Case Studies on ED Management of Asthma

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Outline of Presentation

- NAEPP guidelines
- Initial assessment and diagnosis
- Treatment of asthma exacerbations
- Secondary prevention after the ED visit
NAEPP Guidelines, 1997

• National Asthma Education and Prevention Program (NAEPP)

• Classification of chronic asthma:
  – Mild intermittent asthma
  – **Mild persistent asthma** (>2 days/wk, >2 nights/mo)
  – Moderate persistent asthma
  – Severe persistent asthma

• Inhaled corticosteroids (ICS) are “preferred treatment” for all patients with persistent asthma
2002 Update on Selected Topics

- Antibiotics not recommended for acute asthma
- ICS are preferred treatment for children of all ages with persistent asthma
- ICS + long-acting β-agonist (LABA) is the preferred treatment for moderate or severe persistent asthma in individuals age 6 and older

NAEPP, 2002
Dual Therapy With ICS + LABA (days)

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Dual Therapy With ICS + LABA (weeks)

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Potential for Improving Asthma

- 2 million emergency department (ED) visits per year

- Among ED patients:
  - 74% adults (63% children) use ED for all “problem” asthma care
  - 45% adults (31% children) receive all asthma Rx from ED
  - With primary care physician (PCP): 63% + 61% for problem care; 24% + 25% for all Rx

- High-risk population
  - 60% report history of asthma hospitalization (15% report intubation)
  - 80% to 90% report 1 or more ED visits for asthma in past year
  - However, only 45% are on ICS

www.emnet-usa.org
Case 1: Recurrent Bronchitis

- 6 year old girl presents to ED with “mild bronchitis”

- History:
  - Symptoms began 3 days ago – initial upper respiratory infection (URI) symptoms that progressed to nocturnal cough & mild dyspnea on exertion (DOE). Otherwise, well.
  - Two to three bouts/year of “bronchitis” that require medical care (mist + over-the-counter (OTC) beta-agonist inhaler, occasional 5-day course of steroids)
  - Two ED visits last year, no prior hospitalizations for her bronchitis

- Physical exam:
  - Respiratory rate (RR), normal heart rate (HR) & blood pressure (BP), normal temperature (T)
  - Not using accessory muscles. No stridor
  - End-expiratory wheezing all fields
Underdiagnosis of Asthma in Children

• Asthma onset usually before age 6

• Commonly misdiagnosed as:
  – Recurrent or chronic bronchitis
  – Recurrent croup, URI, or pneumonia
  – Wheezy bronchitis
  – Reactive airway disease

• Children with “mild asthma” accounted for one third of cases in fatal asthma registry

Initial Assessment and Diagnosis

• Determine that:
  – Patient has episodic signs/symptoms of airflow obstruction
  – Alternative diagnoses are excluded (eg, vocal cord dysfunction, foreign bodies, other cardiopulmonary diseases)

• Methods for establishing diagnosis:
  – Medical history & physical exam
  – Referral for spirometry (including forced expiratory volume in 1 second \( FEV_1 \), forced vital capacity \( FVC \), reversibility)
Measurement of Airflow Obstruction

• Asthma severity (acute or chronic) is very difficult to determine by symptoms & physical exam ...

• Measure by one of the following:
  – Peak expiratory flow (PEF, using peak flow meter)
  – FEV$_1$ (spirometry)

• PEF tends to give higher % predicted than FEV$_1$ (ie, PEF tends to underestimate attack)

• Need table of PEF values for children (ages 6 to 17)
# Peak Expiratory Flow (Adults)

Severity per 1997 NAEPP (% predicted):
- Severe (<50) … Moderate (50-79) … Mild (80+)

<table>
<thead>
<tr>
<th>Severity</th>
<th>PEF %</th>
<th>Women</th>
<th>Men</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjunct Rx</td>
<td>&lt;40</td>
<td>&lt;200</td>
<td>&lt;250</td>
</tr>
<tr>
<td></td>
<td>40-69</td>
<td>200-299</td>
<td>250-399</td>
</tr>
<tr>
<td>Discharge goal</td>
<td>70+</td>
<td>300+</td>
<td>400+</td>
</tr>
</tbody>
</table>
Case 2: “Intermittent” Asthma

• 20 year old man presents with allergy problems

• History:
  – Hayfever “acting up” x 3 days … onset mild shortness of breath (SOB) yesterday, not responding to OTC allergy meds (including inhaler)
  – Uses OTC inhaler before & after workouts, plus 1 night/week
  – Multiple infections as child, occasional “allergy” problems, told by MD that he might have asthma but never confirmed
  – 3 ED visits last year, no prior hospitalizations for his “allergies”

• Physical exam:
  _ ↑ RR, ↑ HR, normal BP, normal T
  – PEF 325  (What % predicted?  250/400 … approx 55%)
  – Nasal congestion. Diffuse wheezing
ED and Hospital Management: Goals

1. Correct significant hypoxemia
2. Rapidly reverse airflow obstruction
3. Decrease likelihood of recurrence

NAEPP, 1997
ED and Hospital Management: Initial Treatment

Mild-to-Moderate Exacerbation (PEF > 50%)

- **Oxygen** to achieve O$_2$ sat >90%
- **Inhaled** $\beta_2$-agonist by metered dose inhaler (MDI) or nebulizer (neb), up to 3 times in first hour
- **Oral corticosteroid** if no immediate response or if patient recently took oral corticosteroid

NAEPP, 1997
**β-Agonists**

- Albuterol neb 2.5-5 mg / 4-5 cc NS
  - β₂-selective & longer acting
  - Nebulizer vs. MDI therapy
- Repeat q 20 minutes x 2, then ...
- Attempt switch to MDI/spacer 4 to 10 puffs q1h prn
- Consider “continuous neb” (10 to 20 mg/hr) for patients with PEFR <40%
- Do not use IV or SQ β-agonists *instead of* inhaled. Sparse data on *concomitant* therapy (eg, adding terbutaline 0.25 mg SQ) ...

Systemic Corticosteroids

- Prednisone 40-60 mg po if:
  - Outpatient steroids / recent taper, or
  - Initial peak flow (PF) <70% (W <300, M <400), or
  - 1-hour PF with <10% improvement

- Make steroid decision in ≤1 hour
- No advantage from using high-dose … also, PO = IV

- Systemic steroid Rx at discharge:
  - Fixed (prednisone 50 mg x 5 d) vs taper (multiple options)
  - Ideal regimen not known, probably 5-10 days; taper if >7 days

- Consider IM methylprednisolone (Depo-Medrol) 80 mg to 120 mg for potentially noncompliant patients

Long-term Management?

• Remember NAEPP Goal 3:
  “Decrease likelihood of recurrence”

• Per NAEPP guidelines:
  – He has persistent asthma
  – Preferred therapy = inhaled corticosteroids
  – He needs asthma education & outpatient follow-up

• More on this shortly …

NAEPP, 1997
Case 3: Severe Acute Asthma

• 35 year old woman presents with severe asthma attack

• History of present illness & meds:
  – URI x few days … very SOB x 2 hours before ED presentation
  – On albuterol & ipratropium prn, and ICS (+ compliance)
  – Asthma diagnosis at age 25. Has PCP & Medicaid insurance
  – 2 ED visits last year + asthma hospitalization, + intubation

• Physical exam:
  – ↑RR, ↑HR, normal BP, normal T
  – PEF 150 (<40% predicted)
  – Diffuse wheezing despite poor air movement
ED and Hospital Management:
Initial Treatment

Severe Exacerbation (PEF <50%)

- **Oxygen** to achieve $O_2$ sat $\geq 90$

- **Inhaled high-dose $\beta_2$-agonist and anticholinergic** by neb q 20 minutes or continuously for 1 hour

- **Oral corticosteroid**

NAEPP, 1997
Impending or Actual Respiratory Arrest

- Intubation and mechanical ventilation with 100% O₂
- Nebulized β₂-agonist and anticholinergic
- IV corticosteroid
- Admit to hospital intensive care

NAEPP, 1997
Inhaled Anticholinergics

• Moderate bronchodilation
  – Delayed onset (>20 minutes)
  – Peak effect at 30 to 60 minutes

• Of likely benefit for:
  – Severe (refractory) exacerbations, especially children
  – Older patients with asthma-COPD

• Ipratropium neb 0.5 mg / 4-5 mL NS
  – Available as neb or MDI
  – Q 20 to 30 minutes x 3 may be most effective, then q 2 to 4 hours

Rapid Sequence Intubation

If extreme respiratory distress, with hemodynamic instability or change in mental status:

• **Sedation**
  – Midazolam 5 mg IV … or ketamine 100 mg IV

• **Cough suppression**
  – Lidocaine 100 mg IV

• **Paralysis**
  – Succinylcholine 100 mg IV … or vecuronium 10 mg IV

• **Oropharyngeal intubation with 8-mm tube**
Novel Therapies in the ED

- IV magnesium
- Heliox
- Others
  - ICS in acute setting
  - IV montelukast
  - Bronchoalveolar lavage
IV Magnesium for Acute Asthma – Admit Rate

Heliox for Severe Acute Asthma – PEF


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ED-Initiated Preventive Interventions

- High-risk population
- Use of ED for “problem asthma” care + asthma Rx
- What interventions are feasible in the ED setting?
- Examples from MARC:
  1. ICS initiation at discharge from ED
  2. Asthma education programs
  3. Bridging the gap between ED & primary asthma care
ICS after the ED — Relapse at 20 to 24 Days

Prevention of Repeat ED Visits

Prevention of Fatal Asthma


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Mission Statement

To promote optimal asthma management and quality of life among individuals with asthma, their families and communities, by advancing excellence in asthma education through the Certified Asthma Educator process.

www.naecb.org
Follow-up with PCP

- Philadelphia study
  - Randomized trial, 1 center, N = 178
  - $25 intervention (free meds, taxi vouchers, 48-hr call)
  - Follow-up with PCP: usual care (29%) vs intervention (46%), P = .02; RR = 1.6 (95% CI, 1.1-2.4)

- EMF Center of Excellence Award
  - Recently completed RCT at 9 EMNet sites
  - 1 month: 50% increase in PCP follow-up (ACEP 2001)

Baren, et al. Presented at ACEP; October 2001; Chicago, Ill.
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  - 1 month: 50% increase in PCP follow-up (ACEP 2001)
  - 6 and 12 months: no difference in clinical outcomes … (ACEP 2002)
  - Next steps? Consider facilitated referral to asthma specialist

Summary

- NAEPP guidelines
  - 1997: Initial assessment & diagnosis
    Rely on objective measures (PEF or FEV₁)
    O₂ prn, inhaled β-agonist + anticholinergic, systemic steroids
  - 2002: Antibiotics not recommended for acute asthma
    ICS for children of all ages with persistent asthma
    ICS + LABA for age 6+ with moderate-severe persistent

- Novel treatments – for severe exacerbations only

- Prevention at all clinical encounters!
  - Start ICS at ED discharge … consider ICS + LABA
  - Asthma education & longitudinal care … consider referral
Take-Home Messages

• Case 1 – Recurrent bronchitis
  – Make “presumptive diagnosis” of asthma
  – Need for further assessment (eg, outpatient spirometry)

• Case 2 – Intermittent asthma
  – Many cases of “intermittent” are truly persistent
  – ICS are preferred treatment for persistent asthma

• Case 3 – Severe acute asthma
  – Use adjunct therapies for PEF < 40% predicted (W <200, M <250)
  – ICS + LABA for moderate-severe persistent asthma