

Background and Objective

- Chronic obstructive pulmonary disease (COPD) is estimated to impact over 12.1 million Americans over the age of 18, primarily affecting adults over 45 years of age.^{1,2}
- COPD is characterized by chronic airflow limitation that is not fully reversible, and is recognized as an inflammatory disease of the airways.^{3,4}
- Over time COPD symptoms can worsen, and events related to this decline are often referred to as exacerbations. This decline is associated with deterioration in the quality of life of COPD patients, greater severity of COPD and poor outcomes in terms of both morbidity and mortality.⁵
- In a clinical setting, physicians often base a diagnosis of COPD-related exacerbation on a change in the patient's baseline dyspnea, cough, and/or sputum that is beyond normal day-to-day variations.¹
- Previous claims-based analyses have identified exacerbations via COPD-related emergency room (ER) visits or hospital stays, and the most commonly used COPD-related ICD-9 codes have been validated using chart review (491, 492, and 496).^{5,6} There is a scarcity of research that captures those exacerbations resulting in only outpatient physician visits or management with pharmaceutical agents.
- The objective of the present study was to develop and refine an algorithm, using both medical and pharmaceutical claims, that identifies COPD patients with likely exacerbations in both the inpatient and outpatient setting. The algorithm could be used to target appropriate patients for interventions to potentially improve patient care and prevent recurrence of exacerbations.

References

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2. Mannino DM, Homa DM, Akinbami LJ, et al. Chronic obstructive pulmonary disease surveillance – United States, 1971–2000. *MMWR Surveill Summ* 2002; 51:SS-6.
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4. Braman, S. MD, FACP, FCCP, Rhode Island Hospital, Brown University, Providence, Rhode Island, Update on the ATS Guidelines for COPD: The Definition of COPD. *Medscape Pulmonary Medicine*. 2005;9(1).
5. Seemungal TA, Donaldson GC, Bhowmik A, et al: Time course and recovery of exacerbations in patients with chronic obstructive pulmonary disease. *Am J Respir Crit Care Med* 2000;161:1608-1613.
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Methods

Study period and criteria

- Study period: January 1, 2009 to December 31, 2009
- Data Source: pharmacy and medical claims of Humana's MAPD population
- Inclusion criteria:
 - Enrolled in a Humana MAPD plan for duration of study period
 - At least 40 years of age, and
 - At least one ICD-9-CM diagnosis code (any position) for COPD (491.xx, 492.xx, or 496.xx) in any setting (hospital, ER, outpatient)
- Exclusion criteria:
 - Enrolled in a contractually excluded Group Medicare plan

Algorithm

- The algorithm was applied by using the following hierarchical system of classification:
 - Hospitalization for COPD* with respiratory failure
 - Hospitalization for COPD* without respiratory failure
 - ER visit for COPD*
 - Outpatient visit for COPD* with concurrent antibiotic and/or oral corticosteroid (OCS) use within 7 days of diagnosis
 - No outpatient visit, but concurrent antibiotic and OCS use within 7 days of one another

*After the initial inclusion criteria were applied, the definition of COPD for the algorithm was expanded to include either an ICD-9 diagnosis code for COPD (491.xx, 492.xx, or 496.xx) in the primary position OR an ICD-9 diagnosis code for respiratory failure (518.81, 518.83, 518.84) in the primary position accompanied by a diagnosis code for COPD in the secondary position

Evaluation

- Each algorithm category was described with respect to demographics, clinical characteristics, healthcare costs, and medication usage in order to understand the manner in which the algorithm grouped patients
- Exacerbation severity was also evaluated for those with at least an outpatient visit for COPD

Diagnosis codes

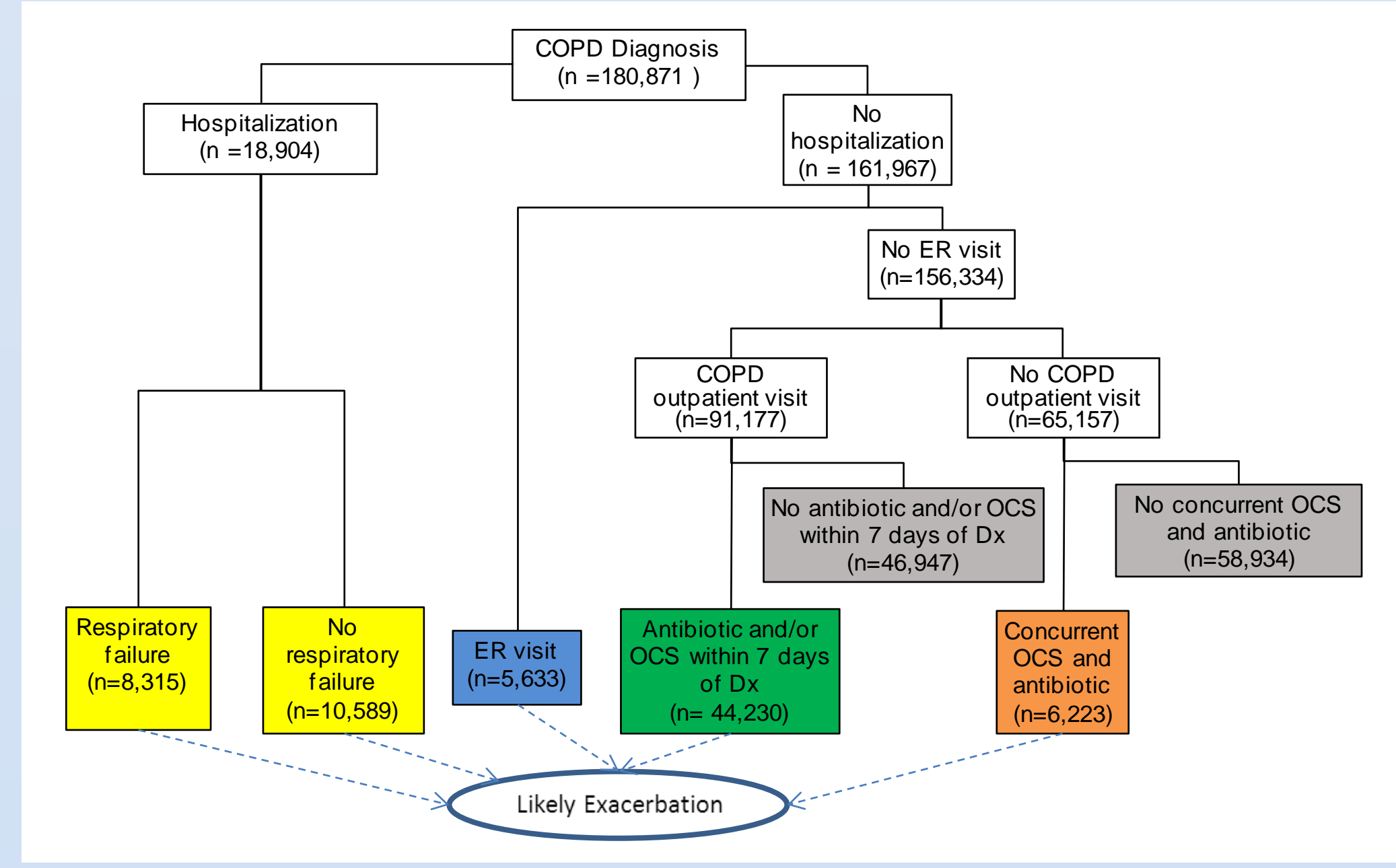
COPD:	Respiratory Failure:
491.xx Chronic bronchitis	518.81 Acute respiratory failure
492.xx Emphysema	518.83 Chronic respiratory failure
496.Xx Chronic airway obstruction not elsewhere classified	518.84 Acute and chronic respiratory failure

Results

Members identified

- Initial data pull identified 194,611 COPD patients
- The final sample included only those patients with integrated medical and pharmacy benefits that fell under the broader COPD definition (to include primary respiratory failure with a secondary COPD code) (Fig 1), resulting in a pool of 180,871 patients
- 74,990 (41.5%) appeared to have had a likely exacerbation during the study period
 - 18,904 had a COPD-related hospitalization (8,315 with respiratory failure, 10,589 without)
 - 5,633 had a COPD-related ER visit
 - 44,230 had a COPD-related office visit with concurrent antibiotic or OCS use within 7 days
 - 6,223 did NOT have a COPD-related office visit, but did have concurrent antibiotic and OCS use

Figure 1. Application of targeting algorithm for identifying likely COPD exacerbations



Demographic and clinical characteristics

- The median age ranged from 71 to 74 years and approximately half were female; 86-88% of patients identified as white
- Nearly 25% of individuals hospitalized for COPD (versus only 4-6% of others with likely exacerbations) were living in long-term care at some point during the study period
- The mean RxRisk scores were 3.4 and 3.7 for those individuals without a classified exacerbation (grey boxes in Fig A) and 4.5 to 6.2 for those who did appear to have an exacerbation
- 13-18% of members with likely exacerbations qualified for an existing MTM program for another disease state at this MCO

Medication Usage

- Long-term controllers were generally used by less than half of this population, but were more common among hospitalized patients

Table 1. Use of long-term controller medications among patients with and without apparent exacerbations

	Hospitalized	ER visit	Outpatient visit/OCS	No Outpatient visit/OCS	Outpatient visit/No OCS	No Outpatient visit/No OCS
N	18,904	5,633	44,230	6,223	46,947	58,934
% with >= 1 script for long-term controller	61.4	50.2	47.9	38.7	34.7	19.5
% LABA	2.7	2.0	1.8	0.8	1.1	0.4
% Anticholinergics	51.2	39.3	34.5	22.7	24.5	11.7
% ICS/LABA combinations	34.8	27.5	26.7	22.0	18.4	10.0
% Methylxanthines	6.4	4.3	3.8	2.4	2.1	0.9

Results (continued)

Healthcare costs

- Median all-cause costs were the following for patients with likely exacerbations:
 - \$25,857 for hospitalized patients
 - \$11,112 for those with an ER visit
 - \$9,195 for patients who had an outpatient visit with OCS and/or antibiotic use
 - \$8,998 amongst those on concurrent OCS and antibiotic therapy, but no outpatient visit
- For those without apparent exacerbations, costs ranged from \$4,073 (outpatient visit but no OCS or antibiotic within 7 days) to \$6,256 (no outpatient visit and no concurrent OCS/antibiotic)
- Median COPD-related costs (medical and pharmacy), were highest for hospitalized patients (\$2,540); other exacerbation groupings had median costs under \$500, with medical costs varying by presence of an outpatient visit and pharmacy costs being fairly similar (\$160-\$192)

Figure 2. Median all-cause healthcare cost over the study period

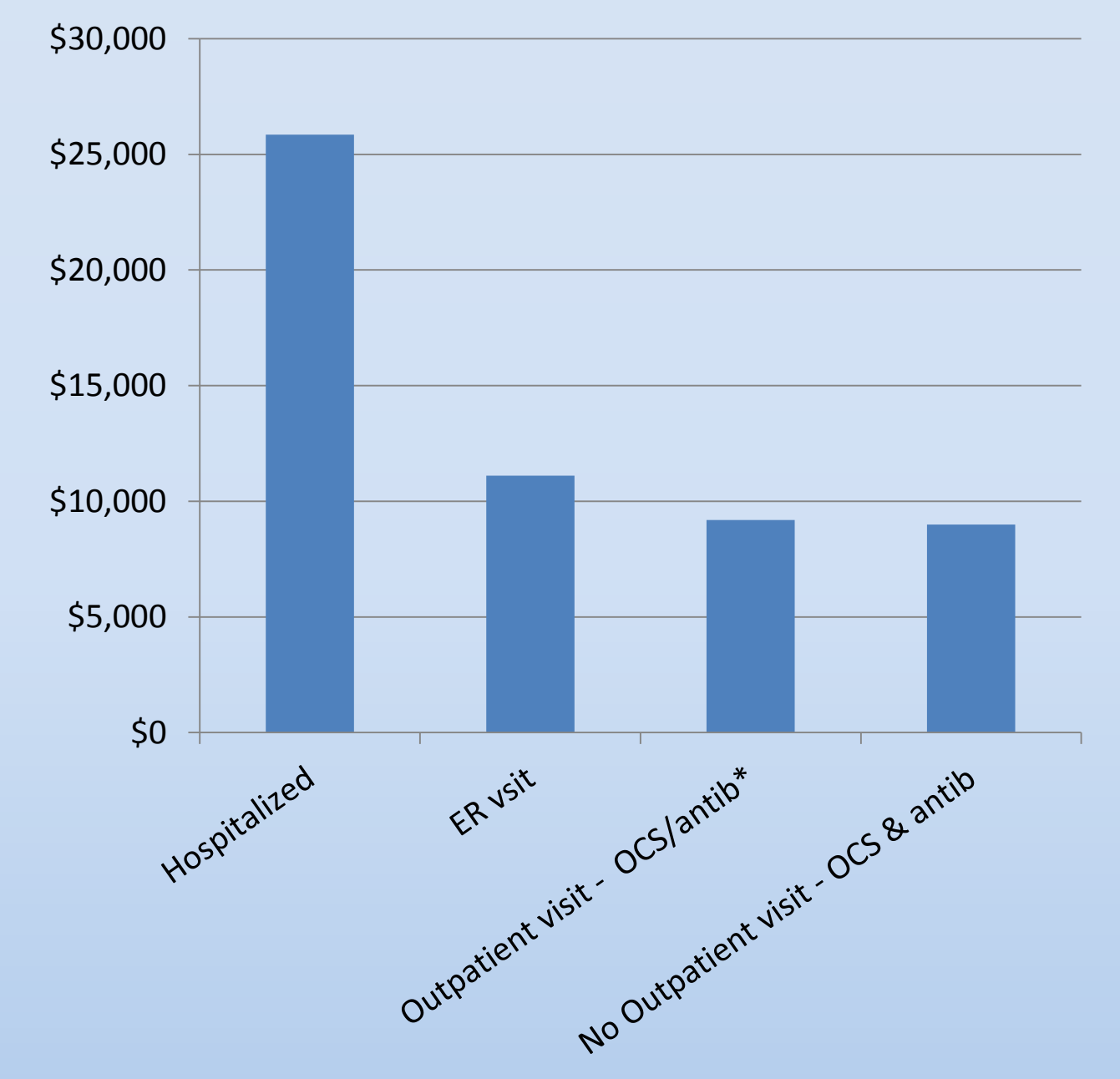
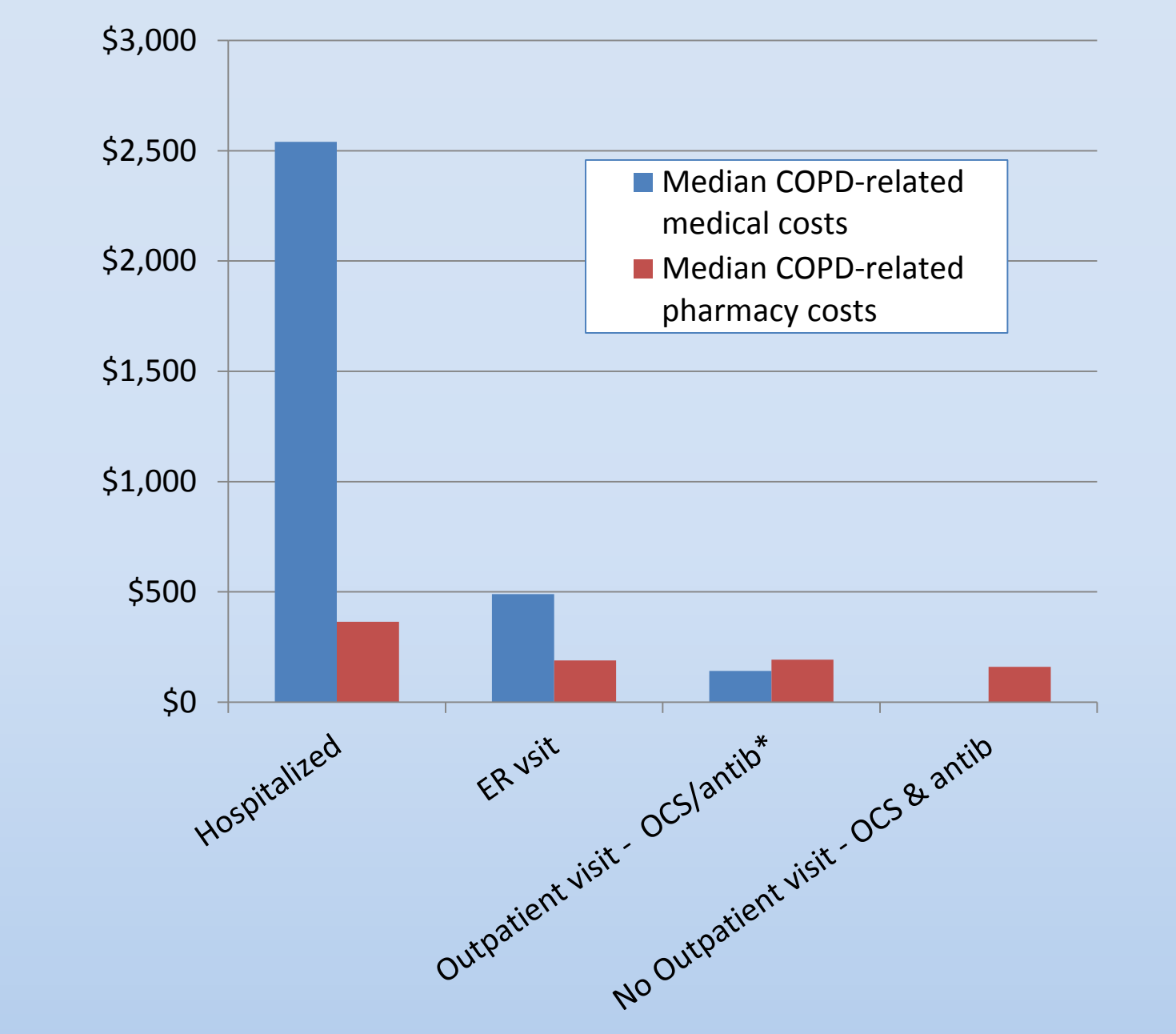


Figure 3. Median COPD-related healthcare costs over the study period



*OCS/antib indicates a pharmacy fill for an OCS and/or antibiotic

Conclusions

- A targeting algorithm was developed and applied to identify COPD patients with likely exacerbations in a national MAPD population using both medical and pharmaceutical claims
- Likely exacerbations were identified in 41.5% of COPD patients in both the inpatient and outpatient settings
- Overall, long-term controller medications were used by <50% of those with likely exacerbations
- Fewer than 18% of likely exacerbating patients identified would qualify for MTM programs within the present MCO, thus opportunities exist for targeted interventions
- This study provides a method for classifying COPD exacerbations via healthcare claims, but also illustrates an opportunity for identifying afflicted individuals who would benefit from targeted interventions aimed at improving outcomes and reducing costs

Disclosure

Authors of this presentation have the following to disclose concerning possible financial or personal relationships with commercial entities that may have a direct or indirect interest in the subject matter of this presentation:
 Karen Worley, PhD: nothing to disclose; Frank Song, PhD: nothing to disclose; Rahul Shenolikar, PhD and CR Cantrell, PhD are employees of GlaxoSmithKline (GSK); Chris Blanchette, PhD was an employee of GSK at the time the research was conducted. This study was funded by GSK.