Disparities in Asthma Care in the United States

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Disclosures

- Atlanta Center for Medical Research – Sub-Investigator
- Boehringer Ingelheim – Advisory Board and Speaker, Honorarium
- Novartis – Speaker, Trainer, Independent Contractor, Honorarium
- ThermoFisher – Speaker, Honorarium
- Meda/Mylan – Speaker Honorarium
Learning Objectives

Upon completion of this program, the participant will be able to:

- Describe current data documenting the alarmingly persistent disparities in asthma prevalence, morbidity and mortality among children, minorities and the poor
- Review potential mechanisms and other factors that might serve as the basis for these disparities
- Share and promote various models of clinical practice, community partnership and programming as actionable strategies to effectively address and reduce these disparities
Background: Drivers

Over 30 million Americans live with asthma

Asthma is the #1 admission diagnosis in American children’s hospitals

Asthma remains under-diagnosed, under-treated

despite NHLBI guidelines for diagnosis and management leading to over-utilization

Knowledge gaps persist

among both patients, families, PCPs who treat asthma in all populations, particularly in minorities and the poor

Alarmingly persistent disparities

in prevalence, morbidity and mortality among children, minorities and the poor

Over 30 million Americans live with asthma
Background: Prevalence

CDC, NHCS
Background: Utilization

![Diagram showing rate ratios for different categories: Female vs. male, Other vs. white, Black vs. white, <18 vs. ≥18 years. The rate ratios are indicated for each category and are related to total ambulatory visit, emergency department visit, hospitalization, and death.]

NOTE: A rate ratio of 1.0 (dashed line) indicates equal rates between the groups being compared.

SOURCES: CDC/NCHS, National Ambulatory Medical Care Survey, National Hospital Ambulatory Medical Care Survey, National Hospital Discharge Survey, Mortality component of the National Vital Statistics System, and National Health Interview Survey (population with current asthma).
Since 2000, asthma prevalence has grown 12.3% to 8.2% of the overall population, most notably in:

**Children**
- African-American males: 17.0%
- Poor children: 13.5%

**Adults**
- Poor adults: 13.5%
- Women: 9.3%

All figures % of total population

CDC/NHCS
How Do We Explain These Differences?
Gene-Environment Interactions in Asthma Development

**Culture and Ethnicity**

- **Early Intermittent Asthma**
- **Chronic (Persistent) Asthma**

**Genetics**

*Susceptibility:*
- Asthma, atopy, bronchial hyper-responsiveness

*Expression:*
- Disease severity, pharmacogenetics

**Environmental Influences**

- Cultural practices, Prenatal maternal influences, allergens, respiratory infections, tobacco smoke, pollutants, prematurity, dietary factors

Reversible and irreversible changes in airway structure and function
Collaborative Study on the Genetics of Asthma

- Three distinct “chromosomal regions of interest”
  - African Americans (5p15, 17p11.1-q11.2)
  - European Americans (11p15, 19q13)
  - Hispanics (2q33, 21q21)

- “High-Risk” candidates for polymorphism impact
  - Arg16 genotype of β2 adrenergic receptor
  - 237G allele of the β chain of the high affinity IgE receptor
  - Ile50 allele of the IL4RA α gene
  - 401A allele of RANTES
  - C.224>T variant in gene encoding for TNF receptor superfamily
  - CRHR1, ALOX5

Tantisira et al NEJM 2011
The Urban Environment

- **Nutrition**
  - Higher intake of snacks, fast food, sweetened beverages
  - Less availability of fresh fruit and vegetables, dietary sources of omega-3 fatty acids

- **Outdoor Pollution**
  - Higher exposure to vehicular traffic, ozone and PM, more oxidant stress
  - Proximity to coal-fired power plants

- **Indoor pollution**
  - More crowded living environment
  - Higher exposure to ETS, mold, dust mites, rodents, cockroaches,

- **Social**
  - More dynamic household membership
  - More housing instability
  - Greater exposure to violence
  - Financial challenges
  - Parental/caretaker stress
  - Competing priorities

- **Practice Setting**
  - Greater prevalence of care by community health centers and hospital based clinics
  - ED as primary care
  - Higher percentage of “minority served” practices
What is Allostasis?

Allostasis is the process of achieving stability, or homeostasis, through physiological or behavioral change.

This can be carried out by means of alteration in HPA axis hormones, the autonomic nervous system, cytokines, or a number of other systems, and is generally adaptive in the short term (McEwen & Wingfield 2003).

Allostasis is essential in order to maintain internal viability amid changing conditions (Sterling & Eyer 1988; McEwen 1998a; McEwen 1998b; Schulkin 2003).

Allostatic Load & Asthma Outcomes

Geographic-level: Violence, neighborhood deprivation, (air pollution)

Individual-level: Education, income, discrimination, healthcare access

Perceived Stress (threat or NO threat)

Individual: sex, genes, development, experience

Behavioral Response (flight or fight)

Physiologic Response (glucose, CRP, IL-6, DHEA-S, lipids, BMI)

ALLOSTATIC LOAD

Source: Burchard UCSF. Image adapted from McEwen NEJM 1998

ASTHMA OUTCOMES
What is the Allostatic Load?

Allostatic load is "the wear and tear on the body" which accumulates as an individual is exposed to repeated or chronic stress. It represents the physiological consequences of chronic exposure heightened neural or neuroendocrine response that results from repeated or chronic stress. [McEwen, Stellar in 1993]

Allostatic load is a framework used to explain how frequent or chronic activation of the body's stress response...can result in physiological wear and damage, with negative consequences for health and function.

Genetic and Social Environment Interactions

- Disparities may result from variations in genes and their interaction with the environment.

- Genetic pathways are involved in regulation of inflammation and catecholamine response signaling varied by socioeconomic status (SES).
  - Children of low SES over-expressed genes that regulated chemokine activity, stress response and wound healing.
  - Children of higher SES over-expressed genes that may be involved in containing damage caused by inflammation.

- SES may thereby have an effect on children’s interpretation of their social world which may alter neuroendocrine and inflammatory signaling processes.
  - Inflammatory and catecholamine pathways are primary targets for asthma medications.

Might the social environment modify the efficacy of asthma therapy in some populations?

Chen, E et al Thorax 2009;64(1):38-43
Racial Differences in Therapeutic Responses

In-Vitro Steroid Sensitivity in African Americans with Asthma

- 3-4 fold increase in steroid dose to suppress lymphocyte stimulation in peripheral blood from African American Asthmatics
- 2–3 fold increase in dose in non-Asthmatic African American control vs. Caucasian controls

Federico et al. JACI, 2005
Perceived Racial/Ethnic Discrimination and Asthma Severity

- SAGE II Enrollees
- Self-reported perceived racial/ethnic discrimination in 49% of enrolled
  - Increased bronchodilator responsiveness
  - Higher TNF–alpha levels
  - Decreased responsiveness to controllers
  - Severe Asthma endotype
- Relation of allostatic load to asthma severity via inflammatory and neuroendocrine mechanisms that lead to severe asthma endotypes

_Burchard et al., ATS 2017_
Racial Differences in Physiologic Parameters of Asthma

- Compared with a matched cohort of European-American children with asthma, middle-class African-American children with asthma had:
  - Decreased forced vital capacity (FVC) and forced expiratory volume in 1 second (FEV₁)
  - Increased airway responsiveness
  - Increased total serum immunoglobulin E (IgE) levels

Joseph, CLM et al. CHEST, 2000
Atopy

- Puerto Rican children were at a significantly higher risk for multiple indoor and outdoor allergies compared to White children.

- African American children were twice as likely as White children to be allergic to mixed tree pollen, mixed grass pollen, ragweed and mugwort/sage.

- Among all children, outdoor allergy predicted a higher degree of overall allergen sensitization.

Source: Celedon J et al., CHEST; 2004
Inner-City Indoor Allergen Exposure

- National Cooperative Inner-City Asthma Study (NCICAS)
  - 85.3% of homes had detectable cockroach allergen
  - 36.8% of patients had positive skin test to cockroach allergen

- Exhibiting cockroach sensitivity plus the presence of high levels of allergen in the bedroom were associated with:
  - Increased hospitalizations
  - Increased emergency department visits
  - Increased days with wheezing

SEC. 3. PROHIBITION ON USE OF FEDERAL FUNDS.

Notwithstanding any other provision of law, no Federal funds may be used to design, build, maintain, utilize, or provide access to a Federal database of geospatial information on community racial disparities or disparities in access to affordable housing.
Vitamin D – Fact or Fake News*

- Vitamin D deficiency and insufficiency clearly more prevalent in minorities, particularly African Americans
  - 20x greater risk than whites
  - Female risk > male risk

- Vitamin D levels:
  - inversely related to prevalence of atopy
  - positively related to lung function

- Vitamin D deficiency more prevalent among urban children with asthma and urban controls without asthma

- Vitamin D insufficiency associated with higher odds of ED visits and hospitalizations (CAMP)
  - No difference in overall rate of exacerbations
  - Possible mitigation by ICS Use

*Limited data from active intervention studies
Disparities in Asthma Medication and Utilization

- Black children: 2x more ED visits (39% vs. 19%) and hospitalizations (12% vs. 5%) than white children (WC)

- Black and Hispanic children: less likely to have used ICS (21% and 22%) than white children (33%) in preceding 3 months

- Black and Hispanic: more likely receive daily SABA (26% and 19%) than White children (12%)

- ED visits positively correlated with SABA use, negatively correlated with ICS use when stratified for race, ethnicity


National Asthma Survey Database
(n = 1,485 children)
Socioeconomic Factors in Asthma

- Low socioeconomic status was a risk factor for asthma in a study of 4-year-old children.¹

- In a lower socioeconomic urban neighborhood, age, race, gender, and body mass index were significant predictors for childhood asthma.²

- Children in low socioeconomic communities had a 70% greater risk of current asthma, independent of ethnicity and family income.³

Insured Vs. Uninsured
Percentage of Patients With Asthma

Source: CDC, NHIS 2011

<table>
<thead>
<tr>
<th>Seen by a specialist</th>
<th>Uninsured</th>
<th>Insured</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seen by a PCP</td>
<td>Uninsured</td>
<td>Insured</td>
</tr>
<tr>
<td>Able to buy Rx</td>
<td>Uninsured</td>
<td>Insured</td>
</tr>
</tbody>
</table>
Disparities in Utilization Type
Kaiser HMO Study, Cleveland Clinic

- **ER Visits**
  - Caucasian
  - African-American

- **Primary Care**
  - Caucasian
  - African-American

- **Referrals**
  - Caucasian
  - African-American

Source: Blixen CE, J Asthma 1999

- 18-50 Years of Age
- 124 African Americans
- 67 Caucasians

Source: Blixen CE, J Asthma 1999
Health Belief Model

Beliefs influence willingness to follow preventive, therapeutic recommendations

“I am susceptible to this health problem”

“The threat to my health is serious”

“The benefits of the recommendation outweigh the costs

“I am confident in my ability to carry out recommended actions successfully”
Beliefs and Self-Efficacy

Research in psychology shows that when you believe you can do something successfully…

- You do it more often
- You are more persistent in the face of difficulty

Many families lack confidence that they can carry out provider recommendations and effectively manage an asthma attack at home.
Self Determination in Healthy Behaviors

- Self determinism is an individual’s belief that they are capable of completing a task and reaching a set goal.

- Self determinism (or self efficacy) measured by a validated scale (KASE) is low in urban blacks with asthma.
Enhanced Asthma Education: One Incomplete Answer

Published comparative effectiveness studies of asthma education show:

- Baseline asthma knowledge is low in high risk groups
- Education does increase knowledge, but does not consistently improve asthma outcomes

If knowledge cannot be applied to specific situations, behavior does not change.
Bandura’s Social Cognitive Theory

Determinants of Improved Self Determinism

- Mastery experiences (practice opportunities)
- Social modeling (watching others succeed)
- Social persuasion (from a trusted source)
- Psychological response (decreased stress)
One Potential Solution

www.notonemorelife.org

- Established 2003
- Community based programs of education, screening, counseling, referral and outcome monitoring
- Model expanded to 19 other US cities
- On line patient and provider education (CME) on asthma management, live CME in selected cities
- Monthly community Pulmonary Clinic
NOML: Novel Approaches

NOML programs presented in partnership with communities of faith health ministries, local schools and other validated community partners

- Short didactic presentation on asthma, Q and A
- Participants screened: validated (modified Juniper) questionnaire and spirometry
- Pulmonologist/allergist/PCP volunteers review results with participants
- Feedback to PCP and/or specialty providers
- Telephonic follow-up at 1, 3, 6 and 12 months
NOML: Novel Solutions

Individual case management

- Telephonic follow-up at 1, 3, 6, and 12 months
- Referral to existing clinics, community hospitals
- Follow-up in our free pulmonary clinic in Atlanta
- Medication assistance
- Access to pulmonologists and allergists
- Determine eligibility for CMS programs
- Utilizing patient assistance programs
Our Partners
Why Communities of Faith?

- Enduring bases of leadership
- Roles in fostering community well-being
- Strong visions for spiritual and physical health of their faith communities
- Well-developed Health Ministries staffed by members committed to fostering health in their congregations
An Introductory Lecture
RT Testing to ATS Standards
Personalized Education
One-on-One Counseling
Community
Each Visit Should Leave a Legacy of Empowerment Sustained by Partnership
The NOML team captured and recorded 87% of all participants’ data.

- 7,635 Participants
- 6,642 Unique Records
- 521 Incomplete Records
- 6,121 Complete Screenings
- 493 No Spirometry
- 28 Missing Data

• 167 NOML Onsite Events
• Metropolitan Atlanta, GA
• October 2003 – July 2014
Only 23.7% self-reported asthma, but 50% have increased symptoms or abnormal lung function.
### NOML: Screen Results

(known diagnosis of asthma)

<table>
<thead>
<tr>
<th>Low Symptom Score and Normal Lung Function</th>
<th>High Symptom Score and Normal Lung Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>17%</td>
<td>35.6%</td>
</tr>
<tr>
<td>Low Symptom Score and Abnormal Lung Function</td>
<td>High Symptom Score and Abnormal Lung Function</td>
</tr>
<tr>
<td>8.9%</td>
<td>38.5%</td>
</tr>
</tbody>
</table>

Only 17% asymptomatic with normal lung function!

**Poor perceivers?**

**Poorly controlled**
NOML: Under-treatment & Utilization

- No current asthma treatment: 38%
- Bronchodilator only: 27%
- Inhaled corticosteroids: 19%
- Ever hospitalized for asthma: 21%
How likely is a NOML participant to have asthma?

<table>
<thead>
<tr>
<th>Evidence Level</th>
<th>Probability</th>
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<tbody>
<tr>
<td>Strong evidence for lung disease</td>
<td>12%</td>
</tr>
<tr>
<td>(symptoms present and abnormal lung function)</td>
<td></td>
</tr>
<tr>
<td>Good evidence for lung disease</td>
<td>16%</td>
</tr>
<tr>
<td>(abnormal lung function only)</td>
<td></td>
</tr>
<tr>
<td>Weak evidence for lung disease</td>
<td>20%</td>
</tr>
<tr>
<td>(symptoms present only)</td>
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**Total:** 48%

90% of participants with abnormal lung function report seeing a physician after a NOML session.

\[ n = 844 \text{ complete screenings without previous asthma diagnosis} \]
### Drew-Freeman Middle School

Suitland, Maryland. March 2014 NOML Program

<table>
<thead>
<tr>
<th>All Students (n= 201)</th>
<th>Students Diagnosed with Asthma (n = 32)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 16% diagnosed with asthma (8.2% national average)</td>
<td>• 20% with history of asthma hospitalization</td>
</tr>
<tr>
<td>• 32% with increased symptoms or abnormal PFTs suggestive of asthma</td>
<td>• 80% had been prescribed a SABA</td>
</tr>
<tr>
<td>• 40% previously prescribed SABA</td>
<td>• &lt;50% had been prescribed a controller</td>
</tr>
<tr>
<td></td>
<td>• &lt;10% had ever done spirometry</td>
</tr>
<tr>
<td></td>
<td>• 100% had a PCP</td>
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</table>
NOML: Nationwide

Existing Sites

Planned Expansion Sites
www.notonemorelife.org

Inner-City Respiratory Alliance Professional Education Center

Check Out Our Library of FREE Online Continuing Education Courses

Spring and Summer usher in a multitude of allergic reactions. Pollen, mold and dust are just some of the many things that can trigger a serious asthma attack.

Asthma affects all people of all shapes and sizes and even famous ones, yet, many of them lead normal healthy lives. Their asthma doesn't bother them. How do they do that? They do so because their asthma is well controlled.

There are about 33 million people with asthma in the United States with 8.6 million being children. Hispanics and African-Americans are affected more than any other population. As a result millions of dollars have been lost because of missed days at work and have been spent on a disease that can be controlled. Many people do not realize there is a problem with their lungs simply because they do not know or understand the symptoms of the disease. Our mission at Not One More Life is to partner with communities of faith to provide asthma education to help reduce the negative impact of the disease among African-Americans.
ENGAGE .....EDUCATE......EMPOWER

- Online Patient Education and Resources
- Online Provider CME focused on High Risk populations (2,000+ users in 2016)
- Target Network of 30 NOML Expansion Cities
  - Live Patient and Provider Education
  - Centralized data collection (ACCESS)
- Developmental Research Network

www.notonemorelife.org
# Effective Management of ASTHMA by Primary Care Providers

**PERFORMANCE IMPROVEMENT PROGRAM:**

To receive credit participants must attend entire session and submit post-test and program evaluation form.

Presented at NO COST to participants

<table>
<thead>
<tr>
<th>CME/CE DINNER MEETINGS:</th>
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<tbody>
<tr>
<td>ATLANTA</td>
<td>November 8, 2012 – 6:30 pm</td>
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<tr>
<td>DETROIT</td>
<td>November 15, 2012 – 6:30 pm</td>
</tr>
<tr>
<td>PHILADELPHIA</td>
<td>November 29, 2012 – 6:30 pm</td>
</tr>
<tr>
<td>ORLANDO</td>
<td>December 5, 2012 – 6:30 pm</td>
</tr>
<tr>
<td>MEMPHIS</td>
<td>December 6, 2012 – 7:00 pm</td>
</tr>
<tr>
<td>BROOKLYN</td>
<td>December 11, 2012 – 6:30 pm</td>
</tr>
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</table>

**TARGET AUDIENCE**

This activity is intended for Primary Care Physicians

**FUNDING**

Funded by an independent educational grant from Teva Pharmaceuticals USA

**OUTCOME OBJECTIVES**

Upon completion of this course, the participant will be able to:
- Discuss the pathophysiology of asthma and associated small airway inflammation
- Describe the relevance of small airway inflammation to the exacerbation prone asthma phenotype and implications for effective pharmacologic therapy
- Review the current recommendations on the use of spirometry for the diagnosis, treatment, and assessment of control in asthma management
- Demonstrate improved knowledge, application, and interpretation of spirometry for the treatment of patients with asthma

**PURPOSE**

To provide the tools to enable the primary care provider to manage the care of patients with asthma and measure the outcomes of their interventions.

**DISCLOSURE(S)**

Faculty disclosures will be provided on the first page of the program syllabus.

**ACCREDITATION**

This activity has been planned and implemented in accordance with the Essential Areas and Policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint sponsorship of the Foundation for Care Management (FCM), Not One More Life, and CME-University. FCM is accredited by the ACCME to provide continuing medical education. FCM designates this educational activity for a maximum of 1.5 AMA PRA Category 1 credit(s)™. Physicians should only claim credit commensurate with the extent of the participation in the activity.

Pre-register Online @ [www.cme-university.net/asthma](http://www.cme-university.net/asthma)

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**COURSE DIRECTORS**

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**ENDORSED BY**

American College of Chest Physicians

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Pre-register Online @ [www.cme-university.net/asthma](http://www.cme-university.net/asthma)
# Strategies to Change the Paradigm

## Increase adherence

Effectively inquire and engage around importance of medication adherence

## Uncover Barriers to Adherence

- Ambivalence
- Fear and misinformation
- Cost
- Hassle factor - KISS

## Address the Barriers

- Straight talk
- Eliminate victim mentality
- Education
- Samples, patient assistance, formulary awareness
In Memory of Kellen

February 9, 1990 - January 11, 2001

“Not One More Child”