1999

# Health Locus of Control, Perceived Health Competence, and Fluid Adherence in Hemodialysis Patients

Mark W. Conard
*Eastern Illinois University*

# THESIS REPRODUCTION CERTIFICATE

TO: Graduate Degree Candidates (who have written formal theses)

SUBJECT: Permission to Reproduce Theses

The University Library is receiving a number of request from other institutions asking permission to reproduce dissertations for inclusion in their library holdings. Although no copyright laws are involved, we feel that professional courtesy demands that permission be obtained from the author before we allow these to be copied.

PLEASE SIGN ONE OF THE FOLLOWING STATEMENTS:

Booth Library of Eastern Illinois University has my permission to lend my thesis to a reputable college or university or the purpose of copying it for inclusion in that institution's library or research holdings.

[redacted] 7-29-99

Author's Signature Date

I respectfully request Booth Library of Eastern Illinois University **NOT** allow my thesis to be reproduced because:

_____

_____

_____

_____ _____

Author's Signature Date

# Health Locus of Control, Perceived Health Competence, and Fluid Adherence in Hemodialysis Patients

BY

**Mark W. Conard**

1972 -

**THESIS**

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF

**Master of Arts in Clinical Psychology**

IN THE GRADUATE SCHOOL, EASTERN ILLINOIS UNIVERSITY
CHARLESTON, ILLINOIS

**1999**
YEAR

I HEREBY RECOMMEND THIS THESIS BE ACCEPTED AS FULFILLING
THIS PART OF THE GRADUATE DEGREE CITED ABOVE

July 29, 1999
Date

[redacted]
Thesis Director

July 29, 1999
Date

[redacted]
Department/School Head

# Health Locus of Control, Perceived Health Competence, and Fluid Adherence in Hemodialysis Patients

Mark W. Conard

Eastern Illinois University

## Abstract

Patient adherence with prescribed medical regimens is vital in promoting the health of patients. Complex medical regimens are difficult for patients to follow and it is therefore important to understand what causes patients not to follow their prescribed treatment recommendations. Hemodialysis (HD) is one such complex medical regimen that requires patients to follow strict restrictions in their diet. One area of the HD regimen that is particularly hard for patients to adhere to is restrictions in the amount of fluid they can safely consume. Research has shown that noncompliance to fluid restrictions is pervasive, with patients stating that adherence to their fluid restrictions is one of the most difficult aspects of their treatment. Researchers have investigated the role patient health beliefs play in adherence to medical treatments. Health locus of control (HLC) is one construct of health beliefs investigated that involves what the patient perceives as controlling their health. Research has focused on a direct link between HLC and patient adherence behaviors, however recent work has suggested that HLC functions as a moderator in patient adherence. A self-efficacy model has also arisen in the research attempting to predict adherence. Perceived health competence (PHC) is a health-specific measure of self-efficacy that taps the level of control and influence a patient believes they have over their overall health. Few studies have investigated the moderating role of HLC combined with a measure of the patient's perceived health competence. This study attempts to assess what effect HLC and PHC have on a patient's adherence to their fluid restrictions.

HD patients (N = 108) from two Midwestern HD centers owned and operated by Gambro Healthcare, Inc. were asked to volunteer to take part in the study with fifty-one consenting to participate. Each subject was given three health belief measure questionnaires, Form C of the Multidimensional Health Locus of Control Scale (Wallston, K. A., Wallston, B. S., & Devellis, R, 1978), the Perceived Health Competence Scale (Smith, M. S., Wallston, K. A., & Smith, C. A., 1995), and the Illness Effects Questionnaire (Greenberg, G. D., & Peterson, R. A., 1984), along with a demographic questionnaire. Their medical charts were also reviewed in order to obtain data pertaining to their fluid adherence behaviors.

The study did not find any significant relationships between the health measures and fluid adherence behaviors. Age was the only significant predictor of fluid adherence behaviors with older patients being more likely to have better adherence to their fluid restrictions than their younger counterparts. When comparing subjects based on degree of adherence, there were no further significant differences found.

## Acknowledgments

I would like to thank Dr. Russell Gruber for his help, guidance, and advice in assisting in the completion of this research as he has acted as my committee chair. I would also like to thank Dr. Christine McCormick and Dr. William Kirk for their advice and input as my committee members. I would also like to recognize and thank Dr. Kenneth Wallston and Dr. Rolf Petersen for their assistance in obtaining the health belief measures used in this study. Appreciation is extended to Dr. Sumantra Mitra, Dr. Stephen Bander, Ms. Gina Campbell, Mrs. Diane Herche, Ms. Ellie Suhl, and Mrs. Tonya Jones of Gambro Healthcare for their use of their facilities and assistance in obtaining patient participation. I am indebted to the many patients who allowed me took time and consented to participate in this study. Thanks go out to my friends at EIU and home for listening to me talk about hemodialysis and adherence all these months. A special loving thank you goes out to my family for supporting me through my endeavors in graduate school. Finally, I can not thank my wife, Heather, enough for her loving support and understanding over the past two years as I have worked on this project and my degree. Her patience and belief in me have helped to see this through to its completion.

Table of Contents

List of Tables

## Introduction

Patients suffering from chronic illnesses such as renal disease, cancer, and congestive heart failure are required to follow stringent medical regimens. Often a failure to adhere to or comply with these regimens can have severe consequences for their health and survival. Compliance has been defined as the extent to which a person's behavior (taking medications, following diets, or executing lifestyle changes) coincides with medical recommendations or health advice (Brickman, A. L., & Yount, S. E., 1996). Definitions of noncompliance in the literature appear to include those who do not comply at all with their prescribed treatment regimens, those who only partially comply, and those who exceed their prescribed medical regimens (Playle, J. F. & Keeley, P., 1998). When the patient is noncompliant or nonadherent with their medical regimen, there are a number of potential consequences. These include the patient's worsening health, hospitalization, potential misdiagnosis stemming from the doctor's assumption that the patient has been compliant and development of resistant strains of diseases (O'Brien, M. K., Petrie, K., Raeburn, J., 1992). Patient compliance with medical instruction and treatment regimens has been the focus of research in the fields of social science and medicine for several decades.

According to Trostle (1997), more than 11,600 English language research and review articles on the topic had been included in the Index Medicus and other bibliographic collections. Reviews of studies on the topic have shown rates of noncompliance to medical treatments and regimens to be anywhere from one third to one half with most reviews indicating these results are inconclusive (Jones, S. L., Jones, P. K., & Katz, J., 1988; Trostle, J. A., 1997; Wolcott, D. L., Maida, C. A., Diamond, R., &

Nissenson, A. R., 1986). Because of the high prevalence of noncompliance and its severe consequences for patients, many consider it to be one of the most serious problems facing health care providers today. It is seen as the most significant reason for failed therapy (O'Brien, et al., 1992), yet one of the least understood behavioral issues in medicine (Trostle, 1997).

*Compliance vs. Adherence*

When researching treatment regimens and a patient's ability to follow them, one encounters the issue of whether to use the term compliance or adherence. Over the past decade, this debate has grown. Adherence and compliance are terms peppered throughout the literature on this subject and are sometimes used interchangeably, yet there are differences in each term and what it implies for the patient and their medical treatment behaviors. While some authors have argued for the use of adherence, Hess (1996) has argued that using the term adherence in place of compliance does not add to our understand the basic issues that underlie the problem of cooperation with medical treatments. Since most of the literature describes these patient behaviors in both terms, this study will use the terms interchangeably.

Compliance is a value-laden term, closely entangled with issues surrounding paternalism, acquiescence of the patient, costs, and the dominance of medicine (Hess, J. D., 1996; Donovan, J. L., & Blake, D. R., 1992). Typically, it refers to the extent that patients are obedient and follow the instructions, proscriptions, and prescriptions of their health care providers as well as connoting a passive role for the patient. Though compliance can be called a nonjudgmental concept, Trostle (1997) has pointed out that it rarely is used or studied as such. When the term noncompliance is used, an evaluative

component that implies a negative or prejudicial attitude toward the patient arises, and it often presumes that failure to comply to the medical regimen is the patient's fault (Playle, & Keeley, 1998; Turk, D. C., & Meichenbaum, D., 1991). Noncompliance denotes a deviant behavior by the patient and ensures that the patient is to blame for not obeying their physicians, nurses, and other health care providers.

In contrast, the term adherence suggests that the patient is more involved in their treatment. Adherence implies that the patient is involved collaboratively in a "mutually acceptable course of behavior that produces a desired preventive or therapeutic result" (Turk & Meichenbaum, 1991). It portrays the patient in an active role with their health care providers helping make the decisions about their care. Patients who are adherent are viewed as acting on a consensually agreed-upon treatment plan that they have had a part in creating, or at least as accepting the importance of carrying out specific treatment. From this view, it can be assumed that if a medical treatment or regimen is not followed the patient is not solely at fault for its failure. A patient may adhere to parts of their medical regimen and not others, however the overall treatment goals may be achieved.

Researchers have postulated that there several different reasons as to why patients do not adhere to or comply with their health care provider's instructions. Brickman (1989) identified seven concepts that she believed might explain patient noncompliance:

1. The infantilizing of patients: The doctor/patient relationship becomes that of a parent/child, where their relationship becomes adversarial with the patient/child keeping things from the doctor/parent and do to fear that they will be reprimanded for it.

2. Overprotection by families: Family members may attempt to take too much control from the patient and criticizing them for not following their medical regimens 100% of the time, with the patient reacting in noncompliant ways through anger and denial.
3. The presentation of a positive self-image: Shame and guilt about their disease can contribute to noncompliance—they do not want to appear as being different so they may find themselves engaging in activities harmful to their conditions.
4. Psychodynamic issues: Denial of the seriousness of their illness can result in resistance to medical prescriptions and the seriousness of their illness. There may be a fear of dependency as well as a need for control.
5. Beliefs and attributes: A person's beliefs can affect their level of adherence; that is if they believe that they have control over their health they may be more adherent to their medical treatments while the converse is also true.
6. Misinformation about medication: Misunderstanding the effects of drugs to treat their illnesses, patients may not take their medications through their entire treatment, or they may be wary of the side effects and therefore do not take their medications.
7. The patient may be right: the patient might have information that the doctor does not know or may have heard about other prescribed or alternative treatments so they are hesitant to follow their doctor's prescription. If the doctor does not allow the patient to express a difference in opinion, the patient either acts out defiantly by not complying or passively accepts treatment with the concern that the treatment may or may not be beneficial.

Another line of thought concerning the reasons behind patient noncompliance addresses different types of compliant behavior. O' Brien (1990) proposed the idea that

there is "ritual" (passive) versus "reasoned" (active) forms of compliance. Ritual compliance describes treatment behavior of more absolute and generally more passive type. In contrast, reasoned or more active compliance constitutes treatment regimen adherence modified or tailored to meet a patient's specific, continuous, ongoing needs physical, emotional, and/or social needs (O' Brien, M. E., 1990). In line with O' Brien's concept of reasoned compliance, Donovan & Blake (1992) concluded that what is seen in the eyes of the medical staff as noncompliance, is to the patient reasoned decision-making. Patients make choices about their health within the context of their beliefs, responsibilities, lifestyles, and preferences. In a sense, patients do a cost/benefits analysis of the medical treatment that their health care providers are prescribing. This viewpoint may be rather different than that of the health care providers and the patient may chose to be noncompliant as a result of such analyses (Donovan & Blake, 1992).

With most chronic illnesses and their particular medical treatments, patients can often only expect a lessening of the symptoms, or a delay in a fatal outcome, rather than cure and a return to healthy functioning. Therefore patients may come to view the small benefits of adherence as not worth the large costs of inconvenience and discomfort (Turk & Meichenbaum, 1991). Nonadherence for the patient may be the best, rational response to their health care providers' prescriptions and treatments. In a review of the literature, researchers discussed this type of adherence labeling it "adaptive noncompliance." (Deaton, 1985 in Turk & Meichenbaum, 1991). They have also described two other types of noncompliance including, capricious adherence, which involves "irregular therapeutic behavior based on false theory and misinformation," and intelligent nonadherence, which involves reasoning that concerns not adhering because of valid

beliefs that may not be the most appropriate in terms of their health. These beliefs include concerns about unpleasant side effects, confusion about medication dosage, or concerns about ingesting too much prescribed medicine (Weintraub, 1976 in Turk & Meichenbaum, 1991).

Kaplan and Simon (1990) reviewed literature on the subject of noncompliance and commented on the type of reasoning patients go through in order to chose whether to comply or not with their medical treatments. They believed that patients are rational and, in line with Donovan and Blake (1992), found that patients comply with their treatments when they perceive a net health benefit and fail to comply when the consequences of compliance outweigh the expected benefits. From their review, Kaplan & Simon divided explanations of noncompliance into three categories:

1. Patient-related theories: They misunderstand information, patients intentionally resist medical advice in order to reject authority, or exert control over their provider. However, their review did not find significant evidence for these theories as causes of noncompliance.
2. Environment-related theories: External factors affect how patients comply with medical treatment such as cultural variables, family or situational variables, and environmental cues.
3. Patient-provider interaction related theories: Lack of information exchange between patients and their health-care providers can affect the patients' abilities to understand what their health care provider is asking and requiring them to do.

Another view on patient adherence comes from Rosenbaum and Ben-Ari Smira (1986). They stated that patient adherence can be explained in part by individual

differences in learned resourcefulness. This construct reflects the tendency to apply self-control skills in solving behavioral problems (e.g., use of strategies to delay gratification or tolerate frustration). They reported that learned resourcefulness increased adherence behaviors in a group of hemodialysis patients indirectly through affecting self-efficacy expectations. They concluded that learned resourcefulness might promote adaptive health-related behaviors, which in turn relate to more favorable adherence behavior.

In an attempt to explain why patients are noncompliant in the face of potentially dire consequences, Trostle (1997) summed up one overriding theme: "Noncompliance is an unavoidable by-product of collisions of the clinical world and other competing worlds work, play, friendship, and family life." He views "compliance as an ideology that transforms physicians' theories about the proper behavior of patients into a series of research strategies, research results, and potentially coercive interventions that appear appropriate and that reinforce physicians' authority over health care." He contends that this is why research on determinants of compliance has been largely inconclusive.

Research investigating factors that act as determinants of medical regimen adherence does not consistently point to any specific variables (Jones, et al., 1988; Playle & Keeley, 1998; O' Brien, et al., 1992). Several variables have been proposed to be factors in patient adherence. These variables include age, sex, socioeconomic status, race, social support, patient health beliefs, personality, medication, satisfaction with the health care provider-patient relationship, and type and duration of medical treatment (Brantley, P. J., & Hitchcock, P. B., 1995; De-Nour, A. K., & Czaczkes, J., 1972; Kaplan, R. M., & Simon, H. J., 1990; O' Brien, et al., 1992; Playle & Keeley, 1998; Turk & Meichenbaum, 1991; Wiebe, J. S., & Christensen, A. J., 1996).

*Renal Disease and Noncompliance*

Chronic renal (kidney) failure or end-stage renal disease (ERSD) is a progressive, irreversible deterioration in renal function in which the body's ability to maintain metabolic, fluid, and electrolyte balance fails (Smeltzer, S. C., & Bare, B. G., 1992). ERSD affects people from all socioeconomic groups, ages, and ethnicities. Often people fail to appreciate the life-sustaining aspects of the kidneys until a problem arises. The kidneys have three essential functions, including the regulation of volume and composition of body fluids, excretion of metabolites, and production and metabolism of hormones (Andreoli, T. E. in Brantley & Hitchcock, 1995). When renal functioning decreases to between 20 and 25% of normal capacity, the characteristic set of clinical symptoms marking the uremic syndrome appear (Cordova, et al., in Brantley & Hitchcock, 1995). Uremic syndrome or uremia affects all organ systems of the body. It results from severe accumulation of nitrogenous waste products in the blood and disorders in the metabolism of calcium and is characterized by anemia, hypertension, fluid retention, gastrointestinal difficulties, and skin problems (Smeltzer, & Bare, 1992).

Before 1960 for those diagnosed with ERSD, there was no other treatment available to them other than dietary modification. Since 1960 medical advancements in hemodialysis, peritoneal dialysis, and renal transplantation have allowed people diagnosed with renal failure a better chance to survive. According to the U.S. Renal Data System's (USRDS) 1998 data, in 1996 approximately 280,000 people in the United States were treated for ERSD and over 73,000 new patients started ERSD treatment. ERSD is most commonly due to the advanced complications of another medical condition such as diabetes or hypertension. For others, the causes of ERSD stem directly

from diseases of the renal system such as glomerulonephritis or polycystic kidney disease (Christensen, A. J., Benotsch, E. G., Smith, T. W., 1997). Of these conditions, diabetes is the most commonly attributed cause of ERSD followed by hypertension, glomerulonephritis, and other cystic diseases, diabetes accounting for approximately 90% of the total ERSD population in the United States during the period from 1994-1996 (USRDS, 1998).

As a result of severely reduced kidney function, fluids and toxins accumulate in the body and must be removed in some other way. Currently, there are three types of renal replacement therapy for ERSD: renal transplantation, peritoneal dialysis, and hemodialysis (HD). Renal transplantation involves transplanting a kidney from a living donor or human cadaver to someone who has undergone a rigorous medical and psychological evaluation to determine his or her suitability for such a surgery. The donor kidney is transplanted into the recipient's pelvic region. An artery and vein of the donor kidney are attached to the person's own circulatory system, and the donor ureter is attached to the recipient's bladder. The donor kidney usually begins functioning once the kidney is attached to the recipient's circulatory system. Transplantation does not cure ERSD, but it does bring improved life satisfaction and a more normal lifestyle. The recipient must take large doses of immune suppressing medications that may lead infections along with various side effects both medical and psychological. Because of the lack of organs available for donation, often some type of dialysis must be used in order to keep the person functioning in their daily lives (Smeltzer, & Bare, 1992).

Peritoneal dialysis uses the person's own peritoneal cavity as a natural filter in cleasening the blood of the toxic impurities. This is done via a catheter that is

permanently inserted into the person's abdomen and a special sterile cleansing solution is allowed to flow into the abdominal cavity. Through diffusion and osmosis, the toxic wastes and excess fluid move from the person's bloodstream into the peritoneal cavity. The special solution dwells for a specific amount of time depending on the type of peritoneal dialysis. At the end of the dwell time, the fluid is drained out of the cavity and exchanged for new solution. Because the process is continuous, peritoneal dialysis is more like the natural process of functioning kidneys (Smeltzer, & Bare, 1992).

The most commonly used form of renal replacement therapy in the United States is HD. The HD treatment is administered by way of a vascular connection made between an external kidney machine and the patient, usually through a permanently placed arteriovenous fistula or graft placed in the patient's arm or thigh. Another type of HD access is a subclavian catheter placed into the patient's subclavian vein which can be permanent or temporary while one of the other types of accesses are created. HD is a process in which the composition of the blood is altered by exposing the blood to a modified salt solution, or dialysate, separated from the blood by a semipermeable membrane called an artificial kidney or dialyzer. The blood passes, by means of a pump from the patient's artery, through the dialyzer, and the dialysate bath flows on the other side of the membrane. The toxins and wastes in the blood are removed by diffusion into the dialysate. Excess fluid is removed from the blood by osmosis via the dialysis machine's pressure monitoring system. HD provides reasonable rehabilitation and life expectancy, yet it does not cure or reverse ERSD and does not compensate for losses of the kidneys' endocrine or metabolic activities (Smeltzer, & Bare, 1992).

There are two forms of HD currently available, home and in-center, that are mechanically similar procedures but differ in important ways. Home HD, as the name implies, is done in the patient's home after the patient and an assistant (usually a spouse) undergo several weeks of training in order to learn how to prepare, operate, and disassemble the dialysis machine, maintain and clean the equipment, administer medications into the machine lines, and handle emergency problems (Smeltzer, & Bare, 1992). Home HD encourages patient independence and allows more freedom in their schedule (USRDS, 1998). Not all people are candidates because this procedure requires a highly motivated patient who is willing to take responsibility for the dialysis procedure and is able to adjust each treatment to meet the body's changing needs (Smeltzer, & Bare, 1992).

In contrast, in-center HD occurs either in a hospital or in a freestanding center (sometimes called a satellite) approximately three to four sessions per week staffed by trained nurses and technicians. The duration of the sessions lasts approximately three to four hours depending on their prescription. The in-center HD patient is a passive recipient of treatment as compared to the home HD patient. Little participation is allowed or required of the patient while undergoing in-center HD (Christensen, et al., 1997), yet at the same time HD requires active participation by the patient and with regards to adherence to rigorous treatment requirements (Witenberg, S. H., Blanchard, E. B., Suls, J., Tennen, H., McCoy, G., & McGoldrick, M. D., 1983). In the period from 1987 to 1996, HD has accounted for 61.2% of the total ERSD patients in the United States compared to home HD which only accounts for 0.8% of this total making it the most common treatment for renal failure (USRDS, 1998).

Although HD can slow ERSD progression and decrease the symptoms of uremia, HD patients vary in degree to which treatment successfully corrects their uremia (Smeltzer, & Bare, 1992). Several conditions that may persist despite treatment include anemia, renal osteodystrophy, pruritus, sodium and volume overload, hypertension, hyperkalemia, hypocalcemia, metabolic derangements, accelerated cardiovascular disease, and pericarditis (Brantley & Hitchcock, 1995; Smeltzer, & Bare, 1992). While advances in dialyzers and HD technology have led to increases in patient longevity, reduced risk of infections, and improvements in the procedure, the intrusive nature of HD can result in difficulty adjusting to a new lifestyle. This different lifestyle includes compliance with a complex and strict regimen (Brantley & Hitchcock, 1995).

Stressors that all ERSD patients face are the constant threat of death and reduced life expectancy, loss of independence, reductions or loss of the ability to work, dependency on medical machinery and personnel, decreased physical strength and stamina, waning sexual desire and impotence, depression, and sleep disorders. Those undergoing HD treatments must also surrender larger amounts of time for treatment (Devins, G. M., Binik, Y. M., Hollomby, D. J., Barré, P. E., & Guttmann, R. D., 1983; Kimmel, P. L., Gavin, C., Miller, G., Mendelson, W. B., Wernli, I., Neugarten, J., 1997; Levy, N. B., 1984; Smeltzer & Bare, 1992). Younger persons have concerns about marriage, having children, and the burden they bring to their families. Along with depression, ERSD brings with it other psychological problems such as anger, guilt, frustration, and in some cases suicidal behaviors (Smeltzer & Bare, 1992).

The HD patient faces a particularly demanding and rigid regimen with guidelines regarding their diet, medications that must be taken, and the amount of fluid that can be

safely ingested. One of the major and greatest sources of stress for the HD patient is the many restrictions (i.e., fluid, medication, and dietary) that the HD lifestyle comes with (Brantley & Hitchcock, 1995; De-Nour & Czaczkes, 1976; Smeltzer & Bare, 1992). Adding to this stress is the complexity and number of recommendations given to the HD patient along with the fact that the regimen significantly affects long-standing personal habits (Hoover, H., 1989). In a study on stress identification and coping patterns in HD patients, researchers found that optimism and active attempts at controlling their health situation were the two most common coping methods used in this population (Baldree, K. S., Murphy, S. P., & Powers, M. J., 1982). In another study looking at coping strategies, researchers found that the relationship between coping and adherence varied depending on the specific type of illness-related stress encountered (Christensen, A. J., Benotsch, E. G., Wiebe, J. S., & Lawton, W. J., 1995). In a study investigating the relation of stress and depression to weight gain, researchers found that daily stressors (e.g., waiting in line, sitting in traffic, being late for an appointment) significantly influenced weight gain in HD patients specifically as these daily minor stressors increased, fluid-intake adherence decreased (Everett, K. D., Brantley, P. J., Sletten, C., Jones, G. N., & McKnight, G. T., 1995). Everett, et al., found that in contrast higher levels of depressive symptoms were associated with lower weight gains while major life stressors were not significantly associated with fluid-intake adherence.

Levy (1984) has described three phases that dialysis patients experience as they progress from the initial uremic poisoning to reasonably good functioning through dialysis. The three phases are the "honeymoon" phase, the period of disenchantment and discouragement, and the period of long-term adaptation. The "honeymoon" phase begins

a few weeks after the onset of dialysis and may last for several months. During this time, patients consciously realize both physical and mental improvement as they are brought from near death back to reasonably good functioning. They often feel relatively euphoric and do not appreciate the limitations and hardships that lay ahead. The period of disenchantment and discouragement can last for about three to twelve months. It is in this stage that the patient learns the limitations of dialysis and what restrictions the regimen places upon them. There tends to be a striking chronological relationship between the onset of this period and the resumption of an active role at work, school, and/or at home. The transition to the third stage of long-term adaptation is usually gradual. Long-term adaptation concerns the patient coming to terms with their physical limitations and the shortcomings of the procedure.

*ERSD and Noncompliance*

ERSD is well suited for studying the issue noncompliance because "the treatment is chronic, patient contact is prolonged and intensive, the patient can not switch treatment facilities easily, the medical regimen is clear cut, and patient compliance can be easily determined with objective measures" (De-Nour & Czaczkes 1972). Noncompliance with the medical regimen can result in short-term health problems such as weight gains, exacerbated hypertension, shortness of breath, and severe muscle cramping. There are also long-term consequences involved including congestive heart failure, accelerated disease processes in other systems, additional medical procedures, and even death (Christensen, A, J., Wiebe, J. S., & Lawton, W. J., 1997; De-Nour & Czaczkes, 1972). De-Nour and Czaczkes found that both primary and secondary gains from the sick role along with low frustration tolerance were the most frequent causes for noncompliance.

These characteristics significantly differentiated compliers from noncompliers, while "acting out" was frequent in both groups though more severe in the noncompliers. Other characteristics they found were denial of sick role and suicidal behavior, but these occurred more rarely. They were that severe and prolonged abuse of the diet appears to be caused most frequently by low frustration tolerance and by continuous severe acting out. When patients use the sick role as a means of problem solving, they are likely to also abuse their diet restrictions.

A past review of the literature on the subject of compliance has suggested that between 30 and 50% of HD patients do not adequately adhere to diet, fluid intake, and medication regimens depending on the particular study and the way adherence was measured (Wolcott, et al., 1986). A number of more recent studies have also shown poor compliance to medical regimens in HD patients (Christensen, A, J., Wiebe, J. S., Edwards, D. L., Michels, J. D., & Lawton, W. J., 1996; Christensen, A. J., & Moran P. J., 1998; Everett, et al., 1995; Bame, S. L., Petersen, N., & Wray, N. P, 1993; Poll, I. B., & De-Nour, A. K., 1980; Schneider, M. S., Friend, R., Whitaker, P., & Wadhwa, N. K., 1991; Sherman, R. A., Cody, R. P., Matera, J. J., Rogers, M. E., Solanchick, J. C., 1994). A central aspect of the HD regimen is control of the amount of fluid the patient consumes because of the intermittent nature of the fluid and waste clearance performed by the HD procedure (Christensen, et al., 1997). Previous reports have suggested that adhering to fluid-intake restrictions is one of the most challenging and stressful aspects of the HD treatment regimen (Baldree, et al., 1982; Blackburn, S. L., 1977; De-Nour & Czaczkes, 1972; Hoover, 1989; Rosenbaum & Ben-Ari Smira, 1986). Even patients who do adhere well to fluid-intake restrictions say that it is difficult and that they are thirsty most of the

time (De-Nour & Czaczkes, 1972). Given the prevalence of noncompliance and its severe consequences, it is not surprising the vast amounts of research investigating the aspects as to reasons for noncompliance.

*Factors related to ERSD Noncompliance*

Rosenbaum & Ben-Ari Smira (1986) researched the role cognitions play in compliance behaviors. Their self-regulation model claimed that compliance is a self-control problem that is a function of personality variables and situational factors. They found that patients' control over their fluid-intake restrictions was related to their perceptions of effort made to adhere to their regimen and successes in doing so as well as their expectations of self-efficacy about controlling their fluid-intake. Their sense of self-efficacy improved chances of future compliance. A similar study provided evidence to support Rosenbaum & Ben-Ari Smira's model (Schneider, et al., 1991). It demonstrated that cognitive control variables predicted fluid-intake restriction compliance both in the present and future.

Christensen, et al. (1992) examined the role of family support in adherence behaviors. They found that a supportive family environment was a correlate of patient adherence. Greater cohesion and expressiveness with less intrafamily conflict characterized a supportive family environment. Christensen, et al., found that patients holding a similar perception of their family exhibited significantly more favorable adherence to fluid-intake restrictions. They believed that this perceived family involvement had a direct influence on adherence to fluid-intake restrictions. Earlier research on family support found similar results (Sherwood, R. J., 1983). He found that families that were characterized as understanding, supportive, organized, and neither

overly involved nor disengaged were more frequently associated with better patient compliance.

Christensen, et al. (1997) studied monitoring styles in HD patients. They discovered that chronic HD patients possessing a pronounced tendency to monitor threat-relevant information were less likely to adhere to fluid-intake and potassium restrictions. Christensen, et al. (1990) examined the type of treatment (i.e., in-center versus home), their level of behavioral involvement, and how these interacted and affected adherence behaviors. They found that HD patients' adherence is better when their mode of treatment is consistent with their preferred level of behavioral involvement. Another study investigated the effect that body consciousness and the degree of physical impairment have on adherence behaviors in HD patients (Christensen, A. J., Wiebe, J. S., Edwards, D. L., Michels, J. D., & Lawton, W. J., 1996). The results suggested that individual differences in private body consciousness play a role in moderating medical regimen adherence. Specifically when HD patients experience a relatively high degree of physical impairment with higher private body consciousness, they do not adhere to their regimens well. Individual differences in cynical hostility and patient expectations about health care providers have also been studied (Christensen, A. J., Wiebe, J. S., & Lawton, W. J., 1997). The researchers found that these variables together predict adherence to medication and dietary regimens among HD patients; however they did not find significant associations of these variables to fluid-intake adherence.

While there is a wealth of data on noncompliance among the ERSD population, there have been inconsistencies in the results concerning the effects of sociodemographic variables on adherence behaviors. Age has proven repeatedly to be a factor in adherence

behaviors (Bame, et al., 1993; Boyer, C. B., Friend, R., Chlouverakis, G., Kaloyanides, G., 1990; Christensen, A. J., & Smith, T. W., 1995; Cummings, K. M., Becker, M. H., Kirscht, J. P., & Levin, N. W., 1982; Leggat, Jr., J. E., Orzol, S. M., Hulbert-Shearon, T. E., Golpher, T. A., Jones, C. A., Held, P. J., & Port, F. K., 1998; Morduchowicz, G., Sulkes, J., Aizic, S., Gabbay, U., Winkler, J., Boner, G., 1993; Ruggiero, L., Brantley, P. J., Bruce, B. K., McKnight, G. T., & Cocke, T. B., 1992). O' Brien (1980) found families of lower socioeconomic and educational levels were frequently more noncompliant. In another study, she found only marital status and type of household to be significantly related to compliance behavior (O' Brien, 1990). Morduchowicz, et al. (1993) found that gender, place of birth, marital status, number of children, and years of education affected adherence to fluid-intake restrictions. In a study involving the elderly, the variables significantly associated with fluid-intake compliance were length of time on dialysis, number of major medical problems, and impaired functional capacity (McKevitt, P. M., Jones, J. F., Lane, D. A., & Marion, R. R., 1990). Boyer, et al. (1990) found gender and length of time on HD to be significant predictors of dietary compliance. Bame, et al. (1993) found that demographic factors varied in relation to different parts of the medical regimen, with fluid-intake restrictions more low income, white males were noncompliant and with dietary restrictions more single patients were noncompliant. A recent study on noncompliance found that the most noncompliant patients were older, male, and less educated (Safdar, N., Baakza, H., Kumar, H., & Naqvi, S. A. J., 1995). While studies on adherence point to various sociodemographic variables as factors, Christensen, et al. (1997) found no sociodemographic variables to be significantly related to dietary or fluid compliance variables.

These variables appear to interact in several ways to affect adherence behaviors. From the commonly reported results, a composite of a "typical" noncomplier arises. This type of patient is most likely an unemployed, single, young male that has little social support (Boyer, et al., 1990; Cummings, et al., 1982). De-Nour & Czaczkes (1972) have concluded that not adhering to medical regimens can not be ascribed to only one factor. When examining this subject, the most useful approaches are direct measurement of patient behaviors through biochemical measures (De-Nour & Czaczkes, 1976; 1972).

*Measurement of ERSD Compliance*

The most frequently used methods of assessing compliance among the ERSD population is by measuring biochemical indices (i.e., interdialytic weight gain (IWG), serum phosphorus and potassium levels, patient self-reports and staff ratings (Wolcott, et al., 1986). There is often minimal consistency between the objective laboratory data, self-reports, and staff reports measuring compliance with an individual being quite compliant on one objective measure and rather noncompliant on another (Cummings, et al., 1982). Researchers have questioned the reliability and validity of biochemical measures because of their sensitivity to residual kidney function, the patient's activity level, amount of caloric intake, the adequacy of the previous dialysis session, individual differences in metabolism, and the presence of comorbid diseases (Binik, Y. M., Devins, G. M., Orme, C. M., 1989; Cummings, et al., 1982; Finn, P. E., & Alcorn, J. D., 1986). Ruggiero, et al. (1992) examined the role biochemical measures play in a HD patient's survival and found that these variables play a minimal role. They suggested that the necessity for strict dietary and fluid-intake recommendations appears questionable. The

biochemical measures of compliance were found to have little relation to length of survival among HD patients.

Fluid-intake adherence is one of the hardest parts of the HD regimen for patients to follow, and noncompliance with fluid-intake restrictions has been found to be more common than with the other biochemical measures (De-Nour & Czaczkes, 1972; Procci, W. R., 1978; Streltzer, J., & Hassell, L. H., 1988). Streltzer & Hassell have stated nonadherence to fluid-intake restrictions is pervasive and a remarkably stable phenomenon while intermittent noncompliance occurs infrequently. IWG is typically used to assess adherence to fluid-intake restrictions both clinically as well as for research purposes (Wolcott, et al., 1986). IWG is a measure of the actual weight gained between dialysis sessions above dry weight and is determined by subtracting the postdialytic weight for the previous treatment session from the predialytic weight for the current session (Christensen, et al., 1997). Dry weight is a hypothetical value established by the medical team for each patient. It is measured in terms of kilograms (kg) and is related to the desired ratio of body fluid to body mass (Finn & Alcorn, 1986). As each patient undergoes HD, the staff attempts to bring the patient as close as possible to their dry weight value by manipulating the pressure system of the HD machine. The HD machine regulates how much fluid is taken out of the patient's bloodstream as it passes through the dialyzer. IWG is believed to be a valid reflection of the amount of fluid that the patient ingests between dialysis sessions (De-Nour & Czaczkes, 1972; Manley, M., & Sweeney, J., 1986). However, it has been reported that IWG can be affected by HD patients' activity level, caloric intake, and the amount they perspire (Binik, et al., 1989). Nonadherence to fluid-intake restrictions can cause fluid overload leading to further

medical complications (i.e., dizziness, hypertension, muscle cramping, and congestive heart failure). Higher IWG values are interpreted as reflecting poorer patient adherence (Christensen, et al., 1997).

While IWG has become a prevalent means of assessing fluid-intake restrictions compliance, there appears to be no definite criterion in measuring who is and is not compliant with their fluid-intake restrictions. More stringent cut-off points inflate the percentage and more lenient cut-off points reduce the percentage of HD patients seen as noncompliant (Manley & Sweeney, 1986). De-Nour & Czaczkes (1976; 1972) classified patients into five categories of compliance behaviors: excellent, good, fair, some abuse, and great abuse. These categories ranged from IWG of never above 0.5 kg to always above 2.0 kg or most of the time above 2.5 kg. with results indicating approximately half of the subjects were noncompliant. Blackburn (1977) used an IWG of approximately 1.5 kg for at least 50% of the study period as her cut-off point discovering 49% of the subjects to be compliant. Procci (1978) labeled patients as noncompliant or weight abusers who had average IWG of 0.9 or greater, and he found 55% of his sample to be weight abusers. Bame, et al. (1993) used a cut-off point of less than 1.0 kg for compliance finding at least half (49.5%) of their subjects were noncompliant. Recently, researchers found that 64% of their subjects were noncompliant when a cut-off of greater than 1.5 kg was used as the criterion for IWG (Safdar, et al., 1995).

Manley & Sweeney (1986) in a retrospective review of patients at their dialysis center found IWG for most of their patients to be above IWG levels used in previous research. They have suggested that previous reports of noncompliance might be inflated because of the stricter cut-offs. Other researchers have used more lenient cut-off points.

Cummings, et al. (1982) determined that HD patients having IWG less than 3.0 kg were found to be compliant (59%). Schneider, et al. (1991) assessed noncompliance as gaining an IWG greater than 3.0 kg. finding this criterion was exceeded an average of 33.6% of the time. Ferraro, K. F., Dixon, R. D., & Kinlaw, B. (1986) and Morduchowicz, et al. (1993) did not use IWG cut-offs to classify adherence, instead both studies used IWG results in their original ordinal form. Leggat, et al. (1998) has defined IWG as a percentage of dry weight using 5.7% as their criterion. They found that only 9.7% of their subjects fell a categorization of noncompliance. This is in line with an earlier criterion designed by Wolcott, et al., in 1986 where they decided upon an IWG of less than 3% of dry weight being and values over 4% as indicative of problematic adherence.

*Renal Disease and Health Beliefs*

The Health Belief Model (HBM) proposes that individuals are likely to perform preventive health behaviors when they believe there is a threat to their health (Rosenstock, I. M., 1974). The HBM states an individual must believe that they are not only personally susceptible to the negative consequences of inaction, but if and when they occur would be severe. They also must perceive their behaviors as helpful in avoiding negative health outcomes while not perceiving excessive environmental barriers to performing these behaviors (Christensen, et al., 1997). They stated that each of these four dimensions may operate independently of one another, however a deficit in one or more may lead to failure to perform a given health behavior. Christensen, et al., reported that the HBM has received modest empirical support in the prediction of preventive health behaviors while reporting that there have been fewer studies applying HBM to adherence behaviors in chronically ill populations often with inconsistent results.

Wolcott, et al. (1986) found little empirical evidence to support the variables of HBM as determinants of adherence among HD patients. Cummings, et al. (1982) found significant effects for two of the variables involved in HBM, benefits and barriers, but the results were inconsistent across all measures of adherence behaviors. Christensen, et al. (1997) stated that "a purely cognitive model not only assumes perfect rationality on the part of the patient, but also a close link between intentions and adherence behavior." They noted that neither of these conditions might necessarily hold true especially when dealing with a very demanding self-care regimen. Rosenbaum & Ben-Ari Smira (1986) concluded that the failure of health beliefs to predict adherence in HD patients was due to the difficulty of successfully carrying out the prescribed medical regimens and changes these regimens placed on them.

Another cognitive construct dealing with patient's health beliefs is locus of control. Locus of control is an individual difference construct derived from Rotter's (1966) social learning theory. Locus of control is referred to as "the generalized beliefs regarding the extent to which life outcomes are controlled by an individual's actions called internal control or controlled by external forces such as luck, fate, or other individuals called external control." Considerable research has been done with locus of control concerning patients' adjustment to chronic illness, yet results have been contradictory (Andrykowski, M. A., & Brady, M. J., 1994). Previous studies have reported that HD patients with an internal locus of control exhibited better adherence behaviors (De-Nour & Czaczkes, 1972; Poll & De-Nour, 1980). Other research has suggested that control expectancies were not significantly related to HD regimen adherence in locus of control (Schneider, et al., 1991). Andrykowski & Brady (1994)

stated that the failure to establish a clear relationship between locus of control and adjustment might be due in part to the complexity of the relationship.

Dr. Kenneth Wallston and his colleagues developed the Multidimensional Health Locus of Control scale (MHLC; Wallston, K. A., Wallston, B. A., & DeVellis, R, 1978) in an effort to specifically address beliefs regarding control over health outcomes. The construct of health locus of control "reflects the degree to which individuals expect health-related outcomes to be contingent upon their own behavior (internal health locus of control; IHLC), the actions of powerful others (external health locus of control; PHLC) such as doctors, nurses, etc., or random events (chance locus of control; CHLC)." The original MHLC scale contained two parallel forms, A and B, each consisting of three subscales, IHLC, PHLC, and CHLC, with six items for each subscale. The original forms, A and B, were deliberately designed so as not to be specific to any one health behavior or any particular health condition (Wallston, K. A., Stein, M. S., & Smith, C. A., 1994).

Wallston, et al. (1994) have contended that it might be possible that people with a particular health condition may hold different locus of control beliefs about their condition than about general health status. They have also suggested that locus of control beliefs about a specific condition might correlate differently with health behaviors and/or health status than do more general locus of control beliefs. Another possible difficulty with the original MHLC scale in terms of chronically ill subjects is that they sometimes might have difficulty in answering certain items resulting in omitted items or random responding. Because of these problems, several researchers have attempted to modify the original MHLC scale to target specific health problems. Yet, no two of the modified

scales selected the exact same set of items or worded their scales in order for direct comparisons with other scales to be made. Wallston and his colleagues developed form C of the MHLC in 1994 because a general purpose, condition-specific locus of control scale that could be easily adapted for use with any existing medically related condition was needed. Form C can be used in place of form A or B when studying subjects with an existing medical condition. This can be done by either replacing the word "condition" in each item with whatever condition a subject has (e.g., ERSD, diabetes) or leave the word "condition" in its place if a subject has several existing medical conditions (Wallston, 1998). Similar to forms A and B, form C has eighteen items, but, instead of a single six-item PHLC, form C has two, independent PHLC three-item subscales: doctors and other powerful people.

Since previous research has been unable to find a consistent connection between locus of control and behavioral outcomes, Wallston (1992) has hypothesized that locus of control expectancies may be best conceptualized as a moderator in this connection. He suggested that other health-related cognitions (e.g., health value, efficacy expectancies) interact with health locus of control expectancies in a person's health behaviors while the locus of control construct plays a far less significant role in predicting health-directed behaviors by itself. He stated that health locus of control was not conceived as an indicator of a personality trait, but health locus of control beliefs could change with new experiences or situations. Wallston (1989) has stated that the mediating effect of locus of control on health behaviors might increase the likelihood that the individual would engage in one or more health behaviors. It has a direct, positive effect on their health status. He also looked at the effect of a chronic illness on the PHLC and CHLC

dimensions of MHLC. He stated that in many health care situations it is realistic to believe that other people's actions might influence one's health status. This is especially true if the powerful others are experts in the health care field or if in some instances there is sometimes little that one can do to change their health status (Wallston, 1989).

Smith & Wallston (1992) have stated that the value of health an individual holds is important in understanding what influences their particular health behaviors. Several theories on health have incorporated this concept; however measurement of the value of health is frequently omitted from research. Smith & Wallston have claimed this is due in part to the difficulty of measuring the value of health. The researchers have stated that the MHLC scale was designed to be used in conjunction with a measure of health value. They have suggested that there is evidence indicating the MHLC scale predicts health behavior more accurately if health is highly valued. Smith & Wallston pointed out that an elderly or chronically ill patient is more likely to rank health higher than a younger or healthier patient is. Wallston (internet correspondence, Sept 1998) stated that it is most important to measure health value in "healthy" subjects, and when the subjects suffer from a chronic illness (e.g., ERSD) it is probable that there will be little variance in the value they attach to health. Wallston (1993) has also written that there is too little variance in health value among persons whose health is compromised with it being probably safe to assume that health value would be "high" among such people. He has stated that in these instances instead of measuring health value it may be useful to assess disease severity with subjects suffering from a chronic illness.

Wallston and his colleagues at Vanderbilt University continued to refine the notion of health-related beliefs by creating a measure of "perceived health competence"

(Smith, M. S., Wallston, K. A., & Smith, C. A., 1995). A sense of competence or self-efficacy has been associated with many positive outcomes in health behaviors. Perceived health competence (PHC) reflects "an individual's perceived ability to influence personal health outcomes effectively" (Christensen, et al., 1997). Smith, et al. (1995) created the PHC scale to provide a measure of perceived competence at an immediate level of specificity. They found that the PHC scale was important in predicting intended or actual health behaviors and was consistently correlated with indicators of health status. Scores on the PHC scale were shown by Smith, et al. (1995) to be associated with a variety of indicators of health status. They have suggested that individuals with chronic illnesses report lower PHC scores relative to individuals with more favorable health status.

*Health Beliefs and Adherence in ERSD*

Research using locus of control and MHLC scales has shown inconsistent results. In an early study of using Rotter's (1966) locus of control and HD patients, researchers found that those patients with an internal locus of control were far better than those with an external locus of control with respect to dietary adherence (Poll & De-Nour, 1980). Safdar, et al. (1995) found that HD patients with an internal locus of control were more compliant (43%) with fluid-intake and dietary restrictions than those patients with an external locus of control orientation (15%). Brown, J. & Fitzpatrick, R. (1988) found that health locus of control scales had only modest influences upon either dietary or fluid-intake measure of compliance. Recently, researchers found that there were no significant associations between the MHLC subscales and compliance measures. They determined that health locus of control had only a minimal effect on measures of adherence because PHLC was slightly correlated with patient self-reports (Lin, C., & Liang, C., 1997). It

would appear that the beliefs about the control one has over one's health are not a salient influence on dietary and fluid-intake adherence among HD patients (Brown & Fitzpatrick, 1988).

Other researchers have investigated the moderating role that health locus of control can play in the adjustment of HD patients to chronic illness (Christensen, A. J., Turner, C. W., Smith, T. W., Holman, Jr., J., M., & Gregory, M. C., 1991). They looked at hemodialysis patients who had had a failed transplant and those that were on HD and had not been transplanted. Locus of control beliefs focused toward the existence of a control agent such as themselves or powerful others were associated with a significantly better adjustment to HD for those patients that had not previously experienced a failed renal transplant. Christensen, et al., found that holding a strong belief in either personal or health care provider control over their health outcomes was associated with a poorer adjustment to HD for failed transplant, HD patients. HD patients holding the belief that their health is controllable are likely to be more positive regarding their health outcomes. Christensen, et al. (1997) researching the role of hostility have suggested that the immediate and uncomfortable results that come from nonadherence to fluid-intake restrictions might provide a form of feedback about the importance of the prescribed restrictions independent of health care provider advice. Patient beliefs involving the results of health care provider recommendations may be a less central determinant of adherence to the fluid-intake restrictions.

A preliminary study using the concept of PHC showed that PHC and MHLC might be multiplicative determinants of adherence (Christensen, A. J., Wiebe, J. S., Benotsch, E. G., & Lawton, W. J., 1996). This research with the mediator concept of

MHLC found dialysis patients with higher PHC scores have been correlated with better medication adherence when the HD patient had high PHLC scores. The study also found a pattern that suggested PHC is related to adherence only when the patient believes that positive health outcomes are contingent upon following the advice and actions of health care providers. Wiebe & Christensen (1996) in their review of the literature have suggested the actions and advice of health care providers play an integral role in adherence behaviors. They have contended that perceptions of self-efficacy regarding control of one's health may be strongly associated to adherence. This is especially true with patients who acknowledge that positive health outcomes are contingent upon following the instructions of their health care providers.

The proposed study will assess the relationship between a HD patient's health beliefs and their ability to adhere to their fluid-intake restrictions. Specifically, the study will attempt to determine what effect health locus of control orientation and level of perceived health competence has on adherence behaviors. The relevance of the proposed study is evident in adding to the body of knowledge in the area of noncompliance to prescribed medical regimens. The collected data might help elucidate what compels some individuals not to heed the advice of those individuals trained to help them, and it might allow us to predict those who are at risk for a poor outcome when starting HD. This study might give insight on intervention strategies to improve adherence among HD patients. While specific to HD patients, the results of this study might provide information valuable to other medical illnesses and noncompliance with their prescribed treatment regimens. This study may also provide further evidence in support of the PHC scale as a useful tool in determining a person's particular health behaviors.

*Predicted Relationships*

1) The relationship between perceived health competence (PHC) and fluid-intake restrictions adherence would be correlated. Those subjects with a high level of PHC will adhere to their fluid-intake restrictions and thus will have lower interdialytic weight gain (IWG).
2) The health locus of control subscales (i.e., internal, others, doctors, and chance) will not directly affect fluid-intake adherence.
3) Those subjects with a high PHC and a strong internal health locus of control (IHLC) (i.e., believing they control their health outcomes) will have low IWG.
4) Subjects with a low PHC and a strong others health locus of control (OHLC) or a strong doctors health locus of control (DHLC) will have high IWG.
5) The severity or impact of illness (Illness Effects Questionnaire (IEQ) scores) will not directly affect the subjects' fluid-intake adherence, yet it will moderate the effects of the subjects' adherence behaviors in conjunction with PHC and Multidimensional Health Locus of Control scale (MHLC).

## Methods

*Subjects*:

The present investigation used hemodialysis (HD) patients from two HD centers in Mattoon and Springfield, Illinois affiliated with Gambro Healthcare. Patient participation was solicited by the author on a voluntary basis. Each patient was assigned a subject number to ensure confidentiality with these numbers corresponding to their completed questionnaires. The exclusionary criteria used were that the participants had to be more than eighteen years of age, had been a patient for over six months, had less

than 500 cc's of urine output, and, based on nursing judgement or medical documentation, had some form of cognitive decline (dementia, Alzheimer's, developmental disability, etc.) that inhibited them from responding appropriately to the questionnaires. The level of urine output was used because residual urine output has not been taken into account in several of the previous adherence studies. It has been shown to affect how a patient follows their fluid-intake restrictions (Morduchowicz, et al., 1993; Sensky, T., Leger, C., & Gilmour, S., 1996). The six-month criterion was used because this amount of time would allow for the patient to become accustomed to the restrictions and rigors of HD. Also, the doctor would have been able to establish a set dry body weight by this time with the patient having likely experienced complications from the removal of excess fluid. Hopefully, this time frame would allow the patient time to become educated on HD and what their role as a patient would be.

Of the 108 adult HD patients approached regarding participation, fifty-one were included in the study. The remaining fifty-seven were not included because they declined (N = 20), did not return the questionnaires (N = 2), were in the hospital during part of the study period or missing fluid data (N = 15), were missing questionnaire data (N = 14), or had more than 500 cc's of urine output (N = 6). All participants were treated in accordance with the Ethical Principles of Psychologists and Code of Conduct (American Psychological Association, 1992). The means, standard deviations, and characteristics of the sample are summarized in Table 1.

Table 1. Means, Standard Deviations, and Percentages for Demographic Variables, Health Belief Measures and IWG [a]

| | |
|---|---|
| Mean Age (in years) | 57.45 (SD = 18.68) |
| Gender | |
| Male | 24 (47%) |
| Female | 27 (53%) |
| Race | |
| African-American | 8 (16%) |
| Caucasian | 43 (84%) |
| Mean Educational Level (in years) | 12.27 (SD = 2.62) |
| Current Marital Status | |
| Married | 19 (37.3%) |
| Other (Single, Divorced, Widowed) | 32 (62.7%) |
| Mean time on dialysis (in years) | 4.79 (SD = 4.08) |
| Diabetic Status | |
| Diabetic | 17 (33.3%) |
| Nondiabetic | 34 (66.7%) |
| Other Medical Problems | |
| Yes | 35 (68.6%) |
| No | 16 (31.4%) |
| Mean Interdialytic Weight Gain (in kilograms) | 2.997 (SD = 1.55) |
| PHC | 26.55 (SD = 6.02) |
| IEQ | 77.96 (SD = 33.11) |
| Internal (IHLC) | 23.00 (SD = 8.64) |
| Chance (CHLC) | 19.75 (SD = 8.00) |
| Doctors (DHLC) | 14.25 (SD = 4.31) |
| Others (OHLC) | 11.14 (SD = 4.25) |

[a] N = 51

*Measures*:

To assess the patient's health beliefs about their kidney failure and HD treatments, the subjects completed the Multidimensional Health Locus of Control (MHLC; Wallston, et al., 1978). Because the subject sample is HD patients, Form C (Wallston, et al., 1994) was used to determine condition-specific health locus of control beliefs. While "condition" was not replaced in the items, the instructions explained to the subjects that they were to think of their kidney disease and HD treatments as they answer the items. Form C uses a six-point Likert scale format ranging from strongly disagree to strongly agree. It contains the two six-item subscales: internal control (IHLC) and chance/external control (CHLC). Scores on both subscales can range from six to 36. Form C also has two, independent three-item subscales: doctors (DHLC), and other people (OHLC) items replacing the original powerful others subscale of Forms A and B. Both subscales have score ranges from three to eighteen. The higher the score on a particular scale means a stronger belief in what that scale is evaluating. For example a score of eighteen on the DHLC indicates that the subject has a very strong belief that their doctor controls the outcomes of their health and treatments. The reliability of Form C has been reported to be between 0.70 and 0.87. The test-retest reliability has been reported to be from 0.35 to 0.80 (Wallston, et al., 1994). Some examples from Form C of the MHLC are: "As to my "condition," what will be will be," "Whatever goes wrong with my condition is my own fault," "If I see my doctor regularly, I am less likely to have problems with my condition." For the complete questionnaire, refer to Appendix B concerning Form C. The MHLC Form C was used with permission of the author, Dr. Ken Wallston, Ph.D. (Internet correspondence, Sept. 1998).

The Perceived Health Competence (PHC; Smith, et al., 1995) scale was given in order to assess a patient's perceived ability to influence their health outcomes. The PHC scale is a domain-specific measure of an individual's perceived competence or effectiveness in influencing or managing their health outcomes. The PHC scale consists of eight statements that use a five-point Likert scale format ranging from strongly disagree to strongly agree. PHC scores can range from eight to forty. The higher the score on the PHC the stronger the subject believes that they can control and influence their health outcomes. The reported reliability coefficient for the PHC scale is between 0.82 and 0.90. The test-retest reliability has been reported to be from 0.60 to 0.82 (Smith, et al., 1995). Some example statements from the PHC scale are: "I handle myself well with respect to my health" and "No matter how hard I try, my health doesn't turn out the way I would like." Appendix C contains the complete PHC scale. Permission to use the PHC was given by the author, Dr. Ken Wallston, Ph.D. (Internet correspondence, Sept. 1998).

To determine the impact the levels of distress and severity of their kidney failure have on their lives, subjects completed the Illness Effects Questionnaire (IEQ; Greenberg, G. D., & Peterson, R. A., 1984). This scale has twenty statements using an eight-point Likert scale, where zero represents no problem and values greater than zero represent higher levels of distress to the problem. Scores between forty-seven and seventy-four represent average distress, and those above seventy-four indicate moderate to severe distress. Some sample items from the IEQ are, "My illness disrupts my work or hobbies" and "My illness disrupts my life." The reported reliability of the IEQ is 0.93, and the test-retest reliability has been reported to be 0.99 (Rosenberg, S. J., Petersen, R.

A., Hayes, J., Hatcher, J., & Headen, S., 1986). The complete IEQ can be found in Appendix D. The IEQ was used in this study with permission of Dr. Rolf Petersen, Ph.D. (Internet correspondence, Dec 1998).

To assess patients' level of adherence to their fluid-intake restrictions, a patient's interdialytic weight gain (IWG) was used as the measure for fluid adherence. IWG is a measure of the actual weight gained between dialysis sessions and is determined by subtracting the postdialytic weight for the previous treatment session from the predialytic weight for the current session (Christensen, et al., 1997). This study used the following criterion for IWG, patients with averaged IWG < 4% of their dry body weight will be classified as adherent to their fluid-intake restrictions and patients with IWG > 4% of their dry body weight will be classified as nonadherent. This criterion was derived after reviewing the previous research where studies that used strict cut-off points of 1.0 to 2.0 kg found higher levels of noncompliance and more recent research using higher cut-off points of 4.0 kg and up found lower levels of noncompliance. For example, Procci (1978) used an IWG cut-off point of 0.9 kg finding high levels of noncompliance in his study, whereas Leggat, et al. (1998) used the cut-off point of 5.7% of each subject's dry weight finding lower levels of noncompliance. Wolcott, et al. (1986) created a similar percentage criterion finding that an IWG of greater than 4% of dry body weight was indicative of problematic adherence.

By using a percentage of a patient's dry body weight, researchers are able to account for the variability of each patient's body size. It is important that with this type of variable individual differences are taken into account. With HD and IWG, a larger patient is able to tolerate larger IWG along with the stresses the removal of excess fluid

places on them during the HD procedure better than that of a smaller person (Bame, et al., 1993; Manley & Sweeney, 1986). For example, a 140 kg patient should tolerate the removal of 4.0 kg better than a 70 kg patient because of their body size, muscle mass, and fat stores each has. After consultation with staff at the proposed HD sites, staff agreed this 4% criterion was a more accurate measure of IWG than stricter cut-off points. Choosing this criterion also came from the author's own experience over the last eight years in HD, a percentage measure will allow for individual differences among HD patients.

Demographic and patient information regarding gender, age, race, educational level, marital status, length of time as a HD patient, diabetic status, and presence of other medical problems were obtained from patient self-reports and review of their medical charts. This information was recorded on a demographic sheet. A sample of this sheet is included in Appendix E. As a measure of compliance, Cummings, et al. (1982) have suggested that medical chart assessments have the advantage of being relatively unaffected by human judgements. They have cautioned that these measures may not be accurate indicators of compliance because they can be affected by factors unrelated to adherence behaviors. It is hoped that by using patient self-reports and medical chart reviews together will aid in a more accurate view of each patient's demographic characteristics.

*Procedures:*

Patients were recruited to participate in the study from the two Gambro HD units with consents to participate obtained by the author during each patient's regularly scheduled HD session. The study period covered one month or twelve HD sessions. The

consent form explained to participants what the study entailed along with the need for their charts to be reviewed for important demographic data (See Appendix A for the consent form.). However, the consent form did not specifically tell the patient that fluid-intake restriction adherence would be investigated. This was done to control for false adherence because they would be aware their adherence to fluid-intake restrictions was being investigated. Literature on HD has shown a strong component of social desirability meaning HD patients may attempt to present themselves to staff and researchers as more compliant than they actually are (Binik, et al., 1989). At the conclusion of the study, subjects were given a debriefing statement (see Appendix F for a sample) that explained that their fluid-intake adherence behaviors were measured.

The measures (Form C of the MHLC, the PHC scale, and the IEQ) and demographic sheet were filled out by the patients during the beginning of their HD session. Each patient was given a packet containing the measures and demographic sheet with the measures counterbalanced in each packet. When the packets were handed out, the patients were again reminded of confidentiality and encouraged to answer each question openly and honestly taking as much time as they required. Because of restrictions due to HD access placement (access in writing arm), some participants were allowed to complete the measures at home. Medical charts were reviewed to retrieve the appropriate fluid data in order to compute the subject's interdialytic weight gain (IWG). First, an averaged weight gain for each session during the study period was calculated. This was done by subtracting the previous session's post-dialytic weight from the next session's pre-dialytic weight. Next, in order to account for outliers and incorrectly recorded weights, the high and low IWG's were excluded. This resulted in IWG's for ten

HD sessions. A final calculation of averaging these ten IWG's was made to determine each subject's mean IWG for the study period.

This study only used data from subjects who completed all the questionnaires correctly and had no missing fluid data from their medical charts. Those subjects that did not fill out a questionnaire correctly were excluded from the final analysis. This was because incorrectly completed or left unfinished questionnaires do not provide accurate accounts on how a subject perceives their health beliefs or treatment outcomes. Those subjects that had errors in their fluid data or were missing some data were also excluded from the study. Exclusion for these reasons was in order ensure homogeneity among the sample.

## Results

A preliminary correlation analysis was conducted to examine the associations between the measures, demographic variables, and IWG. The intercorrelations are presented in Table 2. While there were no correlations between the measures and IWG, several of the measures had significant intercorrelations among themselves. PHC was significantly correlated with IEQ ($r = -0.451$, $p < 0.01$) and CHLC ($r = -0.412$, $p < 0.01$). This effect indicates that subjects in this sample with a stronger belief that they can control their health outcomes view their illness as having less of an impact on their lives as well as chance factors such as luck or fate as having less of an effect on their health outcomes. CHLC was also correlated with DHLC ($r = 0.290$, $p < 0.05$) and OHLC ($r = 0.354$, $p < 0.05$) indicating that those subjects that perceive chance factors as effecting their health outcomes also view doctors and others as factors playing a part in their health outcomes. IHLC and DHLC were correlated, $r = 0.486$, $p < 0.01$. This effect would

indicate that those subjects that perceive themselves as controlling their health outcomes also view their doctors as having a strong impact on their health outcomes. IEQ was also correlated with DHLC ($r = 0.301$, $p < 0.05$) suggesting that those perceiving their illness as having a strong impact on their lives also views their doctors as having an effect on their health outcomes.

After performing the initial correlational analysis, a multiple regression procedure was conducted on the demographic variables age, level of education, and years on HD along with the health belief measures to patient IWG in order to ascertain if any of the variables or measures were predictors of fluid-intake adherence. Because there was no known prediction involving the association between the demographic variables or health belief measures and patient IWG, forward-entry selection was used for the regression analysis. Variables that met a $p < 0.05$ criteria were allowed to enter the into the equation. The overall regression model was significant, $R^2 = 0.094$, $F (1, 50) = 5.063$, $p < 0.03$. The only significant predictor in the model was age, $t (50) = -2.250$, $p < 0.03$, $\beta = -0.306$. This effect indicates that older patients had lower IWG's than younger patients. Results of this regression analysis are presented in Table 3. Next, a comparison of the two groups, adherent and nonadherent, was conducted to determine if there were any significant differences between them. This comparison showed no significant differences between the groups. Table 4 lists the comparisons of means, standard deviations, and percentages between the two groups.

Table 2. Intercorrelations for Measures, Demographic Variables, and IWG [a]

| Variables (Sig. 2-tailed) | PHC | IEQ | IHLC | CHLC | DHLC |
|---|---|---|---|---|---|
| PHC | 1.000 (0.00) | -0.451** (0.005) | 0.241 (0.124) | -0.412** (0.006) | 0.158 (0.477) |
| IEQ | -0.451** (0.005) | 1.000 (0.00) | 0.007 (0.96) | 0.275 (0.051) | 0.301* (0.032) |
| IHLC | 0.241 (0.124) | 0.007 (0.96) | 1.000 (0.00) | 0.005 (0.971) | 0.486** (0.000) |
| CHLC | -0.412** (0.003) | 0.275 (0.051) | 0.005 (0.971) | 1.000 (0.00) | 0.290* (0.039) |
| DHLC | 0.158 (0.269) | 0.301* (0.032) | 0.486** (0.000) | 0.290* (0.039) | 1.000 (0.000) |
| OHLC | 0.131 (0.361) | 0.049 (0.731) | 0.177 (0.215) | 0.354* (0.011) | 0.248 (0.079) |
| Gender | -0.012 (0.933) | -0.194 (0.172) | 0.133 (0.352) | 0.118 (0.408) | 0.047 (0.743) |
| Age | -0.251 (0.076) | 0.078 (0.585) | -0.114 (0.424) | 0.328* (0.019) | 0.232 (0.102) |
| Race | 0.231 (0.102) | -0.215 (0.130) | 0.013 (0.930) | -0.041 (0.777) | -0.076 (0.595) |
| Education | 0.257 (0.068) | -0.407** (0.003) | 0.008 (0.956) | -0.011 (0.940) | 0.096 (0.502) |
| Marital Status | 0.091 (0.524) | -0.210 (0.139) | 0.152 (0.288) | -0.030 (0.835) | -0.163 (0.253) |
| Dialysis | 0.358** (0.010) | -0.070 (0.626) | 0.180 (0.207) | -0.151 (0.289) | -0.036 (0.801) |
| Diabetic Status | -0.012 (0.935) | -0.134 (0.348) | -0.049 (0.735) | -0.122 (0.392) | -0.153 (0.285) |

[a] * = $p < 0.05$; ** = $p < 0.01$; N = 51

Table 2. Intercorrelations for Measures, Demographic Variables, and IWG Cont. [a]

| Variables (Sig. 2-tailed) | PHC | IEQ | IHLC | CHLC | DHLC |
|---|---|---|---|---|---|
| Medical Problems | 0.150 (0.292) | -0.028 (0.848) | 0.089 (0.535) | -0.016 (0.914) | 0.138 (0.335) |
| IWG | 0.027 (0.852) | 0.118 (0.411) | 0.072 (0.615) | -0.071 (0.622) | 0.155 (0.278) |

[a] * = $p < 0.05$; ** = $p < 0.01$; N = 51

Table 2. Intercorrelations for Measures, Demographic Variables, and IWG Cont. [a]

| Variables (Sig. 2-tailed) | OHLC | Gender | Age | Race | Education |
|---|---|---|---|---|---|
| PHC | 0.131 (0.361) | -0.012 (0.933) | -0.251 (0.076) | 0.231 (0.102) | 0.257 (0.068) |
| IEQ | 0.049 (0.731) | -0.194 (0.172) | 0.078 (0.585) | -0.215 (0.130) | -0.407** (0.003) |
| IHLC | 0.177 (0.215) | 0.133 (0.352) | -0.114 (0.424) | 0.013 (0.930) | 0.008 (0.956) |
| CHLC | 0.354* (0.011) | 0.118 (0.408) | 0.328* (0.019) | -0.041 (0.777) | -0.011 (0.940) |
| DHLC | 0.248 (0.079) | 0.047 (0.743) | 0.232 (0.102) | -0.076 (0.595) | 0.096 (0.502) |
| OHLC | 1.000 (0.000) | -0.221 (0.118) | -0.151 (0.292) | -0.117 (0.415) | -0.038 (0.794) |
| Gender | -0.221 (0.118) | 1.000 (0.000) | 0.218 (0.124) | 0.083 (0.564) | -0.248 (0.079) |
| Age | -0.151 (0.292) | 0.218 (0.124) | 1.000 (0.000) | -0.215 (0.131) | -0.078 (0.588) |
| Race | -0.117 (0415) | 0.083 (0.564) | -0.215 (0.131) | 1.000 (0.000) | 0.058 (0.685) |
| Education | -0.038 (0.794) | -0.248 (0.079) | -0.078 (0.588) | 0.058 (0.685) | 1.000 (0.000) |
| Marital Status | 0.006 (0.967) | 0.330* (0.018) | -0.645 (0.755) | 0.109 (0.445) | -0.059 (0.680) |
| Dialysis | 0.199 (0.162) | -0.196 (0.169) | -0.252 (0.724) | -0.025 (0.864) | 0.111 (0.438) |
| Diabetic Status | -0.086 (0.550) | -0.083 (0.561) | 0.004 (0.979) | -0.038 (0.791) | 0.123 (0.391) |

[a] * = $p < 0.05$; ** = $p < 0.01$; N = 51

Table 2. Intercorrelations for Measures, Demographic Variables, and IWG Cont. [a]

| Variables (Sig. 2-tailed) | OHLC | Gender | Age | Race | Education |
|---|---|---|---|---|---|
| Medical Problems | -0.223 (0.116) | -0.040 (0.781) | -0.069 (0.630) | 0.057 (0.691) | 0.254 (0.072) |
| IWG | 0.013 (0.927) | 0.014 (0.923) | -0.306* (0.029) | 0.177 (0.215) | -0.102 (0.475) |

[a] * = $p < 0.05$; ** = $p < 0.01$; N = 51

Table 2. Intercorrelations for Measures, Demographic Variables, and IWG Cont. [a]

| Variables (Sig. 2-tailed) | Marital Status | Dialysis | Diabetic Status | Medical Problems | IWG |
|---|---|---|---|---|---|
| PHC | 0.091 (0.524) | 0.358** (0.010) | -0.012 (0.935) | 0.150 (0.292) | 0.027 (0.852) |
| IEQ | -0.210 (0.139) | -0.070 (0.626) | -0.134 (0.348) | -0.028 (0.848) | 0.118 (0.411) |
| IHLC | 0.152 (0.288) | 0.180 (0.207) | -0.049 (0.735) | 0.089 (0.535) | 0.072 (0.615) |
| CHLC | -0.030 (0.835) | -0.151 (0.289) | -0.122 (0.392) | -0.016 (0.914) | -0.071 (0.622) |
| DHLC | -0.163 (0.253) | -0.036 (0.801) | -0.153 (0.285) | 0.138 (0.335) | 0.155 (0.278) |
| OHLC | 0.006 (0.967) | 0.199 (0.162) | -0.086 (0.550) | -0.223 (0.116) | 0.013 (0.927) |
| Gender | 0.330* (0.018) | -0.196 (0.169) | -0.083 (0.561) | -0.040 (0.781) | 0.014 (0.923) |
| Age | -0.045 (0.755) | -0.252 (0.074) | 0.004 (0.979) | -0.069 (0.630) | -0.306* (0.029) |
| Race | 0.109 (0.455) | -0.025 (0.864) | -0.038 (0.791) | 0.057 (0.691) | 0.177 (0.215) |
| Education | -0.059 (0.680) | 0.111 (0.438) | 0.123 (0.391) | 0.254 (0.072) | -0.102 (0.475) |
| Marital Status | 1.000 (0.000) | 0.052 (0.717) | -0.029 (0.842) | -0.091 (0.526) | -0.182 (0.777) |
| Dialysis | 0.052 (0.717) | 1.000 (0.000) | 0.345* (0.013) | 0.200 (0.160) | -0.041 (0.777) |
| Diabetic Status | -0.029 (0.842) | 0.345* (0.013) | 1.000 (0.000) | 0.030 (0.835) | -0.145 (0.280) |

[a] * = $p < 0.05$; ** = $p < 0.01$; N = 51

Table 2. Intercorrelations for Measures, Demographic Variables, and IWG Cont. [a]

| Variables (Sig. 2-tailed) | Dialysis | Diabetic Status | Medical Problems | IWG |
|---|---|---|---|---|
| Medical Problems | 0.200 (0.160) | 0.030 (0.835) | 1.000 (0.000) | 0.039 (0.785) |
| IWG | 0.041 (0.777) | -0.154 (0.280) | 0.039 (0.785) | 1.000 (0.000) |

[a] * = $p < 0.05$; ** = $p < 0.01$; N = 51

Table 3. Summary of Regression Analysis of Age, Level of Education, Years on HD, Health Belief Measures, and IWG[a]

Model Summary

| R | $R^2$ | Adjusted $R^2$ | Std. Error of Estimate |
|---|---|---|---|
| 0.306 | 0.094 | 0.075 | 1.4874 |

ANOVA

| | Sum of Squares | df | Mean Squares | F | Sig. |
|---|---|---|---|---|---|
| Regression | 11.201 | 1 | 11.201 | 5.063 | 0.029 |
| Residual | 108.408 | 49 | 2.212 | | |
| Total | 119.609 | 50 | | | |

Coefficients

| | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|
| | B | Std. Error | Beta | | |
| AGE | -2.533E-02 | 0.011 | -0.306 | -2.250 | 0.029 |

Excluded Variables

| | Beta In | t | Sig. |
|---|---|---|---|
| PHC | -0.053 | -0.376 | 0.709 |
| IEQ | 0.143 | 1.046 | 0.301 |
| Internal (IHLC) | 0.038 | 0.272 | 0.787 |
| Chance (CHLC | 0.033 | 0.229 | 0.819 |
| Doctors (DHLC) | 0.238 | 1.740 | 0.088 |
| Others (OHLC) | -0.034 | -0.242 | 0.810 |
| Education | -0.127 | -0.929 | 0.358 |
| Dialysis | -0.039 | -0.276 | 0.784 |

[a]N = 51

Table 4. Comparisons Between Means, Standard Deviations, and Percentages of Demographic Variables, Health Belief Measures and IWG for Adherent [a] and Nonadherent [b] Groups

| | Adherent | Nonadherent |
|---|---|---|
| PHC | 26.89 (SD = 5.22) | 26.36 (SD = 6.49) |
| IEQ | 77.06 (SD = 25.96) | 78.45 (SD = 36.81) |
| Internal (IHLC) | 20.61 (SD = 8.26) | 24.30 (SD = 8.68) |
| Chance (CHLC) | 20.39 (SD = 8.03) | 19.39 (SD = 8.09) |
| Doctors (DHLC) | 13.89 (SD = 5.05) | 14.45 (SD = 3.92 |
| Others (OHLC) | 10.67 (SD = 3.82) | 11.39 (SD = 4.50) |
| Mean Age (in years) | 67.44 (SD = 15.01) | 52.00 (SD = 18.41) |
| Gender | | |
| Male | 8 (44.4%) | 16 (48.5%) |
| Female | 10 (55.6%) | 17 (51.5%) |
| Race | | |
| African-American | 2 (11.1%) | 6 (18.2%) |
| Caucasian | 16 (88.9%) | 27 (81.8%) |
| Mean Educational Level (in years) | 12.61 (SD = 2.79) | 12.09 (SD = 2.55) |
| Current Marital Status | | |
| Married | 8 (44.4%) | 11 (33.3%) |
| Single, Divorced, Widowed) | 10 (55.6%) | 22 (66.7%) |
| Mean time on dialysis (in years) | 4.35 (SD = 4.94) | 5.03 (SD = 4.64) |
| Diabetic Status | | |
| Diabetic | 4 (22.2%) | 13 (39.4%) |
| Nondiabetic | 14 (77.8%) | 20 (60.6%) |
| Other Medical Problems | | |
| Yes | 13 (72.2%) | 22 (66.7%) |
| No | 5 (27.8%) | 11 (33.3%) |
| Mean Interdialytic Weight Gain (in kg) | 1.49 (SD = 0.813) | 3.82 (SD = 1.185) |

[a] N = 18; [b] N = 33

## Discussion

Hemodialysis (HD) is a complex treatment process that requires a patient to alter longstanding habits and adhere to new restrictions on their daily routines. One area of a patient's life that is affected is the amount of fluid that they can safely ingest. Fluid-intake adherence has been found to be one of the hardest and most commonly violated aspects of the HD regimen for patients to follow (De-Nour & Czaczkes, 1972; Procci, 1978; Streltzer & Hassell, 1988). Because of the dire consequences of nonadherence, investigators have attempted to examine what causes patients not to follow their health care providers' instructions. Some researchers have postulated that a patient's health beliefs and the impact of their illness may affect their fluid-intake adherence. The current study has attempted to meet some of the criticisms of earlier published investigations concerning fluid-intake adherence among HD patients and their health beliefs.

Based on the > 4% of dry weight criteria for interdialytic weight gain (IWG), 64.7% of the subjects in this study were classified as nonadherent to their fluid-intake restrictions. Earlier research investigating fluid-intake adherence using a weight gain cut-off (i.e., 2.0 kg) to assess nonadherence found a higher percentage of nonadherent than adherent subjects (Bame, et al., 1993; Blackburn, 1977; De-Nour & Czaczkes, 1976; 1972; Procci, 1978; Safdar, et al., 1995). In contrast, this study used a cut-off of > 4% of the patient's dry weight to classify them as nonadherent. When a percentage is used instead of an absolute cut-off, individual differences of the patient are better accounted for. These differences include body size, caloric intake, and residual urine output that can have an impact on whether a patient is able to tolerate higher IWG. If this study had used the stricter cut-off points as used in earlier investigations, 82.4% of the subjects

would have been classified as nonadherent. This suggests that a percentage measurement of weight gain may be more reliable and accurate in distinguishing who should be classified as nonadherent.

When collecting data, care was taken to account for the patients' residual urine output. This criterion has not been used frequently in previous research. As reported earlier, if a patient has some residual urine output, it could allow the patient to ingest more fluids than other patients that do not have this ability. By taking this into account, a more accurate sample was created consisting of those that are truly unable to remove fluids without the aid of HD sessions.

The current study found that age was correlated with fluid-intake adherence. This is in line with previous research findings (Bame, et al., 1993; Boyer, et al., 1990; Christensen & Smith, 1995; Cummings, et al., 1982; Leggat, et al., 1998; Morduchowicz, et al., 1993; Ruggiero, et al., 1992). Clearly age appears to be a strong predictor of fluid-intake restriction nonadherence with it accounting for 30.6% of the variance in IWG. Younger patients were more likely to be nonadherent than their older counterparts. The participants on average were middle-aged ($\underline{M}$ = 57.45) and have been HD patients for approximately five years ($\underline{M}$ = 4.79). This would suggest that older subjects might have experienced the negative effects of nonadherence over the course of their five years as HD patients. They may have learned the consequences of nonadherence through their HD experiences and in doing so they may have become more adherent as they have become accustomed to their HD treatments.

Another explanation for this significant relationship may come from how younger HD patients might view their kidney disease. As a HD patient, a young person is dealing

with conflicting roles in their lives. They are attempting to become independent and create an identity for themselves while also being placed in a dependent position relying on doctors, nurses, and a machine to help remain functional in their daily lives. This along with the restrictions that the HD regimen imposes on them can cause great stress. Nonadherence may be a reaction to these conflicting forces in their lives. Ferraro, et al. (1986) have in the same vein suggested that because disability is more likely to be expected among older people they accept and attempt to cope with kidney failure with more success than younger patients. While these explanations may provide some insight as to why age would be a significant predictor, it is also important to note that in this sample there are only ten out of fifty-one subjects under the age of forty (19.6%) with nine out of those ten being classified nonadherent.

Contrary to predictions, the results showed no significant relationships between the health locus of control measures (internal, others, doctors, or chance), perceived health competence, or impact of illness and the subjects' fluid-intake adherence measure (IWG). Comparable results lacking in significant correlations have been obtained by previous researchers (Brown & Fitzpatrick, 1988; Cummings, et al., 1982; Wallston, et al., 1978). The question becomes what can we learn from this lack of relationship. Brown & Fitzpatrick (1988) have concluded that the beliefs about the control a HD patient has over their health are not a salient influence upon their adhering to their fluid-intake restrictions. They believed that adherence is effected more so by the patient's larger sense of control over their lives than their health specifically. Cummings, et al. (1982) concluded that within their population adherence was largely determined by situational factors more than patient health beliefs with different aspects of adherence

unrelated. These explanations might also be true of the current sample as well as others. A patient's health beliefs appeared not to have a strong influence on their fluid-intake adherence behaviors. The lack of significant relationships between the health locus of control subscales, perceived health competence, and impact of illness and IWG might also suggest that other outside variables not measured in this study have an impact on fluid-intake adherence behaviors. Other outside factors that have been found to affect HD patient adherence were family support (Christensen, et al., 1992; Sherwood, 1983), compatibility of treatment (Christensen, et al., 1996), personality factors (Christensen, A. J., & Smith, T. W., 1995; De-Nour & Czaczkes, 1972; 1976), seasonal effects (Manley & Sweeney, 1986), and depression (Christensen, et al., 1991; De-Nour & Czaczkes, 1972; 1976; Devins, et al., 1983). It appears that a variety of factors interact in affecting whether a patient will choose to follow their health care providers' advice and prescriptions or not.

Although no significant relationships with IWG, other than age, were found, there are some interesting similarities and differences between the adherent (N = 18) and nonadherent (N = 33) groups. Interestingly, the two groups do not differ significantly on the health belief measures or impact of illness scale. This is contrary to what was hypothesized or how one would assume that the subjects would have responded. One would think that nonadherent patients would likely to score higher on the doctors, others, or chance subscales believing that someone or something other than themselves have an impact on their health outcomes. One would also predict higher scores on the impact of illness scale with the nonadherent group meaning that they viewed their illness and HD treatments as infringing more so on their lives than on the lives of the adherent group.

One would also surmise that the adherent group would score higher on the perceived health competence scale believing that they have more control and influence on their health outcomes.

Both groups scored moderately high on the perceived health competence scale. These results would suggest that both groups perceive themselves as able to control their health outcomes. Scoring high on the perceived health competence scale by the adherent group follows prediction that these patients viewed themselves as able to influence their health. However, this does not clearly follow for the nonadherent group. One possible answer might be that they choose not to adhere to their restrictions out of their own reasoned decision-making. This is in the same vein as what O'Brien (1990) called reasoned compliance or modifying their restrictions to meet their specific, continuous, or ongoing physical, emotional, and/or social needs. Likewise, Donovan & Blake (1992) view this as the patient making decisions to adhere or not to their fluid-intake restrictions based on what they see is in their own best interest.

Both groups also scored moderately high on the doctors health locus of control subscale. This result indicates that both groups of patients view their doctors as having an impact on their health outcomes and their HD treatments. Difference in the perceptions of each group not measured by the scale might explain why one follows their fluid-intake restrictions and the other does not. The adherent group might perceive their doctors as competent and believe that their doctors are acting in their best interests so they follow their fluid-intake restrictions. In contrast, the nonadherers might view their doctor as too controlling and as a result they do not follow their prescriptions. It might

also be true that they view their doctors as incompetent or lacking the understanding of being a HD patient so they chose not to adhere to their fluid-intake restrictions.

Both groups reported moderate distress on the impact of illness scale. One would expect that someone dealing with a chronic illness along with an intrusive treatment regimen would report greater distress from their illness and its treatment. Understanding how this affects a HD patient's adherence differently is puzzling. It may be in how each group perceives the impact that their illness has caused. Nonadherers may view their fluid-intake restrictions as one more thing that they can not do. They might view it as a component that they can have little control over so they choose not to follow their restrictions seeing it as fruitless doing little to improve their lives. The adherent group perceives their illness and HD treatment just as distressing as the nonadherent group, yet they still adhere to their fluid-intake restrictions. The adherent patients might view their restrictions as a necessary part of their treatment and adhere in the hopes that it may lead to better health outcomes even with the impact that their illness has on their lives.

Among the demographic variables a similar lack of differences occurred. There were no significant differences with respect to level of education or years on HD. Gender appears to be evenly distributed within each group with almost a fifty-fifty split. Race has similar results among the adherent group with a threefold increase of African-Americans in the nonadherent group. This lack of significance may possibly be due to the small proportion of African-Americans in the total sample (N = 8). Twice as many patients in the nonadherent group were not currently married (either single, divorced, or widowed) than were, and there were twice as many not currently married in the nonadherent group than in the adherent group. Within the adherent group, it was almost

an even split between being married and the not married category. There were more nondiabetics in both groups than those that stated they were diabetic with three-and-a-half times more nondiabetics in the adherent group and one-and-a half times more in the nonadherent group. Both groups had almost twice as many patients that stated they had other existing medical problems than did not. Not surprisingly, on average those in the nonadherent group had two-and-a-half times higher weight gains than did the adherent group.

In summary, adherence to the hemodialysis treatment regimen appears to be based on multifaceted and complex behaviors with nonadherence being very common. It seems to not be easily defined by one measure or aspect of the patient's background. While no significant results were found between any of the health belief measures and fluid-intake adherence, this study did find a significant relationship between patient age and their adherence behaviors. The lack of significant relationships might point to other factors that should be investigated in order to more clearly understand why some HD patients so often do not adhere to their fluid-intake restrictions. This lack of relationship appears to indicate that fluid-intake adherence is not directly contingent upon a patient's health beliefs alone. The current study was also able to provide support for using a percentage method for measuring fluid-intake adherence.

## Limitations and Suggestions for Further Research

The interpretation of the present findings is limited by several factors. First, because the study was correlational, one can not draw definite conclusions from the influence of age on fluid-intake restriction adherence. Attempts were made to control for possible "third variables" that may have influenced the health belief measures and

adherence relationship (e.g., demographic variables and residual urine output). Nevertheless, one can not rule out the possibility that these findings are the result of some unidentified factor. It is important also to point out that this study only researched in-center HD patients. It did not look at home HD patients or peritoneal dialysis patients so these results should not be generalized to all renal replacement therapies.

Another significant interpretative limitation involves the difficulty in measuring nonadherence. Several researchers have used multiple biochemical measures (i.e., potassium and phosphorus levels, interdialytic weight gain, or urea clearance) to measure nonadherence. When using IWG as the measure of nonadherence, care must be taken on deciding what level signifies adherence and nonadherence. Literature reviews have not found a conclusive criterion for IWG. Attempts should be made to devise a definite criterion for IWG as the ones devised for potassium and phosphorus levels by the medical community. However, it has been the author's experience that when discussing IWG doctors inside the same facility differ as to what IWG should be classified as nonadherent or adherent. This study attempted to correct for individual differences that previous work had not. By using a percentage measure of weight for IWG, it appears that a more accurate assessment of fluid-intake adherence was gained. However, further investigations using this percentage method may be needed to clarify its utility. This study also used only medical chart reviews for determining adherence. Utilizing patient self-reports along with staff assessments of each patient's adherence might have been useful in clarifying those that were adherent from those that were not.

Another effect on IWG that has rarely been investigated is the effects that the seasons may have. Manley & Sweeney (1986) found significant effects when they

investigated seasonal variations in weight gains such as increases in IWG during the summer months. In some settings (different areas of the country), climatic conditions may be important to consider when assessing variability in weight gain. The present study was conducted during the winter months only and a seasonal effect was not taken into account. Future investigations should attempt to ascertain if Manley & Sweeney's results can be replicated.

The size and make-up of the sample is another aspect of the study that should be factored into a discussion of its results. As compared to previous studies (on average approximately twenty to thirty participants) with kidney failure, this study's size (N = 51) was greater providing for greater generalizability of results. However, twenty patients declined to participate with most stating that they did not want to be bothered or take the time. It would be interesting for further research to investigate any differences in the demographics of these individuals. If possible, looking into their IWG might provide some insight into adherence based on their decisions as whether to participate or not. A second note on the sample concerns those that had missing fluid data. Most of these individuals were missing fluid data because they had skipped treatments during the study month. Skipping treatments as well as shortening HD session time are both forms of nonadherence that were not investigated in this study but are important factors in maintaining healthy functioning for the HD patient. Future research might want to include such behaviors in their studies to learn what effect health beliefs may have on this type of behavior. Lastly, even with attempts by the author to control for social desirability, most of the participants knew the author from his experiences with HD. They may have answered questionnaires inaccurately because they knew the author

would be able to connect their names to their data. In order to control for this occurring, future research may have an unknown person solicit participation, but this may also lower the response rate.

When discussing this study's interpretative considerations, how the questionnaires were filled out should be mentioned. 13.9% (N = 14) of the subjects were not used because of missing data on one or more of the questionnaires. Some of the subjects mentioned their difficulty in understanding what the questionnaires were asking especially Form C of the Multidimensional Health Locus of Control scale. Lack of education and comprehension of their disease may have played a part in these misunderstandings. The author attempted to answer questions but was unable to answer all especially with those that needed to take their questionnaires home with them. This was another difficulty encountered when administering the health belief measures. Some patients were unable to fill out their questionnaires during their HD session because their HD access was in their writing arm. If time allowed, the patient was allowed to dictate to the author their responses. Later investigations should take these difficulties into account when administering self-report questionnaires to HD patients allowing for these special circumstances.

One final cautionary note should be addressed concerning the effects of outside factors and influences not investigated in the present study. As previously noted, these factors include family support, compatibility of treatment, personality factors, seasonal effects, and depression. As with most of the research on adherence in the HD population, these factors were not found consistently to predict adherence in previous studies. While inconsistent, depression does appear to be a frequent observation and complaint within

this population. A study such as the present one is unable to adequately investigate multiple factors effectively. Future research should look at one or more of these factors along with patient health beliefs in order to ascertain a clearer picture as to what factors interplay to contribute to HD patient adherence. Further investigations may also uncover other factors that previous research has not uncovered.

These qualifications not withstanding this data provide further evidence of the complex nature of adherence behaviors in the hemodialysis population. These findings add to the wealth of data on hemodialysis adherence. It might provide future researchers insight into the construction and carrying out of investigations with this population. Further work is needed to ascertain whether health beliefs do affect fluid-intake adherence behaviors. If these results are replicated, they will serve to indicate that other factors outside a patient's health beliefs are at work in determining whether a hemodialysis patient will adhere or not to their fluid-intake restrictions. They will also provide further validation of the percentage measurement method for assessing interdialytic weight gain. These results along with future research can only provide better understandings as to what factors are working to affect HD patient adherence and in what ways psychologists can aid doctors, nurses, and patients to improve adherence to all facets of the HD treatment regimen.

## Bibliography

American Psychological Association. (1992). Ethical principles of psychologists and code of conduct. American Psychologist, 47. 1597-1611.

Andrykowski, M. A., & Brady, M. J. (1994). Health locus of control and psychological distress in cancer patients: interactive effects of context. Journal of Behavioral Medicine, 17. 439-458.

Baldree, K. S., Murphy, S. P., & Powers, M. J. (1982). Stress identification and coping patterns in patients on hemodialysis. Nursing Research, 31. 107-112.

Bame, S. L., Petersen, N., & Wray, N. P. (1993). Variation in hemodialysis patient compliance according to demographic characteristics. Social Science and Medicine, 37. 1035-1043.

Binik, Y. M., Devins, G. M., & Orme, C. M. (1989). Psychological stress and coping in end-stage renal disease. In Advances in the Investigation of Psychological Stress. ed. Neufeld, R. W. J. John Wiley & Sons: New York. 305-342.

Blackburn, S. L. (1977). Dietary compliance of chronic hemodialysis patients. Journal of the American Dietetic Association, 70. 31-37.

Boyer, C. B., Friend, R., Chlouverakis, G., & Kaloyanides, G. (1990). Social support and demographic factors influencing compliance of hemodialysis patients. Journal of Applied Social Psychology, 20. 1902-1918.

Brickman, A. L., & Yount, S. E. (1996). Noncompliance in end-stage renal disease: a threat to quality of care and cost containment. Journal of Clinical Psychology in Medical Settings, 3. 399-412.

Brickman, M. E. (1989). The Psychology of the Physically Ill Patient: A Clinician's Guide. New York: Plenum Press. 27-28.

Brown, J., & Fitzpatrick, R. (1988). Factors influencing compliance with dietary restrictions in dialysis patients. Journal of Psychosomatic Research, 32. 191-196.

Brownbridge, G., & Fielding, D. M. (1994). Psychosocial adjustment and adherence to dialysis treatment regimes. Pediatric Nephrology, 8. 744-749.

Christensen, A. J., Benotsch, E. C., & Smith, T. W. (1997). Determinants of regimen adherence in renal dialysis. In Handbook of Health Behavior Research II: Provider Determinants, ed. Gochman, D. S. Plenum Press: New York. 231-244.

Christensen, A. J., Benotsch, E. C., Wiebe, J. S., & Lawton, W. J. (1995). Coping with treatment-related stress: effects on patient adherence in hemodialysis. Journal of Consulting and Clinical Psychology, 63. 454-459.

Christensen, A. J., & Moran, P. J. (1998). Psychosomatic research in end-stage renal disease: a framework for matching patient to treatment. Journal of Psychosomatic Research, 44. 523-528.

Christensen, A. J., & Moran, P. J. (1997). Psychological aspects of renal diseases. In Comprehensive Clinical Psychology, v. 8 – Health Psychology. (Eds.) Johnston, D. W., & Johnston, M. J. New York: Pergamon. ??

Christensen, A. J., Moran, P. J., Lawton, W., J., Stallman, D., & Voights, A. L. (1997). Monitoring attentional style and medical regimen adherence in hemodialysis patients. Health Psychology, 16. 256-262.

Christensen, A. J., & Smith, T. W. (1995). Personality and patient adherence: correlates of the five-factor model in renal dialysis. Journal of Behavioral Medicine, 18. 305-313.

Christensen, A. J., Smith, T. W., Turner, C. W., Cundick, K. E. (1994). Patient adherence and adjustment in renal dialysis: a person x treatment interactive approach. Journal of Behavioral Medicine, 17. 549-566.

Christensen, A. J., Smith, T. W., Turner, C. W., Holman, Jr., J. M., & Gregory, M. C. (1990). Type of hemodialysis and preference for behavioral involvement: interactive effects on adherence in end-stage renal disease. Health Psychology, 9. 225-236.

Christensen, A. J., Smith, T. W., Turner, C. W., Holman, Jr., J. M., Gregory, M. C., & Rich, M. A. (1992). Family support, physical impairment, and adherence in hemodialysis: an investigation of main and buffering effects. Journal of Behavioral Medicine, 15. 313-325.

Christensen, A. J., Turner, C. W., Smith, T. W., Holman, Jr., J. M., & Gregory, M. C. (1991). Health locus of control and depression in end-stage renal disease. Journal of Consulting and Clinical Psychology, 59. 419-424.

Christensen, A. J., Wiebe, J. S., Benotsch, E. G., & Lawton, W. J. (1996). Perceived health competence, health locus of control, and patient adherence in renal dialysis. Cognitive Therapy and Research, 20. 411-421.

Christensen, A. J., Wiebe, J. S., Lawton, W. J. (1997). Cynical hostility, powerful others control expectancies, and patient adherence in hemodialysis. Psychosomatic Medicine, 59. 307-312.

Christensen, A. J., Wiebe, J. S., Smith, T. W., & Turner, C. W. (1994). Predictors of survival among hemodialysis patients: effect of perceived family support. Health Psychology, 13. 521-525.

Christensen, A. J., Wiebe, J. S., Edwards, D. L., Michels, J. D., & Lawton, W. J. (1996). Body consciousness, illness-related impairment, and patient adherence in hemodialysis. Journal of Consulting and Clinical Psychology, 64. 147-152.

Cummings, K. M., Becker, M. H., Kirscht, J. P., & Levin, N. W. (1982). Psychosocial factors affecting adherence to medical regimens in a group of hemodialysis patients. Medical Care, 20. 567-580

De-Nour, A. K., & Czaczkes, J. W. (1976). The influence of patient's personality on adjustment to chronic dialysis. The Journal of Nervous and Mental Disease, 162. 323-333.

De-Nour, A. K., & Czaczkes, J. W. (1972). Personality factors in chronic hemodialysis patients causing noncompliance with medical regimen. Psychosomatic Medicine, 34. 333-344.

Devins, G. M., Binik, Y. M., Hutchinson, T. A., Hollomby, D., J., Barre, P. E., & Guttmann, R. D. (1983). The emotional impact of end-stage renal disease: importance of patients' perceptions of intrusiveness and control. International Journal of Psychiatry in Medicine, 13. 327-343.

Donovan, J. L., & Blake, D. R. (1992). Patient non-compliance: deviance or reasoned decision-making. Social Science and Medicine, 34. 507-513.

Everett, K. D., Brantley, P. J., Sletten, C., Jones, G. N., & McKnight, G. T. (1995). The relation of stress and depression to interdialytic weight gain in hemodialysis patients. Behavioral Medicine, 21. 25-30.

Ferraro, K. F., Dixon, R. D., & Kinlaw, B. (1986). Measuring compliance among in-center hemodialysis patients. Dialysis and Transplantation, 15. 226-266.

Finn, P. E., & Alcorn, J. D. (1986). Noncompliance to hemodialysis dietary regimens: literature review and treatment recommendations. Rehabilitation Psychology, 31. 67-78.

Hess, J. D. (1996). The ethics of compliance: a dialectic. Advances in Nursing Science, 19. 18-27.

Hoover, H. (1989). Compliance in hemodialysis patients: a review of the literature. Journal of the American Dietetic Association, 89. 957-959.

Jones, S. L., Jones, P. K., & Katz, J. (1988). Health belief model intervention to increase compliance with emergency department patients. Medical Care, 26. 1172-1184.

Kaplan, R. M., & Simon, H. J. (1990). Compliance in medical care: reconsideration of self-predictions. Annals of Behavioral Medicine, 12. 66-71.

Kimmel, P. L., Gavin, C., Miller, G., Mendelson, W. B., Wernli, I., Neugarten, J. (1997). Disordered sleep and noncompliance in a patient with end-stage renal disease. Advances in Renal Replacement Therapy, 4. 55-67.

Leggat, Jr., J. E., Orzol, S. M., Hulbert-Shearon, T. E, Golper, T. A., Jones, C. A., Held, P. J., & Port, F. K. (1998). Noncompliance in hemodialysis: predictors and survival analysis. American Journal of Kidney Diseases, 32. 139-145.

Levy, N. B. (1984). Psychological complications of dialysis: psychonephrology to the rescue. Bulletin of the Menninger Clinic, 48. 237-250.

Lin, C., & Liang, C. A. (1997). The relationship between health locus of control and compliance of hemodialysis patients. Kaohsiung Journal of Medical Science, 13. 243-254.

Manley, M., & Sweeney, J. (1986). Assessment of compliance in hemodialysis adaptation. Journal of Psychosomatic Research, 30. 153-161.

McKevitt, P. M., Jones, J. F., Lane, D. A., & Marion, R. R. (1990). The elderly on dialysis: some considerations in compliance. American Journal of Kidney Diseases, 16. 346-350.

Marshall, G. N., Collins, B. E., & Crooks, V. C. (1990). A comparison of two multidimensional health locus of control instruments. Journal of Personality Assessment, 54. 181-190.

Morduchowicz, G., Sulkes, J., Aizle, S., Gabbay, U., Winkler, J., & Boner, G. (1993). Compliance in hemodialysis patients: a multivariate regression analysis. Nephron, 64. 365-368.

O' Brien, M. E. (1980). Hemodialysis regimen compliance and social environment: a panel analysis. Nursing Research, 29. 250-255.

O' Brien, M. E. (1990). Compliance behavior and long-term maintenance dialysis. American Journal of Kidney Diseases, 15. 209-214.

O' Brien, M. K., Petrie, K., & Raeburn, J. (1992). Adherence to medication regimens: updating a complex medical issue. Medical Care Review, 49. 435-454.

Playle, J. F., & Keeley, P. (1998). Non-compliance and professional power. Journal of Advanced Nursing, 27. 304-311.

Poll, I. B., & Kaplan De-Nour, A. (1980). Locus of control and adjustment to chronic hemodialysis. Psychological Medicine, 10. 153-157.

Procci, W. R. (1978). Dietary abuse in maintenance hemodialysis patients. Psychosomatics, 19. 16-24.

Rosenbaum, M., & Smira, K. B. (1986). Cognitive and personality factors in the delay of gratification of hemodialysis patients. Journal of Personality and Social Psychology, 51. 357-364.

Rosenberg, S. J., Peterson, R. A., Hayes, J., Hatcher, J., & Headen, S. (1986). Determinants of depression in the hospitalized medically ill. Paper presented at the 94th Annual Convention of the American Psychological Society.

Rosenstock, I. M. (1974). Historical origins of the health belief model. Health Education Monographs, 2. 328-335.

Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. Psychological Monographs, 80. 1-28.

Ruggiero, L., Brantley, P. J., Bruce, B. K., McKnight, G. T., & Cocke, T. B. (1992). The role of dietary compliance in survival of hemodialysis patients. Dialysis and Transplantation, 21. 14-17.

Safdar, N., Baakza, H., Kumar, H., & Naqvi, S. A. J. (1995). Non-compliance to diet and fluid restrictions in haemodialysis patients. Journal of the Pakistan Medical Association, 45. 293-295.

Schneider, M. S., Friend, R., Whitaker, P., & Wadhwa, N. K. (1991). Fluid noncompliance and symptomatology in end-stage renal disease: cognitive and emotional variables. Health Psychology, 10. 209-215.

Sensky, T., Leger, C., & Gilmour, S. (1996). Psychosocial and cognitive factors associated with adherence to dietary and fluid restriction regimens by people on chronic hemodialysis. Psychotherapy and Psychosomatics, 65. 36-42.

Sherman, R. A., Cody, R. P., Matera, J. J., Rogers, M. E., Solanchick, J. C. (1994). Deficiencies in delivered hemodialysis therapy due to missed and shortened treatments. American Journal of Kidney Diseases, 24. 921-923.

Sherwood, R. J. (1983). Compliance behavior of hemodialysis patients and the role of the family. Family Systems Medicine, 1. 60-72.

Shulman, R., Pacey, I., Price, J. D. E., & Spinelli, J. (1987). Self-assessed social functioning on long-term hemodialysis. Psychosomatics, 28. 429-433.

Smeltzer, S. C., & Bare, B. G., (Eds.) (1992). Brunner and Suddarth's Textbook of Medical/Surgical Nursing 7th Ed. Philadelphia: J. B. Lippincott Co. 1136-1137, 1158-1167, & 1191-1199.

Smith, M. S., & Wallston, K. A. (1992). How to measure the value of health. Health Education Rearch: Theory and Practice, 7. 129-135.

Smith, M. S., Wallston, K. A., & Smith, C. A. (1995). The development and validation of the perceived health competence scale. Health Education Research: Theory and Practice, 10. 51-64.

Snyder, P. (1983). The use of nonprescribed treatments by hemodialysis patients. Culture, Medicine and Psychiatry, 7. 57-76.

Stretzler, J. & Hassell, L. H. (1988). Noncompliant hemodialysis patients: a biopsychosocial approach. General Hospital Psychiatry, 10. 255-259.

Trostle, J. A. (1997). The history and meaning of patient compliance as an ideology. In Handbook of Health Behavior Research II: Provider Determinants, (Ed.) Gochman, D. S. Plenum Press: New York. 109-124.

Turk, D. C., & Meichenbaum, D. (1989). Adherence to self-care regimens: the patient's perspective. In Handbook of Clinical Psychology in Medical Settings, (Eds.) Sweet, J. J., Rozensky, R. H., & Tovian, S. M. Plenum Press: New York. 249-266.

U. S. Renal Data System. (1998). USRDS Annual Report. The National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases.

Wallston, K. A. (1992). Hocus-pocus, the focus isn't strictly on locus: Rotter's social learning theory modified for health. Cognitive Therapy in Research, 16. 183-199.

Wallston, K. A. (1989). Assessment of control in health-care settings. In Stress, Personal Control, and Health, (Eds.) Steptoe, A., & Appels, A. John Wiley & Sons, Ltd.: New York. 85-105.

Wallston, K. A., Stein, M. J., King, J. E., Forsberg, P. S., Wallston, B. S., & Nagy, V. T. (1983). Expectancies about control over health: relationship to desire for control of health care. Personality and Social Psychology Bulletin, 9. 377-385.

Wallston, K. A., Stein, M. J., & Smith, C. A. (1994). Form C of the MHLC Scales: a condition-specific measure of locus control. Journal of Personality Assessment, 63. 534-553.

Wallston, K. A., Wallston, B. S., & Devellis, R. (1978). Development of the multidimensional health locus of control scales. Health Education Monographs, 6. 160-170.

Wiebe, J. S., & Christensen, A. J. (1997). Health beliefs, personality, and adherence in hemodialysis patients: an interactional perspective. Annals of Behavioral Medicine, 19. 30-35.

Wiebe, J. S., & Christensen, A. J. (1996). Patient adherence in chronic illness: personality and coping in context. Journal of Personality, 64. 815-835.

Witenberg, S. H., Blanchard, E. B., Suls, J., Tennen, H., McCoy, G., & McGoldrick, M. D. (1983). Perceptions of control and causality as predictors of compliance and coping in hemodialysis. Basic and Applied Social Psychology, 4. 319-336.

Wolcott, D. L., Maida, C. A., Diamond, R., & Nissenson, A. R. (1986). Treatment compliance in end-stage renal disease patients on dialysis. American Journal of Nephrology, 6. 329-338.

Yanagida, E. H., Streltzer, J., & Siemsen, A. (1981). Denial in dialysis patients: relationship to compliance and other variables. Psychosomatic Medicine, 43. 271-280.

# Appendix A

## Consent Form

I understand that this is a study about a person's health beliefs, how their illness has affected their life, and following my health care providers' advice. I understand that I will be asked to fill out four questionnaires concerning my beliefs about my health and the impact that my illness has had on my life. It will take me approximately 45 minutes to complete these questionnaires.

I also understand that the experimenter, Mark Conard, will view my medical chart and ask me some questions about my health. The purpose of viewing my chart is to obtain relevant demographic data such as age, sex, income, medical information, etc., and the questions Mark Conard will be asking me relate to only to these data. I understand that this information will remain confidential and that the only person viewing my chart or the questionnaires is Mark Conard. All participants in the study will be assigned a randomly selected subject number to insure anonymity and confidentiality. I realize that no information will be requested on the questionnaires and obtained from my medical chart that will allow anyone other than Mark Conard to identify me and that my name will not be connected with any results from the study.

I have had the opportunity to have my questions answered, and I reserve the right to ask Mark Conard further questions if I believe they are warranted. I understand that a written description of this study and its results will be available upon request at the experiment's completion. This can be obtained from Mark Conard, Psychology Department at Eastern Illinois University. (It is anticipated that this study will be completed by the end of the spring semester 1999.)

____ I have read the above and agree to participate in the study.

____ I have read the above and choose not to participate in the study.

_____ _____

Participant's Name Date

_____ _____

Experimenter's Name Date

## Appendix B

### MHLC Scale: Form C

Instructions: Each item below is a belief statement about your medical condition with which you may agree or disagree. You should answer questions in terms of your kidney disease and hemodialysis treatments. Beside each statement is a scale which ranges from strongly disagree (1) to strongly agree (6). For each item I would like you to circle the number that represents the extent to which you agree or disagree with that statement. The more you agree with a statement, the higher will be the number you circle. The more you disagree with a statement, the lower will be the number you circle. Please make sure that you answer **EVERY ITEM** and that you circle **ONLY ONE** number per item. This is a measure of your personal beliefs; obviously, there are no right or wrong answers.

1 – Strongly Disagree (SD)
2 – Moderately Disagree (MD)
3 – Slightly Disagree (SD)
4 – Slightly Agree (A)
5 – Moderately Agree (MA)
6 – Strongly Agree (SA)

| | SD | MD | D | A | MA | SA |
|---|---|---|---|---|---|---|
| 1) If my condition worsens, it is my own behavior which determines how soon I will feel better again. | 1 | 2 | 3 | 4 | 5 | 6 |
| 2) As to my condition, what will be will be. | 1 | 2 | 3 | 4 | 5 | 6 |
| 3) If I see my doctor regularly, I am less likely to have problems with my condition. | 1 | 2 | 3 | 4 | 5 | 6 |
| 4) Most things that affect my condition happen to me by chance. | 1 | 2 | 3 | 4 | 5 | 6 |
| 5) Whenever my condition worsens, I should consult a medically trained professional. | 1 | 2 | 3 | 4 | 5 | 6 |
| 6) I am directly responsible for my condition getting better or worse. | 1 | 2 | 3 | 4 | 5 | 6 |
| 7) Other people play a big role in whether my condition improves, stays the same, or gets worse. | 1 | 2 | 3 | 4 | 5 | 6 |
| 8) Whatever goes wrong with my condition is my own fault. | 1 | 2 | 3 | 4 | 5 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 9) Luck plays a big part in determining how my condition improves. | 1 | 2 | 3 | 4 | 5 | 6 |
| 10) In order for my condition to improve, it is up to other people to see that the rights things happen. | 1 | 2 | 3 | 4 | 5 | 6 |
| 11) Whatever improvement occurs with my condition is largely a matter of good fortune. | 1 | 2 | 3 | 4 | 5 | 6 |
| 12) The main thing which affects my condition is what I myself do. | 1 | 2 | 3 | 4 | 5 | 6 |
| 13) I deserve the credit when my condition improves and the blame when it gets worse. | 1 | 2 | 3 | 4 | 5 | 6 |
| 14) Following doctor's orders to the letter is the best way to keep my condition from getting any worse. | 1 | 2 | 3 | 4 | 5 | 6 |
| 15) If my condition worsens, it's a matter of fate. | 1 | 2 | 3 | 4 | 5 | 6 |
| 16) If I am lucky, my condition will get better. | 1 | 2 | 3 | 4 | 5 | 6 |
| 17) If my condition takes a turn for the worse, it is because I have not been taking proper care of myself. | 1 | 2 | 3 | 4 | 5 | 6 |
| 18) The type of help I receive from other people determines how soon my condition improves. | 1 | 2 | 3 | 4 | 5 | 6 |

## Appendix C

## PHC Scale

This is a questionnaire designed to determine the way in which different people view certain important issues related to their health. Each item is a belief statement with which you may agree or disagree. Next to each statement is a scale which ranges from strongly disagree (1) to strongly agree (5). Respond to each of the following items circling the corresponding number. Please try to respond to each item separately in your mind from each other item. Choose your answers thoughtfully and make your answers as true FOR YOU as you can. Please answer every item. There are no "right" or "wrong" answers, so choose the most accurate answer for **YOU**—not what you think most people would say or do.

1 – Strongly Disagree (SD)
2 – Moderately Disagree (MD)
3 – Undecided (U)
4 – Moderately Agree (MA)
5 – Strongly Agree (SA)

| | SD | MD | U | MA | SA |
|---|---|---|---|---|---|
| 1) It is difficult for me to find effective solutions for health problems that come my way. | 1 | 2 | 3 | 4 | 5 |
| 2) I find efforts to change things I don't like about my health are ineffective. | 1 | 2 | 3 | 4 | 5 |
| 3) I handle myself well with respect to my health. | 1 | 2 | 3 | 4 | 5 |
| 4) I am able to do things for my health as well as most other people. | 1 | 2 | 3 | 4 | 5 |
| 5) I succeed in the projects I undertake to improve my health. | 1 | 2 | 3 | 4 | 5 |
| 6) Typically, my plans for my health don't work out well. | 1 | 2 | 3 | 4 | 5 |
| 7) No matter how hard I try, my health doesn't turn out the way I would like. | 1 | 2 | 3 | 4 | 5 |
| 8) I'm generally able to accomplish my goals with respect to my health. | 1 | 2 | 3 | 4 | 5 |

## Appendix D

### Illness Effects Questionnaire (IEQ)

Your responses to this questionnaire help me understand how your kidney failure disrupts your life. Please respond to each statement by circling one number next to the statement that best matches your experience. The higher the number you circle, the more you agree with the statement. Please respond to every statement.

0—Strongly disagree
1—Moderately disagree
2—Somewhat disagree
3—Disagree a little
4—Agree a little
5—Somewhat agree
6—Moderately agree
7—Strongly Agree

| | |
|---|---|
| 1) My illness makes sleeping difficult | 0 1 2 3 4 5 6 7 |
| 2) My illness creates problems between myself and my family (or friends) | 0 1 2 3 4 5 6 7 |
| 3) My sex life is suffering | 0 1 2 3 4 5 6 7 |
| 4) I am in pain or feel discomfort | 0 1 2 3 4 5 6 7 |
| 5) I worry about my illness | 0 1 2 3 4 5 6 7 |
| 6) Some people do not take my illness seriously enough | 0 1 2 3 4 5 6 7 |
| 7) I experience many different symptoms | 0 1 2 3 4 5 6 7 |
| 8) My appetite is poor | 0 1 2 3 4 5 6 7 |
| 9) My illness is the biggest difficulty in my life | 0 1 2 3 4 5 6 7 |
| 10) I don't work as well at my job, in school, or at my hobbies | 0 1 2 3 4 5 6 7 |
| 11) My illness threatens my life | 0 1 2 3 4 5 6 7 |
| 12) My illness requires me to get frequent treatment | 0 1 2 3 4 5 6 7 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 13) My memory or my mind is not as good now | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 14) I don't enjoy life as much | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 15) My illness is difficult to control | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 16) I depend on others to do things I used to do myself | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 17) I am less active now | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 18) I can be a burden for others to care for | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 19) Sometimes, I wonder if I'll ever be the person I was before I became ill | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 20) All things considered, my illness disrupts my life | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

# Appendix E

## Demographics Sheet

Please circle or answer each question to the best or your ability:

1. Sex: M or F
2. Age: _____
3. Race:
    a. African-American
    b. Hispanic
    c. Caucasian
    d. Asian-American
    e. Native American
    f. Other
4. Years of Education:
    a. K – 8 (Grade School)
    b. 9 – 12 (Jr./High School)
    c. 13 – 17 (College)
    d. 17 or greater (Graduate School)
5. Marital Status:
    a. Single
    b. Married
    c. Widowed
    d. Separated
6. Do you have children: Yes or No
    If yes, how many? _____
7. Employment:
    a. Currently Employed
    b. Unemployed
    c. Homemaker

d. Student

e. Retired

8. Time on Dialysis: _____

9. Diabetic Status:

a. Diabetic

b. Nondiabetic

10. Level of Yearly Income:

a. Less than 15,000

b. 16,000 – 25,000

c. 26,000 – 35,000

d. 36,000 – 45,000

e. 46,000 – 55,000

f. 56,000 – 65,000

g. 66,000 – 75,000

h. 75,000 or greater

11. Previous Kidney Transplant: Yes or No

If yes, how many? _____

12. Do you have other medical problems: Yes or No

If yes, what are they?

_____

_____

_____

# Appendix F

## Debriefing Statement

Project Title: Health Locus of Control, Perceived Health Competence, and Fluid Adherence in Hemodialysis Patients

Investigator: Mark Conard

There has been considerable speculation about what factors play a part in affecting a person on hemodialysis' compliance with their fluid restrictions. In prior studies, researchers have found that believing you have control over their health allows you to follow your doctor's prescribed fluid restrictions. They have also shown that how your kidney disease affects your life can affect how well you comply with your doctor's orders. However, the results have been inconsistent because of how the study was constructed, who they looked at, and other factors. These other factors included your level of support, other illnesses besides your kidney disease, your gender, as well as others. The purpose of this study was to attempt to correct some of the problems with the earlier research and to support the earlier findings on patient health beliefs and adherence. It also served to provide further evidence for using the Perceived Health Competence (PHC) scale in this type of research.

You completed two questionnaires on your health beliefs, one on the impact of kidney failure has on your life, and a personal data sheet. I reviewed your medical chart in order to clarify your personal information if there were questions that you were unable to answer. I also used your medical chart to obtain your weight gains for the previous thirty days. I then analyzed the answers from your questionnaires and your weight gains in order to see how the impact of kidney failure on your life and your health beliefs affect your fluid restriction compliance. Your answers along with other hemodialysis patients in the study were combined to give a general view of how patient beliefs affect their fluid adherence behaviors.

Thank you for your participation. The results should be available at the beginning of the summer 1999. Your cooperation will help in better understanding the processes that hemodialysis patients undergo as they decide to comply or not with their fluid restrictions. If you have further questions, you can contact me at the Psychology Department, Eastern Illinois University, 600 Lincoln Ave. Charleston, IL 61920. 217-581-2127.