

A Retrospective Economic Comparison of Combined Ipratropium Bromide and Albuterol versus Individual Components in Chronic Obstructive Pulmonary Disease (COPD) Patients

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INTRODUCTION

- DuoNeb® (IAC; DEY Laboratories, LP; Napa, CA) is a two-in-one inhalation solution for nebulization combining ipratropium and albuterol.¹ It is approved for bronchospasm in COPD patients requiring more than one bronchodilator.
- While combination therapy with other two-in-one delivery systems has been demonstrated to be effective in COPD^{2,4}, the impact of IAC on health care resources and compliance has not been widely evaluated.

OBJECTIVE

- To compare nebulized ipratropium and albuterol combination product (IAC) versus dual single agents (DSA) on health care resources and compliance in COPD patients.

METHODS

- A retrospective analysis was conducted utilizing a three-month baseline and a 12-month comparison.
- Data were extracted from the PharMetrics managed care database of U.S. patients enrolled from January 2001 through December 2003. Records utilized were HIPPA compliant. The study protocol required member eligibility for physician and institutional medical claims, prescription drug claims, and patient enrollment information.

Assessments:

- Primary:** Total expenditures, medical, inpatient, pharmacy, and emergency department (ED) costs were presented on Per-member-per-month (PMPM) basis.
- Secondary:** Compliance evaluation evaluated Interruptions and discontinuations.
 - Interruptions** (1-month break in prescription therapy followed by subsequent use) were defined by association with therapy (0 = No, 1 or 1+ = Yes) and number.
 - Discontinuations** (at least 2 consecutive months of prescription therapy without subsequent use) were defined by association with therapy (0 = No, 1 or 1+ = Yes).

Table 1. Inclusion/Exclusion Criteria

Inclusion	Exclusion
<ul style="list-style-type: none"> COPD Age ≥ 40 as of 12/31/2003 ≥ 15 mos of continuous plan enrollment Chronic bronchitis (ICD9: 491.x and 490.x) Emphysema (ICD9:492.x, and 518.x) Bronchiectasis (ICD9: 494.x) or other chronic airway obstructions not otherwise defined (ICD9: 496.x) Ipratropium and albuterol therapy for a minimum of 12 months (IAC or DSA) 	<ul style="list-style-type: none"> Human immunodeficiency virus (ICD9: 042.x–0.44x) or history of Diagnosis of neoplasms (ICD9: 140.x–239.x) within 3 months of the end of the analysis Asthma (ICD9 493.x) without concurrent diagnosis of COPD (ICD9: 490.x, 491.x, 492.x, 494.x, 496.x, or 518.x) Extrinsic allergic alveolitis (ICD9 495.x)

COPD Drug Severity Stage (CDSS)

CDSS Stage	Criteria
I	• Two bronchodilators
II	• Two bronchodilators • Inhaled corticosteroids
III	• Two bronchodilators • Inhaled corticosteroids • Oxygen

- Disease severity was classified by pharmacotherapy—termed CDSS—based on available claims data. This was a “best effort” to recognize COPD severity based on drug claims as an alternative to the tradition GOLD staging due to limited clinical information.⁵

Statistical Analysis:

- PMPM data were compared using unpaired Student's *t*-Tests.
- Sub-analysis was conducted to examine influence of CDSS stage and age.
- Compliance parameters were analyzed using χ^2 and Wilcoxon rank sum tests.

RESULTS

Table 2. Baseline Demographics

Parameter	IAC (n = 468) %	DSA (n = 1063) %
Age*		
40–64*	66.9	57.7
65–74	13.9	19.0
75+	19.2	23.3
Gender		
Male	43.6	41.6
Female	56.4	58.4
COPD diagnosis code		
Bronchitis (any dx of 490.x, 491.x)	80.0	79.0
Emphysema (any dx of 492.x, 518.x)	69.0	70.6
Bronchiectasis (any dx of 494.x)	5.5	5.4
Obstruction chronic airway NEC (496)	92.5	92.1
CDSS Subgroup[†]		
I	40.0	48.8
II	34.6	27.5
III [†]	25.4	23.7

*P < 0.05 †P < 0.003

Figure 1. Baseline PMPM Expenditures

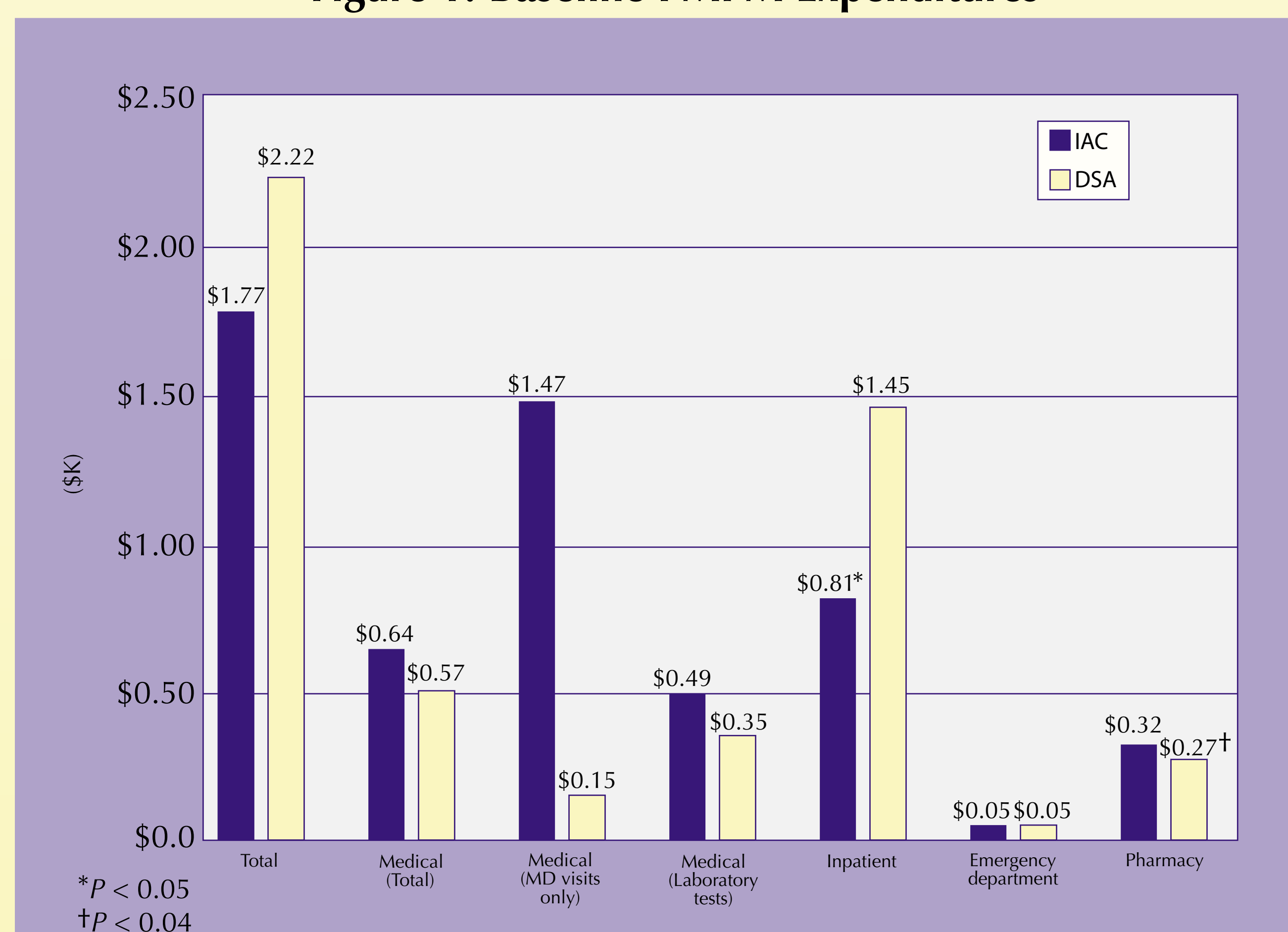
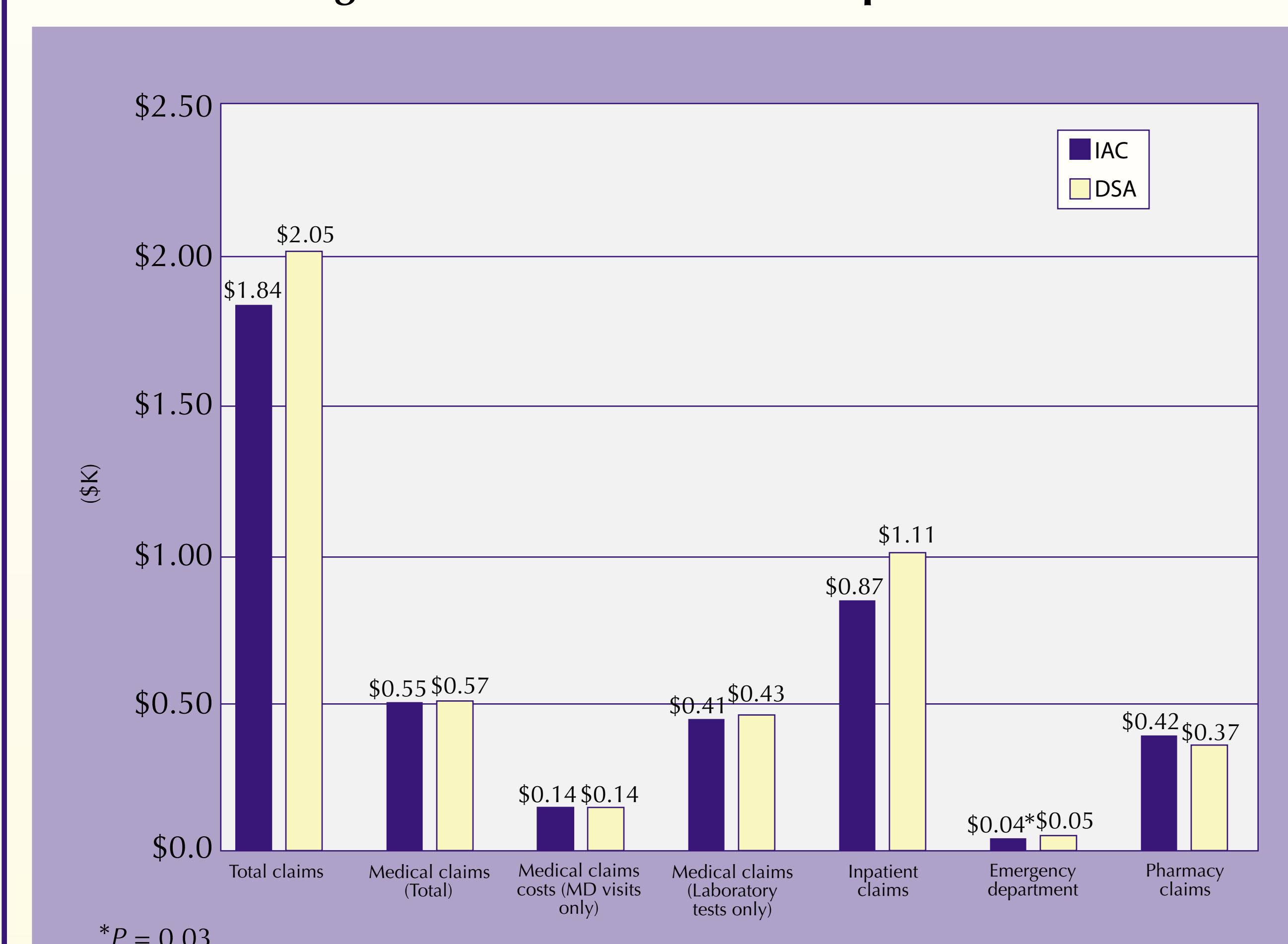


Figure 2. Treatment PMPM Expenditures



Note: IAC ED PMPM was \$36.67, while DSA ED PMPM was \$52.82. (Δ of \$16.15).

Figure 3. Significant Subgroup Treatment PMPM Expenditures

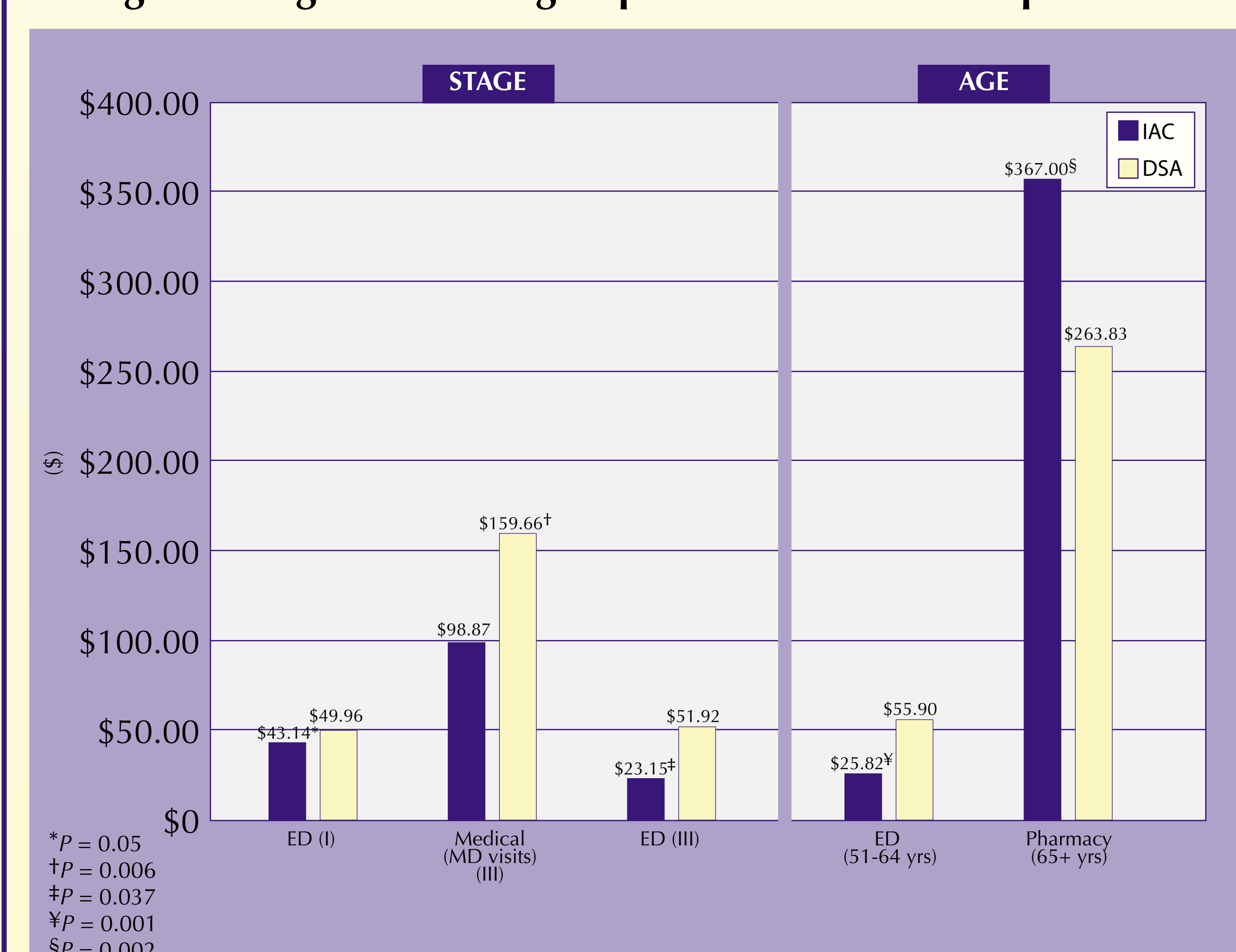
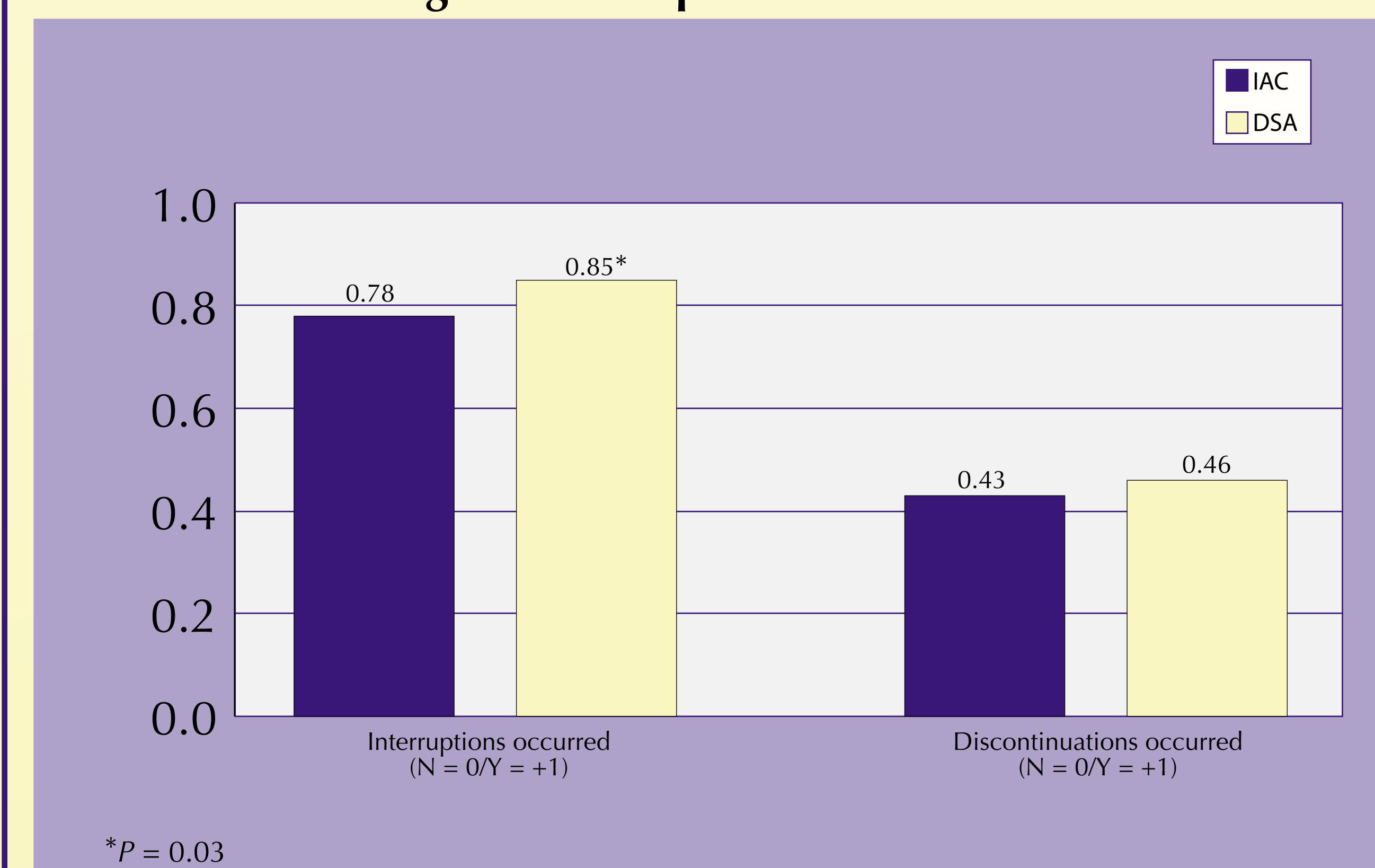


Figure 4. Compliance Parameters



DISCUSSION

- IAC was associated with statistically fewer ED visits and lower expenditures. The impact on ED resources suggest savings, annualized to \$193.99 per patient.
- Potential Per-member-per-year (PMPY) savings was \$2,476.45 (NS). For equivalent-size DSA cohort (1063 patients), savings could be as high as \$2.6 million.
- Multivariate techniques did not observe any significant confounders. However, the lack of complete clinical information limited analysis to fully assess the full influence of disease progression.
- Limitations included retrospective design, limited patient sample for 12-month assessment, a wide sample diversity (and standard deviation), and no available COPD clinical information. Many of these are inherent to claims-based evaluations. Future analysis should try to address.
- The study population (58% of DSA and 67% of IAC patients were younger than 65 years) would be applicable to health care plans covering COPD. Disease prevalence may be greater in the less than 65 population than previously claimed.⁶
- Improved compliance may contribute to savings. At least 15% of COPD patients are noncompliant with nearly one-third of their bronchodilators.⁷
- Reduced potential for medication errors may contribute to savings. Albuterol is ranked 2nd, ipratropium is listed as 15th, and the two agents together as individual components is rated 41st by the MEDMARX system for medication errors.⁸

CONCLUSION

- IAC therapy does not appear to generate any greater expense than DSA overall, despite a higher product acquisition costs (NS).
- IAC was associated with statistically lower ED visits and costs, plus significantly fewer individuals who experienced therapy interruptions.

DISCLOSURES

JM York, PharmD has received consulting and research support from DEY, LP. G Klein, MD is a DEY, LP employee. L Wong, PharmD was a DEY, LP employee at the time of this analysis. Supported via a grant from DEY, LP.

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