The Relationship of Depression to Survival in Chronic Renal Failure

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The authors examine the relationship between psychosocial factors and survival of patients with chronic renal failure, while considering simultaneously the influence of parameters of physiologic functioning. Psychosocial and physiologic variables selected for discriminant analysis were extracted from data on 285 home-dialysis patients in Ontario, Canada. This analytical procedure defined which variables best discriminated between the survivor and nonsurvivor groups. The findings suggest that demographic and psychosocial factors may be more important than physiologic variables in determination of survival on home dialysis. The severity and type of depression is of particular importance to outcome.

INTRODUCTION

The permanency of end-stage renal disease (ESRD) is catastrophic for the individual and his or her family. It may disrupt a normal life-style and require considerable psychologic and social accommodation (1–5). The deterioration from "renal patient" to "dialysis patient" results in progressively more difficult restrictions, crises, and threats of personal loss (6–10). Chronic recurring stress on an almost daily basis commonly gives rise to elevated levels of depression in this patient group (11).

The purpose of this article is to report our most recent findings on the relative influence of depression on survival of patients on home dialysis, taking into account other psychologic and physiologic factors. Secondly, typologic models of depression are developed that distinguish between survival and nonsurvival patient groups.

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LITERATURE REVIEW

Incidence and Prevalence

Examination of patient data reveals depression to be a common psychiatric complication of renal replacement therapy (12–14). The data further show a wide range of findings on the reported incidence and severity of depression. Most patients observed by Shea and co-workers were depressed, some 60% severely (15). Similar findings were reported by Retan and Lewis (16) and Beard (17). Severe depression was noted by Gonzalez and colleagues in half of their patients (18). In other studies, depression was seen less frequently; less than half of the patients in a study by Foster et al., 40% according to Holcomb and MacDonald, and only 25% according to Cramond et al. (8, 19, 20). De-Nour, who initially reported rates less than 10%, sub-

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sequently found moderate depression ranging from 33% to 37% and severe depression from 13% to 20% percent (4, 9, 21, 22). Collectively, the findings add information but not clarity (23). It is clear, however, that for dialysis patients depression not only occurs with greater frequency and more severity than in the general population but also is problematic to their survival (10, 24–26).

DEPRESSION AS A FACTOR IN SURVIVAL

Depression is the most important underlying problem in the suicidal ideation and behavior of dialysis patients. The general acceptance of suicidal ideation in dialysis patients is best illustrated in the writings of Gelfman and Wilson (27), as well as Retan and Lewis (16). Both describe patients' difficulty in facing the implications of their illness and in questioning the value of continuing to struggle for a minimal existence. Death from a lack of meaning and value of one's existence is a common cause of many present-day suicides, especially in cases of chronic illness (28–32). Eisendrath concluded that a loss of the will to live culminates in "psychologic death" followed by "physiologic demise" (33).

The notion that patients often think about taking their life is generally accepted by the renal team. There is less agreement as to the number who actually do. Estimates range from a high of 100 to 400 times that of the general population to a low of 4 to 5 times (34). Rate discrepancies, to a large degree, are based on differing opinions as to what constitutes genuine suicidal behavior.

DEPRESSION, NONCOMPLIANCE, AND MORTALITY

It is commonly accepted that all dialysis patients have problems adhering to their dietary regimens and, at some time or another, cheat (35). For a number, dietary indiscretion is the vehicle for acting out conflictual feelings toward dialysis and the treatment team. Fluid and dietary binges as expressed hostility or suicidal behavior can jeopardize their lives and at times lead to tragic consequences. Although adherence to a medical regimen for those dialyzing is an essential factor in survival, there is no unequivocal evidence that depression is a determining factor in noncompliance (36, 37). There is, however, evidence that depression is a modifying factor that significantly influences compliance with diet. Patients who were predicted to comply well did not do so when depressed (25, 38). Depressed patients who are noncompliers have an increased mortality, death often occurring by suicide or cardiac arrest as a result of fluid and dietary indiscretion (39).

DEPRESSIVE PSYCHOSIS AND MORTALITY

Despite its ease of diagnosis and grave consequences, the frequency of depressive psychosis in dialysis patients is not known (11). Upon reviewing the literature, Levy (40) concluded that psychosis is relatively uncommon. However, the mortality of patients who do develop psychotic symptoms is significantly high (38). De-Nour reported death in 55% of those with psychotic symptoms as compared to 35% of those without psychotic symptoms (41). In her experience, depressive paranoid reactions

are fairly common, seem to be of "psychogenic" and not "organic" origin, and cause frequent problems of management.

DEPRESSION AND SUCCESSFUL ADAPTATION

Emotional and personality factors are known to affect both the patient's state of health and survival (42, 43). Levy considers the long-term survivor on dialysis to have an independent personality that is adaptive to change. The survivor also has high levels of denial and tends to be empathetic to fellow patients (42). Failures have been considered to lack these qualities and to have higher levels of mortality and psychiatric morbidity (15, 44, 45). We previously reported that in those under 45 years of age the profile of failure on a home program is of higher diastolic blood pressure in training, more frequent episodes of congestive heart failure, higher levels of stress associated with varying health and loss of sleep, and greater anxiety and depression. In the older age group, failure was associated with higher levels of depression and self depreciation, high levels of stress associated with fear of death, pain during dialysis, and blood clotting. Our results suggested a possible interaction between psychologic factors and physical disease, with depression of primary importance (47, 48).

SUBJECTS AND METHODS

Our results are based on data obtained on 167 dialysis patients (43 deaths, 124 survivors) from 16 renal units in Ontario (Canada) who were followed for 2 years. Data collection involved patients being questioned by trained interviewers on their psychologic, physical, social and economic functioning, as well as sources of social support. The interviewers were registered nurses with experience in a renal unit. From chart abstraction and renal unit records, data were recorded to assess physiologic and physical functioning.

Analysis was performed to define which parameters from two sets of variables (psychosocial and physiologic) best discriminate between survivors and nonsurvivors. In discriminant analysis, each variable is considered individually while controlling for the others. The standardized discriminant function coefficients describe the relative power of each variable to discriminate between the two groups.

The survival group included all patients who, after commencing a home training program, were still dialyzing at home some 2 years later. Nonsurvivors were those individuals who died during this 2-year follow up period.

Among the psychosocial set of variables, indices of psychologic functioning predominated. Measures included personality profiles on hypochondriasis, self-depreciation, social introversion, denial, anxiety, and depression, in addition to assessment of stress associated with the chronic disease and treatment regimen.

Personality profiles were obtained by the Basic Personality Inventory (BPI) developed out of the work of Jackson (49). Scales contain 20 statements reflecting certain tendencies, preferences, or traits of people. The scales represent relatively independent aspects of traditional dimensions of psychologic dysfunctioning. A modern construction strategy was employed to maximize reliability, validity, coverage, and efficiency while minimizing the influence of response distortion (50). The scales have been shown to have suitable psychometric properties, and significant correlations with its appropriately named counterpart scales of the Minnesota Multiphasic Personality Inventory (MMPI) (51–53). Reported reliabilities are on average in the 0.76 range and are consistent across a wide range of population strata.

The dialysis stress scale (DSS) was developed by the authors to analyze response to chronic renal disease as well as dialysis stress and adjustment. Items reflect fears and concerns generally related to chronic renal failure and those more specific to the dialysis regimen. The 14 items were selected on the basis of observed clinical symptoms. Scale reliability for the DSS is 0.78.

An objective reliable physiologic index (PINDEX) for evaluating the severity of the physical condition of renal patients comprised the second set of vari-

ables included in the discriminant analysis. The PINDEX, consisting of 19 biochemical and clinical items directly relevant to dialysis patients, overcomes previous problems in assessing adequacy of regular dialysis therapy (54, 55). The index has been standardized with validity and practicability established by Strauch and associates (56). Construct validity shows that the index significantly discriminates between survivors and nonsurvivors, and, additionally, between those patients doing poorly and those doing well on home dialysis (57).

RESULTS

Of the 167 patients in the sample, complete data for discriminant analysis were available for 147 patients. They were divided into two groups, consisting of 110 and 37 patients, representing, respectively, survivors and nonsurvivors (deaths). The discriminant analysis started with 111 independent variables that reflected the concepts of psychosocial and physiologic functioning as described earlier. From these variables using the Wilks' lambda criteria, the discriminant analysis procedure identified the best possible set of variables to differentiate between groups.

The findings altered the order of the factors in the discriminant function from that reported previously, especially as it related to depression (48). In that analysis (Table 1), based on 204 survivors and 37 deaths, age and depression best discriminated between the two groups. Physiologic variables entered as separate indices of physical functioning were less powerful than the nonphysiological factors. As shown in Table 1, the discriminant function based on data obtained from a prospective follow-up of a different population of patients places self depreciation, hypochondriasis, and the PINDEX as the more powerful discriminators. The rank order of depression and age was much lower than had been anticipated.

We hypothesized that the failure of depression to maintain its predominant rank was related to the shorter time exposure to dialysis, a factor that differentiated between the two population groups and our failure to include hypochon-

TABLE 1. Discriminant Analysis of Deaths vs. Survivors in a Home Dialysis Population

STUDY 1—N = 241	Standardized Coefficient	STUDY 2—N = 147	Standardized Coefficient
Age	0.563	Self-depreciation	0.488
Depression	0.551	Hypochondriasis	0.474
Weight gain	−0.320	PINDEX	0.450
Hemoglobin	−0.260	Age	0.292
Dialysis stress	−0 234	Depression	0.289
Locus of control	0.223	Social introversion	−0 236
Protein	−0.203	Denial	−0.161
		Treatment stress	−0.160
		Anxiety	−0.158
		Disease stress	−0.074
		Education	−0.065
Wilks' α = 0.854		Wilks' α = .835	
χ^2 = 32.23		χ^2 = 25.24	
$p < 0.001$		$p < 0.01$	
Correctly classified		Correctly classified	
7 out of 10 patients		7 out of 10 patients	

driasis into the first discriminant analysis. Our clinical impressions suggested to us that in the early stages of dialysis, depression is often extremely difficult to detect, in part due to masking signs of somatic complaints and self-depreciation and the underlying dynamics of denial.

In a subsequent analysis, which eliminated hypochondriasis and self-depreciation, our hypothesis was confirmed (Table 2). Depression regained its prominence as the primary variable that discriminates survivors from nonsurvivors. The PINDEX and age were also important factors in the discriminant function which correctly classified 7 out of 10 patients.

Statistically significant and moderately high intercorrelations between depression and self-depreciation/hypochondriasis (<0.62; $p < 0.001$) and the lower correlation (0.45) between self-depreciation and hypochondriasis justifies the exclusion of these latter two personality traits from the discriminant analysis. They also add credence to the supposition of the influence both have in masking manifest symptoms of depression in the initial stages of dialysis.

The validity of the finding that elevated depression is clearly related to greater risk of death was again supported in a further comparison. The mean depression score of a group of survivors on home dialysis was significantly lower ($p < 0.01$) than the mean scores from a group who died shortly after assessment (3.84 vs. 5.61). It is interesting to note that both groups were significantly higher ($p < 0.01$) than either the general population norm (2.84) or a pretransplant group (2.83).

To determine the nature of the depressive state for those who subsequently died and those who continued to function at home, two equations or models were created from the Basic Personality Inventory (BPI). The significantly predictive models, generated by multiple regression techniques, utilized the raw scores of the variables: depression (DEP), hypochondriasis (H), anxiety (A), self-depreciation (SD), and social introversion (SI).

TABLE 2. Discriminant Analysis of Death vs. Survivor in a Home Dialysis Population

$N = 147$	Standardized Coefficient
Depression	0.722
PINDEX	0.571
Age	0.407
Social introversion	−0.151
Treatment stress	−0.130
Anxiety	0.119
Disease stress	−0.094
Denial	−0.052
Education	−0.001
Wilks' $\alpha = 0.870$	
$\chi^2 = 19.67$	
$p < 0.05$	
Correctly classified	
7 out of 10 patients	

Model A—Prediction Based on Nonsurvivor Group. Based upon our total sample of 43 deaths, a statistically significant model ($R = 0.83$; $p < 0.001$) was constructed. The model of depression accounts for 69% of the variance between the depression and other personality trait scores. The model is

$$\text{DEPRESSION} = 0.50(\text{SD}) + 0.28(\text{A}) + 0.19(\text{H}) + 0.04(\text{SI}).$$

Model B—Prediction Based on Survivor Group. With our sample of 124 people still on a home dialysis program we created a second statistically significant predictive model ($R = 0.80$; $p < 0.001$). This model accounts for 64% of the variance with the depression scores. The model is

$$\text{DEPRESSION} = .34(\text{A}) + 0.24(\text{SD}) + 0.22(\text{SI}) + 0.23(\text{H}).$$

The clinical picture is clearly different between the two groups. For those who re-

mained on home dialysis, their depressive state is one of profound anxiety and marked feelings of self-depreciation, social introversion, and hypochondriasis. Depression for the nonsurvivor group is associated primarily with self-depreciation and to a lesser extent with feelings of anxiety and hypochondriasis. Social introversion was of minimal importance.

DISCUSSION

What emerges from the analysis of data is two contiguous but independent profiles of depression. Type I depression is associated with those patients who remained on home dialysis. The central finding is one of profound anxiety, with elevated levels of self-depreciation, social introversion, and hypochondriasis. Type II depression is associated with those patients who die while on a home program. The central finding here is that of self-depreciation, though there are slight elevations of anxiety and hypochondriasis as well.

Our findings have immediate implications for rational decision making in the placement of patients on home or in hospital dialysis in addition to the choice of peritoneal or hemodialysis. Those patients dialyzing at home who exhibit a Type I profile should be monitored periodically for rising levels of depressive symptoms associated with high levels of self depreciation. In the absence of such findings, these patients are likely to manage well on a home dialysis program.

The authors believe that the elucidation of the clinical and psychologic profile associated with our nonsurvivor group warrants emergency intervention on the part of the dialysis team. The minimum response would include a clinical psychologic assessment with immediate institution of necessary supportive measures.

Our findings argue for further research to determine the predictive value of these models for patients commencing dialysis. Even more important, there lurks the possiblity that the more insidious Type II profile may be linked to an underlying causal or correlated pathophysiologic substratum, possibly in the immune system. This speculation opens the door to defining clinically and biochemically an emergency state for at-risk dialysis patients which has not yet been recognized.

CONCLUSION

In summary, based on a sample of patients from 16 home dialysis programs in Ontario, Canada, who were dialyzing at home for a minimum of 2 years, it can be concluded that psychologic dysfunctioning, especially Type II depression, is associated with an increased probability of death when a patient enters home dialysis. The profile of those at a high risk to die is one of a tendency toward pre-occupation with complaints, degradation of self as being worthless, unpleasant, and undeserving, and an inclination to be downhearted, despondent, and pessimistic.

As financial constraints force renal teams to maintain as large a percentage of patients outside the hospital as possible, it is obviously imperative that we be cognizant of nonphysiologic parameters that may influence survival for dialysis patients. More importantly, identification of these key determinants may help to minimize unnecessary mortality and morbidity by early appropriate intervention and will likely improve patients' adaptation to their illness, thus influencing their quality of life.

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