Brief Reports

Minor Depression and Rehabilitation Outcome for Older Adults in Subacute Care

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Abstract

During recent years, numerous studies have found an association between minor depressive symptoms and physical functioning for older adults recuperating from illness or injury. Whereas earlier research has focused on the effects of minor depression during rehabilitation in acute or long-term settings, this study examined 209 patients receiving subacute physical therapy. The dependent measures were total score changes on the Functional Independence Measure (FIM) obtained at admission, discharge, and 3-month follow-up. The independent measure was minor depressive symptoms, as defined by the Diagnostic and Statistical Manual of Mental Disorders, *Fourth Edition, obtained within 5 days of admission. A binary logistic regression analysis was conducted with dichotomized FIM scores and the presence/absence of minor depressive symptoms. The results indicated a statistically significant relationship between FIM score change and minor depression from admission to discharge, but not from discharge to follow-up.*

Introduction

In recent years, there has been a growing awareness of the mental health needs of people 65 years of age and older.[1] Of the various mental disorders experienced by older adults, depression is among the most common.[2] For example, the Epidemiologic Catchment Area Study found that as many as 15% of community residents older than 65 years have depressive symptoms. Among older adults living in the community, major depression is relatively uncommon with a prevalence rate of less than 3%. The prevalence of minor depression, however, is estimated to be higher with rates ranging from 9.8% to 20%.[3,4]

In comparison, rates of depression in nursing homes are substantially greater with a prevalence of 15% for major depression and 40% to 60% for subsyndromal or minor depression.[5] Although depression is relatively common after the age of 65 years, it is often undiagnosed,[6,7] which not only reduces overall quality of life,[8,9] but also significantly impacts health.[10,11] Many studies have identified an association between depression and increased mortality[12–14] and the occurrence of diseases[15,16] such as cardiovascular disease,[17–19] cancer,[20–22] and cerebrovascular disease.[23,24]

More currently, a growing body of research has identified an association between mood and functioning.[25,26] In a comprehensive study of more than 1200 people older than 71 years, Penninx et al[27] found that for older adults living in the community, there was a relationship between depressive symptoms and decline in activities of daily living. This relationship remained significant after controlling for other variables such as decreased physical activity, reduced social interaction, and chronicity of the mood disorder.[28,29] These findings supported the conclusions of earlier studies, which also found that even minor symptoms of depression have an effect on the daily functioning of older community residents.[30–33]

Despite research finding an association between functioning and depression, there is limited data regarding the effects of minor depression on recovery of functioning for older adults. One possible explanation is that "minor" symptoms are typically viewed as benign and transient. As compared to major depression, the diagnosis of minor depression requires a total of 2 symptoms of depression whereas major depression requires 5 symptoms. Additional symptoms may include change in weight or appetite, change in sleep patterns, psychomotor retardation or agitation, fatigue or loss of energy, feelings of worthlessness or inappropriate guilt, diminished ability to think/concentrate or indecisiveness, and recurrent thoughts of death or suicide ideation, attempt or plan.

In one study, Diamond et al[34] compared patients in an acute geriatric rehabilitation setting with clinical or major depression to nondepressed patients on the variables of age, length of stay, admission Functional Independence Measure (FIM) scores, discharge FIM scores, change in FIM scores, Mini Mental State Exam scores, and discharge to home versus nursing home. The 8 patients with major depression had significantly lower admission and discharge FIM scores. No other variables, however, were significantly related. Although Diamond's research identified a significant relationship between depression and rehabilitation outcome for older adults, these findings were limited to an acute setting with a small number of subjects who had major depression.

In examining a possible association between minor depression and recovery of function, this study examined the following hypotheses (1) there is a relationship between minor depression and rehabilitation outcome as measured by total FIM scores at the time of discharge from a subacute rehabilitation unit for adults older than 65 years, and (2) there is a relationship between minor depression and rehabilitation outcome as measured by total FIM scores at the time of a 90-day follow-up subsequent to discharge from a subacute rehabilitation unit for adults older than 65 years.

Method

This study was a retrospective cohort design, based upon a review of files from 1999, which included patients who entered into subacute care with a diagnosis of weakness secondary to hospitalization. These patients were determined to require physical therapy in order to recuperate from hospitalization so that they could return to their previous level of independence. The information was collected and analyzed to determine if there was a significant association between minor depressive symptoms at admission and subsequent improvements in functioning at both discharge and follow-up.

Setting and subjects

The study was conducted at an agency for older adults located in a large Midwestern city, that included a 36-bed subacute rehabilitation unit. The subjects were usually admitted from nearby hospitals for rehabilitation subsequent to acute care ($n = 206$). In some cases, patients arrived from other sources such as other rehabilitation/assisted living programs ($n = 1$) or home ($n = 2$).

The subjects were patients admitted to the facility's subacute rehabilitation unit, subsequent to hospitalization, with a ICD-9 code of 780.79, which indicates weakness secondary to hospitalization for medical conditions. This diagnosis accounted for the majority of admissions to the rehabilitation unit and of the 600 rehabilitation admissions in 1999, 328 met this inclusion criteria. From these 328 patients, subjects were excluded for the following reasons: (1) missing FIM scores at discharge ($n = 1$); (2) missing FIM scores at follow-up ($n = 81$) (excluded from follow-up analysis only); (3) receiving antidepressant medications at admissions and discharge ($n = 65$); and (4) major depression defined as more than 4 symptoms of depression ($n = 14$). The demographic characteristics for those excluded from the study were otherwise similar in regard to age, gender, and marital status.

The subjects receiving antidepressants ($N = 65$) were excluded because of numerous complicating factors including (1) lack of information regarding how the diagnosis of depression was made or by whom; (2) different classes of antidepressants prescribed (SSRIs, tricyclics, etc); (3) differing periods of time for which the antidepressants were prescribed; and (4) the use of multiple antidepressants for the same subject either consecutively or concurrently.

Additionally, some subjects met more than 1 of the exclusionary criteria, which resulted in a cohort of 209 subjects with complete information at the time of discharge. From the original cohort at admission, 148 of the subjects had complete information at the time of follow-up. Also, the majority ($n = 176$) of subjects had 2 or more admissions to the unit during 1999 primarily because of rehospitalization. In these cases, the data for the most recent or last subacute stay were utilized.

Data collection

A list of eligible subjects admitted during 1999 was generated from a computer database capable of sorting by diagnostic codes. The files of these subjects were reviewed in the facility's medical records office and the following information was obtained: age, gender, marital status, ethnicity, diagnosis of depression, antidepressant medication, dementia, and number of identified symptoms of depression on Section E.1 of the Minimum Data Set (MDS). Section E.1 of the MDS includes 16 items, 13 of which have been found to be significantly correlated with standardized depression screens.[35]

The physical therapy department provided "FIM Case Coding Forms" and "FIM Profile" for these specific subjects from which the following information was obtained: number of days received physical therapy, setting admitted from, setting discharged to, total FIM score at admission, total FIM score at discharge, and total FIM score at 90-day follow-up.

The MDS, Version 2, was completed by a registered nurse case manager trained in MDS assessment. Five days after admission to the subacute unit, an MDS evaluation was conducted for each subject with input from various departments. For Section E, the nursing staff provided the basic information regarding each person's moods and behaviors.

The initial FIM scores were obtained within 24 hours of admission to the subacute unit by physical therapy staff trained in FIM assessment. Also, at that time, therapy goals were established and a treatment plan completed. Prior to discharge from the subacute unit, another physical therapy assessment was administered and discharge FIM scores were obtained. A follow-up evaluation was completed 90 days after discharge and FIM scores were documented on a Interim or Follow-up Assessment Coding Form. This assessment was completed by a trained physical therapist via a telephone interview.

Key variables

The independent variable or predictor measure, minor depression, which is identical to major depression in duration but has fewer symptoms and less impairment. As with major depression, an episode of minor depression involves either a sad or depressed mood and/or loss of interest or pleasure in nearly all activities. The main difference is that minor depression requires a total of 2 symptoms of depression whereas major depression requires 5 symptoms.[36] These additional symptoms include change in weight or appetite, change in sleep patterns, psychomotor retardation or agitation, fatigue or loss of energy, feelings of worthlessness or inappropriate guilt, diminished ability to think/concentrate or indecisiveness, and recurrent thoughts of death or suicide ideation attempt or plan. For this study, the presence of minor depression was determined based upon the number of symptoms present on Section E.1 of the MDS, Version 2, labeled "Mood and Behaviors Patterns." The diagnosis of minor depression was derived from the presence of 2 to 4 symptoms (at the first MDS assessment) over a 5-day period.

Generally, these symptoms/behaviors in Section E.1 have been found to significantly correlate with other, widely used, depression screens.[35] Burrows et al[37] interviewed 108 residents of 2 nursing homes to determine if there were any relationships between the MDS mood items and depression ratings from the *Hamilton Depression Rating Scale* and the *Cornell Scale for Depression in Dementia*. The correlations with the Hamilton Depression Rating Scale and MDS mood items ranged from 0.15 to 0.54 with 13 items being significant at or below the 0.05 level. They include negative statements; persistent anger with self or others; self-deprecation; expression of unrealistic fears; expressions of panic; repetitive health complaints; repetitive anxious complaints; diurnal mood variation; sad, pained, worried facial expression; crying, tearfulness; sleep disturbance; repetitive questions; and withdrawal from activities of interest. Also, since the MDS mood item "reduced social interaction" was near the 0.05 level of significance, it was also used as a symptom of minor depression for this study.

The dependent measure or change in functioning at discharge and follow-up was measured using the total scores of the FIM. The FIM is an 18-item rating scale which has been found to be both a valid and reliable tool in which to evaluate functioning.[38,39] It is composed of 18 items, including eating; grooming; bathing; dressing upper body; dressing lower body; toileting; bladder; bowel; bed, chair, wheelchair transfer; toilet transfer; tub, shower transfer; walking, wheelchair; stairs; comprehension; expression; social interaction; problem solving; and memory. Each of the items is rated using a Likert-type scale with values ranging from 1 (*total dependence*) to 7 (*complete independence*), with a total score range of 18 to 128. The scores for each item are summed and a total score is derived with functional levels ranging from *independent* to *total assistance* as represented by 18-point intervals.

Analysis

The data were analyzed utilizing both descriptive and inferential statistical procedures. Demographic variables were analyzed separately for the cohort at discharge and at follow-up because of incomplete data for some of the subjects after the 90-day period. The variable "ethnicity" was not included in the table because all of the subjects identified themselves as Caucasian. Additionally, an outlier patient with 187 days of therapy was excluded.

An initial analysis using a least squares multiple regression was conducted where the dependent variables were difference scores between FIM scores at admission, discharge, and follow-up (ie, FIM at admission − FIM at discharge and FIM at admission − FIM at follow up). This dependent measure was then regressed on the independent variable minor depression and other demographic variables. This analysis resulted in no statistically significant associations. Further analysis was conducted using binary logistic regression with dichotomized variables, which has been used by other studies to evaluate functioning and depressive symptoms.[40,41] Although one argument against dichotomized variables is that it limits or restricts the scope of the statistical analysis, an advantage is that the

data are interpreted based upon clinical significance. That is, dichotomized variables focus upon the clinical relevance of changes and not simply upon a correlative relationship.

Accordingly, the variable minor depression was treated as nominal data insofar as a subject was categorized as either with or without this diagnosis. The total FIM scores were also treated as ordinal data based upon the assumption that the intervals between the raw scores were not equal. That is, although changes in FIM scores are often treated as having equal intervals between them, it may be argued that they are unequal in regard to "clinical" relevance. Thus, an increase in 1 point may place the person at a higher functional level whereas an increase of 10 points may result in no change in level.

Consequently, minor depression was coded as present when the subject had 2 to 4 symptoms and not present when the subject had less than 2 symptoms. The FIM scores were coded as "improved" when the scores indicated an improvement of at least one level of functioning and "not improved" when there was no improvement in the level of functioning or a decline in functioning. The dichotomized FIM improvement scores were then used as the outcome variable with the presence or absence of minor depression being the predictor variable. Logistic regression analyses were conducted for change in FIM scores from admission to discharge, admission to follow-up, and discharge to follow-up. Thus, FIM outcome scores were actually improvement scores that represented either no or a positive change during the 3 specified time periods.

The first logistic regression model included the variable "minor depression" and the FIM score change. A subsequent multivariate logistic regression included a number of clinical and demographic variables including dementia, number of depressive symptoms, age, gender, marital status, days of therapy, and place of discharge. Whereas raw scores for days of therapy and age were used, variables with more than 2 categories were dichotomized. Thus, married subjects were assigned a value of 1, while individuals who were single, widowed, divorced, or separated were assigned a value of 0. This classification of the data was based upon married people having someone at home who was able to support him/her on a relatively continuous basis as compared to the other groups. If the subject was discharged home, he/she was assigned a 1 while a 0 was given for all other places of discharge. The assumption was that people returning home achieved a higher level of functioning as compared to people discharged to other settings.

Results

The characteristics of patients in the cohort at discharge and follow-up are summarized in Table 1.

The average age of patients in the cohort at discharge was about 82 years of age, with the majority (71%) being female and widowed (59%). About 15% of the subjects had a diagnosis of dementia and the average length of physical therapy was 9 days. Almost all of the subjects (98%) were admitted from an acute unit of another facility (hospital) and about half (53%) were discharged home.

The characteristics of the cohort at follow-up were similar to the cohort at discharge except that the follow-up cohort had about 1 day less of physical therapy. The groups were similar in regard to gender, marital status, presence of dementia, place admitted from, and place of discharge.

The FIM scores at admission, discharge, and follow-up were compared for patients in the cohort at discharge and cohort at follow-up. As illustrated in Table 2, the mean FIM scores at admission and discharge were similar for the cohort at admission and at follow-up. There was about a 17-point increase in FIM score from admission to discharge, for both cohorts. Of the subjects who responded during follow-up, however, the FIM scores only increased, on average, 3 points from discharge to follow-up.

Logistic regression analyses were conducted assessing the association of minor depression with improvement in FIM level at admission, discharge, and follow-up (Table 3).

The logistic regression analysis indicated a significant association between minor depression at admission and change in functional status, from admission to discharge. Subjects with minor depressive symptoms were less likely (OR 0.30; 95% CI 0.11–0.80) to show improvement in FIM scores from admission to discharge. To state this result another way, patients without minor depression

Table 1
Characteristics of patients in cohort at discharge and follow-up

Variable	Cohort at discharge ($N = 209$)	Cohort at follow-up ($N = 148$)
Mean age in years (standard deviation)	82.7 (7.8)	81.9 (7.6)
Gender		
Male	60 (29%)	40 (27%)
Female	149 (71%)	108 (73%)
Marital status		
Never been married	17 (8%)	14 (9%)
Married	58 (28%)	46 (31%)
Widowed	124 (59%)	84 (57%)
Separated	0	0
Divorced	10 (5%)	5 (3%)
Diagnosis of dementia		
Yes	32 (15%)	24 (16%)
No	177 (85%)	124 (84%)
Mean days of physical therapy (standard deviation)	9.66 (13.8)	8.67 (5.7)
Admitted from		
Home	2 (1%)	2 (1%)
Acute unit-own facility	0	1 (1%)
Acute unit-another facility	206 (98%)	145 (98%)
Assisted living	1 (1%)	0
Discharge to		
Home	111 (53%)	84 (57%)
Board and care	2 (1%)	1 (1%)
Nursing facility	52 (25%)	34 (23%)
Transitional living	0	0
Acute unit-another facility	18 (9%)	7 (5%)
Assisted living	20 (10%)	16 (11%)
Died	6 (3%)	1 (1%)

Note: Percentages are rounded to the nearest whole number.

Table 2
FIM scores of cohort at discharge and follow-up

Mean scores (standard deviation)	Cohort at discharge ($N = 209$)	Cohort at follow-up ($N = 148$)
Mean FIM scores at admission (standard deviation)	73.627 (14.09)	73.84 (14.4)
Mean FIM scores at discharge (standard deviation)	90.24 (18.0)	91.73 (17.74)
Mean FIM scores at follow-up (standard deviation)	NA	94.41 (20.91)

Note: The cohort of 209 subjects represents those people who met the inclusion criteria at the time of discharge from the subacute unit. When these subjects were contacted 90 days later for follow-up, 61 subjects did not respond or had died. Consequently, the cohort changed from time of discharge to follow-up and thus, it was analyzed separately at these 2 end points.

Table 3
Association of minor depressive symptoms at admission and improvement in FIM level

Variable	Coefficient	P	Odds ratio	95% CI lower	95% CI upper
FIM score improvement from admission to discharge Minor depression	−1.2062	.016	0.30	0.11	0.80
FIM score improvement from discharge to follow-up Minor depression	0.0435	.952	1.04	0.25	4.37
FIM score improvement from admission to follow-up Minor depression	−0.0374	.964	0.96	0.19	4.88

at admission were 3.3 times more likely to show improvement as compared to patients with minor depression. Additionally, improvement in total FIM score was a strong determining factor in whether or not the person returned home. There was not, however, a significant association of minor depression with FIM score improvement from discharge to 90-day follow-up (OR 1.04; 95% CI 0.25–4.37) or admission to 90-day follow-up (OR 0.96; 95% CI 0.19–4.88).

Multivariate logistic regression analysis was used to study the association of score improvement from "admission to discharge" and "discharge to follow-up" with minor depression while controlling for dementia, age, gender, marital status, days of therapy, and place of discharge (Table 4).

The analysis indicated that the association between minor depression and FIM scores from "admission to discharge" remained unchanged after controlling for potential confounders. There was also a significant association between total FIM score from admission to discharge and place of

Table 4
Association of FIM score improvement and minor depression, dementia, age, gender, marital status, days of treatment, and place of discharge

Variable	Coefficient	P	Odds ratio	95% CI Lower	95% CI Upper
FIM score improvement from admission to discharge					
Minor depression	−1.2990	.016	0.27	0.09	0.79
Dementia	0.4006	.362	1.49	0.63	3.53
Age	−0.01580	.482	0.98	0.94	1.03
Gender	−0.1912	.630	0.83	0.38	1.80
Marital status	−0.0933	.818	0.91	0.41	2.01
Days/treatment	0.02532	.411	1.03	0.97	1.09
Place/discharge	1.1340	.002	3.11	1.53	6.30
FIM score change from discharge to follow-up					
Minor depression	−0.0152	.984	0.98	0.23	4.23
Dementia	0.0264	.959	1.03	0.38	2.80
Age	−0.01839	.447	0.98	0.94	1.03
Gender	−0.1063	.806	0.90	0.38	2.10
Marital status	0.0625	.883	1.06	0.46	2.45
Days/treatment	0.02902	.345	1.03	0.97	1.09
Place/discharge	0.2429	.512	1.27	0.62	2.64

discharge. That is, people who returned home were more likely to have exhibited improved total FIM scores from admission to discharge.

Discussion

Within the past few years, numerous studies have identified the detrimental effects of minor depression on the health and functioning of people older than 65 years.[42] Generally, the results of this research can be summarized in 3 main points. First, minor depression is an identifiable psychiatric disorder, which sometimes occurs independently of recurrent major depressive disorders.[43] Second, minor depression is not a self-resolving or "evanescent" disorder and it requires appropriate treatment[44,45] Third, there is a significant association between mood, specifically minor depression, and functioning, especially for older people.

The purpose of this study was to explore this third point; namely, it examined if there is an association between minor depression and recovery of function for older people receiving subacute care. From a clinical perspective, recovery of functioning is a critical factor in the rehabilitation process because it determines whether or not the person is likely to return home (or to previous residential setting). If not, the odds are greater that the person will be placed in a nursing facility or assisted living, usually contrary to his/her wishes. Additionally, because of less independence and autonomy, loss of functioning results in a significantly poorer quality of life.

Whereas previous studies have focused on the effects of major depression, our research has found that even minor depressive symptoms affect the recovery of functioning during subacute rehabilitation.[46] It is important to note, however, that this study had 2 primary limitations. First, it did not specifically take into account the severity of the subjects' medical illness and associated treatments. This may have resulted in appreciable confounding of medical status at admission with depression and functional outcomes. A second limitation was that the results regarding the effect of minor depression during follow-up were inconclusive perhaps because of loss of subjects. Thus, there may be an association not identified by this analysis because of limited statistical power. Another possible explanation is that the subjects may have recovered spontaneously after returning home. Arnold and Kafetz[47] found that nearly half of elderly patients in medical inpatient settings exhibited spontaneous recovery from depressive symptoms upon returning home. Despite these limitations, however, the results of this study reveal a strong association between minor depression and rehabilitation outcome for older adults receiving subacute treatment.

Implications for Behavioral Health Services

From a treatment or clinical perspective, our findings suggest that adequate screening and treatment for minor depression should be conducted for older people in subacute care to ensure maximum benefit from physical therapy and recovery of functioning. As compared to major depression, the assessment and treatment of minor depression presents some unique challenges for the healthcare provider. First, minor depression may be difficult to diagnose because, unlike major depression, it may not include physical symptoms such as sleep disturbance and/or appetite change. It is often characterized by subtle mood and cognitive changes which makes diagnosis less amenable to observational evaluation. Consequently, if depression is suspected, of any intensity, patients should be referred for a thorough diagnostic evaluation which would likely identify slight changes in mood/cognition. Secondly, people often resist treatment because of the misperception that the effects of minor depression are relatively benign. Accordingly, it is important that patients are educated on the effects of depressive symptoms so that they may make informed choices about appropriate treatments.

In summary, minor depression is a quality of life issue for older adults insofar as it affects both general functioning and recovery of functioning following an injury or illness. From a public health perspective, untreated minor depression translates into poorer treatment efficacy and higher healthcare costs. From the perspective of the older patient, however, it means having to give up his/her

independence, autonomy, and in some cases, home. With proper psychotherapeutic and pharmaceutical treatment, however, minor depression can be alleviated, resulting in better rehabilitation outcomes and better quality of life.[48]

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