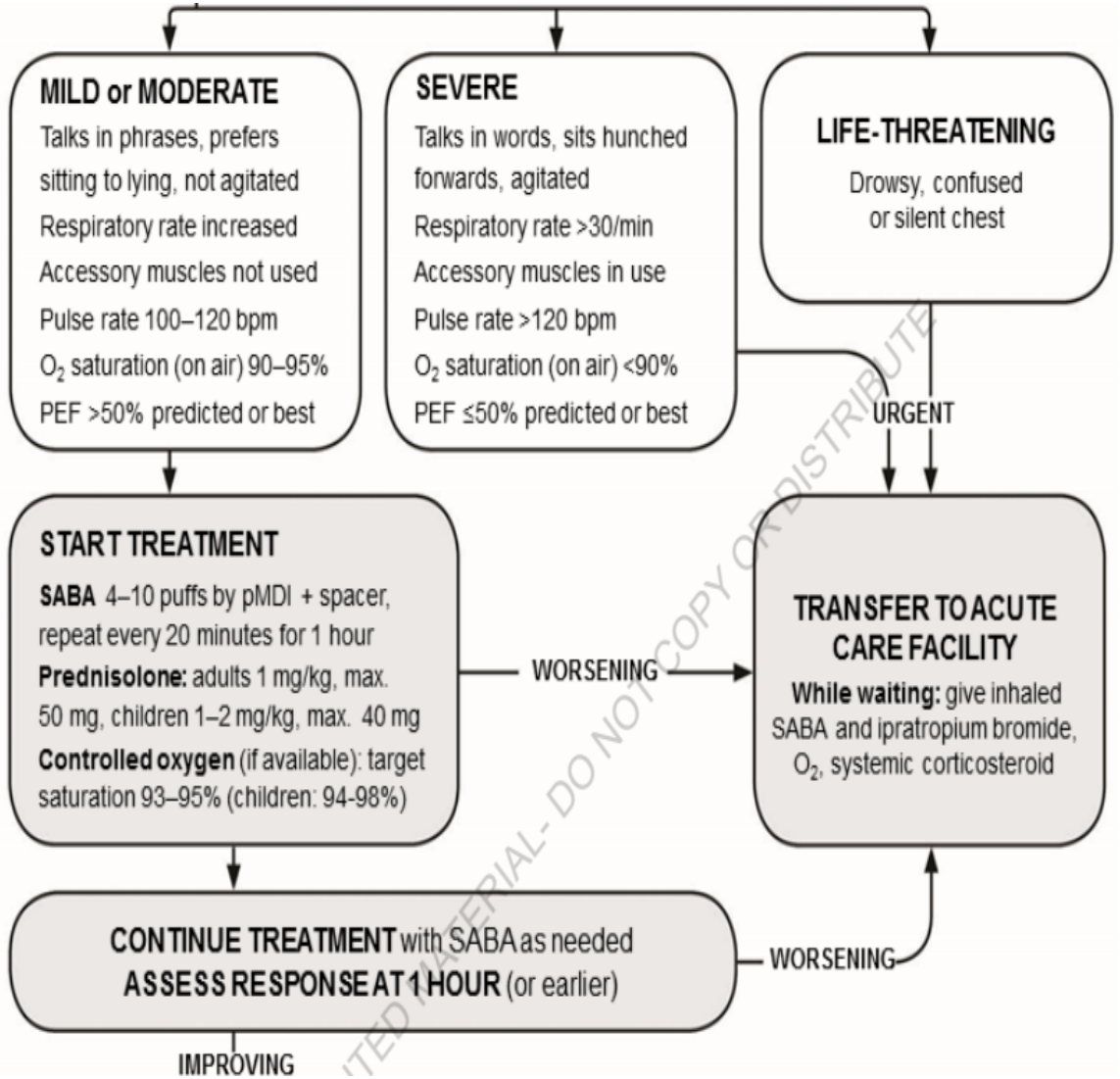
Asthma exacerbation

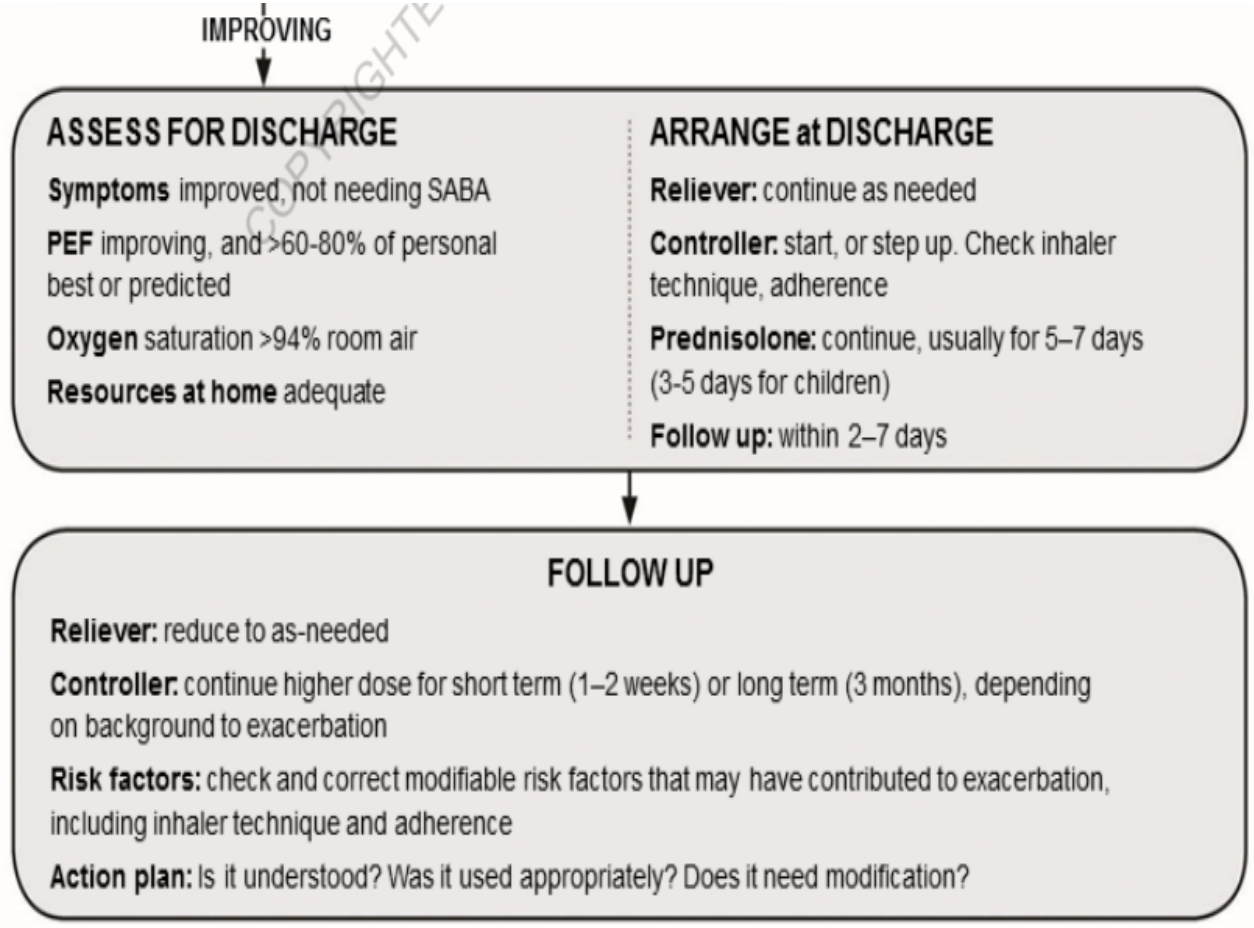
Management:



Asthma exacerbation

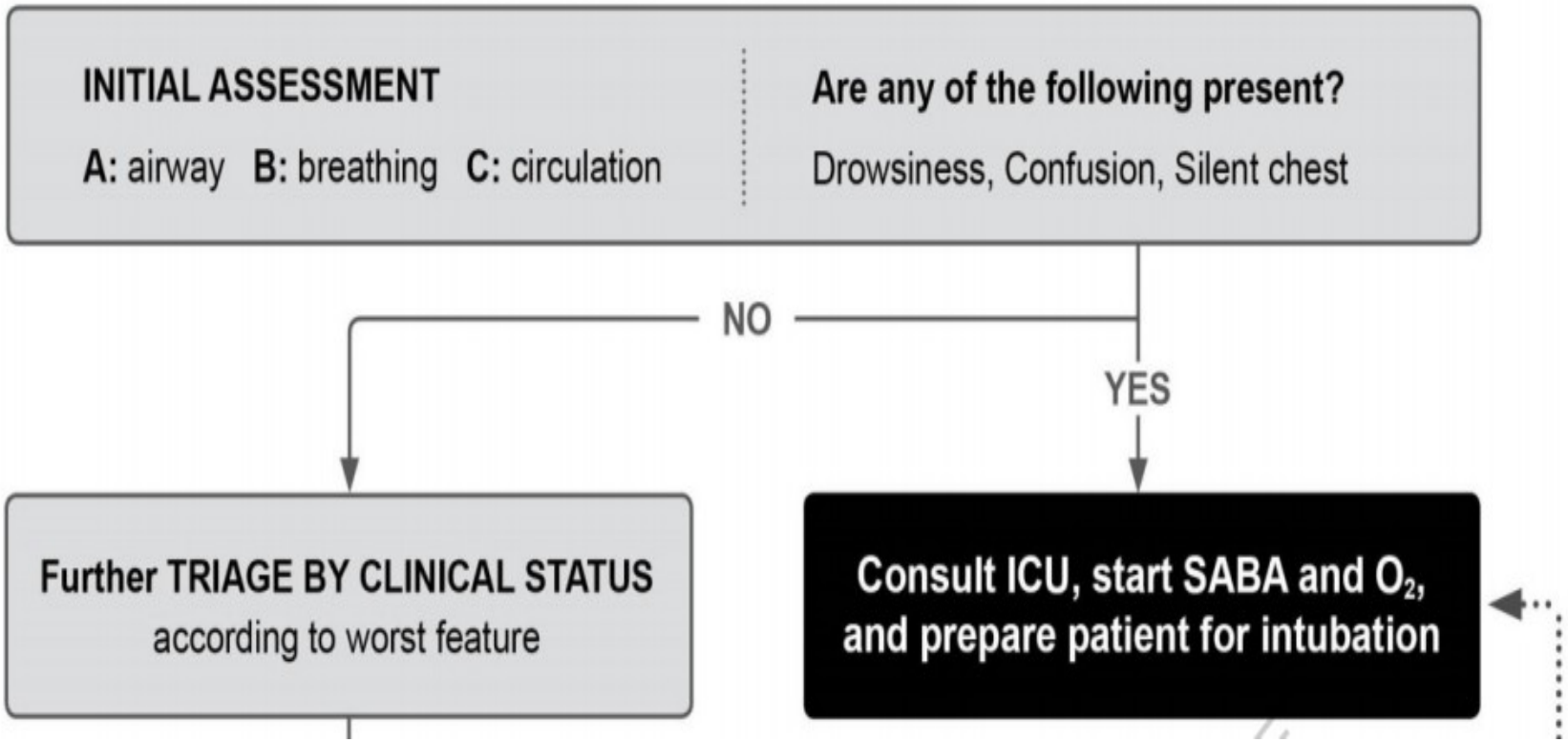


duszność - astma



O_2: oxygen; PEF: peak expiratory flow; SABA: short-acting beta$_2$-agonist (doses are for salbutamol)

duszność - astma



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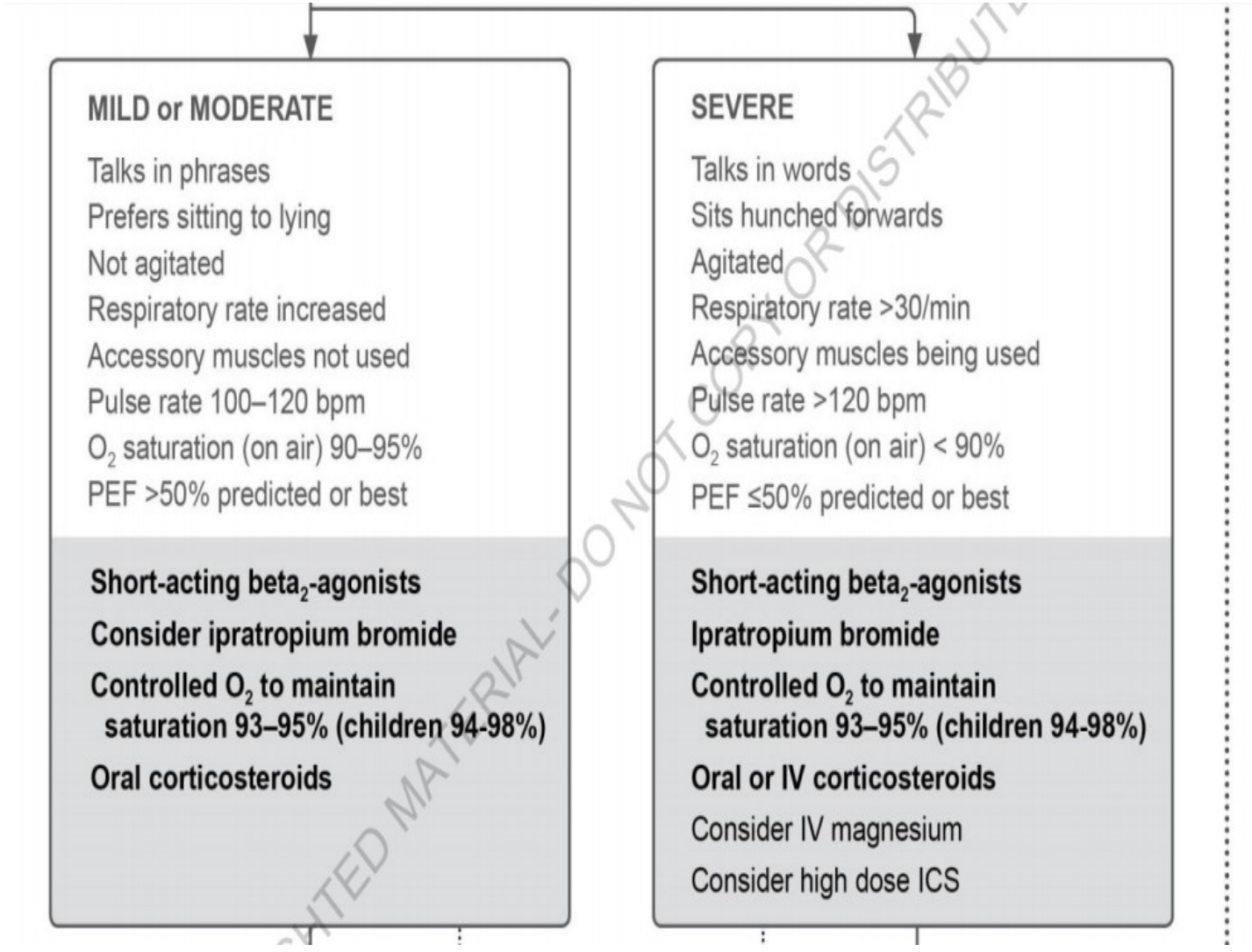

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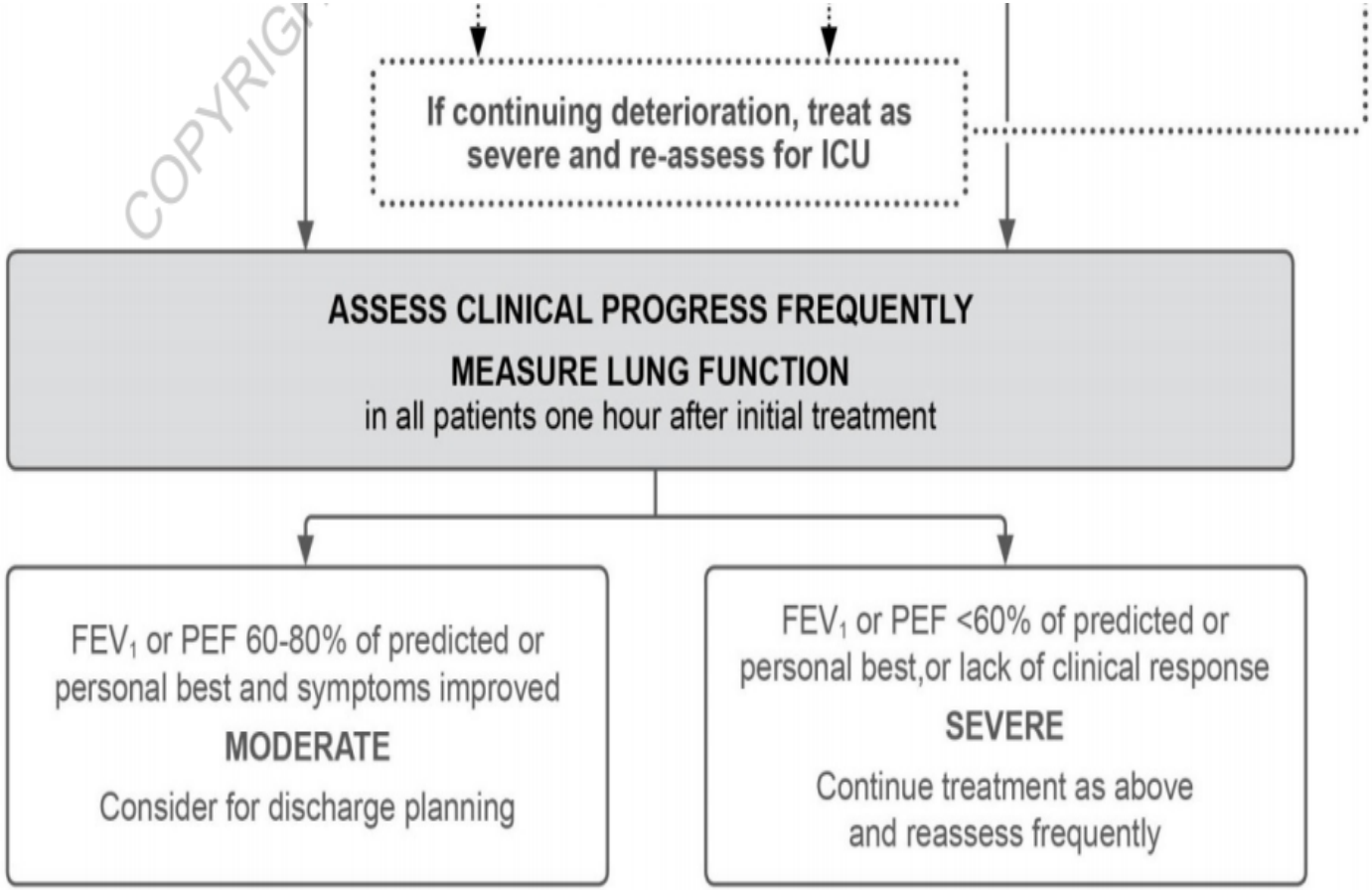


ICS: inhaled corticosteroids; ICU: intensive care unit; IV: intravenous; O_2: oxygen; PEF; peak expiratory flow; FEV_1; forced expiratory volume in 1 second

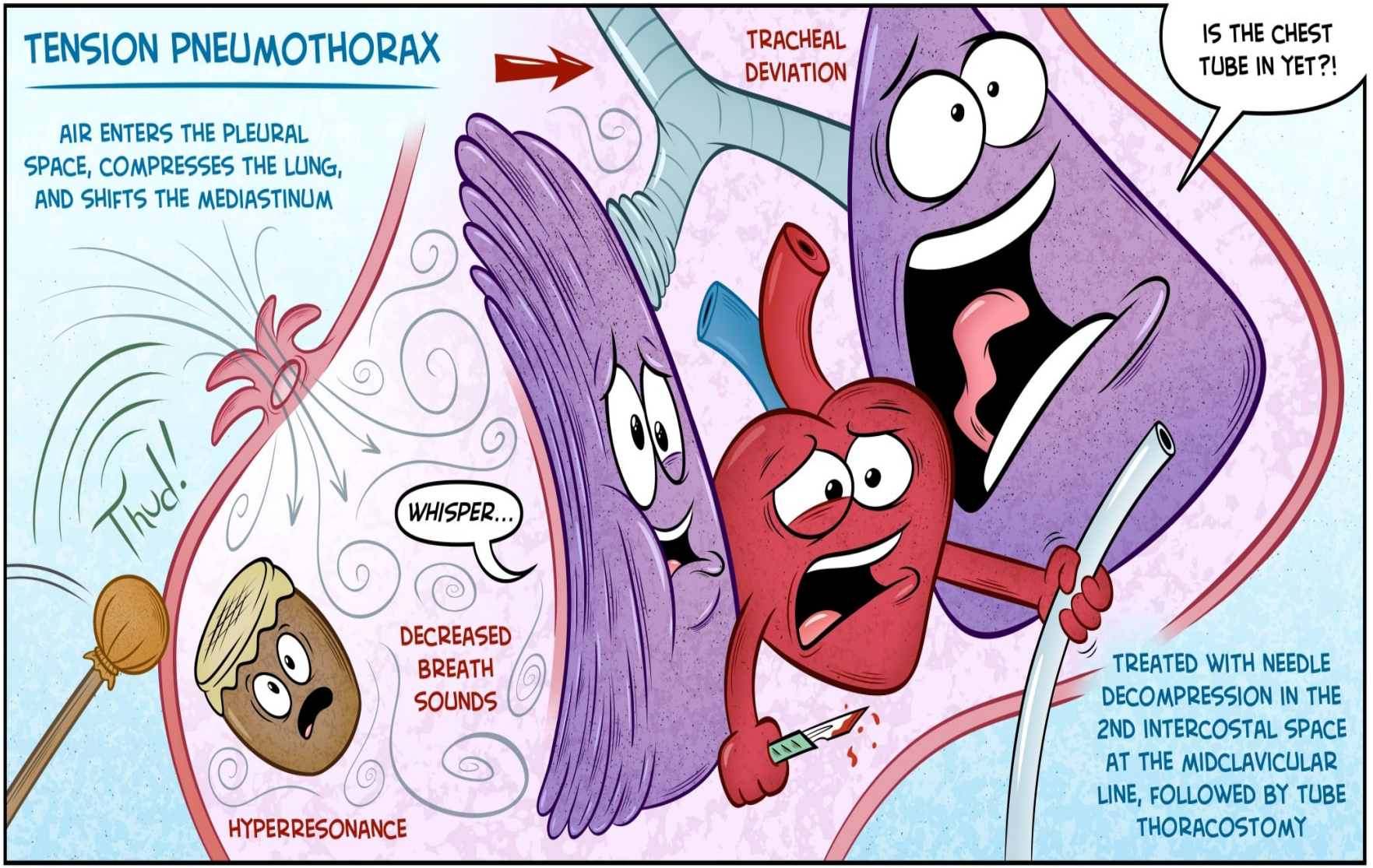
PNEUMOTHORAX

Pneumothorax

- Presence of air or gas in the pleural cavity . Air can enter the cavity through:
  - Lung parenhyma across the visceral pleura
  - Bronchi
  - Chest wall

- Types of pneumothorax:
  - Spontaneus pneumothorax (no clinical signs/symptoms until a bleb raptures; acute onset of chest pain)
  - Iatrogenic pneumothorax
  - Tension pneumothorax (hypotension, hypoxia, chest pain, dyspnea)
  - Catamenial pneumothorax (women aged 30-40y, onset 48h from menstruation, right-sided, recurs)
  - Pneumomediastinum

Tension pneumothorax



Pneumothorax signs and symptoms

- Acute onset of chest pain
- Dyspnea
- Dry cough
- Assymetric lung expansion
- Decreased or absent lung sounds
- Hyperresonance on percussion
- Tachycardia

Foreign body aspiration

Symptoms

3 phases of reaction to aspiration:

I phase – right after the incident

- cough
- dyspnoea
- vomitting
- stridor
- wheezy breath
- cianosis

larynx: hoarsness, aphonia, barking cough (symptoms like in acute laryngitis).

Foreign body location

1. Main bronchiP>L (ok. 80-90 %)

2. Trachea (3-12%)

3. Larynx (2-12%) – symptoms might be related to the presence of the foreign body or the iritation it caused in case the body has shifted to the trachea

Complications – most common in case of larynx involvment (4-5x greater than in all other locations)

Symtoms

II phase, asymptomatic – can last from couple of hours to months depending on

- ✓ foreign body location
- ✓ degree of airway obstruction
- ✓ degree of inflammation

In this phase the foreign body may change its location causing symptoms to change

Symptoms

III phase – symptomatic, related to complications

- cough
- discharge expectoration
- fever
- wheezing breath
- dyspnoea
- haemoptysis

Diagnosis

History !

Physical examination:

- wheezes on one side / symmetrical
- diminished vesicular sound over one side of the chest
- Drum-like sound on percussion

Sensitive – 24-85%, specific - 12-64%

Diagnosis

Typical set of symptoms:

- cough
- wheezing breath
- vesicular sound diminished on one side

Present in 50% of cases

Diagnosis

Radiology diagnostics:

- Foreign body located in trachea or larynx

  Neck X-Ray i P-A and lateral projection (if the shoulders are positioned downwards and backwards, it is possible to see the larynx and trachea on one radiogram)

Diagnosis

Diagnosis

Diagnosis

- Foreign body in the bronchial tree

  end-inspiratory and end-expiratory chest X-ray in P-A projection

  In younger children it can be useful to do the chest X-ray in P-A projection in supine and horisontal position with patient lying on both sides – forced expiratory position.

Diagnosis

Abnormalities on chest X-ray:

- ✓ hiperinflation on the involved side
- ✓ air-trap sign
- ✓ mediastinal shift to the healthy side
- ✓ signs of unilateral pneumonia

Fine chest X-ray doesn’r rule out the possibility of foreign body aspiration! (25-75%)

Management

Life-threatening event– management depend on the effectiveness of cough (ERC 2015)

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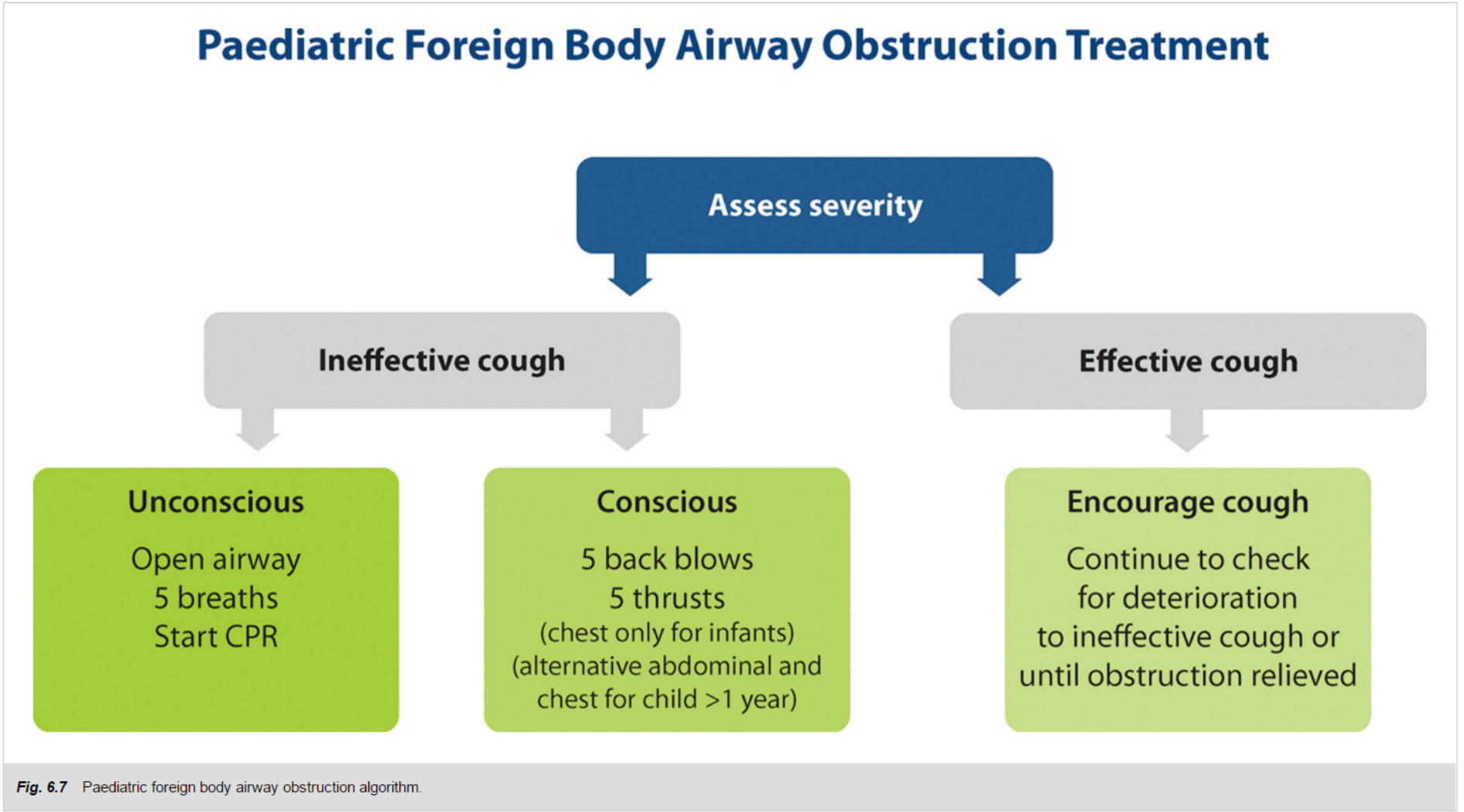

Fig. 6.7 Paediatric foreign body airway obstruction algorithm.

Management

Back blows for infants

- Support the infant in a head downward, prone position, to enable gravity to assist removal of the foreign body.
- A seated or kneeling rescuer should be able to support the infant safely across their lap.
- Support the infant's head by placing the thumb of one hand, at the angle of the lower jaw, and one or two fingers from the same hand, at the same point on the other side of the jaw.
- Do not compress the soft tissues under the infant's jaw, as this will worsen the airway obstruction.
- Deliver up to five sharp back blows with the heel of one hand in the middle of the back between the shoulder blades.
- The aim is to relieve the obstruction with each blow rather than to give all five.

Management

Back blows for children over 1 year

- Back blows are more effective if the child is positioned head down.
- A small child may be placed across the rescuer's lap as with the infant.
- If this is not possible, support the child in a forward leaning position and deliver the back blows from behind.

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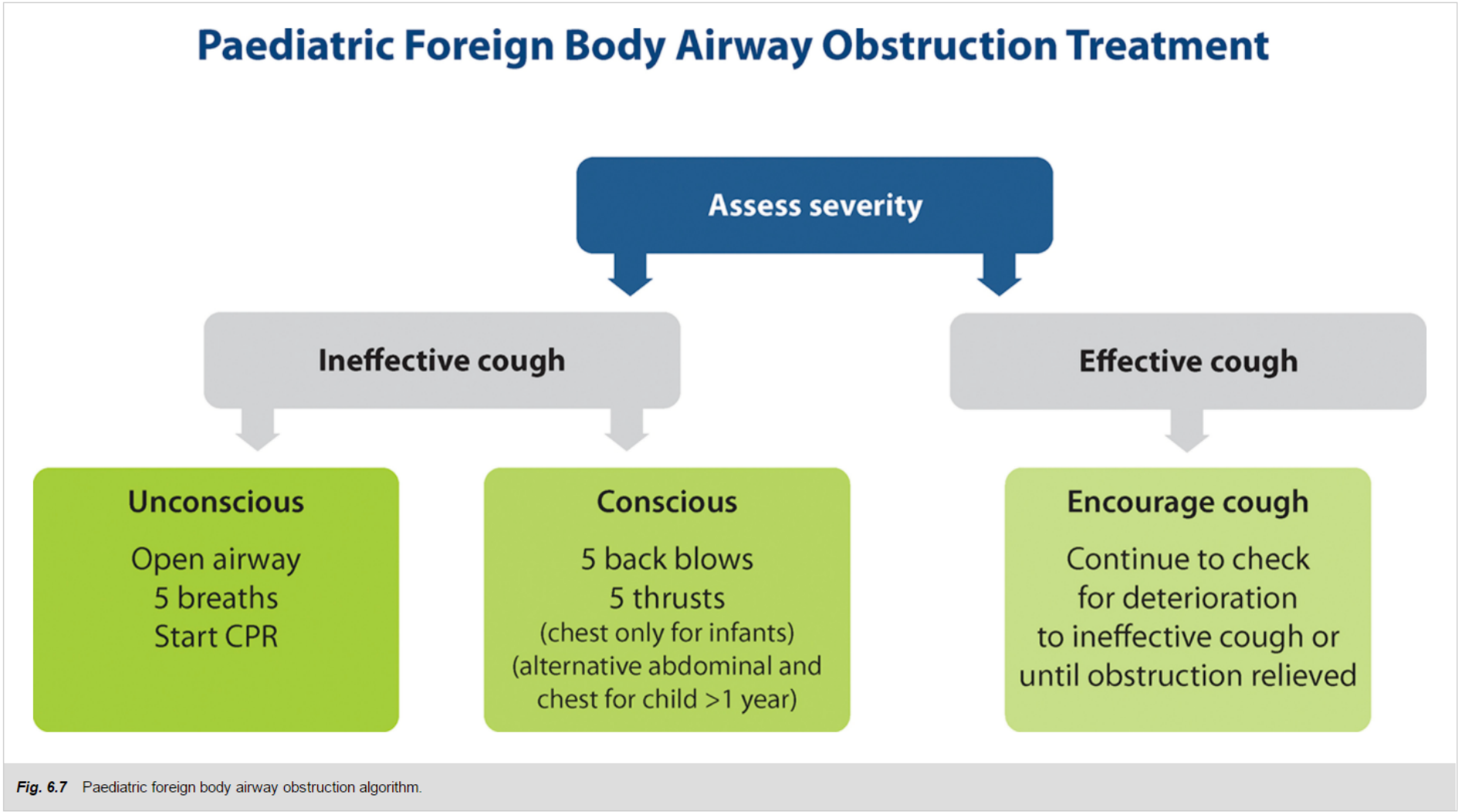

Fig. 6.7 Paediatric foreign body airway obstruction algorithm.

Management

Chest thrusts for infants

- Turn the infant into a head downward supine position. This is achieved safely by placing your free arm along the infant's back and encircling the occiput with the hand.
- Support the infant down your arm, which is placed down (or across) your thigh.
- Identify the landmark for chest compressions (on the lower half of the sternum, approximately a finger's breadth above the xiphisternum).
- Give five chest thrusts; these are similar to chest compressions but sharper and delivered at a slower rate.

Management

Abdominal thrusts for children over 1 year

- Stand or kneel behind the child; place your arms under the child's arms and encircle his torso.
- Clench your fist and place it between the umbilicus and the xiphisternum.
- Grasp this hand with the other hand and pull sharply inwards and upwards.
- Repeat up to five times.
- Ensure that pressure is not applied to the xiphoid process or the lower rib cage—this may cause abdominal trauma.

Management

Unconscious child with FBAO

- If the child with FBAO is, or becomes, unconscious, place him on a firm, flat surface. Call out, or send, for help if it is still not available. Do not leave the child at this stage; proceed as follows:

Airway opening

- Open the mouth and look for any obvious object. If one is seen, make an attempt to remove it with a single finger sweep. Do not attempt blind or repeated finger sweeps—these could push the object deeper into the pharynx and cause injury.
- *Rescue breaths*
- Open the airway using a head tilt/chin lift and attempt five rescue breaths. Assess the effectiveness of each breath: if a breath does not make the chest rise, reposition the head before making the next attempt.

Management

Tracheotomy:

- Big foreign bodies localised in larynx or proximal part of trachea
- The foreign body is too big or too sharp to remove it through the vocal cords
- Major laryngal swelling

Incidence 0,5-3%

Management

Bronchoscopy – „golden standard”

If the foreign body remained in airways for a long time the following might occur:

- Intensive productive cough
- haemoptysis

Bronchoscopy

1. Who and when should be qualified?

- HISTORY !!!
- what should be done if the history isn't reliable?

Bronchoscopy qualification guidelines - 2009

Suspected Foreign Body Inhalation in Children: What Are the Indications for Bronchoscopy? Shlomo Cohen i wsp.

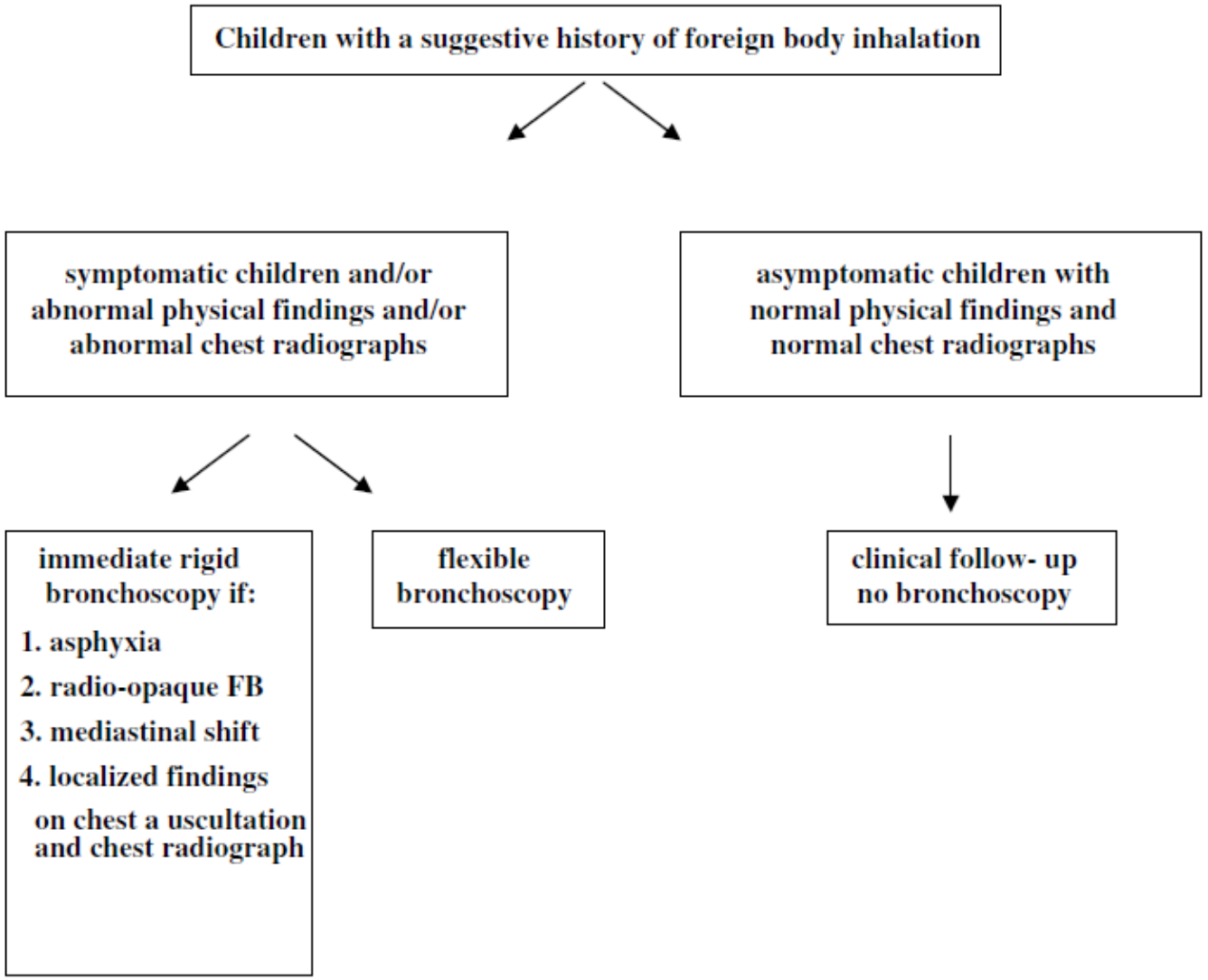

Figure 2. A recommended decision tree for FB aspiration in children.

Bronchoscopy

The attempt to remove aspirated foreign body should last less than 1,5 godz. – if hemmorage or edema that precludes further attempts occurs

↓

antybiotic + GKS

Another attempt in

3-4 days