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Autoimmune Disorders Among Adults With Asthma: An Economic Outlook

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BACKGROUND

- Asthma—chronic inflammatory disorder of the lungs characterized by bronchoconstriction, chest tightness, and wheezing—affects approximately 20 million United States (US) adults.[1]
- Asthma poses significant economic burden with an annual estimated cost of $56 billion.[2]
- Patients with asthma are at an elevated risk of having comorbid conditions that may complicate overall asthma management.[3]
- The prevalence of autoimmune disorders (AD) among patients with asthma is common due to similar etiological pathways.
  - As immunosuppressants are being considered as a potential treatment of asthma, possible linkages between asthma and other ADs are being investigated.[4,5]
- Evidence regarding the burden of AD among patients with asthma in the US is limited.

OBJECTIVE

- To examine the prevalence and incremental economic burden of ADs in a US asthma cohort.

METHODS

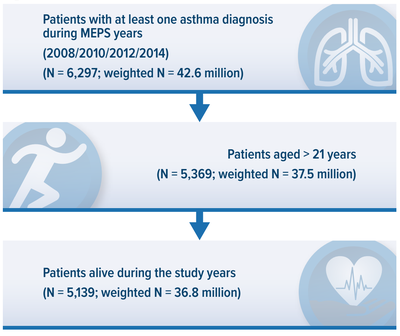
Study Design and Data Source

- This study utilized a cross-sectional, retrospective study design, using pooled data from alternate multiple years (2008/2010/2012/2014) of the Medical Expenditure Panel Survey (MEPS).
  - Data from alternate years were used to obtain unique patients as MEPS follows patients for 1 year after cohort entry.
- MEPS is a nationally representative survey of the US civilian noninstitutionalized population that collects person- and household-level information on respondents' sociodemographic characteristics, health status, access to care, clinical diagnosis, and related charges and payments.
- Full-year consolidated household, medical conditions, and prescribed medicine event files were used to obtain patient demographic, clinical characteristic, and health care cost information.

Patient Selection and Cohorts of Interest

- Patients with asthma were identified using the ICD-9-CM diagnosis code for asthma (493.xx).
  - The analytic sample for this study included adults (aged ≥ 21 years) who were alive during the year they were identified.
- We further divided patients into two cohorts based on presence of ADs during the study observation year.
  - ADs included the following chronic conditions: ankylosing spondylitis, Crohn's disease, lupus, psoriasis, and rheumatoid arthritis.
  - The following combination of ICD-9-CM diagnosis codes were used to identify the ADs:
    - Ankylosing spondylitis (720.0)
    - Crohn's disease (555.xx)
    - Lupus (710.0)
    - Psoriasis (696.xx)
    - Rheumatoid arthritis (714.xx)
  - Any patient with asthma included in the study sample with at least one of the above-mentioned conditions was grouped under the AD cohort, and other patients were grouped in the no AD cohort.

Figure 1. Patient Selection Criteria



Patient Characteristics

- Demographic characteristics included patient age in years (22-49, 50-64, ≥ 65), gender (male, female), race/ethnicity (white, African-American, and others), and metropolitan region (metropolitan, rural, unknown).
- Socioeconomic characteristics included:
  - Education status: (less than high school education, high school education or above, unknown)
  - Poverty status: poor (< 100% of federal poverty line [FPL]), low income (100% ≤ FPL< 200), middle income (200% ≤ FPL < 400%), and high-income (400% of FPL)
- Clinical characteristics included:
  - Health status categorized into three groups: excellent/very good, good, and fair/poor
  - Polypharmacy: use of 0-5 drug classes, ≥ 6 drug classes
  - Number of chronic conditions excluding ADs: 0, 1, ≥ 2
- Access to care was measured by health insurance status (private, public, and uninsured).

Outcome Measure

- Total annual health care expenditures were calculated by adding expenditures for hospitalizations, emergency room and outpatient visits, prescription drugs, and other services during the study year.
- Health care costs were updated to 2014 US dollars using the medical care component of the consumer price index.

Statistical Analysis

- Descriptive analyses entailed the tabular display of mean values, medians, ranges, and standard deviations (SDs) of continuous variables and frequency distributions for categorical variables.
- T-tests were used to examine unadjusted subgroup differences in average annual health care expenditures by the presence of ADs.
- Ordinary least squares regression on log-transformed health care expenditures was conducted to estimate the magnitude of excess health care expenditures associated with ADs.
- All analyses controlled for the complex sample design of MEPS and were conducted using SAS version 9.4 (Cary, NC: SAS Institute, Inc.; 2011).

RESULTS

- Overall, 5,139 adults (weighted n = 36.8 million) had asthma during one of the 4 years of pooled data and were alive during the observation period.
  - Of these patients, 350 (weighted n = 2.2 million; weighted percentage = 5.8%) had AD.

Demographic and Clinical Characteristics (Table 1)

- Patients with ADs were older (aged ≥ 65 years: 31.2% vs. 22.3; $P < 0.001$), more likely female (77.6% vs. 65.77%; $P < 0.001$), and resided in a metropolitan region (72.0% vs. 59.7%; $P < 0.001$) compared with patients without ADs.
- Socioeconomic characteristics measured by poverty status and education were significantly different between the two study cohorts. Similarly, the two study cohorts also differed on access to health care (i.e., insurance coverage).
- Clinical characteristics significantly differed between the two study cohorts.
  - A greater proportion of patients in the AD cohort had fair/poor health status compared with those in the no AD cohort (60.7% vs. 28.7%; $P < 0.001$).
  - Similarly, a greater proportion of patients had polypharmacy and a greater number of chronic conditions in the AD cohort compared with the no AD cohort.

Proportion of Health Care Costs by Type of Service (Figure 2)

- Prescription drug costs represented the largest category of spending of the total health care expenditures for patients with asthma.
- Additionally, half of the total health care costs were for either outpatient or inpatient services.

Figure 2. Proportion of Health Care Costs by Type of Service

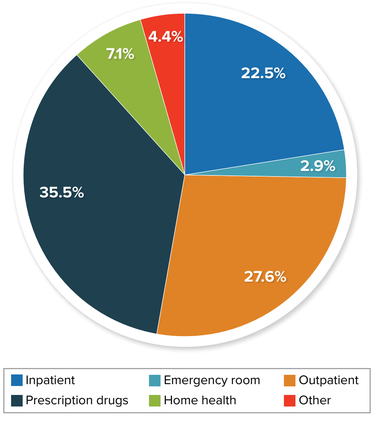


Table 1. Demographics and Clinical Characteristics by Cohort

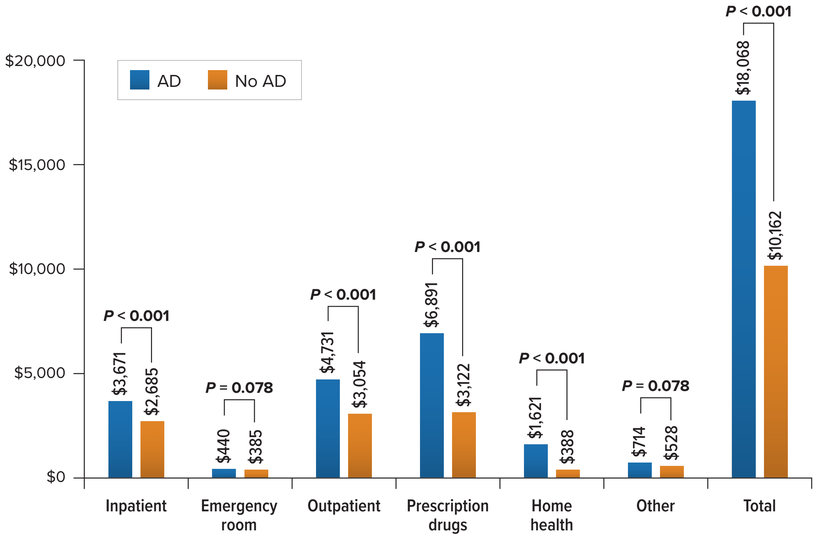
	Asthma and AD		Asthma and no AD		*P* Value
Age groups (n, wt. col %)					
22-49 years	108	30.6	2,322	47.6	< 0.001
50-64 years	140	38.1	1,467	30.1	
≥ 65 years	102	31.2	1,000	22.3	
Gender (n, wt. col %)					
Female	279	77.6	3,247	65.7	< 0.001
Male	71	22.4	1,542	34.3	
Race (n, wt. col %)					
White	163	65.2	2,462	72.0	0.052
African-American	88	13.6	1,122	12.6	
Other	99	21.2	1,205	15.4	
Metropolitan region (n, wt. col %)					
Metropolitan	267	72.0	2,936	59.7	< 0.001
Rural	60	19.8	512	12.5	
Unknown	23	8.2	1,341	27.8	
Education (n, wt. col %)					
Less than high school	92	20.8	671	9.9	< 0.001
High school or above	88	26.0	785	15.8	
Unknown	170	53.2	3,333	74.3	
Poverty status (n, wt. col %)					
Poor	132	31.0	1,125	16.4	0.009
Low income	86	22.7	1,053	18.7	
Middle income	74	23.3	1,296	26.7	
High income	58	23.0	1,315	38.3	
Insurance coverage (n, wt. col %)					
Private	125	41.1	2,662	65.9	0.002
Public	198	50.3	1,721	27.0	
Uninsured	27	8.6	406	7.1	
Health status (n, wt. col %)					
Excellent/very good	35	12.3	1,644	38.9	< 0.001
Good	98	27.1	1,541	32.4	
Fair/poor	217	60.7	1,604	28.7	
Polypharmacy (n, wt. col %)					
< 6 drug classes	116	32.9	3,008	62.4	< 0.001
≥ 6 drug classes	234	67.1	1,781	37.6	
Number of chronic condition excluding ADs (n, wt. col %)					
0	13	5.3	2,139	45.0	< 0.001
1	179	48.8	1,807	36.9	
≥ 2	158	45.9	843	18.0	

wt. = weighted.

Annual All-Cause Health Care Costs (Figure 3)

- Mean (SD) all-cause annual health care expenditures during the study years were $18,068 ($1,799) among patients with asthma and AD versus $10,162 ($359) among patients with asthma but no AD ($P < 0.001$).
- Mean (SD) inpatient costs were $3,671 ($964) among patients with asthma and AD versus $2,685 ($216) among patients with asthma but no AD ($P = 0.029$).
- Total costs for prescription drugs and home health services were significantly greater in the AD cohort versus the no AD cohort.
- Multivariable ordinary least squares regression that adjusted for patient demographic, socioeconomic, and clinical characteristics indicated that patients with comorbid ADs had 19% ($\beta = 0.182$; $\exp[\beta] = 1.19$; $P < 0.05$) higher expenditures than patients without ADs.

Figure 3. All-Cause Annual Health Care Expenditures by Cohort



DISCUSSION

- Recent experimental studies have suggested that asthma may have an autoimmune pathway and thus may be associated with higher rates of autoimmune comorbidities.
- Using nationally representative survey data, this study reported the combined prevalence of several ADs among patients with asthma.
- Prescription drug costs were the major driver of the total health care costs among patients with asthma.
- The study also highlighted the incremental costs associated with AD among patients with asthma.
- Some plausible reasons for the potentially high costs among patients with AD include different socioeconomic characteristics, reduced access to health care coverage, and poorer health status.
- Health care providers should consider the potential burden of ADs while treating patients with asthma.
- Key limitations included the following:
  - This study used survey data and thus may have inherent limitations associated with survey databases such as recall bias and inaccuracy of self-reported measures such as prescription drug use.
  - Data on severity of asthma as well as the ADs were not available, which may have significant implications on the results.
  - Some ADs such as type 1 diabetes were not included in this study; future studies should comprehensively evaluate the impact of ADs in patients with asthma.

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