Hospital Management of Acute exacerbations & Non-Invasive Ventilation

Dr. Vinod Palissery
Agenda

- Hospital Assessment & Management
- Respiratory failure
- Acute Non Invasive Ventilation (NIV)
- Long term NIV in COPD
Acute exacerbations of COPD

- 1 in 5 general medical admissions
- High rates of respiratory failure
  - 25% had respiratory failure
  - 13% received ventilator support
- Significant readmission rate
  - 33% at 90 days
  - 80% at 1 year
- Significant mortality
  - 7% inpatient
  - 14% at 90 days
  - 35% at 1 year
- Male 75 yrs, former smoker (40 p/y)
- COPD  (FEV1 32% pred.; Dyspnea -MRC 3-)
- 3 exacerbation/year, 2 hospitalisations
- Worsening breathlessness & cough. Sputum green last 2 days 4 days
O2  6,0 l/min

99 83
- Male 75 yrs, former smoker (40 p/y)
- COPD (FEV1 32% pred.; Dyspnea -MRC 3-)
- 3 exacerbation/year, 2 hospitalisations with one episode NIV last year;
- LTOT at 1l/min: pH 7.41, PaO2 9.9 KPa, PaCO2 6.7
- Comorbidities: Systemic hypertension, previous AMI
Seen in A&E

- GCS13
- Resp rate 26, SpO2 94 % on 6 litres oxygen via nasal canula.
- Pulse rate 100, BP 126/74
- Using accessory muscles
- Chest bilateral wheeze
- Minimal pedal oedema
Severity of exacerbation

- For hospitalized patients the severity of the exacerbation should be based on the patient’s clinical signs
  
  - *No respiratory failure*
  
  - *Acute respiratory failure*
  
  - *Acute respiratory failure - life-threatening*
Oxygen therapy

- Key component of hospital treatment of an exacerbation

- Supplemental oxygen should be titrated to improve the patient’s hypoxemia with a target saturation of 88-92% (or lower target as per previous clinical assessment)

- Once oxygen is started, blood gases should be checked frequently to ensure satisfactory oxygenation without carbon dioxide retention and/or worsening acidosis
Patients referred to hospital
In all patients with an exacerbation requiring hospital assessment:

- A chest radiograph should be obtained
- Arterial blood gas should be measured (if clinically indicated)
- ECG should be recorded
- FBC, U&E should be measured
- If sputum is purulent, a sample should be sent for microscopy and culture
# Medical Management

<table>
<thead>
<tr>
<th>A (Antibiotic)</th>
<th>If evidence of infection MC+S</th>
</tr>
</thead>
<tbody>
<tr>
<td>S (Steroid)</td>
<td>Prednisolone - 30 mg daily 5-7 days</td>
</tr>
<tr>
<td>B (Bronchodilator)</td>
<td>Salbutamol nebs + Ipratropium Nebs</td>
</tr>
<tr>
<td>O (Oxygen)</td>
<td>Controlled O₂ to maintain SpO₂ 88-92%</td>
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</table>
Consider giving antibiotics when sputum is purulent and of greater volume than usual.
# DECAF Score

<table>
<thead>
<tr>
<th>Variable</th>
<th>Points</th>
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<tr>
<td>Dyspnea limiting the patient to home (MRCD 5) and:</td>
<td>1</td>
</tr>
<tr>
<td>Independent in bathing and/or dressing (eMRCD 5a)</td>
<td></td>
</tr>
<tr>
<td>Requires assistance with bathing AND dressing (eMRCD 5b)</td>
<td>2</td>
</tr>
<tr>
<td><strong>Eosinopenia</strong> (&lt;0.05 x 10^9/L)</td>
<td>1</td>
</tr>
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<td><strong>Consolidation</strong> (on chest x-ray)</td>
<td>1</td>
</tr>
<tr>
<td><strong>Acidemia</strong> (pH &lt; 7.30)</td>
<td>1</td>
</tr>
<tr>
<td><strong>Atrial Fibrillation</strong> (on admission EKG)</td>
<td>1</td>
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- **Low** (0-1 point), in-hospital mortality 1.4%
  (Low risk – potentially suitable for hospital at home)

- **Intermediate** (2 points), in-hospital mortality 8.4%

- **High** (3-6 points), in-hospital mortality 34.6%

Steer J. Thorax 2012
Other aspects of care to be reviewed as part of Hospital Assessment

- Smoking
- Self management plan
- Pulmonary rehab status
- Inhaler
Seen in A&E

- Resp rate 26, SpO2 94% on 6 litres oxygen via nasal canula.
- Pulse rate 100, BP 126/74
- Using accessory muscles
- Chest bilateral wheeze, Minimal pedal oedema
- On arrival in emergency department on 60% Oxygen: pH – 7.27, paCO2 - 10.16 kPa, paO2 – 9.96 kPa, HCO3 – 35.1 mmol/L
The patient is given

- ‘back-to-back’ nebulisers
- 30 mg prednisolone
- Antibiotics
- FiO2 – 24%
After 1 hr of optimal medical therapy and controlled oxygen therapy, the arterial blood gas is resampled:

- pH – 7.29
- paCO2 – 9.7 kPa
- paO2 – 8.54 kPa
- HCO3 – 33.9 mmol/L
How could you manage this patient now?

- Start NIV
- Continue medical therapy with controlled oxygen
- Contact ICU and refer for intubation and invasive mechanical ventilation
Role of NIV in AECOPD
Recommendations

24. For most patients with AECOPD, the initial management should be optimal medical therapy and targeting an oxygen saturation of 88–92% (Grade A).

25. NIV should be started when pH < 7.35 and pCO₂ > 6.5 kPa persist or develop despite optimal medical therapy (Grade A).
Type II Respiratory Failure in COPD

- Bronchospasm
  - Increased airway mucus
  - Airway inflammation

- Air trapping

- Increased intrinsic PEEP

- Increased work of breathing

- Accessory muscle use

- Accessory muscle fatigue

- Decreased tidal volumes

- Increased PaCO2

- Diaphragm flattening

- Muscle inefficiency

- Type II Respiratory Failure
Starting NIV in COPD - Good practice points

- **Arterial blood gas (ABG)** measurement is needed prior to and following starting NIV

- **Chest radiography** is recommended but should not delay initiation of NIV in severe acidosis

- **Reversible causes** for respiratory failure should be sought and treated appropriately

- At the start of treatment, an **individualised patient plan** (involving the patient wherever possible) should document agreed measures to be taken in the event of NIV failure
UK Survival of Acute Exacerbation of COPD Requiring Noninvasive Ventilation (NIV)

UK Survival of Acute Exacerbation of COPD Requiring Noninvasive Ventilation (NIV)


4-6 weeks post discharge
UK Survival of Acute Exacerbation of COPD Requiring Noninvasive Ventilation (NIV)

UK Survival of Acute Exacerbation of COPD Requiring Noninvasive Ventilation (n=1)

Median time to re-admission: 32 days

Cumulative Survival

Survival Time (Months)

Months post discharge
Should we start home Non-Invasive Ventilation following an acute exacerbation of COPD?

- **Pro**
  - High risk of death or readmission
  - Benefit of NIV in acute setting
  - On-going respiratory failure at time of NIV discontinuation

- **Con**
  - What is evidence base
  - Cost of therapy
  - Burden for patient
  - Patient Selection
Primary Outcome

Admission-free survival by treatment arm

12 month admission free survival

Murphy PB et al. JAMA Published online May 21, 2017.
Primary Outcome

Admission-free survival by treatment arm

WHAT DOES THIS MEAN?

12 month admission free survival

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<td>33 (58%)</td>
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Primary Outcome

HOT-HMV reduced the likelihood of readmission or death by almost 50%.

HOT-HMV increased time to readmission or death by >90 days.

12 month admission free survival

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Need to Treat 6 patients with HOT-HMV to prevent 1 readmission or death within 1 year

12 month admission free survival

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Domiciliary NIV

- Beneficial in selected patients - patients selection most important
(World Health Organization 2002)
Sheffield Palliative Care Communicating System Form –
For patients with a Sheffield GP only

(Affix addressograph label here)
Patient name:
Patient Address:

Hosp No:
NHS No:
Date of Birth

The above patient has been considered by:

**Diagnosis**
Primary diagnosis

Secondary diagnoses

**Additional notes for respiratory patients:**

1. Consider for NIV as an acute intervention
2. For active hospital treatment but not escalation to NIV
3. Not for domiciliary NIV
4. NIV not yet discussed
5. For hospital palliation but no active treatment
6. Care at home

Name of clinician completing form:
Designation:
Signature:
Date:

Please fax completed registration forms to Viv Esberger, SPCCS Administrator on 2357499
Email: sht-fr.SPCCS@nhs.net, Tel: 2357459, Fax: 2351321
Central Services, St. Luke’s Hospice, Little Common Lane, Sheffield S11 9NE
Thank you