

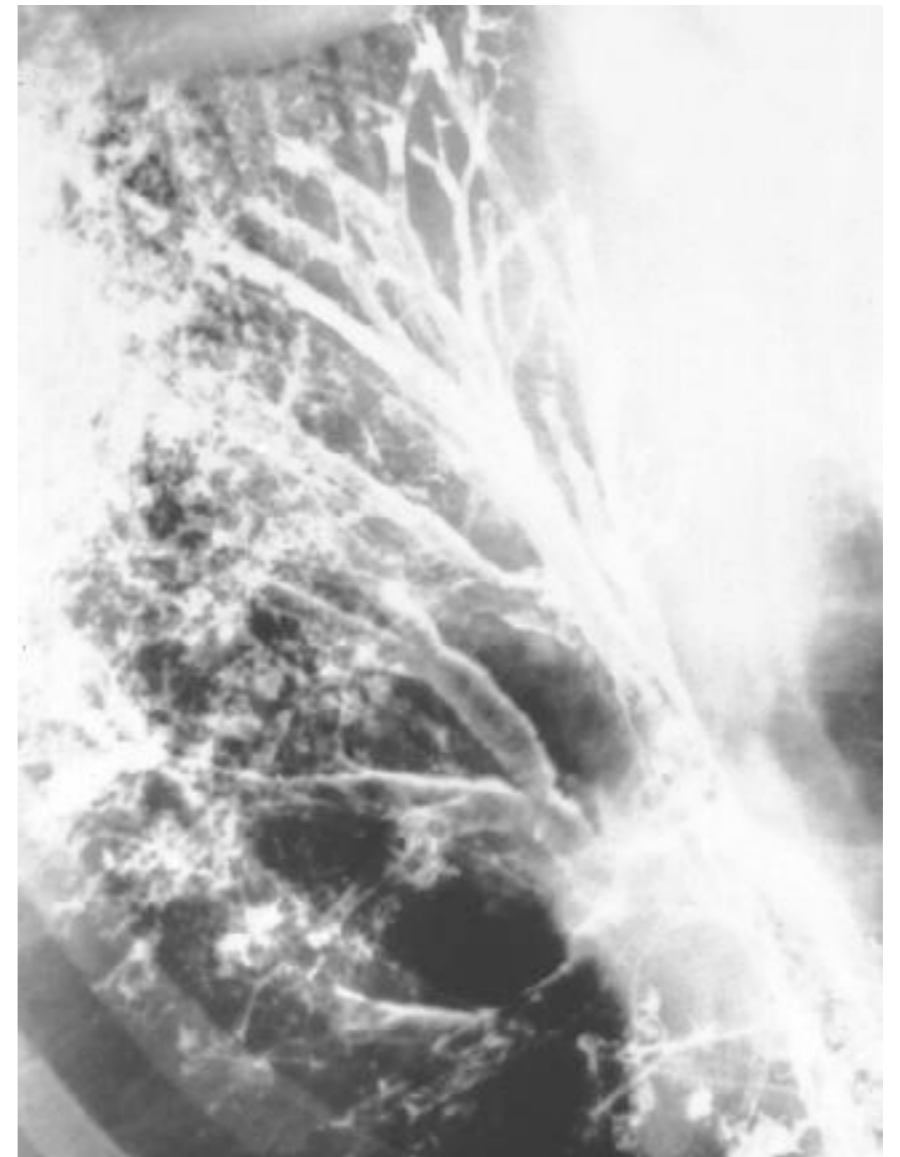
Mr Colin Dibble  
Consultant in Emergency Medicine  
North Manchester General Hospital ED



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# Contents

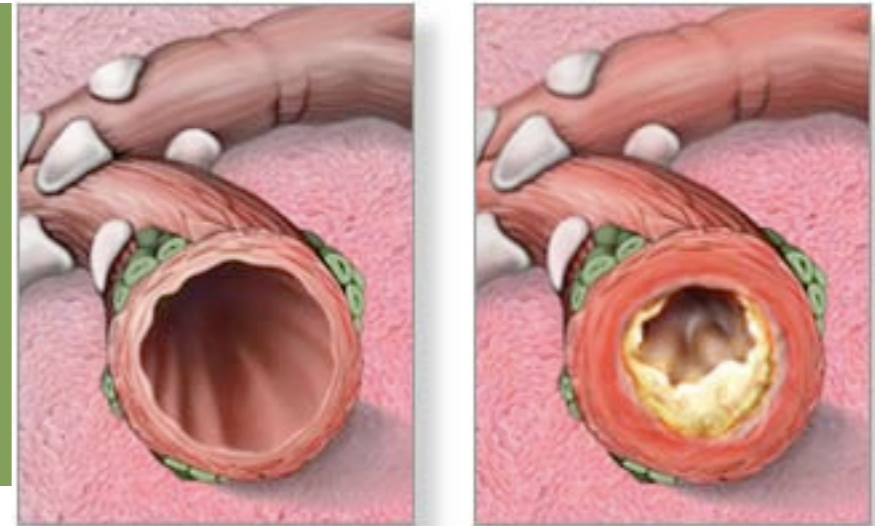
- ▶ Introduction
- ▶ Pathophysiology
- ▶ Clinical Presentation
- ▶ Emergency Management
- ▶ NIV
- ▶ Questions
- ▶ Summary



# Introduction

- ▶ Common cause of ED presentations; 597 exacerbations of COPD at NMGH from Oct 07-Oct 08
- ▶ 900 000 in UK diagnosed with COPD, 450 000 not yet diagnosed, increasing in ♀, static in ♂
- ▶ 30 000 deaths in 1999. Increasing ♀, reducing ♂ last 30yrs
- ▶ Guidelines on COPD from BTS 1997, then NICE 2004
- ▶ Airflow obstruction with reduced FEV<sub>1</sub> (80%) and reduced FEV<sub>1</sub>/FVC ratio <0.7

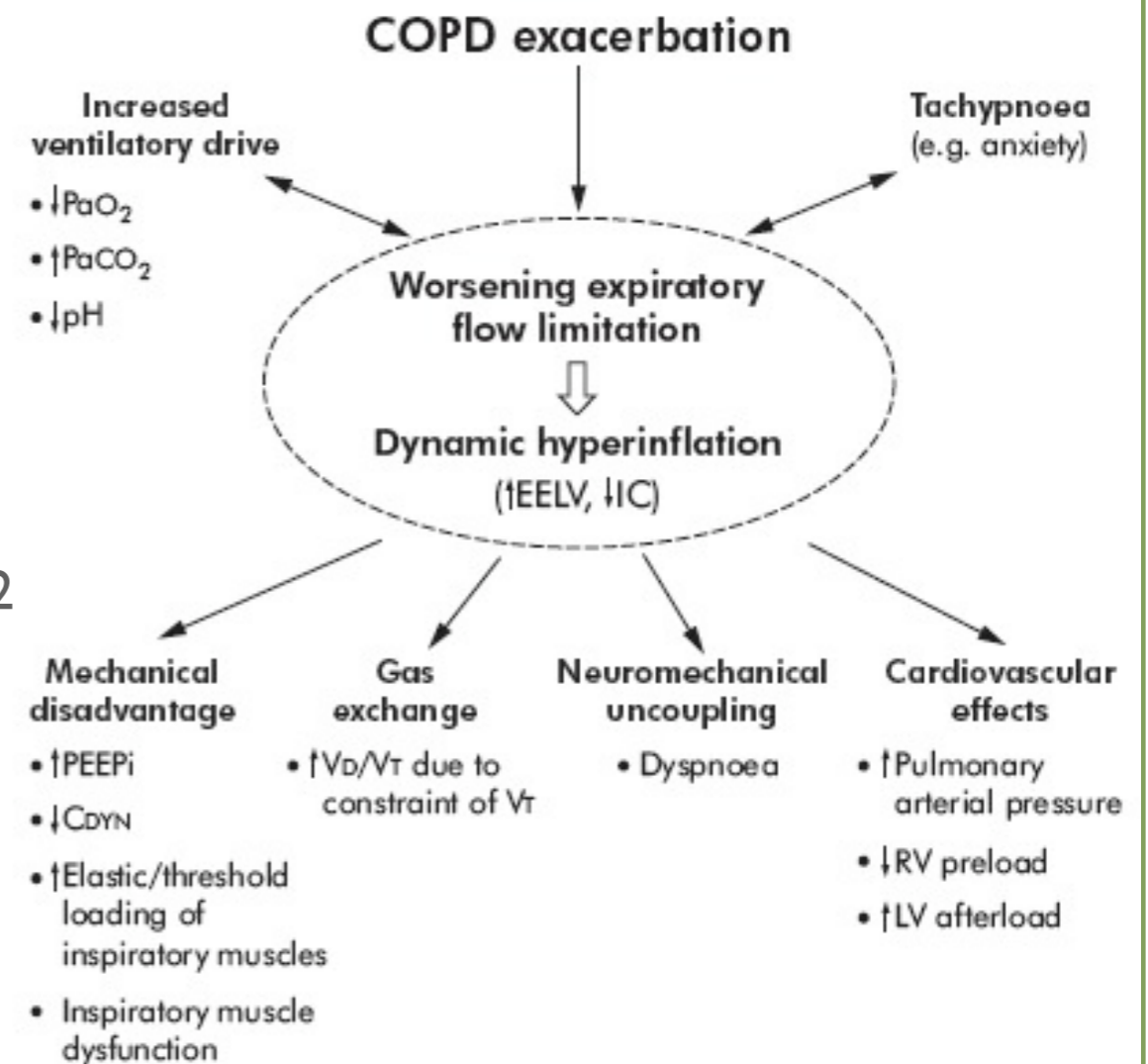
# Pathophysiology I



- ▶ Smoking accounts for 80-90%; risk in  $\alpha_1$ -antitrypsin deficiency/occupation
- ▶ Early bronchial epithelium metaplasia, incr gland number & size
- ▶ Later acute & chronic inflammation/acinar expansion, destruction and coalescence. Mucous
- ▶ Reduced elasticity and surface area-hyperinflation
- ▶ Impedance to (expiratory. ++ ) airflow, incr. resistance/small caliber

# Pathophysiology II

- ▶ Chronic hypoxia leads to polycythaemia, pulmonary hypertension and cor pulmonale
- ▶ May retain  $\text{CO}_2$ , central receptors lose their respiratory drive and rely on hypoxia. Giving high flow  $\text{O}_2$  may then lead to worsening  $\text{CO}_2$ , (chronic bronchitic blue bloaters)
- ▶ Some have normal  $\text{CO}_2$ , low/normal  $\text{O}_2$ , (emphysematous 'pink puffers')



# Clinical Presentation

- ▶ Smoking history
- ▶ Gradual onset of increasing exertional dyspnoea
- ▶ Cough, >3 consecutive months, >2 consecutive years
- ▶ Tachypnoea, hyperinflation, wheeze, creps
- ▶ Flattened diaphragms on CXR. May have infection, chronic changes, pneumothorax, bullae
- ▶ Exacerbation: respiratory distress, altered GCS: ? infection, ?resp failure, ?Cor pulmonale, ? ↓CO<sub>2</sub>
- ▶ ABGs....

<b>pH=7.34</b>	<b>pH=7.10</b>	<b>pH=7.5</b>
<b>pO<sub>2</sub>=8.5 RA</b>	<b>pO<sub>2</sub>=7 RA</b>	<b>pO<sub>2</sub>=10 RA</b>
<b>pCO<sub>2</sub>=9.5</b>	<b>pCO<sub>2</sub>=15</b>	<b>pCO<sub>2</sub>=3.5</b>
<b>HCO<sub>3</sub>=35</b>	<b>HCO<sub>3</sub>=33</b>	<b>HCO<sub>3</sub>=23</b>





# ABGs

1	2	3
pH=7.34	pH=7.10	pH=7.5
pO <sub>2</sub> =8.5 RA	pO <sub>2</sub> =7 RA	pO <sub>2</sub> =10 RA
pCO <sub>2</sub> =9.5	pCO <sub>2</sub> =15	pCO <sub>2</sub> =3.5
HCO <sub>3</sub> =35	HCO <sub>3</sub> =33	HCO <sub>3</sub> =23

# On-going treatment

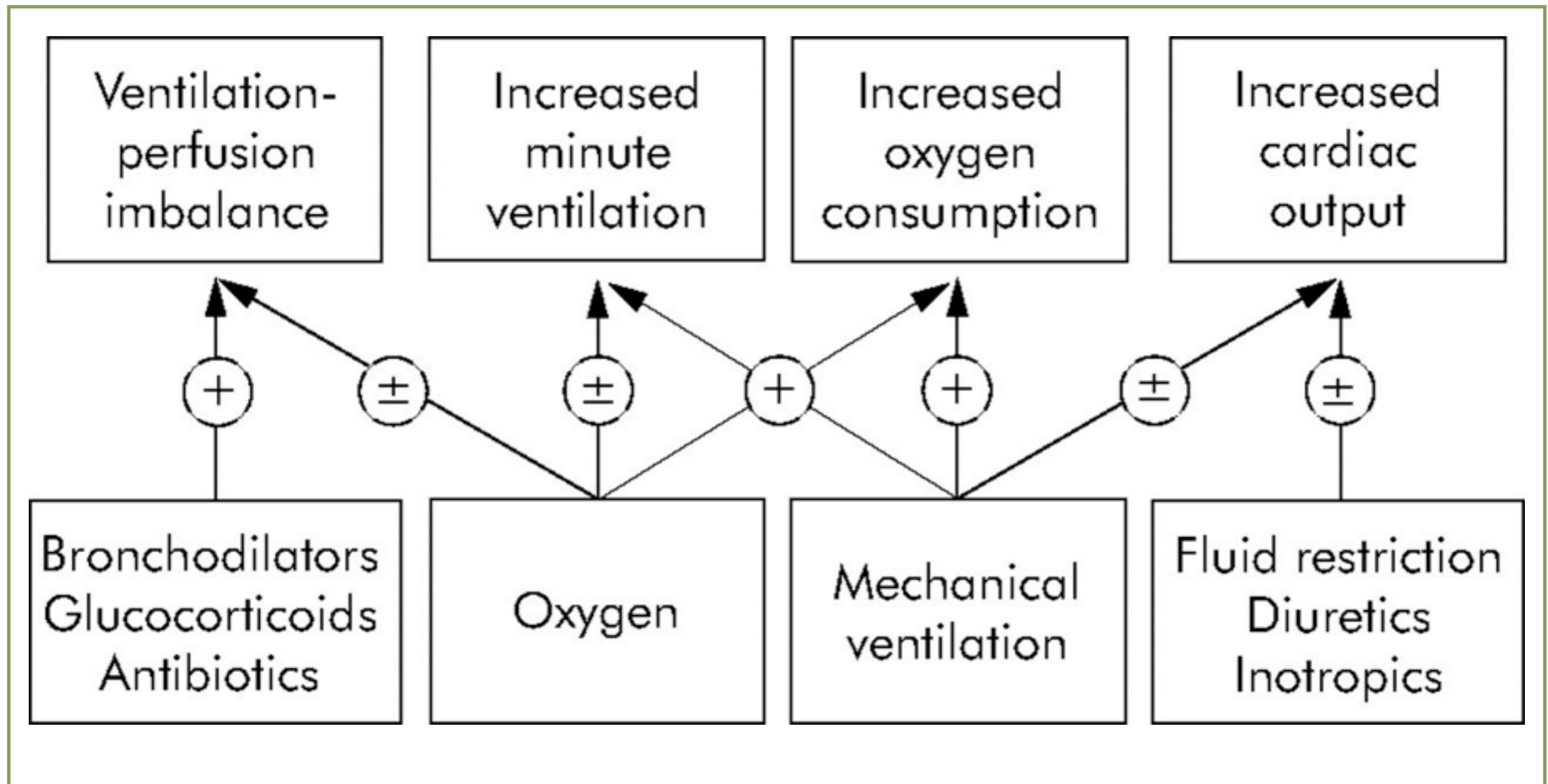
GOLD guidelines

Severity	Test Values	Clinical Management
<b>0. At Risk</b>	Normal spirometry Chronic symptoms (cough, sputum production)	
<b>I. Mild COPD</b>	FEV <sub>1</sub> /FVC <70% predicted  FEV <sub>1</sub> >80% predicted With or without chronic symptoms (cough, sputum production)	<ul style="list-style-type: none"> <li>■ Short acting bronchodilator when needed</li> </ul>
<b>II. Moderate COPD</b>	FEV <sub>1</sub> /FVC <70% predicted  30% < FEV <sub>1</sub> < 80% predicted  (IIA - 50% < FEV <sub>1</sub> < 80% predicted IIB - 30% < FEV <sub>1</sub> < 80% predicted)  With or without chronic symptoms (cough, sputum production, dyspnoea)	<ul style="list-style-type: none"> <li>■ Regular treatment with one or more bronchodilators</li> <li>■ Inhaled steroids if significant symptoms and lung function response indicates reversible element to disease (or in IIB if repeated exacerbations)</li> <li>■ Pulmonary rehabilitation</li> </ul>
<b>III. Severe COPD</b>	FEV <sub>1</sub> / FVC <70% predicted  FEV <sub>1</sub> <30% predicted or FEV <sub>1</sub> <50% predicted plus respiratory failure or clinical signs of right heart failure	<ul style="list-style-type: none"> <li>■ Regular treatment with one or more bronchodilators</li> <li>■ Inhaled steroids if reversible element, or if repeated exacerbations</li> <li>■ Pulmonary rehabilitation</li> <li>■ Treatment of complications, such as heart failure</li> <li>■ Long term oxygen therapy if respiratory failure</li> <li>■ Consider surgical treatments</li> </ul>



# COPD Exacerbation

*Thorax* 2006;61:535-544;



# COPD Exacerbation

## ► BTS Guidelines *Thorax 2004;59(Suppl 1):1-232 doi: 10.1136/thx.2004.022707*

**Exacerbations of COPD can be associated with increased:**

- dyspnoea
- sputum purulence
- sputum volume
- cough

**Initial management**

- Increase frequency of bronchodilator use – consider giving via a nebuliser
- Oral antibiotics if purulent sputum
- Prednisolone 30 mg daily for 7–14 days – for all patients with significant increase in breathlessness, and all patients admitted to hospital, unless contraindicated

Salbutamol 5mg nebs  
Ipratropium 500mcg nebs  
Prednisolone 30-40mg po

**Decide where to manage**

Hospital

Home

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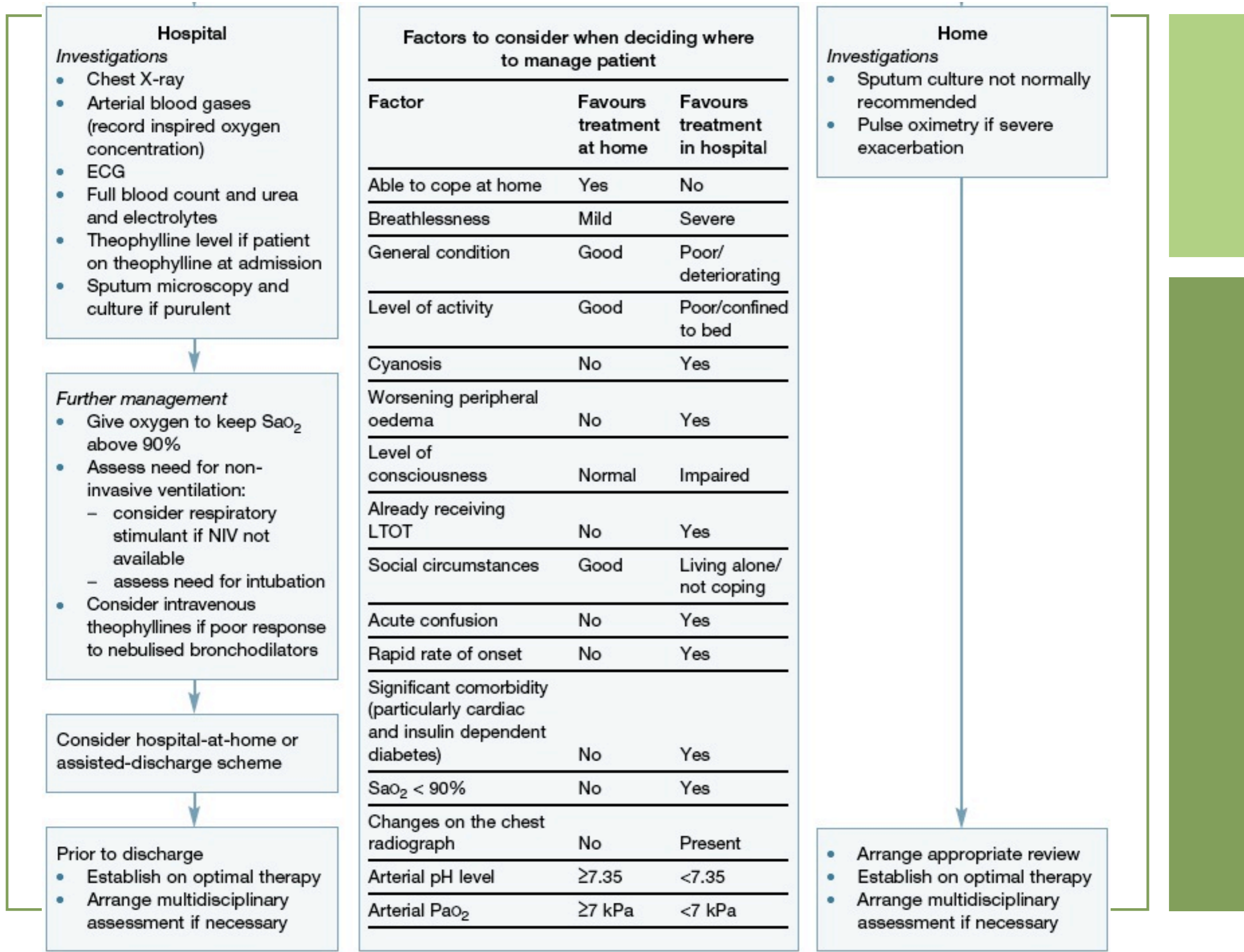
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**Hospital**

*Investigations*

- Chest X-ray
- Arterial blood gases (record inspired oxygen concentration)
- ECG
- Full blood count and urea and electrolytes
- Theophylline level if patient on theophylline at admission
- Sputum microscopy and culture if purulent

*Further management*

- Give oxygen to keep SaO<sub>2</sub> above 90%
- Assess need for non-invasive ventilation:
  - consider respiratory stimulant if NIV not available
  - assess need for intubation
- Consider intravenous theophyllines if poor response to nebulised bronchodilators

Consider hospital-at-home or assisted-discharge scheme

*Prior to discharge*

- Establish on optimal therapy
- Arrange multidisciplinary assessment if necessary

**Factors to consider when deciding where to manage patient**

Factor	Favours treatment at home	Favours treatment 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 and insulin dependent diabetes)	No	Yes
SaO <sub>2</sub> < 90%	No	Yes
Changes on the chest radiograph	No	Present
Arterial pH level	≥7.35	<7.35
Arterial PaO <sub>2</sub>	≥7 kPa	<7 kPa

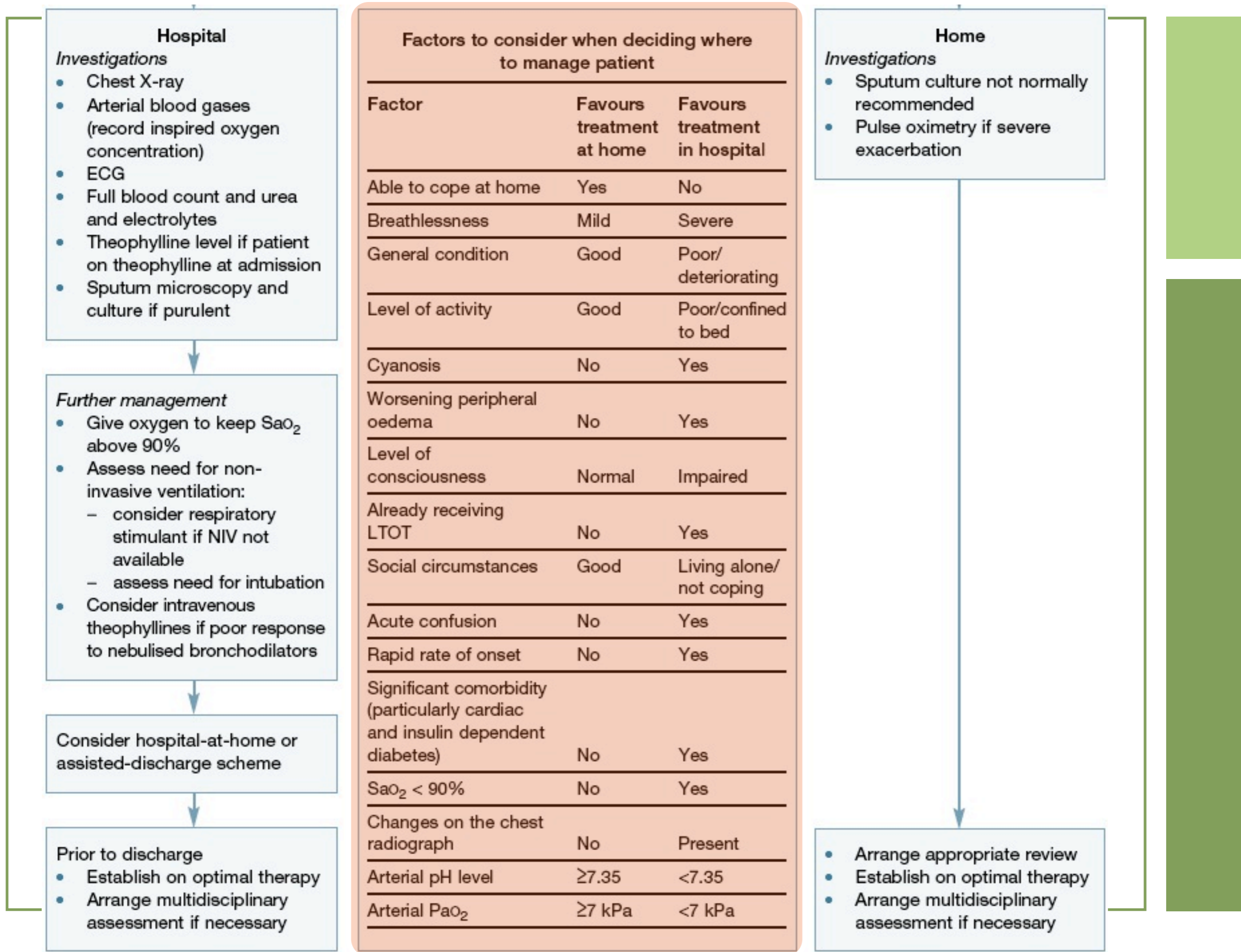
**Home**

*Investigations*

- Sputum culture not normally recommended
- Pulse oximetry if severe exacerbation

- Arrange appropriate review
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## Hospital

### Investigations

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## Home

### Investigations

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# NIV



- ▶ In patients who are tiring, poor ABGs ( $\text{pH} < 7.35$ ,  $\text{pCO}_2 > 6$ ,  $\text{pO}_2 < 8$ ), poor response to therapy
- ▶ Have to be making spontaneous effort
- ▶ Provide recruitment of collapsed (mucous plugged, atelectatic) alveoli
- ▶ Reduce work of breathing by helping with compliance, reduced muscle work, help overcome auto PEEP by providing PEEP, reduce pulmonary oedema (cor pulmonale), and provide high  $\text{O}_2$  and help reduce  $\text{CO}_2$
- ▶ Waters circuit can provide temporary relief until NIV machine

# ARAS Team

- ▶ Only with previous diagnosed COPD on spirometry (already known to chest team/ARAS)
- ▶ Are able to do home follow up and support to avoid admission (if possible)
- ▶ Mostly referral from MEU by medics

Inclusion Criteria	Yes	No
Has clinically diagnosed COPD, and is currently exacerbating		
Min Mental Score >6		
pH > 7.35		
Systolic BP > 100mmHg		
Oxygen saturation >90% (with supplementary oxygen if needed at 2-4 litres or 28% via mask)		
Has adequate social support and telephone		

Exclusion Criteria	Yes	No
Pneumothorax/cardiac signs on CXR		
CURB score >2		
Pulse Rate <60/min or >110/min		
Concomitant medical conditions ie. LVF, angina requiring inpatient stay		
Acute ECG changes		
Requires full time nursing		
Has refused to consider home care		





Questions?

# Summary

- ▶ Common
- ▶ Worsening with increase sputum & symptoms
- ▶ Nebulise salbutamol/ipratropium and steroids
- ▶ Least O2 flow (28%, 35% etc) to keep sats at about 90%
- ▶ NIV for *in extremis* patients