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Changes in Mood in New Enrollees at a Program of All-Inclusive Care for the Elderly (PACE)

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Abstract

OBJECTIVES—To examine changes in mood after 9 months of enrollment in a Program of All-Inclusive Care for the Elderly (PACE).

DESIGN—Cohort Study

SETTING—Alexian Brothers PACE—St. Louis, Missouri

PARTICIPANTS—Newly enrolled patients aged 55 or older, living in the PACE service area, eligible for nursing home care, and able to live safely in the community with continuous care for at least 9 months (n=182).

MAIN OUTCOME MEASURES—Geriatric Depression Scale (GDS)-15 score at the pre-admission evaluation (PAE) and the 9 month evaluation (9ME).

RESULTS—Of the 182 patients evaluated, 27% (n=49) met the definition of depression as defined by the GDS-15 score of ≥ 6 at the PAE. At the 9ME, only 11% of patients met the depression criteria ($p<0.001$). Of the patients who met the criteria for depression at the PAE, 80% of patients (n=39) no longer met this criteria at the 9ME ($p=0.029$). Similar findings were observed by age, sex, and race. Greater improvement was observed among those who were

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depressed at the PAE; the depressed cohort improved by 5.0 points ($p<0.001$) on the GDS-15 scale from the PAE to the 9ME, whereas the non-depressed cohort improved by 0.6 points ($p=0.003$).

CONCLUSION—The use of PACE as an alternative intervention may be a good option to improve mood in older adults.

Keywords

Program of All-Inclusive Care for the Elderly; Depression; Mood; Geriatric Depression Scale

Introduction

Depression is a common comorbid condition in older adults. It is estimated that 1 in 6 adults aged 65 or older experiences symptoms of depression.^{1–3} However, only 1–5% of older adults meet the diagnostic criteria for depression.^{2,3} Depression may be under-diagnosed and under-treated in older adults as symptoms suggestive of depression do not typically present as depressed mood. Instead older adults present with complaints of sleep disturbances, fatigue, psychomotor retardation, loss of interest, hopelessness, issues with concentration, anorexia, agitation, and loneliness.^{1,2} Risk factors for poor mood in older adults can include loss of a loved one, living alone, loss of or lack of social support, change in residence, financial issues, functional/cognitive decline, being female, chronic medical illnesses, and taking certain medications.^{1,2}

Currently, the American Psychiatric Association recommends the use of both pharmacological and non-pharmacological treatments for depression.⁴ Medications may cause adverse drug events at a higher rate in older adults compared to younger adults. Likewise, medications may not treat the root cause of the problem (e.g., financial issues, lack of social support). Therefore, non-pharmacological interventions, such as physical activity and social interventions, should be considered in older adults as interventions to improve mood.^{5,6} One option that can incorporate both pharmacological and non-pharmacological approaches to care is the use of Program of All-Inclusive Care for the Elderly (PACE) organizations, which aim to improve overall quality of life in four domains (physical, psychological, social, and spiritual) using a multidisciplinary approach.⁷ Our objective is to examine changes in mood in newly enrolled older adults at an individual PACE organization.

METHODS

This is a population-based retrospective cohort study of patients enrolled in Alexian Brothers Community Services (ABCS) PACE in St. Louis, Missouri. This research was approved by the St. Louis College of Pharmacy institutional review board.

Program of All-Inclusive Care for the Elderly

Patients qualify for services at PACE if the following criteria are met: aged 55 or older, deemed to be at a nursing facility level of care as determined by the state,⁸ living in the service area of PACE, and can be safely cared for in the community at the time of enrollment.^{9,10} Prior to a patient's enrollment at PACE, a pre-admission evaluation (PAE) is

completed by members of the interdisciplinary team (IDT), which includes physicians, nursing staff, pharmacists, social workers, physical therapists, occupational therapists, and nutritionists, as well as social and spiritual care staff at the ABCS PACE. The PAE occurs within one month of enrollment in PACE over the course of one or two days. During this evaluation each member of the IDT is given 30 to 60 minutes to perform various assessments to determine goals for future care. After enrollment in PACE, similar evaluations occur after 3 months (3ME) and every 6 months thereafter (9ME, etc.) to ensure that the patient's physical, psychological, social, and spiritual concerns are being addressed.

Measures

During the PAE and subsequent evaluations, patient characteristics are captured by each member of the IDT. The Geriatric Depression Scale (GDS) -15 is administered by social workers as part of their assessment. This scale was specifically designed to assess depressive symptoms in older adults using 15 yes or no questions.¹¹ Scores ≥ 6 are considered to be suggestive of depression (sensitivity=81.5%, specificity=75.4%).¹² Herein, the terms depression or depressed will be defined by a GDS-15 score ≥ 6 , and the terms no depression or non-depressed will be defined by a GDS-15 score <6 . The GDS was not administered to those patients with cognitive impairment or those who refused. We collected documentation of the GDS-15 from the social worker note within the electronic medical record (EMR).

Other characteristics such as age at the time of enrollment, sex, and race were collected from the demographics section of the EMR. Routine psychoactive medications were collected from the physician or pharmacist PAE note and subsequent evaluation notes; psychoactive medications were categorized based on drug class (Appendix). As needed medications were not included as we could not quantify its use. Changes in psychoactive medications were assessed using McNemar's test. Psychiatry diagnoses and evidence of changes in status were collected from the physician's notes.

ABCS PACE was established in 2000; however, many early records are not routinely available as the EMR was not instituted until 6/1/2006. Therefore, we performed a chart review for patients who enrolled between 6/1/2006 through 1/1/2013.

Data collection was performed by four collaborators. Collaborators were trained on the use of the EMR and the location of information; they were observed by the primary investigator for at least five patients prior to assessing on their own. The primary investigator also randomly reviewed at least 20% of the patients to ensure the data were appropriately collected.

Statistical analysis

Our primary objective was to evaluate the change from depressed (GDS-15 score ≥ 6) at the PAE to non-depressed (GDS-15 score <6) at the 9ME. We dichotomized depressed and non-depressed based on the GDS, as we suspected the general services of PACE would have a greater impact on patients' depression based on the GDS-15 score. We used McNemar's test to evaluate changes in depression over time. Our secondary objectives included evaluating changes in mood stratified by age, sex, and race, and changes in mood using GDS-15 as a continuous scale. We evaluated change in mood through both the 3ME and the 9ME, as we

suspected there might be an initial improvement in mood at enrollment and a regression to the mean in GDS-15 scores during this study period. We compared changes in mood by age, sex, and race by including an interaction term(s) in conditional logistic regression models, and evaluating the significance of this term(s) by the likelihood ratio test. We evaluated changes in GDS-15 on a continuous scale by repeated measures ANOVA (with post-hoc Bonferroni correction). To understand the influence of medications used to treat depression, which we defined as selective serotonin reuptake inhibitor (SSRI), serotonin-norepinephrine reuptake inhibitor (SNRI), tricyclic antidepressant (TCA), antipsychotic, α 2-adrenergic receptor antagonist, 5-HT1A receptor partial agonist, and dopamine-reuptake inhibitor, we performed sub-analyses on persistent users and persistent non-users. Persistent users were defined as patients on depression medications at both PAE and 9ME and persistent non-users were defined as patient not on depression medications at both PAE and 9ME. Statistical significance was assessed using a two-sided test with level of significance $\alpha = 0.05$. Statistical analyses were performed using IBM-SPSS version 22.0 (IBM Corp., Armonk, NY) and SAS version 9.4 (SAS Institute, Inc., Cary, NC).

RESULTS

Based on the inclusion criteria, 182 patients were analyzed (Figure 1). A majority of patients enrolled were female (70%) and African-American (64%). The mean (standard deviation) age at PAE was 70.2 (9.4). The Mini Mental State Exam at PAE was 23.2 (5.9) in the 176 patients with documented scores. Forty-six percent of patients had a psychiatry diagnosis, and 36% were taking psychoactive medications as documented during the PAE (Table 1). There were no differences in the changes in psychoactive medications between PAE and 9ME except for SSRIs ($p=0.001$).

Of the 182 patients enrolled, 27% ($n=49$) met the GDS-15 criteria for depression at the PAE. At the 9ME, only 11% of patients met the GDS-15 criteria for depression ($p<0.001$). Of the patients who met the criteria for depression at the PAE, 80% of patients ($n=39$) no longer met this criteria at the 9ME ($p=0.029$). Next we analyzed changes in depression by age, sex, and race (Table 2). Overall, there were no differences across these groups, although younger patients appeared to be more likely to improve than older patients (p -interaction=0.096). We explored the changes in SSRI use in patients with GDS-15 suggestive and not suggestive of depression due to the increase use in the whole population. In patients who met the GDS-15 criteria for depression, 28.6% ($n=14$) were taking a SSRI at PAE compared to 44.9% ($n=22$) at 9ME ($p=0.07$).

To understand the magnitude of change, we also analyzed the change in GDS-15 over the first nine months of follow-up as a continuous variable. The mean (standard deviation) GDS-15 for all patients was 4.0 (3.1) points at the PAE. After adjusting for multiple comparisons, there were decreases in GDS-15 from the PAE to the 3ME by 1.3 (2.7) points ($p<0.001$), from the 3ME to the 9ME by 0.5 (2.4) points ($p=0.008$), and from the PAE to the 9ME by 1.8 (3.1) points ($p<0.001$).

Next we assessed changes in GDS-15 among depressed and non-depressed patients. Using the previously stated approach, there were decreases in GDS-15 in the depressed group from

the PAE to the 3ME by 4.0 (2.6) points ($p<0.001$), the 3ME to 9ME by 1.0 (3.0) points ($p=0.059$), and the PAE to the 9ME by 5.0 (3.0) points ($p<0.001$, Figure 2). There were also decreases in GDS-15 from the PAE to the 3ME by 0.3 (2.0) points ($p=0.405$), the 3ME to the 9ME by 0.4 (2.1) points ($p=0.155$), and the PAE to the 9ME of 0.6 (2.1) points ($p=0.003$) in the non-depressed group (Figure 2).

Finally, to explore the influence of medications on the change in GDS-15, we performed sub-analyses on persistent depression medication users and persistent depression medication non-users in patients suggestive of depression at PAE. Nineteen patients were classified as persistent depression medication users. In these patients there was a mean (standard deviation) improvement in GDS-15 of 5.0 (3.7) points ($p<0.001$). Eighteen patients were classified as persistent depression medication non-users. In these patients there was a mean (standard deviation) improvement in GDS-15 of 4.8 (2.5) points ($p<0.001$).

DISCUSSION

In our study, the proportion of patients depressed per GDS-15 at the PAE ($n=49$) was reduced by 80% over the course of follow-up ($n=10$). There was likely a clinically significant improvement in GDS-15 scores for depressed patients (5 points; $p<0.001$), whereas improvements seen in non-depressed patients (0.6 points; $p=0.003$) are likely not clinically significant.

To date, few studies have utilized the GDS-15 as a marker for changes in mood. The GDS-15 was used to assess changes in mood at an adult day center and day hospital in Canada for patients ($n=41$) referred for management of medical, social, functional, and psychiatric conditions.¹³ Enrollment in this program showed a mean improvement in GDS-15 score of 1.7 points ($p<0.002$) from admission to discharge (mean duration of 130 days) in adults with a mean age of 81 years. This result was very similar to our study in which there were mean improvements in GDS-15 of 1.3 points over three months ($p<0.001$) and 1.8 points over nine months ($p<0.001$) in a population with a mean age of 70 years. This Canadian study did not stratify based on the patients' GDS-15 categorization at enrollment of depressed versus non-depressed as was done in our study.

Another analysis used the GDS-30 to capture improvements in mood after initiating a SSRI medication in adults with depression ($n=18$).¹⁴ Adults (mean age of 76 years) with a GDS-30 ≥ 6 and mean (standard deviation) of 9.4 (1.9) points were included, and escitalopram was titrated to a maximum of 20 mg per day (mean dose of 16.1 mg per day). After four weeks of treatment, there was a significant improvement of the GDS-30 to 4.7 (2.7) points ($p<0.001$). In our study, there was an overall significant increase in the use of SSRIs from PAE (36%) to 9ME (42%). However, there were only eight additional patients on SSRIs from PAE to 9ME in patients suggestive of depression at PAE. In our sub-analyses of persistent depression medication users and non-users, we still observed a GDS-15 reduction of approximately 5 points from the PAE to the 9ME ($p<0.001$) in both groups. As two separate GDS versions were used, it is difficult to directly compare the results of these previously reported studies. Currently, there are 113 PACE organizations in 32 states across the United States.¹⁵ Various interventions have been studied at PACE that

may contribute to improved mood in patients. These interventions include an exercise program, which reported high levels of satisfaction, dance therapy, which resulted in improved function, art therapy, which improved wellness in the elderly, and the inclusion of mental health services, which included improved access to care and reduced psychiatric admissions.^{16–19} Any one of these interventions or other non-studied interventions may have contributed to our observed finding of improved mood. Similar results may also be observed at adult day centers, in which attendees experience structured health, social, and therapeutic activities in a supportive group environment. Currently, there are over 4,500 such centers throughout the United States.²⁰

There are some potential limitations in this study. First, although the GDS-15 score is a reasonable screening tool for depression in adults aged 60 and older, it has traditionally not been used to assess impact of therapy on mood. Scales such as the Hamilton Depression Rating Scale and the Montgomery Asberg Depression Rating Scale are more typically used.²¹ However, a study using citalopram showed improvements over time using the GDS.¹⁴ Second, as this was a retrospective chart review, we were unable to capture the specific non-pharmacological interventions from the EMR that likely resulted in improved mood; therefore, we assessed the impact of PACE as a whole on our population. Third, GDS-15 was not available for all patients due to the inability or refusal to complete the screening, a lack of documentation of the score, and disenrollment prior to the 9ME; however, available data from the PAE and the 3ME (without documentation of the 9ME) were tested and compared to the full data, and no differences were noted in the outcome (data not shown). Fourth, there was no control group to assess patients not enrolled in PACE and the impact on GDS-15 due to the retrospective and single-centered nature of this study.

To further explore the influence of PACE on mood, future studies should examine this relation in other PACE organizations with different demographics, as our study was conducted in a primarily African American, indigent population residing in an urban area. Additionally, future studies using a prospective design could allow quantification of specific non-pharmacological interventions within PACE on mood, incorporate a control-group, and test other commonly used depression tools along with the GDS-15 to validate the use of GDS-15 on the impact of interventions on mood over time.

CONCLUSION

This study of new patients in PACE described the impact of enrollment in the program on those with symptoms suggestive of depression. In general there was an improvement of the GDS-15 score after nine months of follow-up. The use of PACE as an alternative intervention may be a good option to improve mood in older adults.

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Abbreviations

3ME	3 month evaluation
9ME	9 month evaluation
ABCS	Alexian Brothers Community Services
IDT	Interdisciplinary team
GDS	Geriatric Depression Scale
EMR	Electronic medical record
PACE	Program of All-inclusive Care for the Elderly (PACE)
PAE	Pre-admission evaluation
SNRI	serotonin-norepinephrine reuptake inhibitor
SSRI	selective serotonin reuptake inhibitor
TCA	tricyclic antidepressant

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Figure 1.

Flowchart for Patient Inclusion in an Analysis of Enrollment in a Program of All-Inclusive Care for the Elderly (PACE) on Mood.

Definitions: 3ME= 3 Month Evaluation; 9ME = 9 Month Evaluation; EMR= Electronic Medical Record; PAE = Pre-Admission Evaluation; PACE = Program of All-Inclusive Care for the Elderly

Figure 2.

Mean Changes in GDS-15 Score over 9 Months, Program of All-Inclusive Care for the Elderly.

PAE = Pre-Admission Evaluation

3ME = 3 Month Evaluation

9ME = 9 Month Evaluation

GDS-15 = Geriatric Depression Scale-15

Non-Depressed Patients = Geriatric Depression Scale of <6/15 at Pre-Admission Evaluation

Depressed Patients=Geriatric Depression Scale of ≥ 6/15 at Pre-Admission Evaluation

Calculated by Repeated Measures ANOVA and pairwise evaluation (using Bonferroni correction)

Table 1

Characteristics of Newly Enrolled Patients at a Program of All-Inclusive Care for the Elderly.

(n=182)	Baseline: n(%)	9 Months: n(%)	P-Value*
Age			
55–64	56 (30.8)		
65–74	64 (35.2)	---	---
75–84	46 (25.3)		
85 or older	16 (8.8)		
Female	127 (69.8)	---	---
Race			
White	37 (20.3)		
African American	116 (63.7)	---	---
Asian	25 (13.7)		
Hispanic	4 (2.2)		
Diagnosis of Any Psychiatry Condition	84 (46.2)		
Depression	64 (35.2)		
Bipolar	14 (7.7)	---	---
Schizophrenia	5 (2.7)		
Anxiety	4 (2.2)		
Other Diagnosis	1 (0.5)		
Diagnosis of Any Psychiatry Condition After Enrollment	---	6 (3.3)	---
Use of Any Psychoactive Medication	65 (35.7)	77 (42.3)	0.115
Psychoactive Medications by Type			
Selective Serotonin Reuptake Inhibitor	33 (18.1)	52 (28.6)	0.001
Antipsychotic	23 (12.6)	25 (13.7)	0.75
Mood Stabilizer	7 (3.8)	11 (6.0)	0.22
Benzodiazepine	7 (3.8)	6 (3.3)	1.00
Serotonin-Norepinephrine Reuptake Inhibitor	5 (2.7)	5 (2.7)	1.00
Tri-Cyclic Antidepressant	5 (2.7)	0 (0)	0.06
α2-adrenergic receptor antagonist	4 (2.2)	9 (4.9)	0.18
Dopamine-reuptake inhibitor	3 (1.6)	2 (0.8)	1.00
5-HT1A receptor partial agonist	2 (1.1)	1 (0.4)	1.00

* =Calculated by McNemar's Test

Table 2

Changes in the Prevalence of Depression based on Stratified Characteristics, Program of All-Inclusive Care for the Elderly.

(n=182)	Depressed at PAE* n(row %)	Depressed at 9ME* n(row %)	P Value [†]	P Value [‡]
Overall Population: n(%)	49 (26.9)	20 (11.0)	<0.001	
Age: n(%)				0.096
55–64 (n= 56)	23 (41.1)	7 (12.5)	<0.001	
65–74 (n= 64)	16 (25.0)	7 (10.9)	0.064	
75 or older (n= 62)	10 (16.1)	6 (9.7)	0.39	
Sex: n(%)				0.418
Female (n= 127)	36 (28.3)	14 (11.0)	0.001	
Male (n= 55)	13 (23.6)	6 (10.9)	0.039	
Race: n(%)				0.974
White (n=37)	13 (35.1)	7 (18.9)	0.109	
African American (n=116)	26 (22.4)	10 (8.6)	0.004	
Asian (n=25)	9 (36.0)	3 (12.0)	0.109	

GDS = Geriatric Depression Scale; PAE=Pre-Admission Evaluation; 9ME=9-month evaluation.

* = Geriatric Depression Scale of 6/15

[†] = P-value for the comparison between depression at the 9 month and baseline visits; calculated by McNemar's Test.

[‡] = P-value for interaction; calculated by conditional logistic regression.