HHS Public Access

Author manuscript

Curr Med Res Opin. Author manuscript; available in PMC 2018 February 01.

Published in final edited form as:

Curr Med Res Opin. 2017 February ; 33(2): 201–208. doi:10.1080/03007995.2016.1248383.

Depression Treatment Patterns among Adults with Chronic Obstructive Pulmonary Disease and Depression

Arijita Deb and **Usha Sambamoorthi**

West Virginia University School of Pharmacy, Robert C. Byrd Health Sciences Center, Morgantown, WV, USA

Abstract

Objective—To estimate rates and the patterns of depression treatment among adults with Chronic Obstructive Pulmonary Disease (COPD) and depression.

Methods—We used a retrospective, cross-sectional study design, pooling data from 2010 and 2012 Medical Expenditure Panel Survey (MEPS). The study sample consisted of 527 individuals aged 21 years or older, diagnosed with COPD and depression. Depression treatment was grouped into 3 categories based on those who received: 1) neither antidepressant nor psychotherapy; 2) antidepressants only; and 3) psychotherapy combined with antidepressants (combination therapy). We conducted chi-squared tests and multinomial logistic regressions to examine factors (demographic, socio-economic characteristics, healthcare access, health status, and personal health practices) associated with depression treatment among adults with COPD and depression.

Key Findings—The mean age of the study sample was 55.96 years(SD=13.36). Overall, 18.8% of the sample adults did not report any use of antidepressants or psychotherapy, 58.3% reported antidepressants use only and 23% reported using combination therapy. Females(AOR=1.89, 95% CI= 1.02, 3.55), older adults(>=65 years: AOR=3.69, 95% CI= 1.62, 8.41), adults with fair/poor physical health status(AOR=3.32, 95% CI=1.29, 8.56) and those suffering from anxiety (AOR=1.94, 95% CI= 1.09, 3.46) were more likely to receive antidepressant treatment. Older adults(AOR=2.94, 95% CI=1.05, 8.22), those who were never married(AOR=3.17, 95% CI=1.18, 8.56), suffered from anxiety(AOR=6.01, 95% CI=3.11, 11.61) and current smokers (AOR=2.29, 95% CI= 1.05, 4.98) were more likely to receive combination therapy. Whereas, adults who were uninsured(AOR=0.21, 95% CI= 0.05, 0.86) and did not have physical activity (AOR=0.33, 95% CI= 0.16, 0.67) were less likely to receive combination therapy. Key limitations of our study is that we could not control for the severity of depression or COPD which may have influenced depression treatment.

Address for correspondence: Arijita Deb, M. Pharm, Department of Pharmaceutical Systems and Policy, West Virginia University School of Pharmacy, Robert C. Byrd Health Sciences Center (North), P.O. Box 9510, Morgantown, WV 26506-9510 USA. Tel: +1 304-293-6991, Fax: +1 304-293-2529; ardeb@mix.wvu.edu.

TRANSPARENCY

Declaration of funding:

The project was supported by the National Institute of General Medical Sciences, U54GM104942.

Declaration of financial/other interests:

The Authors and CMRO peer reviewers on this manuscript have no relevant financial relationships to disclose.

Conclusion—Efforts to improve depression care among adults with co-occurring COPD and depression may need to be tailored for different subgroups.

Keywords

COPD; Antidepressants; Psychotherapy; Depression Treatment; MEPS

Introduction

Depression is a frequently occurring concomitant disease among adults with Chronic Obstructive Pulmonary Disease (COPD) with an estimated prevalence of 24.6%[1]. Adults with COPD are 4 times as likely as those without COPD to develop depression[2]; and twice as likely to develop depression as adults with other chronic conditions such as arthritis, cancer, diabetes, hypertension, and stroke[3]. Depression leads to worsening of COPD-related outcomes such as COPD-exacerbation frequency[4, 5], symptom burden and COPD treatment failure[6]. Depression also increases severity of COPD due to its effect on early addictive smoking and impediment of smoking cessation[7]. In addition, non COPD-related outcomes of depression include longer hospitalization[8], mortality[9], impaired functional status, poor exercise capacity[8], poor quality of life[10], non-adherence to medical treatment, and sleep disturbances[8].

Randomized clinical trials (RCTs) have demonstrated the beneficial effect of antidepressants use among patients with COPD and depression[11]. In addition to reduction of depressive symptoms, antidepressants may confer other benefits such as decrease in tobacco cravings, improvement of subjective dyspnea, improvement of appetite, weight loss reversal, decrease in anxiety symptoms and better decision making regarding end-of-life-care preferences[12]. Adding psychotherapy to antidepressant treatment (combination therapy) is also an effective strategy in managing depression. Evidence-based clinical practice guidelines [13–15] on the management of depression in general population have recommended combined therapy (psychotherapy and antidepressant medication) for patients with moderate-to-severe depression. In a recent meta-analysis, researchers showed that adding psychotherapy to antidepressant medications was twice as effective as compared to antidepressant treatment alone [16] in reducing depressive symptoms. However, evidence regarding combination therapy use in the management of depression in COPD population has been limited[17].

Despite, the high prevalence of depression in patients with COPD and the beneficial effect of depression treatment, nationally representative studies on the rates of depression treatment in real-world settings among adults with COPD and depression have been limited [2, 18]. One study conducted in the United States (US) in 2003 reported that only 31% of adults with COPD and depression seen in one primary care setting received treatment for depression[2]. Another study using claims data of elderly (>=65 years) Medicare beneficiaries found that 82.1% of the elderly COPD patients with depression received antidepressants[18]. It has to be noted that this study focused only on elderly Medicare beneficiaries. Thus, the extant literature provides no information on depression treatment in adults with COPD and little is known about the various person-level factors that are associated with depression treatment in adults with COPD and depression. Therefore, the primary objective of this

study was to estimate the rates of depression treatment with antidepressants and combination therapy among adults with co-occurring depression and COPD. We also examined the patterns of depression treatment by demographic, socio-economic characteristics, access to care, health status, and personal health care practices in a nationally representative sample of adults with COPD and depression.

Methods

Design

A retrospective cross-sectional study design was used.

Data

We used data from the Medical Expenditure Panel Survey (MEPS), a large-scale survey of the civilian non-institutionalized population in the U.S. The Household Component (HC) of MEPS collects demographic characteristics, medical conditions, health status, utilization of healthcare services, charges and payments, access to care, health insurance coverage, income, education and employment on all household members[19]. For this study we used the person-level household full year consolidated file, event-level medical conditions and prescribed medicines file. Medical conditions file captures medical conditions of the respondents based on the verbatim text and these texts are converted into International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) codes by professional coders [20]. The event-level prescribed medications file contains detailed records of prescribed medicines such as the national drug code (NDC), medicine name, therapeutic class based on Multum Lexicon classification, sources of payment, fill date and others.

MEPS uses a probability weighted complex multistage survey design with primary sampling units, strata, and person level sampling weights[21]. For the current study, we pooled data from two years (2010 and 2012) to have sufficient sample size and alternate years were used to avoid using two observations per individual.

Study Sample

The study sample comprised of individuals aged 21 years or older, who were diagnosed with depression and COPD and were alive during the calendar years. Depression was identified using ICD-9-CM codes (296.XX, 298.XX, 300.XX, 309.XX and 311.XX) used in published literature and the National Committee on Quality Assurance [22, 23]. COPD was identified using previously validated ICD-9-CM codes (491.XX, 492.XX and 496.XX) [24, 25].

Measures

All variables (dependent and independent) used in this analysis were identified from the same calendar year.

Dependent Variable

Antidepressant Treatment—Information on antidepressant prescriptions was derived from Prescribed Medicine file in MEPS using the therapeutic class codes from the Multum-lexicon classification scheme. The therapeutic class code 249 represented antidepressants. In

our study, we considered individuals to have received antidepressant treatment if they had one or more prescriptions for antidepressants.

Psychotherapy—Information on Psychotherapy was obtained from the office-based medical provider visit files and the outpatient files. These files capture information on the reason for visits. In our study, we considered individuals to have received psychotherapy if they had at least one visit in which they received psychotherapy.

Based on the receipt of antidepressants and psychotherapy, adults were classified into three mutually exclusive depression treatment categories: 1) received neither antidepressants nor psychotherapy; 2) received antidepressants only; and 3) received psychotherapy combined with antidepressants (combination therapy). As less than 4% (n=23) of the study population reported psychotherapy use only, we excluded individuals receiving "psychotherapy only" from our population.

Independent Variables

Demographic variables included sex, race (white, African American, other racial minorities), age in years (21–39 years, 40–49 years, 50–64 years, 65 and older), marital status (married, widowed, separated/divorced, never married), and metro status (metro, rural). *Socio-economic* characteristics included education (less than high school, high school, above high school) and poverty status (not poor, poor). *Access to care* variables consisted of health insurance (public, private, uninsured) and usual source of care (yes/no). The usual source of care variable was based on whether each individual ascertains if there is a particular doctor's office, clinic, health center, or other place from where an individual usually seek care[19]. Health status variables included a diagnosis of anxiety (yes/no), number of chronic conditions other than COPD (none, 1 to 3, >3 conditions) from a list of 12 conditions that included arthritis, asthma, cancer, dementia, diabetes, heart disease, gastroesophageal reflux disease (GERD), hypertension, liver disease, renal disease, stroke, and thyroid disorders, and perceived physical health status (excellent/very good, good, and fair/poor). Perceived mental health status (excellent/very good, good, and fair/poor) was used as a proxy for the severity of depression. Personal health practice variables included Body Mass Index (BMI) categories (underweight/normal, overweight, obese), smoking status (current smoker, other) and physical activity (moderate to vigorous activities 3 times per week, no physical activity).

Statistical Analysis

Chi-square tests were used to analyze the differences in depression treatment among various subgroups of individuals with COPD and depression. Multinomial logistic regressions were employed to analyze the depression treatment patterns by gender, age race, marital status, metro status, insurance status, usual source of care, medical conditions and health status variables. We used "neither antidepressants nor psychotherapy" as the reference group for the dependent variable in the multinomial regression model. There were a few individuals with missing data (n =24) on BMI and smoking and these individuals were excluded from the multinomial logistic regression. Parameter estimates from the multinomial logistic regression were transformed into adjusted odds ratio (AOR) and their corresponding 95% confidence intervals were reported. To account for the complex, probabilistic survey design

of MEPS, all statistics were weighted to the national level by incorporating MEPS variance adjustment weights (sampling strata and primary sampling unit) and MEPS person-level weights in all analyses. SAS 9.4 (SAS Institute Inc., Cary, NC) software was used to adjust the estimated standard errors for weighted survey estimates using the Taylor-series linearization approach. This was done by using survey procedures found in SAS such as SURVEYFREQ, SURVEYMEANS and SURVEYLOGISTIC.

Results

The sample description of our study population is presented in Table 1. Our study population consisted of 527 adults with co-occurring COPD and depression. About 70% were females and 82.2% were whites. 45.1% of the study population was in the age group 50–64 years. An overwhelming majority of the population (58.7%) reported the presence of 1 to 3 chronic illnesses such as arthritis, diabetes mellitus, heart diseases, stroke, hypertension and thyroid disorders; nearly 38.4% reported anxiety. In addition, almost 46% of the study population was obese and about 40.8% was current smokers.

The un-weighted number and weighted percent of depression treatment categories by socio-demographic, medical conditions and health status are presented in Table 2. We found that 18.8% of the study population received neither antidepressants nor psychotherapy, 58.3% reported antidepressants use only and 23% reported the use of combination therapy (Table 2). We observed statistically significant differences in depression treatment by race, age, marital status, education, health insurance, usual source of care, perceived mental health status, anxiety, current smoking status and number of chronic conditions. A significantly higher proportion of racial minorities (other than African Americans) (28.1%) compared to whites (15.9%) did not receive any treatment with antidepressants or psychotherapy. Also higher proportions of uninsured adults (38.7%) as compared to those with private (14.3%) or public insurance (13.8%) did not report any treatment with antidepressants or psychotherapy.

Adjusted odds ratios (AOR) and 95% CIs from multinomial logistic regression analysis based on depression treatment of the various subgroups are presented in Table 3. Females (AOR=1.89, 95% CI= 1.02, 3.55), older adults (>=65 years: AOR=3.69, 95% CI= 1.62, 8.41), adults with fair/poor physical health status (AOR=3.32, 95% CI=1.29, 8.56) and those suffering from anxiety (AOR=1.94, 95% CI= 1.09, 3.46) were more likely to receive antidepressant treatment compared to males, younger adults aged 22 to 39 years, adults with very excellent/very good physical health status and those who did not suffer from anxiety respectively. In contrast, adults with fair/poor mental health status (AOR=0.36, 95% CI=0.18, 0.75) as compared to adults with excellent/ very good mental health status were less likely to receive antidepressant treatment. Older adults (AOR=2.94, 95% CI=1.05, 8.22), those who were never married (AOR=3.17, 95% CI=1.18, 8.56), suffered from anxiety (AOR=6.01, 95% CI=3.11, 11.61) and current smokers (AOR=2.29, 95% CI= 1.05, 4.98) were more likely to receive combination therapy compared to younger adults aged 22 to 39 years, those who were married, did not have anxiety and were not current smokers respectively. Whereas, adults who were uninsured (AOR=0.21, 95% CI= 0.05, 0.86) and did not have physical activity (AOR=0.33, 95% CI= 0.16, 0.67) were less likely to receive with

the combination therapy as compared to those who had private insurance and had regular physical activity respectively.

Discussion

Our study analyzed the rates and patterns of depression treatment among adults with co-occurring COPD and depression using data from the nationally representative household survey, MEPS. The results from our study show that 81.5% of the population with COPD and depression received treatment for depression with either antidepressants or combination therapy. There are no studies on depression treatment among all adults with COPD and depression in the US. Therefore, we compared the rate of antidepressants use among older adults (i.e. age ≥ 65 years) in our study to one published study on antidepressant treatment among Medicare beneficiaries with COPD and depression[18]. The percentage of antidepressants use in our study (86%) is consistent with Qian et al., which showed that 82% of older Medicare beneficiaries with both COPD and depression received treatment with antidepressants. However, another study by Kunik et al. reported that only 31% of the patients in one primary care center with co-occurring chronic breathing disorders and depression received treatment for depression[2]. Because this study was more than a decade old, the difference in the rate of depression treatment may be in part due to study settings, single site, changes in practice patterns over time and increasing trends in detection and management of depression in outpatient setting[26].

We found that more than two-thirds (70%) of adults with co-occurring COPD and depression were women. It is well-established that that women are more likely to have depression than men across numerous chronic conditions[27, 28]. Among patients with COPD, epidemiologic studies have reported higher prevalence of depression among women than men[29]. Although historically COPD has been considered to affect men disproportionately[30], in the past decade there has been a shift in the trend of COPD from a male predominant disease to a female predominant disease[31, 32].Therefore, it is not surprising that an overwhelming majority of our study sample were women.

Our results also indicate that women with COPD and depression were significantly more likely to receive antidepressant treatment as compared to men. The sex-related disparity in depression treatment has been attributed to the lowered willingness of men to seek treatment for mental disorders [33–36]. In a landmark multisite trial (IMPACT) conducted among older adults with depression, qualitative assessments showed that the sex-related disparities in depression treatment could be attributed to the stereotypical masculine ideologies such as emotional control, self-reliance and stoicism as well as high social stigma associated with seeking healthcare for chronic mental disorders[33].

We also found that adults with co-occurring COPD and depression who had fair/poor physical health status were more likely to receive depression treatment as compared to adults with excellent/very good physical health status. A possible explanation for the high antidepressant use could be the effectiveness of antidepressants in the alleviation of COPD related symptoms such as decrease in exacerbation frequency, dyspnea and COPD related treatment failure [4, 5, 11].

Conversely, adults with fair/poor mental health status were less likely to receive depression treatment than adults with excellent/ very good mental health status. In a feasibility trial of antidepressant therapy in patients with COPD, it was found that the majority (72%) of depressed patients refused antidepressant therapy due to anticipation of adverse events, resentment in taking multiple medications, and denial of depressive symptoms[37]. This might explain the reason for low antidepressant use among adults with more severe mental health. Future studies need to explore the barriers to antidepressant use among this subpopulation.

Adults with anxiety were 1.9 times as likely to receive antidepressant treatment and 6 times as likely to receive combination therapy as compared to those without anxiety. Previous research have demonstrated that anxiety among patients with COPD and depression leads to significant increase in behavioral and psychological symptoms of distress such as higher levels of fatigue, shortness of breath, and frequency of COPD symptoms[38]. One plausible reason for the higher likelihood of combination therapy among adults with COPD and depression may be due to the effectiveness of combination therapy in treating a wide variety of anxiety symptoms[39].

One noteworthy finding from this study is that current smokers were 2.3 times as likely to receive combination therapy as compared to those who were not current smokers. Prior research has shown that among adults with COPD and depression, who also smoke, have a nearly 40-fold increase in risk of severity from COPD interaction effects [7, 9]. It is well-documented that treatment for depression may have the added benefit of facilitating smoking cessation in addition to reducing depressive symptoms [40–42] among adults with COPD and depression. These findings suggest that current smokers may be treated with combination therapy to provide relief from depression as well as smoking cessation.

Despite the effectiveness of combination therapy in providing relief from depression, only 23% of adults with COPD and depression received combination therapy. Furthermore, certain subgroups were less likely to receive combination therapy. For example, we found that patients who lacked regular physical activity were less likely to receive combination therapy. Exercise is particularly challenging in patients with COPD due to alterations in their skeletal muscle caused by their illness [43]. In our study, approximately 3 in 4 patients with COPD and depression reported lack of exercise perhaps due to exercise intolerance in this population. Therefore, physicians may need to pay particular attention to these patients in making a decision about the modality of depression treatment.

Our study findings also highlighted lack of health insurance as a barrier to receipt of combination therapy. Uninsured may not receive combination therapy due to high out-of-pocket spending burden. A study of financial burden and out-of-pocket expenditures for mental health reported that uninsured adults were more likely to bear a significant burden as compared to insured adults [44]. This finding suggest a need for clinical practice and policy efforts to be integrated. For example, clinicians can attempt to reduce access barriers to combination therapy by providing linkages of the various behavioral and social services that are available in the community for the underserved or the uninsured[45].

Conversely, results from our study also indicate that certain subgroups of adults - those who were older (>=65 years), never married, current smokers and who had anxiety - were more likely to receive combination therapy. Our study did not examine the reasons behind the higher rates of combination therapy in these groups. Therefore, future studies are needed to explore the motivational determinants of combination therapy in these patient subgroups.

The findings of this study are subject to certain limitations. As data from MEPS are self-reported, it is subject to recall bias. Also, due to the cross-sectional nature of the study, causal relationship between depression treatment and other variables cannot be established. Furthermore, due to the absence of disease specific severity measure in MEPS, the severity of COPD or depression could not be taken into account. In addition, we did not analyze the use of alternative and complementary therapies of depression in this population.

Conclusion

Notwithstanding the limitations, our study findings identified subgroups of patients with COPD and depression who may be vulnerable for non-receipt of effective depression treatment modality (i.e. combination therapy). In our study some subgroups of patients were more likely to receive combination therapy, suggesting that these subgroups may have accepted combination therapy. Future research needs to explore whether other factors such as patient preferences, attitudes, knowledge and willingness to accept combination therapy that were not measured in our study contributed to the high rates of combination therapy in these groups.

Acknowledgments

The content is solely the responsibility of the authors and does not necessarily represent the views/opinions of any organization.

References

1. Zhang MW, Ho RC, Cheung MW, Fu E, Mak A. Prevalence of depressive symptoms in patients with chronic obstructive pulmonary disease: a systematic review, meta-analysis and meta-regression. Gen Hosp Psychiatry. 2011 May-Jun;33(3):217–23. [PubMed: 21601717]
2. Kunik ME, Roundy K, Veazey C, Souchek J, Richardson P, Wray NP, et al. Surprisingly high prevalence of anxiety and depression in chronic breathing disorders. Chest. 2005 Apr; 127(4):1205–11. [PubMed: 15821196]
3. Schane RE, Walter LC, Dinno A, Covinsky KE, Woodruff PG. Prevalence and risk factors for depressive symptoms in persons with chronic obstructive pulmonary disease. J Gen Intern Med. 2008 Nov; 23(11):1757–62. [PubMed: 18690488]
4. Pooler A, Beech R. Examining the relationship between anxiety and depression and exacerbations of COPD which result in hospital admission: a systematic review. Int J Chron Obstruct Pulmon Dis. 2014; 9:315–30. [PubMed: 24729698]
5. Laurin C, Moullec G, Bacon SL, Lavoie KL. Impact of anxiety and depression on chronic obstructive pulmonary disease exacerbation risk. American Journal of Respiratory and Critical Care Medicine. 2012; 185(9):918–23. [PubMed: 22246177]
6. Jordan N, Lee TA, Valenstein M, Weiss KB. Effect of care setting on evidence-based depression treatment for veterans with COPD and comorbid depression. J Gen Intern Med. 2007 Oct; 22(10): 1447–52. [PubMed: 17687614]

7. Lou P, Chen P, Zhang P, Yu J, Wang Y, Chen N, et al. Interaction of depression and nicotine addiction on the severity of chronic obstructive pulmonary disease: A prospective cohort study. Iranian Journal of Public Health. 2016; 45(2):146–57. [PubMed: 27114979]
8. Ng TP, Niti M, Tan WC, Cao Z, Ong KC, Eng P. Depressive symptoms and chronic obstructive pulmonary disease: effect on mortality, hospital readmission, symptom burden, functional status, and quality of life. Arch Intern Med. 2007 Jan 8; 167(1):60–7. [PubMed: 17210879]
9. Lou P, Chen P, Zhang P, Yu J, Wang Y, Chen N, et al. Effects of smoking, depression, and anxiety on mortality in COPD patients: a prospective study. Respiratory care. 2014; 59(1):54–61. [PubMed: 23737545]
10. Lu Y, Nyunt MS, Gwee X, Feng L, Feng L, Kua EH, et al. Life event stress and chronic obstructive pulmonary disease (COPD): associations with mental well-being and quality of life in a population-based study. BMJ Open. 2012; 2(6)
11. Rayner L, Price A, Evans A, Valsraj K, Higginson IJ, Hotopf M. Antidepressants for depression in physically ill people. The Cochrane database of systematic reviews. 2010; (3):Cd007503. [PubMed: 20238354]
12. Raji MA. On Depression, Antidepressant Medications, and Resuscitation Preferences in COPD Patients. Chest. 2006; 129(1):211. [PubMed: 16424436]
13. National Guideline C. Practice guideline for the treatment of patients with major depressive disorder. 3. 2010.
14. Cohen LJ, Guthrie SK. Depression in primary care: review of AHCPR guidelines. The Annals of pharmacotherapy. 1997 Jun; 31(6):782–5. [PubMed: 9184725]
15. Department of Veterans Affairs. VA/DoD Clinical Practice Guideline For The Management Of Major Depressive Disorder. 2016. [cited 2016 5/18/2016]; Available from: http://www.healthquality.va.gov/guidelines/MH/mdd/VADoDMDDCPGFINAL41816.pdf
16. Cuijpers P, Sijbrandij M, Koole SL, Andersson G, Beekman AT, Reynolds CF. Adding psychotherapy to antidepressant medication in depression and anxiety disorders: a meta-analysis. World Psychiatry. 2014 Feb 04; 13(1):56–67. [PubMed: 24497254]
17. Tselebis A, Pachi A, Ilias I, Kosmas E, Bratis D, Moussas G, et al. Strategies to improve anxiety and depression in patients with COPD: a mental health perspective. Neuropsychiatric Disease and Treatment. 2016 Feb 09.12:297–328. [PubMed: 26929625]
18. Qian J, Simoni-Wastila L, Langenberg P, Rattinger GB, Zuckerman IH, Lehmann S, et al. Effects of depression diagnosis and antidepressant treatment on mortality in medicare beneficiaries with chronic obstructive pulmonary disease. Journal of the American Geriatrics Society. 2013; 61(5): 754–61. [PubMed: 23617752]
19. Agency for Healthcare Research and Quality. Medical Expenditure Panel Survey Household Component Documentation, 2012 Full Year Consolidated Data File. [cited 2016 4/17/2016]; Available from: http://meps.ahrq.gov/mepsweb/data_stats/download_data/pufs/h155/h155doc.pdf
20. Agency for Healthcare Research and Quality. MEPS HC-154: 2012 Medical Conditions File. [cited 2016 5/17/2016]; Available from: http://meps.ahrq.gov/mepsweb/data_stats/download_data/pufs/h154/h154doc.pdf
21. Agency of Healthcare Research and Quality. MEPS-HC Panel Design and Data Collection Process. [cited 2016 4/17/2016]; Available from: http://meps.ahrq.gov/mepsweb/survey_comp/hc_data_collection.jsp
22. Townsend L, Walkup JT, Crystal S, Olfson M. A systematic review of validated methods for identifying depression using administrative data. Pharmacoepidemiology and drug safety. 2012 Jan; 21(Suppl 1):163–73. [PubMed: 22262603]
23. Egede LE, Walker RJ, Bishu K, Dismuke CE. Trends in Costs of Depression in Adults with Diabetes in the United States: Medical Expenditure Panel Survey, 2004–2011. Journal of General Internal Medicine. 2016; 31(6):615–22. [PubMed: 26969312]
24. Miller JD, Foster T, Boulanger L, Chace M, Russell MW, Marton JP, et al. Direct costs of COPD in the U.S: An analysis of Medical Expenditure Panel Survey (MEPS) data. COPD: Journal of Chronic Obstructive Pulmonary Disease. 2005; 2(3):311–18. [PubMed: 17146996]
25. Blanchette CM, Dalal AA, Mapel D. Changes in COPD demographics and costs over 20 years. Journal of Medical Economics. 2012; 15(6):1176–82. [PubMed: 22812689]

26. Marcus SC, Olfson M. National trends in the treatment for depression from 1998 to 2007. Arch Gen Psychiatry. 2010 Dec; 67(12):1265–73. [PubMed: 21135326]
27. PICCINELLI M, WILKINSON G. Gender differences in depression. Critical review. 2000; 177(6): 486–92.
28. Lochner KA, Cox CS. Prevalence of Multiple Chronic Conditions Among Medicare Beneficiaries, United States, 2010. Preventing Chronic Disease. 2013; 10:E61. [PubMed: 23618541]
29. Di Marco F, Verga M, Reggente M, Maria Casanova F, Santus P, Blasi F, et al. Anxiety and depression in COPD patients: The roles of gender and disease severity. Respiratory Medicine. 2006 Oct; 100(10):1767–74. [PubMed: 16531031]
30. Aryal S, Diaz-Guzman E, Mannino DM. COPD and gender differences: an update. Translational Research. 162(4):208–18.
31. Akinbami LJ, Liu X. Chronic obstructive pulmonary disease among adults aged 18 and over in the United States, 1998–2009. NCHS Data Brief. 2011 Jun.(63):1–8.
32. Ford ES, Croft JB, Mannino DM, Wheaton AG, Zhang X, Giles WH. COPD surveillance--United States, 1999–2011. Chest. 2013 Jul; 144(1):284–305. [PubMed: 23619732]
33. Hinton L, Zweifach M, Oishi S, Tang L, Unutzer J. Gender disparities in the treatment of late-life depression: qualitative and quantitative findings from the IMPACT trial. The American journal of geriatric psychiatry : official journal of the American Association for Geriatric Psychiatry. 2006 Oct; 14(10):884–92. [PubMed: 17001028]
34. Kornstein SG. Gender differences in depression: implications for treatment. J Clin Psychiatry. 1997; 58(Suppl 15):12–8.
35. Goodwin RD, Gotlib IH. Gender differences in depression: the role of personality factors. Psychiatry research. 2004 Apr 30; 126(2):135–42. [PubMed: 15123392]
36. Addis ME. Gender and Depression in Men. Clinical Psychology: Science and Practice. 2008; 15(3):153–68.
37. Yohannes AM, Connolly MJ, Baldwin RC. A feasibility study of antidepressant drug therapy in depressed elderly patients with chronic obstructive pulmonary disease. International journal of geriatric psychiatry. 2001; 16(5):451–54. [PubMed: 11376459]
38. Suh S, Ellis RJ, Sollers JJ, Thayer JF, Yang HC, Emery CF. The effect of anxiety on heart rate variability, depression, and sleep in Chronic Obstructive Pulmonary Disease. Journal of Psychosomatic Research. 2013; 74(5):407–13. [PubMed: 23597328]
39. Zohar J, Westenberg HGM. Anxiety disorders: a review of tricyclic antidepressants and selective serotonin reuptake inhibitors. Acta Psychiatrica Scandinavica. 2000; 101:39–49.
40. Wagena E, Huibers M, Van Schayck CP. Antidepressants in the treatment of patients with COPD: possible associations between smoking cigarettes, COPD and depression. Thorax. 2001; 56(8): 587–88. [PubMed: 11462058]
41. Tashkin DP, Rennard S, Hays JT, Ma W, Lawrence D, Lee TC. Effects of varenicline on smoking cessation in patients with mild to moderate copd: A randomized controlled trial. Chest. 2011; 139(3):591–99. [PubMed: 20864613]
42. Wagena EJ, Kant I, Huibers MJH, van Amelsvoort LGPM, Swaen GMH, Wouters EFM, et al. Psychological distress and depressed mood in employees with asthma, chronic bronchitis or emphysema: A population-based observational study on prevalence and the relationship with smoking cigarettes. European Journal of Epidemiology. 2004; 19(2):147–53. [PubMed: 15080082]
43. Wüst RCI, Degens H. Factors contributing to muscle wasting and dysfunction in COPD patients. International Journal of Chronic Obstructive Pulmonary Disease. 2007 Sep; 2(3):289–300. [PubMed: 18229567]
44. Ringel JS, Sturm R. Financial Burden and Out-of-Pocket Expenditures for Mental Health Across Different Socioeconomic Groups: Results from HealthCare for Communities. The journal of mental health policy and economics. 2001 Sep 1; 4(3):141–50. [PubMed: 11967474]
45. Wells R, Morrissey JP, Lee IH, Radford A. Trends in Behavioral Health Care Service Provision by Community Health Centers, 1998–2007. Psychiatric services (Washington, DC). 2010; 61(8):759–64.

Table 1

Descriptive Statistics of Study Sample (N=527)
Adults with COPD and Depression;
Medical Expenditure Panel Survey, 2010 and 2012

Variable	N	Weighted %
All	**527**	**100.0**
Sex		
Female	376	69.9
Male	151	30.1
Race		
White	368	82.2
African American	71	7.1
Other	88	10.7
Age in years		
22–39 years	60	11.6
40–49 years	82	15.5
50–64 years	243	45.1
65 and older	142	27.8
Marital Status		
Married	226	44.4
Widow	69	12.6
Separated/Divorced	144	25.9
Never married	88	17.2
Metro		
Metro	423	79.6
Rural	104	20.4
Education		
Less than High School	127	20.0
High School	125	20.6
More than High School	168	39.1
Employment Status		
Employed	135	29.4
Not Employed	392	70.6
Poverty Status		
Poor	287	46.3
Not Poor	240	53.7
Insurance Status		
Private	211	48.9
Public	261	41.8
Uninsured	55	9.3
Usual Source of Care		
Yes	475	90.7

Variable	N	Weighted %
No	51	9.3
Perceived Physical Health Status		
Excellent/very good	82	18.2
Good	145	29.6
Fair/poor	300	52.2
Perceived Mental Health Status		
Excellent/very good	122	24.9
Good	185	36.1
Fair/poor	220	39.0
Anxiety		
Yes	192	38.4
No	335	61.6
Body Mass Index		
Underweight/normal	121	23.7
Overweight	142	29.4
Obese	260	45.9
Smoking Status		
Current smoker	227	40.8
Other	280	55.6
Physical Activity		
3 times per week	133	26.5
No exercise	394	73.5
Number of Chronic Conditions		
None	52	12.3
1–3	311	58.7
4 or more	164	29.1

Note: Based on 527 adults, aged 21 years older with self-reported Chronic Obstructive Pulmonary Disease and depression who were alive during the calendar years. Missing categories for education, usual source of care, smoking status, body mass index and physical activity are not displayed.

COPD: Chronic Obstructive Pulmonary Disease

Table 2

Number and Weighted Percent of Depression Treatment Categories
Adults with COPD and Depression
Medical Expenditure Panel Survey, 2010 and 2012

Variable	No Antidepressants or Psychotherapy		Antidepressants Only		Combination Therapy		sig
	N	Wt. (%)	N	Wt. (%)	N	Wt. (%)	
All	99	18.8	307	58.3	121	23.0	
Sex							
Female	63	14.0	221	59.4	92	26.6	
Male	36	21.9	86	55.8	29	22.3	
Race							
White	60	15.0	232	61.1	76	23.9	**
African American	14	17.7	34	47.4	23	34.9	
Other	25	26.1	41	44.3	22	29.6	
Age in Years							
22–39 years	18	32.0	22	33.1	20	34.9	***
40–49 years	16	16.3	41	47.6	25	36.1	
50–64 years	44	13.8	145	61.6	54	24.6	
65 and older	21	14.0	99	69.5	22	16.4	
Marital Status							
Married	37	13.0	157	72.2	32	14.8	***
Widow	9	11.0	44	61.5	16	27.5	
Separated/Divorced	32	22.6	75	46.8	37	30.5	
Never married	21	19.6	31	37.4	36	42.9	
Metro							
Metro	85	17.8	240	57.5	98	24.8	
Rural	14	10.8	67	61.7	23	27.5	
Education							
Less than High School	24	18.2	80	67.0	23	14.8	**
High School	29	22.3	76	58.1	20	19.6	
More than High School	25	11.7	97	58.3	46	30.0	

Variable	No Antidepressants or Psychotherapy		Antidepressants Only		Combination Therapy		sig
	N	Wt. (%)	N	Wt. (%)	N	Wt. (%)	
Employment Status							
Employed	32	19.6	78	55.1	25	25.2	
Not Employed	67	15.0	229	59.7	96	25.3	
Poverty Status							
Poor	56	17.8	154	54.8	77	27.4	
Not Poor	43	15.1	153	61.4	44	23.5	
Insurance Status							
Private	36	14.3	133	59.5	42	26.2	***
Public	39	13.8	149	59.2	73	27.0	
Uninsured	24	38.7	25	48.5	6	12.8	
Usual Source of Care							
Yes	81	14.6	286	60.3	108	25.0	**
No	17	31.5	21	40.1	13	28.4	
Perceived Physical Health Status							
Excellent/very good	18	20.6	48	58.8	16	20.5	
Good	26	15.2	85	54.0	34	30.8	
Fair/poor	55	15.5	174	60.6	71	23.9	
Perceived Mental Health Status							
Excellent/very good	25	17.1	81	65.7	16	17.2	***
Good	25	11.4	132	71.2	28	17.5	
Fair/poor	49	20.5	94	41.7	77	37.8	
Anxiety							
Yes	22	9.1	97	48.5	73	42.3	***
No	77	20.8	210	64.4	48	14.7	
Body Mass Index							
Underweight/normal	26	17.6	70	59.9	25	22.4	
Overweight	22	12.5	84	62.2	36	25.3	
Obese	50	18.2	150	54.5	60	27.3	
Smoking Status							
Current smoker	40	14.2	125	53.5	62	32.3	*

Curr Med Res Opin. Author manuscript; available in PMC 2018 February 01.

Variable	No Antidepressants or Psychotherapy		Antidepressants Only		Combination Therapy		sig
	N	Wt. (%)	N	Wt. (%)	N	Wt. (%)	
Other	53	16.9	171	62.3	56	20.8	
Physical Activity							
3 times per week	25	13.4	76	55.4	32	31.2	
No exercise	74	17.4	231	59.4	89	23.2	
Number of Chronic Conditions							
0	16	24.6	22	43.5	14	31.9	*
1–3	61	16.6	180	57.6	70	25.7	
4 or more	22	12.3	105	66.0	37	21.7	

Note: Based on 527 adults, aged 21 years older with self-reported Chronic Obstructive Pulmonary Disease and depression who were alive during the calendar year (2010 and 2012). Missing categories for education, usual source of care, smoking status, body mass index and physical activity are not displayed. Asterisks represent significant group differences by depression treatment categories based on chi-square tests.

COPD: Chronic Obstructive Pulmonary Disease; Sig: Significance; Wt: Weighted;

*** $p < .001$;

** $.001 \leq p < .01$;

* $.01 \leq p < .05$.

Table 3

Adjusted Odds Ratios and 95% Confidence Intervals of Independent Variables from Multinomial Logistic Regression on Depression Treatment Adults with COPD and Depression
Medical Expenditure Panel Survey, 2010 and 2012

Variable	Antidepressants only			Combination Therapy		
	AOR	95% CI	Sig	AOR	95% CI	Sig
Sex						
Female	1.89	[1.02, 3.55]	*	2.13	[0.87, 5.22]	
Male (Ref)						
Race						
White (Ref)						
African American	0.99	[0.53, 1.84]		1.61	[0.90, 2.86]	
Other	0.33	[0.17, 0.65]	**	0.66	[0.26, 1.68]	
Age in Years						
22–39 years						
40–49 years	2.32	[0.93, 5.82]		1.73	[0.60, 5.03]	
50–64 years	3.47	[1.46, 8.22]	**	2.20	[0.89, 5.44]	
65 and older	3.69	[1.62, 8.41]	**	2.94	[1.05, 8.22]	*
Marital Status						
Married (Ref)						
Widow	0.69	[0.24, 1.99]		1.75	[0.57, 5.42]	
Separated/Divorced	0.36	[0.18, 0.70]	**	1.01	[0.43, 2.36]	
Never married	0.56	[0.21, 1.52]		3.17	[1.18, 8.56]	*
Metro						
Metro (Ref)						
Rural	1.29	[0.71, 2.33]		2.02	[0.75, 5.42]	
Poverty Status						
Not Poor (Ref)						
Poor	1.12	[0.62, 2.03]		0.89	[0.44, 1.78]	
Insurance Status						
Private (Ref)						

Variable	Antidepressants only			Combination Therapy		
	AOR	95% CI	Sig	AOR	95% CI	Sig
Public	0.95	[0.48, 1.89]		0.82	[0.38, 1.78]	
Uninsured	0.45	[0.18, 1.12]		0.21	[0.05, 0.86]	*
Usual Source of Care						
No (Ref)						
Yes	1.99	[0.95, 4.18]		1.91	[0.85, 4.31]	
Perceived Physical Health Status						
Excellent/very good (Ref)						
Good	1.26	[0.54, 2.93]		1.68	[0.57, 4.92]	
Fair/poor	3.32	[1.29, 8.56]	*	1.52	[0.43, 5.36]	
Perceived Mental Health Status						
Excellent/very good (Ref)						
Good	1.27	[0.63, 2.59]		1.07	[0.45, 2.53]	
Fair/poor	0.36	[0.18, 0.75]	**	1.73	[0.71, 4.21]	
Anxiety						
No (Ref)						
Yes	1.94	[1.09, 3.46]	*	6.01	[3.11, 11.61]	***
Body Mass Index						
Underweight/Normal	1.85	[0.85, 4.00]		2.08	[0.76, 5.73]	
Overweight	0.93	[0.46, 1.91]		1.41	[0.65, 3.05]	
Obese (Ref)						
Smoking Status						
Current Smoker	1.79	[0.85, 3.75]		2.29	[1.05, 4.98]	*
Other (Ref)						
Physical Activity						
3 times per week (Ref)						
No exercise	0.54	[0.27, 1.09]		0.33	[0.16, 0.67]	**
Number of Chronic Conditions						
0 (Ref)						
1–3	1.32	[0.63, 2.77]		0.96	[0.36, 2.56]	
4 or more	1.52	[0.56, 4.13]		0.87	[0.27, 2.80]	

Curr Med Res Opin. Author manuscript; available in PMC 2018 February 01.

Note: Based on 527 adults, aged 21 years older with self-reported Chronic Obstructive Pulmonary Disease and Depression who were alive during the calendar year (2010 and 2012). Asterisks represent significant group differences in type of treatment compared to the reference group. The reference group for the dependent variable in the multinomial logistic regression was “No Antidepressants and No Psychotherapy”.

AOR: Adjusted odds ratio; COPD: Chronic Obstructive Pulmonary Disease; CI: Confidence Interval; Ref: Reference Group; Sig: significance.

*** $p < .001$;

** $.001 \leq p < .01$;

* $.01 \leq p < .05$.