

DYSPNOEA AND EVIDENCE- BASED MANAGEMENT

kellyam_jec



Anne-Maree Kelly

Objectives

- To review the breadth of diagnoses associated with the symptom of dyspnoea in adults
- To review the evidence base for treatment for major causes and how we perform in delivering it


The size of the problem

- Patients with dyspnoea make up:
 - ▣ 5.2% of ED presentations
 - ▣ 11.4% of ward admissions and
 - ▣ 19.9% of ED Intensive Care Unit (ICU) admissions

The AANZDEM study, Acad Emerg Med (at press)

Who are the patients?

- Median age is 67 (IQR 49-80), 61% aged >60 years.
- 49% male
- 48.5% arrive ambulance
- Co-morbidity is very common
 - The 'usual suspects'
 - Only 12% have no significant co-morbidities/ PMH



What proportion do you think are accounted for by asthma, COPD and heart failure?

What are the ED diagnoses?

42%

Diagnosis	Percent
Lower respiratory tract infection (including pneumonia)	20%
Heart failure	15%
COPD	14%
Asthma	13%
Acute coronary syndrome	3%
Arrhythmia (incl. RAF)	3%
Pleural effusion	2%
Pulmonary embolism	1%
Pneumothorax	1%
Other	23%
No clear diagnosis	3%



The AANZDEM study, Acad Emerg Med (at press)

What is 'other'?

- Sepsis – non respiratory
- Allergic reactions and anaphylaxis
- Drug and alcohol
- Malignancy
- Upper respiratory tract conditions
- Anaemia
- Cardiac – non-CAD

What are the outcomes?

- Die in ED 0.4%
- Admission to hospital (incl. ICU) 64%
- In-hospital mortality 6%
- Median LOS 5 days

Meet Mary

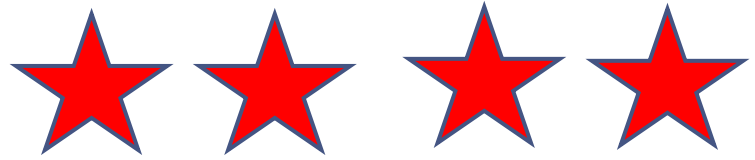
- 86 year old
- PMH
 - ▣ ACS
 - ▣ CHF
- Acute dyspnoea at 6am
- Tachycardic, diaphoretic, hypoxic (SpO₂ 84% RA), creps to mid-zones
- CXR- Acute pulmonary oedema



What are the evidence-based treatments for APO?

- CPAP?
- Diuretics?
- Vasodilators?
- Oxygen – YES (with care)
- Morphine - NO





- NIV significantly reduces:
 - ▣ Hospital mortality (RR 0.66, 95% CI 0.48 to 0.89)
 - ▣ Endotracheal intubation (RR 0.52, 95% CI 0.36 to 0.75).
- No difference in hospital length of stay

Cochrane review:

<http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD005351.pub3/pdf/abstract>

Diuretics



- Use is supported by level V evidence – expert opinion!
- No firm evidence of benefit and some of harm
- High doses are associated with increased risk of renal failure, longer LOS and increased mortality

Marik PE, Flemmer M. Narrative review: the management of acute decompensated heart failure. *J Intensive Care Med* 2012; 27: 343-53.

Vasodilation (e.g. GTN)



- There is no compelling evidence
- Limited studies with non-optimal design
- Some evidence that higher dose vasodilators and low dose frusemide is better than the alternative
- Lots of anecdotal evidence that patients with hypertensive ‘flash’ pulmonary oedema improve quickly when GTN is used to lower BP

Cotter et al. Lancet 1998; 351: 389–93

What works?

- CPAP
- Oxygen (when used with care due to high COPD co-morbidity)
- Probably GTN in selected cases but not enough focussed research
- Maybe (or maybe not) frusemide
- Not morphine ✘

What treatments are we using?

- Oxygen – 62%
- NIV -12%
- ETT and MV – 1%
- Diuretics -73%, most IV
- Nitrates – 25%, most transdermal/ sub-lingual
- Inotrope -1%

AANZDEM data

Meet Tran

- ▣ 74 year old known COAD
- ▣ Acute respiratory distress after URTI illness
- ▣ Purulent sputum
- ▣ Pulse 125, BP 140/-, respiratory rate 35, SpO₂ (air) 86%

▣ VBG result:

- ▣ pH – 7.16
- ▣ pCO₂ – 82.6mmHg
- ▣ HCO₃ – 28.8 mmol/l

What are the evidence-based treatments for COPD?

- ❑ Oxygen - titrated
- ❑ Bronchodilators
- ❑ Systemic steroids
- ❑ Antibiotics for infection
- ❑ BiPAP - if respiratory acidosis



COPD-X guidelines. <http://copdx.org.au/copd-x-plan/x-manage-exacerbations/>

Bronchodilators and steroids

- Lots of level I evidence regarding bronchodilators and systemic steroids – ‘well known’
 - Global Initiative for Chronic Obstructive Lung Disease 2016, American Thoracic Society 1995, British Thoracic Society 1997 and others
 - Walters J et al. Systemic corticosteroids for acute exacerbations of chronic obstructive pulmonary disease. *Cochrane Database Syst Rev*, 9, CD001288



Antibiotics



- Level II evidence
- Indications: Evidence of infection on CXR, increased WCC or CRP, increased or purulent sputum
- Reduces risk of treatment failure
- Only proven to reduce mortality in critically ill
- Oral is fine e.g. doxycycline
- Combination with steroids and antibiotics results in higher rate of clinical 'cure'

Vollenweider DJ et al. Antibiotics for exacerbations of chronic obstructive pulmonary disease. *Cochrane Database Syst Rev*, 12,CD010257

Controlled oxygen therapy



- Uncontrolled oxygen increases risk of suppression of hypoxic drive in chronically hypercapnic patients
- Aim SpO₂ 88-92%
- Beware patients arriving by ambulance!

Austin MA et al. Effect of high flow oxygen on mortality in chronic obstructive pulmonary disease patients in prehospital setting: randomized controlled trial. BMJ 2010 Oct 18;341:c5462



- Level I evidence
- Indications:
 - ▣ pH <7.3
 - ▣ Severe dyspnoea
 - ▣ Rising pCO₂

Ram FS et al. (2004) Non-invasive positive pressure ventilation for treatment of respiratory failure due to exacerbations of chronic obstructive pulmonary disease. Cochrane Database Syst Rev, CD004104.

What works?

- Oxygen- titrated
- Bronchodilators
- Systemic steroids
- Antibiotics for infection
- BiPAP - if respiratory acidosis

What treatments are we using?

- Inhaled bronchodilator -80%
- Systemic corticosteroid – 66%
- Both – 61%
- Antibiotic -49%
- NIV if pH <7.3 – 57%

AANZDEM data

VBG in COPD



□ pH

- Weighted mean difference= 0.034 pH units
(95% LOA +/- 0.1)

□ pCO₂

- Venous pCO₂ <45mmHg, 100% sensitive to exclude significant hypercarbia

The concept of a bundle of care



- CXR
- Controlled oxygen therapy
- Bronchodilator
- Systemic steroid
- Antibiotic (if indicated)
- NIV if pH <7.3
- (Blood gas if non-mild)
- **Compliance with the bundle:**
 - ▣ Single health service study (Victoria): 49%
 - ▣ Victorian ED after a QI project: 63%

Meet Tim

- 25 years old
- Life long asthma
- Takes preventer & occasional Ventolin
- No ICU, few admissions
- SOB 2 days after URTI
- Pulse 110, RR 28, O2 sat 94%,
widespread wheeze



What are the evidence-based treatments?

- Inhaled bronchodilators 
- Systemic steroids – irrespective of severity assessment
- IV magnesium in severe cases 
- ‘Consider’: NIV, IV salbutamol, ketamine for intubation

The 'considerers'



- NIV – small studies, promising results with biPaP
 - ▣ What should the criteria be?
- IV salbutamol – very limited data, methodological issues, inconclusive
- Ketamine for intubation– no high quality evidence

- Soroksky et al. Noninvasive positive pressure ventilation in acute asthmatic attack. European Respiratory Review 2010 19: 39-45
- http://www.cochrane.org/CD010179/AIRWAYS_addition-of-intravenous-beta2-agonists-to-inhaled-beta2-agonists-for-acute-asthma

What treatments are we using?

- Inhaled bronchodilator – 88%
- Systemic corticosteroid – 70%
- Both -67%
- BiPaP -2%
- Mechanical ventilation ...none

AANZDEM data

Pneumothorax

- Accounts for $<1\%$ of all patients with dyspnoea (AANZDEM study)
- Largely an evidence-free zone!



Current recommendations (BTS)

- Patients with pneumothorax and significant breathlessness should undergo active intervention.
- Observation is the treatment of choice for small pneumothorax without significant breathlessness. Selected asymptomatic patients with a large PSP may be managed by observation alone. ★ ★
- Needle (14–16 G) aspiration is as effective as large-bore chest drains ★ ★ ★
- Following failed needle aspiration, small-bore (<14 F) chest drain insertion is recommended.
- Large-bore chest drains are not needed for pneumothorax.

What treatments are we using?

- In AANZDEM study there were 27 patients with pneumothorax
 - 15 UWSD (55%)
 - 2 aspiration (13%)
 - Rest treated conservatively

AANZDEM data

Summary

- Dyspnoea is common with a very wide range of causes
- There is surprisingly little evidence to guide care in some conditions
- Where there is high quality evidence, compliance with it is variable with some obvious gaps
- We need to keep working on making sure evidence is translated into practice

Questions?

