

ASTHMA (SEE BTS GUIDELINES NEXT PAGE)

Signs of Severe asthma

- Unable to speak in sentences?
- Peak flow < 50% predicted or best?
- Respiratory Rate >25/min?
- Pulse >110/min?
- **SaO₂** <92%?

Features of a LIFE-THREATENING Attack

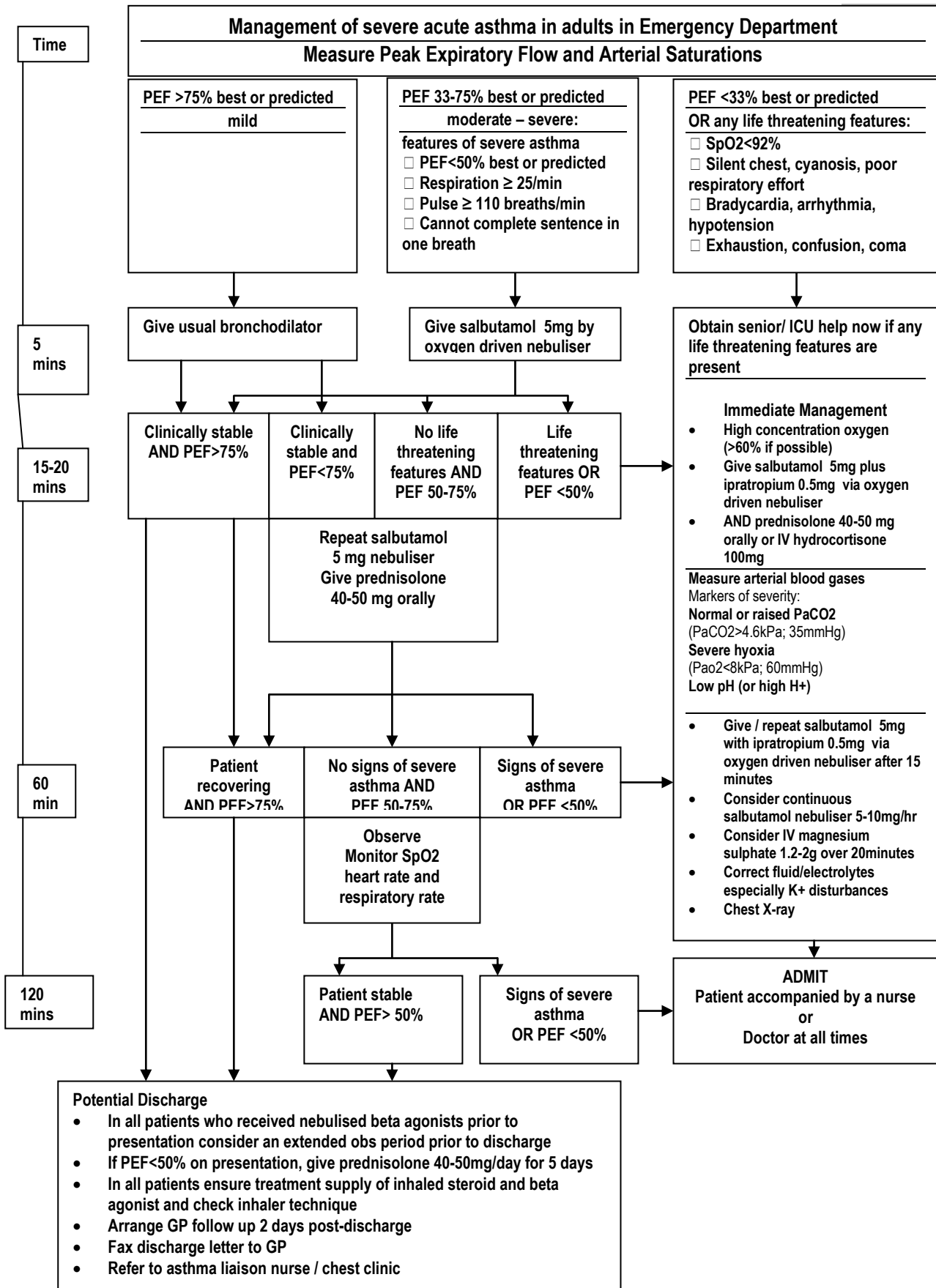
- Unable to speak?
- Silent chest, cyanosis, or feeble respiratory effort?
- Bradycardia or hypotension?
- Exhaustion, confusion, or coma?

a) Clinical Assessment

- Exclude tension pneumothorax by palpitation of trachea and auscultation
- Check blood gas (normal or high PaCO₂ 36mmHg+; PO₂<60)
- Obtain urgent portable chest x-ray

b) Treatment of severe & life-threatening attacks

- **Follow BTS guidelines (next page)**
- Immediately apply oxygen 100% by NRRM. Give continuously (including during x-ray)
- Give salbutamol 5mg with ipratropium 500mcg via nebulizer: repeat if necessary
- Obtain venous access
- Contact anaesthetist and medical registrar if signs of life-threatening asthma
- Send FBP, U&E, serum theophylline to laboratory (watch for hypokalaemia)
- Erect a 5% dextrose infusion and start Fluid Balance Chart
- Give Prednisolone 30mg orally (or hydrocortisone 200mg iv if unable to swallow)
- Give Oral Antibiotic (see Antibiotic Guidance) or iv if unable to swallow
- Consider Magnesium 1.2 - 2g iv infusion over 20 minutes
- Consider Aminophylline iv or Salbutamol iv if poor inspiratory effort
- **MONITOR CONTINUOUSLY**



Management of acute severe asthma in adults in hospital

Features of acute severe asthma

- Peak expiratory flow (PEF) 33-50% of best (use % predicted if recent best unknown)
- Can't complete sentences in one breath
- Respirations ≥ 25 breaths/min
- Pulse ≥ 110 beats/min
- Life threatening features**
- PEF $< 33\%$ of best or predicted
- SpO₂ $< 92\%$
- Silent chest, cyanosis, or feeble respiratory effort
- Bradycardia, dysrhythmia, or hypotension
- Exhaustion, confusion, or coma

If a patient has any life threatening feature, measure arterial blood gases. No other investigations are needed for immediate management. Blood gas markers of a life threatening attack:

- Normal (4.6-6 kPa, 35-45 mmHg) PaCO₂
- Severe hypoxia: PaCO₂ < 8 kPa (60mmHg) irrespective of treatment with oxygen
- A low pH (or high H⁺)

Caution: Patients with severe or life threatening attacks may not be distressed and may not have all these abnormalities. The presence of any should alert the doctor.

Near fatal asthma

- Raised PaCO₂
- Requiring mechanical ventilation with raised inflation pressures

Immediate Treatment

- Oxygen 40-60% (CO₂ retention is not usually aggravated by oxygen therapy in asthma)
- Salbutamol 5 mg or terbutaline 10 mg via an oxygen-driven nebuliser
- Ipratropium bromide 0.5 mg via an oxygen-driven nebuliser
- Prednisolone tablets 40-50 mg or IV hydrocortisone 100 mg or both if very ill
- No sedatives of any kind
- Chest X ray if pneumothorax or consolidation are suspected or patient requires mechanical ventilation
- IF LIFE THREATENING FEATURES ARE PRESENT:**
- Discuss with senior clinician and ICU team
- Add IV magnesium sulphate 1.2-2 g infusion over 20 minutes (unless already given)
- Give nebulised β_2 agonist more frequently e.g. salbutamol 5 mg up to every 15-30 minutes or 10 mg continuously hourly

Subsequent Management

IF PATIENT IS IMPROVING continue:

- 40-60% oxygen
- Prednisolone 40-50mg daily or IV hydrocortisone 100 mg 6 hourly
- Nebulised β_2 agonist and ipratropium 4-6 hourly

IF PATIENT NOT IMPROVING AFTER 15-30 MINUTES:

- Continue oxygen and steroids
- Give nebulised β_2 agonist more frequently e.g. salbutamol 5 mg up to every 15-30 minutes or 10 mg continuously hourly
- Continue ipratropium 0.5 mg 4-6 hourly until patient is improving

IF PATIENT IS STILL NOT IMPROVING:

- Discuss patient with senior clinician and ICU team
- IV magnesium sulphate 1.2-2 g over 20 minutes (unless already given)
- Senior clinician may consider use of IV β_2 agonist or IV aminophylline or progression to mechanical ventilation

Monitoring

Repeat measurement of PEF 15-30 minutes after starting treatment

- Oximetry: maintain SpO₂ $> 92\%$
- Repeat blood gas measurements within 2 hours of starting treatment if:
 - initial PaO₂ < 8 kPa (60 mmHg) unless subsequent SpO₂ $> 92\%$
 - PaCO₂ normal or raised
 - patient deteriorates
- Chart PEF before and after giving β_2 agonists and at least 4 times daily throughout hospital stay

Transfer to ICU accompanied by a doctor prepared to intubate if:

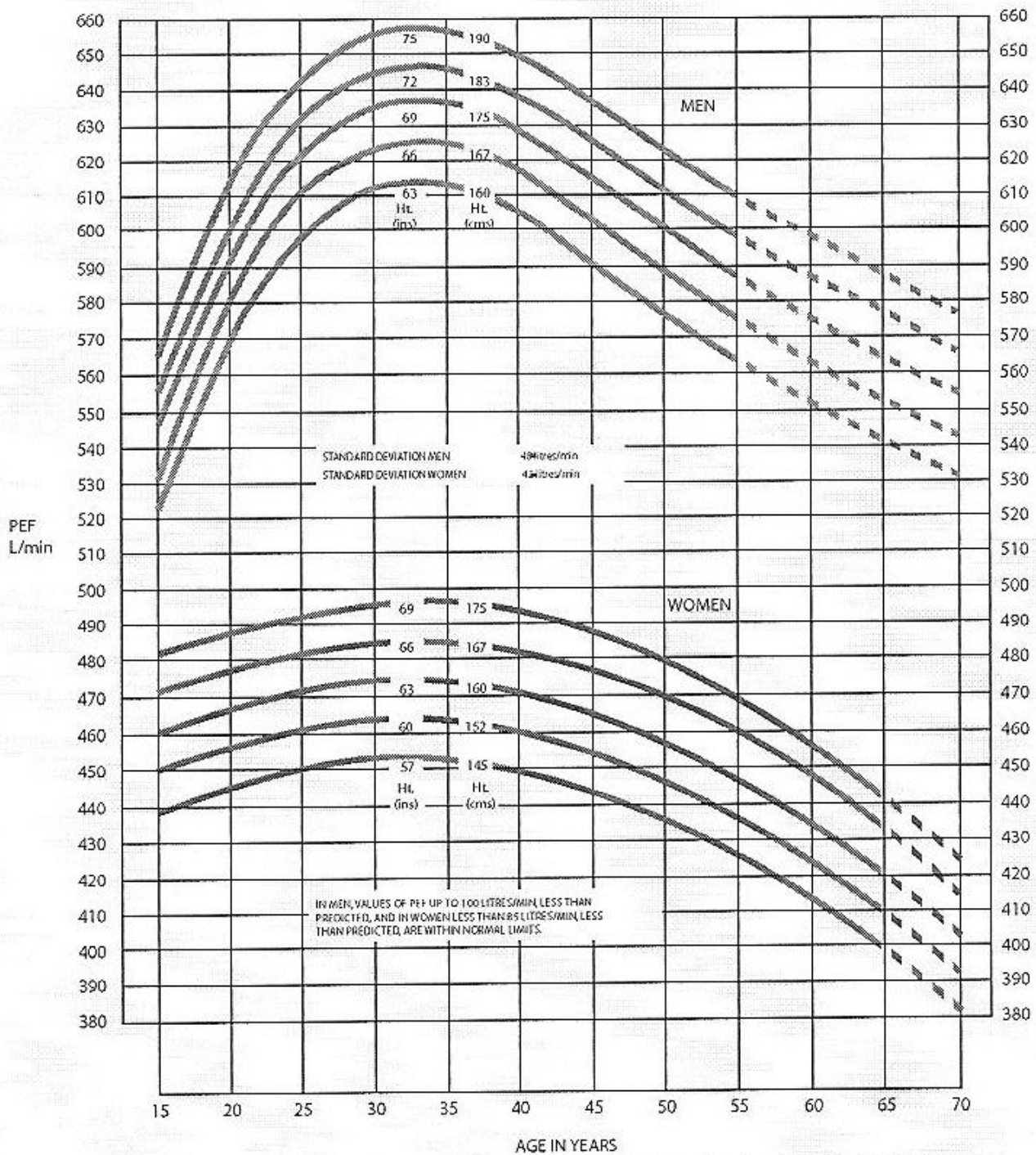
- Deteriorating PEF, worsening or persisting hypoxia, or hypercapnea
- Exhaustion, feeble respirations, confusion or drowsiness
- Coma or respiratory arrest

Discharge

When discharged from hospital, patients should have:

- Been on discharge medication for 24 hours and have had inhaler technique checked and recorded
 - PEF $> 75\%$ of best or predicted and PEF diurnal variability $< 25\%$ unless discharge is agreed with respiratory physician
 - Treatment with oral and inhaled steroids in addition to bronchodilators
 - Own PEF meter and written asthma action plan
 - GP follow up arranged within 2 working days
 - Follow up appointment in respiratory clinic within 4 weeks
- Patients with severe asthma (indicated by need for admission) and adverse behavioural or psychosocial features are at risk of further severe or fatal attacks
- Determine reason(s) for exacerbation and admission
 - Send details of admission, discharge and potential best PEF to GP

Peak expiratory flow in normal adults



Nunn AJ, Gregg I. New regression equations for predicting peak expiratory flow in adults. *BMJ* 1989;298:1068-70.

c) Treatment for Mild and Moderate asthma attacks

Asthma is a dangerous condition and special care must be taken when you decide to discharge a patient who has presented with symptoms of exacerbation. There is “step up” guidance in the BNF.

- All patients attending the Emergency Department must be given inhaled or nebulized beta-agonists and have their peak expiratory flow rate (PEFR) re-checked 15-30 minutes later. Pre- and post- PEFR to be recorded in notes.
- Patients may be considered for discharge if PEFR is greater than 60% of best or predicted value following treatment, *and* stable or improving
- Usual treatment should be stepped up (see BNF).
- A “rescue” course of steroids should be prescribed particularly if initial PEFR was less than 60% of best/predicted value).
 - adults: 30-60 mg prednisolone for 3 days (to be stopped or stepped down by GP)
 - children: Prednisolone Soluble 1mg/kg for 1-5 days
- Patient must be reviewed by their GP or asthma nurse within 48 hours of Emergency Department attendance. Notes to document what to do if they worsen.
- Send a letter to the Respiratory nurse team to ensure follow up.

CHEST INFECTION

- *Be mindful of respiratory infections during epidemics such as SARS or flu epidemics (e.g. swine flu). Follow current departmental guidance regarding this. In particular take measures to reduce spread of infection (see pag 103 for example)*

Wash Hands - Clean Surfaces - Limit Contact

Use oral therapy unless patients are unable to tolerate fluids. Where possible decide what your patient is suffering from before choosing an antibiotic:

- **Upper respiratory tract infection**
- **Infective exacerbation of COPD**
- **Lobar pneumonia**
- **Bronchopneumonia**

The pneumonias are characterised by the presence of consolidation – this should be visible on x-ray. Patients with bronchopneumonia generally require admission

for supportive therapy. Patients with lobar pneumonia are often young and can be managed at home if there are no poor prognostic indications or complications.

Don't forget to consider atypical pathogens such as varicella, pneumocystis, TB, Legionella and psittacosis in patients who are severely ill.

CURB 65 scoring

Confusion* **Urea >7** **Resp. rate >30** **BP (Systolic <90; Diastolic <60)** **Age > 65**

Score 1 point for each feature present

Score 0-1 likely suitable for home treatment

Score 2 consider hospital treatment

Pneumonia has a poor prognosis if 3 or more apply. If 4 or 5 assess for ICU

*defined as a Mental Test Score of ≤ 8 , or new disorientation in person, place or time.

CHRONIC OBSTRUCTIVE PULMONARY DISEASE (SEE ALSO CHEST INFECTION)

Diagnosis of exacerbation of COPD:

- History of “winter” productive cough
- Decrease in exercise tolerance
- Change in colour or volume of sputum

Management

- Give 28% oxygen by facemask
- Monitor SaO₂, pulse and resp.onsiveness
- Check ABG at T=0 and T=30mins and adjust O₂ strength accordingly
- Give nebulised bronchodilators and repeat if necessary
- Give Prednisilone 30mg orally
- Give oral antibiotics (iv if not tolerating fluids) Amoxicillin 1g 8 hrly PO 5-7 days
If previous recent antibiotic: Doxycycline 100mg 12 hrly PO OR Clarithromycin 500mg 12 hrly PO 5-7 days
- Start a fluid balance chart and erect iv fluids if poor oral intake

Consider the following table (Table 1) when determining a management plan for the patient.

Table 1. Factors to consider when deciding where to manage exacerbations		
	Treat at home?	Treat in hospital?
Able to cope at home	Yes	No
Breathlessness	Mild	Severe
General condition	Good	Poor/deteriorating
Level of activity	Good	Poor/confined to bed
Cyanosis	No	Yes
Worsening peripheral oedema	No	Yes
Level of consciousness	Normal	Impaired
Already receiving LTOT	No	Yes
Social circumstances	Good	Living alone/not coping
Acute confusion	No	Yes
Rapid rate of onset	No	Yes
Significant comorbidity (particularly cardiac disease and insulin-dependent diabetes)	No	Yes
SaO ₂ < 90%	No	Yes
Changes on chest X-ray	No	Present
Arterial pH level	≥ 7.35	< 7.35
Arterial PaO ₂	≥ 7 kPa	< 7 kPa

There are three options for managing patients with COPD exacerbation.

1. Medical admission – under respiratory team

2. Home with Respiratory Enhanced Discharge Scheme (REDS) See table 2

- Mon-Fri, 9am-5pm.
Contact respiratory nurse specialist ext. 334930, bleep 5727

Table 2. Criteria for REDS
Exacerbation of COPD
No Acute Hypercapnoeic Respiratory Failure (AHRF)
No consolidation on CXR
No <i>new</i> requirement for oxygen
OR SaO ₂ >90% on usual flow of oxygen if on LTOT

3. Home (send a letter to respiratory nurse specialist on discharge)

- Arrange appropriate review (GP, community respiratory team)
- Give clear instructions on correct use of medication and stopping corticosteroid therapy

COPD, Hypercapnia and Oxygen:

- All patients who require medically-supervised resuscitation should receive 100% oxygen via non-rebreather reservoir mask (NRRM). Oxygen MUST be prescribed on the ED flimsy / drug kardex.
- After the immediate resuscitation period, continuous oxygen therapy should only be given when prescribed by a doctor. The prescription should include the concentration of oxygen to be administered. Empirical starting concentration for clinically hypercapnic patients should be 28%. All should have FiO_2 adjusted after ABG check 30 mins later –aim for $PO_2 >8$ and $PCO_2 < 7.5$
- *Hypercapnia is characterised by altered level of consciousness/drowsiness, muscle twitching or tremor (this can be very marked), and reduced rate or depth of **respiration**. In COPD patients it will usually be associated with cyanosis caused by concomitant hypoxia.*
- Refer COPD patients with pH of 7.35 –7.25 to medical team re non-invasive ventilation. Patients with profound acidosis ($pH < 7.25$) may require anaesthetic assessment regarding intubation and ventilation.
- Asthmatic patients must receive 100% oxygen by NRRM.
- Hypoxic or hypercarbic patients must have frequent clinical assessment blood gas monitoring.

NON-INVASIVE VENTILATION (NIV)**a) When to use non-invasive ventilation****1. Patients**

- COPD
- Cardiogenic pulmonary oedema unresponsive to CPAP
- Chest wall deformity, neuromuscular disorder, decompensated OSA

2. Blood gases

- Respiratory acidosis ($PaCO_2 > 6.0$ kPa, $pH < 7.35$ or $H^+ > 45$ nmol/l) which persists despite maximal medical treatment and appropriate controlled oxygen therapy (patients with $pH < 7.25$ or $H^+ > 56$ nmol/l respond less well and should be managed in an HDU/ICU).
- Low A–a oxygen gradient (patients with severe life threatening hypoxaemia are more appropriately managed by tracheal intubation).

3. Clinical state

- Sick but not moribund, few co-morbidities
- Able to protect airway, conscious and co-operative
- Haemodynamically stable
- No excessive respiratory secretions

b) Contraindications / Exclusions**1. Premorbid state**

- Potential for recovery to quality of life acceptable to the patient
- Patient's wishes considered

2. Contraindications to NIV

- Facial trauma/burns
- Recent facial, upper airway, or upper gastrointestinal tract* surgery
- Fixed obstruction of the upper airway
- Inability to protect airway*
- Life threatening hypoxaemia*
- Haemodynamic instability*
- Severe co-morbidity*
- Impaired consciousness*
- Confusion/agitation*
- Vomiting
- Bowel obstruction*
- Copious respiratory secretions*
- Focal consolidation on chest radiograph*
- Un-drained pneumothorax*

*NIV may be used, despite the presence of these contraindications, if it is to be the "ceiling" of treatment

c) Management of Patients in Respiratory Failure

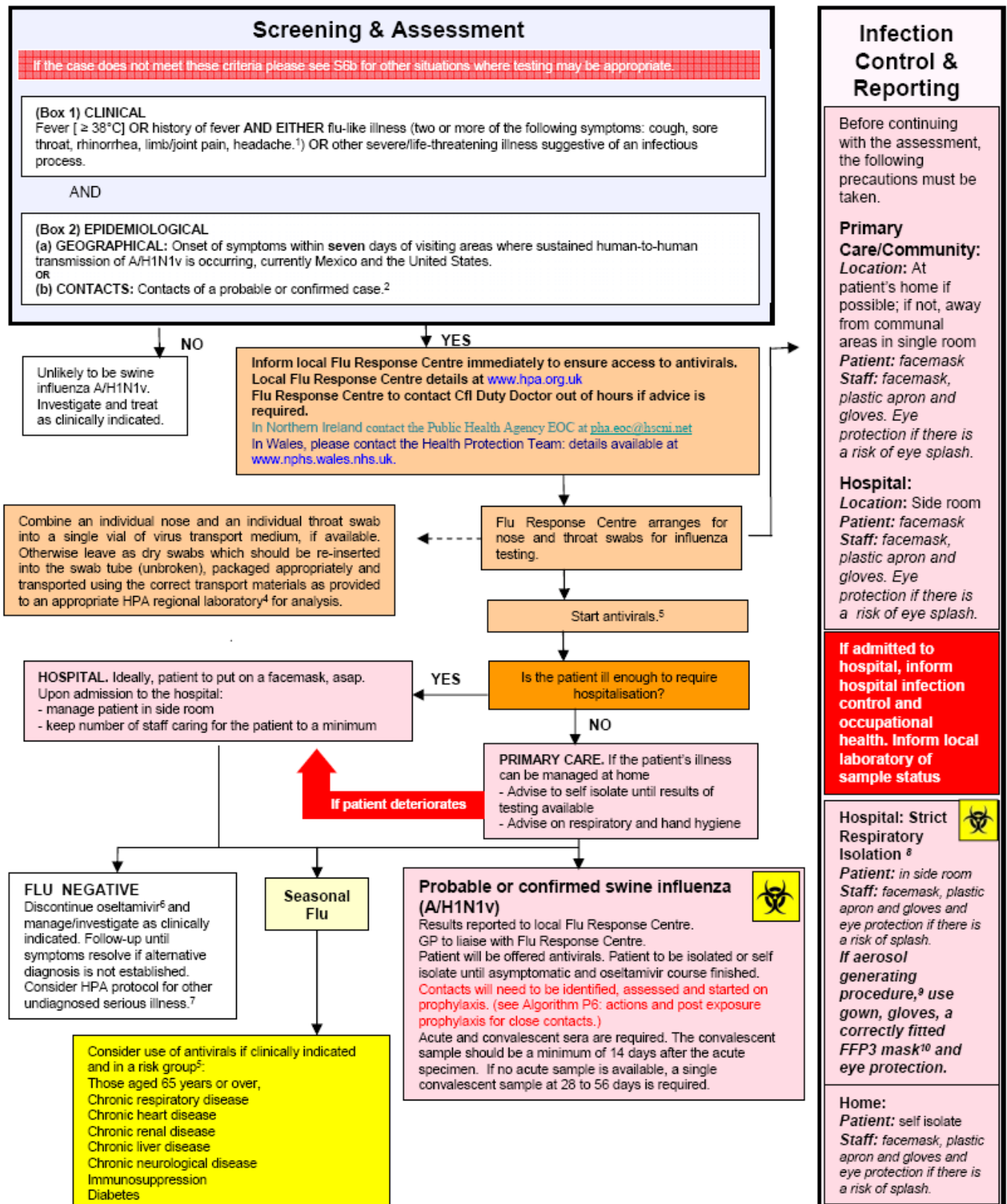
1. Each patient should have an Arterial Blood Gas (ABG) if:
 - SpO₂ <93% Room Air
 - Abnormal Respiratory Rate
 - History of domiciliary Oxygen use
 - History of NIAS administered O₂ in transit to the ED
2. The concentration of Oxygen should be clearly documented.
3. CXR interpretation should be documented in the notes.
4. A repeat ABG should be checked 30 minutes after the first ABG of pH <7.35 and PaCO₂ > 6.5kPa
5. Referral for NIV should be made for
 - COPD patients with persistent respiratory acidosis.
 - LVF patients with pulmonary oedema and low saturations.

S6a

Updated on 12 June 2009, 11.00. Please check HPA website for latest version before taking action.

WHO PANDEMIC ALERT PHASE 6: Algorithm for the management of suspected cases of swine influenza (A/H1N1v)

(including returning travellers and visitors from countries affected by A/H1N1v and contacts of known cases)

**Footnotes:**

- 1 Vomiting and diarrhoea have been a feature of some of the reported cases.
- 2 Refer to swine flu case definitions at <http://www.hpa.org.uk/web/HPAweb&Page&HPAwebAutol/IsName/1240812334677>.
- 3 CMO swine flu alert 1 May 2009 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/111203.
- 4 HPA regional laboratories can be found at <http://www.hpa.org.uk/web/HPAweb&Page&HPAwebAutol/IsName/11538466742067-11538466742065>.
- 5 Standard treatment dose of oseltamivir in adults (age >13 years old) is 75mg bd for 5 days. Standard treatment dose of zanamivir is 10mg bd for 5 days. (<http://www.medicines.org.uk>) Treatment for seasonal flu should only be given within 48 hours of onset of symptoms however for swine influenza it can be given at any point that the patient is symptomatic and continue until the patient has recovered. Follow guidelines unless expert advice is to the contrary.
- 6 If swab taken prior to starting oseltamivir, treatment can stop. Otherwise, complete treatment course.
- 7 Refer to HPA protocol <http://www.hpa.org.uk/web/HPAweb&Page&HPAwebAutol/IsName/1160495617061>.
- 8 Infection control guidance is available at: <http://www.hpa.org.uk/web/HPAweb&Page&HPAwebAutol/IsName/11919421711907-11919421711907>.
- 9 Includes patients requiring Level 3 intensive care. See guidance for infection control in critical care at <http://www.hpa.org.uk/web/HPAweb&Page&HPAwebAutol/IsName/11919421711907-11919421711907>.
- 10 FFP3 standard masks, see HSE guidelines: <http://www.hse.gov.uk/controls/willscases/pandemic.htm>.

In case of uncertainty, discuss with local Flu Response Centre.

Health Protection Agency <http://www.hpa.org.uk/>

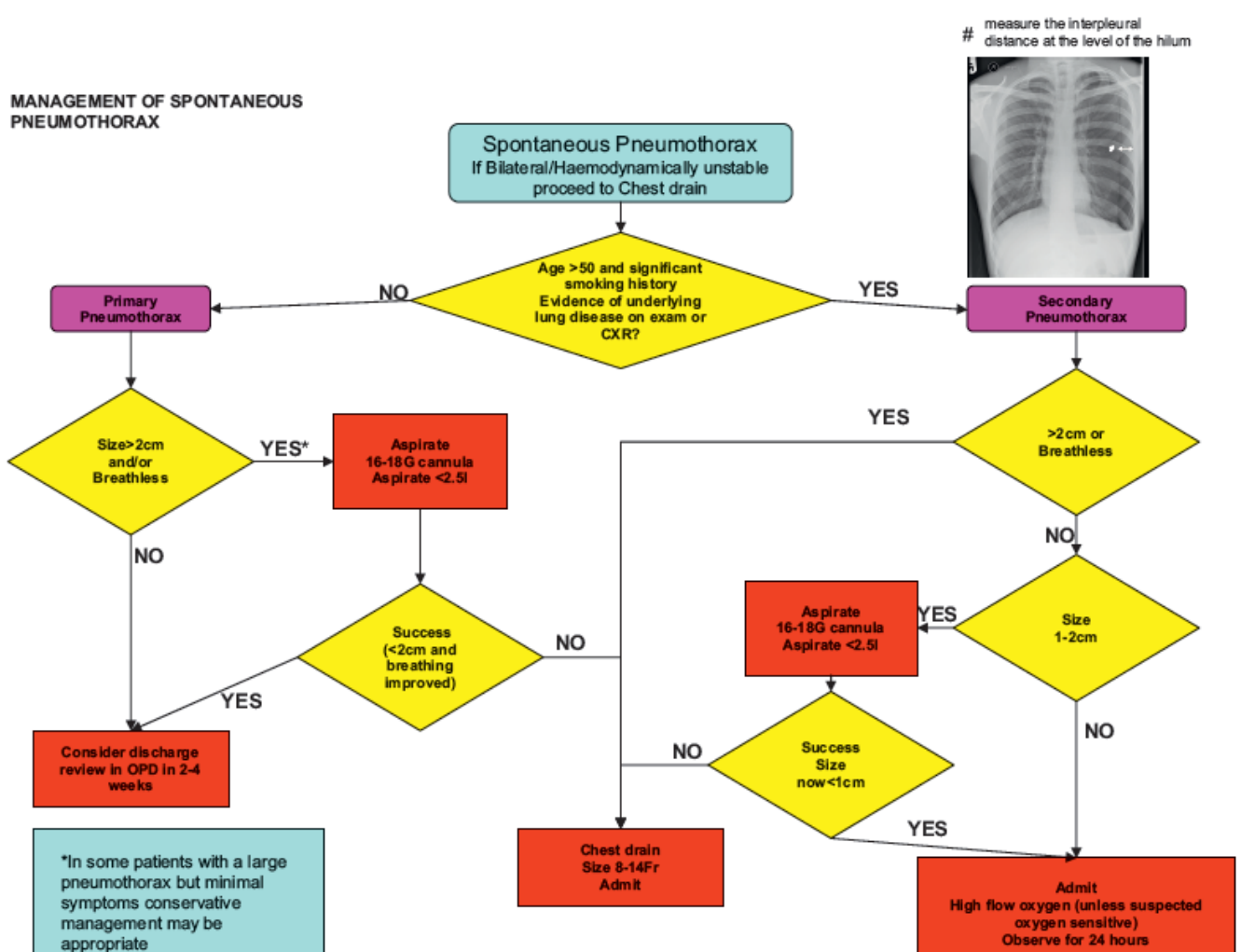
PNEUMOTHORAX

Tension pneumothorax is a life-threatening emergency diagnosed clinically in a rapidly deteriorating breathless patient with jugular venous distension, tracheal shift, absent breath sounds and a thready pulse. It requires immediate release by inserting a brown venflon into the second inter-costal space mid-clavicular line (ideally using the set-up for pleural aspiration described on the following pages) followed by immediate insertion of a chest drain into the fifth inter-costal space mid-axillary line prior to x-ray.

1. Traumatic pneumothorax

This is the term used for any pneumothorax of whatever size that follows injury to the chest. Patients with chest trauma and sub-optimal x-rays should usually have chest drains prior to IPPV. Refer to ATLS guidelines regarding management.

2. Spontaneous pneumothorax



BTS Guidelines for Management of Spontaneous Pneumothorax

a) Primary Spontaneous Pneumothorax

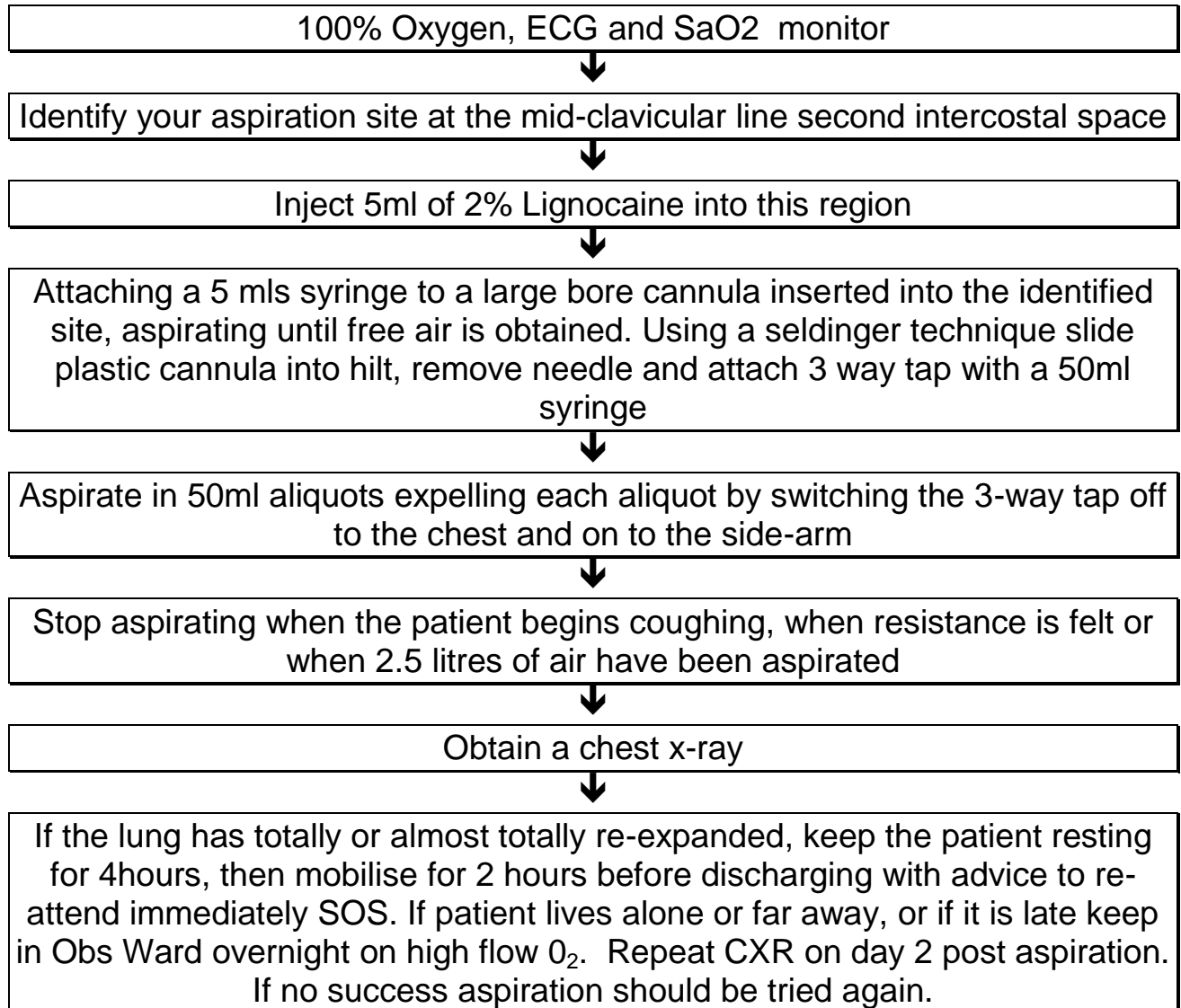
This is the term used for a non-traumatic pneumothorax in a patient with no pre-existing lung disease.

Most cases are suitable for wait-and-see management or aspiration *and this is the treatment of choice for such patients*. Tell the patient that aspiration has a 70% success rate – i.e. they might still need a chest drain. All patients discharged home from the ED whether treated conservatively or by aspiration should re-attend the ED after 48 hours for their first follow-up chest x-ray. It is essential that they rest during this initial period and that they fully understand the importance of returning immediately in the event of any deterioration.

INSERTION OF A CHEST DRAIN IS NOT FIRST LINE TREATMENT FOR PRIMARY SPONTANEOUS PNEUMOTHORAX. DO NOT PERFORM FOR THIS INDICATION WITHOUT SENIOR EMERGENCY DEPARTMENT ADVICE.

Aspiration Technique for Management of Primary Pneumothorax

Only to be undertaken if you are able to insert a chest drain in the event of a sudden deterioration in the patient's condition



*PRIMARY SPONTANEOUS PNEUMOTHORACES WITH A RIM OF AIR LESS THAN 2cm ON CXR DO NOT REQUIRE ASPIRATION OR ADMISSION. THEY STILL REQUIRE FOLLOW UP CXR DAY 2.

Discharge Advice

On discharge, strong emphasis on smoking cessation. It is important to avoid air travel for 1/52 after CXR has shown resolution. Abstain from underwater diving for life.

b. Secondary* Spontaneous Pneumothorax

This is the term used for a non-traumatic pneumothorax in a patient with pre-existing lung disease, e.g. COPD or asthma. All such patients require admission and some form of intervention. First line is insertion of small bore chest drain. Chest drain insertion in stable patients with a secondary pneumothorax may be left until in hours as per BTS guidelines. All patients with a secondary spontaneous pneumothorax **MUST** be admitted under the respiratory team. **DO NOT** discharge home.

