Management of acute exacerbations of COPD and Asthma

similarities and differences

Importance

- Imp cause of morbidity and mortality
- Accelerated decline in lung function
- Poorer quality of life
- Increased medical costs

Incidence

- **Ranges from 1-4%**
- **About 10% - requires ICU admission**
- **2% of all admitted patients – intubation**

Ann Allergy Asthma Immunol,2004

- **PGI data – in last 5 mths**
  - **Total pts. In EMOPD – 6254**
  - **Acute exacerbation of COPD – 111 (1.8%)**
  - **Acute exacerbation of asthma – 66 (1.1%)**

Definition

- Sustained worsening of patients symptoms
- From normal stable state
- Beyond normal day to day variations
- Acute onset
- Often necessitates change in medication

Chest 2000;117:398S-401S

COPD and Asthma

Asthma

sensitizing agent

airway inflammation

CD4+ T iympho

eosinophils

reversible

COPD

noxious agent

airway inflammation

CD8+ T lympho

macrophages, neutrophils

irreversible

Airflow limitation

The Dutch Hypothesis

Asthma

- Intermittent airflow obstruction
- Improvement with bronchodilators and steroids
- High level of bronchial responsiveness
- Broad inflammatory mediator responses
- Airway remodeling (epithelial injury and fibrosis)

COPD

- Progressive airflow obstruction
- Smaller bronchodilator and steroid response
- Most have increased bronchial responsiveness
- Cytokine, chemokine, proteases responses
- Emphysema (lung destruction) frequent

EMOPD

Diagnosis & estimation of severity

- **Brief focused clinical history :**

  severity of symptoms, all medications, cause of exacerbation, high risk factors esp. prior emergency admissions

- **Physical examination** :

  vitals, cyanosis, accessory muscles, PEF or $FEV_{1,}$ oxygen saturation

Investigations

- ABG – in all cases of COPD
  - asthma: PEF – 30-50% predicted, not responding to initial Rx
- CxR, ECG
- Hemogram, electrolytes
- Sputum culture – limited value
- Theophylline levels
- Blood c/s – in case of fever
- Lung function – not practical

Mimickers

- Pneumonia
- Pneumothorax
- LVF / pulmonary edema
- Pulmonary thromboembolism (30%)
- Lung carcinoma
- Upper airway obstruction
- Pleural effusion
- Recurrent aspiration

Oxygen

- Mainstay of therapy
- Aim – $SaO_2 \geq 90\%$

  $PaO_2 \geq 60$ mm Hg
- Nasal prongs v/s venturimasks
- Controlled O_2 therapy in COPD
- High flow O_2 to all pts. with acute asthma
- Monitoring: in asthma by oximeter

  in COPD by complete ABG

Heliox

- Mixture of helium (70%) and oxygen (30%)
- Not in initial treatment
- Useful in refractory cases
- Cannot be used if patient requires >30% O_2
- No studies in COPD

Rapid acting β_2 agonists

- Cornerstone of therapy in both
- Nebuliser v/s MDI with spacer
- Continuous v/s intermittent therapy
- iv β_2 agonists: only in asthma if no response to high dose continuous neb.
  - no role in COPD
- Long acting β_2 agonists: currently recommended only for maintenance Rx

Anticholinergics

- **Imp adjuvants or second line agents**
- **Advantages: prolonged onset of action**
  less systemic side effects
- **Combination of Ipratropium and SABA**
  - lower hospitalisation rates
  - improve PEF and FEV_1

Chest 1998;114:365-72
Am J Respir Crit Care Med 2000;161:1862-8
BMJ 1998;317:971-7

- **Tiotropium- under clinical testing in acute asthma ($M_3 > M_2 > M_1$)**

Methylxanthines

- **Asthma : equivalent effect to β_2 agonists**
  increased side effects
  increased drug interactions
  requires drug monitoring

  Cochrane Database Syst Rev 2000;4

- **COPD : meta-analysis of 4 RCT'S**
  no added benefits but
  increased s/e

  bmj.com 2003;327:643

Systemic corticosteroids

- **Established therapy in both and should be considered integral to management of all**
- **Improves airflow, gas exchange, symptoms, reduce rates of Rx failure**
- **Short course in recommended (10-14 days)**

-SCOPE trial

- **Intravenous vs oral**

Inhaled corticosteroids

- **COPD – no role**

Postgrad Med J 2004

- **Asthma – only marginally effective in acute exacerbations – 9 RCT's**

  - used in maintenance phase

Am J Respir Crit Care Med 2003

Antibiotics

- **COPD – role is intuitive**
- **Upto 50% of exacerbations are caused by typical and atypical bacterial pathogens**

  Chest 2006;129:223-224
- **Effective in patients with cough with increased sputum volume and purulence**
- **Asthma – not routinely, unless signs of pneumonia or bacterial sinusitis**

Magnesium sulphate

- **Asthma – not routinely indicated**

  indicated in – failure to initial Rx

  - adults with FEV_1 25-30% predicted

  - child with failure to improve FEV_1 >60% predicted after 1 hr of care

- **Aerosolized $MgSO_4$ – no benefits**

Chest 2005;128:337-344

- **COPD – no role**

Leukotriene antagonists

- Improve lung function and decrease the need for SABA during long term asthma therapy
- Limited data in acute asthma – presently not recommended
- No role in COPD

Other agents

- Respiratory stimulants – doxapram in hypercapnic resp failure in COPD
- Mucolytics, cough syrups
- Antihistamines
- Sedatives
- Physiotherapy
- Inhaled anesthetics

NIV in COPD

- Well established role
- Benefits – lower rates of intubation
  - lower in-hospital mortality rates
  - short hospital stays
  - ↑ symptomatic & physiological improvement
- Also role in weaning

Indications of NIV in COPD

- Moderate to severe dyspnea with use of accessory muscles and paradoxical abdominal motion
- Moderate to severe acidosis (pH <7.35)
- Hypercapnia ($PaCO_2$ > 45 mm Hg)
- Respiratory frequency >25 breaths per min

Exclusion criteria for NIV

- Respiratory arrest
- CVS instability (hypotension, arrhythmias, myocardial infarction)
- Somnolence, impaired mental status, uncooperative patient
- High aspiration risk: viscous/ copious secretions
- Recent facial or gastroesophageal surgery
- Craniofacial trauma
- Extreme obesity
- Fixed nasopharyngeal abnormalities

NIV in Asthma

- May be beneficial in carefully selected and monitored patients
- Extreme caution – to recognize failure
- Optimal medical therapy – no improvement in one hour or deterioration – NIV
- Trial of NIV – if no improvement at one hour or deterioration – endotracheal intubation

MV in COPD

- Severe dyspnea with use of accessory muscles and paradoxical abdominal motion
- Respiratory frequency >35 breaths per min
- Life threatening hypoxemia(PaO_2 <40 mm Hg or PaO_2/FiO_2 <200 mm Hg)
- Severe acidosis (pH <7.25)
- Hypercapnia ($PaCO_2$ >60 mm Hg)
- Respiratory arrest
- CVS complications
- Somnolence, impaired mental status
- NIV failure

MV in Asthma

- Severe asthma despite max optimal therapy
- Impending respiratory arrest
- Presence of confusion, drowsiness or loss of consciousness

Summarising….

	Asthma	COPD
Oxygen	++	++
β_2 agonists	++	++
Corticosteroids	++	++
Anticholinergics	+	++
Methylxanthines	+	-
$MgSO_4$	+	-
Antibiotics	-	+
NIPPV	$\pm$	++
MV	++	++


Thank You