Impact of Chronic Lung Disease and Depression on Diabetes Monitoring in the Elderly

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

Importance of Studying Chronic Disease

- **For elderly Americans in 1999**
  - **82% have at least 1 chronic disease**
  - **65% have 2 or more chronic diseases**
  - **43% have 3 or more**
  - **24% have 4 or more**

    Reference: Wolff, et al, Arch Intern Med, 2002

- **20% of elderly Americans have diabetes**

Study Objective

Examine the impact of two important chronic diseases, COPD and depression, on the receipt of at least annual Hemoglobin A1c (HbA1c) testing in elderly Medicare fee-for-service beneficiaries with diabetes

Discordant Disease

- **Why COPD and depression?**
- **Not pathophysiologically related**
- **Allows us to look at a clean, independent effect of additional disease**

(Reference: Piette and Kerr. Diabetes Care, 2006)

Competing Hypotheses

- Will sicker people get fewer services?
- Will sicker people get more services because they have more interaction with the health care system?
- Will patients with DM+COPD be more or less likely to get an HbA1c test?
- Will patients with DM+depression be more or less likely to get an HbA1c test?

(Reference: Jaen et al. J Fam Prac, 1994)

Differential Effect of Chronic Disease

- **Will the effect of COPD and depression be similar?**
- **Which disease will affect the receipt of HbA1c testing more?**
  - COPD
  - Depression

Data Sources

- **Chronic Condition Warehouse (CCW)**
- **Enhanced 5% Medicare files**
- **Years 2001 to 2004**
  - **Carrier (physician) claims**
  - **Outpatient (facility) claims**
  - **Inpatient claims**
  - **Beneficiary Summary file**
  - **Chronic Condition Summary file**

Provided by CCW

- **All Medicare beneficiaries having**
  - **Diabetes or**
  - **COPD or**
  - **Depression**
- **Pre-defined algorithms using data from 2001 and/or 2002**
- **Exclusions – beneficiaries who had**
  - **Any HMO, gap in Part A or B coverage, ESRD, less than 67 years of age, not alive as of 12/31/2002**

Pre-defined Algorithms
Example - Diabetes

- ICD-9   250.00 - 250.93, 357.2,
           362.01, 362.02, 366.41

- On 1 inpatient, SNF or HHA claim or
      2 Outpatient or Carrier claims
      > 1 day apart

- Look back 2 years

- Validated to have
   90% sensitivity, 95% specificity, 82% PPV

(Reference: Wang, et al. J Am Soc Nephrol, 2005)

Study Cohorts

- **Diabetes only**
  N=184,941
- **Diabetes + COPD**
  N=23,793
- **Diabetes + depression**
  N=19,111
- **Diabetes + COPD + depression**
  N=5,670

Outcome Measure:
Receipt of an HbA1c Test in 2003

- Searched the 2003 Physician and Outpatient claims for CPT or HCPCS code of 83036

Covariates – Personal Characteristics

- Age Group
- Gender
- Race/ethnicity
- In Medicaid administered program
- Median household income of zipcode

Covariates – Health Status

- Charlson score
- History of hospitalization in 2001 or 2002
- Months alive in 2003

Covariates – Health Services Utilization

- **Rural residence**
- **U.S. Census Bureau region of residence**
- **Number of physician office visits in 2003**
- **Visited an endocrinologist in 2003**
- **Visited a gynecologist in 2003 (women only)**
- **Visited a psychiatrist in 2003**
- **Visited a pulmonologist in 2003**

Personal Characteristics

	DM	DM+D	DM+ COPD	DM+D+ COPD
% Age 80+	31.0	40.2	34.6	37.8
% Female	57.8	73.3	51.2	66.5
% White	82.9	86.4	86.7	88.0
% Buy-in	17.0	29.4	24.7	37.9

All pair-wise comparisons between cohorts are statistically significant, $p < 0.05$

Health Status and Services

	DM	DM+D	DM+ COPD	DM+D+ COPD
Charlson Score (mean)	1.9	3.0	3.2	4.1
# Office Visits in 2003 (mean)	9.1	9.4	11.1	9.7
% Hospitalized 2001-2002	37.5	63.7	74.3	87.6
Months Alive in 2003 (mean)	11.6	11.1	10.9	10.3
% who visited Endocrinologist in 2003	7.0	6.5	6.7	4.8

(All pair-wise comparisons between cohorts are statistically significant, $p < 0.05$.)

Supporting Disease Algorithms

	DM	DM+D	DM+ COPD	DM+D+ COPD
% who visited Psychiatrist in 2003	3.2	23.7	5.2	17.9
% who visited Pulmonologist in 2003	6.9	9.1	30.6	20.1

Age-Adjusted Rates (per 100) of HbA1c Testing by Chronic Condition Cohort
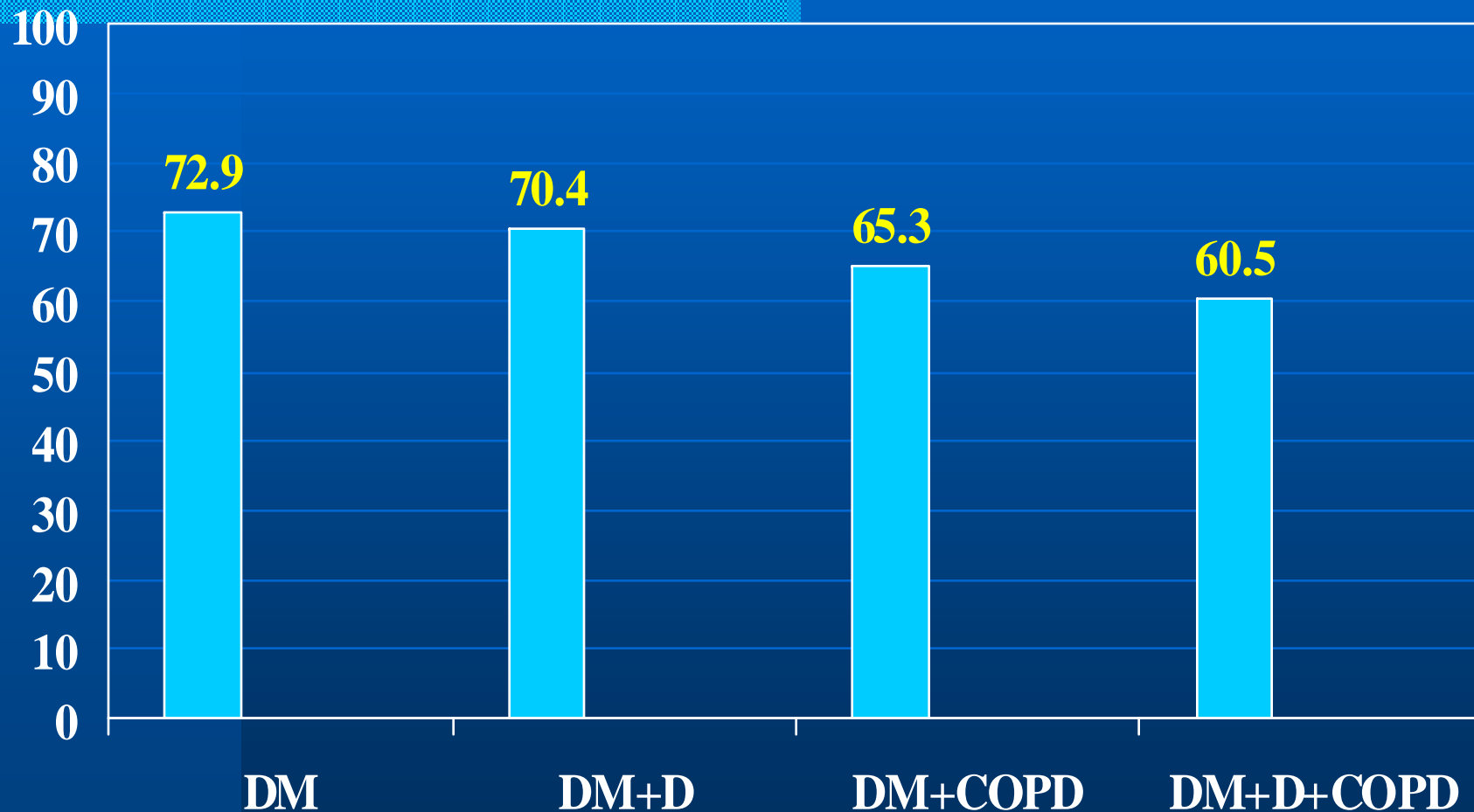
(All pair-wise comparisons between cohorts are statistically significant, p< 0.05)

Regression Analyses

- **We ran 4 different models**
  - **Age-adjusted**
  - **Age-adjusted + Personal Characteristics (PC)**
  - **Age-adjusted + PC + Health Status (HS)**
  - **Age-adjusted + PC + HS + Health Services Utilization = Full Model**

Model adjusted odds ratios (95% CIs) Relative odds of having an HbA1c test
(Diabetes only as the reference population)

Model	DM	DM+D	DM+ COPD	DM+D+ COPD
Age-Adjusted	1	0.79 (0.77-0.82)	0.61 (0.59-0.63)	0.45 (0.43-0.48)
Personal Character-istics (PC)	1	0.79 (0.76-0.81)	0.62 (0.60-0.63)	0.46 (0.43-0.48)
PC + Health Status (HS)	1	0.92 (0.89-0.95)	0.77 (0.75-0.79)	0.65 (0.61-0.69)
PC + HS + Health Services	1	0.99 (0.96-1.03)	0.76 (0.73-0.78)	0.70 (0.66-0.75)

Model adjusted odds ratios (95% CIs) Relative odds of having an HbA1c test

(Diabetes+COPD as the reference population)

Model	DM	DM+D	DM+ COPD	DM+D+ COPD
PC + HS + Health Services	1.32 (1.28-1.36)	1.31 (1.25-1.36)	1	0.93 (0.87-0.99)

Conclusions

- COPD and depression have different effects on the rate of HbA1c testing among people with diabetes
- Patients with depression in addition to diabetes do not have reduced rates of HbA1c testing
- Patients with COPD in addition to diabetes have reduced rates of HbA1c testing
- Depression reduces the rate of HbA1c testing in those with diabetes and COPD