The Effect of Major and Minor Depression on Medicare Home Healthcare Services Use

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Abstract

OBJECTIVE—To examine the associations of major and minor depression with categories of Medicare home healthcare use during the subsequent year.

DESIGN—An observational prospective study (1997–99).

SETTING—A visiting nurse agency in suburban New York State.

PARTCIPANTS—539 new Medicare admissions age 65+. Mean age = 78.4 years, 65.1% were female, and 15.0% were nonwhite. About 13.5% were diagnosed with major depression and another 10.8% with minor depression.

MEASUREMENTS—Consensus "best estimate" DSM-IV diagnoses for major and minor depression assessed using Structured Clinical Interviews for DSM-IV (SCID) plus medical charts.

RESULTS—Both major and minor depression appear to have little association with probability and amount of use of the types of Medicare home healthcare (skilled nurse, home health aide, therapist [physical, occupational, and speech], and medical social services). Overall, patients with minor depression appear to have similar utilization as patients with major depression.

CONCLUSION—It seems likely that any potential incremental depression effect on utilization is being offset by the transitional medical state of the patients that entered Medicare home healthcare directly from a hospital, nursing home, or rehabilitation facility, and the overall severity of disability and chronic illness present in long-term home healthcare patients. Further research is required to determine if similar findings occur in other home healthcare agencies and whether these are present under the current Medicare Prospective Payment System reimbursement mechanism.

Keywords

Aged; depression; Medicare; home healthcare; utilization

INTRODUCTION

Late-life depression is a significant public health problem since it is associated with great suffering, increased morbidity and mortality,[1] functional [2–4] and cognitive [5]impairment, and high levels of suicidal ideation, suicide attempts, and completed suicide.[6]

Prevalence estimates for major depression range between 1% and 3% for older persons living in the community, while for minor depression they range from 4% to 13%.[7] A prevalence rate

Martha L. Bruce - study concept and design, acquisition of subjects and/or data, interpretation of data, and preparation of manuscript.

Conflict of Interest Disclosures:

Elements of Financial/Personal Conflicts	BF		RLD		THS		MLB	
	Yes	No	Yes	No	Yes	No	Yes	No
Employment or Affiliation		✓		✓		✓		✓
Grants/Funds	✓		✓		✓		✓	
Honoraria		✓		✓		✓		✓
Speaker Forum		✓		✓		✓		✓
Consultant		✓		✓		✓	✓	
Stocks		✓		✓		✓		✓
Royalties		✓		✓		✓		✓
Expert Testimony		✓		✓		✓		✓
Board Member		✓		✓		✓	✓	
Patents		✓		✓		✓		✓
Personal Relationship		✓		✓		✓		✓

For "yes" x mark(s): see brief explanation below:

CONFLICT OF INTEREST (Must be submitted in this format)

employed for the present study.[8]

Home healthcare provides demonstrated benefits to depressed elderly patients, including improved quality of life as well as preventing or minimizing negative effects of depression on cardiovascular disease and other comorbidities.

A small but growing body of research has found that depression is often associated with greater healthcare utilization and costs for older persons.[9–15] This research finds that a higher proportion of depressed than non-depressed older people use many types of services, including home care [11] and home nursing.[14] Older persons with depression have higher mean costs for many types of services including home care.[11] One study has examined the association of depression with probability of Medicare financed home healthcare use and the extent of Medicare home healthcare expenditures in a Medicaid home and community-based care waiver program,[16] but no studies have investigated the relationship between depression and specific types of Medicare home healthcare services.

Little is known about how major and minor depression are associated with the use of home healthcare services provided to older persons. Two studies of aged adults have included measures of both major and minor/subthreshold depression.[13,14] These report that both major depression/dysthymia and subthreshold/minor depression are associated with higher healthcare use or costs. A Dutch study found that both major and minor depression were associated with higher probability of use of home nursing.[14]

Medicare does not pay for long term care but rather is limited to funding intermittent or part-time "skilled" care (skilled nursing or physical therapy, or occupational therapy in some situations) delivered to "homebound" patients. The study reported here was conducted during the period when the Medicare home healthcare Interim Payment System (IPS) was in effect (October 1997 - September 2000). Under IPS home healthcare agencies were paid their costs up to the lower of two cost limits: a visit-based limit, and a limit calculated by multiplying the number of patients who received services by a blended per beneficiary limit.[17]

Although Medicare has since switched to a Prospective Payment System (PPS), the present study is intended to describe the association between depression and service utilization under IPS, which was a less restrictive payment system than PPS. Our findings can be compared and contrasted with similar studies under PPS, and potentially provide a better understanding of the influence of payment systems on medical and depression status and service utilization.

The present study examines the effects of major and minor depression at entry into Medicare home healthcare on probability and amount of skilled nurse, home health aide, therapist (physical, occupational, and speech), and medical social services use among new admissions to Medicare home healthcare, and on the number of visits of all types combined. We had four hypotheses: (1) that Medicare home healthcare patients with *major* depression would have significantly higher use of each of the above services than would patients with neither major nor minor depression; (2) that patients with *minor* depression would have significantly higher use of each of these services than would patients with neither major nor minor depression: (3) that the effects of major depression on use would be similar to those of minor depression; and (4) that depressed patients would have greater utilization for both the initial 60-day home care episode and for one year after a new home care admission. An advantage of the present study is the improved clinical validity of our measure for minor depression (a consensus "best estimate" diagnosis using a structured clinical interview) as compared with two earlier studies. [13,14]

METHODS

Research Design

This study employed an observational prospective research design. A probability sample of Medicare patients age 65+ who were newly admitted to a certified home health agency was enrolled.

Data Sources

The data used in this study came from three sources: patient interviews, informant interviews, and certified home health agency medical records (Health Care Financing Agency Form 485).

Study Sample

During the two-year period December 1997 to December 1999, a 40% (1,359) random sample of 3,416 new Medicare admissions to the Visiting Nurse Service of Westchester County who met the following criteria were recruited into the study: age 65+, able to give informed consent, and able to speak English or Spanish. A total of 470 (34.6%) of the random sample of 1,359 persons were later identified as non-eligible, usually because of termination from home care (due to recovery, admission to a nursing home or another institution, or death) or inability to give informed consent. Of the remaining 889 potential study subjects, 539 (60.6%) consented to enter the study.

Measures

Major depression and minor depression are defined as in the Diagnostic and Statistical Manual for Mental Disorders, Fourth Edition (DSM-IV).[18] Specifically, minor depressive disorder is defined as having 2–4 of the 9 symptoms of depression with at least one of them being depressed mood or anhedonia. Subjects were assessed shortly after admission during home interviews using the **Structured Clinical Interview for DSM-IV** (SCID),[19] which is considered the "gold standard" approach for diagnosis of depression.[20] It allows the diagnosis of major and minor depression. A team including a geriatric psychiatrist, geriatrician, clinical psychologist, and psychiatric epidemiologist used these interviews plus medical charts to generate a consensus "best estimate" DSM-IV diagnosis for depression.[21] The strict DSM-IV "etiologic" criteria were employed **to address potential medical causes**.

Home Healthcare Services

Four categories of home healthcare services use were examined in this study: skilled nurse, home health aide, therapist (physical, occupational, and speech), and medical social services. We also examined all 4 visit types combined.

Model Specification

We examined both probability of nurse, aide, therapist, and social services use, and amount of use (number of visits). The dependent variable in each probability of use equation was a binary variable that indicated some (1) or no (0) use, while the dependent variable in each amount of use equation was a continuous variable indicating the number of visits.

Our regression models included independent variables that measured our variables of interest: major depression and minor depression. The models controlled for sociodemographic status (age 75–84, age 85+, female gender, African American, Hispanic/Other, widowed, separated/divorced, never married, living alone, less than high school graduate, high school graduate) and health status (Charlson Comorbidity Index score [excluding scores for psychiatric illness],[22] the number of activities of daily living [ADL][23] and the number of instrumental activities of daily living [IADL][23] which the patient could not do without assistance, mobility disability,

cognitive functioning [Mini Mental State Exam score],[24] and pain intensity [a question from the SF-36].[25]) It was sometimes necessary to include squared or cubed terms or interactions.

Missing Data

Because there were little missing data, it seemed reasonable to use a listwise complete analysis approach. This resulted in most non-conditional regression analyses including 510 of the 539 cases, which is 94.6% of the cases. The variable most responsible for missing cases was mobility disability, which was missing for 22 cases.

Estimation Methods

Logistic regression analysis was employed to examine probability of home health aide, therapist, and medical social services use in the year following admission to home care. We did not estimate a logistic regression equation for probability of skilled nursing use because every patient had at least one visit. Linear regression analysis and two-part models (logistic regression followed by conditional linear regression) were used to investigate the number of nurse, aide, therapist, and social services visits during the subsequent year. Goodness of fit was examined and robust standard errors were calculated.

Standardized predicted mean probability of aide, therapist, and social services use was calculated for major, minor, and no depression. Standardized predicted mean were also calculated for each amount of nurse, aide, therapist, and social services visits. Two-part models were utilized for aide, therapist, and medical social services visits. When a logged dependent variable was needed to address excessive residual skewness, the smearing estimator [26] was used to retransform the predictions from logged to actual visits. Bootstrapped standardized predicted means and their 95% confidence intervals were calculated.

Kaplan-Meier and Cox proportional hazard models were estimated for length of stay in Medicare home care. For the Cox proportional hazard models the proportionality assumption was tested using Schoenfeld residuals and the generalization by Grambsch and Therneau.[27]

Separate analyses were carried out for the first 60 days after the initial admission to home care, and the year following the initial admission.

Software

Analyses were conducted using Stata version 8.0.

RESULTS

Study Subject Baseline Characteristics

At study entry the mean age of the 539 study participants was 78.4 years (range: 65–102), two-thirds were female, and 15.0% was nonwhite. A total of 13.5% were diagnosed as having major depression and another 10.8% as having minor depression. Two-thirds (347 or 65%) entered the study directly after discharge from the hospital while another quarter (121 or 23%) entered after discharge from a nursing home or rehabilitation facility (see Table 1).

Utilization of All Visit Types Combined

The study sample received a mean number of 32.4 visits (SD=38.4) (range: 1–447) for all visit types combined (nurse, aide, therapist, and social services).

Unadjusted (Raw) Utilization

For the first episode (60 days) of Medicare home healthcare, there were no statistically significant differences by depression status. However, three significant effects were found for unadjusted utilization over the year since the patient began receiving Medicare home healthcare. Compared to patients with no depression, those with major or minor depression were more likely to have received at least one home health aide visit and at least one medical social services visit, and had a higher mean number of medical social services visits. **(Table available from the authors on request.)**

Modeled (Adjusted) Regression Results

For the first episode of Medicare home healthcare, there were no statistically significant differences by depression status at p<.05. However, one difference was observed at p=.06. Among patients with at least one home health aide visit, persons with major depression had fewer home health aide visits. During the year since the first Medicare home healthcare visit, major depression was associated with higher probability of having at least one home health aide visit (p=.028). In addition, two effects were close to statistically significant. Major depression was associated with more skilled nurse visits (p=.054) and, among patients with at least one medical social services visit, more of these visits (p=.065) (see Table 2).

Estimated Means/Proportions (Standardized Adjusted Predictions)

For all types of visits the 95% confidence intervals overlap across major depression versus no depression and minor depression versus no depression for the proportion with any service use, the mean number of visits conditional on at least one visit, and the mean number of visits for both the first episode of care and the year following the initiation of Medicare home healthcare (see Table 3).

Regression Analysis Results for Other Variables

Mobility disability was associated with greater likelihood of home health aide, therapist, and medical social services use, while ADL impairment was related to greater likelihood of home health aide and therapist use. Female gender was associated with more therapist and medical social services visits, the Charlson Index with more skilled nurse visits, and ADL impairment with more therapist visits and visits of all visit types combined. **(Table available from the authors on request.)**

Survival Analysis

The mean length of stay in Medicare home healthcare from the initial visit to the last visit of any type was 80.2 days (SD=95.7) (range: 1–365). Medicare home healthcare length of stay was shortest for patients with no depression, intermediate for those with major depression, and longest for persons with minor depression. There was little difference by depression status for the first 60 or 70 days. After that the three groups diverged until about 300 days.

We found similar patterns using Kaplan-Meier and Cox proportional hazards models. Because the Cox model (N=510) failed the proportional hazards assumption (p=.028 for African Americans), we removed all non-whites (58 African Americans plus 25 Hispanics/Others) from the sample, leaving a sample of 458 whites. When we estimated a Cox model for the latter the hazard ratio for minor depression was of borderline statistical significance (.748; p=.061; 95% Confidence Interval = .552–1.013) while that for major depression was not significantly different from no depression (hazard ratio = .962; p=.765; 95% CI = .745–1.241). These results were very similar to those for the entire sample.

DISCUSSION

Three of our four hypotheses were not verified. The only hypothesis that appears to have been confirmed is that patients with major depression have similar utilization as those with minor depression. It seems likely that non-support for the hypothesized impact of depression (major or minor) on home care utilization can be explained by several factors.

First, Medicare's home healthcare program is not designed to provide long term home care but rather short term skilled nursing and related services to patients who are too medically or functionally compromised to visit a physician or clinic without help. The majority of these patients initiate home healthcare services upon returning home following medical or surgical hospitalization (65% of our study sample) or discharge from a nursing home or rehabilitation facility (23%). Thus, Medicare's home healthcare program exists to provide care to patients as they transition to recovery, rehospitalization, long term care, or death.

The short term, transitional nature of Medicare home healthcare has two implications for our finding of little impact of depression on service utilization. First, Medicare home healthcare patients may well have little influence on when and what services they receive compared to outpatient services where patients themselves are able to seek and ask for care, and have considerably more control over what types of care they seek. To the extent that the increased utilization associated with depression in outpatient care is a function of patient helpseeking, depression should have less impact in home healthcare. Similarly, to the extent that the scope of care is more targeted, structured, and time limited in Medicare home healthcare than in outpatient care, depression may also have less influence on decisions made by providers for home healthcare than for outpatient services. Third, the greater severity of illness and disability in Medicare home healthcare patients, relative to outpatients, may override the influence that depression might otherwise have on service utilization.

How nationally representative is the pattern of Medicare home healthcare services use experienced by the agency in the present study? Compared to 1999 national data reported by Komisar,[28] patients in the present study received on average fewer skilled nurse (16.0 versus 22.3) and home health aide (8.6 versus 16.4) visits.

A number of potential limitations should be mentioned. First, this study was conducted when the Medicare home healthcare IPS payment system was in effect. The main mechanisms of utilization and cost controls included in IPS were aggregate per visit cost limits and aggregate per beneficiary cost limits.[17] A new Medicare home healthcare reimbursement mechanism, PPS, was implemented on October 1, 2000. PPS differs from IPS in that it includes the determination of patient case mix. Compared to IPS, there has been less home healthcare utilization under PPS and the number of visits per person served remained flat during 2001–03.[29] Because of this very different PPS reimbursement mechanism, it is possible that major and minor depression will have different associations with Medicare home healthcare services under PPS than we found under IPS. This should be the subject of future research. Second, our measures of physical illness and disability are relatively crude and may have contributed to some uncontrolled confounding. Although the Charlson Comorbidity Index is an "industry standard," it predicts a small proportion of the total variance in healthcare use and costs. This could lead to an overestimation of the independent effect of depression. However, this does not appear to be an issue in this study. A third limitation is that the present study includes patients from only one home healthcare agency. Thus, external validity or generalizability could be an issue although patient characteristics were similar in this agency to those nationally. Fourth, the investigators were not able to interview patients who had very short stays and were discharged from Medicare home healthcare during the first two weeks. Thus the findings may not be generalizable to this category of patients. Next, the study included only about 60% of

eligible subjects. Another limitation is that too few patients in this study were receiving antidepressant treatment to examine whether treatment modified the effect of depression on services use. A final limitation is that we combined the three types of therapist services rather than analyzed them separately.

One of the strengths of this study was the use of a best-estimate consensus conference approach to diagnose both major and minor depression. This method has been found to be valid and reliable in past studies.[21,30] Another strength was that a substantial proportion (15.0%) of the study sample was nonwhite.

In conclusion, **both** major and **minor** depression **appear** to have little association with probability and amount of use of **the** types of Medicare home healthcare. Overall, patients with minor depression appear to have similar utilization as **patients** with major depression. It seems likely that any potential influence of depression on patient helpseeking or provider behavior observed in other settings is being offset in Medicare home healthcare by the short term, transitional medical state of the patients, and the overall severity of disability and chronic illness present in long term home healthcare patients.

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Table 1

Patient Baseline Characteristics (N = 539)

Variable	n	%	Variable	n	%
Sociodemographic Factors			Marital Status		
Age	Mean = 78.37	SD = 7.54	Married	204	37.85
65–74	189	35.06	Widowed	234	43.41
75–84	223	41.37	Separated or Divorced	43	7.98
85–102	127	23.56	Never Married	58	10.76
Gender			Education (n=536)		
Male	188	34.88	Less than High School	164	30.60
Female	351	65.12	High School Grad/ Some College	261	48.69
Race/Ethnicity			At Least College Graduate	111	20.71
White	458	84.97	Poverty Status (n=363)		
African American	56	10.39	Poor	94	17.44
Hispanic/Other	25	4.64	Not Poor	269	49.91
Living Situation (n=538)			Missing	176	32.65
Alone	210	39.03			
With Spouse	199	36.99			
With Others	129	23.98			
Health Status			Impairments in Activities of Daily Living (n=527)	Mean = 1.08	SD = 1.30
Depression			0	238	45.16
Major	73	13.54	1–2	217	41.18
Minor	58	10.76	3–4	62	11.76
None	408	75.70	5–6	10	1.90
Charlson Comorbidity Index	Mean = 2.67	SD = 2.10	Impairments in Instrumental Activities of Daily Living (n=528)	Mean = 3.30	SD=1.48
0	73	13.54	0	28	5.30
1–2	231	42.86	1–2	110	20.83
3–4	136	25.23	3–4	287	54.36
5+	99	18.37	5–6	103	19.51
Mini-Mental State Exam (n=535)	Mean = 26.24	SD = 3.39	Mobility Disability (n=517)	Mean = 1.99	SD = 1.03
<24	96	17.94	0	60	11.61

Variable	n	%	Variable	n	%
24 +	439	82.06	1	95	18.38
Reported Pain (n=527)			2	152	29.40
1	163	30.93	3	210	40.62
2	214	40.61			
3	150	28.46			

Table 2

Modeled (Adjusted) Regression Results for Medicare Home Healthcare Services Visit Types for Major, Minor, and No Depression First Episode (60 Days) and Entire Year (365 Days)

Logistic Regression Models for Probability of Any Use[1]	First Episode (60 Days)				Entire Year (365 Days)			
	Odds Ratio	P Value	n	Pseudo R-Squared	Odds Ratio	P Value	n	Pseudo R-Squared
Home Health Aide[2]			510	.204			510	.221
Major depression	1.46	.229			2.20	**.028**		
Minor depression	1.05	.879			1.29	.426		
Therapist[3]			510	.166			510	.187
Major depression	0.88	.666			1.53	.191		
Minor depression	0.83	.594			1.00	.987		
Medical Social Services[4]			510	.079			510	.100
Major depression	1.12	.743			1.36	.327		
Minor depression	1.10	.782			1.46	.226		

Ordinary Least Squares Regression Models for Number of Visits[1]	First Episode (60 Days)				Entire Year (365 Days)			
	Coefficient	P Value	N	Adjusted R-Squared	Coefficient	P Value	N	Adjusted R-Squared
All Visit Types Combined[1] (square root visits)	(square root visits)		510	.191	(logged visits)		510	.165
Major depression	.062	.756			.196	.098		
Minor depression	.129	.637			.073	.644		
Skilled Nurse[1] (logged visits)	(logged visits)		509	.024	(logged visits)		510	.057
Major depression	.096	.309			**.211**	**.054**		
Minor depression	.032	.821			.128	.408		
Home Health Aide[1] (square root visits)	(square root visits)		199	.104	(logged visits)		218	.055
Major depression	**-.432**	**.060**			.010	.954		
Minor depression	.062	.852			-.035	.873		
Therapist[5] (square root visits)	(square root visits)		305	.173	(logged visits)		331	.159
Major depression	-.121	.482			.050	.735		
Minor depression	-.107	.613			-.085	.642		

	First Episode (60 Days)				Entire Year (365 Days)			
	Coefficient	P Value	N	Adjusted R-Squared	Coefficient	P Value	N	Adjusted R-Squared
Medical Social Services (logged visits)[6]			100	.077	(logged visits)[7]		125	.134
Major depression	.132	.360			.244	.065		
Minor depression	.148	.372						

[1] Adjusted for age 75–84, age 85+, female, African American, Hispanic/other, widowed, separated/divorced, never married, living alone, less than high school graduate, high school graduate, Charlson Comorbidity Index, number of activities of daily living (ADL) requiring assistance, number of instrumental activities of daily living (IADL) requiring assistance, mobility disability, Mini Mental State Exam score, and pain.

[2] The logistic regression model for home health aide use for the initial episode also includes the interaction between ADL and IADL disability. The logistic regression model for home health aide use for the entire year also includes ADL squared and ADL cubed.

[3] The logistic regression model for therapist use for the initial episode also includes the interaction between ADL and IADL disability. The logistic regression model for therapist use for the entire year also includes ADL squared.

[4] The logistic regression model for medical social services use for the entire year and the OLS regression model for medical social services use for the entire year also include ADL squared.

[5] The OLS regression model for the entire year also includes ADL squared.

[6] Adjusted for age, female, nonwhite, living alone, Charlson Comorbidity Index, and Mini Mental State Exam score.

[7] Adjusted for age, age squared, female, widowed, Charlson Comorbidity Index, Charlson Comorbidity Index squared, and Mini Mental State Exam score.

Table 3

Estimated Means/Proportions (Standardized Adjusted Predictions) for Medicare Home Healthcare Services Visit Types for Major, Minor, and No Depression First Episode (60 Days) and Entire Year (365 Days)

	First Episode (60 Days)			Entire Year (365 Days)		
	Major Depression	Minor Depression	No Depression	Major Depression	Minor Depression	No Depression
Proportion with any use (95% CI)						
Home Health Aide	.449 (.320–.562)	.389 (.271–.498)	.380 (.318–.418)	.546 (.384–.641)	.449 (.353–.540)	.403 (.364–.454)
Therapist	.581 (.482–.705)	.568 (.441–.693)	.605 (.558–.653)	.712 (.609–.804)	.640 (.507–.740)	.639 (.593–.691)
Medical Social Services	.208 (.134–.306)	.207 (.111–.312)	.192 (.143–.227)	.283 (.190–.399)	.296 (.182–.401)	.230 (.185–.274)
Mean number of visits conditional on at least one visit (95% CI)						
Home Health Aide	11.99 (9.57–14.08)	15.40 (11.36–21.01)	14.94 (13.32–16.09)	20.02 (15.67–26.96)	19.15 (9.97–26.62)	19.83 (15.65–22.71)
Therapist	8.59 (7.42–10.97)	8.67 (6.84–11.31)	9.27 (8.45–9.94)	11.63 (8.83–15.13)	10.16 (6.81–14.33)	11.06 (9.76–12.49)
Medical Social Services	2.19 (1.73–2.87)	2.23 (1.53–3.06)	1.92 (1.64–2.15)	2.59 (2.04–3.18)	2.03 (1.79–2.34)	
Mean number of visits (95% CI)						
All Visit Types Combined	21.93 (18.32–25.65)	23.78 (19.24–29.26)	21.83 (19.96–23.38)	37.74 (30.75–49.27)	33.36 (25.56–44.55)	31.02 (27.01–34.24)
Skilled Nurse	11.62 (9.95–14.06)	10.90 (8.11–13.40)	10.56 (9.80–11.41)	18.81 (15.03–23.51)	17.31 (12.88–22.67)	15.23 (13.73–17.10)
Home Health Aide	5.32 (3.74–7.13)	5.98 (3.85–9.00)	5.68 (4.70–6.69)	10.73 (7.39–15.46)	8.58 (5.09–12.92)	8.03 (6.18–9.60)
Therapist	5.02 (3.84–6.43)	4.97 (3.33–6.87)	5.60 (4.82–6.18)	9.64 (7.11–12.31)	7.84 (4.93–10.83)	8.53 (7.35–9.74)
Medical Social Services	.46 (.27–.76)	.46 (.20–.75)	.37 (.24–.46)	.95 (.62–1.31)	.64 (.51–.74)	

Note: The standardized predicted means and their 95% confidence intervals were calculated using the bootstrap.