Final Report

Medicare Research and Demonstration (MRAD) Contract

Task Order Number 1

Activity 1

Monitoring Chronic Disease Care and Outcomes among Elderly Medicare Beneficiaries with Multiple Chronic Diseases

Submitted by

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Executive Summary

Introduction

Wolff, et al. have pointed out that in 1999, 82% of elderly Americans had at least one chronic disease, 65% had 2 or more, 43% had 3 or more, and 24% had 4 or more. This situation has lead researchers to create various classification schemes to categorize co-morbid conditions using Medicare and other administrative data, as well as survey information. These classifications have been used to understand the impact of multiple acute and chronic conditions on various health services and health outcomes among the elderly. However, only a few researchers such as Bertoni, et al. (2004) and Foley, et al. (2005) have examined the impact of having specific chronic diseases, such as diabetes and congestive heart failure (Bertoni) or diabetes and chronic kidney disease (Foley), on subsequent mortality and certain clinical outcomes. Our study reports the rates of appropriate/recommended care for diabetes, and Medicare reimbursed preventive services among elderly Medicare beneficiaries with one, two or three specific chronic diseases: diabetes, diabetes + depression, diabetes + chronic obstructive pulmonary disease (COPD), or diabetes + depression + COPD.

Methods

The data sources for this study were the enhanced 5% Medicare enrollment, claims and summary files prepared by the CMS Chronic Condition Warehouse (CCW) at the Iowa Foundation for Medical Care (IFMC) for 2001 through 2004, and the U.S. Census Bureau SF3 file for 2000. Cohorts of beneficiaries having diabetes, COPD and major depression as of 12/31/02 were requested from the CCW database. The algorithms used to identify persons with these diseases are described in the CCW Manual at http://www.ccwdata.org/downloads/CCW%20User%20Manual.pdf . People with diabetes were identified using the files from 2001 and 2002. The 2002 files were used to identify those with COPD or depression. In addition, the CCW chronic condition algorithms exclude beneficiaries (and their associated claims) who were in managed care or who did not have continuous Part A and Part B coverage during 2001 or 2002. Beneficiaries with ESRD, who were less than 67 years of age (diabetes) or less than 66 years of age (COPD and depression), or who were not alive as of 12/31/2002 were excluded by the CCW.

We then excluded beneficiaries (n=7,863) who were not residents of the 50 United States or the District of Columbia in 2002 and any beneficiaries who were < 67 years of age. This resulted in 233,515, 112,452 and 96,897 eligible persons with diabetes, COPD and major depression, respectively, who were alive as of 12/31/02.

We categorized beneficiaries into study cohorts defined as persons having

- diabetes only (n=184,941),
- diabetes plus COPD (n=23,793),
- diabetes plus major depression (n=19,111),
- diabetes plus COPD plus major depression (n=5,670),
- COPD only (n=59,158), and
- Major depression only (n=70,031).

The study outcome measures included three diabetes care measures that can be tracked in the administrative data: serum hemoglobin A1c (HbA1c) and lipid (LDL-C) testing, as well as eye examination, and three preventive care measures that are recommended for all elderly beneficiaries (or one gender): influenza immunization, mammography and screening prostate specific antigen (PSA) testing. Outcomes were measured in 2003 and 2004.

The following covariates that could influence the use of diabetes care or prevention services that could be obtained from the Medicare data or the Census SF3 file were used: age, sex, race/ethnicity, enrollment in a state administered Medicaid program, median income of the zip code of residence, Charlson co-morbidity score, hospitalization in 2001 or 2002, months alive in 2003 and 2004, U.S. Census Region of residence, rural residence, number of physician office visits in 2003 or 2004, visiting one of the following specialists in 2003 or 2004 (endocrinologist, obstetrician/gynecologist, psychiatrist, pulmonologist or urologist) and number of diabetes care services received in 2003 or 2004.

Rates of service use for each of the six outcome measures were calculated based on person-years. Both crude and age-adjusted rates were computed. Rates were age adjusted using the cohort of beneficiaries with diabetes only in 2002 as the standard population.

Rates of mammography were calculated for women only. Rates of PSA testing were calculated for men only. For these outcomes, we excluded beneficiaries with diagnoses indicating previous breast or prostate cancer, also.

To compare the characteristics of the disease cohorts, we used chi square tests for the categorical variables and t-tests for the continuous variables. We tested each pair of disease cohorts for the distribution of values for each of the covariates.

To compare rates of service use, both bivariate and multivariate regression analyses were performed. Chi square tests were used to compare rates of service use between cohorts at every level for each covariate.

Multivariate logistic regression analyses were carried out for each service with the disease cohort as our independent variable of primary interest. Thus, we could examine the effect of adding additional disease burden on the rate of receipt diabetes care and preventive care services. The multivariate regression also allowed us to examine the impact of the covariates on the receipt of services while simultaneously adjusting for the others. We separated the covariates into three groups as follows:

- Personal characteristics, including socio-demographic variables – age-group, gender, race/ethnicity, in a Medicaid administered program, and income
- Health status – Charlson score, hospitalization history, and months alive
- Health services – region of residence, urban/rural residence, number of physician office visits, and visited an endocrinologist, OB/GYN, psychiatrist, or pulmonologist.

An initial model used only the personal characteristics covariates. The model was re-run adding the health status variables, followed by the full model, which added the health service-related variables.

Differences between groups were judged statistically significant if the 95% confidence interval (CI) did not include 1.00. All statistical analyses were performed using SAS 9.1 for Windows, SAS Institute Inc., Cary, NC, 2006.

Results

Significant differences existed in the baseline characteristics between the cohort with diabetes only, and those with diabetes + COPD or depression or both COPD and depression for almost all of the patient and health service characteristics we measured. Those with additional diseases were older, and were more likely to be white, be in a state Medicaid administered program, have higher Charlson co-morbidity scores, have more physician office visits, have been previously hospitalized, and live fewer months in 2003 and 2004.

The results for HbA1c testing in 2003 are presented below as an example of what was found in the analysis. The results for the other diabetes care and prevention services, as well as for 2004 are presented in the full text and the Appendix.

The age-adjusted rate of HbA1c testing in 2003 was the highest among persons with diabetes only (72.9 per 100); 20.6% greater than for the cohort with all three diseases, which had the lowest rate of HbA1c testing (60.5 per 100).

The testing rate among beneficiaries with diabetes + COPD was 65.3 per 100, 10.4% lower than that of the cohort with diabetes only. Among those with all three diseases, the age-adjusted rate was 14.0% lower than in the cohort with diabetes + depression. This suggests that having COPD has a greater impact on those who have diabetes + depression than those with only diabetes only.

The impact of having depression showed the same pattern on the use of HbA1c testing. The age-adjusted rate for people with diabetes + depression was 70.4 per 100; 3.4% lower than that for those with diabetes only, and the rate among persons with all three diseases was lower by 7.5%, compared with rate among those with diabetes + COPD.

Comparing the effect of COPD with the effect of depression, we found that the impact of having COPD among those who had either diabetes only or the two diseases, diabetes + depression, was approximately two to three times greater than the impact of having depression among those who had either diabetes only or the two diseases, diabetes + COPD (10.4% vs. 3.4% for those with diabetes only, and 14.0% vs. 7.5% for those with the two other diseases).

All of the differences in the rates across the total population of each cohort were statistically significant ($p < 0.05$). Significant differences between the cohorts were also found for almost all of the subgroups of the patient characteristics, health status and health service use. Of the 252 possible pair-wise comparisons between the sub-groups of the four cohorts, only 17 were found not to be significantly different.

Examining differences within cohorts, those who were older, were a member of a minority race/ethnicity group, or were in a Medicaid administered program had lower rates of testing. There was no difference between men and women or between those living in rural versus non-rural areas. Lower rates were found with increasing Charlson scores. Having been hospitalized in prior years was also negatively related to the rate of HbA1c testing. Increasing numbers of office visits resulted in higher rates of testing. Visiting an endocrinologist in 2003 increased the rates by 27% to 32%, depending on the cohort. Visiting a pulmonologist in 2003 was associated with lower rates of HbA1c testing only in the cohort with all three diseases. Diabetics with depression who visited a psychiatrist had lower rates of testing compared with those who did not.

In general, the results of the regression models were consistent with the findings of the bivariate analysis described above. The full model confirmed that the cohort with diabetes + COPD had a significantly lower probability of having an HbA1c test in 2003 compared to the diabetes only cohort: adjusted relative odds ratio = 0.76 (95% CI = 0.73-0.78) The model also confirmed that the cohort with all three diseases had a significantly lower probability of having an HbA1c test in 2003 compared to the diabetes only cohort: adjusted relative odds ratio = 0.70 (95% CI = 0.66-0.75) However, the regression results showed that the group with diabetes + depression did not have a lower rate of HbA1c testing that the group with diabetes only: adjusted relative odds ratio = 0.99 (95% CI = 0.96-1.03).

Regarding other covariates, the multivariate model showed that visiting an endocrinologist tripled the odds of receiving an HbA1c test, and visits to other specialists were associated with decreased testing. The negative impact of an increasing Charlson score and increasing age was also confirmed, as was the positive impact of increasing number of physician visits and of being of white race. Contrary to the age-adjusted rates, the full multivariate model results showed that being female was positively associated with HbA1c testing (OR=1.09, 95% CI = 1.07-1.11).

There was little change in the relative odds of having an HbA1c test compared with the age-adjusted odds when personal characteristics were added to the model. A relatively large increase in the relative odds occurred when health status variables were added. Adding the health service use variables after adding personal characteristics and health status variables had a modest additional effect.

Discussion

The most consistent result was the association between increasing from diabetes only to diabetes plus the two other diseases and significantly lower age-adjusted rates of health service use. These results were confirmed in the full multiple regression model results. For the most important indicator of good diabetes care, annual HbA1c testing, there was an important difference between those with diabetes only and those with all three diseases. In 2003, the rate of HbA1c testing for the cohort with all 3 diseases was 17.0% lower than for the cohort with diabetes only. However, the biggest differences were seen for the two cancer screening activities. In 2003, the rate of PSA testing was 30% lower in the all 3 disease cohort compared to the diabetes only cohort. The rate for mammography was 42.5% lower for 2003/2004. Interestingly, and somewhat expectedly, the rates of influenza immunization were slightly and statistically higher in the cohort with diabetes + COPD (55.4 per 100 versus 54.7 per 100 in 2003), although this difference was not very great (< 2%).

The fully adjusted rates of diabetes care measures were consistently lower in one of the groups with two diseases, those with diabetes + COPD. However, in the other group with two diseases, diabetes + depression, the rates were lower only for lipid testing.

Likewise, the answer to the question whether the association of COPD with the use of recommended health services was similar in magnitude to the association with depression depended on the outcome measure used. Based on the fully adjusted model results, the relative odds comparing those with diabetes + COPD to those with diabetes only were lower for HbA1c testing, eye examination and mammography than the relative odds comparing those with diabetes + depression to those with diabetes only. They were similar for the other three measures.

In summary, the variability in the results indicates the importance of continuing to study the impact of individual chronic diseases as they act alone or in combination with other chronic diseases. While we showed that having the three chronic diseases we studied almost always had the greatest negative association with the receipt of recommended health services compared with have one or two diseases, the direction and the magnitude was not always consistent.

Introduction

Chronic diseases in the elderly Medicare population

The epidemiologic transition that occurred in the middle of the past century in the United States changed the focus of American medicine and healthcare from infectious to chronic diseases. Improved lifestyle and improved care of acute and chronic illnesses has lead to an increased life expectancy at birth and at age 65. In addition, the cohort of "baby-boomers" is turning 65 which will exacerbate the healthcare needs by the elderly. Thus, the need for appropriate, high-quality and cost-effective healthcare for the elderly served by the Medicare program. Concerns about adequately meeting these needs have been expressed in several important publications. Perhaps the most notable is the Institute of Medicine's (IOM) report Crossing the Quality Chasm: A New Health System for the 21st Century which highlighted the needs of persons with chronic diseases, particularly those with more than one. The preferred health care situation is that each person has a medical home with a provider who has primary responsibility for the person and who coordinates the care received while promoting a healthy lifestyle and the use of appropriate preventive services. However, this is frequently not true. Also, evidence indicates that the care received by Medicare beneficiaries with chronic diseases does not always meet published guidelines or standards. At particular risk are the almost 2/3rds of elderly beneficiaries with multiple chronic diseases, the focus of this study. However, in fairness to many, it also true that there is evidence that the adherence to guidelines is improving (Jencks, et al., 2003; U. S. Renal Data System, 2005; McBean, et al., 2005). However, if we are to achieve the Healthy People 2010 goal of improved health and healthcare, then the treatment received by Medicare beneficiaries and outcomes of this care need to be continuously monitored. The purpose of Activity 1 reported in this document is to examine treatment received. Activity 2, to be reported on later, will focus on the outcomes of care.

The health and cost implications of having more than one chronic disease have been discussed from several perspectives (Wolff, et al., 2002; Hwang, et al., 2001; Ray, et al., 2000; Yu, et al., 2003; Foley, et al., 2004). As a point of departure, Wolff, et al. pointed out that in 1999, 82% of elderly Americans had at least one chronic disease, 65% had 2 or more, 43% had 3 or more, and 24% had 4 or more. These authors, as well as others, have generally used different taxonomies and methods to categorize and count chronic diseases. For example, Woolf, et al., used broad categories of disease, namely 16 of the DRG Major Diagnostic Categories (MDCs). Elixhauser, et al. (1998) identified 259 mutually exclusive disease categories based on ICD-9-CM diagnosis codes which were then collapsed into 30 groups. Ray, et al. and Yu, et al. used ICD-9-CM codes also to identify 25 chronic and acute diseases, and Hwang, et al. used self-reported information from the Medical Expenditure Panel Survey (MEPS) and had clinicians categorize them into 177 chronic conditions in adults.

In most of these classification schemes that rely on administrative data, the occurrence of one hospital claim with the appropriate diagnosis code, or of only one claim in either an institutional or a non-institutional data file will result in designating the person as having a disease or to assigning them to a certain group of diseases. This is particularly true if they are studying several chronic diseases in which case they will use just one diagnosis on just one claim as sufficient evidence for its presence. Elixhauser, et al., Ray, et al., Yu, et al., Hwang, et al. used one claim with a diagnosis, as adequate evidence. Ray, et al. state, “for most patients a single hospital or outpatient diagnosis was sufficient to assign the condition to a patient”.

Other researchers have used these schemes to help understand and/or explain the use of health services, the impact of certain interventions, and outcomes of care among the elderly. One distracting aspect of this work is that the authors will go to great lengths to develop a case-definition and/or an algorithm to define and find persons with the disease of primary interest or the treatment group, but they will be much less precise in their approach to identifying co-existing diseases (co-morbidities). This may be appropriate when comparing the impact of two different surgical interventions, but it is not the best method for determining the impact of co-existing, important chronic diseases. It is well known that all diagnoses, for example hypertension, are not coded for every hospitalization. Also, among those with self-reported diabetes, over a two-year period only 29% had a diagnosis of diabetes in a Medicare hospitalization claim record (Hebert, et al., 1999). An accurate assessment of the impact of multiple chronic diseases requires that the same rigor be applied to identifying each of the important chronic diseases a person may have. This possibility exists using the special features of the Medicare Modernization Act Section 723 Chronic Conditions Warehouse (CCW) data.

Two notable exceptions to the general approach described above are the studies of Bertoni, et al. (2004) and Foley, et al. (2005). In both studies two chronic diseases, diabetes and one other, were identified using more sophisticated algorithms such as those used in creating the Section 723 CCW databases, and beneficiaries were followed to look at clinical outcomes: the occurrence of mortality, the development of additional diseases, or kidney replacement. Each study included patients with diabetes; one included those who also had congestive heart failure (CHF) (Bertoni, et al.) and the other those with chronic kidney disease (CKD) (Foley, et al). Of interest to this Task Order, and not surprising, is that those with diabetes who had one of these other chronic diseases were at markedly increased risks of dying or of developing one of the other clinical endpoints they measured. These authors did not look at the use of recommended diabetes care or prevention services, which is the goal of Activity 1.

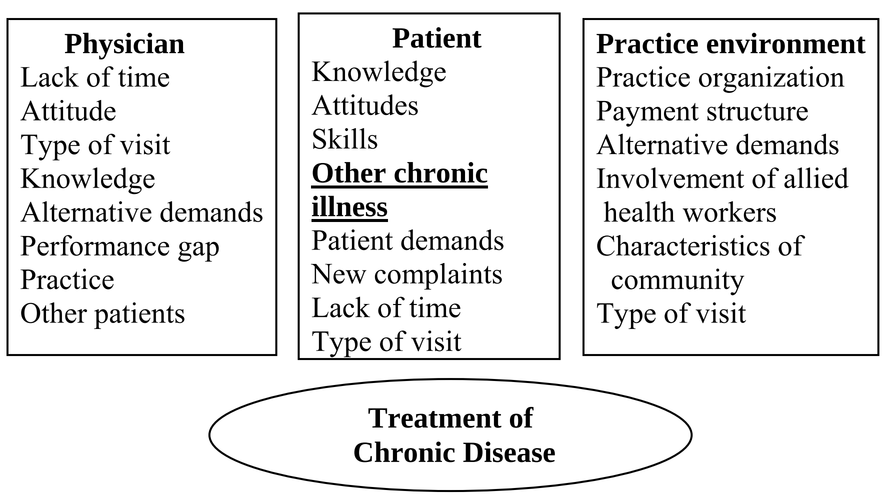
Conceptual framework

Almost any study of the use of health services, particularly preventive services and pharmaceuticals by persons with chronic diseases, can find its theoretical basis in the Health Beliefs Model (HBM) first developed by Hochbaum to describe the use of tuberculosis screening services (Rosenstock, 1974). The HBM has been used by many others to study the use of health services (Wdowik, et al, 2001; Yarbrough and Branden, 2001, Green, 2000). According to the model, in order to adopt or accept an intervention or drug, an individual must feel susceptible to the disease, believe that the disease would have a serious impact on him/her, and judge that the health service or treatment would be beneficial to undertake given the potential and real barriers to action. In addition, ‘cues to action’ may be required for the behavior to occur. Green and Kreuter (1999), working with other colleagues, developed the Precede-Proceed model for use by health educators and clinicians that moves beyond the individual to include a broader array of health system and community determinants that they organized as predisposing, enabling and reinforcing factors. Predisposing factors include patient demographics, patient and provider knowledge, attitudes and beliefs about a particular service. Enabling factors include policies such as the payment by Medicare for preventive and diabetes care services, and not requiring a co-payment for influenza immunization which is recommended for all persons with chronic diseases. Reinforcing factors include positive feedback for the adoption of prevention and healthy behaviors, as well as the reimbursement of physicians and other providers, again which can be related to Medicare policies. Almost never mentioned in the application of these models is the role of competing influences that exist for persons with more than one disease.

Thus, a model that could be seen to have more direct applicability to our proposed analyses is the competing demands model of Jaen, et al. (1994). See Figure 1, below. Although initially developed to explain the use of clinical preventive services in a family practice setting it is equally applicable to the use of services by persons with one or more chronic diseases. Arguments and data have been published to support the greater or lesser use of health services among persons with specific chronic conditions.

Feinstein (1970) postulated that persons with one or more chronic diseases could receive more care and screening because when they are seen for the treatment for one disease they could be screened, or immunized or treated for another disease as part of a complete visit. Patients with multiple chronic diseases also would likely be seen more frequently, enhancing the likelihood they would be screened, immunized or treated. Because they have established a 'medical relationship', they are, again, more likely to receive needed care more than the person who has no relationship. Grady, et al. (1992) adds that physician encouragement is a very important factor in the medical relationship regarding the use of screening mammography, for example. In their study, physician encouragement was more important than health status, health care utilization, attitudes, and sociodemographic characteristics. In support of Feinstein's position, Chao, et al. (1987) reported that women with diagnosed chronic diseases had increased rates of

Figure 1. Competing Demands Model (Jaen, et al., 1994)



mammography, but they felt that it was 'likely for the monitoring of disease progression or recurrence rather than' for screening. Bostick, et al. (1994) reported that having a 'chronic monitorable condition' (diabetes, hypertension, elevated cholesterol, prior myocardial infarction or stroke, or oral contraceptives or hormone replacement therapy) increased the use of rectal exams, fecal occult blood testing, sigmoidoscopy, and mammography. Earle, et al. (2003)

reported that Medicare beneficiaries who were breast cancer survivors were more likely to receive preventive services (influenza vaccination, lipid testing, cervical and colon screening and bone densitometry) than matched controls.

On the other hand, Jaen and colleagues (1994) argue that 'competing demands' faced by the clinicians during a patient visit are a barrier to the provision of clinical preventive services. Similarly, patients face competing demands, including financial demands, when managing more than one chronic illness. Supporting evidence for this position is seen in several studies. Fontana, et al. (1997) followed persons with self-reported diabetes, hypertension and/or heart disease for three years and found a reduced odds ratios for sigmoidoscopy, FOBT, mammography, or Pap smear in people in the chronic disease groups. Keife, et al. (1998) used the Charlson Co-morbidity Index (Charlson, et al., 1987) to measure the severity of chronic disease on breast and cervical cancer screening. They reported a 17% decrease in the likelihood of mammography for every one-unit increase in the index. When they looked at specific co-morbidities, only hypertension was associated with an increase in screening (Pap smear). Chronic stable angina, rheumatoid arthritis, congestive heart failure and myocardial infarction significantly reduced screening. They also pointed out that some large negative effects of certain chronic conditions (up to 38%) lacked statistical significance because of small sample size. Sample size was not an issue for Redelmeier, et al. (1998) who used the Ontario Drug Benefit Program to identify persons 65 years of age an older with diabetes, pulmonary emphysema, or psychotic syndromes. They then assessed the likelihood of receiving drug therapy for a totally unrelated condition: estrogen replacement therapy for those with diabetes; lipid lowering medication for those with emphysema; and medications for arthritis among those with psychotic syndromes. They concluded that even in a situation where medications are available free of charge, 'unrelated disorders are undertreated'. More recently, reluctance to increase a patient's medication burden has been implicated as a critical factor that may prevent physicians from adding recommended therapies to already complex regimens, (Gurwitz, 2004; Tinetti, et al. 2004). Care for competing chronic diseases has also been cited as a barrier to implementing disease management protocols Masoudi, et al. (2003) and Stuart, et al. (2005) have seen reduced medication use in elderly Medicare beneficiaries as the number of chronic diseases increases in the MCBS population. Finally, the same Earle who published the increased health service use among breast cancer survivors subsequently reported decreased use of recommended care among elderly Medicare beneficiaries who were colon cancer survivors (Earle and Nevill, 2004).

The majority of the recent evidence, particularly that dealing with drugs, supports the hypothesis that the occurrence or presence of a second chronic disease in a person with diabetes will reduce the likelihood that the person will receive (or use) the clinical services or medications indicated for their diabetes care or the care of the other chronic disease(s). This relationship should be of major concern to the Medicare program because of the large percentage of beneficiaries with more than one chronic disease, described earlier. The impact of a second, third, etc. disease could, of course, vary by the competing disease. A disease that is perceived to be life threatening, such as congestive heart failure, may have a different effect than one which is not life threatening, such as depression or glaucoma.

In summary, the competing demands model reorganizes many of the elements of the HBM and Precede-Proceed models into a framework that is very applicable to the care of patients with more than one chronic disease. For our purposes, it highlights the concern that persons with more than one important chronic disease might not be receiving the recommended care they need, and that this will influence their health outcomes. We cannot know all of the components included in the model using the CCW data because we are limited to what is available in the CMS administrative and assessment data. However, the strengths of the data regarding the patient include an in-depth knowledge of the type of chronic illnesses the person has, the basic socio-demographic characteristics, and information on the providers of care.

Selection of the chronic diseases for this study

Diabetes is the primary chronic disease on which we focus in this Task Order. We recently have reported that diabetes affected 20% of the elderly Medicare population in 2001, an increase of 40% over 1994 (McBean, et al., 2004). Boyle, et al. (2001) estimate that the greatest increase in diabetes between 2000 and 2050 will be among the elderly; increasing from 252% to 537% depending on the age-sex stratum. It has also been estimated that persons with diabetes account for approximately one-third of Medicare expenditures among the elderly.

In addition to the obvious burden caused by diabetes, there were other reasons for including diabetes in the Task Order. (1) The algorithm used to identify persons with diabetes using administrative data has been validated (Hebert, et al., 1999; Wang, et al., 2005), and it is widely accepted. (2) There are well established national guidelines for the treatment of diabetes, and several of these can be monitored using CCW data. Depression and COPD were selected as the other two chronic conditions to study because they are not pathophysiologically related to diabetes. Thus, there is no *a priori* reason for either more or less care to be provided to beneficiaries with these additional chronic diseases.

Purpose

The purpose of Activity 1 was to analyze and report the rates of appropriate/recommended care for diabetes, and Medicare reimbursed preventive services among elderly Medicare beneficiaries with one, two or three specific chronic diseases: diabetes, diabetes + depression, diabetes + chronic obstructive pulmonary disease (COPD), or diabetes + depression + COPD.

Methods

Data Sources

The primary data sources for this study were Medicare claims, enrollment, and assessment data obtained from the CMS Chronic Condition Warehouse at the Iowa Foundation for Medical Care (IFMC). Specifically, we used the enhanced 5% Inpatient, Outpatient, Carrier, Home Health Agency (HHA), Skilled Nursing Facility (SNF), Durable Medical Equipment, Hospice, OASIS assessment, Beneficiary Eligibility Summary (BES), and Chronic Condition Summary files for years 2001 to 2004.

The CCW database was developed out of requirements of Section 723 of the Medicare Prescription Drug, Improvement, and Modernization Act of 2003. This specified that CMS make Medicare data available to researchers who are studying chronic diseases in the Medicare population. Algorithms for 21 chronic conditions were developed and cohorts of beneficiaries with these diseases were identified. The chronic diseases include acute myocardial infarction, Alzheimer's disease, chronic obstructive pulmonary disease (COPD), diabetes, hip fracture, stroke, breast, colorectal, lung, endometrial and prostate cancer, and major depression, among others. For 1999 to 2004, the CCW database population is based on the 5% national Medicare sample. The sample is "enhanced" because, unlike the CMS 5% national sample, any beneficiary who becomes part of the 5% sample because of the digits in their Medicare identification number (HIC), remains in the sample from that point forward regardless of subsequent HIC changes, if any. This is beneficial in following patients over time in longitudinal studies. More information about the CCW database can be found by following the link on the Research Data Assistance Center (ResDAC) website, http://www.resdac.umn.edu/CCW/data_available.asp .

Definition of Study Cohort

Cohorts of beneficiaries having diabetes, chronic obstructive pulmonary disease (COPD) and major depression were requested from the CCW database. The algorithms to identify diabetes, COPD and major depression are described below. They are also listed in the CCW Manual at http://www.ccwdata.org/downloads/CCW%20User%20Manual.pdf (link active as of 4/14/09).

Diabetes
A diagnosis of diabetes (any diagnosis on the claim) on at least one inpatient, SNF or HHA claim, or two Outpatient or Carrier* claims during a 2-year "look-back" period. The diagnoses on Outpatient or Carrier claims must be at least one day apart. The ICD-9 diagnoses used for diabetes are 250.00 to 250.93, 357.2, 362.01, 362.02, and 366.41. This algorithm has been validated to have a sensitivity of 90%, a specificity of 95% and a positive

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*Carrier claims refers to RIC "O" claims (not DMERC RIC "M" claims), and excludes any claims for which line item Berenson-Eggers Type of Service variable [BETOS] equals D1A, D1B, D1C, D1D, D1E, D1F, D1G, or O1A. The categories with D1 in the first two positions are DME categories. The O1A category includes ambulance services. The intent of the algorithm is to exclude claims where the services do not require a licensed health care professional.

predictive value of 82% for identifying elderly Medicare beneficiaries with diabetes (Wang, et al., 2005).

COPD
A diagnosis of COPD (any diagnosis on the claim) on at least one inpatient, SNF, HHA, or two Outpatient or Carrier claims during a 1-year "look-back" period. The diagnoses on Outpatient or Carrier claims must be at least one day apart. The ICD-9 diagnoses used for COPD are 491.0 to 491.9, 492.0, 492.8, 494.0, 494.1, and 496.

Major Depression
A diagnosis of major depression (any diagnosis on the claim) on at least one inpatient, SNF, HHA, Outpatient, or Carrier claim during a 1-year "look-back" period. The ICD-9 diagnoses used for major depression are 296.20 to 296.36, 298.0, 300.4, 309.1, and 311.

For this study, we requested that years 2001 and 2002 be used as the "look-back" period for diabetes, and 2002 be used as the look-back period for COPD and depression.

In addition, the CCW chronic condition algorithms exclude beneficiaries (and their associated claims) who were in managed care or who did not have continuous Part A and Part B coverage during the look-back period. We also requested that beneficiaries with ESRD, who were less than 67 years of age (diabetes) or less than 66 years of age (COPD and depression), or who were not alive as of 12/31/2002 be eliminated from the study cohort.

We excluded beneficiaries (n=7,863) who were not residents of the 50 United States or the District of Columbia in 2002, and also the remaining beneficiaries who were < 67 years of age. This resulted in 233,515, 112,452 and 96,897 eligible persons with diabetes, COPD and major depression, respectively, who were alive as of 12/31/02.

We categorized beneficiaries into study cohorts defined as persons having

- diabetes only (n=184,941),
- diabetes plus COPD (n=23,793),
- diabetes plus major depression (n=19,111), and
- diabetes plus COPD plus major depression (n=5,670).

In addition, there were 59,158 beneficiaries with COPD only and 70,031 beneficiaries with major depression only.

Definitions of Covariates

Socio-demographic, health status, and health services information available directly in the Medicare data or that can be derived from the Medicare data were used to help understand the uses of diabetes related services. To describe and compare the study cohorts and to adjust for differences between cohorts in the regression analyses, we used the following covariates.

Age
Age was calculated as of 1/1/03.

Gender
The gender recorded in the 2002 BES file was used.

Race/ethnicity
The CMS categories recorded in the 2002 BES file were used: 1 = White, 2 = Black, 4 = Asian, 5 = Hispanic. “Other” combines categories: 0 = Unknown, 3 = Other, 6 = North American Native.

In Medicaid administered program (yes or no)
The value of this variable was defined as “yes” if any of the 12 monthly state buy-in indicators in the 2002 BES file are “A”, “B”, or “C”. Buy-in values of “A”, “B”, or “C” indicate that the state paid the premiums for a beneficiary’s Part B coverage.

Median household income of zip code
The beneficiary’s zip code in the 2002 BES was matched against the 2000 U.S. Census Bureau’s SF3 file. The SF3 file contains the median household income for each zip code. When zip code level income was not available, the aggregated income at the county level was used.

Income was divided into three roughly equal categories, in terms of number of beneficiaries, of “<$34,000”, “$34,000-$45,000” and “>$45,000”.

Charlson score
To identify coexisting disease burden in addition to the three diseases being studied, we calculated the Charlson score (Deyo, et al., 1992) for each beneficiary using the diagnoses found in the 2001 and 2002 Inpatient, Outpatient and Carrier files. Because all persons with diabetes or COPD would have a Charlson score ≥ 1, and because the effect of these diseases was already included as the disease cohort variable, diabetes and COPD were excluded when calculating the Charlson scores. There is no contribution to the Charlson score for depression. Charlson scores were categorized as “0”, “1-2”, and “3+”.

Hospitalization history in 2001 or 2002 (yes or no)
Hospitalization history equals “yes” if the beneficiary had a claim record in the 2001 or 2002 Inpatient file.

Months alive in 2003 and 2004
The death dates in the 2003 and 2004 BES files were used to determine the months alive for each beneficiary in 2003 and 2004. This covariate was included to adjust for the differential mortality among the cohorts.

U.S. region of residence
The beneficiary’s state in the 2002 BES file was used to determine the U.S. region of residence as defined by the U.S. Census Bureau. The regions are:

- Northeast – CT, ME, MA, NH, RI, VT, NJ, NY, PA
- Midwest – IN, IL, MI, OH, WI, IA, KS, MN, MO, NE, ND, SD
- South - DE, DC, FL, GA, MD, NC, SC, VA, WV, AL, KY, MS, TN, AR, LA, OK, TX
- West – AZ, CO, ID, NM, MT, UT, NV, WY, AK, CA, HI, OR, WA

Rural/urban residence
To determine whether the beneficiary resided in a rural or an urban area, we matched the beneficiary's zip code found in the 2002 Beneficiary Summary file with the "rural – urban commuting area" (RUCA) codes developed by the WWAMI Rural Health Research Center at the University of Washington in collaboration with Health Resources and Service Administration's (HRSA) Office of Rural Health Policy (ORHP) and the Department of Agriculture's Economic Research Service (ERS). The RUCA codes are described at http://www.depts.washington.edu/uwruca/index.html (active as of 7/17/06). Of the many definitions of "rural" (Hart, et al., 2005), we chose Categorization D described at http://depts.washington.edu/uwruca/ruca1/use_healthcare.html in which urban is defined as "all places that have 30% or more of their workers going to a Census Bureau defined Urbanized area". For the relatively few cases where the RUCA zip code and the beneficiary zip code did not match, we matched the RUCA zip code with a numerically adjacent zip code.

119 out of approximately 376,000 beneficiaries could not be matched for income and/or rural/urban residence and were not included in the regression analyses.

Number of physician office visits
This count includes office visits to all physicians including visits to psychiatrists and ophthalmologists in the same year as the outcome measure (2003 or 2004). To count visits, we checked the Carrier line item file for line item services with BETOS codes of M1A (office visits – new) and M1B (office visits – established), and HCPCS of 90801 to 90815 for psychiatrists and 92002 to 92004 and 92012 to 92014 for ophthalmologists.

The number of visits were categorized as "<5", "5-9", "10-14" and "15+". We also calculated the mean number of visits per person, but we included the categorical classification in the regression analyses.

Visited a specialist
To determine whether or not a beneficiary visited one of the specialists below, the Carrier line item file for the year of the outcome measure was searched for BETOS codes equal to M1A, M1B, M2A, M2B, M2C, M3, M4A, M4B, M5A, M5B, M5C, M5D, or M6. These BETOS codes are for office, hospital, emergency room, home, nursing home, specialist and consultation visits.

Visited an Endocrinologist (yes or no)
The beneficiary was counted as having visited an endocrinologist if there was a line item service in the list of BETOS codes above and the HCFA specialty equaled "46".

Visited an OB/GYN visits (yes or no)
The beneficiary was counted as having visited an OB/GYN if there was a line item service in the list of BETOS codes above and the HCFA specialty equaled "16". Only visits by women were counted.

Visited a psychiatrist (yes or no)
The beneficiary was counted as having visited a psychiatrist if there was a line item service in the list of BETOS codes above and the HCFA specialty equaled “26”.

Visited a pulmonologist (yes or no)
The beneficiary was counted as having visited an endocrinologist if there was a line item service in the list of BETOS codes above and the HCFA specialty equaled “29”.

Number of diabetes care services received in 2003 or 2004
HbA1c tests, lipid tests and eye examination were the diabetes care services included in this covariate. Thus, the total score ranged from “0” to “3” with “0” meaning that the beneficiary received none of the three services during the year; “1” meaning that they received 1 of the services; “2” meaning that they received 2 of the services, and “3” meaning that they received all 3 of the services. The mean number of services was calculated for each person in 2003 and in 2004 and used in the analyses of the use of the three preventive services.

Definition of Outcome Measures

Diabetes care and preventive services were measured in 2003 and 2004 for the beneficiaries in the study cohorts defined as of 12/31/02. The “Results” section describes the findings for 2003 for all outcome measures except for mammogram which are presented for 2003/2004. The Appendix presents the findings for 2004, except for mammography.

Diabetes care
There is consensus in the form of published guidelines regarding appropriate care for persons with diabetes (Diabetes Quality Improvement Project, American Diabetes Association, Health Plan and Employer Data Information Set - HEDIS), and CMS has devoted significant energy and resources to encourage providers and beneficiaries to follow these guidelines. The three diabetes care measures that can be tracked in the administrative data are annual serum hemoglobin A1c (HbA1c) and lipid (LDL-C) testing, as well as annual eye examination.

Prevention services
In addition to the diabetes care measures, we calculated the use of the following preventive care measures that are recommended for all elderly beneficiaries (or one gender): influenza immunization, mammography and screening prostate specific antigen (PSA).

We searched the Medicare Carrier and Outpatient files for the following procedure and diagnosis codes indicating receipt of the services of interest. A beneficiary was counted as having had the service if any of the codes for that service occurred in the time period. In the Carrier file, denied services were excluded.

Hemoglobin A1c
HCPCS code 83036

Serum lipid
HCPCS codes 80061, 83716, and 83721

Eye Examination
HCPCS codes 67101, 67105, 67107, 67108, 67110, 67112, 67141, 67145, 67208, 67210, 67218, 67227, 67228, 92002, 92004, 92012, 92014, 92018, 92019, 92225, 92226, 92230, 92235, 92240, 92250, and 92260

Influenza vaccination
The HCPCS codes used to identify receipt of influenza vaccine were: 90724, 90658, 90659, G0008, and 90656. Rates are for the receipt of influenza vaccine during the period from September 1st to December 31st of the given year. The denominator for the rates was the number of person-years for those alive from September 1st to December 31st of the given year.

Mammogram (women only)
Only women were included in the rates and analyses of the receipt of mammogram testing. Also, beneficiaries with evidence of prior breast cancer were excluded. Prior breast cancer was determined by any ICD-9 diagnosis code of 174.xx in the Inpatient, Outpatient, Carrier, SNF, HHA, Hospice or DME claims during 2001 or 2002. The codes used to identify mammogram testing were: HCPCS 76090, 76091, 76092, G0202, G0203, G0204, G0205, G0206, G0207, G0236 or ICD-9 diagnosis V76.12 (line diagnosis in the Carrier file, or any diagnosis in the Outpatient file).

Prostate specific antigen (PSA) (men only)
Only men were included in the rates and analyses of PSA testing. Also, beneficiaries with evidence of prior prostate cancer were excluded. Prior prostate cancer was determined by any ICD-9 diagnosis code of 185, 233.4 or V10.46 in Inpatient, Outpatient, Carrier, SNF, HHA, Hospice or DME claims during 2001 or 2002. The codes used for PSA testing were: HCPCS G0103, 84153 or ICD-9 diagnosis code V76.44 (line diagnosis in the Carrier file, or any diagnosis in the Outpatient file

Analytical and Statistical Methods

Calculating rates of service use
Rates of service use for each of the six outcome measures were calculated based on person-years. Both crude and age-adjusted rates were computed. Rates were age adjusted using the cohort of beneficiaries with diabetes only in 2002 as the standard population.

Rates of mammography were calculated for women only. Rates of PSA testing were calculated for men only. For these outcomes, we modified the cohorts by excluding beneficiaries with diagnoses indicating previous breast or prostate cancer: female beneficiaries with ICD-9 diagnosis codes of 174 to 174.9 (breast cancer); male beneficiaries with ICD-9 diagnosis codes of 185, V10.46 and 233.4 (prostate cancer). This provides a clearer picture of rates of screening for these diseases.

Statistical analyses
To compare the composition of the disease cohorts, we used chi square tests for the categorical variables and t-tests for the continuous variables. We tested each pair of disease cohorts for the distribution of values for each of the covariates.

To compare rates of service use, both bivariate and multivariate regression analyses were performed. Chi square tests were used to compare rates of service use between cohorts at every level for each covariate.

Multivariate logistic regression analyses were carried out for each service with the disease cohort as our independent variable of primary interest. Thus, we could examine the effect of adding additional disease burden on the rate of receipt of diabetes care and of preventive care services. The multivariate regression also allowed us to examine the impact of the covariates on the receipt of services while simultaneously adjusting for the others. We separated the covariates into three groups as follows:

- Personal characteristics, including socio-demographic variables – age- group, gender, race/ethnicity, in a Medicaid administered program, and income
- Health status – Charlson score, hospitalization history, and months alive
- Health services – region of residence, urban/rural residence, number of physician office visits, and visited an endocrinologist, OB/GYN, psychiatrist, or pulmonologist.

An initial model used only the personal characteristics covariates. The model was re-run adding the health status variables, followed by the full model, which added the health service variables.

Differences between groups were judged statistically significant if the 95% confidence interval (CI) did not include 1.00. All statistical analyses were performed using SAS 9.1 for Windows, SAS Institute Inc., Cary, NC, 2006.

Results

As agreed with the Project Officer, the focus of Activity 1 is the presentation and comparison of the rates of health service use in 2003 for the four study cohorts. The one exception is mammography which is presented for the two years 2003 and 2004, combined, because most researchers present 2-year totals even though the Medicare recommends and reimburses for annual mammograms. The Appendix contains tables showing the rates of health service use for 2004 for the four study cohorts, as well as for the cohorts of beneficiaries with COPD only and with depression only.

Distribution of covariates

Table 1.1 contains the distributions of the baseline characteristics of the four study cohorts as of 1/1/03. The study cohorts are beneficiaries with diabetes only, diabetes + COPD, diabetes + depression, and all three diseases.

Table 1.2 contains the distributions of the health services used by the study cohorts in 2003 and 2004. Together these tables show all variables used in the analysis of the receipt of diabetic and preventive services in 2003 and 2004 for the four cohorts.

Significant differences existed between the cohort with diabetes only and those with diabetes + COPD, diabetes + depression, or all three diseases for almost all of the patient characteristics and health service use measurements we studied. Those with additional diseases were older, were more likely to be white, be in a state Medicaid administered program, have a higher Charlson co-morbidity score, have more physician office visits, have been previously hospitalized, and live fewer months in 2003. Persons with all three diseases were less likely to visit a psychiatrist in 2003 than those with diabetes + depression (18% versus 24%), and fewer persons with all three diseases visited a pulmonologist in 2003 compared with those with diabetes + COPD (20% versus 31%). The mean number of diabetes care services was greatest among those with diabetes only, and least among those with all three diseases.

Comparison of the distributions of the health service use covariates in 2004 with those in 2003 shows similar patterns in the two years.

The distributions of the covariates for cohorts with COPD only and depression only are also presented in the Appendix (Tables B.1.1 and B.1.2).

Age-adjusted rates[2]

HbA1c testing

The rates of HbA1c testing in 2003 for the four cohort groups are presented in Table 2.1. The age-adjusted rate of HbA1c testing was the highest among persons with diabetes

[2] All rates are based on person-years

only (72.9 per 100); 20.6% greater than for the cohort with all three diseases, which had the lowest rate of HbA1c testing (60.5 per 100).

The rate among beneficiaries with diabetes + COPD was 65.3 per 100, 10.4% lower than that of the cohort with diabetes only. Among those with all three diseases, the age-adjusted rate was 14.0% lower than in the cohort with diabetes + depression. This suggests that having COPD has a greater impact on those who have diabetes + depression than those with only diabetes only.

The impact of having depression showed the same pattern on the use of HbA1c testing. The age-adjusted rate for people with diabetes + depression was 70.4 per 100; 3.4% lower than that for those with diabetes only, and the rate among persons with all three diseases was lower by 7.5%, compared with rate among those with diabetes + COPD.

Comparing the effect of COPD with the effect of depression, we found that the impact of having COPD among those who had either diabetes only or the two diseases, diabetes + depression, was approximately two to three times greater than the impact of having depression among those who had either diabetes only or the two diseases, diabetes + COPD (10.4% vs. 3.4% for those with diabetes only, and 14.0% vs. 7.5% for those with the two other diseases studied).

All of the differences in the age-adjusted rates between the total population of each cohort were statistically significant ($p < 0.05$). Significant differences between the cohorts were also found for almost all of the subgroups of the patient characteristics, health status and health service use. Of the 252 possible pair-wise comparisons between the sub-groups of the four cohorts in Table 2.1, only 17 were found not to be significantly different.

Examining differences within cohorts, those who were older, were a member of a minority race/ethnicity group, or were in a Medicaid administered program had lower rates of testing. There was no difference between men and women or between those living in rural versus non-rural areas. Lower rates were found with increasing Charlson scores. Having been hospitalized in prior years was also negatively related to the rate of HbA1c testing. Increasing numbers of office visits resulted in higher rates of testing. Visiting an endocrinologist in 2003 increased the rates by 27% to 32%, depending on the cohort. Visiting a pulmonologist in 2003 was associated with lower rates of HbA1c testing only in the cohort with all three diseases. Diabetics with depression who visited a psychiatrist had lower rates of testing compared with those who did not.

The age-adjusted rates of HbA1c testing in 2004 are presented in the Appendix (Table A.2.1). The rates of testing HbA1c in 2004 are slightly greater than in 2003 for all cohorts, but the patterns of the differences in rates across the cohorts as well as across sub-groups within cohorts were the same as 2003.

Appendix Tables B.2.1_03 and B.2.1_04 contain the age-adjusted rates of HbA1c testing for the cohorts with COPD only and depression only for 2003 and 2004, respectively.

These tables reinforce the quality of the diabetes algorithm used by the Section 723 CCW. In 2003, only between 5 and 6 per 100 of the cohorts with COPD only and depression only had HbA1c tests. The rate increased to 8.1 per 100 in 2004 for both groups.

Lipid test

The rates of lipid testing in 2003 for the four cohort groups are shown in Table 2.2. The age-adjusted rate of lipid testing was the highest among persons with diabetes only (66.5 per 100); 35.8% greater than for the cohort with all three diseases, which had the lowest rate of lipid testing (49.0 per 100).

The rate among beneficiaries with diabetes + COPD was 59.8 per 100, 10.2% lower than that of the cohort with diabetes only. The rate among beneficiaries with all three diseases was 14.1% lower than among those with diabetes + depression.

The impact of having depression on lipid testing showed a similar pattern with HbA1c testing; the rate for people with diabetes + depression was 57.0 per 100, 14.3% lower than for those with diabetes only, and the rate among beneficiaries with all three diseases was 18% lower than the rate among those with diabetes + COPD.

However, a comparison between COPD and depression presents a different result from HbA1c testing where COPD was associated with a greater negative impact. For lipid testing, depression was associated with a greater negative impact. The rate among those with three diseases was 14.1% lower than the rate among those with diabetes and depression, but it was 18.0% lower among those with all three diseases compared with the rate among those with diabetes + COPD.

All of the differences in the age-adjusted lipid testing rates between the cohorts were statistically significant ($p < 0.05$), and significant differences were consistently found for almost all of the subgroups of covariates. Of the 252 possible pair-wise comparisons between the sub-groups of the four cohorts in Table 2.2, only 12 pairs were found not to be significantly different.

The pattern of the differences in the rates within cohorts was very close to that of HbA1c testing; those who were older, were a member of a minority race/ethnicity group, or were in a Medicaid administered program had lower rates of testing. Unlike HbA1c testing, those who lived in rural areas had lower rates of testing. Women tended to receive lipid tests less than men. Lower rates were found with increasing Charlson scores. Hospitalization history was negatively correlated with the use of lipid testing. Increasing numbers of office visits resulted in higher rates of testing. Visiting an endocrinologist in 2003 increased the rates of the receipt of lipid tests by 23% to 36%. Visiting a pulmonologist in 2003 was associated with lower rates of lipid testing in all the four cohorts. Diabetics with depression who visited a psychiatrist had lower rates of testing compared with those who did not.

The age-adjusted rates of lipid testing in 2004 are shown in the Appendix (Table A.2.2). The rates of testing lipid in 2004 were slightly greater than in 2003 for all the four cohorts, but the patterns of the differences in rates across the cohorts as well as across sub-groups within cohorts were the same as 2003.

Appendix Tables B.2.2_03 and B.2.2_04 present the age-adjusted rates of lipid testing for the cohorts with COPD only and depression only for 2003 and 2004, respectively.

Eye examination

Table 2.3 contains the rates of eye examination in 2003 for the four cohort groups. The cohort with diabetes only had the highest age-adjusted rate of eye examination (50.7 per 100); 13.9% greater than for the cohort with all three diseases (44.5 per 100).

The age-adjusted rate among beneficiaries with diabetes + COPD was 46.8 per 100; 7.6% lower than for the cohort with diabetes only. The rate was 8.2% lower among those with all three diseases than among people with the two diseases, diabetes + depression.

Having depression also decreased the probability of receiving an eye examination: the rate for people with diabetes + depression was 48.5 per 100; 4.3% lower than for those with diabetes only. The rate was 5.0% lower among those with all three diseases than among people with the two diseases, diabetes + COPD.

As with HbA1c testing there appears to be a greater impact of having COPD than depression among those with the two pairs of chronic diseases we studied. The rate among those with three diseases was lower than the rate among those with diabetes and depression (8.2%). It was 5.0% lower among those with all three diseases compared with the rate among those with diabetes + COPD.

All of the differences in the age-adjusted rates between the cohorts were statistically significant ($p < 0.05$), however, when the rates were compared for possible subgroups of covariates, 59 out of 252 pairs were found not to be significantly different. (See Table 2.3.)

Within cohorts, being in a Medicaid administered program or a resident of rural areas were negatively related to receiving eye exam. Higher rates were found with increasing numbers of office visits. Women were more likely to receive eye exams than men, and those who have been hospitalized had lower rates of examination.

The rate of eye examination was highest among whites than other race groups only in the cohort with diabetes only. Increasing Charlson scores resulted in lower rates in the cohorts with two conditions, diabetes + COPD or depression. Like other diabetic care measures, visiting an endocrinologist in 2003 increased the rates of the receipt of eye exams, by 28% to 37%.

The age-adjusted rates of eye exam in 2004 are shown in the Appendix (Table A.2.3). The rates of eye exams in 2004 were slightly higher than in 2003 for all four cohorts, but the patterns of the differences in rates across the cohorts as well as across sub-groups within cohorts were the same as 2003.

Appendix Tables B.2.3_03 and B.2.3_04 present the age-adjusted rates of eye exams for the cohorts with COPD only and depression only for 2003 and 2004, respectively.

Influenza vaccination

The rates of receiving influenza vaccination in 2003 are shown in Table 2.4. Unlike other measures, the age-adjusted influenza vaccination rate was the highest among persons with diabetes + COPD (55.4 per 100); slightly higher than beneficiaries with diabetes only (54.7 per 100); and 16.4% greater than for the cohort with all three diseases (47.6 per 100). While having COPD resulted in an increased probability of receiving flu vaccination compared to the probability among those who had diabetes only, among those with all three diseases the rate of 47.6 per 100 was significantly lower than the rate among those with diabetes + depression (51.4 per 100).

Having depression appears to reduce the use of flu vaccination. The rate for people with diabetes + depression was 51.4 per 100, 6.0% lower than for those with diabetes only. In addition, the rate among beneficiaries with all three diseases was lower by 14.1%, compared with those with diabetes + COPD.

Unlike HbA1c testing and eye examination, there appears to be a greater impact of having depression than COPD among those with the two pairs of chronic diseases we studied. The rate among those with three diseases was lower than the rate among those with diabetes + COPD (14.1%). It was only 7.4% lower among those with all three diseases compared with the rate among those with diabetes + depression.

All of the differences in the age-adjusted rates between the cohorts are statistically significant ($p < 0.05$), however, when the rates were compared for possible subgroups of covariates, 77 out of 252 pairs were found not to be significantly different. (See Table 2.4.)

Examining differences within cohorts, those who were a member of a minority race/ethnicity group, or were in a Medicaid administered program, or lived in rural areas had lower rates of flu vaccination. Women tended to receive flu vaccination less than men. Lower rates were found with increasing Charlson scores and having been hospitalized in prior years. Increasing numbers of office visits resulted in higher rates of testing. Unlike diabetic care measures, visiting an endocrinologist in 2003 decreased the probability of receiving flu vaccination, and visiting a pulmonologist in 2003 was associated with higher rates of vaccination in the cohorts with COPD. Diabetics with depression who visited a psychiatrist had lower rates of vaccination compared with those who did not, which is consistent with findings in the diabetic care measures.

The age-adjusted rates of flu vaccination in 2004 are shown in the Appendix (Table A.2.4). The flu vaccination rates in 2004 were lower than in 2003 for all the four cohorts. The patterns of the differences in rates across the cohorts as well as across sub-groups within cohorts were the same as 2003, except that people with diabetes + depression had similar rates of flu vaccination to the cohort with diabetes only (41.9 per 100 vs. 41.7 per 100), and higher rates were found among those who visited an endocrinologist in 2004.

Appendix Tables B.2.4_03 and B.2.4_04 present the age-adjusted rates of flu vaccination for the cohorts with COPD only and depression only for 2003 and 2004, respectively.

Mammogram screening in 2003 and 2004

Table 2.5 shows the rates of the use of mammogram among women in 2003-2004 for the four cohort groups. The age-adjusted rate of receiving a mammogram was the highest again among women with diabetes only (45.4 per 100); about 74% greater than the cohort with all three diseases (26.1 per 100).

The rate among beneficiaries with diabetes + COPD was 36.0 per 100, 20.7% lower than for the cohort with diabetes only. The rate among beneficiaries with all three diseases (26.1 per 100) was 29.8% lower than for the cohort with diabetes + depression. Thus, the impact of having COPD appears to be greater if a person has two diseases, diabetes + depression, than if a person has only one disease, diabetes only.

Having depression also decreased the probability of receiving mammogram: the rate for people with diabetes + depression was 37.2 per 100; 18.1% lower than for those with diabetes only. Also, the rate for people with all three diseases, 26.1 per 100 was 27.5% lower than for those with diabetes + COPD.

There appears to be a slightly greater impact of having COPD than depression among those with the two pairs of chronic diseases we studied. The rate among those with three diseases was 29.8% lower than the rate among those with diabetes + depression, whereas it was 27.5% lower among those with all three disease compared with the rate among those with diabetes + COPD.

The differences in the age-adjusted rates between the cohorts were generally statistically significant, except between people with diabetes + COPD and persons with diabetes + depression ($p < 0.05$). When the rates are compared for subgroups of covariates, most of the pair-wise comparisons showed significant difference in the rates; 33 out of 252 pairs were found not to be significantly different. (See Table 2.5.)

Within cohorts, those who were older, were a member of a minority race/ethnicity group, or were in a Medicaid administered program, or lived in rural areas had lower rates of the use of mammogram. Lower rates were found with increasing Charlson scores and having been hospitalized in prior years. Increasing numbers of office visits resulted in higher rates of receiving mammogram. Visiting an endocrinologist in 2003 increased the rates of the use of mammogram by 11% to 23%, and visiting an obstetrician/gynecologist in 2003 or 2004 doubled the rates of receiving mammogram. Diabetics with COPD who visited a pulmonologist in 2003 or 2004 had higher rates of receiving mammogram than those who did not see one. However, diabetics with depression who visited a psychiatrist had lower rates compared with those who did not.

Appendix Table B.2.5_03/04 presents the age-adjusted rates of receiving a mammogram for the cohorts, with diabetes only, with COPD only and depression only in 2003-2004.

Prostate specific antigen testing (PSA)

The rates of receiving PSA test among men in 2003 are shown in Table 2.6. The age-adjusted rate of using PSA was the highest again among people with diabetes only (42.0 per 100); 43.3% greater than for the cohort with all three diseases, which had the lowest rate (29.3 per 100).

The cohort with diabetes + COPD showed the second highest PSA testing rate (35.0 per 100), 16.7% lower than that of the cohort with diabetes only. Among those with all three diseases, the rate was 29.3 per 100, 13.1% lower than among those with diabetes + depression.

Having depression showed a similar pattern on the use of PSA as COPD. The rate for people with diabetes + depression was 33.7 per 100, 19.8% lower than for those with diabetes only, and the rate among beneficiaries with all three diseases was lower by 16.3%, compared with those with diabetes + COPD.

There appears to be a slighter greater impact of having depression than COPD among those with the two pairs of chronic diseases we studied. The rate among those with three diseases was 16.3% lower than the rate among those with diabetes + COPD, and it was 13.1% lower among those with all three disease compared with the rate among those with diabetes + depression.

The differences in the total age-adjusted rates between the cohorts were mostly statistically significant, except between the cohort with diabetes + COPD and diabetes + depression. When the rates are compared for possible subgroups of covariates, 84 out of 252 pairs were found not to be significantly different. (See Table 2.6.)

Examining differences within cohorts, those who were older, or were in a Medicaid administered program, or lived in rural areas had lower rates of PSA. Whites showed the highest rates of the receipt of PSA testing in the cohort with diabetes only and among people with diabetes + depression. Lower rates were found with increasing Charlson scores and having been hospitalized in prior years. Increasing numbers of office visits resulted in higher rates of testing. Visiting a urologist in 2003 almost doubled the use of PSA, and visiting an endocrinologist also increased the probability of receiving a PSA test. Visiting a pulmonologist in 2003 was associated with higher rates of PSA testing only in the cohort with diabetes + COPD, and diabetics with depression who visited a psychiatrist had lower rates of testing compared with those who did not.

The age-adjusted rates of the receipt of PSA in 2004 are shown in the Appendix (Table A.2.6). The PSA testing rates in 2004 were higher than in 2003 for all the four cohorts. The patterns of the differences in rates across the cohorts as well as across sub-groups within cohorts were the same as 2003.

Appendix Tables B.2.6_03 and B.2.6_04 present the age-adjusted rates of PSA for the cohorts with COPD only and depression only for 2003 and 2004, respectively.

Regression results using individual covariates

Multivariate logistic regressions were conducted to analyze the impact of having COPD or/and depression on the use of services while controlling for all other covariates, thus allowing us to better assess the impact of each covariate.

HbA1c test

Table 3a.DC contains the results from the regression analysis for the receipt of HbA1c testing in 2003. In general, the results of the regression models were consistent with the findings of the bivariate analysis described in the previous section. The model confirmed that the cohort with diabetes + COPD had a significantly lower probability of having an HbA1c test in 2003 compared to the diabetes only cohort: adjusted relative odds ratio = 0.76 (95% CI = 0.73-0.78) The model also confirmed that the cohort with all three diseases had a significantly lower probability of having an HbA1c test in 2003 compared to the diabetes only cohort: adjusted relative odds ratio = 0.70 (95% CI = 0.66-0.75) However, the regression results showed that the group with diabetes + depression did not have a lower rate of HbA1c testing that the group with diabetes only: adjusted relative odds ratio = 0.99 (95% CI = 0.96-1.03).

Regarding other covariates, visiting an endocrinologist tripled the odds of receiving an HbA1c test, and visits to other specialists were associated with decreased testing. The negative impact of an increasing Charlson score and increasing age was also confirmed, as was the positive impact of increasing number of physician visits and of being of white race. Interestingly, after the multivariate adjustments, being female was shown to be positively associated with HbA1c testing (OR=1.09, 95% CI = 1.07-1.11).

We also ran logistic regression to analyze the use of HbA1c testing in 2004 (See Appendix Table A.3a.DC), and we found very similar results to 2003.

Lipid test

Table 3a.DC also presents the odds ratios and 95% CIs of the multivariate regression for the use of lipid testing in 2003. Consistent with the finding in the bivariate analysis, the cohorts with diabetes + COPD, diabetes + depression, and with all three diseases had lower relative odds of having a lipid test in 2003 compared to the cohort with diabetes only: adjusted relative odds ratios of 0.81 (95% CI = 0.78 - 0.83) for those with diabetes and COPD, 0.80 (95% CI = 0.77 - 0.83); for those with diabetes and depression, and 0.66 (95% CI = 0.62 - 0.70) for those with all three diseases.

The results for the other covariates also confirmed the bivariate findings (Table 2.2). Visiting an endocrinologist and an obstetrician-gynecologist increased the odds of receiving a lipid test, however, visits to a pulmonologist or a psychiatrist were associated with decreased testing. A negative impact of increasing Charlson score and increasing age was also confirmed, as was the positive impact of increasing number of physician visits and residing in non-rural areas. Unlike HbA1c testing, people of Asian or Hispanic race were more likely to receive lipid tests than whites (OR = 1.22, 95% CI = 1.12 - 1.32 for Asians, and OR=1.18, 95% CI = 1.11 - 1.26 for Hispanics).

Logistic regression was also conducted to analyze the use of Lipid testing in 2004 (see the Appendix, Table A.3a.DC), and very similar results with the 2003 analysis were found.

Eye examination

The results from the regression for the receipt of an eye examination in 2003 are presented in Table 3a.DC, also. After controlling for other covariates, the difference between those with COPD + depression compared with those with diabetes only remained significant (OR=0.84, 95% CI=0.81 - 0.86); however, the difference between those with diabetes and depression and diabetes only was no longer significant (OR=0.97, 95% CI=0.94 - 1.00). Further, the odds ratio of receiving eye exams between people with diabetes only and people with all three conditions was 0.89 (CI=0.84 – 0.95), suggesting that the effect of having both COPD and depression along with diabetes was less than having COPD only (OR=0.89 vs. 0.84).

Turning to the results of the covariates, increasing age did not necessarily decrease the use of eye exams. People of age 75-79 had the highest odds of receiving eye exams. The odds among persons over age 79 was smaller compared with the group of age 75-79, but greater than those under age 75. For the race variable, while the bivariate analysis showed a mixed effect (Table 2.3), after adjusting for all control variables, being of white race resulted in a positive impact on eye exams.

Women were more likely to have eye exams than men. Interestingly, after adjusting for control variables, living in rural areas was shown to be positively associated with eye exams (OR=1.04, 95% CI = 1.02-1.06). Increasing Charlson score had a negative impact on the receipt of eye exams, and increasing number of physician visits was positively related to eye exams. Having been hospitalized in prior years was associated with decreased use of eye exams. Visiting an endocrinologist or an obstetrician-gynecologist increased the odds of receiving eye exams, however, visits to a pulmonologist showed a negative association with the use of eye exams.

The results for 2004 are presented in the Appendix (Table A.3b.3). The directions of the changes in odds ratios are similar to those of the 2003 analysis. However, in 2004, in the full model, the difference between those who had diabetes only and those with diabetes + depression was significant (adjusted O.R. = 0.95, 95% CI = 0.92 - 0.99), and the difference between those with diabetes and those with all three disease was not significant (adjusted O.R. = 0.94, 95% CI = 0.88 - 1.01)

Influenza vaccination

Table 3a.PRV presents the results from the regression analysis of receiving influenza vaccination in 2003. After controlling for other covariates, those who had diabetes + COPD had significantly higher rates of influenza vaccination than those with diabetes only. The odds ratio was positive and significant (OR= 1.09, 95% CI=1.06 - 1.13). However, the difference between the vaccination rate among those with diabetes + depression and those with diabetes only was no longer significant (OR= 1.04, 95% CI= 1.00 - 1.08) compared to the bivariate analysis. The relative odds indicated that the probability of getting vaccinated among people with diabetes only was similar to that among people with all three diseases (O.R. = 1.02, 95% CI= 0.95 - 1.09).

For other covariates, first we found that increasing age had a positive effect on the receipt of flu vaccination, after adjusting for all control variables; the odds was the highest among people age over 85 (OR=1.31, 95% CI=1.26 - 1.36), with persons of age 67-69 being a reference group. This pattern was unique for the flu vaccination measure, among the six outcome measures examined in this study.

Asians had the same level of flu vaccination use as whites (OR=1.07, 95% CI= 0.99 - 1.15), however, other race groups were much less likely to receive flu vaccination than whites (OR= 0.53, 95% CI= 0.52 - 0.55 for blacks, and OR=0.55, 95% CI=0.52 - 0.59 for Hispanics).

Women were slightly less likely to have flu vaccination than men. Being in a Medicaid-administered program, and having been hospitalized decreased the likelihood of receiving flu vaccination. As in other measures, increasing Charlson score had a negative impact on the receipt of flu vaccination, and increasing number of physician visits was positively related to getting a vaccination.

A negative effect of visiting an endocrinologist on the use of flu vaccination was confirmed, as was the positive effect of visiting an obstetrician/gynecologist. Visits to other specialists were associated with decreased receipt of flu vaccinations. Finally, the number of diabetic care services received in 2003 was positively related to the use of flu vaccination.

The results of logistic regression to analyze the use of flu vaccination in 2004 are presented in Appendix (Table A.3a.PRV). In general, the results of 2004 analysis were similar with 2003, however, the odds ratio comparing those with diabetes + depression with those who had diabetes only was positive and significant. There was no difference in the receipt of flu vaccination in 2004 between men and women, and living in a rural area was positively associated with receiving flu vaccination (OR=1.25, 95% CI=1.22 - 1.28)

Mammogram screening in 2003 and 2004

The results from the regression analysis for the use of mammogram among women in 2003/2004 are presented in Table 3a.PRV. The multiple regression analysis generally confirmed the findings in the bivariate analysis (Table 2.5). Compared to those with diabetes only, women with one or two of the additional chronic conditions we studied had significantly lower rates of mammogram testing in 2003 or 2004. Compared to those with diabetes only the adjusted relative odds ratios were 0.85 (95% CI = 0.80 - 0.89) for those with diabetes + COPD; 0.90 (95% CI = 0.86 - 0.95) for those with diabetes + depressions; and 0.71 (95% CI = 0.64 - 0.78) for those with all three diseases.

Regarding other covariates, the odds of receiving a mammogram markedly went down as age increased. Blacks were more likely to use mammogram service in 2003 or 2004 than whites (OR= 1.10, 95% CI= 1.05 - 1.15), and whites were more likely to use the service than all other races.

Consistent with the bivariate analysis, being in a Medicaid-program, having higher Charlson score, or having been hospitalized were negatively associated with mammogram tests, and the positive effect of increasing number of physician visits was confirmed. After the multivariate adjustments, there was no significant difference between residents in rural areas and their counterpart (OR=1.00, CI = 0.97-1.04).

Visiting an obstetrician-gynecologist almost quadrupled the odds of receiving a mammogram, and visits to other specialists were associated with decreased use of mammogram. As in flu vaccination, the number of diabetic services received in 2003 was positively related to the use of mammogram.

Prostate specific antigen testing

Table 3a.PRV presents the results from the regression analysis of receiving a PSA test among men in 2003. After controlling for other covariates, the difference between those with diabetes only and those with diabetes + COPD was negative and significant (OR= 0.94, 95% CI= 0.89 – 0.99); the difference between those with diabetes only and those with diabetes + depression was also negative and significant (OR= 0.85, 95% CI= 0.78 – 0.91). However, the difference of getting a PSA test between men with diabetes only and men with all three conditions was no longer significant (OR= 0.89 (95% CI= 0.78 - 1.01), perhaps due to the small sample size.

The regression results for other covariates generally confirmed the findings of the bivariate analysis (Table 2.6). The use of PSA decreased as age increased, and there was no significant difference between whites and Asians or Hispanics (OR = 0.97, 95% CI =

0.85 – 1.11 for Asians, and OR= 0.96, 95% CI = 0.85 – 1.07 for Hispanics). However, blacks were less likely to use PSA service than whites (OR= 0.92, 95% CI = 0.86 – 0.98).

As in other measures, being in a Medicaid-administered program, having a higher Charlson score, and having been hospitalized decreased the likelihood of receiving PSA. Those who had more physician visits in 2003 were more likely to have a PSA test. Like other preventive services, living in rural areas did not have any significant effect on the PSA use.

The odds of receiving PSA among those who visited a urologist was 3.7 times higher than that of those who did not, however, visits to other specialists were associated with the decreased use of PSA. The number of diabetic services received in 2003 showed a positive association with the use of PSA. This pattern is found in all preventive services used in the study.

In the analysis of the 2004 data (Appendix, Table A.3a.PRV), there was no difference in the rate of PSA testing between the cohort with diabetes only and the cohort with diabetes + COPD (OR=0.99, 95% CI= 0.94 - 1.05). The lack of difference in the use of PSA between persons with diabetes only and the cohort with all three conditions (OR = 0.93, 95% CI= 0.81 - 1.08) was found again. Asians were more likely to use PSA in 2004 than whites (OR = 1.33, 95% CI = 1.16 - 1.53), and blacks were still less likely to use than whites (OR = 0.92, CI = 0.86 – 0.98).

Regression results using groups of covariates

In order to examine how the relative odds ratios changed by adjusting for different groups of covariates, we ran a sequence of regressions for each diabetes care or preventive care measure adding groups of covariates one by one (personal characteristics, health status, and health services) which allows us to assess the impact of groups of variables.

HbA1c

Table 3b.1 shows the changes in odds ratios when groups of covariates are added in the model one by one. There was little change in the odds ratios from the age-adjusted odds ratios when only personal characteristics were added to the model. A relatively large increase in odds ratios occurred when health status variables were added. This suggests that the differences in age-adjusted rates of HbA1c testing may be partially caused by diabetic beneficiaries with COPD and/or depression being sicker than persons with diabetes only. Adding the health service use variables after adding personal characteristics and health status variables had a modest effect.

Results for 2004 are presented in the Appendix (Table A.3b.1). The directions and the magnitudes of the changes in odds ratios as groups of covariate were added were close to those of the 2003 analysis.

Lipid Test
Table 3b.2 shows the changes in odds ratios when groups of covariates are added in the model one by one. The pattern of the change was the same as HbA1c testing; there was little change in the odds ratios from the age-adjusted odds ratios, when only personal characteristics were additionally included in the model. A relatively large increase in odds ratios occurred when health status variables were added to the model, suggesting that the differences in age-adjusted rates of lipid testing may be partially caused by differences in health risk between cohorts. Again, adding the health service use variables had a modest effect.

The results for 2004 are presented in the Appendix (Table A.3b.2). The directions and the magnitudes of the changes in odds ratios as groups of covariate were added were close to those of the 2003 analysis.

Eye Examination
The pattern of the changes in odds ratios when clusters of covariates are added in the model is similar with other measures (Table 3b.3); there was little change in the odds ratios from the age-adjusted odds ratios, when only personal characteristics were additionally included. A relatively large increase in odds ratios occurred when health status variables were added to the model, again suggesting that differences in health risk across cohort groups related to the differences in the receipt of eye exams. Adding the health service use variables had a modest effect.

The results for 2004 are presented in the Appendix (Table A.3b.3). The directions of the changes in odds ratios as groups of covariate were added are similar to those of the 2003 analysis. However, as mentioned earlier, in 2004, in the full model, the difference between those who had diabetes only and those with diabetes + depression was significant (adjusted O.R. = 0.95, 95% CI = 0.92 - 0.99), and the difference between those with diabetes and those with all three disease was not significant (adjusted O.R. = 0.94, 95% CI = 0.88 - 1.01)

Influenza Vaccination
Table 3b.4 shows the changes in odds ratios when clusters of covariates are added in the model; overall, there was a small change in the odds ratios from the age-adjusted odds ratios when only personal characteristics were included. Health status variables also had a modest effect. Unlike other measures, a relatively large increase in odds ratios was found when health service use variables were added, except for the diabetes + COPD cohort, suggesting that differences in the flu vaccination rates without full adjustment for control variables, may be due to differences in health services use between cohorts.

The results for 2004 are presented in the Appendix (Table A.3b.4). The directions of the changes in odds ratios as groups of covariate were added were similar to those of the 2003 analysis. However, as mentioned earlier, in 2004, the relative odds of receiving an influenza vaccination was greater among those with diabetes + depression than among those with diabetes only (OR=1.12, 95% CI= 1.08 - 1.16).

Mammogram Screening in 2003 and 2004

Changes in odds ratios when clusters of covariates were added in the model are presented in Table 3b.5. The pattern of the change was similar with other measures; there was a very small change in the odds ratios from the age-adjusted odds ratios, when only personal characteristics were included. A large increase in odds ratios was found by adding health status variables to the model, implying substantial differences in health status existed between the cohorts with different chronic conditions. Unlike other measures, adding health services use variables had more than a modest effect, implying that the use of health services is positively related to the receipt of mammograms

Prostate specific antigen testing

Table 3b.6 presents the changes in odds ratios when clusters of covariates were added in the model. The results are consistent with findings in other measures; there was a small change in the odds ratios from the age-adjusted odds ratios, when only personal characteristics were included. Adding health status variables led to a large increase in odds ratios, and an effect was found when health services use variables are added especially for the cohort of all 3 chronic conditions.

The results for the receipt of PSA in 2004 are presented in the Appendix (Table A.3b.6). The directions of the changes in odds ratios as groups of covariate were added were similar to those of the 2003 analysis.

Discussion

The purpose of Activity 1 was to compare the rates of six health care process measures among elderly fee-for-service Medicare beneficiaries with diabetes only or diabetes plus one or both of two other chronic diseases: COPD and major depression. Three of these measures (HbA1c testing, lipid testing, and eye examination) are services recommended to be performed annually on all persons with diabetes. The other three (influenza immunization, mammography and PSA testing) are preventive services that are recommended annually for all elderly persons. We found that as the number of chronic diseases increased from diabetes only to all three diseases, the cohorts were older, were more likely to be white, were more likely to be in a state Medicaid administered program, have a history of prior hospitalization, have a higher Charlson score, and have more physician office visits.

The most consistent result was the association between increasing from diabetes only to diabetes plus the two other diseases and significantly lower age-adjusted rates of health service use. These results were confirmed in the full multiple regression model results. For the most important indicator of good diabetes care, annual HbA1c testing, there was an important difference between those with diabetes only and those with all three diseases. In 2003, the rate of HbA1c testing for the cohort with all 3 diseases was 17.0% lower than for the cohort with diabetes only. However, the biggest differences were seen for the two cancer screening activities. In 2003, the rate of PSA testing was 30.2% lower in the all 3 disease cohort compared to the diabetes only cohort. The rate for mammography was 42.5% lower for 2003/2004. Interestingly, and somewhat expectedly, the rates of influenza immunization were slightly and statistically higher in the cohort with diabetes + COPD (55.4 per 100 versus 54.7 per 100 in 2003), although this difference was not very great (< 2%).

The citing of the difference in the results for influenza immunization compared with the other services measured is a reminder that each of these measures may have different factors that influence the use of the service and that total consistency across all measures would be difficult to find. In the case of influenza vaccination many professional and para-professional groups that focus on people with diabetes or COPD have been strong advocates for the use of the vaccine in these patients. For example, even though influenza vaccine is recommended by the CDC for all elderly persons, the American Diabetes Association and the American Lung Association place special emphasis on promoting annual influenza vaccination. This may explain the results of the full model multiple regression that found that there was a difference in the vaccination rates between those with diabetes only and diabetes plus COPD (those with diabetes + COPD had a significantly higher rate)

Interestingly, the fully adjusted rates of diabetes care measures were consistently lower in one of the groups with two diseases, those with diabetes + COPD. However, in the other group with two diseases, diabetes + depression, the rates were lower only for lipid testing.

A somewhat anomalous result is the failure to find a significant difference between the men with diabetes only and the men with all three diseases in the rates of PSA testing in 2003 and 2004; namely, the 95% confidence intervals include 1.00. This may be due to the lower sample sizes for these two cohorts compared with others: 1,900 in 2003; and 1,357 in 2004. Also, we present without explanation, the lack of significant difference in PSA testing between the men with diabetes and the men with diabetes + COPD in 2004.

A summary of the finding in the above portion of the Discussion is that the effect of COPD and of depression varied depending on the service measured. Most commonly, those with additional chronic diseases had lower rates of service use, but at times they were the same, and uncommonly, those with more chronic diseases had greater rates of service use.

Likewise, the answer to the question whether the association of COPD with the use of recommended health services was similar in magnitude to the association with depression depended on the outcome measure used. Based on the fully adjusted model results, the relative odds comparing those with diabetes + COPD to those with diabetes only were lower for HbA1c testing, eye examination and mammography than the relative odds comparing those with diabetes + depression to those with diabetes. They were similar for the other three measures.

Finally, the impact of the covariates used in the multivariate analysis deserves comment. As shown by the age-adjusted rates and confirmed in the full model odds ratios (Tables 3a.DC and 3a.PRV), increasing age was generally a negative predictor of use of service, with the exception of eye examination. Increasing Charlson scores and the history of prior hospitalization reduced the probability of receiving services, as did visits to pulmonologists or psychiatrists. These latter two observations may indicate that the visits to these specialists are surrogate measures of disease severity thus having an impact similar to the increasing Charlson score or prior hospitalization. Visiting an endocrinologist increased the likelihood of receiving diabetes-related services, as might be expected, but was associated with a lower likelihood of receiving the prevention services. Increasing the number of physician visits was a strong predictor of increased service use. Visits to obstetrician/gynecologists increased the probability of receiving services (except eye examinations), particularly mammography. Whether the impact is due uniquely to these physicians, especially with regard to mammography, or to preventive care-seeking behavior on the part of patients cannot be determined. Similarly, the positive association with the number of diabetes services received and the use of the three preventive services may reflect care-seeking on the part of the beneficiary or the positive impact of association with the health care system.

In summary, the variability in the results indicates the importance of continuing to study the impact of individual chronic diseases as they act alone or in combination with other chronic diseases. While we showed that having the three chronic diseases we studied almost always had the greatest negative association with the receipt of recommended health services compared with have one or two diseases, the direction and the magnitude was not always consistent.

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MRAD ACTIVITY 1 TABLE LIST

2003 information on 4 study cohorts except mammograms which is 2003+2004

Baseline characteristics - personal characteristics, health status and health service use

1.1	Baseline characteristics
1.2	Baseline characteristics of health service use

Crude and age-adjusted results

2.1	HbA1c 2003
2.2	Lipid testing 2003
2.3	Eye examination 2003
2.4	Influenza immunization 2003
2.5	Mammography 2003/2004
2.6	PSA test 2003

Full model logistic regression results presenting covariates

3a.DC (Diabetes Care)	HbA1c, lipid test and eye examination
3a.PRV (Preventive Services)	Influenza, mammogram and PSA

Logistic regression with three different reference groups

3b.1	HbA1c 2003
3b.2	Lipid testing 2003
3b.3	Eye examination 2003
3b.4	Influenza immunization
3b.5	Mammography 2003/2004
3b.6	PSA test 2003

Table 1.1. Patient baseline characteristics as of 01/01/03 among cohorts with diabetes only (DM),

diabetes+chronic obstructive pulmonary disease (DM+COPD), diabetes+depression (DM+D), and all three diseases (DM+COPD+D)

	DM		DM+COPD		DM+D		DM+COPD+D	
	Number	%	Number	%	Number	%	Number	%
All	184,941		23,793		19,111		5,670	
Age-group (years)								
67-69	29,025	15.7	3,117	13.1	2,476	13.0	716	12.6
70-74	51,276	27.7	5,970	25.1	4,315	22.6	1,332	23.5
75-79	47,374	25.6	6,473	27.2	4,639	24.3	1,474	26.0
80-84	33,017	17.9	4,732	19.9	3,967	20.8	1,193	21.0
85+	24,249	13.1	3,501	14.7	3,714	19.4	955	16.8
Age (mean)		***76.5***		***77.2***		***78.0***		***77.7***
Gender								
Male	78,141	42.3	11,624	48.9	5,107	26.7	1,900	33.5
Female	106,800	57.8	12,169	51.2	14,004	73.3	3,770	66.5
Race/ethnicity								
White	153,236	82.9	20,629	86.7	16,513	86.4	4,990	88.0
Black	21,732	11.8	2,120	8.9	1,666	8.7	394	7.0
Hispanic	4,110	2.2	488	2.1	549	2.9	169	3.0
Asian	2,815	1.5	284	1.2	157	0.8	51	0.9
Others	3,048	1.7	272	1.1	226	1.2	66	1.2
In Medicaid-administered program								
Yes	31,473	17.0	5,870	24.7	5,615	29.4	2,151	37.9
No	153,468	83.0	17,923	75.3	13,496	70.6	3,519	62.1
Median household income of zip code [b, e]								
< $34,000	63,024	34.1	8,867	37.3	6,429	33.7	2,059	36.3
$34,000-$45,000	61,966	33.5	8,041	33.8	6,401	33.5	1,926	34.0
> $45,000	59,925	32.4	6,878	28.9	6,278	32.9	1,685	29.7
Income (mean)		***$41,936***		***$40,657***		***$42,008***		***$40,793***
Charlson score								
0	59,665	32.3	2,545	10.7	2,883	15.1	278	4.9
1-2	72,112	39.0	8,309	34.9	6,635	34.7	1,417	25.0
3+	53,164	28.8	12,939	54.4	9,593	50.2	3,975	70.1
Charlson score (mean)		***1.9***		***3.2***		***3.0***		***4.1***
History of hospitalization in 2001 or 2002								
Yes	69,279	37.5	17,678	74.3	12,179	63.7	4,969	87.6
No	115,662	62.5	6,115	25.7	6,932	36.3	701	12.4
U.S. region of residence [e]								
Midwest	48,646	26.3	6,033	25.4	5,462	28.6	1,441	25.4
Northeast	38,379	20.8	5,098	21.4	4,097	21.4	1,258	22.2
South	73,861	39.9	9,813	41.2	7,226	37.8	2,312	40.8
West	24,045	13.0	2,849	12.0	2,325	12.2	659	11.6
Rural residence [c, f]								
Yes	51,635	27.9	7,099	29.9	5,209	27.3	1,572	27.7
No	133,262	72.1	16,686	70.2	13,901	72.7	4,097	72.3

All differences in pair-wise comparisons between cohorts are significant, $p<0.05$, except as footnoted.
Each alphabetic letter indicates a non-significant difference in the rates of the two groups as listed below.
a) DM and DM+COPD; b) DM and DM+D; c) DM and DM+COPD+D
d) DM+COPD and DM+D; e) DM+COPD and DM+COPD+D; f) DM+D and DM+COPD+D

Table 1.2. Health services that patients received among cohorts with diabetes only (DM), diabetes + chronic obstructive pulmonary disease (DM+COPD), diabetes+depression (DM+D) and all three diseases (DM+COPD+D)

	DM		DM+COPD		DM+D		DM+COPD+D	
	Number	%	Number	%	Number	%	Number	%
Health services that patients received in 2003								
Number of physician office visits in 2003								
< 5	54,076	29.2	6,515	27.4	7,321	38.3	2,350	41.5
5-10	61,239	33.1	5,833	24.5	4,406	23.1	1,076	19.0
10-15	36,460	19.7	4,808	20.2	3,141	16.4	848	15.0
15 +	33,166	17.9	6,637	27.9	4,243	22.2	1,396	24.6
No. of visits (mean)		***9.1***		***11.1***		***9.4***		***9.7***
Visited an endocrinologist in 2003								
Yes	12,963	7.0	1,596	6.7	1,248	6.5	270	4.8
No	171,978	93.0	22,197	93.3	17,863	93.5	5,400	95.2
Visited an obstetrician-gynecologist in 2003 (women only)								
Yes	9,247	8.7	806	6.6	1,000	7.1	207	5.5
No	97,553	91.3	11,363	93.4	13,004	92.9	3,563	94.5
Visited a psychiatrist in 2003								
Yes	5,861	3.2	1,239	5.2	4,523	23.7	1,017	17.9
No	179,080	96.8	22,554	94.8	14,588	76.3	4,653	82.1
Visited a pulmonologist in 2003								
Yes	12,738	6.9	7,269	30.6	1,730	9.1	1,138	20.1
No	172,203	93.1	16,524	69.5	17,381	91.0	4,532	79.9
Visited a urologist in 2003 (men only) [f]								
Yes	21,759	27.9	3,201	27.5	1,443	28.3	465	24.5
No	56,382	72.2	8,423	72.5	3,664	71.7	1,435	75.5
Number of Diabetic Services in 2003 (mean)		***1.84***		***1.55***		***1.59***		***1.30***
Health services that patients received in 2004*								
Number of physician office visits in 2004								
< 5	49,669	28.9	5,368	27.5	6,106	37.6	1,676	40.3
5-10	55,416	32.3	4,754	24.4	3,737	23.0	825	19.8
10-15	34,171	19.9	3,926	20.1	2,716	16.7	610	14.7
15 +	32,507	18.9	5,456	28.0	3,668	22.6	1,048	25.2
No. of visits (mean)		***9.3***		***11.0***		***9.5***		***9.9***
Visited an endocrinologist in 2004 [a,d]								
Yes	12,663	7.4	1,361	7.0	1,147	7.1	270	6.5
No	159,100	92.6	18,143	93.0	15,080	92.9	3,889	93.5
Visited an obstetrician-gynecologist in 2004 (women only)								
Yes	8,247	8.4	631	6.4	930	7.8	158	5.6
No	90,459	91.6	9,299	93.7	10,968	92.2	2,644	94.4
Visited a psychiatrist in 2004								
Yes	6,136	3.6	1,107	5.7	3,463	21.3	1,017	24.5
No	165,627	96.4	18,397	94.3	12,764	78.7	3,142	75.6
Visited a pulmonologist in 2004								
Yes	12,920	7.5	5,731	29.4	1,481	9.1	1,138	27.4
No	158,843	92.5	13,773	70.6	14,746	90.9	3,021	72.6
Visited a urologist in 2004 (men only)								
Yes	20,608	28.2	2,646	27.6	1,228	28.4	361	26.6
No	52,449	71.8	6,928	72.4	3,101	71.6	996	73.4
Number of Diabetic Services in 2004 (mean)		***1.88***		***1.63***		***1.67***		***1.43***

* Persons who died in 2003 are excluded
All differences in pair-wise comparisons between cohorts are significant, p<0.05, except as footnoted.
Each alphabetic letter indicates a non-significant difference in the rates of the two groups as listed below.
a) DM and DM+COPD; b) DM and DM+D; c) DM and DM+COPD+D
d) DM+COPD and DM+D; e) DM+COPD and DM+COPD+D; f) DM+D and DM+COPD+D

Table 2.1. Crude and age-adjusted rates of hemoglobin A1c testing in 2003 among study cohorts:
diabetes only(DM), diabetes+chronic obstructive pulmonary disease (DM+COPD), diabetes+depression (DM+D), and all three diseases(DM+COPD+D)

	DM		DM+COPD		DM+D		DM+COPD+D	
	Number	Rate*/ 100	Number	Rate*/ 100	Number	Rate*/ 100	Number	Rate*/ 100
Crude rate	130,300	73.0	14,010	65.2	12,256	69.6	2,901	60.1
Age-group (years)								
67-69	21,418	74.8 [b]	2,001	68.1	1,788	74.7 [b]	411	63.9
70-74	38,107	75.7	3,845	69.1	3,022	73.3	742	62.7
75-79	34,208	74.2	3,892	66.1	3,043	70.3	805	62.6
80-84	22,489	71.4	2,648	62.7	2,500	69.3	563	57.4
85+	14,078	64.4	1,624	56.3	1,903	60.4	380	51.8
Age-adjusted rate								
Total	130,300	72.9	14,010	65.3	12,256	70.4	2,901	60.5
Sex								
Male	54,895	72.2	6,911	65.6	3,310	70.5	982	61.4
Female	75,405	73.7	7,099	65.3	8,946	70.4	1,919	60.1
Race/ethnicity								
White	109,314	73.9	12,321	66.4	10,684	71.2	2,577	61.2
Black	14,518	69.1	1,115	58.3	1,024	66.3	185	55.6
Asian	1,917	69.2	155	58.6 [d]	89	60.0 [d]	20	39.8
Hispanic	2,689	66.7 [b]	269	61.2 [e]	347	67.1 [b]	88	58.7 [e]
Others	1,862	63.0 [a]	150	58.6 [a,d,e]	112	55.4 [d,f]	31	51.5 [e,f]
In Medicaid-administered program								
Yes	20,641	69.6	3,282	62.9	3,390	67.6	1,054	58.2
No	109,659	73.6	10,728	66.1	8,866	71.5	1,847	62.0
Median household income of zip code								
< $34,000	43,280	71.0	5,126	63.8	4,079	68.9	995	56.3
$34,000-$45,000	44,477	74.3	4,870	67.3	4,198	72.3	1,053	64.9
> $45,000	42,523	73.5	4,012	65.1	3,977	69.8	853	60.7
Charlson score								
0	44,517	74.9 [b]	1,703	68.4 [e]	2,120	73.57 [b]	179	65.9 [e]
1 or 2	51,307	73.1	5,214	66.7	4,479	71.43	788	61.3
3+	34,476	71.0	7,093	63.9	5,657	68.24	1,934	59.6
History of hospitalization in 2001 or 2002								
Yes	45,351	70.1	9,906	63.6	7,332	67.9	2,464	59.5
No	84,949	74.7	4,104	70.0	4,924	74.3	437	66.7
U.S. region of residence								
Midwest	35,468	75.6	3,660	67.4	3,660	73.6	782	64.1
Northeast	26,446	71.7	2,991	66.0	2,546	69.2	621	59.2
South	51,782	72.4	5,734	64.5	4,576	68.9	1,164	59.4
West	16,596	71.3	1,625	63.5	1,473	69.3	334	59.0
Rural residence								
Yes	36,966	74.0	4,276	66.5	3,438	72.1	819	61.5
No	93,305	72.5	9,728	64.9	8,818	69.7	2,081	60.1
Number of physician office visits in 2003								
< 5	29,956	61.3	2,602	54.7 [e]	3,740	62.8	890	54.4 [e]
5-10	46,587	76.9	3,577	65.0	3,096	72.7	577	58.7
10-15	28,319	78.1	3,241	69.1	2,289	73.8	528	64.1
15 +	25,438	77.0	4,590	69.8	3,131	74.1	906	64.6
Visited an endocrinologist in 2003								
Yes	11,538	90.7	1,263	84.5	1,054	88.4	252	77.6
No	118,762	71.6	12,747	63.9	11,202	69.0	2,649	59.2
Visited an obstetrician-gynecologist in 2003 (women only)								
Yes	6,735	72.5	532	66.8 [d,e]	680	68.6 [d,f]	127	60.8 [e,f]
No	68,670	73.8	6,567	65.2	8,266	70.6	1,792	60.0
Visited a psychiatrist in 2003								
Yes	3,601	68.1 [b]	638	59.1 [e]	2,808	67.5 [b]	733	56.9 [e]
No	126,699	73.1	13,372	65.7	9,448	71.3	2,168	61.8
Visited a pulmonologist in 2003								
Yes	8,321	72.9	4,261	65.5 [d]	1,004	68.8 [d]	769	56.9
No	121,979	72.9	9,749	65.2	11,252	70.5	2,132	61.9

*Rates are based on person-years

All differences in pair-wise comparisons between cohorts are significant, $p<0.05$, except as footnoted.
Each alphabetic letter indicates a non-significant difference in the rates of the two groups as listed below.
a) DM and DM+COPD; b) DM and DM+D; c) DM and DM+COPD+D
d) DM+COPD and DM+D; e) DM+COPD and DM+COPD+D; f) DM+D and DM+COPD+D

Table 2.2. Crude and age-adjusted rates of lipid testing in 2003 among study cohorts: diabetes only (DM), diabetes+chronic obstructive pulmonary disease (DM+COPD), diabetes+depression (DM+D), and all three diseases (DM+COPD+D)

	DM		DM + COPD		DM + D		DM +COPD + D	
	Number	Rate*/ 100	Number	Rate*/ 100	Number	Rate*/ 100	Number	Rate*/ 100
Crude rate	119,167	66.8	12,792	59.5	9,642	54.8	2,319	48.0
Age-group (years)								
67-69	20,768	72.5	1,887	64.2	1,677	70.0	362	56.2
70-74	36,786	73.0	3,670	65.9	2,758	66.9	663	56.0
75-79	32,146	69.8	3,674	62.4	2,504	57.9	668	51.9
80-84	19,657	62.4	2,390	56.6	1,775	49.2	423	43.1
85+	9,810	44.8	1,171	40.6	928	29.4	203	27.7
Age-adjusted rate								
Total	119,167	66.5	12,792	59.8	9,642	57.0	2,319	49.0
Sex								
Male	51,507	67.0	6,441	60.8	2,760	58.8	823	52.0
Female	67,660	66.6 [b,c]	6,351	59.0	6,882	56.5	1,496	47.5
Race/ethnicity								
White	100,604	67.9	11,199	60.5	8,398	58.0	2,033	49.0
Black	12,156	57.3	1,010	52.7	742	48.1	139	42.0
Asian	1,980	70.9	178	67.6	82	56.1 [f]	21	40.8 [f]
Hispanic	2,696	66.6	275	61.6 [b,e]	341	65.8 [f]	100	66.6 [c,e,f]
Others	1,731	57.8	130	50.5 [e]	79	40.0 [f]	26	43.7 [e,f]
In Medicaid-administered program								
Yes	16,681	56.8	2,696	52.0	2,258	47.5	789	43.8
No	102,486	68.5	10,096	62.3	7,384	60.8	1,530	52.1
Median household income of zip code								
< $34,000	38,181	62.4	4,544	56.5	3,212	55.1	816	46.3
$34,000 -$45,000	40,072	66.8	4,364	60.5	3,229	57.3	787	49.3
> $45,000	40,900	70.6	3,883	63.4	3,201	58.9	716	52.2
Charlson score								
0	41,085	67.8	1,600	63.0 [e]	1,859	62.1 [f]	165	59.5 [e,f]
1 or 2	47,182	67.2	4,721	60.3	3,693	60.2	631	49.1
3+	30,900	64.7	6,471	58.7	4,090	52.4	1,523	48.2
History of hospitalization in 2001 or 2002								
Yes	40,382	68.7	8,794	67.8	5,601	61.6	1,932	58.9
No	78,785	63.1	3,998	56.8	4,041	54.1 [f]	387	47.4 [f]
U.S. region of residence								
Midwest	30,371	64.6	3,106	57.3	2,609	55.0	556	46.3
Northeast	26,179	71.2	2,917	64.4	2,141	60.5	500	49.3
South	47,181	65.5	5,241	58.9	3,702	56.6	994	51.0
West	15,429	66.1	1,528	60.0	1,190	57.1	269	47.6
Rural residence								
Yes	30,926	61.6	3,539	55.0	2,487	54.0	562	42.9
No	88,219	68.4	9,249	61.8	7,155	58.2	1,756	51.3
Number of physician office visits in 2003								
< 5	23,555	48.9	1,721	38.2	1,880	36.6	419	27.3
5-10	43,219	70.9	3,372	61.3	2,606	61.7	491	50.3
10-15	27,203	74.8	3,094	65.9	2,102	67.6	481	58.0
15 +	25,190	76.2	4,605	69.9	3,054	71.8	928	66.5
Visited an endocrinologist in 2003								
Yes	10,389	80.9	1,139	75.6	8,731	75.7	202	61.3
No	108,778	65.5	11,653	58.6	911	55.7	2,117	48.1
Visited an obstetrician-gynecologist in 2003 (women only)								
Yes	7,126	76.1	553	69.7 [d]	671	66.7 [d]	124	59.5
No	60,534	65.7	5,798	58.2	6,211	55.7	1,372	46.7
Visited a psychiatrist in 2003								
Yes	2,594	51.3	471	44.7 [e]	2,097	52.0	550	43.7 [e]
No	116,573	67.0	12,321	60.6	7,545	58.6	1,769	50.9
Visited a pulmonologist in 2003								
Yes	7,647	67.1	4,011	61.5	850	58.4	706	52.1
No	172,203	66.5	8,781	59.1	8,792	56.9	1,613	47.9

*Rates are based on person-years

All differences in pair-wise comparisons between cohorts are significant, $p<0.05$, except as footnoted.
Each alphabetic letter indicates a non-significant difference in the rates of the two groups as listed below.
a) DM and DM+COPD; b) DM and DM+D; c) DM and DM+COPD+D
d) DM+COPD and DM+D; e) DM+COPD and DM+COPD+D; f) DM+D and DM+COPD+D

Table 2.3. Crude and age-adjusted rates of eye exam in 2003 among study cohorts: diabetes only (DM), diabetes+chronic obstructive pulmonary disease (DM+COPD), diabetes+depression (DM+D), and all three diseases (DM+COPD+D)

	DM		DM + COPD		DM + D		DM + COPD + D	
	Number	Rate */100	Number	Rate* /100	Number	Rate */100	Number	Rate */100
Crude rate	90,475	50.7	10,114	47.0	8,448	48.0	2,152	44.6
Age-group (years)								
67-69	13,144	45.9 [b]	1,231	41.9	1,147	47.9 [b]	252	39.2
70-74	25,782	51.2 [b]	2,584	46.4 [e]	2,126	51.6 [b]	544	46.0 [e]
75-79	24,839	53.9 [b]	2,925	49.7	2,160	49.9 [b]	596	46.3
80-84	16,541	52.5	2,086	49.4 [d]	1,684	46.7 [d]	442	45.1
85+	10,169	46.5	1,288	44.7 [d]	1,331	42.2 [d,f]	318	43.4 [f]
Age-adjusted rate								
Total	90,475	50.7	10,114	46.8	8,448	48.5	2,152	44.5
Sex								
Male	37,176	49.3	4,804	45.5	2,240	47.7	709	44.3
Female	53,299	51.9	5,310	48.4	6,208	48.9 [d]	1,443	44.6
Race/ethnicity								
White	76,597	51.8	8,856	47.3	7,350	49.1	1,897	44.7
Black	9,413	45.1	806	42.3	677	43.6 [d]	134	40.2 [e]
Asian	1,267	45.0 [a,b,c]	133	51.2	65	43.3 [b,d,f]	16	35.5 [c,f]
Hispanic	1,886	46.9 [a,b,c]	206	45.0	276	53.2 [b,d,f]	78	51.2 [c,e,f]
Others	1,312	44.4 [a,c]	113	44.2	80	38.8 [d,f]	27	45.9 [c,e,f]
In Medicaid-administered program								
Yes	12,783	43.2	2,098	40.3	2,195	43.7	772	42.7 [e]
No	77,692	52.2	8,016	49.0	6,253	50.4	1,380	45.6
Median household income of zip code								
< $34,000	28,855	47.5	3,523	43.8	2,698	45.6	753	42.4
$34,000-$45,000	30,385	50.8	3,444	47.2 [d]	2,808	48.2 [d]	723	44.5
> $45,000	31,225	53.9	3,147	50.3 [d]	2,941	51.8 [d]	676	47.0
Charlson score								
0	29,398	50.2 [a,b,c]	1,216	49.7	1,430	50.3 [b,d,f]	125	47.0 [c,e,f]
1 or 2	36,028	51.3	3,670	46.9	3,099	49.5 [d]	560	43.3
3+	25,049	51.0	5,228	46.4	3,919	47.2	1,467	44.8
History of hospitalization in 2001 or 2002								
Yes	32,137	49.4	2,965	45.5	3,325	47.4	306	44.2
No	58,338	51.6	7,149	50.6 [d]	5,123	50.4 [d]	1,846	46.8
U.S. region of residence								
Midwest	22,302	47.5	2,374	43.4	2,334	46.9	525	42.5
Northeast	21,037	56.8	2,425	52.0 [d]	2,017	54.7 [d]	522	49.1
South	35,875	50.3	4,094	46.0 [d]	3,086	46.5 [d]	855	43.3
West	11,255	48.4	1,221	47.4 [d]	1,010	47.4 [d]	250	44.1
Rural residence								
Yes	23,794	47.8	2,809	43.6	2,166	45.7	536	40.1
No	66,664	51.8	7,300	48.2	6,282	49.5	1,616	46.2
Number of physician office visits in 2003								
< 5	13,509	27.8 [b]	1,116	23.0	1,780	28.9 [b]	490	28.6
5-10	31,713	52.6	2,383	43.1 [e]	2,056	48.1	400	40.3 [e]
10-15	22,661	62.6 [b]	2,532	53.9 [e]	1,779	57.4 [b]	420	51.3 [e]
15 +	22,592	68.5	4,083	62.3	2,833	67.7	842	60.8
Visited an endocrinologist in 2003								
Yes	8,154	64.4 [b]	875	58.7	759	63.7 [b]	191	59.4 [e]
No	82,321	49.6	9,239	46.0	7,689	47.3 [d]	1,961	43.4
Visited an obstetrician-gynecologist in 2003 (women only)								
Yes	5,866	50.8 [a,b]	488	61.6 [a,d]	602	61.2 [b,d,f]	110	55.4 [f]
No	47,433	64.2	4,822	47.3 [d]	5,606	47.9 [d]	1,333	44.0
Visited a psychiatrist in 2003								
Yes	2,396	45.0 [a,c]	493	45.5 [a,e]	2,090	49.7	606	46.8 [c,e]
No	88,079	50.9	9,621	47.0 [d]	6,358	48.1 [d]	1,546	43.6
Visited a pulmonologist in 2003								
Yes	5,994	52.3 [a]	3,325	51.2 [a,d]	761	52.0 [d,f]	662	42.8 [f]
No	84,481	50.6	6,789	45.0	7,687	48.2	1,490	49.4

*Rates are based on person-years

All differences in pair-wise comparisons between cohorts are significant, $p<0.05$, except as footnoted.
Each alphabetic letter indicates a non-significant difference in the rates of the two groups as listed below.
a) DM and DM+COPD; b) DM and DM+D; c) DM and DM+COPD+D
d) DM+COPD and DM+D; e) DM+COPD and DM+COPD+D; f) DM+D and DM+COPD+D

Table 2.4. Crude and age-adjusted rates of flu vaccination in 2003 among study cohorts: diabetes only (DM), diabetes+chronic obstructive pulmonary disease (DM+COPD), diabetes+depression (DM+D), and all three diseases (DM+COPD+D)

	DM		DM + COPD		DM + D		DM + COPD + D	
	Number	Rate*/ 100	Number	Rate*/ 100	Number	Rate*/ 100	Number	Rate*/ 100
Crude rate	96,505	54.7	11,553	55.5	8,728	51.0	2,181	47.5
Age-group (years)								
67-69	14,384	50.4 [b]	1,525	52.9 [d]	1,204	50.9 [b,d]	279	44.8
70-74	27,757	55.4 [a]	3,043	56.0 [a]	2,142	52.8 [f]	569	49.7 [f]
75-79	26,027	57.0 [a]	3,304	57.8 [a]	2,274	53.9 [f]	631	51.3 [f]
80-84	17,497	56.5 [a]	2,316	56.9 [a]	1,790	51.3	409	44.5
85+	10,840	51.3 [a]	1,365	50.4 [a]	1,318	44.1 [f]	293	43.9 [f]
Age-adjusted rate								
Total	96,505	54.7	11,553	55.4 [a]	8,728	51.4	2,181	47.6
Sex								
Male	41,966	56.3	5,829	57.1	2,424	53.0	732	48.3
Female	54,539	53.8 [a]	5,724	54.0	6,304	50.9	1,449	47.4
Race/ethnicity								
White	84,649	57.9 [a]	10,431	57.8 [a]	7,866	53.8	1,976	49.2
Black	7,655	37.1 [a,b,c]	704	38.1 [a,d,e]	529	35.4 [b,d,f]	122	38.3 [c,e,f]
Asian	1,487	53.9 [a,b]	143	55.8 [a,d]	75	49.4 [b,d,f]	13	28.2 [f]
Hispanic	1,471	36.4 [a,b,c]	170	39.2 [a,d,e]	190	37.3 [b,d,f]	50	33.8 [c,e,f]
Others	1,243	43.2 [a,c]	105	42.3 [a,d,e]	68	34.6 [d,f]	20	32.4 [c,e,f]
In Medicaid-administered program								
Yes	11,559	39.7 [b,c]	2,148	42.5	1,925	39.5 [b,f]	651	38.0 [c,f]
No	84,946	57.7	9,405	59.5	6,803	56.0	1,530	53.4
Median household income of zip code								
< $34,000	29,237	48.7 [a]	3,870	49.7 [a]	2,732	47.3	744	43.9
$34,000-$45,000	33,337	56.4 [a]	4,036	57.5 [a]	3,010	53.1 [f]	773	50.1 [f]
> $45,000	33,919	59.2	3,646	60.6	2,985	54.1	664	49.8
Charlson scores								
0	31,928	54.6	1,449	59.1 [d,e]	1,600	57.0	147	56.0 [c,e,f]
1 or 2	38,632	55.5	4,353	56.7 [a]	3,277	53.0 [f]	638	51.0 [f]
3+	25,945	54.2	5,751	53.7	3,851	48.3	1,396	45.6
History of hospitalization in 2001 or 2002								
Yes	34,114	53.4 [a]	8,102	53.7 [a]	5,195	49.6	1,844	46.9
No	62,391	55.5 [c]	3,451	59.7	3,533	54.2 [f]	337	52.5 [c,f]
U.S. region of residence								
Midwest	26,958	58.1	3,093	58.4 [a]	2,631	54.4 [f]	610	52.2 [f]
Northeast	20,852	57.0	2,635	59.0	1,872	52.0 [f]	518	51.2 [f]
South	37,161	52.8	4,575	53.2 [a]	3,213	49.7	853	45.8
West	11,531	50.2	1,250	50.4 [a,d]	1,011	48.6 [b,d]	200	37.1
Rural Residence								
Yes	25,914	52.7	3,355	53.7 [a]	2,397	51.4 [b,f]	614	48.4 [f]
No	70,574	55.5	8,193	56.1 [a]	6,331	51.4	1,566	47.3
Number of physician office visits in 2003								
< 5	17,311	36.6	1,401	32.6 [d]	1,854	32.3 [d]	430	29.0
5-10	34,412	57.4	2,914	54.3 [d]	2,233	52.9 [d]	431	45.4
10-15	22,706	62.9 [a,b]	2,854	61.7 [a,d]	1,909	61.9 [b,d]	460	56.6
15 +	22,076	67.0 [a]	4,384	67.2 [a]	2,732	65.2 [f]	860	62.7 [f]
Visited an endocrinologist in 2003								
Yes	7,462	54.3 [a,b]	855	55.1 [a,d]	660	56.6 [b,d,f]	159	51.6 [f]
No	89,043	59.4	10,698	58.9	8,068	51.0	2,022	47.4
Visited an obstetrician-gynecologist in 2003 (women only)								
Yes	5,739	62.6 [a,b]	512	65.8 [a]	594	60.5 [b,f]	109	55.0 [f]
No	48,800	52.9 [a]	5,212	53.0 [a]	5,710	50.0	1,340	47.0
Visited a psychiatrist in 2003								
Yes	2,099	41.1 [a]	395	38.7 [a,e]	1,869	46.2	514	42.0 [e]
No	94,406	55.2	11,158	56.3	6,859	53.0	1,667	49.7
Visited a pulmonologist in 2003								
Yes	5,961	54.3	3,611	58.0	649	47.4 [f]	633	49.9 [f]
No	90,544	54.7 [a]	7,942	54.3 [a]	8,079	51.7	1,548	46.6

*Rates are based on person-years

Each alphabetic letter indicates a non-significant difference in the rates of the two groups as listed below.
a) DM and DM+COPD; b) DM and DM+D; c) DM and DM+COPD+D
d) DM+COPD and DM+D; e) DM+COPD and DM+COPD+D; f) DM+D and DM+COPD+D

Table 2.5 Crude and age-adjusted rates of mammogram examination in 2003/04 among study cohorts (women only): diabetes only (DM), diabetes+chronic obstructive pulmonary disease (DM+COPD), diabetes+depression (DM+D), and all three diseases (DM+COPD+D)

	DM		DM + COPD		DM + D		DM + COPD + D	
	Number	Rate*/ 100	Number	Rate*/ 100	Number	Rate*/ 100	Number	Rate*/ 100
Crude Rate	41,226	44.8	3,270	35.0	3,846	34.5	666	25.2
Age-group (years)								
67-69	8,098	36.1	554	43.5	844	55.4	130	36.1
70-74	13,779	33.1	1,047	45.2	1,244	48.4	223	33.1
75-79	11,070	27.8	943	38.0[d]	985	36.8[d]	189	27.8
80-84	6,090	17.8	513	27.5[d]	565	24.2[d]	95	17.8
85+	2,189	7.3	213	15.0	208	10.1	29	7.3
Age-adjusted rate								
Total	41,226	45.4	3,270	36.0[d]	3,846	37.2[d]	666	26.1
Sex								
Male								
Female	41,226	45.4	3,270	36.0[d]	3,846	37.2[d]	666	26.1
Race/ethnicity								
White	33,568	46.8	2,796	36.4[d]	3,313	38.3[d]	573	25.9
Black	5,569	41.1	361	36.1[d]	354	32.5[d]	57	28.5
Asian	578	35.0	29	27.1[d,e]	22	24.4[d,f]	4	18.8[e,f]
Hispanic	901	39.0	52	25.2[e]	126	34.0	19	22.7[e]
Others	610	37.0[c]	32	30.6[d]	31	24.1[d,f]	13	46.5[c,f]
In Medicaid-administered program								
Yes	6,479	49.0	781	26.9[d]	864	26.2[d]	218	19.5
No	34,747	49.0	2,489	40.2	2,982	42.4	448	31.4
Median household income of zip code								
< $34,000	14,028	42.1	1,213	34.4[d]	1,307	34.5[d]	234	23.6
$34,000-$45,000	14,159	46.9	1,099	36.0[d]	1,318	38.4[d]	238	28.5
> $45,000	13,034	47.6	957	38.2	1,221	39.2	194	27.0
Charlson score								
0	17,559	48.7[b]	556	44.0	1,084	48.1[b]	60	32.3
1 or 2	16,330	45.6	1,409	37.3[d]	1,611	39.3[d]	240	28.3
3+	7,337	39.4	1,305	32.4	1,151	29.3	366	24.1
History of hospitalization in 2001 or 2002								
Yes	12,557	40.6	2,165	33.1[d]	1,992	32.9[d]	554	25.4
No	28,669	48.0	1,105	43.3[d]	1,854	43.3[d]	112	30.5
U.S. region of residence								
Midwest	11,057	46.6	818	35.9[d]	1,082	38.1[d]	155	24.8
Northeast	8,398	45.8	699	36.6[d]	821	40.1[d]	153	28.9
South	16,581	44.5	1,387	35.7[d]	1,464	34.9[d]	274	24.9
West	5,188	45.2	366	36.2[d]	479	38.4[d]	84	28.8
Rural residence								
Yes	11,199	43.4	892	33.4[d]	1,022	36.0[d]	171	24.3
No	30,014	46.2	2,377	37.1[d]	2,824	37.7[d]	495	26.8
Number of physician office visits in 2003 and 2004								
< 5	6,804	28.9	314	16.1[d]	523	17.8[d]	81	9.8
5-10	15,578	47.8	846	33.4	1,073	38.8	128	24.2
10-15	10,252	54.1	851	42.5	919	46.9	156	33.5
15+	8,592	57.4[b]	1,259	50.7	1,331	56.2[b]	301	43.1
Visited an endocrinologist in 2003 or 2004								
Yes	4,378	50.8	351	39.7	448	44.7	75	31.6
No	36,848	44.9	2,919	35.7[d]	3,398	36.5[d]	591	25.6
Visited an obstetrician-gynecologist in 2003 or 2004								
Yes	8,982	74.6	681	69.5[d]	889	65.7[d]	143	54.5
No	32,244	41.1	2,589	32.1[d]	2,957	33.1[d]	523	22.9
Visited a psychiatrist in 2003 or 2004								
Yes	1,269	29.5	174	23.2[e]	944	32.9	207	23.7[e]
No	39,957	46.2	3,096	37.2[d]	2,902	38.9[d]	459	27.4
Visited a pulmonologist in 2003 or 2004								
Yes	3,831	43.4	1,302	37.5	486	36.3	272	29.1
No	37,395	45.6	1,968	35.1	3,360	37.4	394	24.4

*Rates are based on person-years, and the beneficiaries with breast cancer were removed.
All differences in pair-wise comparisons between cohorts are significant, p<0.05, except as footnoted.
Each alphabetic letter indicates a non-significant difference in the rates of the two groups as listed below.
a) DM and DM+COPD; b) DM and DM+D; c) DM and DM+COPD+D
d) DM+COPD and DM+D; e) DM+COPD and DM+COPD+D; f) DM+D and DM+COPD+D

Table 2.6. Crude and age-adjusted rates of PSA test in 2003 among study cohorts (men only): diabetes only (DM), diabetes+chronic obstructive pulmonary disease (DM+COPD), diabetes+depression (DM+D), and all three diseases (DM+COPD+D)

	DM		DM + COPD		DM + D		DM + COPD + D	
	Number	Rate*/ 100	Number	Rate*/100	Number	Rate*/ 100	Number	Rate*/ 100
Crude rate	27,913	42.9	3,179	35.4	1,346	34.0	393	29.1
Age-group (years)								
67-69	5,634	44.5	518	37.3[d]	265	39.3[d]	66	31.3
70-74	9,498	45.7	1,010	39.2[d,e]	428	39.1[d,f]	128	37.0[e,f]
75-79	7,367	43.8	907	36.1[d]	352	33.7[d]	106	28.9
80-84	3,846	39.1	525	32.3[d]	209	30.3[d]	57	22.4
85+	1,568	31.1	219	24.8[d,e]	92	20.3[d,f]	36	20.8[e,f]
Age-adjusted rate								
Total	27,913	42.0	3,179	35.0[d]	1,346	33.7[d]	393	29.3
Sex								
Male	27,913	42.0	3,179	35.0[d]	1,346	33.7[d]	393	29.3
Female								
Race/ethnicity								
White	24,824	42.9	2,835	35.2[d]	1,238	34.7[d]	347	29.3
Black	1,854	36.0	191	32.1	61	24.2[f]	22	27.0[e,f]
Asian	373	37.8[a,b,c]	49	41.9	11	31.4[b,d,f]	4	21.8[c,e,f]
Hispanic	485	35.2[a,b,c]	69	39.9	24	29.1[b,d,f]	15	38.5[c,e,f]
Others	377	33.7[a,b,c]	35	26.1	12	23.9[b,d,f]	5	28.5[c,e,f]
In Medicaid-administered program								
Yes	1,869	30.3	454	29.0	176	23.3[f]	98	24.6[f]
No	26,044	43.1	2,725	36.2[d]	1,170	36.1[d]	295	31.1
Median household income of zip code								
< $34,000	8,273	39.3	1,167	34.5[d]	425	33.5[d]	140	28.5
$34,000-$45,000	9,566	42.3	1,085	34.8[d]	445	33.0[d,f]	143	30.9[f]
> $45,000	10,070	44.0	927	36.1[d]	476	34.8[d]	110	27.3
Charlson scores								
0	10,892	44.1[a,b,c]	530	43.4[a,d,e]	309	43.1	36	36.6[c,e,f]
1 or 2	11,001	42.1	1,223	36.1[d]	489	34.5[d,f]	104	32.4[f]
3+	6,020	38.6	1,426	32.2	548	29.5	253	27.4
History of hospitalization in 2001 or 2002								
Yes	8,739	38.1	2,103	32.5	728	30.0	307	26.8
No	19,174	44.1[c]	1,076	41.3[d,e]	618	39.7[d,f]	86	43.6[c,e,f]
U.S. region of residence								
Midwest	7,375	41.6	769	32.8[d]	381	32.0[d]	99	27.0
Northeast	5,757	43.9	699	38.3[d]	301	36.2[d]	73	26.6
South	11,141	41.9	1,299	34.6[d]	506	34.7[d]	166	31.4
West	3,639	40.0	412	35.8[d,e]	158	31.2[d,f]	55	32.3[e,f]
Rural Residence								
Yes	7,596	39.8	965	33.3[d]	365	32.4[d]	98	25.7
No	20,315	42.8	2,212	35.7[d]	981	34.2[d]	294	30.7
Number of physician office visits in 2003								
< 5	5,711	29.3	391	20.1[d]	226	18.9[d]	55	13.1
5-10	10,461	45.2	826	34.7[d]	329	33.8[d]	80	28.2
10-15	6,107	48.1	842	41.7[d]	304	40.5[d,f]	84	35.0[f]
15 +	5,634	49.2[b]	1,120	41.3[d,e]	487	46.4[b,d,f]	174	46.2[e,f]
Visited an endocrinologist in 2003								
Yes	2,188	46.6[b,c]	245	40.4[d,e]	131	41.9	41	38.1[c,e,f]
No	25,725	41.7	2,934	34.6[d]	1,215	33.1	352	28.4
Visited a psychiatrist in 2003								
Yes	1,750	40.8[b,c]	91	26.2[e]	294	30.8[b]	86	27.0[c,e]
No	26,163	42.0	3,088	35.4[d]	1,052	34.6[d]	307	30.0
Visited a pulmonologist visits in 2003								
Yes	1,750	40.8	997	35.7[d]	123	33.7[d,f]	116	28.6[f]
No	26,163	42.0	2,182	34.6[d]	1,223	33.7[d,f]	277	29.8[f]
Visited a urologist in 2003								
Yes	9,948	66.0	1,236	58.3[d,e]	547	56.5[d,f]	168	54.1[e,f]
No	17,965	34.8	1,943	27.9[d]	799	26.3[d]	225	21.8

*Rates are based on person-years, and the beneficiaries with prostate cancer were removed.
All differences in pair-wise comparisons between cohorts are significant, p<0.05, except as footnoted.
Each alphabetic letter indicates a non-significant difference in the rates of the two groups as listed below.
a) DM and DM+COPD; b) DM and DM+D; c) DM and DM+COPD+D
d) DM+COPD and DM+D; e) DM+COPD and DM+COPD+D; f) DM+D and DM+COPD+D

Table 3a.DC. The results of logistic regression (Use of diabetes care in 2003)

	Hb A1c in 2003	**Lipid test in 2003**	**Eye exam in 2003**
	Odds ratio (95% CI)	Odds ratio (95% CI)	Odds ratio (95% CI)
Chronic conditions			
Diabetes - reference			
DM + COPD	0.76 (0.73-0.78)	0.81 (0.78-0.83)	0.84 (0.81-0.86)
DM +D	0.99 (0.96-1.03)	0.80 (0.77-0.83)	0.97 (0.94-1.00)
DM +COPD +D	0.70 (0.66-0.75)	0.66 (0.62-0.70)	0.89 (0.84-0.95)
Age-group			
67-69 - reference			
70-74 years	1.02 (0.99-1.05)	0.97 (0.94-1.00)	1.19 (1.15-1.12)
75-79 years	0.94 (0.91-0.97)	0.80 (0.78-0.83)	1.30 (1.26-1.33)
80-84 years	0.85 (0.82-0.88)	0.61 (0.59-0.63)	1.29 (1.25-1.33)
85+ years	0.67 (0.67-0.71)	0.35 (0.33-0.36)	1.23 (1.19-1.28)
Sex			
Male - reference			
Female	1.09 (1.07-1.11)	1.02 (1.00-1.04)	1.13 (1.11-1.15)
Race/Ethnicity			
White - reference			
Black	0.88 (0.85-0.90)	0.75 (0.72-0.77)	0.90 (0.88-0.93)
Asian	0.78 (0.72-0.85)	1.22 (1.12-1.32)	0.79 (0.73-0.85)
Hispanic	0.79 (0.74-0.84)	1.18 (1.11-1.26)	0.93 (0.87-0.98)
Others	0.63 (0.59-0.68)	0.69 (0.64-0.75)	0.86 (0.80-0.92)
In Medicaid-administered program			
No - reference			
Yes	1.05 (1.02-1.08)	0.77 (0.75-0.79)	0.88 (0.86-0.91)
Median household income of zip code			
<$34,000 - reference			
$34,000-$45,000	1.12 (1.10-1.15)	1.04 (1.02-1.07)	1.06 (1.04-1.08)
>$45,000	1.08 (1.05-1.10)	1.09 (1.06-1.12)	1.11 (1.08-1.14)
Charlson score			
0 - reference			
1-2	0.89 (0.87-0.91)	0.92 (0.90-0.95)	0.90 (0.88-0.92)
3+	0.80 (0.78-0.83)	0.84 (0.81-0.86)	0.84 (0.82-0.86)
History of hospitalization in 2001 or 2002			
No - reference			
Yes	0.78 (0.77-0.80)	0.76 (0.74-0.77)	0.85 (0.84-0.87)
No. of months alive	1.21 (1.20-1.22)	1.27 (1.26-1.28)	1.21 (1.20-1.22)
U.S region of residence			
Northeast- reference			
Midwest	1.24 (1.20-1.27)	0.81 (0.79-0.83)	0.75 (0.73-0.77)
South	1.05 (1.02-1.08)	0.87 (0.85-0.90)	0.82 (0.80-0.84)
West	1.01 (0.97-1.04)	0.81 (0.79-0.84)	0.74 (0.72-0.77)
Rural residence			
No - reference			
Yes	1.18 (1.25-1.21)	0.86 (0.84-0.88)	1.04 (1.02-1.06)
Number of physician office visits in 2003			
<5 - reference			
5-10	1.99 (1.94-2.04)	2.46 (2.40-2.52)	2.69 (2.63-2.76)
10-15	2.23 (2.17-2.29)	3.05 (2.97-3.13)	4.12 (4.01-4.23)
15+	2.22 (2.15-2.28)	3.45 (3.36-3.56)	5.63 (5.47-5.79)
Visited an endocrinologist in 2003			
No - reference			
Yes	3.11 (2.96-3.27)	1.69 (1.62-1.76)	1.27 (1.23-1.32)
Visited an obstetrician-gynecologist in 2003			
No - reference			
Yes	0.79 (0.76-0.83)	1.16 (1.11-1.22)	1.15 (1.10-1.20)
Visited a psychiatrist in 2003			
No - reference			
Yes	0.90 (0.87-0.94)	0.67 (0.64-0.70)	1.03 (0.99-1.07)
Visited a pulmonologist in 2003			
No - reference			
Yes	0.84 (0.81-0.87)	0.86 (0.84-0.89)	0.86 (0.83-0.89)
-2 Log likelihood	236036.7	234151.56	262211.52
C-statistic	0.689	0.738	0.708

Table 3a. PRV. The results of logistic regression (Use of preventive services in 2003)

	Flu vaccine in 2003	Mammogram in 2003	PSA test in 2003
	Odds Ratio (95% CI)	Odds Ratio (95% CI)	Odds Ratio (95% CI)
Chronic conditions			
Diabetes - reference			
DM+ COPD	1.09 (1.06-1.13)	0.85 (0.80-0.89)	0.94 (0.89-0.99)
DM + D	1.04 (1.00-1.08)	0.90 (0.86-0.95)	0.85 (0.78-0.91)
DM+ COPD + D	1.02 (0.95-1.09)	0.71 (0.64-0.78)	0.89 (0.78-1.01)
Age-group			
67-69 - reference			
70-74	1.16 (1.13-1.19)	0.88 (0.85-0.92)	0.97 (0.93-1.02)
75-79	1.24 (1.20-1.27)	0.64 (0.61-0.67)	0.85 (0.82-0.90)
80-84	1.29 (1.25-1.33)	0.43 (0.41-0.45)	0.73 (0.69-0.77)
85+	1.31 (1.26-1.36)	0.21 (0.20-0.22)	0.60 (0.56-0.64)
Sex			
Male - reference			
Female	0.97 (0.95-0.99)		
Race/ethnicity			
White - reference			
Black	0.53 (0.52-0.55)	1.10 (1.05-1.15)	0.92 (0.86-0.98)
Asian	1.07 (0.99-1.15)	0.64 (0.57-0.72)	0.97 (0.85-1.11)
Hispanic	0.55 (0.52-0.59)	0.92 (0.84-1.00)	0.96 (0.85-1.07)
Others	0.68 (0.63-0.73)	0.81 (0.73-0.91)	0.81 (0.71-0.92)
In Medicaid-administered program			
No - reference			
Yes	0.70 (0.69-0.72)	0.61 (0.59-0.63)	0.78 (0.74-0.82)
Median household income of zip code			
< $34,000 - reference			
$34,000-$45,000	1.14 (1.12-1.17)	1.06 (1.03-1.10)	0.99 (0.95-1.03)
> $45,000	1.19 (1.16-1.22)	0.99 (0.96-1.03)	0.98 (0.94-1.03)
Charlson score			
0 - reference			
1-2	0.97 (0.95-1.00)	0.85 (0.83-0.88)	0.88 (0.84-0.91)
3+	0.91 (0.89-0.94)	0.70 (0.68-0.73)	0.77 (0.74-0.81)
History of hospitalization in 2001 or 2002			
No - reference			
Yes	0.92 (0.91-0.94)	0.81 (0.78-0.83)	0.82 (0.79-0.85)
No. of months alive	4.14 (3.86-4.43)	1.09 (1.08-1.09)	1.21 (1.19-1.23)
U.S. region of residence			
Northeast - reference			
Midwest	1.14 (1.11-1.17)	1.19 (1.14-1.23)	1.01 (0.97-1.06)
South	0.99 (0.97-1.02)	1.08 (1.04-1.12)	0.98 (0.94-1.03)
West	0.81 (0.78-0.83)	1.19 (1.13-1.25)	1.00 (0.94-1.05)
Rural residence			
No - reference			
Yes	1.02 (1.00-1.04)	1.00 (0.97-1.04)	0.99 (0.95-1.03)
Number of physician office visits in 2003			
< 5 - reference			
5-10	1.94 (1.89-1.99)	1.79 (1.72-1.85)	1.26 (1.21-1.31)
10-15	2.48 (2.42-2.55)	2.26 (2.17-2.36)	1.26 (1.20-1.33)
15 +	3.10 (3.01-3.20)	2.74 (2.62-2.87)	1.21 (1.15-1.28)
Visited an endocrinologist in 2003			
No - reference			
Yes	0.84 (0.82-0.88)	0.88 (0.84-0.92)	0.77 (0.73-0.82)
Visited an obstetrician-gynecologist in 2003			
No - reference			
Yes	1.09 (1.05-1.14)	3.87 (3.70-4.04)	
Visited a psychiatrist in 2003			
No - reference			
Yes	0.73 (0.70-0.77)	0.67 (0.63-0.70)	0.78 (0.71-0.85)
Visited a pulmonologist in 2003			
No - reference			
Yes	0.94 (0.91-0.98)	0.88 (0.85-0.92)	0.88 (0.83-0.93)
Visited an urologist in 2003			
No - reference			
Yes			3.68 (3.55-3.83)
Number of diabetic care services received in 2003			
	1.25 (1.23-1.26)	1.62 (1.58-1.64)	1.79 (1.76-1.83)
-2 Log likelihood	275532.34	131839.68	95162.105
C-statistic	0.686	0.800	0.746

Table 3b.1. Odds ratio (95% CI) for HbA1c testing in 2003 adjusting for age-group, personal characteristics (PC), PC + health status, and PC + health service factors (full model) using different cohorts as the reference cohort.

	Age-group adjusted	PC	PC + health status	Full model
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Diabetes as a reference				
DM (reference)	1	1	1	1
DM + COPD	0.61 (0.59-0.63)	0.61 (0.59-0.63)	0.77 (0.75-0.79)	0.76 (0.73-0.78)
DM + D	0.79 (0.77-0.82)	0.79 (0.76-0.81)	0.92 (0.89-0.95)	0.99 (0.96-1.03)
All three diseases	0.45 (0.43-0.48)	0.46 (0.43-0.48)	0.65 (0.61-0.69)	0.70 (0.66-0.75)
Diabetes + depression as reference				
DM	1.27 (1.23-1.31)	1.27 (1.23-1.31)	1.08 (1.05-1.12)	1.01 (0.98-1.05)
DM + COPD	0.77 (0.74-0.80)	0.78 (0.75-0.81)	0.83 (0.80-0.87)	0.77 (0.73-0.80)
DM + D (reference)	1	1	1	1
All three diseases	0.57 (0.54-0.61)	0.58 (0.55-0.62)	0.70 (0.66-0.75)	0.71 (0.67-0.76)
Diabetes + COPD as reference				
DM	1.64 (1.60-1.69)	1.62 (1.58-1.67)	1.30 (1.26-1.34)	1.32 (1.28-1.36)
DM + COPD (reference)	1	1	1	1
DM + D	1.30 (1.25-1.35)	1.28 (1.23-1.33)	1.20 (1.15-1.25)	1.31 (1.25-1.36)
All three diseases	0.74 (0.70-0.79)	0.74 (0.70-0.79)	0.84 (0.79-0.90)	0.93 (0.87-0.99)

DM = diabetes only; COPD = chronic obstructive pulmonary disease; D = depression

Table 3b.2. Odds ratio (95% CI) for lipid testing (LDL-C) in 2003 adjusting for age-group, personal characteristics (PC), PC + health status, and PC + health status + health service factors (full model) using different cohorts as the reference cohort.

	Age-group adjusted	PC	PC + health status	Full model
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Diabetes as a reference				
DM (reference)	1	1	1	1
DM + COPD	0.65 (0.63-0.67)	0.68 (0.66-0.70)	0.85 (0.83-0.88)	0.81 (0.78-0.83)
DM + D	0.60 (0.59-0.62)	0.62 (0.60-0.64)	0.71 (0.69-0.74)	0.80 (0.77-0.83)
All three diseases	0.39 (0.37-0.41)	0.42 (0.40-0.45)	0.59 (0.56-0.63)	0.66 (0.62-0.70)
Diabetes + depression as reference				
DM	1.66 (1.61-1.71)	1.61 (1.56-1.66)	1.41 (1.36-1.45)	1.25 (1.21-1.29)
DM + COPD	1.08 (1.04-1.12)	1.09 (1.04-1.13)	1.20 (1.15-1.25)	1.01 (0.97-1.06)
DM + D (reference)	1	1	1	1
All three diseases	0.65 (0.61-0.69)	0.68 (0.64-0.72)	0.83 (0.78-0.89)	0.83 (0.77-0.88)
Diabetes + COPD as reference				
DM	1.54 (1.49-1.58)	1.48 (1.44-1.52)	1.17 (1.14-1.21)	1.24 (1.20-1.28)
DM + COPD (reference)	1	1	1	1
DM + D	0.93 (0.89-0.96)	0.92 (0.88-0.96)	0.83 (0.80-0.87)	0.99 (0.95-1.04)
All three diseases	0.60 (0.56-0.64)	0.62 (0.59-0.66)	0.69 (0.65-0.74)	0.82 (0.77-0.88)

DM = diabetes only; COPD = chronic obstructive pulmonary disease; D = depression

Table 3b.3. Odds ratio (95% CI) for eye examination in 2003 adjusting for age-group, personal characteristics (PC), PC + health status, and PC + health status + health service factors (full model) using different cohorts as the reference cohort.

	Age-group adjusted	PC	PC + health status	Full model
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Diabetes as a reference				
DM (reference)	1	1	1	1
DM + COPD	0.77 (0.75-0.79)	0.80 (0.78-0.82)	0.92 (0.89-0.94)	0.84 (0.81-0.86)
DM + D	0.84 (0.82-0.87)	0.85 (0.83-0.88)	0.92 (0.89-0.95)	0.97 (0.94-1.00)
All three diseases	0.64 (0.61-0.68)	0.68 (0.64-0.71)	0.86 (0.81-0.91)	0.89 (0.84-0.95)
Diabetes + depression as reference				
DM	1.19 (1.15-1.22)	1.18 (1.14-1.21)	1.08 (1.05-1.12)	1.03 (1.00-1.07)
DM + COPD	0.92 (0.88-0.95)	0.94 (0.91-0.98)	0.99 (0.95-1.03)	0.86 (0.83-0.90)
DM + D (reference)	1	1	1	1
All three diseases	0.76 (0.72-0.81)	0.80 (0.75-0.85)	0.93 (0.87-0.99)	0.92 (0.86-0.98)
Diabetes + COPD as reference				
DM	1.30 (1.26-1.33)	1.25 (1.21-1.28)	1.09 (1.06-1.12)	1.19 (1.16-1.23)
DM + COPD (reference)	1	1	1	1
DM + D	1.09 (1.05-1.14)	1.06 (1.02-1.10)	1.01 (0.97-1.05)	1.16 (1.11-1.21)
All three diseases	0.83 (0.79-0.88)	0.84 (0.80-0.90)	0.93 (0.88-0.99)	1.06 (1.00-1.14)

DM = diabetes only; COPD = chronic obstructive pulmonary disease; D = depression

Table 3b.4. Odds ratio (95% CI) for influenza immunization in 2003 adjusting for age-group, personal characteristics (PC), PC + health status, and PC + health status + health service factors (full model) using different cohorts as the reference cohort.

	Age-group adjusted	PC	PC + health status	Full model
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Diabetes as a reference				
DM (reference)	1	1	1	1
DM + COPD	1.03 (1.00-1.06)	1.06 (1.03-1.09)	1.13 (1.09-1.16)	1.09 (1.06-1.13)
DM + D	0.87 (0.84-0.89)	0.90 (0.87-0.93)	0.93 (0.90-0.96)	1.04 (1.00-1.08)
All three diseases	0.75 (0.71-0.79)	0.81 (0.77-0.86)	0.88 (0.83-0.94)	1.02 (0.95-1.09)
Diabetes + depression as reference				
DM	1.16 (1.12-1.19)	1.11 (1.07-1.15)	1.08 (1.04-1.11)	0.96 (0.93-1.00)
DM + COPD	1.19 (1.14-1.24)	1.18 (1.13-1.23)	1.22 (1.16-1.27)	1.05 (1.01-1.10)
DM + D (reference)	1	1	1	1
All three diseases	0.87 (0.81-0.92)	0.90 (0.84-0.96)	0.95 (0.89-1.02)	0.98 (0.91-1.05)
Diabetes + COPD as reference				
DM	0.97 (0.95-1.00)	0.94 (0.91-0.97)	0.89 (0.86-0.91)	0.92 (0.89-0.95)
DM + COPD (reference)	1	1	1	1
DM + D	0.84 (0.81-0.88)	0.85 (0.81-0.89)	0.82 (0.79-0.86)	0.95 (0.91-0.99)
All three diseases	0.73 (0.68-0.78)	0.77 (0.72-0.82)	0.78 (0.73-0.84)	0.93 (0.87-1.00)

DM = diabetes only; COPD = chronic obstructive pulmonary disease; D = depression

Table 3b.5. Odds ratio (95% CI) for mammography in 2003 or 2004 adjusting for age-group, personal characteristics (PC), PC + health status, and PC + health status + health service factors (full model) using different cohorts as the reference cohort.

	Age-group adjusted	PC	PC + health status	Full model
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Diabetes as a reference				
DM (reference)	1	1	1	1
DM + COPD	0.57 (0.55-0.60)	0.61 (0.58-0.63)	0.84 (0.80-0.88)	0.85 (0.80-0.89)
DM + D	0.63 (0.61-0.66)	0.67 (0.65-0.70)	0.81 (0.77-0.84)	0.90 (0.86-0.95)
All three diseases	0.32 (0.30-0.35)	0.37 (0.34-0.40)	0.59 (0.53-0.64)	0.71 (0.64-0.78)
Diabetes + depression as reference				
DM	1.58 (1.52-1.65)	1.49 (1.43-1.55)	1.24 (1.19-1.30)	1.11 (1.06-1.16)
DM + COPD	0.90 (0.85-0.96)	0.90 (0.85-0.96)	1.04 (0.97-1.10)	0.94 (0.88-1.00)
DM + D (reference)	1	1	1	1
All three diseases	0.51 (0.46-0.56)	0.55 (0.50-0.60)	0.73 (0.66-0.80)	0.79 (0.71-0.88)
Diabetes + COPD as reference				
DM	1.75 (1.67-1.83)	1.65 (1.58-1.73)	1.27 (1.21-1.33)	1.18 (1.12-1.25)
DM + COPD (reference)	1	1	1	1
DM + D	1.11 (1.05-1.17)	1.11 (1.05-1.18)	1.01 (0.95-1.07)	1.07 (1.00-1.14)
All three diseases	0.57 (0.51-0.62)	0.61 (0.55-0.67)	0.69 (0.62-0.76)	0.84 (0.75-0.94)

DM = diabetes only; COPD = chronic obstructive pulmonary disease; D = depression

Table 3b.6. Odds ratio (95% CI) for PSA testing in 2003 adjusting for age-group, personal characteristics (PC), PC + health status, and PC + health status + health service factors (full model) using different cohorts as the reference cohort.

	Age-group adjusted	PC	PC + health status	Full model
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Diabetes as a reference				
DM (reference)	1	1	1	1
DM + COPD	0.68 (0.65-0.71)	0.71 (0.68-0.74)	0.87 (0.83-0.92)	0.94 (0.89-0.99)
DM + D	0.67 (0.62-0.71)	0.70 (0.65-0.74)	0.80 (0.75-0.86)	0.85 (0.78-0.91)
All three diseases	0.48 (0.43-0.54)	0.53 (0.47-0.59)	0.75 (0.66-0.84)	0.89 (0.78-1.01)
Diabetes + depression as reference				
DM	1.50 (1.41-1.61)	1.44 (1.35-1.54)	1.25 (1.17-1.34)	1.18 (1.10-1.28)
DM + COPD	1.02 (0.95-1.10)	1.02 (0.94-1.10)	1.09 (1.01-1.18)	1.11 (1.02-1.22)
DM + D (reference)	1	1	1	1
All three diseases	0.73 (0.64-0.83)	0.76 (0.67-0.87)	0.94 (0.82-1.07)	1.05 (0.90-1.21)
Diabetes + COPD as reference				
DM	1.47 (1.41-1.54)	1.42 (1.35-1.48)	1.15 (1.09-1.20)	1.06 (1.01-1.12)
DM + COPD (reference)	1	1	1	1
DM + D	0.98 (0.91-1.06)	0.98 (0.91-1.06)	0.92 (0.85-0.99)	0.90 (0.82-0.98)
All three diseases	0.71 (0.63-0.80)	0.75 (0.66- 0.85)	0.86 (0.75-0.97)	0.94 (0.82-1.08)

DM = diabetes only; COPD = chronic obstructive pulmonary disease; D = depression

APPENDIX

2004 tables on four study cohorts

Crude and age-adjusted results

Table A.2.1	HbA1c 2004
Table A.2.2	Lipid testing 2004
Table A.2.3	Eye Examination 2004
Table A.2.4	Influenza Immunization 2004
Table A.2.6	PSA test 2004

Full model logistic regression results presenting covariates

Table A.3a.DC (Diabetes Care)	HbA1c, lipid test and eye examination
Table A.3a.PRV (Preventive Services)	Influenza, mammography and PSA

Logistic regression with three different reference groups

Table A.3b.1	HbA1c 2004
Table A.3b.2	Lipid testing 2004
Table A.3b.3	Eye examination 2004
Table A.3b.4	Influenza immunization 2004
Table A.3b.6	PSA test 2004

2003 tables on diabetes only, COPD only, and depression only cohorts

Baseline characteristics - personal characteristics, health status and health service use

Table B.1.1	Baseline characteristics
Table B.1.2	Baseline characteristics of health service use

Crude and age-adjusted results

Table B.2.1_03	HbA1c 2003
Table B.2.2_03	Lipid testing 2003
Table B.2.3_03	Eye examination 2003
Table B.2.4_03	Influenza immunization
Table B.2.5_03/04	Mammography 2003-04
Table B.2.6_03	PSA test 2003

2004 tables on diabetes only, COPD only, and depression only cohorts

Crude and age-adjusted results

Table B.2.1_04	HbA1c 2004
Table B.2.2_04	Lipid testing 2004
Table B.2.3_04	Eye Examination 2004
Table B.2.4_04	Influenza Immunization 2004
Table B.2.6_04	PSA test 2004

Appendix A

Table A.2.1. Crude and age-adjusted rates of hemoglobin A1c testing in 2004 among study cohorts: diabetes only (DM), diabetes+chronic obstructive pulmonary disease (DM+COPD), diabetes+depression (DM+D), and all three diseases (DM+COPD+D)

	DM		DM + COPD		DM + D		DM + COPD + D	
	Tested	Rate*/ 100	Tested	Rate*/ 100	Tested	Rate*/ 100	Tested	Rate*/ 100
Crude Rates								
Total	122,461	74.2	11,880	66.8	10,799	71.7	2,289	62.3
Age-group (years)								
67-69	21,198	76.2	1,846	70.7 [e]	1,671	73.8	371	68.7 [e]
70-74	36,990	76.6	3,422	70.1	2,874	75.8	619	64.1
75-79	32,452	75.1	3,342	67.6	2,752	72.5	623	62.0
80-84	20,474	72.4	2,149	63.8	2,116	71.2	420	60.5
85+	11,347	65.0	1,121	56.2 [e]	1,386	62.0	256	54.5 [e]
Age-adjusted Rates								
Total	122,461	73.9	11,880	66.6	10,799	72.0	2,289	62.4
Sex								
Male	51,899	73.1	5,862	66.6	2,895	71.6	765	63.7
Female	70,562	74.6	6,018	67.0	7,904	72.3	1,524	61.8
Race/ethnicity								
White	102,566	74.8	10,336	67.2	9,358	72.8	2,014	63.1
Black	13,718	70.5	1,018	63.6	938	69.6	148	57.4
Asian	1,854	69.9 [c]	139	58.8 [d,e]	87	64.5 [d,f]	23	55.3 [c,e,f]
Hispanic	2,596	67.9 [a,b]	257	67.1 [a,d,e]	317	67.0 [b,d]	78	59.3 [e]
Others	1,727	62.8	130	58.0 [d,e]	99	56.4 [d,f]	26	50.8 [e,f]
In Medicaid-administered program								
Yes	18,833	71.0	2,743	64.7	2,880	69.6	830	60.8
No	103,628	74.4	9,137	67.2	7,919	72.9	1,459	63.6
Median household income of zip code								
< $34,000	40,568	71.9	4,403	65.4	3,628	70.9	804	59.1
$34,000-$45,000	41,753	75.3	4,096	68.3	3,718	74.2	803	66.4
> $45,000	40,123	74.5	3,379	66.3	3,451	70.9	682	61.9
Charlson score								
0	43,777	75.7 [b]	1,620	69.6 [e]	2,066	74.3 [b]	163	68.6 [e]
1 or 2	48,561	74.0	4,537	66.6	4,110	73.1	656	62.4
3+	30,123	71.7	5,723	66.0	4,623	70.0	1,470	61.9
History of hospitalization in 2001 or 2002								
Yes	40,956	71.1	8,181	65.2	6,280	70.0	1,921	61.9
No	81,505	75.5	3,699	70.1	4,519	75.1	368	65.5
U.S. region of residence								
Midwest	33,302	76.4	3,096	68.7	3,191	75.4	595	63.9
Northeast	25,031	73.2	2,527	66.5	2,231	70.6	501	63.2
South	48,585	73.2	4,904	66.2	4,082	71.0	914	60.6
West	15,536	71.9	1,353	64.0 [e]	1,294	69.9	279	63.6 [e]
Rural residence								
Yes	34604	74.8	3,649	68.1	3,048	74.5	654	64.7
No	87834	73.5	8,227	66.0	7,751	71.1	1,634	61.6
Number of physician office visits in 2003								
< 5	27,465	61.9 [b]	2,239	55.6	3,327	65.6 [b]	695	54.8 [e]
5-10	42,467	77.4	3,024	66.9	2,682	73.8	490	63.3
10-15	26,956	79.2	2,711	70.1	2,029	75.4	396	65.0
15 +	25,573	78.7	3,906	71.7	2,761	74.7	708	66.6
Visited an endocrinologist in 2003								
Yes	11,352	91.9	1,117	87.4	960	87.4 [d]	195	77.7
No	111,109	72.5	10,763	65.0	9,839	70.8	2,094	61.3
Visited an obstetrician-gynecologist in 2003 (women only)								
Yes	6,091	73.6	423	67.8 [d,e]	630	69.0 [d,f]	95	61.1 [e,f]
No	64,471	74.7	5,595	66.9	7,274	72.6	1,429	61.8
Visited a psychiatrist in 2003								
Yes	3,882	70.5	598	61.3 [e]	2,265	69.8	568	61.9 [e]
No	118,579	74.0	11,282	66.9	8,534	72.6	1,721	62.7
Visited a pulmonologist in 2003								
Yes	8,612	74.5	3,428	66.7	918	71.7	599	60.7
No	113,849	73.8	8,452	66.6	9,881	72.1	1,690	63.0

*Rates are based on person-years

All differences in pair-wise comparisons between cohorts are significant, p<0.05, except as footnoted.
Each alphabetic letter indicates a non-significant difference in the rates of the two groups as listed below.
a) DM and DM+COPD; b) DM and DM+D; c) DM and DM+COPD+D
d) DM+COPD and DM+D; e) DM+COPD and DM+COPD+D; f) DM+D and DM+COPD+D

Table A.2.2. Crude and age-adjusted rates of lipid testing in 2004 among study cohorts: diabetes only (DM), diabetes+chronic obstructive pulmonary disease (DM+COPD), diabetes+depression (DM+D), and all three diseases (DM+COPD+D)

	DM		DM + COPD		DM + D		DM +COPD + D	
	Tested	Rate*/100	Tested	Rate*/100	Tested	Rate*/100	Tested	Rate*/100
Crude Rates								
Total	115,376	69.9	11,313	63.6	9,046	60.1	1,967	53.5
Age-group (years)								
67-69	21,034	75.6	1,830	70.0	1,628	71.9	351	65.0
70-74	36,594	75.8	3,379	69.2	2,668	70.4	568	58.8
75-79	31,063	71.9	3,237	65.5	2,407	63.4	561	55.8
80-84	18,347	64.9	1,976	58.7	1,566	52.7	341	49.1
85+	8,338	47.8	891	44.7	777	34.7[f]	146	31.1[f]
Age-adjusted Rates								
Total	115,376	69.1	11,313	63.3	9,046	61.0	1,967	53.7
Sex								
Male	49,833	69.2	5,686	64.0	2,539	62.2	687	56.9
Female	65,543	69.4	5,627	62.8	6,507	60.7	1,280	52.2
Race/ethnicity								
White	97,103	70.4	9,880	64.1	7,810	61.6	1,704	53.4
Black	11,989	60.8	904	56.2	750	55.3	123	48.2
Asian	1,954	73.3[c]	157	67.3[e]	83	62.5[f]	25	65.9[c,e,f]
Hispanic	2,681	70.4[b]	250	65.0[e]	319	67.8[b]	86	67.4[e]
Others	1,649	59.2[c]	122	54.2[e]	84	48.1[f]	29	56.6[c,e,f]
In Medicaid-administered program								
Yes	16,103	60.5	2,398	56.3	2,105	51.9[f]	686	49.6[f]
No	99,273	70.8	8,915	65.5	6,941	64.4	1,281	56.0
Median household income of zip code								
< $34,000	37,022	65.1	4,001	59.2	2,984	58.4	693	50.7
$34,000-$45,000	38,796	69.4	3,857	64.1	3,046	61.5	667	55.1
> $45,000	39,541	73.0	3,454	67.7	3,014	63.3	607	55.8
Charlson scores								
0	41,482	70.2	1,578	66.6[e]	1,923	66.9	152	62.7
1 or 2	45,715	69.3	4,326	63.3	3,499	62.6	564	53.3
3+	28,179	67.7	5,409	62.6	3,624	56.9	1,251	53.0
History of hospitalization in 2001 or 2002								
Yes	38,040	66.3	7,624	60.7	5,070	57.8	1,628	52.6
No	77,336	70.8	3,689	69.6	3,976	65.6	339	59.8
U.S. region of residence								
Midwest	29,448	67.0	2,702	59.8	2,403	58.0	463	49.7
Northeast	25,303	73.9	2,630	69.3	1,999	64.7	449	57.7
South	45,719	68.2	4,650	62.4	3,560	61.9	817	53.9
West	14,899	68.4	1,331	62.9	1,084	59.0	238	54.0
Rural Residence								
Yes	30,223	64.5	3,162	58.6	2,334	57.8	499	49.3
No	85,126	70.9	8,147	65.3	6,712	62.2	1,467	55.3
Number of physician office visits in 2004								
< 5	22,602	51.2	1,648	42.2	1,926	42.1	398	33.4
5-10	40,737	73.6	2,977	65.6	2,415	66.5	432	55.5
10-15	26,345	77.0	2,714	70.3[e]	1,927	71.2	390	65.0[e]
15 +	25,692	78.9	3,974	73.0	2,778	75.1	747	71.0
Visited an endocrinologist in 2004								
Yes	10,333	82.7	995	77.5	886	79.1	179	71.0
No	105,043	68.1	10,318	62.2	8,160	59.6	1,788	52.5
Visited an obstetrician-gynecologist in 2004 (women only)								
Yes	6,543	78.3	468	75.0[d]	680	73.2[d]	94	58.5
No	59,000	68.6	5,159	61.9	5,827	59.6	1,186	51.6
Visited a psychiatrist in 2004								
Yes	2,899	54.5[a,c]	488	50.7[a,d,e]	1,842	57.4[d]	479	52.7[c,e]
No	112,477	69.7	10,825	64.0	7,204	62.0	1,488	54.1
Visited a pulmonologist in 2004								
Yes	8,035	69.4	3,348	64.8	810	63.2	551	55.1
No	107,341	69.1	7,965	62.8	8,236	60.8	1,416	53.2

*Rates are based on person-years

All differences in pair-wise comparisons between cohorts are significant, p<0.05, except as footnoted.
Each alphabetic letter indicates a non-significant difference in the rates of the two groups as listed below.
a) DM and DM+COPD; b) DM and DM+D; c) DM and DM+COPD+D
d) DM+COPD and DM+D; e) DM+COPD and DM+COPD+D; f) DM+D and DM+COPD+D

Table A. 2.3. Crude and age-adjusted rates of eye exam in 2004 among study cohorts: diabetes only (DM), diabetes+chronic obstructive pulmonary disease (DM+COPD), diabetes+depression (DM+D), and all three diseases (DM+COPD+D)

	DM		DM + COPD		DM + D		DM + COPD + D	
	Tested	Rate*/ 100	Tested	Rate*/ 100	Tested	Rate*/ 100	Tested	Rate*/ 100
Crude Rates								
Total	85,832	52.0	8,583	48.2	7,317	48.6	1,702	46.3[e]
Age-group (years)								
67-69	13,454	48.3[b]	1,111	42.5[e]	1,116	49.3[b]	240	44.4[e]
70-74	25,549	52.9	2,330	47.7[e]	1,916	50.6	454	47.0[e]
75-79	23,519	54.4	2,544	51.5[d,e]	1,917	50.5[d,f]	503	50.1[e,f]
80-84	15,053	53.2	1,680	49.9[d]	1,428	48.1[d]	299	43.1
85+	8,257	47.3	918	46.0[e]	940	42.0[f]	206	43.9[e,f]
Age-adjusted Rates								
Total	85,832	51.9	8,583	48.0	7,317	48.8	1,702	46.3
Sex								
Male	35,594	50.6	4,155	47.0[d]	1,898	47.0[d]	546	45.5
Female	50,238	53.1	4,428	49.0[d]	5,419	49.6[d]	1,156	46.8
Race/ethnicity								
White	72,526	53.0	7,478	48.4[d]	6,343	49.3[d]	1,478	46.2
Black	8,980	46.6[b,c]	719	45.3[d,e]	612	45.6[b,d,f]	119	45.5[c,e,f]
Asian	1,225	45.7[a,c,b]	116	49.4[a,d,e]	59	42.8[b,d,f]	14	39.0[c,e,f]
Hispanic	1,856	49.0[a,b,c]	183	47.5[a,d,e]	238	51.2[b,d,f]	66	49.7[c,e,f]
Others	1,245	44.9[c]	87	39.6[d,e]	65	37.6[d,f]	25	48.5[c,e,f]
In Medicaid-administered program								
Yes	11,748	44.3	1,753	41.5[d,e]	1,788	43.1[d,f]	596	43.7[e,f]
No	74,084	53.4	6,830	50.0	5,529	50.9	1,106	47.9
Median household income of zip code								
< $34,000	27,396	48.7	3,062	45.7[d,e]	2,381	46.5[d]	603	44.4[e]
$34,000-$45,000	28,643	51.8	2,858	47.6	2,452	48.9	560	46.2
> $45,000	29,786	55.4	2,663	51.6[d]	2,483	51.1[d]	539	48.4
Charlson scores								
0	29,472	51.6[b]	1,154	51.0[d,e]	1,413	51.8[b,d]	106	44.8[e]
1 or 2	34,430	52.4	3,256	47.9[d,e]	2,773	49.3[d]	495	47.1[e]
3+	21,930	51.9	4,173	47.6[d]	3,131	47.5[d,f]	1,101	46.2[f]
History of hospitalization in 2001 or 2002								
Yes	29,182	50.5	5,870	46.5[d,e]	4,284	47.8[d]	1,432	46.0[e]
No	56,650	52.8	2,713	51.7[d]	3,033	50.4[d,f]	270	47.8[f]
U.S. region of residence								
Midwest	20,985	48.3	2,029	44.9[d,e]	1,934	45.6[d,f]	424	45.1[e,f]
Northeast	19,980	58.3	2,064	53.4[e]	1,779	56.1	423	53.2[e]
South	34,206	51.7	3,476	47.1[d]	2,726	47.4[d]	661	43.7
West	10,658	49.4	1,014	48.1[d,e]	877	47.3[d,f]	194	44.2[e,f]
Rural residence								
Yes	22,500	48.8	2,454	45.9	1,841	45.1	442	43.8
No	63,316	53.1[c]	6,127	49.0[d]	5,476	50.2[d,f]	1,260	47.3[c,f]
Number of physician office visits in 2004								
< 5	12,643	51.2[c]	1,031	25.2	1,471	28.4[f]	397	30.7[c,f]
5-10	29,342	73.6	1,956	43.2[e]	1,807	49.7	337	43.6[e]
10-15	21,437	77.0	2,092	54.6[e]	1,583	59.4	317	53.8[e]
15 +	22,410	78.9	3,504	64.9[e]	2,456	67.5	651	62.9[e]
Visited an endocrinologist in 2004								
Yes	8,057	65.8[b,c]	773	60.8[e]	729	66.1[b,f]	163	64.8[c,e,f]
No	77,775	50.8	7,810	47.1[d]	6,588	47.4[d]	1,539	44.9
Visited an obstetrician-gynecologist in 2004 (women only)								
Yes	5,340	65.4[a,b]	386	63.0[a,d]	585	69.0[b,d,f]	93	61.1[f]
No	44,898	52.0	4,042	48.0	4,834	72.6[d]	1,063	45.9
Visited a psychiatrist in 2004								
Yes	2,603	46.8[a]	452	45.9[a]	1,602	49.2[f]	465	50.4[f]
No	83,229	52.1	8,131	48.1[d]	5,715	48.6[d]	1,237	44.9
Visited a pulmonologist in 2004								
Yes	6,212	53.9[a]	2,699	52.8[a]	654	51.1[f]	491	50.1[f]
No	79,620	51.7	5,884	46.2	6,663	48.6	1,211	45.0

*Rates are based on person-years

All differences in pair-wise comparisons between cohorts are significant, $p<0.05$, except as footnoted.
Each alphabetic letter indicates a non-significant difference in the rates of the two groups as listed below.
a) DM and DM+COPD; b) DM and DM+D; c) DM and DM+COPD+D
d) DM+COPD and DM+D; e) DM+COPD and DM+COPD+D; f) DM+D and DM+COPD+D

Table A.2.4. Crude and age-adjusted rates of flu vaccination in 2004 among study cohorts: diabetes only (DM), diabetes+chronic obstructive pulmonary disease (DM+COPD), diabetes+ depression, and all three diseases (DM+COPD+D)

	DM		DM+COPD		DM		DM+COPD+D	
	Tested	Rate*/100	Tested	Rate*/100	Tested	Rate*/100	Tested	Rate*/100
Crude Rates								
Total	67,915	41.7	7,362	42.6	6,173	42.0	1,329	37.7
Age group (years)								
67-69	10,543	38.0[b,c]	1,026	40.0[d,e]	874	39.0[d,b,f]	193	36.5[c,e,f]
70-74	19,955	41.6[b,c]	2,084	43.6	1,549	41.4[b,f]	361	38.7[c,f]
75-79	18,431	43.1[b]	2,091	43.5[d]	1,638	43.9[b,d]	371	38.4
80-84	12,121	43.6[b]	1,382	42.5[d]	1,250	43.4[b,d]	250	37.9
85+	6,865	41.0[b]	779	41.4[d]	862	40.8[b,d]	154	35.0
Age-adjusted rates								
Total	67,915	41.7	7,362	42.5[d]	6,173	41.9[d]	1,329	37.6
Sex								
Male	29,705	43.0[b]	3,724	43.7[d]	1,665	42.2[b,d]	423	36.4
Female	38,210	40.9[b]	3,638	41.6[d]	4,508	41.8[b,d]	906	38.2
Race/ethnicity								
White	60,656	45.0[b]	6,740	45.1[d]	5,611	44.5[d,b]	1,224	39.9
Black	4,530	23.7[c]	385	24.9[d,e]	349	26.7[d,f]	68	27.3[c,e,f]
Asian	1,044	39.8[b]	82	35.8[d]	52	37.3[d,b]	6	13.6
Hispanic	870	23.0[b]	86	23.5[d,e]	115	24.9[b,d]	20	15.7[e]
Others	815	30.4[b,c]	69	33.5[d,e]	46	27.2[b,d,f]	11	22.7[c,e,f]
In Medicaid-administered program								
Yes	7,309	28.2[c]	1,273	31.0[d,e]	1,340	32.9[d]	390	30.0[c,e]
No	60,606	44.3[c]	6,089	46.1[d]	4,833	45.3[d]	939	42.3[c]
Median household income of zip code								
< $34,000	19,556	35.4[c]	2,367	36.3[d,e]	1,865	37.4[d]	442	34.4[c,e]
$34,000-$45,000	23,740	43.6[b]	2,624	45.2[d]	2,149	43.7[b,d]	448	38.4
> $45,000	24,614	46.4[b]	2,370	47.8	2,158	45.2[b]	439	41.4
Charlson score								
0	23,471	41.6[c]	1,052	46.4[d,e]	1,198	44.8[d,f]	105	47.5[c,e,f]
1 or 2	27,302	42.2[b,c]	2,863	43.3[d,e]	2,384	43.0[b,d]	407	40.1[c,e]
3+	17,142	41.4	3,447	41.2[d]	2,591	39.7[d]	817	35.8
History of hospitalization in 2001 or 2002								
Yes	23,429	41.3[b]	5,042	41.5[d]	3,610	40.9[b,d]	1,128	37.8
No	44,486	42.0	2,320	45.1[d]	2,563	43.3[d]	201	36.8
U.S. region of residence								
Midwest	21,322	49.8[b]	2,217	50.7[d]	2,055	49.5[b,d,f]	415	46.1[f]
Northeast	13,883	41.0[b,c]	1,648	44.2	1,269	40.6[b,f]	305	40.3[c,f]
South	24,478	37.7[b]	2,766	38.7[d]	2,167	38.6[b,d]	484	33.5
West	8,228	38.8[b]	731	35.6[d]	681	37.5[b,d]	125	30.1
Rural Residence								
Yes	19,499	43.1[c]	2,283	44.0[d,e]	1,789	44.6[d,f]	431	44.3
No	48,409	41.2[b]	5,078	41.9[d]	4,384	41.0[b,d]	898	35.1
Number of physician office in visits in 2004								
< 5	12,507	29.3[c]	1,014	27.4[e]	1,563	31.5	327	27.8[c,e]
5-10	23,312	43.2[b]	1,823	41.4[d,e]	1,534	42.7[b,d]	288	38.6[e]
10-15	15,843	47.0[b]	1,757	46.0[d]	1,261	47.5[b,d]	245	42.3
15 +	16,253	50.4[b]	2,768	51.4[d]	1,815	50.2[b,d]	469	45.0
Visited an endocrinologist in 2004								
Yes	5,489	45.0[b]	558	44.2[d]	493	45.8[b,d]	88	36.5
No	62,426	41.4[b]	6,804	42.4[d]	5,680	41.6[b,d]	1,241	37.8
Visited an obstetrician-gynecologist in 2004 (women only)								
Yes	3,759	46.1[b,c]	318	52.1	409	46.0[b,f]	64	40.9[c,f]
No	34,451	40.4	3,320	40.8[d]	4,099	41.5[d]	842	37.9
Visited a psychiatrist in 2004								
Yes	1,821	33.5[a,c]	300	31.9[a,e]	1,261	39.6	299	33.7[c,e]
No	66,094	42.0[b]	7,062	43.1[d]	4,912	42.6[b,d]	1,030	39.0
Visited a pulmonologist in 2004								
Yes	4,612	41.8	2,277	46.0	463	38.1[f]	337	35.6[f]
No	63,303	41.7[b]	5,085	41.1	5,710	42.3[b]	992	38.3

*Rates are based on person-years

All differences in pair-wise comparisons between cohorts are significant, $p<0.05$, except as footnoted.
Each alphabetic letter indicates a non-significant difference in the rates of the two groups as listed below.
a) DM and DM+COPD; b) DM and DM+D; c) DM and DM+COPD+D
d) DM+COPD and DM+D; e) DM+COPD and DM+COPD+D; f) DM+D and DM+COPD+D

Table A.2.6. Crude and age-adjusted rates of PSA test in 2004 among study cohorts (men only): diabetes only (DM), diabetes+chronic obstructive pulmonary disease (DM+COPD), diabetes+depression (DM+D), and all three diseases (DM+COPD+D)

	DM		DM+COPD		DM+D		DM+COPD+D	
	Tested	Rate*/ 100	Tested	Rate*/ 100	Tested	Rate*/100	Tested	Rate*/ 100
Crude Rates								
Total	26,875	44.1	2,866	38.2	1,252	36.6	334	32.9
Age-group (years)								
67-69	5,777	47.0[b]	502	40.9[e]	280	44.223[b]	60	34.3[e]
70-74	9,404	47.2	918	40.8[d,e]	374	37.631[d,f]	100	37.0[e,f]
75-79	7,033	44.6	821	38.9[d,e]	338	37.33[d,f]	103	35.6[e,f]
80-84	3,448	39.1	445	34.4[d]	185	32.513[d,f]	47	26.4[f]
85+	1,213	29.7[a]	180	28.5[a,d,e]	75	23.378[d,f]	24	23.6[e,f]
Age-adjusted Rates								
Total	26,875	42.8	2,866	37.6	1,252	35.806[d]	334	32.6
Sex								
Male	26,875	42.8	2,866	37.6	1,252	35.806[d]	334	32.6
Female								
Race/ethnicity								
White	23,739	43.4	2,560	37.9[d]	1,133	36.244[d]	297	33.0
Black	1,838	37.5	162	32.5[d]	64	30.521[d,f]	11	18.0[f]
Asian	424	45.0[a,b,c]	47	43.2[a,d,e]	9	21.865[d]	8	52.8[c,e]
Hispanic	496	37.3[a,b,c]	63	41.3[a,d,e]	33	43.212[b,d,f]	11	22.1[c,e,f]
Others	378	36.2[a,b,c]	34	30.3[a,d,e]	13	27.32[b,d,f]	7	40.1[c,e,f]
In Medicaid-administered program								
Yes	1,848	32.8[a]	416	32.5[a,d,e]	182	29.778[d,f]	88	29.0[e,f]
No	25,027	43.7	2,450	38.6[d]	1,070	37.137[d]	246	33.4
Median household income of zip code								
< $34,000	8,018	40.6	1,037	36.2[d]	381	34.98[d,f]	115	31.5[f]
$34,000-$45,000	9,108	42.5	993	38.2[d]	439	37.213[d,f]	120	34.8[f]
> $45,000	9,746	45.0	836	38.9[d]	432	35.349[d,f]	99	31.4[f]
Charlson scores								
0	10,861	44.9[a,b,c]	508	44.3[a,d,e]	305	44.13[b,d,f]	38	51.0[c,e,f]
1 or 2	10,540	42.4	1,155	38.9[d,e]	470	36.46[d,f]	91	35.8[e,f]
3+	5,474	40.1	1,203	34.6[d]	477	31.749[d,f]	205	29.6[f]
History of hospitalization in 2001 or 2002								
Yes	8,291	39.6	1,834	34.8[d]	673	32.813[d]	260	29.9
No	18,584	44.4[c]	1,032	44.1[d,e]	579	40.123[d,f]	74	46.2
U.S. region of residence								
Midwest	7,081	42.1	671	34.5[d,e]	354	34.256[d,f]	83	30.7[e,f]
Northeast	5,601	45.3	628	40.4[d]	271	37.501[d]	64	30.4
South	10,806	43.2	1,197	37.7[d,e]	469	36.6[d,f]	141	33.9[e,f]
West	3,386	39.6[a,c]	370	38.6[a,d,e]	158	35.704[d,f]	46	34.3[c,e,f]
Rural Residence								
Yes	7,203	39.9	859	35.2[d]	354	36.174[d]	86	31.0
No	19,669	43.8	2,005	38.6[d]	898	35.632[d]	248	33.3
Number of physician office visits in 2004								
< 5	5,241	29.5	364	21.8[d]	191	17.7[d]	45	14.0
5-10	9,634	45.9	782	39.0[d,e]	358	41.0[d,f]	87	39.3[e,f]
10-15	6,097	48.8	677	41.6[d,e]	272	44.9[d,f]	74	41.6[e,f]
15+	5,903	50.4[b]	1,043	45.3[d,e]	431	47.3[b,d,f]	128	43.3[e,f]
Visited an endocrinologist in 2004								
Yes	2,190	46.2	199	39.9[d,e]	122	40.7[d,f]	23	36.8[e,f]
No	24,685	42.5	2,667	37.5[d,e]	1,130	35.4[d]	311	32.6
Visited a psychiatrist in 2004								
Yes	499	31.5[a,c]	97	28.8[a,e]	276	35.9	64	30.4[c,e]
No	26,376	43.1	2,769	38.0[d]	976	35.7[d]	270	33.1
Visited a pulmonologist in 2004								
Yes	1,873	41.5	865	37.8[d,e]	105	31.4[d,f]	104	36.6[e,f]
No	25,002	42.9	2,001	37.4[d]	1,147	36.2[d]	230	31.1
Visited a urologist in 2004								
Yes	9,960	66.9	1,081	59.7[d,e]	516	59.8[d,f]	147	58.6[e,f]
No	16,915	35.1	1,785	30.6[d]	736	27.9[d]	187	24.1

*Rates are based on person-years, and the beneficiaries with prostate cancer were removed.
Each alphabetic letter indicates a non-significant difference in the rates of the two groups as listed below.
a) DM and DM+COPD; b) DM and DM+D; c) DM and DM+COPD+D
d) DM+COPD and DM+D; e) DM+COPD and DM+COPD+D; f) DM+D and DM+COPD+D

Table 3a.DC. The results of logistic regression (Use of diabetes care in 2003)

	HbA1c in 2004	Lipid test in 2004	Eye exam in 2004
	Odds Ratio (95% CI)	Odds Ratio (95% CI)	Odds Ratio (95% CI)
Chronic conditions			
Diabetes - reference			
DM+ COPD	0.76 (0.74-0.79)	0.83 (0.80-0.86)	0.85 (0.82-0.88)
DM + D	1.02 (0.98-1.05)	0.84 (0.80-0.87)	0.95 (0.92-0.99)
DM+ COPD + D	0.72 (0.67-0.77)	0.70 (0.65-0.75)	0.94 (0.88-1.01)
Age-group			
67-69 - reference			
70-74	1.00 (0.97-1.04)	0.95 (0.92-0.98)	1.15 (1.12-1.19)
75-79	0.92 (0.89-0.95)	0.77 (0.74-0.79)	1.23 (1.19-1.26)
80-84	0.83 (0.81-0.86)	0.58 (0.56-0.60)	1.22 (1.19-1.26)
85+	0.66 (0.64-0.69)	0.34 (0.32-0.35)	1.17 (1.13-1.21)
Sex			
Male - reference			
Female	1.11 (1.09-1.13)	1.06 (1.04-1.08)	1.14 (1.12-1.17)
Race/ethnicity			
White - reference			
Black	0.91 (0.88-0.94)	0.77 (0.74-0.79)	0.92 (0.89-0.95)
Asian	0.79 (0.73-0.86)	1.20 (1.10-1.31)	0.78 (0.72 0.84)
Hispanic	0.82 (0.77-0.87)	1.20 (1.12-1.29)	0.95 (0.90-1.02)
Others	0.60 (0.56-0.64)	0.65 (0.60-0.70)	0.83 (0.77-0.89)
In Medicaid-administered program			
No - reference			
Yes	1.07 (1.04-1.10)	0.80 (0.78-0.82)	0.87 (0.84-0.89)
Median household income of zip code			
< $34,000 - reference			
$34,000-$45,000	1.13 (1.10-1.16)	1.08 (1.06-1.11)	1.04 (1.02-1.07)
> $45,000	1.08 (1.05-1.11)	1.15 (1.12-1.18)	1.11 (1.08-1.14)
Charlson score			
0 - reference			
1-2	0.88 (0.86-0.90)	0.90 (0.88-0.93)	0.91 (0.89-0.93)
3+	0.80 (0.78-0.83)	0.85 (0.82-0.87)	0.84 (0.82-0.86)
History of hospitalization in 2001 or 2002			
No - reference			
Yes	0.81 (0.79-0.83)	0.80 (0.78-0.82)	0.88 (0.87-0.90)
No. of month alive			
	1.21 (1.20-1.22)	1.29 (1.28-1.30)	1.21 (1.20-1.22)
U.S. region of residence			
Northeast - reference			
Midwest	1.22 (1.18-1.26)	0.77 (0.75-0.80)	0.73 (0.71-0.75)
South	1.02 (1.00-1.05)	0.85 (0.83-0.88)	0.81 (0.79-0.83)
West	0.97 (0.94-1.01)	0.78 (0.75-0.80)	0.73 (0.71-0.75)
Rural residence			
No - reference			
Yes	1.19 (1.16-1.22)	0.90 (0.88-0.92)	1.04 (1.02-1.07)
Number of physician office visits in 2004			
< 5 - reference			
5-10	2.04 (1.98-2.09)	2.55 (2.49-2.61)	2.72 (2.65-2.78)
10-15	2.33 (2.26-2.40)	3.07 (2.98-3.16)	4.05 (3.93-4.16)
15 +	2.36 (2.29-2.44)	3.50 (3.39-3.61)	5.57 (5.41-5.74)
Visited an endocrinologist in 2004			
No - reference			
Yes	3.20 (3.03-3.37)	1.67 (1.59-1.74)	1.28 (1.23-1.33)
Visited an obstetrician-gynecologist in 2004			
No - reference			
Yes	0.77 (0.73-0.81)	1.17 (1.11-1.23)	1.17 (1.12-1.22)
Visited a psychiatrist in 2004			
No - reference			
Yes	0.92 (0.89-0.97)	0.67 (0.64-0.70)	0.99 (0.95-1.03)
Visited a pulmonologist in 2004			
No - reference			
Yes	0.84 (0.81-0.87)	0.82 (0.80-0.85)	0.84 (0.81-0.87)
-2 Log likelihood	236036.7	234151.56	262211.52
C-statistic	0.689	0.738	0.708

Table A.3a.PRV. The results of logistic regression (Use of preventive services in 2004)

	Flu vaccine in 2004	PSA test in 2004
	Odds Ratio (95% CI)	Odds Ratio (95% CI)
Chronic conditions		
Diabetes - reference		
DM+ COPD	1.07 (1.03-1.11)	0.99 (0.94-1.05)
DM + D	1.12 (1.08-1.16)	0.90 (0.83-0.98)
DM+ COPD + D	1.03 (0.95-1.11)	0.93 (0.81-1.08)
Age-group		
67-69 - reference		
70-74	1.12 (1.09-1.15)	0.93 (0.89-0.97)
75-79	1.19 (1.16-1.23)	0.82 (0.78-0.86)
80-84	1.27 (1.23-1.31)	0.67 (0.63-0.70)
85+	1.37 (1.32-1.42)	0.52 (0.49-0.56)
Sex		
Male - reference		
Female	1.01 (0.99-1.03)	
Race/ethnicity		
White - reference		
Black	0.50 (0.49-0.52)	0.92 (0.86-0.98)
Asian	1.01 (0.93-1.09)	1.33 (1.16-1.53)
Hispanic	0.51 (0.48-0.55)	1.04 (0.93- 1.17)
Others	0.66 (0.61-0.71)	0.87 (0.77- 1.00)
In Medicaid-administered program		
No - reference		
Yes	0.73 (0.71-0.75)	0.82 (0.77-0.87)
Median household income of zip code		
< $34,000 - reference		
$34,000-$45,000	1.20 (1.18-1.23)	0.98 (0.94-1.02)
> $45,000	1.35 (1.32-1.39)	0.98 (0.94-1.03)
Charlson score		
0 - reference		
1-2	1.00 (0.98-1.02)	0.88 (0.85-0.92)
3+	0.97 (0.94-1.00)	0.79 (0.76-0.83)
History of hospitalization in 2001 or 2002		
No - reference		
Yes	0.99 (0.97-1.01)	0.87 (0.84-0.90)
No. of month alive		
	3.51 (3.25-3.79)	1.21 (1.19-1.23)
U.S. region of residence		
Northeast - reference		
Midwest	1.50 (1.46-1.54)	1.00 (0.95-1.05)
South	1.02 (0.99-1.04)	1.00 (0.95-1.04)
West	0.96 (0.93-0.99)	0.91 (0.86-0.97)
Rural residence		
No - reference		
Yes	1.25 (1.22-1.28)	0.95 (0.91-0.99)
Number of physician office visits in 2004		
< 5 - reference		
5-10	1.54 (1.50-1.58)	1.28 (1.22-1.33)
10-15	1.79 (1.74-1.85)	1.22 (1.16-1.28)
15 +	2.11 (2.05-2.17)	1.18 (1.12-1.25)
Visited an endocrinologist in 2004		
No - reference		
Yes	0.91 (0.88-0.95)	0.73 (0.68-0.77)
Visited an obstetrician-gynecologist in 2004		
No - reference		
Yes	1.04 (0.99-1.08)	
Visited a psychiatrist in 2004		
No - reference		
Yes	0.89 (0.85-0.93)	0.74 (0.68- 0.81)
Visited a pulmonologist in 2004		
No - reference		
Yes	1.00 (0.97-1.04)	0.86 (0.82-0.92)
Visited an urologist in 2004		
No - reference		
Yes		3.80 (3.65-3.95)
Number of diabetic care services received in 2004		
	1.22 (1.20-1.23)	1.82 (1.79-1.86)
-2 Log likelihood	252609.91	87700.19
C-statistic	0.661	0.747

Table A.3b.1. Odds ratio (95% CI) for HbA1c testing in 2004 adjusting for age-group, personal characteristics (PC), PC + health status, and PC + health status + health service factors (full model) using different cohorts as the reference cohort.

	Age-group adjusted	PC	PC + health status	Full model
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Diabetes as a reference				
DM (reference)	1	1	1	1
DM + COPD	0.63 (0.61-0.65)	0.64 (0.62-0.66)	0.77 (0.75-0.80)	0.76 (0.74-0.79)
DM + D	0.84 (0.81-0.87)	0.84 (0.81-0.87)	0.95 (0.91-0.98)	1.02 (0.98-1.05)
All three diseases	0.50 (0.47-0.53)	0.51 (0.48-0.54)	0.66 (0.62-0.71)	0.72 (0.67-0.77)
Diabetes + depression as reference				
DM	1.19 (1.15-1.24)	1.20 (1.16-1.24)	1.06 (1.02-1.09)	0.99 (0.95-1.02)
DM + COPD	0.75 (0.72-0.79)	0.77 (0.73-0.80)	0.81 (0.78-0.85)	0.77 (0.73-0.80)
DM + D (reference)	1	1	1	1
All three diseases	0.60 (0.56-0.64)	0.61 (0.57-0.65)	0.70 (0.65-0.75)	0.71 (0.66-0.77)
Diabetes + COPD as reference				
DM	1.58 (1.53-1.63)	1.56 (1.51-1.61)	1.30 (1.25-1.34)	1.31 (1.27-1.36)
DM + COPD (reference)	1	1	1	1
DM + D	1.33 (1.27-1.39)	1.30 (1.25-1.36)	1.23 (1.17-1.29)	1.33 (1.27-1.40)
All three diseases	0.79 (0.74-0.85)	0.79 (0.74-0.85)	0.86 (0.80-0.92)	0.95 (0.88-1.02)

DM = diabetes only; COPD = chronic obstructive pulmonary disease; D = depression

Table A.3b.2. Odds ratio (95% CI) for lipid testing in 2004 adjusting for age-group, personal characteristics (PC), PC + health status, and PC + health status + health service factors (full model) using different cohorts as the reference cohort.

	Age-group adjusted	PC	PC + health status	Full model
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Diabetes as a reference				
DM (reference)	1	1	1	1
DM + COPD	0.68 (0.66-0.70)	0.71 (0.69-0.73)	0.86 (0.83-0.89)	0.83 (0.80-0.86)
DM + D	0.65 (0.63-0.68)	0.67 (0.65-0.69)	0.74 (0.72-0.77)	0.84 (0.80-0.87)
All three diseases	0.44 (0.42-0.47)	0.47 (0.45-0.51)	0.61 (0.57-0.65)	0.70 (0.65-0.75)
Diabetes + depression as reference				
DM	1.53 (1.48-1.58)	1.49 (1.44-1.54)	1.35 (1.30-1.40)	1.20 (1.15-1.24)
DM + COPD	1.04 (1.00-1.09)	1.06 (1.01-1.10)	1.16 (1.11-1.12)	0.99 (0.95-1.04)
DM + D (reference)	1	1	1	1
All three diseases	0.68 (0.63-0.73)	0.71 (0.66-0.76)	0.82 (0.77-0.89)	0.84 (0.78-0.91)
Diabetes + COPD as reference				
DM	1.47 (1.43-1.52)	1.41 (1.37-1.46)	1.16 (1.13-1.20)	1.21 (1.16-1.25)
DM + COPD (reference)	1	1	1	1
DM + D	0.96 (0.92-1.00)	0.95 (0.91-0.99)	0.86 (0.82-0.90)	1.01 (0.96-1.06)
All three diseases	0.65 (0.61-0.70)	0.67 (0.63-0.72)	0.71 (0.66-0.76)	0.84 (0.78-0.91)

DM = diabetes only; COPD = chronic obstructive pulmonary disease; D = depression

Table A.3b.3. Odds ratio (95% CI) for eye examination in 2004 adjusting for age-group, personal characteristics (PC), PC + health status, and PC + health status + health service factors (full model) using different cohorts as the reference cohort.

	Age-group adjusted	PC	PC + health status	Full model
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Diabetes as a reference				
DM (reference)	1	1	1	1
DM + COPD	0.79 (0.76-0.81)	0.82 (0.79-0.84)	0.92 (0.89-0.95)	0.85 (0.82-0.88)
DM + D	0.84 (0.81-0.86)	0.84 (0.82-0.87)	0.90 (0.87-0.93)	0.95 (0.92-0.99)
All three diseases	0.70 (0.65-0.74)	0.73 (0.69-1.01)	0.87 (0.82-0.93)	0.94 (0.88-1.01)
Diabetes + depression as reference				
DM	1.20 (1.16-1.24)	1.19 (1.15-1.22)	1.11 (1.08-1.15)	1.05 (1.01-1.09)
DM + COPD	0.94 (0.90-0.98)	0.97 (0.93-1.01)	1.02 (0.98-1.07)	0.89 (0.85-0.94)
DM + D (reference)	1	1	1	1
All three diseases	0.83 (0.78-0.89)	0.87 (0.81-0.93)	0.97 (0.90-1.04)	0.99 (0.92-1.07)
Diabetes + COPD as reference				
DM	1.27 (1.24-1.31)	1.22 (1.19-1.26)	1.09 (1.06-1.13)	1.18 (1.14-1.22)
DM + COPD (reference)	1	1	1	1
DM + D	1.06 (1.02-1.11)	1.03 (0.09-1.08)	0.98 (0.94-1.03)	1.12 (1.07-1.17)
All three diseases	0.89 (0.83-0.95)	0.90 (0.84-0.96)	0.95 (0.89-1.02)	1.11 (1.03-1.20)

DM = diabetes only; COPD = chronic obstructive pulmonary disease; D = depression

Table A. 3b.4. Odds ratio (95% CI) for influenza immunization in 2004 adjusting for age-group, personal characteristics (PC), PC + health status, and PC + health status + health service factors (full model) using different cohorts as the reference cohort.

	Age-group adjusted	PC	PC + health status	Full model
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Diabetes as a reference				
DM (reference)	1	1	1	1
DM + COPD	1.03 (1.00-1.07)	1.06 (1.03-1.10)	1.09 (1.05-1.12)	1.07 (1.03-1.11)
DM + D	1.01 (0.98-1.05)	1.04 (1.01-1.08)	1.06 (1.02-1.10)	1.12 (1.08-1.16)
All three diseases	0.84 (0.79-0.90)	0.90 (0.84-0.97)	0.94 (0.88-1.01)	1.03 (0.95-1.11)
Diabetes + depression as reference				
DM	0.99 (0.96-1.03)	0.96 (0.93-0.99)	0.95 (0.91-0.98)	0.89 (0.86-0.93)
DM + COPD	1.02 (0.98-1.07)	1.02 (0.98-1.07)	1.03 (0.98-1.08)	0.95 (0.91-1.00)
DM + D (reference)	1	1	1	1
All three diseases	0.83 (0.77-0.90)	0.87 (0.80-0.94)	0.89 (0.82-0.96)	0.92 (0.85-0.99)
Diabetes + COPD as reference				
DM	0.97 (0.94-1.00)	0.94 (0.91-0.97)	0.92 (0.89-0.95)	0.94 (0.90-0.97)
DM + COPD (reference)	1	1	1	1
DM + D	0.98 (0.94-1.02)	0.98 (0.94-1.03)	0.97 (0.93-1.02)	1.05 (1.00-1.10)
All three diseases	0.82 (0.76-0.88)	0.85 (0.79-0.92)	0.87 (0.80-0.94)	0.96 (0.89-1.04)

DM = diabetes only; COPD = chronic obstructive pulmonary disease; D = depression

Table A.3b.6. Odds ratio (95% CI) for PSA testing in 2004 adjusting for age-group, personal characteristics (PC), PC + health status, and PC + health status + health service factors (full model) using different cohorts as the reference cohort.

	Age-group adjusted	PC	PC + health status	Full model
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Diabetes as a reference				
DM (reference)	1	1	1	1
DM + COPD	0.63 (0.60-0.66)	0.66 (0.63-0.69)	0.90 (0.86-0.95)	0.98 (0.93-1.04)
DM + D	0.65 (0.60-0.69)	0.68 (0.63-0.72)	0.82 (0.77-0.88)	0.90 (0.83-0.97)
All three diseases	0.42 (0.37-0.48)	0.46 (0.41-0.52)	0.77 (0.67-0.88)	0.91 (0.79-1.05)
Diabetes + depression as reference				
DM	1.55 (1.45-1.66)	1.48 (1.38-1.59)	1.22 (1.13-1.31)	1.12 (1.03-1.21)
DM + COPD	0.97 (0.90-1.06)	0.97 (0.90-1.05)	1.10 (1.01-1.19)	1.10 (1.00-1.20)
DM + D (reference)	1	1	1	1
All three diseases	0.66 (0.57-0.75)	0.69 (0.60-0.79)	0.94 (0.81-1.09)	1.02 (0.87-1.20)
Diabetes + COPD as reference				
DM	1.59 (1.52-1.66)	1.53 (1.46-1.60)	1.11 (1.05-1.17)	1.02 (0.96-1.08)
DM + COPD (reference)	1	1	1	1
DM + D	1.03 (0.95-1.11)	1.03 (0.95-1.12)	0.91 (0.84-0.99)	0.91 (0.83-1.00)
All three diseases	0.67 (0.59-0.77)	0.71 (0.62- 0.80)	0.85 (0.74-0.98)	0.93 (0.80-1.08)

DM = diabetes only; COPD = chronic obstructive pulmonary disease; D = depression

Appendix B

Table B.1.1 Patient baseline characteristics as of 01/01/03 among cohorts with diabetes only (DM), chronic obstructive pulmonary disease (COPD) only, depression only (D)

	DM		COPD		D	
	Number	%	Number	%	Number	%
All	184,941		70,031		59,158	
Age-group (years)						
67-69	29,025	15.7	8,320	11.9	7,302	12.3
70-74	51,276	27.7	16,749	23.9	12,220	20.7
75-79	47,374	25.6	18,045	25.8	13,007	22.0
80-84	33,017	17.9	14,354	20.5	12,172	20.6
85+	24,249	13.1	12,563	17.9	14,457	24.4
Age (mean)		***76.5***		***77.8***		***78.9***
Gender						
Male	78,141	42.3	32,422	46.3	13,218	22.3
Female	106,800	57.8	37,609	53.7	45,940	77.7
Race/ethnicity						
White	153,236	82.9	64,421	92.0	55,012	93.0
Black	21,732	11.8	3,605	5.2	2,578	4.4
Hispanic	4,110	2.2	769	1.1	793	1.3
Asian	2,815	1.5	633	0.9	314	0.5
Others	3,048	1.7	603	0.9	461	0.8
In Medicaid-administered program						
Yes	31,473	17.0	12,006	17.1	10,938	18.5
No	153,468	83.0	58,025	82.9	48,220	81.5
Median household income of zip code [b, e]						
< $34,000	63,024	34.1	24,349	34.8	17,122	29.0
$34,000-$45,000	61,966	33.5	23,783	34.0	20,265	34.3
> $45,000	59,925	32.4	21,893	31.3	21,764	36.8
Income (mean)		***$41,936***		***$41,648***		***$43,909***
Charlson score						
0	59,665	32.3	15,629	22.3	15,603	26.4
1-2	72,112	39.0	28,381	40.5	23,693	40.1
3+	53,164	28.8	26,021	37.2	19,862	33.6
Charlson score (mean)		***1.9***		***2.4***		***2.1***
History of hospitalization in 2001 or 2002						
Yes	69,279	37.5	28,989	41.4	28,783	48.7
No	115,662	62.5	41,042	58.6	30,375	51.4
Months alive (mean)		***11.6***		***11.2***		***11.4***
U.S. region of residence [e]						
Midwest	48,646	26.3	17,956	25.6	16,861	28.5
Northeast	38,379	20.8	13,610	19.4	12,073	20.4
South	73,861	39.9	28,553	40.8	21,888	37.0
West	24,045	13.0	9,908	14.2	8,334	14.1
Rural residence [c, f]						
Yes	51,635	27.9	21,565	30.8	16,171	27.3
No	133,262	72.1	48,454	69.2	42,973	72.7

Alphabetic letters represent that the difference in the distribution of variables is not significant between two groups as listed below.
a) DM and DM+COPD; b) DM and DM+D; c) DM and DM+COPD+D
d) DM+COPD and DM+D; e) DM+COPD and DM+COPD+D; f) DM+D and DM+COPD+D

Table B.1.2. Health services that patients received among cohorts with diabetes only (DM), chronic obstructive pulmonary disease (COPD) only, depression only (D)

	DM		COPD		D	
	Number	%	Number	%	Number	%
Health services that patients received in 2003						
Number of physician office visits in 2003						
< 5	54,076	29.2	21,869	31.2	22,657	38.3
5-10	61,239	33.1	20,394	29.1	15,494	26.2
10-15	36,460	19.7	13,533	19.3	9,751	16.5
15 +	33,166	17.9	14,235	20.3	11,256	19.0
No. of visits (mean)		***9.1***		***9.4***		***9.0***
Visited an endocrinologist in 2003						
Yes	12,963	7.0	1,120	1.6	1,021	1.7
No	171,978	93.0	68,911	98.4	58,137	98.3
Visited an obstetrician-gynecologist in 2003 (women only)[b, e]						
Yes	9,247	8.7	3,181	8.5	4,718	10.3
No	97,553	91.3	34,428	91.5	41,222	89.7
Visited a psychiatrist in 2003						
Yes	5,861	3.2	2,877	4.1	13,315	22.5
No	179,080	96.8	67,154	95.9	45,843	77.5
Visited a pulmonologist in 2003						
Yes	12,738	6.9	20,570	29.4	4,082	6.9
No	172,203	93.1	49,461	70.6	55,076	93.1
Visited a urologist in 2003 (men only)						
Yes	21,759	27.9	9,080	28.0	3,992	30.2
No	56,382	72.2	23,342	72.0	9,226	69.8
Number of Diabetic Services in 2003 (mean)		***1.84***		***0.85***		***0.86***
Health services that patients received in 2004*						
Number of physician office visits in 2004						
< 5	49,669	28.9	18,799	31.3	19,971	38.1
5-10	55,416	32.3	17,408	29.0	13,694	26.1
10-15	34,171	19.9	11,633	19.4	8,850	16.9
15 +	32,507	18.9	12,258	20.4	9,974	19.0
No. of visits (mean)		***9.3***		***9.4***		***9.0***
Visited an endocrinologist in 2004						
Yes	12,663	7.4	1,053	1.8	1,001	1.9
No	159,100	92.6	59,045	98.3	51,488	98.1
Visited an obstetrician-gynecologist in 2004 (women only)						
Yes	8,247	8.4	2,640	8.2	4,131	10.1
No	90,459	91.6	29,554	91.8	36,706	89.9
Visited a psychiatrist in 2004						
Yes	6,136	3.6	2,567	4.3	10,970	20.9
No	165,627	96.4	57,531	95.7	41,519	79.1
Visited a pulmonologist in 2004						
Yes	12,920	7.5	17,537	29.2	3,760	7.2
No	158,843	92.5	42,561	70.8	48,729	92.8
Visited a urologist in 2004 (men only)						
Yes	20,608	28.2	7,890	28.3	3,551	30.5
No	52,449	71.8	20,014	71.7	8,101	69.5
Number of Diabetic Services in 2004 (mean)		***1.88***		***0.93***		***0.94***

* Persons who died in 2003 are excluded
Alphabetic letters represent that the difference in the distribution of variables is not significant between two groups as listed below.
a) DM and DM+COPD; b) DM and DM+D; c) DM and DM+COPD+D
d) DM+COPD and DM+D; e) DM+COPD and DM+COPD+D; f) DM+D and DM+COPD+D

Table B.2.1_03. Crude and age-adjusted rates of hemoglobin A1c testing in 2003 among study cohorts: diabetes only (DM), chronic obstructive pulmonary disease only (COPD) and depression only (D)

	DM		COPD		D	
	Tested	Rate*/ 100	Tested	Rate*/ 100	Tested	Rate*/ 100
Crude Rates						
Total	130,300	72.9	3,569	5.5	3,024	5.4
Age-group (years)						
67-69	21,418	74.8	485	6.1	481	6.7
70-74	38,107	75.7	934	5.8	746	6.2
75-79	34,208	74.2	987	5.8	730	5.8
80-84	22,489	71.4	683	5.2	555	4.9
85+	14,078	64.4	480	4.5	512	4.1
Age-adjusted Rates						
Total	130,300	72.9	3,569	5.6	3,024	5.7
Sex						
Male	54,895	72.2	1,790	5.7	754	6.2
Female	75,405	73.7	1,860	5.5	2,270	5.5
Race/ethnicity						
White	109,314	73.9	3,235	5.5	2,795	5.7
Black	14,518	69.1	204	6.3	131	5.4
Asian	1,917	69.2	36	5.8	18	6.3
Hispanic	2,689	66.7	57	7.8	60	7.8
Others	1,862	63.0	37	6.7	20	5.1
In Medicaid-administered program						
Yes	20,641	69.6	604	5.7	541	5.8
No	109,659	73.6	2,965	5.5	2,483	5.6
Median household income of zip code						
< $34,000	43,280	71.0	1,178	5.3	843	5.4
$34,000-$45,000	44,477	74.3	1,173	5.4	1,037	5.7
> $45,000	42,523	73.5	1,218	6.1	1,144	5.9
Charlson score						
0	44,517	74.9	668	4.3	792	5.0
1 or 2	51,307	73.1	1,469	5.6	1,266	6.0
3+	34,476	71.0	1,432	6.6	966	5.9
History of hospitalization in 2001 or 2002						
Yes	45,351	70.1	1,518	5.7	1,588	5.9
No	84,949	74.7	2,051	5.5	1,436	5.5
U.S. region of residence						
Midwest	35,468	75.6	925	6.0	893	6.0
Northeast	26,446	71.7	811	6.2	660	6.2
South	51,782	72.4	1,215	4.8	972	4.8
West	16,596	71.3	578	6.5	498	6.5
Rural residence						
Yes	36,966	74.0	993	5.0	798	5.4
No	93,305	72.5	2,576	5.8	2,224	5.8
Number of physician office visits in 2003						
< 5	29,956	61.3	553	3.2	702	3.7
5-10	46,587	76.9	1,006	5.1	797	5.4
10-15	28,319	78.1	828	6.3	613	6.4
15+	25,438	77.0	1,182	8.5	912	8.2
Visited an endocrinologist in 2003						
Yes	11,538	90.7	3,452	9.9	2,926	9.9
No	118,762	71.6	117	5.5	98	5.6
Visited an obstetrician-gynecologist in 2003 (women only)						
Yes	6,735	72.5	1,659	6.4	1,977	6.2
No	68,670	73.8	201	5.4	293	5.4
Visited a psychiatrist in 2003						
Yes	3,601	68.1	3,418	6.6	2,293	6.0
No	126,699	73.1	151	7.8	731	5.6
Visited a pulmonologist in 2003						
Yes	8,321	72.9	2,375	6.4	2,744	8.1
No	121,979	72.9	1,194	5.2	280	5.5

*Rates are based on person-years

Table B.2.2_03. Crude and age-adjusted rates of lipid testing in 2003 among study cohorts: diabetes only (DM), chronic obstructive pulmonary disease only (COPD) and depression only (D)

	DM		COPD		D	
	Tested	Rate*/ 100	Tested	Rate*/ 100	Tested	Rate*/ 100
Crude Rates						
Total	119,167	66.8	28,827	44.5	23,550	42.3
Age-group (years)						
67-69	20,768	72.5	4,094	51.2	3,956	55.0
70-74	36,786	73.0	8,139	50.9	6,493	54.4
75-79	32,146	69.8	7,980	47.2	6,117	48.7
80-84	19,657	62.4	5,518	42.0	4,310	37.8
85+	9,810	44.8	3,096	28.8	2,674	21.2
Age-adjusted Rates						
Total	119,167	66.5	28,827	45.5	23,550	45.7
Sex						
Male	51,507	67.0	13,668	45.7	5,593	46.5
Female	67,660	66.6	15,159	45.4	17,957	45.6
Race/ethnicity						
White	100,604	67.9	26,758	45.9	21,898	45.9
Black	12,156	57.3	1,188	36.5	916	39.1
Asian	1,980	70.9	298	50.2	164	55.0
Hispanic	2,696	66.6	381	54.0	418	54.0
Others	1,731	57.8	202	37.4	154	40.2
In Medicaid-administered program						
Yes	16,681	56.8	3,829	36.6	3,106	35.8
No	102,486	68.5	24,998	47.2	20,444	47.8
Median household income of zip code						
< $34,000	38,181	62.4	9,397	42.5	6,607	43.6
$34,000-$45,000	40,072	66.8	9,813	45.5	7,967	45.0
> $45,000	40,900	70.6	9,614	48.8	8,975	48.1
Charlson score						
0	41,085	67.8	6,766	43.5	7,704	42.1
1 or 2	47,182	67.2	12,106	46.2	9,472	41.2
3+	30,900	64.7	9,955	46.3	6,374	41.0
History of hospitalization in 2001 or 2002						
Yes	40,382	68.7	15,327	48.5	10,046	47.7
No	78,785	63.1	13,500	43.1	13,504	43.2
U.S. region of residence						
Midwest	30,371	64.6	6,754	42.0	6,001	42.4
Northeast	26,179	71.2	6,195	50.9	5,063	49.5
South	47,181	65.5	11,937	45.6	9,171	46.5
West	15,429	66.1	3,940	44.2	3,314	45.1
Rural residence						
Yes	30,926	61.6	7,961	40.7	5,911	41.9
No	88,219	68.4	20,860	47.6	17,631	47.2
Number of physician office visits in 2003						
< 5	23,555	48.9	4,755	28.7	4,596	28.9
5-10	43,219	70.9	9,319	47.9	7,206	49.2
10-15	27,203	74.8	6,939	52.8	5,244	55.3
15+	25,190	76.2	7,814	55.9	6,504	58.4
Visited an endocrinologist in 2003						
Yes	10,389	80.9	606	57.6	575	58.1
No	108,778	65.5	28,221	45.3	22,975	45.5
Visited an obstetrician-gynecologist in 2003(women only)						
Yes	7,126	76.1	1,760	55.7	2,822	58.9
No	60,534	65.7	13,399	44.4	15,135	43.9
Visited a psychiatrist in 2003						
Yes	2,594	51.3	766	33.7	5,004	42.5
No	116,573	67.0	28,061	45.9	18,546	46.7
Visited a pulmonologist in 2003						
Yes	7,647	67.1	8,778	46.7	1,667	48.7
No	111,520	66.5	20,049	45.1	21,883	45.5

*Rates are based on person-years

Table B.2.3_03. Crude and age-adjusted rates of eye examination in 2003 among study cohorts: diabetes only (DM), chronic obstructive pulmonary disease only (COPD) and depression only (D)

	DM		COPD		D	
	Tested	Rate*/ 100	Tested	Rate*/ 100	Tested	Rate*/ 100
Crude Rates						
Total	90,475	50.7	27,126	41.8	24,574	44.1
Age-group (years)						
67-69	13,144	45.9	2,502	31.3	2,823	39.3
70-74	25,782	51.2	6,191	38.7	5,342	44.7
75-79	24,839	53.9	7,676	45.4	6,018	47.9
80-84	16,541	52.5	6,120	46.6	5,308	46.6
85+	10,169	46.5	4,637	43.1	5,083	40.3
Age-adjusted Rates						
Total	90,475	50.7	27,126	41.2	24,574	44.4
Sex						
Male	37,176	49.3	11,728	38.6	5,261	42.3
Female	53,299	51.9	15,398	43.7	19,313	45.2
Race/ethnicity						
White	76,597	51.8	25,395	41.9	23,129	45.1
Black	9,413	45.1	1,048	31.8	850	34.4
Asian	1,267	45.0	224	36.9	115	38.2
Hispanic	1,886	46.9	261	35.4	330	42.2
Others	1,312	44.4	198	34.9	150	35.0
In Medicaid-administered program						
Yes	12,783	43.2	3,583	33.0	3,563	36.0
No	77,692	52.2	23,543	42.9	21,011	46.2
Median household income of zip code						
< $34,000	28,855	47.5	8,568	37.7	6,625	41.1
$34,000-$45,000	30,385	50.8	9,209	41.1	8,384	44.2
> $45,000	31,225	53.9	9,347	45.2	9,564	47.4
Charlson score						
0	29,398	50.2	6,273	42.07	7,070	46.8
1 or 2	36,028	51.3	11,206	41.18	9,972	44.6
3+	25,049	51.0	9,647	40.99	7,532	42.9
History of hospitalization in 2001 or 2002						
Yes	32,137	49.4	14,989	39.6	11,221	42.6
No	58,338	51.6	12,137	43.4	13,353	45.9
U.S. region of residence						
Midwest	22,302	47.5	6,332	37.4	6,530	41.6
Northeast	21,037	56.8	6,081	47.2	5,671	50.4
South	35,875	50.3	11,028	41.4	8,993	43.8
West	11,255	48.4	3,683	39.4	3,379	43.3
Rural residence						
Yes	23,794	47.8	7,634	37.9	6,323	41.8
No	66,664	51.8	19,487	42.7	18,242	45.5
Number of physician office visits in 2003						
< 5	13,509	27.8	3,797	20.9	5,057	25.4
5-10	31,713	52.6	8,081	40.6	7,022	45.8
10-15	22,661	62.6	6,877	51.0	5,400	55.5
15 +	22,592	68.5	8,371	58.3	7,095	63.2
Visited an endocrinologist in 2003						
Yes	8,154	64.4	549	51.7	561	56.4
No	82,321	49.6	26,577	41.0	24,013	44.2
Visited an obstetrician-gynecologist in 2003 (women only)						
Yes	5,866	64.2	1,859	59.4	2,748	59.4
No	47,433	50.8	13,539	42.1	16,565	43.3
Visited a psychiatrist in 2003						
Yes	2,396	45.0	993	39.3	5,823	46.3
No	88,079	50.9	26,133	41.3	18,751	43.9
Visited a pulmonologist in 2003						
Yes	5,994	52.3	8,743	45.9	1,724	48.2
No	84,481	50.6	18,383	39.3	22,850	44.2

*Rates are based on person-years

Table B.2.4_03 Crude and age-adjusted rates of influenza vaccination in 2003 among study cohorts: diabetes only (DM), chronic obstructive pulmonary disease only (COPD) and depression only (D)

	DM		COPD		D	
	Tested	Rate*/100	Tested	Rate*/100	Tested	Rate*/100
Crude Rates						
Total	96,505	54.7	36,282	57.4	28,840	52.8
Age-group (years)						
67-69	14,384	50.4	4,229	53.5	3,774	52.7
70-74	27,757	55.4	9,336	59.2	6,616	55.8
75-79	26,027	57.0	9,853	59.5	6,968	56.0
80-84	17,497	56.5	7,514	58.8	5,925	53.1
85+	10,840	51.3	5,350	52.4	5,557	46.1
Age-adjusted Rates						
Total	96,505	54.7	36,282	57.4	28,840	53.6
Sex						
Male	41,966	56.3	16,857	57.4	6,621	54.7
Female	54,539	53.8	19,425	57.7	22,219	53.4
Race/ethnicity						
White	84,649	57.9	34,238	58.9	27,432	55.0
Black	7,655	37.1	1,195	37.6	816	34.3
Asian	1,487	53.9	335	55.4	150	50.0
Hispanic	1,471	36.4	268	38.0	272	35.2
Others	1,243	43.2	246	45.5	170	42.2
In Medicaid-administered program						
Yes	11,559	39.7	4,408	42.1	3,636	37.9
No	84,946	57.7	31,874	60.4	25,204	56.8
Median household income of zip code						
< $34,000	29,237	48.7	11,504	52.4	7,689	48.7
$34,000-$45,000	33,337	56.4	12,654	58.9	10,140	54.8
> $45,000	33,919	59.2	12,122	61.5	11,009	56.6
Charlson scores						
0	31,928	54.6	8,979	59.8	8,621	56.4
1 or 2	38,632	55.5	15,234	57.9	11,930	54.6
3+	25,945	54.2	12,069	55.5	8,289	50.2
History of hospitalization in 2001 or 2002						
Yes	34,114	53.4	19,693	55.1	13,116	52.2
No	62,391	55.5	16,589	60.3	15,724	54.8
U.S. region of residence						
Midwest	26,958	58.1	9,576	59.2	8,704	57.3
Northeast	20,852	57.0	7,338	60.0	5,766	53.1
South	37,161	52.8	14,667	56.8	10,514	52.2
West	11,531	50.2	4,697	52.5	3,856	51.0
Rural Residence						
Yes	25,914	52.7	10,618	54.4	7,778	52.2
No	70,574	55.5	25,658	58.8	21,053	54.2
Number of physician office visits in 2003						
< 5	17,311	36.6	6,202	37.5	6,852	37.0
5-10	34,412	57.4	11,524	59.5	8,593	57.3
10-15	22,706	62.9	8,809	66.6	6,069	63.0
15 +	22,076	67.0	9,747	69.2	7,326	65.5
Visited an endocrinologist in 2003						
Yes	7,462	54.3	638	62.5	583	59.1
No	89,043	59.4	35,644	57.3	28,257	53.5
Visited an obstetrician-gynecologist in 2003 (women only)						
Yes	5,739	62.6	2,136	68.3	2,922	62.4
No	48,800	52.9	17,289	56.5	19,297	52.1
Visited a psychiatrist in 2003						
Yes	2,099	41.1	979	41.5	6,093	50.0
No	94,406	55.2	35,303	58.0	22,747	54.7
Visited a pulmonologist visits in 2003						
Yes	5,961	54.3	11,443	62.6	1,769	52.7
No	90,544	54.7	24,839	55.2	27,071	53.7

*Rates are based on person-years

Table B.2.5_03/04. Crude and age-adjusted rates of mammogram examination in 2003/04 among study cohorts (women only): diabetes only(DM), chronic obstructive pulmonary disease only (COPD) and depression only(D)

	DM		COPD		D	
	Number	Rate*	Number	Rate*	Number	Rate*
Crude Rates						
Total	41,226	44.8	11,751	38.8	16,001	41.9
Age-group (years)						
67-69	8,098	36.1	1,997	54.7	3,250	66.4
70-74	13,779	33.1	3,560	50.0	4,983	60.7
75-79	11,070	27.8	3,331	42.9	4,210	49.1
80-84	6,090	17.8	2,033	33.2	2,550	32.5
85+	2,189	7.3	830	14.8	1,008	11.7
Age-adjusted rates						
Total	41,226	45.4	11,751	41.3	16,001	47.2
Sex						
Male						
Female	41,226	45.4	11,751	41.3	16,001	47.2
Race/ethnicity						
White	33,568	46.8	11,001	41.7	14,957	47.8
Black	5,569	41.1	513	37.0	660	40.7
Asian	578	35.0	71	31.0	60	31.9
Hispanic	901	39.0	98	39.4	216	41.3
Others	610	37.0	68	30.3	108	40.2
In Medicaid-administered program						
Yes	6,479	49.0	1,436	26.8	1,793	30.0
No	34,747	49.0	10,315	44.7	14,208	50.9
Median household income of zip code						
< $34,000	14,028	42.1	3,717	38.0	4,517	43.7
$34,000-$45,000	14,159	46.9	4,023	41.9	5,610	48.1
> $45,000	13,034	47.6	4,010	44.2	5,874	49.3
Charlson score						
0	17,559	48.7	3,862	45.4	6,929	54.2
1 or 2	16,330	45.6	5,238	41.7	6,409	46.5
3+	7,337	39.4	2,651	36.4	2,663	37.2
History of hospitalization in 2001 or 2002						
Yes	12,557	40.6	5,670	37.2	5,820	41.3
No	28,669	48.0	6,081	46.0	10,181	51.5
U.S. region of residence						
Midwest	11,057	46.6	2,896	41.0	4,413	47.4
Northeast	8,398	45.8	2,408	42.9	3,127	48.0
South	16,581	44.5	4,844	40.9	6,176	46.3
West	5,188	45.2	1,603	41.0	2,285	48.2
Rural residence						
Yes	11,199	43.4	3,203	38.4	4,329	45.1
No	30,014	46.2	8,546	42.5	11,668	48.0
Number of physician office visits in 2003 and 2004						
< 5	6,804	28.9	1,622	22.8	2,733	28.3
5-10	15,578	47.8	3,883	41.8	5,217	50.4
10-15	10,252	54.1	2,983	49.2	3,756	58.1
15+	8,592	57.4	3,263	57.2	4,295	63.9
Visited an endocrinologist in 2003 or 2004						
Yes	4,378	50.8	442	47.7	640	58.9
No	36,848	44.9	11,309	41.1	15,361	46.8
Visited an obstetrician-gynecologist in 2003 or 2004						
Yes	8,982	74.6	2,895	73.6	4,451	73.9
No	32,244	41.1	8,856	36.2	11,550	41.8
Visited a psychiatrist in 2003 or 2004						
Yes	1,269	29.5	464	27.8	3,756	42.8
No	39,957	46.2	11,287	42.1	12,245	48.7
Visited a pulmonologist in 2003 or 2004						
Yes	3,831	43.4	4,636	43.8	1,579	47.9
No	37,395	45.6	7,115	39.9	14,422	47.1

*Rates are based on person-years
**This is the number of beneficiaries as of 01/01/03 and the beneficiaries with breast cancer were removed.

Table B.2.6_03 Crude and age-adjusted rates of PSA test in 2003 among study cohorts (men only): diabetes only (DM), chronic obstructive pulmonary disease only (COPD) and depression only (D)

	DM		COPD		D	
	Tested	Rate*/ 100	Tested	Rate*/ 100	Tested	Rate*/ 100
Crude Rates						
Total	27,913	42.9	9,369	36.6	3,858	37.6
Age-group (years)						
67-69	5,634	44.5	1,452	39.4	694	41.8
70-74	9,498	45.7	2,870	40.3	1,140	45.5
75-79	7,367	43.8	2,600	38.0	979	40.3
80-84	3,846	39.1	1,678	34.7	664	33.1
85+	1,568	31.1	769	24.8	381	23.0
Age-adjusted Rates						
Total	27,913	42.0	9,369	36.6	3,858	38.4
Sex						
Male	27,913	42.0	9,369	36.6	3,858	38.4
Female						
Race/ethnicity						
White	24,824	42.9	8,669	37.0	3,653	39.2
Black	1,854	36.0	381	29.5	105	25.8
Asian	373	37.8	102	31.1	29	39.9
Hispanic	485	35.2	130	40.8	51	33.3
Others	377	33.7	87	36.9	20	24.7
In Medicaid-administered program						
Yes	1,869	30.3	1,010	28.3	322	24.5
No	26,044	43.1	8,359	37.9	3,536	40.5
Median household income of zip code						
< $34,000	8,273	39.3	3,197	34.5	1,045	36.9
$34,000-$45,000	9,566	42.3	3,245	36.7	1,356	38.3
> $45,000	10,070	44.0	2,927	38.9	1,457	39.7
Charlson score						
0	10,892	44.1	2,666	39.4	1,282	43.6
1 or 2	11,001	42.1	3,958	37.1	1,590	39.1
3+	6,020	38.6	2,745	33.4	986	33.7
History of hospitalization in 2001 or 2002						
Yes	8,739	38.1	4,678	32.8	1,629	35.0
No	19,174	44.1	4,691	41.2	2,229	41.7
U.S. region of residence						
Midwest	7,375	41.6	2,406	35.5	1,046	37.2
Northeast	5,757	43.9	1,753	38.9	773	39.6
South	11,141	41.9	3,908	36.6	1,443	39.2
West	3,639	40.0	1,301	35.4	595	37.9
Rural Residence						
Yes	7,596	39.8	3,048	35.1	992	35.4
No	20,315	42.8	6,320	37.3	2,866	39.6
Number of physician office visits in 2003						
< 5	5,711	29.3	1,734	23.1	759	22.3
5-10	10,461	45.2	3,137	39.5	1,178	41.9
10-15	6,107	48.1	2,211	43.2	834	46.7
15 +	5,634	49.2	2,287	45.0	1,087	52.4
Visited an endocrinologist in 2003						
Yes	2,188	46.6	121	46.0	65	50.8
No	25,725	41.7	9,248	36.5	3,793	38.3
Visited a psychiatrist in 2003						
Yes	1,750	40.8	223	29.4	955	38.5
No	26,163	42.0	9,146	36.8	2,903	38.4
Visited a pulmonologist in 2003						
Yes	1,750	40.8	2,839	38.0	268	37.8
No	26,163	42.0	6,530	36.1	3,590	38.5
Visited a urologist in 2003						
Yes	9,948	66.0	3,768	63.5	1,679	63.6
No	17,965	34.8	5,601	28.5	2,179	29.5

*Rates are based on person-years, and the beneficiaries with prostate cancer were removed.

Table B.2.1_04. Crude and age-adjusted rates of hemoglobin A1c testing in 2004 among study cohorts: diabetes only (DM), chronic obstructive pulmonary disease only (COPD) and depression only (D)

	DM		COPD		D	
	Tested	Rate*/100	Tested	Rate*/100	Tested	Rate*/100
Crude Rates						
Total	122,461	74.2	4,480	8.0	3,883	7.8
Age-group (years)						
67-69	21,198	76.2	665	9.0	694	9.9
70-74	36,990	76.6	1,255	8.6	979	8.6
75-79	32,452	75.1	1,284	8.6	968	8.3
80-84	20,474	72.4	786	7.1	739	7.4
85+	11,347	65.0	490	6.2	503	5.3
Age-adjusted Rates						
Total	122,461	73.9	4,480	8.1	3,883	8.1
Sex						
Male	51,899	73.1	2,121	8.1	938	8.6
Female	70,562	74.6	2,359	8.1	2,945	7.9
Race/ethnicity						
White	102,566	74.8	4,086	8.0	3,546	8.0
Black	13,718	70.5	239	8.5	195	9.0
Asian	1,854	69.9	56	10.3	31	11.3
Hispanic	2,596	67.9	55	9.0	78	10.8
Others	1,727	62.8	44	9.3	33	9.1
In Medicaid-administered program						
Yes	18,833	71.0	767	8.7	731	9.2
No	103,628	74.4	3,713	8.0	3,152	7.9
Median household income of zip code						
< $34,000	40,568	71.9	936	6.4	1,093	7.1
$34,000-$45,000	41,753	75.3	1,885	8.1	1,617	8.4
> $45,000	40,123	74.5	1,659	9.6	1,173	8.9
Charlson score						
0	43,777	75.7	5,993	42.9	6,954	47.2
1 or 2	48,561	74.0	10,219	43.0	9,073	45.2
3+	30,123	71.7	7,908	42.9	6,142	43.6
History of hospitalization in 2001 or 2002						
Yes	40,956	71.1	2,511	8.4	1,767	8.4
No	81,505	75.5	1,969	7.8	2,116	7.9
U.S. region of residence						
Midwest	33,302	76.4	1,153	8.2	1,056	7.9
Northeast	25,031	73.2	966	9.0	869	9.0
South	48,585	73.2	1,689	7.4	1,405	7.7
West	15,536	71.9	672	8.6	552	8.0
Rural residence						
Yes	34,604	74.8	1,273	7.4	1,003	7.6
No	87,834	73.5	3,207	8.4	2,879	8.3
Number of physician office visits in 2004						
< 5	27,465	61.9	798	5.2	929	5.5
5-10	42,467	77.4	1,195	7.1	997	7.5
10-15	26,956	79.2	1,057	9.3	811	9.3
15 +	25,573	78.7	1,430	11.9	1,146	11.5
Visited an endocrinologist in 2004						
Yes	11,352	91.9	168	16.9	146	14.9
No	111,109	72.5	4,312	7.9	3,737	7.9
Visited an obstetrician-gynecologist in 2004 (women only)						
Yes	6,091	73.6	239	9.2	361	8.3
No	64,471	74.7	2,120	8.0	2,584	7.8
Visited a psychiatrist in 2004						
Yes	3,882	70.5	221	10.1	906	8.9
No	118,579	74.0	4,259	8.0	2,977	7.9
Visited a pulmonologist in 2004						
Yes	8,612	74.5	1,431	8.9	354	10.9
No	113,849	73.8	3,049	7.8	3,529	7.9

*Rates are based on person-years

Table B.2.2_04. Crude and age-adjusted rates of lipid testing in 2004 among study cohorts: diabetes only (DM), chronic obstructive pulmonary disease only (COPD) and depression only (D)

	DM		COPD		D	
	Tested	Rate*/100	Tested	Rate*/100	Tested	Rate*/100
Crude rates						
Total	115,376	69.9	27,311	48.9	23,550	48.9
Age-group (years)						
67-69	21,034	75.6	4,106	55.3	4,266	61.1
70-74	36,594	75.8	7,968	54.7	6,645	58.3
75-79	31,063	71.9	7,726	51.8	6,201	53.1
80-84	18,347	64.9	5,008	45.6	4,185	41.9
85+	8,338	47.8	2,503	31.6	2,253	23.8
Age-adjusted Rates						
Total	115,376	69.1	27,311	49.4	23,550	49.9
Sex						
Male	49,833	69.2	12,930	49.5	5,546	51.1
Female	65,543	69.4	14,381	49.5	18,004	49.7
Race/ethnicity						
White	97,103	70.4	25,195	49.6	21,907	50.2
Black	11,989	60.8	1,211	43.1	925	43.4
Asian	1,954	73.3	325	59.6	148	54.4
Hispanic	2,681	70.4	373	58.9	410	55.9
Others	1,649	59.2	207	44.1	145	39.5
In Medicaid-administered program						
Yes	16,103	60.5	3,695	42.0	3,045	36.9
No	99,273	70.8	23,616	50.8	19,124	46.7
Median household income of zip code						
< $34,000	37,022	65.1	8,904	46.3	6,669	48.0
$34,000-$45,000	38,796	69.4	9,211	48.9	7,917	48.9
> $45,000	39,541	73.0	9,192	53.5	8,963	52.5
Charlson score						
0	41,482	70.2	6,872	47.1	8,110	52.4
1 or 2	45,715	69.3	11,670	50.2	9,517	50.0
3+	28,179	67.7	8,769	50.4	5,923	47.5
History of hospitalization in 2001 or 2002						
Yes	38,040	66.3	14,128	47.4	9,756	47.7
No	77,336	70.8	13,183	51.9	13,794	51.8
U.S. region of residence						
Midwest	29,448	67.0	6,384	45.5	6,018	46.6
Northeast	25,303	73.9	5,793	54.5	5,005	53.6
South	45,719	68.2	11,369	49.8	9,240	51.1
West	14,899	68.4	3,763	48.4	3,287	48.4
Rural residence						
Yes	30,223	64.5	7,605	44.4	5,892	45.4
No	85,126	70.9	19,700	51.6	17,649	51.7
Number of physician office visits in 2004						
< 5	22,602	51.2	4,630	31.5	4,790	32.3
5-10	40,737	73.6	8,739	51.9	7,178	54.4
10-15	26,345	77.0	6,571	57.5	5,208	59.6
15 +	25,692	78.9	7,371	60.8	6,374	63.9
Visited an endocrinologist in 2004						
Yes	10,333	82.7	606	61.3	629	64.5
No	105,043	68.1	26,705	49.2	22,921	49.6
Visited an obstetrician-gynecologist in 2004 (women only)						
Yes	6,543	78.3	1,630	61.4	2,604	61.1
No	59,000	68.6	12,751	48.3	15,400	48.2
Visited a psychiatrist in 2004						
Yes	2,899	54.5	824	38.7	4,833	47.9
No	112,477	69.7	26,487	49.8	18,717	50.5
Visited a pulmonologist in 2004						
Yes	8,035	69.4	8,048	49.9	1,714	53.1
No	107,341	69.1	19,263	49.3	21,836	49.7

*Rates are based on person-years

Table B.2.3_04. Crude and age-adjusted rates of eye examination in 2004 among study cohorts: diabetes only (DM), chronic obstructive pulmonary disease only (COPD) and depression only (D)

	DM		COPD		D	
	Tested	Rate*/ 100	Tested	Rate*/100	Tested	Rate*/ 100
Crude Rates						
Total	85,832	52.0	24,120	43.2	22,169	44.8
Age-group (years)						
67-69	13,454	48.3	2,522	34.0	2,853	40.8
70-74	25,549	52.9	6,027	41.4	5,331	46.7
75-79	23,519	54.4	6,879	46.2	5,594	47.9
80-84	15,053	53.2	5,267	47.9	4,647	46.6
85+	8,257	47.3	3,425	43.3	3,744	39.6
Age-adjusted Rates						
Total	85,832	51.9	24,120	42.8	22,169	45.1
Sex						
Male	35,594	50.6	10,635	40.7	4,708	42.9
Female	50,238	53.1	13,485	44.9	17,461	45.9
Race/ethnicity						
White	72,526	53.0	22,566	43.6	20,814	45.7
Black	8,980	46.6	916	32.5	779	35.7
Asian	1,225	45.7	211	37.3	107	38.8
Hispanic	1,856	49.0	265	40.0	324	44.0
Others	1,245	44.9	162	34.4	145	39.5
In Medicaid-administered program						
Yes	11,748	44.3	3,055	34.2	3,045	36.9
No	74,084	53.4	21,065	44.5	19,124	46.7
Median household income of zip code						
< $34,000	27,396	48.7	7,718	39.7	6,048	42.3
$34,000-$45,000	28,643	51.8	8,250	43.0	7,537	44.6
> $45,000	29,786	55.4	8,149	46.1	8,581	47.9
Charlson score						
0	29,472	51.6	5,993	42.9	6,954	47.2
1 or 2	34,430	52.4	10,219	43.0	9,073	45.2
3+	21,930	51.9	7,908	42.9	6,142	43.6
History of hospitalization in 2001 or 2002						
Yes	29,182	50.5	12,812	41.2	9,634	43.4
No	56,650	52.8	11,308	44.8	12,535	46.6
U.S. region of residence						
Midwest	20,985	48.3	5,553	38.7	5,755	41.9
Northeast	19,980	58.3	5,401	49.0	5,075	50.9
South	34,206	51.7	9,937	43.3	8,262	44.9
West	10,658	49.4	3,227	40.4	3,077	43.9
Rural residence						
Yes	22,500	48.8	6,885	39.9	5,746	42.7
No	63,316	53.1	17,231	44.2	16,415	46.1
Number of physician office visits in 2004						
< 5	12,643	51.2	3,457	22.3	4,469	25.5
5-10	29,342	73.6	7,130	42.2	6,312	47.0
10-15	21,437	77.0	6,013	52.1	4,978	56.6
15 +	22,410	78.9	7,520	61.3	6,410	64.7
Visited an endocrinologist in 2004						
Yes	8,057	65.8	520	42.7	548	44.9
No	77,775	50.8	23,600	52.8	21,621	56.8
Visited an obstetrician-gynecologist in 2004 (women only)						
Yes	5,340	65.4	1,583	60.8	2,447	60.2
No	44,898	52.0	11,902	43.3	15,014	44.1
Visited a psychiatrist in 2004						
Yes	2,603	46.8	918	40.3	4,912	47.2
No	83,229	52.1	23,202	43.0	17,257	44.6
Visited a pulmonologist in 2004						
Yes	6,212	53.9	7,755	48.1	1,635	49.5
No	79,620	51.7	16,365	40.7	20,534	44.8

*Rates are based on person-years

Table B.2.4_04 Crude and age-adjusted rates of flu vaccination in 2004 among study cohorts: diabetes only (DM), chronic obstructive pulmonary disease only (COPD) and depression only (D).

	DM		COPD		D	
	Tested	Rate*/100	Tested	Rate*/100	Tested	Rate*/100
Crude Rates						
Total	67,915	41.7	24,826	45.6	21,111	43.5
Age-group (years)						
67-69	10,543	38.0	3,073	41.8	2,797	40.2
70-74	19,955	41.6	6,635	46.3	4,953	43.7
75-79	18,431	43.1	6,785	46.6	5,225	45.3
80-84	12,121	43.6	5,029	47.0	4,373	44.8
85+	6,865	41.0	3,304	43.9	3,763	41.9
Age-adjusted Rates						
Total	67,915	41.7	24,826	45.5	21,111	43.5
Sex						
Male	29,705	43.0	11,437	44.9	4,685	43.7
Female	38,210	40.9	13,389	46.1	16,426	43.5
Race/ethnicity						
White	60,656	45.0	23,673	47.2	20,210	44.9
Black	4,530	23.7	657	23.9	532	24.9
Asian	1,044	39.8	209	37.9	93	34.8
Hispanic	870	23.0	132	20.4	150	20.5
Others	815	30.4	155	33.2	126	34.9
In Medicaid-administered program						
Yes	7,309	28.2	2,779	32.0	2,597	31.7
No	60,606	44.3	22,047	48.0	18,514	45.8
< $34,000	19,556	35.4	7,538	39.8	5,429	38.3
$34,000-$45,000	23,740	43.6	8,854	47.6	7,414	44.5
> $45,000	24,614	46.4	8,433	49.4	8,268	46.9
Charlson score						
0	23,471	41.6	6,591	47.1	6,570	44.7
1 or 2	27,302	42.2	10,568	45.7	8,794	44.0
3+	17,142	41.4	7,667	43.8	5,747	41.7
History of hospitalization in 2001 or 2002						
Yes	23,429	41.3	13,106	44.0	9,378	42.9
No	44,486	42.0	11,720	47.3	11,733	44.1
U.S. region of residence						
Midwest	21,322	49.8	7,374	53.0	6,927	51.0
Northeast	13,883	41.0	4,881	45.8	4,075	41.6
South	24,478	37.7	9,454	42.3	7,332	40.3
West	8,228	38.8	3,115	40.4	2,776	40.2
Rural Residence						
Yes	19,499	43.1	7,769	46.1	5,911	44.3
No	48,409	41.2	17,053	45.2	15,195	43.3
Number of physician office visits in 2004						
< 5	12,507	29.3	4,543	31.4	5,583	32.7
5-10	23,312	43.2	7,806	47.0	6,091	45.8
10-15	15,843	47.0	5,835	51.2	4,396	50.2
15 +	16,253	50.4	6,642	54.6	5,041	50.8
Visited an endocrinologist in 2004						
Yes	5,489	45.0	483	50.2	440	46.0
No	62,426	41.4	24,343	45.4	20,671	43.5
Visited an obstetrician-gynecologist in 2004						
Yes	3,759	46.1	1,349	51.9	14,428	49.3
No	34,451	40.4	12,040	45.5	1,998	42.7
Visited a psychiatrist in 2004						
Yes	1,821	33.5	754	34.4	4,158	40.4
No	66,094	42.0	24,072	45.9	16,953	44.4
Visited a pulmonologist in 2004						
Yes	4,612	41.8	7,912	50.8	1,376	43.9
No	63,303	41.7	16,914	43.2	19,735	43.5

*Rates are based on person-years

Table B.2.6_04 Crude and age-adjusted rates of PSA test in 2004 among study cohorts (men only): diabetes only (DM), chronic obstructive pulmonary disease only (COPD) and depression only (D)

	DM		COPD		D	
	Tested	Rate* /100	Tested	Rate* /100	Tested	Rate* /100
Crude Rates						
Total	26,875	44.1	8,707	39.2	3,684	40.3
Age-group (years)						
67-69	5,777	47.0	1,459	43.0	734	45.7
70-74	9,404	47.2	2,779	42.9	1,117	47.3
75-79	7,033	44.6	2,397	40.0	944	42.4
80-84	3,448	39.1	1,449	35.7	591	34.5
85+	1,213	29.7	623	27.3	298	24.3
Age-adjusted Rates						
Total	26,875	42.8	8,707	38.8	3,684	40.5
Sex						
Male	26,875	42.8	8,707	38.8	3,684	40.5
Female						
Race/ethnicity						
White	23,739	43.4	8,019	39.1	3,499	41.4
Black	1,838	37.5	376	33.8	88	24.9
Asian	424	45.0	130	43.8	26	36.8
Hispanic	496	37.3	110	38.4	51	37.7
	378	36.2	72	35.6	20	30.4
In Medicaid-administered program						
Yes	1,848	32.8	934	31.1	281	25.1
No	25,027	43.7	7,773	40.1	3,403	42.7
Median household income of zip code						
< $34,000	8,018	40.6	2,970	36.8	984	38.9
$34,000-$45,000	9,108	42.5	3,024	39.0	1,263	39.3
> $45,000	9,746	45.0	2,712	41.1	1,437	42.8
Charlson scores						
0	10,861	44.9	2,578	40.8	1,323	46.0
1 or 2	10,540	42.4	3,675	38.8	1,498	40.4
3+	5,474	40.1	2,454	37.3	863	35.0
History of hospitalization in 2001 or 2002						
Yes	8,291	39.6	4,266	35.6	1,486	36.4
No	18,584	44.4	4,441	42.7	2,198	44.1
U.S. region of residence						
Midwest	7,081	42.1	2,233	37.5	1,003	39.6
Northeast	5,601	45.3	1,656	41.9	754	42.9
South	10,806	43.2	3,658	39.2	1,368	40.8
West	3,386	39.6	1,159	36.5	559	39.1
Rural Residence						
Yes	7,203	39.9	2,821	37.0	972	38.5
No	19,669	43.8	5,883	39.7	2,711	41.2
Number of physician office visits in 2004						
< 5	5,241	29.5	1,601	24.7	758	24.4
5-10	9,634	45.9	2,902	42.0	1,134	45.2
10-15	6,097	48.8	1,986	44.3	810	49.5
15 +	5,903	50.4	2,218	49.0	982	53.7
Visited an endocrinologist in 2004						
Yes	2,190	46.2	114	45.6	83	60.8
No	24,685	42.5	8,593	38.7	3,601	40.2
Visited a psychiatrist in 2004						
Yes	499	31.5	215	30.3	855	41.3
No	26,376	43.1	8,492	39.1	2,829	40.3
Visited a pulmonologist in 2004						
Yes	1,873	41.5	2,600	39.8	287	39.6
No	25,002	42.9	6,107	38.5	3,397	40.6
Visited a urologist in 2004						
Yes	9,960	66.9	3,573	65.3	1,621	65.7
No	16,915	35.1	5,134	30.3	2,063	31.1

Rates are based on person-years, and the beneficiaries with prostate cancer were removed.