



Research paper

Trajectory of cost overtime after psychotherapy for depression in older Veterans via telemedicine



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ABSTRACT

Background: Little evidence exists regarding the costs of telemedicine, especially considering changes over time. This analysis aimed to analyze trajectory of healthcare cost before, during, and after a behavioral activation intervention delivered via telepsychology and same-room delivery to elderly Veterans with depression.

Methods: 241 participants were randomly assigned into one of two study groups: behavioral activation for depression via telemedicine or via same-room treatment. Patients received 8 weeks of weekly 60-min individual sessions of behavioral activation for depression. Primary outcomes were collected at 12-months. Inpatient, outpatient, pharmacy, and total costs were collected from VA Health Economics Resource Center (HERC) datasets for FY 1998–2014 and compared between the two treatment groups. Generalized mixed models were used to investigate the trajectories over time.

Results: Overall cost, as well as, outpatient and pharmacy cost show increasing trend over time. Unadjusted and adjusted trajectories over time for any cost were not different between the two treatment groups. There was a significant overall increasing trend over time for outpatient ($p < 0.001$) and total cost ($p < 0.001$) but not for inpatient ($p = 0.543$) or pharmacy cost ($p = 0.084$).

Limitations: Generalizability to younger, healthier populations may be limited due to inclusion criteria for study participants.

Conclusion: Healthcare costs before, during, and after intervention did not differ between the telemedicine and in-person delivery methods. Outpatient costs accounted for most of the increasing trend of cost over time. These results support policies to use both telehealth and in-person treatment modalities to effectively and efficiently provide high quality care.

1. Introduction

Depression is the leading cause of disability worldwide, and is associated with an increased risk of mortality and morbidity (Kessler, 2012; Kessler and Bromet, 2013; Global Burden of Disease Study, 2015). In addition to an increased risk from suicide, depression is associated with onset and severity of multiple chronic physical disorders including arthritis, cardiovascular disease, diabetes, hypertension and chronic pain (Kessler, 2012; Kessler and Bromet, 2013; Blazer et al., 1987). Financial costs of depression are significant, with

US costs alone estimated at \$210.5 billion annually (Greenberg et al., 2015). While more prevalent in younger age groups, the existing medical illnesses and disability of the elderly make the diagnosis detrimental to cognitive and role functioning (Blazer et al., 1987; Alexopoulos, 2005; Fiske et al., 2009). Suicide in the elderly is nearly twice that of younger age groups, in addition to depression being the most frequent cause of emotional distress in the elderly (Alexopoulos, 2005; Bottino et al., 2012; National Alliance on Mental Illness, 2009).

Treatment has been shown to reduce depression, decrease pain, and increase quality of life, but the rate of treatment for individuals

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Table 1
Patient demographics at baseline.

Characteristics	Total (n=241)	Telepsychology (n=120)	Same-room (n=121)	p-value
Age, years, mean \pm s.d.	63.9 \pm 5.1	63.5 \pm 4.4	64.2 \pm 5.6	0.27
Race, no. (%)				0.17
1: White	143 (60.3)	68 (58.1)	75 (62.5)	
2: Black	94 (39.7)	49 (41.9)	45 (37.5)	
Male gender, no. (%)	235 (97.5)	116 (96.7)	119 (98.3)	0.40
Employed, no. (%)	50 (21.0)	23 (19.5)	27 (22.5)	0.56
Married, no. (%)	165 (69.0)	83 (70.3)	82 (67.8)	0.52
Education, years, mean \pm s.d.	13.7 \pm 2.6	13.5 \pm 2.3	13.8 \pm 2.9	0.38
Smoker, no. (%)				0.94
1: current smoker	49 (20.7)	25 (21.0)	24 (20.3)	
2: former smoker	132 (55.7)	65 (54.6)	67 (56.8)	
3: non-smoker	56 (23.6)	29 (24.4)	27 (22.9)	
Percentage service connected medical care, mean \pm s.d.	45.1 \pm 40.4	47.8 \pm 39.7	42.5 \pm 41.1	0.31
Health status compared to previous year, no. (%)				0.02
1: Better	39 (16.3)	20 (16.8)	19 (15.8)	
2: About the same	104 (43.5)	61 (51.3)	43 (35.8)	
3: Worse	96 (40.2)	38 (31.9)	58 (48.3)	
Insurance coverage, no. (%)				0.48
1: Private	67 (27.8)	32 (26.7)	35 (28.9)	
2: Government	72 (29.9)	41 (34.2)	31 (25.6)	
3: Private & Government	22 (9.1)	9 (7.5)	13 (10.7)	
4: No others than VA	80 (33.2)	38 (31.7)	42 (34.7)	
Income, no. (%)				0.70
1: \$0- < \$15,000	49 (20.6)	25 (21.2)	24 (20.0)	
2: \$15,000- < \$25,000	56 (23.5)	24 (20.3)	32 (26.7)	
3: \$25,000- < \$50,000	93 (39.1)	49 (41.5)	44 (36.7)	
4: \$50,000 or more	40 (16.8)	20 (16.9)	20 (16.7)	

with depression has been historically low, and in a recent report noted it remains at 56% of those diagnosed (Greenberg et al., 2015; Snowden et al., 2003). Reasons for low levels of treatment include mobility issues, geographic isolation, and negative attitudes or stigma toward depression, which may lead people to deny symptoms or delay treatment (Alexopoulos, 2005; Centers for Disease Control and Prevention (CDC), 2010; Weiss, 1994; Egede et al., 2015). Telemedicine may offer an important option to increase access by addressing patient costs resulting from transportation and missed work, the need for increased coverage by providers to geographically remote areas, and a desire for confidentiality for those concerned with stigma (Gros et al., 2013; Stronge et al., 2007; Fortney et al., 2013; Frueh et al., 2000; Frueh et al., 2007; Richardson et al., 2009). A recent trial of psychotherapy for elderly patients with depression found telemedicine was not inferior to same-room care based on clinical outcomes of treatment response (50% reduction in symptoms from baseline to 12-months, and no longer diagnosed with major depressive disorder at 12-months) (Egede et al., 2015). The results of this trial added significantly to the evidence base in support of telepsychiatry as a way to provide effective care for depression (Egede et al., 2015).

Though theoretically cheaper, many claims regarding the cost savings of telehealth are based on logic, with few studies actually investigating the cost-effectiveness of interventions (Whitten et al., 2002; Hailey et al., 2002; Bergmo, 2009). A cross-sectional analysis found lower utilization and cost for patients in treatment for depression at a community practice (Simon et al., 2006), however, most interventional studies have shown an increase in healthcare costs after treatment as a result of increased care-seeking (Pyne et al., 2010; Fortney et al., 2011; Simon et al., 2009). In addition, most analyzes investigated cost only during the intervention, with little follow-up or attention to changes over time (Whitten et al., 2002; Hailey et al., 2002). Economic analyzes conducted on collaborative care interventions for depression found them to be effective but expensive, with increased expenditures for patients in the intervention group rather than usual care (Pyne et al., 2010). In addition, both programs in a study of telephone based care management versus additional telephone based psychotherapy led to higher outpatient costs, with the more

intensive program approximately \$150 higher (Simon et al., 2009).

Little strong evidence exists regarding the costs of telemedicine, and specifically telepsychiatry (Whitten et al., 2002; Hailey et al., 2002). The aim of this analysis was to analyze the trajectory of cost over time for a trial investigating the impact of telepsychology and same-room delivery of behavioral activation to elderly Veterans with depression. Analyzes focused on understanding the trajectory of cost for both treatment groups over time, and understanding the effect of treatment on cost overtime, by targeting the impact on healthcare costs before, during, and after a behavioral activation intervention.

2. Methods

2.1. Study design and participants

This randomized, controlled, non-inferiority trial is registered with ClinicaTrials.gov, number NCT00324701 (Egede et al., 2009). Participants were recruited from the Ralph H. Johnson Veterans Affairs Medical Center (VAMC) in Charleston, SC, USA and four VA community outpatient based clinics (Goose Creek, Beaufort, and Myrtle Beach, SC and Savannah, GA, USA). Eligibility was initially Veterans aged 60 years or older, however, was decreased to ages 58 or older following requests to lower the age limit to accommodate more Vietnam war era Veterans. Participants were eligible if they met DSM-IV criteria (Diagnostic and statistical manual of mental disorders, 2000) for major depressive disorder, and excluded if they were diagnosed with active psychosis or dementia, has both suicidal ideation and clear intent, or met criteria for substance dependence. Other psychopathology was not an exclusion factor.

2.2. Recruitment and randomization

Study coordinators recruited possible participants using mailing procedures approved by the Medical University of South Carolina Institutional Review Board and Veterans Affairs Research and Development Committee. Postcards were mailed to Veterans meeting inclusion criteria indicating they may be eligible for a study investigat-

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