Evidence-Based Practice Guideline: Wheelchair Biking for the Treatment of Depression

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Abstract:

The purpose of this evidence-based practice guideline is to describe a specific recreational therapy program, wheelchair biking, for the treatment of depression in older adults with and without cognitive impairment. The goal of the guideline is to reduce depressive mood in older adults and to provide a complementary or alternative treatment to medications.

Keywords: Nursing | Depression | Wheelchair Biking | Recreational Therapy | Older Adults

Article:

It is estimated that the incidence of depression in older adults living in long-term care facilities can be as high as 77% and is the most common mood disorder of late life (Steinberg et al., 2008). Unfortunately, depression often goes undiagnosed, and therefore untreated, since older adults may exhibit nonspecific somatic symptoms, rather than symptoms of depressed mood classified in the *Diagnostic and Statistical Manual of Mental Disorders,* fourth edition, text revision (*DSM-IV-TR*) (American Psychiatric Association [APA], 2000; Bekelman et al., 2007; Greenberg, 2007). Minor depression often becomes chronic in older adults but is not a part of normal aging (Lammer, 2007). Depression is a serious mental illness that affects a person's mood, behaviors, function, thoughts, and physical health. According to the World Health Organization (n.d.), depression is the leading cause of disability for older adults.

Depression may be associated with side effects of medications (APA, 2000) or compounded by medical conditions such as a cerebral vascular accident (Roose & Sackeim, 2004), Parkinson's disease (Ehrt, Brønnick, Leentjens, Larsen, & Aarsland, 2006), diabetes (Egede, Nietert, & Zheng, 2005), dementia (Landes, Sperry, & Strauss, 2005), urinary incontinence (Zorn, Montgomery, Pieper, Gray, & Steers, 1999), and sensory impairment (Capella-McDonnall, 2005). Hormonal disorders may contribute to increased rates of depression in women (National Institute of Mental Health, 2000).

Depression may be caused by a number of psychological conditions (e.g., coping with chronic illness and frequent pain), gloomy institutionalized environments, and an assortment of losses including function, independence, social roles, friends and relatives, and past leisure activities. Women who are abused have high rates of depression (Fisher & Regan, 2006), as do older adults experiencing bereavement (U.S. Surgeon General, 1999b). Chronic pain is also associated with high rates of depression (Zanocchi et al., 2008). Finally, residents in long-term care facilities who have fecal incontinence (Hawes & Ahmad, 2006) and those who are dissatisfied with the food (Crogan & Evans, 2006) are more likely to experience depression.

Whether unrecognized, untreated, or undertreated, depression has a host of consequences for older adults. It is important to recognize and aggressively treat depression, as its impact goes far beyond affecting mood. The highest suicide rate of any age group is for those 65 and older (U.S. Surgeon General, 1999c). This is significant, considering that older adults who commit suicide had visited their primary provider close to the time of the suicide: 20% on the same day, 40% within 1 week, and 75% within 1 month (Conwell, 2001). Depression is associated with functional decline and excess mortality and therefore should be treated vigorously (Stein, Cox, Afifi, Belik, & Sareen, 2006). Depression is associated with increased falls (Finkelstein, Prabhu, & Chen, 2007) and poorer recoveries following fractures (Craik, 1994; Mutran, Reitzes, Mossey, & Fernandez, 1995; Shepherd & Prescott, 1996). It has also been demonstrated that depression can be spread from one person to another in a phenomenon known as *emotional contagion* (Goodman & Shippy, 2002).

Not everyone who is depressed needs to be treated with medications. Only 50% of older adults show any improvement in depression using pharmacological treatment (Driscoll, Karp, Dew, & Reynolds, 2007). Older adults not requiring medications may be those whose depression is mild or situational, those who have difficulty tolerating medications, or those who refuse to take medications. Research indicates that mild to moderate depression can often be treated successfully with nonpharmacological interventions alone (Crowe & Luty, 2005). Nonpharmacological interventions may provide a feasible, safe alternative or complementary intervention to the current treatment modality for this population. More serious depression is best treated using a combination of medications and nonpharmacological interventions (Byrd, 2005).

No antidepressant medication is 100% effective in treating depression, and the risks related to adverse side effects must be considered. Approximately one third of older adults are unable to tolerate side effects of the most commonly prescribed antidepressant agents (Sterke, Verhagen, van Beeck, & van der Cammen, 2008). The most costly of these side effects, in terms of quality of life and dollars, are falls (Sterke et al., 2008). An association between antidepressant medication use and falls has been repeatedly demonstrated (Richards et al., 2007). Because of the serious side effects of these medications and older adults' sensitivity to them, it is safest to initially try nonpharmaceutical interventions with depressed older adults.

Social interactions and pleasurable experiences are ways of providing older adults with opportunities to attain happiness, a feeling of purpose, and quality of life. The ability to reach this mood state is often out of reach to older adults with depressive diseases residing in long-term facilities. This group frequently has compounding constraints to leisure in the form of multiple chronic conditions, such as cognitive and mobility impairments and numerous medical diagnoses (Buettner & Martin, 1995). Recreational therapists are specifically trained to help individuals with disabilities overcome such complex constraints. Recreational therapy is an important, yet often overlooked treatment option for long-term care residents with depression. Research examining the link between the body and mind has demonstrated that a person's mood and attitude affect not only the immune system but also other body systems because depression stimulates the parasympathetic nervous system, leading to a vast assortment of medical problems (Armenian, Pratt, Gallo, & Eaton, 1998; Carlin, 1998; Cole-King & Harding, 2001; Ferketich, Schwartzbaum, Frid, & Moeschberger, 2000; Lammer, 2007; Penninx et al., 1998).

Purpose

The purpose of this evidence-based practice guideline is to describe a specific recreational therapy program, wheelchair biking, for the treatment of depression in older adults with and without cognitive impairment. The goal of the guideline is to reduce depressive mood in older adults and to provide a complementary or alternative treatment to medications. The complete guideline (Fitzsimmons, 2010) is distributed by The University of Iowa College of Nursing Hartford Center of Geriatric Excellence and is available for purchase athttp://www.nursing.uiowa.edu/hartford/nurse/ebp.htm.

For the purposes of this guideline, depression may be major, minor (dysthymic), or atypical as defined by *DSM-IV-TR* criteria (APA, 2000). Major depression is a serious medical problem that is persistent and can significantly interfere with all aspects of life. Of all of the medical conditions, major depression is the leading cause of disability in the United States (National Alliance on Mental Illness, n.d.). For a diagnosis of major depressive disorder, symptoms must be present most of the day, nearly daily for 2 weeks. At least five of the following symptoms must be present during the same period, and those five or more symptoms must include at least one of the first two symptoms: (a) depressed mood most of the day, nearly every day, (b) markedly diminished interest or pleasure in almost all activities most of the day, nearly every day, (c) significant weight loss or gain, (d) insomnia or hypersomnia, (e) psychomotor agitation or retardation, (f) fatigue (loss of energy), (g) feelings of worthlessness (guilt), (h) impaired concentration (indecisiveness), and (i) recurrent thoughts of death or suicide.

The essential feature of dysthymic disorder is a chronic mood disturbance present most of the day, more days than not, for at least 2 years. While the person is depressed, at least two of the following must be present: (a) poor appetite or overeating, (b) insomnia or hypersomnia, (c) low energy/fatigue, (d) low self-esteem, (e) poor concentration or difficulty making decisions, and (f) feelings of hopelessness. In addition, during that 2-year period, the person with dysthymic

disorder is never without symptoms for more than 2 months at a time. There must also be no evidence of a major depressive episode, manic or hypomanic episodes, chronic psychotic disorder (e.g., schizophrenia, delusional disorder), or an organic factor that initiated and maintained the disturbance (APA, 2000).

Atypical depression is characterized by a particular pattern of signs and symptoms. While the person shows signs of mood reactivity, at least two of the following additional symptoms must be present: (a) laden paralysis, (b) a long-standing pattern of interpersonal rejection sensitivity, (c) significant weight gain or increase in appetite, and (d) hypersomnia, manic, or hypomanic episodes (APA, 2000).

Residents at Risk for Depression

This wheelchair biking guideline is designed to treat older adults who are depressed or at risk for depression. Clinical and research findings have identified many risk factors for depression in older adults including medications, medical conditions, and psychological conditions (Tables 1, 2 and 3).

Table 1. Medication that Contribute to Depression

• Anticonvulsant agents
• Barbiturates
• Benzodiazepines
• Beta blockers
• Calcium channel blockers
• Carbidopa-levodopa (Sinemet®)
• Clonidine (Catapres®)
• Digoxin (Lanoxin®)
• Histamine-2 blockers
• Hormonal and neuroleptic agents
• Narcotics
• Polypharmacy, defined as taking three or more medications per day.
• Some antihypertensive agents
• Thiazide diuretic agents

Sources. Drugs that Cause Depression (n.d.), Garcia and Tobias (2001), U.S. Surgeon General (1999a).

Table 2. Medical Conditions that Contribute to Depression

Condition	**Evidence**
Cardiovascular accidents	Six prospective evaluations of depressive symptoms/syndromes using various criteria revealed the prevalence of major depressive disorder to be between 10% and 27% in post-stroke patients, with an additional 15% to 40% showing less severe forms of illness within 2 months of the stroke (Roose & Sackeim, 2004; U.S. Surgeon General, 1999a).

Chronic illness	Late-life mental disorders are often detected in association with somatic illness (Reynolds et al., 1999). The prevalence of clinically significant depression in later life is estimated to be highest, approximately 25%, among those with chronic illness, especially ischemic heart disease, stroke, cancer, chronic lung disease, arthritis, Alzheimer's disease, and Parkinson's disease (Davis & Strivastava, 2003; U.S. Surgeon General, 1999a).
Coronary artery disease	The relationship between depression and increased morbidity and mortality is well documented in both post-myocardial infarction patients and in coronary artery disease patients without myocardial infarction (U.S. Surgeon General, 1999a).
Dementia	Approximately 30% to 40% of patients with Alzheimer's disease demonstrate depressive mood symptoms and/or psychotic symptoms sometime during their illness (Landes, Sperry, & Strauss, 2005; Reichman & Coyne, 1995; U.S. Surgeon General, 1999a).
Diabetes	Numerous studies that have estimated the prevalence of depression in treated samples of adults with diabetes suggest that major depressive syndrome is approximately three times more common in patients with diabetes than in the general population (U.S. Surgeon General, 1999a).
Hearing impairment	Older adults with hearing impairments have significantly more depressive symptoms than older adults with normal hearing (Kramer, Kapteyn, Kuik, & Deeg, 2002).
Pain	Pain has been correlated with depression and found to be more severe if the depression is unrecognized (Horgas & Dunn, 2001). Chronic pain is associated with high rates of depression (Zanocchi et al., 2008).
Parkinson's disease	Approximately 50% of patients with Parkinson's disease and symptoms of dementia experience major depressive disorder sometime during the course of the illness (Ehrt, Brønnick, Leentjens, Larsen, & Aarsland, 2006; U.S. Surgeon General, 1999a).
Persistent insomnia	Occurring in 5% to 10% of older adults, persistent insomnia is a risk factor for the subsequent onset of new cases of major depression in older adults (Kemp, Malhotra, Franco, Tesar, & Bronson, 2003; U.S. Surgeon General, 1999a).
Posttraumatic stress disorder	Posttraumatic stress disorder studies have found high levels of comorbid major depressive disorders (Franklin & Zimmerman, 2001).
Urinary incontinence	An association has been identified between depression and patients with urinary incontinence (Brown, McGhan, & Chokroverty, 2000; Engberg et al., 2001; Steers & Lee, 2001; Zorn, Montgomery, Pieper, Gray, & Steers, 1999).
Visual impairment	The rate of depression among nursing home residents with visual impairments exceeds 45% (Capella-McDonnall, 2005; Ip, Leung, & Mak, 2000).

Table 3. Psychological States and Other Factors that Contribute to Depression

Factor	**Evidence**
Bereavement	At least 10% to 20% of widows and widowers develop clinically significant depression during the first year of bereavement (Carr, House, Wortman, Nesse, & Kessler, 2001; U.S. Surgeon General, 1999a, 1999b).
Demographic/personal	Based on results of prospective studies, risk factors for late-onset depression include educational attainment less than high school (Garcia & Tobias, 2001), female gender (Garcia & Tobias, 2001), impaired physical functioning status (Garcia & Tobias, 2001; Jaffe, Froom, & Galambos, 1994), and heavy alcohol consumption (U.S. Surgeon General, 1999a).
Losses	Correlations have been found between depression and a variety of losses, including family home, friends, social activities, volunteering, financial security, and marital harmony (Bellino, Patria, Ziero, Rocca, & Bogetto, 2001; Kivelä, Köngäs-Saviaro, Laippala, Pahkala, & Kesti, 1996; Lawrence et al., 2006; Maciejewski, Prigerson, & Mazure, 2001; Wang, 2001).
Social isolation	Social isolation has been correlated with depression in community-dwelling older adults (Solomon & Zinke, 1991). For nursing home residents, lack of social relationships with other residents is a strong predictor of depression (Fessman & Lester, 2000; Garcia & Tobias, 2001).

Conceptual Framework

The conceptual framework for the intervention is the Roy Adaptation Model, in which the person is conceptualized as an open adaptive system engaging in interactions with environmental stimuli (Roy & Andrews, 1991). The individual, as an open system, is in constant change with the environment. Treatment of older adults with depression is aimed at manipulating the environment with a psychosocial intervention—in this case, a therapy biking program. The objective of this intervention is to increase positive coping mechanisms through social interactions and to provide enjoyable experiences to minimize, reduce, or eliminate depressive mood.

The Roy Adaptive Model is a systems model that focuses on outcomes. The adaptive response to the therapy biking program intervention is a decrease in the level of depression. When people are in an adaptive state, they have more energy to respond to other stimuli. Depression, in the long-term care setting, is maintained by a series of person-environmental interactions that include an excess of negative experiences and a deficit of positive experiences. The introduction of the wheelchair biking intervention provides a positive experience and may interrupt the cycle of depression.

Literature Review

Fitzsimmons (2001) was the first to investigate the use of a wheelchair biking program for the treatment of depression in older adults in a long-term care setting. In that study, the program was conducted in an interdisciplinary manner by both recreational therapists and nursing staff members working as a team. Findings from this pilot study, a classical experimental design with randomization, identified a clinically and statistically significant reduction in depression after a 2-week wheelchair biking program. These findings were supported by Buettner and Fitzsimmons (2002), when they replicated the study using only participants with cognitive impairment. The study incorporated a 3-month maintenance biking period after a 2-week intense intervention period. The findings showed statistically significant improvements in depression for the experimental group after the 2-week period, and depression scores continued to decline through the 3-month maintenance period. A third study by Benson and Tatham (2001) again replicated the pilot study and supported the significant findings.

The Wheelchair Biking Program

This psychosocial treatment links two familiar items, a wheelchair and a bicycle, using the Duet™ wheelchair bicycle (*Rollfiets* in German), a modified tandem bicycle, manufactured in Germany by Robert Hoening Spezialfahrzeuge. The Duet is an innovative intervention that can be used with a majority of nursing home residents. The front of the system is a rugged, detachable wheelchair that acts as the front wheel of the bike. The wheelchair attaches to a half bicycle, with the bicycle being unusable on its own. The specially designed chair, orthopedically shaped from fiberglass and reinforced plastic, has padding, adjustable footrests, and a headrest. When fixed to the cycle, the chair tilts back, lifting the small front guide wheels off the ground. This gives a relaxed, stable seated position that facilitates conversation between seated resident and pedaling rider. The chair has good suspension and light handling, and the offroad tires are excellent on gravel and dirt tracks. There are twin drum brakes on the chair's wheels, and a back pedal brake on the cycle wheel. Standard on the bike is a three-speed hub gear, allowing easier pedaling on inclines. The bike comes with many additional safety features including a chest harness seatbelt and wheel-spoke covers.

Who Can Participate

The program is indicated for older adults with mild to moderate depression, with or without cognitive impairment. Residents should be selected for screening based on a diagnosis or history of depression; use of an antidepressant medication without a depression diagnosis; or signs and symptoms of depression noticed by staff, family, or friends (Fitzsimmons, 2001). Depression in older adults frequently has atypical presentation and thus is not diagnosed and therefore not treated and not listed in their medical records (Devanand et al., 1996). Signs of depression include sadness, weepiness, apathy, passivity, sleep disturbance, agitation, anxiety, decreased socialization, decreased verbalization, weight loss, mobility problems, and frequent unspecific somatic symptoms (U.S. Surgeon General, 1999a). Depression is common in older adults, but unless a mood assessment is performed, the diagnosis may be missed.

Although mood assessment can be performed at admission to a nursing home setting, many residents may need time to adjust to their new surroundings. Thus, 1 to 2 weeks should be allowed for the resident to adjust to the new environment before being screened for depression. Several valid, formal tools are available to assess residents for depression, including the Geriatric Depression Scale-Short Form (Sheikh & Yesavage, 1986), the Geriatric Depression Scale-Long Form (Yesavage et al., 1982–1983), and the Cornell Scale for Depression in Dementia (Alexopoulos, Abrams, Young, & Shamoian, 1988). The Cornell Scale is beneficial for assessing older adults with moderate to severe cognitive impairment.

Not all older adults can participate in the wheelchair biking program. After identifying residents with depression, the next step is to determine whether the resident is able to safely participate. This can be done by asking:

- Is the person able to sit in an upright position? (Conditions that might prevent this are contracture, postural considerations, decubitus ulcer, or an order for leg elevation at all times.)
- Is the person medically stable? (Febrile conditions, infections, and other acute conditions would prevent the resident from leaving the unit and going outdoors.)
- Is the person’s behavior predictable and controllable? (Severe physical agitation, anxiety, or other behaviors might be exacerbated by leaving the unit and going outdoors.)
- Has the person agreed to take a ride? (The resident should be shown the bike, as well as a demonstration of how it is used. Staff should ask if the resident would like to ride. If the resident says no, staff can ask if the person would like to watch someone else ride, then offer a ride again.)

Residents with and without dementia; those requiring assistance or a mechanical lift to transfer; and those with urinary drainage devices, portable oxygen, or portable tube feedings are capable of participating (Fitzsimmons, 2001). In instances where participation is questionable, consultation with the resident’s primary care provider is recommended. When possible, staff

should obtain an order for the therapy. A sample order from a primary care provider for the therapy would be: “Recreational therapy: Wheelchair biking once per day for 2 weeks for depressive symptoms.”

Description of the Practice

The wheelchair biking program provides older adults with an opportunity to enjoy extended mobility and a sense of freedom, to be outdoors, to socialize with others, and to bring back familiar childhood memories. The program combines the approaches of small group socialization, reminiscing, and exercise therapies without requiring mobility or advanced cognitive skills, making this treatment available to a wide range of older adults. To implement the program, advanced planning is advised. Table 4 outlines the steps to take when setting up a program.

Table 4. Setting up a Wheelchair Biking Program

• Assess the feasibility of a wheelchair biking program. For example, is there safe space to ride outdoors? Minor hills are not a problem, but a paved area with little traffic is important. Large facilities with wide halls and good turn-around spots can also use the bike indoors. If there is an interest in the program by facility management, staff, residents, and family members, professionals from all disciplines, family members, and even volunteers can be taught how to assist with the program.
• Determine who will be responsible for training the riders, as no one should take a resident for a ride without understanding all functions of the bike. Although the bike is easy to pedal, the steering is different from a conventional bicycle and takes some practice.
• Ensure everyone who is to take residents for bike rides is properly trained and practices bike rides with another staff member before taking any residents for bike rides.
• Order the equipment. The Duet™ Wheelchair Bicycle Tandem is made in Germany and distributed in the United States by Frank Mobility Systems, Inc. (http://www.frankmobility.com/duetfeat.php).
• Determine a safe bike route or course. This will be specific to the location but should include areas of interest, such as a pond or gardens. Consider having walkie talkies available (one for the bike rider and one for a staff member in the facility) or use cell phones in case of emergency.
• On bright days, have sunglasses available for residents. Other items you may want to have available are a squeeze-type horn for the resident to use, bread to throw to fish, nuts for squirrels along the way, and binoculars. Taking pictures of the resident on the bike allows residents to show their friends and family when they visit.
• Consider setting up a designated space to house the bike when not in use and selecting a

maintenance crew for minor repairs and tire inflation. (Crew members can also take residents for bike rides.)

Optimal effectiveness is achieved by implementing the intervention 5 days per week for a 2-week period (Fitzsimmons, 2001; Fitzsimmons & Buettner, 2002). Since it is not feasible to provide recreational therapy indefinitely to an individual resident, this 2-week intensive time is followed by a maintenance period where the person rides 2 days per week and is encouraged to attend other facility activities the remaining days of the week.

The program is designed for groups of three to five participants for each 1-hour session and has two components. The first component is a small group discussion program about bike riding, and the second component is a 15-minute ride on the wheelchair bike. The residents should be grouped based on similar cognitive functioning levels, with consideration given to individual personalities. For example, it is probably not advisable to place two residents who dislike each other in the same group. Consideration must also be given to the residents' physical functioning levels. For example, staff may not wish to include in the same group four residents who require lifting devices to transfer to the wheelchair bike, unless the necessary resources and equipment are available during the program time to complete all of the transfers.

Once the group is assembled, the first rider is assisted into the wheelchair portion of the bike. The rest of the group sits with a second staff member and discusses biking and other activities from the past. One-by-one each rider is encouraged to put on the safety helmet and h-harness independently and take a ride. When the resident returns, the group discusses what was seen during the ride. Participants are asked how they enjoyed the ride, and this is recorded on individual ride records. The process continues until all participants have had the opportunity to ride.

The daily intervention is then followed up with a maintenance biking therapy period, as well as encouragement and opportunity for residents to participate in routine facility activities (Buettner & Fitzsimmons, 2002). During the maintenance period, staff inform residents of other facility activities that are available and assists, or arranges assistance, to transport residents to the facility activities that interest them. Staff may also consider using the wheelchair bike to transport residents to the selected activities.

Outcome Indicators

Outcome indicators are those expected to change or improve from consistent use of the guideline. The major outcome indicators that should be monitored over time are a decrease in depressive symptoms (e.g., sadness, weepiness, loss of interest or apathy, decreased socialization, decreased verbalization, weight gain or loss, low energy or fatigue). It is important to use the same method of evaluating depression before and after implementing the wheelchair

biking intervention. It is recommended that a depression assessment instrument be used for posttesting after the 2-week intervention and monthly thereafter.

Implications for Nursing Practice

Demographic data consistently warn health care providers of the steadily growing number of older adults. This rise in numbers will also bring an increase in the number of older adults with depression. Geriatric nurse practitioners, along with long-term care nurses, are increasingly needed to care for this population. Knowing that psychosocial interventions can be effective in treating depression may prevent automatically resorting to the medical model of pharmacological treatment.

Given all of the tasks and documentation required of nursing staff, one might wonder how nurses can assist in this type of intervention. Professional nurses can help with a wheelchair biking program in many ways. They can advocate for the facility to purchase a wheelchair bike and implement the wheelchair biking program. Nurses can consider taking the lead or participating in a fund-raising program to purchase a wheelchair bike. Nurses can also read this wheelchair biking evidence-based practice guideline and educate residents, families, and other staff about the research that supports this program and the use of evidence-based practice in general.

Nurses should be alert for signs of depression in residents and perform depression assessments as necessary. Once a facility obtains a wheelchair bike, nurses can recommend the wheelchair biking program for residents who score in the depressed range, those who need to get outdoors, or those who are curious to try the bike. Nurses can refer identified residents to the recreational therapy department and document the results of the assessment and the residents' mood while attending the program.

In addition, nurses must ensure that residents in this program have been toileted, are dressed for the outdoors, and are ready at their scheduled time. To determine whether the program is having an impact on the resident's mood, nurses can perform a follow-up depression assessment after 2 weeks of program participation. Nurses can also encourage nursing assistants and other staff members to become trained riders and provide time for them to take residents on rides. Lastly, nurses can be trained on how to ride the bike and may take a resident or two out for a ride, as they may enjoy some of the same benefits the residents experience.

Summary

Depression is a problem that will continue to burden older adults and challenge health care providers. Failing to recognize and effectively treat depression in institutionalized older adults is sanctioning these members of society to live their final years in despair and emotional suffering. The wheelchair biking program described in this evidence-based practice guideline provides a refreshing, safe, innovative tool to address depression and improve quality of life in older adults.

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