Treatment of Depression Following Spinal Cord Injury: An Evidence-Based Review

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Study Design: Evaluative research review. Objective: Depression is a significant secondary complication of spinal cord injuries (SCI); this study applies the D. L. Sackett (1989) research criteria to evaluate the quality of intervention studies of the treatment of depression among persons with SCI. Method: An extensive range of peer-reviewed published research was identified through established databases, critical reviews, and published meta-analyses. Results: Nine studies met the inclusion criteria. One antidepressant study was rated above Level III; although the psychological intervention studies had control groups, these were not randomized. Conclusion: This review demonstrates the need for randomized clinical trials of psychological and pharmacological interventions for depression and distress among persons with SCI, so that informed decisions concerning cost-effective treatments can be made.

Depression has received more attention from clinicians and researchers than any other psychological issue among persons with spinal cord injuries (SCI; Elliott & Umlauf, 1995). For many years, clinical lore maintained that depression was to be expected soon after the onset of injury, and it was construed as a critical element in most anecdotal models of adjustment, typically signaling rational acceptance of the permanence of the injury (Frank, Elliott, Corcoran, & Wonderlich, 1987). Empirical study has broadened our understanding of depression considerably. Studies relying on Diagnostic and Statistical Manual of Mental Disorders (3rd ed.; DSM–III; American Psychiatric Association, 1980) criteria using small samples of recently injured persons and conservative diagnostic interview techniques have found the rate of major depressive episodes to range from 22.7% to over 30% (Frank, Kashani, Wonderlich, Lissing, & Visot, 1985; Fullerton, Harvey, Klein, & Howell, 1981). Lower rates have been observed in studies using less stringent interview methods (13.7%; Judd & Brown, 1992) and with self-report measures based on Diagnostic and Statistical Manual of Mental Disorders (3rd ed., rev.; DSM–III–R; American Psychiatric Association, 1987) criteria with a sample varying in time since the onset of injury (11%; Frank et al., 1992). This research has been plagued by a host of methodological problems (e.g., sample selection biases, few studies of consecutive cases, measurement problems; Elliott & Frank, 1996). Other data indicate that among newly injured persons who met criteria for major and minor depressive disorders, many may remit within 3 months of injury onset (Kishi, Robinson, & Forrester, 1994).

Generally, many report decreasing problems with depressive symptoms over the 1st year of SCI (Richards, 1986). Yet higher levels of depression—as measured by a variety of self-report measures that assess symptoms often associated with depressive syndromes—have been associated with increased expenditures and longer rehabilitation stays and with decreased quality of life (Elliott & Frank, 1996). Thus, depression does not signal any adaptive process in adjustment; it is best construed as a secondary complication that severely limits mobility, erodes quality of life, and occurs at expense to the person, to the family, and to health care delivery systems (Elliott & Frank, 1996). Moreover, a variety of personal and social characteristics have been consistently and reliably predictive of depressive behavior among persons with SCI (Elliott & Rivera, 2003).

Despite the rich and informative literature concerning the correlates and concomitants of depressive symptoms among persons with SCI, there has been little attention in the empirical literature to the treatment of depression. Recent efforts have been made to distill the relevant research on SCI and depression to derive clinical practice guidelines (Consortium for Spinal Cord Medicine, 1998) and to summarize the literature so that meaningful implications for practice, research, and policy formation might ensue (McAweeney, Tate, & McAweeney, n.d.). Unfortunately, both of these endeavors addressed the extant literature on treatment of depression, generally, and neither restricted its focus to the intervention research conducted specifically with persons who have SCI. Although these efforts relied on a fairly stringent meta-analysis of the available literature, recommendations concerning interventions were based primarily on the perceived quality of intervention research in other areas, conducted with persons with
diagnostic entities and conditions other than SCI. For example, the Consortium guidelines did not specifically identify or evaluate published studies of the treatment of depression conducted with persons with SCI, despite the availability of several published studies for evaluation. The McAweeney et al. (n.d.) document did not evaluate any studies of antidepressant therapy among persons with SCI.

In the present study, we applied the Sackett (1989) criteria to evaluate the available intervention research specific to the treatment of depression among persons with SCI. These criteria are often used to evaluate the quality of evidence on the basis of the use of randomized samples and control groups in intervention studies (e.g., Consortium for Spinal Cord Medicine, 1998). We restricted our focus to empirical studies that explicitly addressed interventions for depression among persons with SCI that appeared in peer-reviewed outlets. We did not survey the empirical research concerning depression and SCI, generally, nor did we attempt any systematic meta-analysis of this work. We evaluated the published evidence for the treatment of depression among persons with SCI using the Sackett criteria to determine the methodological quality of the intervention.

Method

Procedure

We conducted computer searches of MedLine and PsycINFO databases using the keywords spinal cord injury and various iterations of the following: depression, adjustment, physical disability, intervention, antidepressant (and anti-depressant), medication, counseling, and therapy. We also perused recent documents, including a recent critical review of this literature (e.g., Elliott & Frank, 1996), clinical practice guidelines for the treatment of depression following SCI (Consortium for Spinal Cord Medicine, 1998), a state-of-the-art meta-analysis of psychosocial research in SCI (McAweeney et al., n.d.), and consumer guidelines (SCI & Depression, 1996). We also reviewed several comprehensive chapters that addressed topics germane to treatment of depression following SCI to detect other published works that might have been overlooked in the computer searches (McKenzie, Julius, & MacDonald, 1987; Zorowitz & Robinson, 2000).

To be included in the present study, an article had to be empirical in nature, be published in a peer-reviewed journal, and describe and evaluate the effects of an intervention on an outcome measure of depression. Studies also had to explicitly identify participants as having an SCI to be included.

Evaluative Criteria

Studies were evaluated according to the criteria espoused by Sackett (1989; Table 1). We first read studies to determine the reported use of a control or comparison group. In the event that a comparison group was used with a treatment group, we scrutinized the study to determine whether participants were randomized into separate treatment and control groups. This is an essential and fundamental component of true experimental design. Studies that feature a randomized clinical trial with a sizable control group received a higher rating (indicated by I or II, depending on the number of participants and statistical power) and thus merited a higher grade of recommendation (A). Studies that did not feature randomization to treatment and comparison groups—a quasi-experimental design—received a lower level of evidence rating (III). Studies without control or comparison groups received the lowest level of evidence (IV or V). Studies that had a nonrandomized control group received a lower grade of evidence (C). All journal articles identified in our search were subjected to this evaluation. Timothy R. Elliott identified and read the selected articles that met criteria for inclusion; he then shared them with Paul Kennedy for a second evaluation.

Results

The search of the literature revealed nine studies that met the criteria for inclusion in this study. Three of these studies were psychological interventions. Five studies described antidepressant therapy, and one study reported effects of functional electrical stimulation. These are contained in Table 2. Only one study used randomized assignment to treatment and control groups; no other study met the methodological rigor required for the highest level of evidence. The single randomized clinical trial did not find significant effects for the treatment on a self-report measure of depression. Thus, there was no need to examine statistical power or to request a panel opinion about strength of the evidence of this literature.

Psychological Interventions

Three articles reported interventions for depression among persons with SCI. Of these, one was a follow-up study of a previous report (Craig, Hancock, Chang, & Dickson, 1998; Craig, Hancock, Dickson, & Chang, 1997). These two articles described a cognitive–behavioral group intervention for 28 individuals with SCI (featuring approximately 10 sessions, 1 per week) and a comparison group of persons receiving standard rehabilitative care. The first study reported differences between the groups from pretest to posttest at completion of the group sequence and 1 year later (Craig et al., 1997). No substantive differences were found between the two groups on the measure of depression (the Beck Depression Inventory; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961), but persons who had higher scores on the Beck Depression Inventory had greater reductions in these scores 1 year later than persons in the comparison group. The second article reported that persons in the treatment group experienced greater reductions in depression and anxiety at a 2-year assessment in comparison with persons in the control group. Thus, positive effects in the first study were limited to persons who reported higher levels of depressive symptomatology prior to entering the treatment group (and this was found only at the 1-year follow-up); differences
between the two groups on the Beck Depression Inventory were found at a 2-year follow-up.

The third study reported the effectiveness of a cognitive–behavioral group therapy for 19 persons assigned to the treatment group in comparison with a matched and contemporaneous control group of individuals (n = 19) who were receiving rehabilitative services (King & Kennedy, 1999). The intervention participants displayed significantly greater reductions in scores on the Beck Depression Inventory in comparison with the control group after seven group sessions and again at a 6-week follow-up assessment. This is the only published study to document significant effects of a psychological intervention for individuals with SCI in comparison with a matched and contemporaneous control group.

As depicted in Table 1, these studies received a Level III rating because of the use of nonrandomized, contemporaneous control groups.

**Antidepressant Interventions**

Four studies were identified that reported the use and effects of antidepressant therapy for depression among persons with SCI. None of these studies used comparison groups. Thus, these studies received the lowest level of evidence (V). One randomized clinical trial was identified, yet this study was designed to examine the effects of antidepressant therapy for pain relief, and a depression measure was used as an ancillary outcome. This study met methodological standards consonant with a Level I rating.

In the earliest published study we found of antidepressant effects, Kim, Davis, and Sell (1977) reported the use of amitriptyline with 9 persons with SCI. A rating scale of depression symptoms was used, on the basis of accepted diagnostic criteria at the time. Patients were assessed with this measure initially and again at 48 hr, 72 hr, and 1 week later. All patients were recorded as severely depressed at onset and mildly depressed 1 week later.

A second article described the types of psychiatric disorders among a sample of persons with SCI and noted that 3 of the patients who were diagnosed with major depression were prescribed amitriptyline (Fullerton et al., 1981). A rigorous standardized diagnostic interview system was used to make all diagnoses and follow-up assessments. Two of the patients developed adverse side effects (including autonomic dysreflexia), and the antidepressant was discontinued. The remaining individual improved by discharge from the inpatient rehabilitation program.

Two other studies were similar in the description of the sample, setting, and instrument used; thus, it is difficult to determine whether these studies shared a common sample. In the first study, Judd et al. (Judd, Burrows, & Brown, 1986) reported the use of second-line antidepressants to treat 9 persons diagnosed with depression (out of the 84 consecutively admitted patients interviewed). The Hamilton Depression Rating Scale was used for follow-up assessments (Hamilton, 1960). All patients responded favorably to the regimen, although there were no tests of significance reported on the Hamilton Depression Rating Scale scores.

The second study by this research team found 14 persons out of 71 consecutively admitted patients met criteria for a major depressive disorder and followed their response to antidepressant therapy (Judd, Stone, Webber, Brown, & Burrows, 1989). The Beck Depression Inventory was used to assess symptomatology at follow-up assessments. One person refused the antidepressant therapy, and the remaining 13 demonstrated improvement on the Beck Depression Inventory (although no tests of significance were reported).

The most recent study identified met Sackett’s (1989) methodological standards for the highest quality of evidence; however, this randomized clinical trial was designed to examine the effects of antidepressant therapy on pain relief among 84 persons with SCI and chronic pain (Cardenas et al., 2002). Individuals who met diagnostic criteria for a major depressive disorder were excluded from the study (Cardenas et al., 2002, p. 366), but a self-report measure of depressive symptoms was administered pre- and post-treatment (the Center for Epidemiological Studies–Depression Scale; Radloff, 1977). The research team stratified randomization to the two groups by intensity of depressive symptoms assessed by this measure (high vs. low) to control for possible response effects due to depression levels. The effects of amitriptyline were compar-
pared with those associated with an active placebo (benztropine mesylate) in alleviating pain. There were no observed effects on self-reported depressive symptoms as a function of treatment. Analysis of side effects indicated that there were no significant differences between the two groups on the intensity of side effects, with the one exception of increased spasticity among participants receiving amitriptyline.

**Alternative Therapies**

One study reported the effects of a functional electrical stimulation exercise program on depressed mood, as rated on an adjective checklist, among 22 persons who chose to participate in this protocol (15 persons who refused treatment comprised the control group; Bradley, 1994). Analysis of group means at posttest revealed a significant effect for the treatment in increasing depressed mood. It was argued that persons with unrealistic expectations were more likely to experience negative mood in response to the treatment.

**Discussion**

Depression may be the most frequently studied psychosocial variable in SCI rehabilitation (Elliott & Umlauf, 1995). It is generally accepted that depression constitutes a secondary complication that compromises quality of life and results in great expense incurred by the individual, the family, and health care programs (Elliott & Frank, 1996). Nevertheless, our investigation reveals that there are no randomized clinical trials of therapies to alleviate depression among persons with SCI, and the only randomized clinical trial to date incidentally examined effects on depressive symptoms in a study that excluded persons with a major depressive syndrome. In fact, perusal of the published literature reveals that lack of control groups in the study of antidepressant therapy renders generalization from this work tenuous. There is no evidence to suggest that the effects of antidepressant treatment are different from what might be observed as a result of chance, environment, personal, or time factors. Although psychological interventions have used control groups, these were contemporaneous and nonrandomized, and the results in general provided meager support for these interventions. The one psychological intervention study with documented positive effects was limited by nonrandomized assignment and a relatively small number of participants (King & Kennedy, 1999).

The glaring lack of intervention data in the literature raises questions about the state of this research. There is some concern that consumers, researchers, and funding agencies have not been interested in examining the effects of different interventions for depression among persons with SCI. Recent consumer-oriented research has found that persons living with SCI do not list depression as a major problem that they experience, nor do they express interest in finding assistance in resolving depressive symptoms (Elliott & Shewchuk, 2002). Other clinicians have noted that the problems encountered in offering psychosocial interventions to persons with SCI including resistance, lack of interest and receptivity, and disregard of psychological issues, generally (Craig & Hancock, 1994). These kinds of reactions and observations have been considered by some representative of personality characteristics of many persons who incur SCI, which in turn necessitates a tailoring of psychosocial interventions that are suitable and palatable to these persons (Rohe, 1996). It should be noted, however, that exit interviews conducted in the King and Kennedy (1999) study found that participants had favorable evaluations of the cognitive–behavioral intervention that proved effective, and, in particular, they enjoyed the interaction with other group members, the normalization experience of the group, and the learning of specific, helpful coping skills.

The lack of research in the use of antidepressant therapy raises other concerns. We found no systematic study of side effect profiles of these medications among persons with SCI, and the lack of control groups in this literature casts doubt on the effectiveness of this treatment, generally, in contrast to changes that might occur as a result of chance, remission, or other uncontrolled reasons. The effects of antidepressant therapy on spasticity, in particular, provokes some concern, as this has been observed in a case study (Stolp-Smith & Weinberg, 1999) and in the one randomized clinical trial included in our study (Cardenas et al., 2002). One other randomized clinical trial examining the effects of trazodone on pain complaints has reported a significant increase in spasticity in the treatment group and other significant side effects were observed (including drowsiness, dry mouth, dizziness, and urinary retention; Davidoff, Guaraccini, Roth, Sliwa, & Yarkony, 1987).

Although the published clinical guidelines graded the recommendation for antidepressant interventions as an A, this evaluation was based on panel opinion and extrapolation from the extant literature concerning antidepressant use among people in general (Consortium for Spinal Cord Medicine, 1998). Such a recommendation cannot be based on the research specific to persons with SCI. Such a recommendation obscures the clear need for randomized clinical trials of the effectiveness of antidepressant therapy among persons with SCI. It is unknown why the quality of the antidepressant research in SCI was not explicitly addressed in the clinical guidelines (Consortium for Spinal Cord Medicine, 1998). Two of the five antidepressant reports identified in the present study were cited in the guidelines, but no antidepressant study in the SCI literature was explicitly evaluated in the guidelines.

McAweeneey et al. (n.d.) also observed a lack of experimental designs in the intervention studies they evaluated in the SCI literature. It is interesting that they found that four studies used a true experimental design—featuring randomization into treatment and control groups—and these four studies were dissertations. None of these studies were subsequently published in peer-reviewed outlets, and only one used a measure of depression to operationalize an outcome variable. Although randomized clinical trials are time consuming and difficult to conduct, it is unfortunate that there are few studies with this level of experimental rigor in the peer-reviewed research concerning interventions for persons with SCI. Several researchers in other areas of clinical focus (e.g., arthritis, cancer, chronic pain) have conducted randomized clinical trials in the study of psychological and antidepressant therapies. Randomized clinical trials can be conducted in SCI rehabilitation: The two we identified examined antidepressant therapy for chronic pain among persons with SCI (Cardenas et al., 2002; Davidoff et al., 1987), but only one used a measure of depressive symptoms.

Recent randomized clinical trial research indicates that cognitive–behavioral interventions are as effective as antidepressant therapies in treating depression among patients seen in primary care settings (Mynors-Wallis, Garth, Lloyd-Thomas, & Tomlin-
son, 1995). This kind of research is sorely needed in SCI rehabilitation to determine the relative effectiveness of these approaches to the treatment of depression. Comparative trials are necessary to make rational determinations about cost effectiveness and reasonable allocation of resources to better serve persons with SCI. At present, the empirical evidence specific to depression and SCI does not support the use of antidepressant therapy as an intervention for depression following SCI. There are no data to indicate whether this intervention is superior to placebo or no treatment in treating depression among persons with SCI. Parenthetically, we note that case control research, quasi-experimental designs, and single-case designs can provide valuable information about treatment and intervention strategies. Unfortunately, the methodological features of the antidepressant studies we found violated many standards expected of case-control research designs.

Randomized clinical trials are a logical extension of experimental methods, and they represent the “closest science has come to a means for demonstrating causality” (Haaga & Stiles, 2000, p. 14). It appears that we have many untested assumptions about available treatments for depression among persons with SCI. The evidence to date implies that these treatments are not empirically supported, and it is our obligation to the public trust to acknowledge the limitations of our data and our options for treatment at this time (Ingram, Hayes, & Scott, 2000). It is imperative that we identify effective interventions for the treatment of depression following SCI. Perhaps researchers have not had adequate support or experience requisite for conducting controlled trials, or they have encountered institutional difficulties that have compromised their efforts. It is also possible that consumers may have other perspectives concerning their needs and researchers have not sufficiently elicited consumer input in designing appropriate or relevant interventions preferred by consumers. Interventions that meet the highest standards of methodological rigor should incorporate adequate comparison groups (including bona fide alternative treatments; Wampold et al., 1997), minimize sampling problems, and establish clinical significance and feature multimethod assessment of critical outcomes (Haaga & Stiles, 2000). It is also recommended that systematic, programmatic study of side effect profiles of antidepressant therapy be conducted, as antidepressant medications often have side effects that may affect a variety of bodily and neurological functions impaired by SCI. It is also important that intervention research be grounded in a theoretical perspective that provides clear directives for measurement and treatment, as this feature increases the likelihood of generalizability and replication (Elliott & Frank, 2000). Failure to conduct psychosocial intervention research from an established theoretical base and at the expense of consumer input will likely prove futile (Elliott, 2002). This area merits a multilevel, methodological response, including field effectiveness studies with clearer outcomes of value to consumers; experimental and observational studies; studies using well-controlled single case designs, and collaborative work across sites to explore funding opportunities to support research in this domain.

References


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