DETERMINANTS OF ADHERENCE BEHAVIORS AND HEALTH OUTCOMES OF PATIENTS WITH CHRONIC RENAL FAILURE

by

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I am imbued with two deep impressions; the first, that science knows no country; the second, which seems to contradict the first, although it is in reality a direct consequence of it, that science is the highest personification of the nation. Science knows no country because knowledge belongs to humanity, and is the torch which illuminates the world. Science is the highest personification of the nation because that nation will remain the first which carries the furthest the works of thought and intelligence.

---Louis Pasteur (1822-1895)

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Determinants of Adherence Behaviors and Health Outcomes of Patients with Chronic Renal Failure

Abstract

by

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Purpose

The purpose of the current research was twofold: 1) to explore the relationship between adherence to therapeutic prescriptions and health outcomes as reflected in clinical laboratory measures, and 2) to observe the influence of patient-health care provider interactions on adherence behaviors.

Methods

A cross-sectional descriptive survey design was implemented. Seven hundred and eighty-nine medical records were surveyed for levels of potassium (SeK), phosphorus ($SePO_4$), and interdialytic weight gain(IWG) at eleven dialysis centers in Hungary. The study population was selected from patients who represented one-third of the total hemodialysis population. A final sample of 147 subjects responded to the survey items and completed the study. Major sample characteristics included being on treatment for more than 6 months, 18 years of age or above, attendance at 4-hour chronic

in-center hemodialysis treatments three times a week, no residual kidney function. Psychosocial measures used were adherence behaviors, patient-provider interactions, dietary self-efficacy, and depression.

Results

There was no relationship between adherence behaviors and health outcomes. However, adherence behaviors were significantly related to patient-provider interactions ($r = .342$, $p < .001$), to depression ($r = -.281$, $p < .001$), and to dietary self-efficacy ($r = .229$, $p < .001$). Significant correlations were also found between IWG and length of treatment ($r = .171$, $p < .05$) and IWG and dietary self-efficacy ($r = .176$, $p < .001$). Nonsignificant MANOVAs showed SeK and IWG unable to discriminate between adherent/nonadherent subjects. However, adherence behaviors clearly discriminated between adherent/nonadherent subjects. A hierarchical regression model accounted for 18% of the variance in adherence behaviors and showed patient-provider interactions, self-efficacy, and depression successively predicting adherence behaviors.

Conclusions

The use of laboratory measures as surrogates of adherence behaviors was inconclusive and their interpretation as such should be cautioned. Adherence behaviors were able to discriminate between adherent/nonadherent patients, but more research is needed to evaluate the accuracy and applicability of the measure for practice. The relationship

between adherence behaviors and staff interactions designates new dimensions for intervention. Dietary self-efficacy was a relevant predictor of adherence behaviors that deserves further study. Behavioral adherence assessments should be routinely implemented by hemodialysis nurses.

CHAPTER ONE

Impact of Chronic Illness

As we approach the 21st century, chronic illness is a challenging issue facing society and presents a growing demand on health care professionals. In the past, the majority of individuals with a chronic illness died early in the course of their illness; now, with advanced technology, people are receiving extraordinary and aggressive treatment and living longer. Therefore, the illness traverses many phases of a person's life span and impacts on many aspects.

Compared to an acute illness, which generally has a dynamic onset and is shortly followed by either a recovery or death, a chronic illness usually has a slow and insidious onset and trajectory. The development of the disease may take months or years to exhibit signs and symptoms that alter a lifestyle. Most chronic illnesses are irreversible, incurable, and usually progressive in nature. Without appropriate long-term treatment, the condition of the individual may deteriorate rapidly and the outcome is often premature death.

Chronic illness affects the entire human existence, often in cyclical manner. Personal factors affected include social, psychological, physical, and economic aspects of life. The impact of the physical disability interacts with and alters the psychological status, which, in turn impinges on social interactions and economic capabilities (Lancaster, 1988).

The above aspects bring in many respective stressors. The person inevitably faces family tensions and changes in sexual functioning; experiences social isolation, dependence on others, and alterations in body image and self-concept; and is worried by economic pressures as well as by the sustained threats of death. The chronic illness becomes the person's identity. Once a patient develops chronic illness, the health care team must enhance adaptation to the disease and its treatment regimen; this in turn will maximize physical and psychosocial functioning and catalyze an optimal quality of life as defined by the individual person and the health care team.

End-Stage Renal Disease as a Chronic Illness

End-Stage Renal Disease (ESRD) is ranked as the fourth major disease in the United States. ESRD impacted the lives of more than 250, 000 individuals in 1997 (USRDS, 1997). Kidney functions can be impaired by infections; damaged by poisoning substances such as mercury or carbon tetrachloride; blocked by lesions, tumors, and stones; or halted by shock or many circulatory diseases. One major and common disease is glomerulonephritis, a condition in which the glomeruli become damaged. Diabetes and particularly hypertension are primary causes associated with the development of kidney malfunctions. The above-mentioned impairments may all lead to the development of ESRD.

In many chronic kidney diseases a progressive loss of renal function may eventually reach the stage of kidney failure. Kidney failure is manifested when the decrease of the glomerular filtration rate prevents the kidneys from maintaining homeostasis of the blood. The homeostatic balance of water, sodium, potassium, phosphorus, calcium, and other electrolytes are no longer possible and nitrogenous wastes are not excreted. Retention of water causes edema, and acidosis develops as the concentration of hydrogen ions increases. Nitrogenous wastes accumulate and a condition referred to as uremia develops in the blood and tissues. If untreated, the acidosis and uremia can cause coma and eventually death. Chronic kidney failure can be treated by kidney dialysis and kidney transplant.

Hemodialysis treatment (HD) is a process of separating solutes in a solution by diffusion across a semipermeable membrane. A kidney dialysis machine can be used to restore appropriate solute balance to a patient whose kidneys are not functioning. In extracorporeal hemodialysis, needles are inserted in both an artery and a vein (or into surgically inserted plastic shunts in the blood vessels) in the patient's arms or legs. These needles can then be connected to a circuit of plastic transporting tubing and filter from a dialysis machine. The patient's blood flows through the filter, which is immersed in a solution containing most of the normal blood plasma constituents in their homeostatic proportion. The walls of the fiber filter

constitute a semipermeable membrane. Because dialysis fluids contain no wastes, nitrogenous wastes such as urea pass from the patient's blood through minute pores in the filter and into the surrounding solution. As the blood circulates repeatedly through the filter in the machine, dialysis continues, eventually adjusting most of the values of the patient's blood chemistry to normal ranges. Although much improved by recent engineering advances, hemodialysis is very expensive, inconvenient, and may produce serious side effects.

A different dialysis technique, continuous ambulatory peritoneal dialysis (CAPD), makes use of the fact that the peritoneum (the lining of the abdominal cavity) is a differentially permeable membrane. A plastic bag containing dialysis fluid is temporarily attached to the patient's abdominal cavity through the use of an abdominal catheter. After about 30 minutes, the fluid is withdrawn into the bag and discarded. This process is repeated about four times a day. This type of dialysis is much more convenient but poses the threat of peritonitis, should bacteria enter the body cavity with the dialysis fluid.

A functioning kidney is more desirable for the patient than long term use of dialysis. With a successful kidney transplant, a patient can live a more normal life with far less long-term expense. Because it costs Medicare more than $40,000 annually to dialyze each kidney patient, while the cost of transplant with additional medication is $100,000 the first year and

$12,000 per year thereafter, transplantation is also considerably more cost effective than continued dialysis care (Carlstrom & Rollow, 1997). At present more than two-thirds of kidney transplants are successful with a median survival rate of 6 years (Carlstrom & Rollow), although physicians must routinely treat the problems of graft rejection. Some recipients of kidney transplants survive for more than 10 years (USRDS, 1997). However, the availability of cadaver and living organ donors is limited and individual immune incompatibility, even with the availability of highly effective immunosupressive agents, often compromises successful transplantation.

Issue of Adherence

There is unanimous agreement that despite the most advanced technology at hand, the health, general well-being, and ultimately the survival of hemodialysis patients is greatly dependent upon how well they adhere to the prescribed therapeutic regimens (Bame, Petersen, & Wray, 1993; Betts & Crotty, 1988; Brown & Fitzpatrick, 1988; Boyer, Friend, Chlouverakis, & Kaloyanides, 1990; Schneider, 1992; Sensky, Leger, & Gilmour, 1996). These explicit regimens, namely taking medications appropriately and restricting dietary and fluid intake, require full and determined cooperation from the patient. Patients must restrict their diet, typically limiting protein, potassium, and phosphorus intake. Because the kidney cannot excrete these components, they build up in the blood and

lead to imbalances that can result in serious metabolic disturbances. Dietary indiscretion, a primary and often immediate cause of death resulting from congestive heart failure in patients with ESRD, was noted to be prevalent among ESRD patients (USRDS, 1997; Schneider, 1991). Hyperkalemia and hyperphosphatemia were highly associated with increased morbidity and premature death due to intolerable increase of the intercellular osmotic concentration of potassium, which will lead to immediate cardiac arrest in most patients (Betts & Crotty, 1988). Pruritis, the excruciating feeling of itching, is yet another consequence of dietary indiscretion (Cameron & Gregor, 1987).

Because failed kidneys cannot take up phosphorus, it binds with calcium and carbonizes bone mass. Excess phosphorus also often leads to secondary hyperparathyroidism, which accelerates the already present renal osteodysthrophy (Schneider, 1992). The final consequence of high serum phosphate levels is bone demineralization (Bame et al., 1993). Therefore, routine phosphate-binder medications are usually prescribed to enable the excretion of phosphorus through the intestinal tract. The positive effect of the medication is detectable when it is regularly and appropriately taken in the prescribed dosage. Patients must also compensate for the kidneys' inability to excrete fluids. Fluid-intake restriction, the amount being dependent on the degree of residual kidney function and body weight, is a must to avoid fluid overload. Fluid overload can result in pulmonary edema

leading to sudden suffocation, or may cause long-term concomitant cardiovascular damage (Bame et al., 1993).

Chronic hemodialysis patients often have the false belief that a diet may be dispensed with because the entire treatment is to compensate for any dietary overstep they may make (Schmicker & Baumbach, 1990). Such beliefs sometimes lead to fatal outcomes because treatments are often unable to respond quickly enough to restore the individual's homeostatic balance. These outcomes explain why health professionals are rightly concerned about a patient's persistently elevated serum potassium or fluid levels. High potassium and fluid levels can result in irreversible and lethal consequences. Despite these foreseeable and life threatening consequences, reports of nonadherence to various aspects of the dialysis regimen range from 28 to 86% in hemodialysis populations (Bame et al., 1993). Although extensive research has been conducted on determinants of adherence behaviors, it still remains unclear why some individuals are more adherent than others. Because a major technological breakthrough in hemodialysis therapy is not expected, the focus on adherence will continue to be of utmost relevance to patients with this chronic illness.

Nonadherence is also of critical importance to health care professionals and health policy makers. Nonadherent patients can exhaust the reserves of their family and their social environment. Their behavior may prevent an entire renal team from accomplishing its mission to promote a