Improving asthma outcomes through asthma education and disease management

Ryan G Pett & Shane Nye

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Shane Nye, PharmD, NCPS, AE-C

- Clinical Pharmacists
- Yakama Indian Health Service

**Ryan G Pett**
- Ryan completed his pharmacy residency at Rapid City PHS Indian Hospital.
- Instituted a pediatric asthma education clinic at Rapid City.

**Shane Nye**
- Shane served as an active-duty pharmacist in the Navy for five years prior to entering the IHS.
- Developed the Yakama Indian Health pharmacy asthma clinic in conjunction with multidisciplinary collaboration.
Learning objectives

• Cite the Healthy People 2020 objectives for asthma
• Apply the four components of asthma care to professional practice
• Describe how collaborative practice by the entire Indian Health Service (IHS) professional staff (physician, nurse, pharmacist, respiratory therapist, environmental health engineer) can affect outcomes in asthma patients
Public health burden of asthma (year)

- Prevalence: 25,600,000 (8.3%), 6.8 million children (9.3%) (2012)
- Office visits: 14,200,000 (2010)
- Emergency Dept. visits: 1,781,000 (2011)
- Hospitalizations: 439,000 (2010)
- Deaths: 3,500 (2012)
Current asthma prevalence: US 2001-2010

Total number of persons

Percent

Year

2001 2002 2003 2004 2005 2006 2007 2008 2009 2010

Total number of persons in millions
Asthma prevalence by race/ethnicity
National Health Interview Survey 2001-2010

Race/Ethnicity

<table>
<thead>
<tr>
<th>Race/Ethnicity</th>
<th>Adult (18+years)</th>
<th>Child (0-17 Years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AI/AN</td>
<td>6.7</td>
<td>10.1</td>
</tr>
<tr>
<td>Asian</td>
<td>6.7</td>
<td>7.2</td>
</tr>
<tr>
<td>Other Hispanic</td>
<td>8.3</td>
<td>11.6</td>
</tr>
<tr>
<td>Mexican/Mexican American</td>
<td>6.6</td>
<td>14.3</td>
</tr>
<tr>
<td>Puerto Rican</td>
<td>14.3</td>
<td></td>
</tr>
<tr>
<td>Non-Hispanic Black</td>
<td>12.5</td>
<td></td>
</tr>
<tr>
<td>Non-Hispanic White</td>
<td>8.6</td>
<td></td>
</tr>
</tbody>
</table>

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What is Healthy People 2020?

- Healthy People (HP2020) provides science-based, 10-year national objectives for improving the health of all Americans
  - Encourage collaborations across communities and sectors
  - Empower individuals toward making informed health decisions
  - Measure the impact of prevention activities
Healthy People 2020:
Eight national asthma objectives

1. asthma deaths
2. hospitalizations for asthma
3. emergency department (ED) visits for asthma
4. activity limitations among persons with asthma
5. proportion asthma who miss school or work days
6. proportion who receive formal patient education
7. proportion who receive appropriate asthma care
8. number of States...with a comprehensive asthma surveillance system for tracking asthma cases, illnesses, and disability at the state level
Objective 1: Reduce asthma deaths

• **Under age 35 years**: 3.4 asthma deaths per million children and adults occurred in 2007
  – This measure is being tracked for informational purposes. If warranted, a target will be set during the decade.
• No target set as of December 2014
Asthma deaths, 1999-2010

Rate per million

- 65+ years
- 35-64 years
- <35 years

HP2020 Target: 21.5
No HP2020 Target: 4.9

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Asthma deaths

### Total population

<table>
<thead>
<tr>
<th></th>
<th>1999</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of asthma deaths</td>
<td>4,657</td>
<td>3,404</td>
</tr>
<tr>
<td>% change 1999-2010</td>
<td></td>
<td>-26.9%</td>
</tr>
</tbody>
</table>

### Asthma death rates per million

- **Total**
- **Female**
- **Male**
- **Black, non-Hispanic**
- **White, non-Hispanic**
- **Asian/Pacific Islander**
- **Am Indian/AK Native**
- **Hispanic/Latino**
Objective 2: Reduce asthma hospitalizations

• **<5 years**: Target 18.2 hospitalizations per 10,000
  – Baseline: 41.4 occurred in 2007

• **5-64 years**: Target 8.7 hospitalizations per 10,000
  – Baseline: 11.1 occurred in 2007

• **>65 years**: Target 20.1 hospitalizations per 10,000
  – Baseline: 25.3 occurred in 2007
Asthma hospitalizations U.S., 2010

- >65 years: 25.5, HP2020 target: 20.1
- 5-64 years: 10.5, HP2020 target: 8.7
- <5 years: 40.6, HP2020 target: 18.2

Note: data for group <5 years is from 2009.
Asthma hospitalizations: U.S., 2001-2009

Asthma hospitalizations 439,000 (2010)
Comparing asthma hospitalizations among AI/AN versus general US population, 2003-2011

<table>
<thead>
<tr>
<th></th>
<th>2003-2011</th>
<th>Asthma Hospitalizations (total number)</th>
<th>All Hospitalizations (percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AI/AN</strong></td>
<td></td>
<td>10,116</td>
<td>1.5%</td>
</tr>
<tr>
<td><strong>General US population</strong></td>
<td></td>
<td>3,820,242 (SE, 49,382)</td>
<td>1.2% (SE, 0.01%)</td>
</tr>
</tbody>
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<tr>
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<tbody>
<tr>
<td><strong>2003-2005 vs 2009-2011</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>AI/AN</strong></td>
<td>No. (SE) [all ages]</td>
<td>Rate(^a) (95% CI)</td>
<td>No. (SE) [all ages]</td>
</tr>
<tr>
<td></td>
<td>3,939</td>
<td>10.8</td>
<td>2,924</td>
</tr>
<tr>
<td><strong>General US Population</strong></td>
<td>1,332,056 (30,822)</td>
<td>15.2 (14.5-15.9)</td>
<td>1,254,874 (27,564)</td>
</tr>
</tbody>
</table>

\(^a\)Unadjusted rate per 10,000  \(^b\)significant change from 2003-2005 to 2009-2011
Age-specific average annual rate of asthma hospitalizations among AI/AN and the general US population, 2009-2011

HP2020 Target shown with black line
Region-specific average annual rate of asthma hospitalizations among AI/AN 2003-2005 vs 2009-2011

* Significant change
Comparing asthma hospitalizations among AI/AN by gender

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>No. [all ages]</td>
<td>Rate(^a)</td>
<td>No. [all ages]</td>
</tr>
<tr>
<td>Male</td>
<td>1,651</td>
<td>9.5</td>
<td>1,180</td>
</tr>
<tr>
<td>Female</td>
<td>2,288</td>
<td>12.0</td>
<td>1,744</td>
</tr>
</tbody>
</table>

\(^a\)Unadjusted rate per 10,000  
\(^b\)significant change from 2003-2005 to 2009-2011
Objective 3: Reduce asthma ED visits

- **<5 years**: Target 95.7 ED visits per 10,000
  - Baseline: 132.8 occurred in 2005-2007
- **5-64 years**: Target 49.6 ED visits per 10,000
  - Baseline: 57.0 ED visits occurred in 2005-2007
- **>65 years**: Target 13.7 ED visits per 10,000
ED visits for asthma, U.S. population

<table>
<thead>
<tr>
<th>Year</th>
<th>&lt;5 years</th>
<th>5-64 years</th>
<th>&gt;65 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995-1997</td>
<td>29.5</td>
<td>69.9</td>
<td>71.1</td>
</tr>
<tr>
<td>1998-2000</td>
<td>31.5</td>
<td>59.6</td>
<td>69.9</td>
</tr>
<tr>
<td>2001-2003</td>
<td>30.9</td>
<td>57</td>
<td>59.6</td>
</tr>
<tr>
<td>2005-2007</td>
<td>21.9</td>
<td>61.8</td>
<td>57</td>
</tr>
<tr>
<td>2008-2010</td>
<td>31.6</td>
<td></td>
<td>61.8</td>
</tr>
</tbody>
</table>

HP2020 targets:
- <5 years: 95.7
- 5-64 years: 49.6
- >65 years: 13.7
Asthma ED visits U.S., 2001-2009

Total number of visits in thousands

Rate per 10,000 population

Rate per 100 persons with asthma

Asthma ED visits 1,781,000 (2011)
Asthma ED visit rates (risk-based), by detailed age group: U.S., average annual 2007-2009
Asthma-related ED or urgent care center visit in past 12 months, National Health Interview Survey 2001-2010

Race/Ethnicity

- AI/AN
- Asian
- Other Hispanic
- Mexican/Mexican American
- Puerto Rican
- Non-Hispanic Black
- Non-Hispanic White

Prevalence

- Adult (18+ years)
- Child (0-17 years)
Objective Status (1-3): Asthma

• Objective 1
  – Asthma deaths: <35 – little/no change

• Objective 2
  – Asthma hospitalizations <5 years: improving
  – Asthma hospitalizations 5-64 years: improving

• Objective 3
  – ED visits <5 years: little/no change
  – ED visits 5-64 years: little/no change
Asthma health care encounters per 100 persons with asthma: United States 2001-2009

- Office and outpatient visits per 100 persons with asthma
- Emergency department visits per 100 persons with asthma
- Hospitalizations per 100 persons with asthma
- Deaths per 1,000 persons with asthma
Healthy People 2020: Eight national asthma objectives

1. asthma deaths
2. hospitalizations for asthma
3. emergency department (ED) visits for asthma
4. activity limitations among persons with asthma
5. proportion asthma who miss school or work days

6. proportion who receive formal patient education
7. proportion who receive appropriate asthma care
8. number of States...with a comprehensive asthma surveillance system for tracking asthma cases, illnesses, and disability at the state level
Objectives 6 & 7

• **Objective 6:** Proportion who receive formal patient education
  – proportion of persons with current asthma who have ever taken a course or class on how to manage their asthma

• **Objective 7:** Proportion who receive appropriate asthma care
  – Using National Asthma Education and Prevention Program (NAEPP) guidelines
Asthma patient education

Percent

HP2020 Target: 14.5%

2003  2008

Total  White, non-Hispanic  Black, non-Hispanic  Hispanic or Latino
Key takeaways: HP2020 Objectives

• Despite increasing asthma prevalence, **deaths and hospitalization rates have declined** while ED visits have remained stable.

• Age, sex, race and income **disparities persist**.

• Asthma hospitalization rates for AI/AN children still remain higher than for older age groups.

• Overall asthma education **has declined**
Self-assessment question

Which of the following is the BEST indicator of asthma morbidity?

A) Prescribing patterns of asthma medications
B) Spirometry or other pulmonary function test results
C) Asthma-related emergency department visits
D) Adherence of the national asthma guidelines by health care providers
How to meet the Healthy People 2020 goals in AI/AN youth

Team Work!
Four components of asthma control

1. Assessing and Monitoring Asthma Severity and Asthma Control
2. Education for a Partnership in Care
3. Control of Environmental Factors and Comorbid Conditions that Affect Asthma
4. Medications
Role of spirometry

• **Spirometry** is an objective measure to establish diagnosis of asthma
  – May be used in children as young as 5 years old

• **Peak Flow meters** may be used to monitor asthma, but not diagnose
What to assess at each visit

• Asthma control
  – Validated questionnaires (e.g. ACT, ACQ, ATAQ)
• Medication technique
• Written asthma action plan
• Adherence
• Patient concerns
Four components of asthma control

1. Assessing and Monitoring Asthma Severity and Asthma Control
2. Education for a Partnership in Care
3. Control of Environmental Factors and Comorbid Conditions that Affect Asthma
4. Medications

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Asthma education

• **Integral** component of effective asthma care
• Has been shown to reduce:
  – ER/Urgent care visits, hospitalizations
• Has been shown to improve:
  – Quality of life, health status and perceived control of asthma
• Teach and Reinforce at EVERY opportunity!
Key educational messages
(not all inclusive)

• Basic facts about asthma
  – Inflammation, pathophysiology of asthma attacks

• Role of medications
  – Rescue versus controller

• Patient skills
  – Proper use
    • Assess proper use (and proper education by providers)
  – Self monitoring
    • Asthma action plan, when to seek medical care
National Asthma Educators Certification Board (NAECB)

• Administers test for Asthma Educator Certified (AE-C) credential

• Definition of AE-C:
  – “An AE-C is an expert in teaching, educating, and counseling individuals with asthma and their families in the knowledge and skills necessary to minimize the impact of asthma on their quality of life.”
Four components of asthma control

1. Assessing and Monitoring Asthma Severity and Asthma Control
2. Education for a Partnership in Care
3. Control of Environmental Factors and Comorbid Conditions that Affect Asthma
4. Medications
Control of environmental factors and comorbid conditions that affect asthma

• Environmental Factors
  – Measures to control allergens/irritants
  – Team Work!
    • Environmental Health Engineer
    • Home Health Nursing

• Recognition and treatment of comorbid conditions may improve asthma control

• Recommend influenza & pneumonia vaccines
Four components of asthma control

1. Assessing and Monitoring Asthma Severity and Asthma Control
2. Education for a Partnership in Care
3. Control of Environmental Factors and Comorbid Conditions that Affect Asthma
4. Medications
Medications: stepwise approach

Persistent Asthma: Daily Medication
Consult with asthma specialist if step 3 care or higher is required.
Consider consultation at step 2.

Step 1
Preferred: SABA PRN
Alternative: Cromolyn or Montelukast

Step 2
Preferred: Medium-dose ICS

Step 3
Preferred: Medium-dose ICS + either LABA or Montelukast

Step 4
Preferred: High-dose ICS + either LABA or Montelukast
Oral systemic corticosteroids

Step 5
Preferred: High-dose ICS + either LABA or Montelukast
Oral systemic corticosteroids

Step 6
Step up if needed
(first, check adherence, inhaler technique, and environmental control)
Assess control
Step down if possible
(and asthma is well controlled at least 3 months)

Patient Education and Environmental Control at Each Step

Quick-Relief Medication for All Patients
- SABA as needed for symptoms. Intensity of treatment depends on severity of symptoms.
- With viral respiratory infection: SABA q 4–6 hours up to 24 hours (longer with physician consult). Consider short course of oral systemic corticosteroids if exacerbation is severe or patient has history of previous severe exacerbations.
- Caution: Frequent use of SABA may indicate the need to step up treatment. See text for recommendations on initiating daily long-term-control therapy.
Proper technique of inhalers

• Metered-dose inhaler (MDI)
  – SLOW breath (3-5 seconds) followed by a 10 second breath hold

• Dry Powder Inhaler (DPI)
  – Rapid deep inhalation (1-2 seconds)
  – For use in ≥4 years old
  – Dose is lost if patient exhales through device after activating

• For corticosteroids, wash mouth and spit after use
Case study

• W.E.Z. is a 25 y/o female with intermittent asthma since childhood. She presents to your asthma clinic for follow-up 3 weeks post asthma flare that was treated outpatient with a 5-day prednisone burst, along with OTC cough/congestion medications.

• During the visit she is comfortable and conversing. She reports she is back to normal breathing and uses albuterol 1 or 2 times/day and usually just once during the night. No cough or notable wheeze. Her vitals are:
Case study (cont.)

• Vitals
  - **Peak flow:** 345 L/min (predicted = 430 L/min)
  - **Temp:** 98.3°F
  - **BP:** 128/72
  - **RR:** 20
  - **P:** 78 bpm
  - **Wt:** 212 lbs
  - **Ht:** 60”

• Current Medications (NKDA)
  - Albuterol MDI 2 puffs every 4-6 hours as needed
  - Montelukast 10mg by mouth daily
  - Loratadine 10mg daily
  - Ortho Evra 1 patch weekly
Case study (cont.)

• How would you classify this patient’s level of asthma control?
  A. Well controlled
  B. Not well controlled
  C. Very poorly controlled

• What factors led you to select that answer?

• What additional medical history would you obtain from this patient?
Case study (cont.)

- After more questioning, you find that she does not use tobacco but her husband is a smoker although he usually smokes outside (unless it is cold); she does not have pets, and her symptoms seem to worsen in the Fall and Winter or when cleaning the house or when at the rodeo.

- What asthma triggers would you document for this patient?
  - Seasonal Allergies
  - Tobacco Smoke
  - Dust Mites
  - Household cleaners?
Case study (cont.)

• Which of the following may also be possible triggers to ask about?
  a. Strong emotions or anxiety
  b. Tobacco smoke
  c. Exercise
  d. Menses
  e. Mold
  f. Household cleaners
  g. a, b, e
  h. a, b, c, e, f
  i. all of the above
Case study (cont.)

• What immunization history would be beneficial to check on?

• What changes (if any) would you recommend for treatment of this patient’s asthma?
  – Inhaled corticosteroid (high vs med dose?).
  – Assess technique with MDI or DPI.
  – Recommend bedding covers.
  – Continue vs d/c montelukast?
Yakama IHS team approach

Medical Provider

PATIENT

Home Health Nurse/
Environmental Health Officer

Pharmacist
Yakama IHS team approach

• Medical Provider
  – Patient diagnosis of asthma
    • Specialty referrals (pulmonology, PFT, etc) by provider
  – Initiates patient referral
    • Pharmacy asthma clinic and/or
    • Home review
  – Reviews and cosigns all encounter notes
  – Maintains patient relationship through annual or semiannual visits
Yakama IHS team approach

• Pharmacist
  – Supervised and trained by medical provider
    • 12 Hours direct supervision for RPh credentialing
    • Administrative and Clinical support
  – AE-C preferred
  – Coordinates all provider referrals
  – Medical management of asthma pt ages 6 and up
  – Patient Education
  – Asthma follow up
Yakama IHS team approach

• Home Health Nurse / EHO
  – Home review and evaluation for environmental factors
    • Series of 3 incentivized home visits
    • Patient education
    • Trigger elimination and avoidance
    • Currently only billable through HH Nurse
    • Evaluation documented in health record
    • EHO Funded by grant
Quality improvement project: Yakama IHS pharmacist-run asthma clinic

• **Chart review** from Sept 2010 – Sept 2014 of patients referred to asthma clinic
• **Eligibility:** > 1 visit at asthma clinic & >12 months elapsed since first visit
• **Compared 2 time periods** for asthma-related hospitalizations and ER visits: 12 months preceding and immediately following the first asthma clinic visit

<table>
<thead>
<tr>
<th>Primary Outcomes (n=65)</th>
<th>Period 1</th>
<th>Period 2</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asthma-related Hospitalizations</td>
<td>13</td>
<td>2</td>
<td>&lt;0.05*</td>
</tr>
<tr>
<td>Asthma-related ED/Urgent Care Visits</td>
<td>45</td>
<td>25</td>
<td>&lt;0.05*</td>
</tr>
</tbody>
</table>

*Statistical significance; paired t-test
Reimbursement for asthma education

- Opportunities for reimbursement are highly variable from state-to-state
  - Physician versus non-physician billing

<table>
<thead>
<tr>
<th>Description</th>
<th>Billing Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asthma education in person per visit</td>
<td>S9441 / 98960</td>
</tr>
<tr>
<td>Group asthma education visit</td>
<td>99078</td>
</tr>
<tr>
<td>Evaluation and teaching of inhaler and/or nebulizer</td>
<td>94664</td>
</tr>
<tr>
<td>Spirometry test +/- bronchodilator</td>
<td>94060 / 94010</td>
</tr>
</tbody>
</table>
Objectives

• Cite the Healthy People 2020 objectives for asthma
• Apply the four components of asthma care to professional practice
• Describe how collaborative practice by the entire Indian Health Service (IHS) professional staff (physician, nurse, pharmacist, respiratory therapist, environmental health engineer) can affect outcomes in asthma patients
References

2. National Hospital Discharge Survey (NHDS)
3. National Hospital Ambulatory Medical Care Survey (NHAMCS)
4. National Ambulatory Medical Care Survey (NAMCS), and National Health Interview Survey (NHIS), CDC/NCHS.
5. CDC/NCHS, National Health Interview Survey - www.cdc.gov/nchs/data/series/sr_03/sr03_035.pdf (figures 1, 14, 17, 18)