COGNITIVE APPRAISAL OF STRESS AND COPING OF INTRADIALYTIC EVENTS IN PERSONS ON HEMODIALYSIS

by

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October, 2017

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Major Department: College of Nursing

Although hemodialysis (HD) has the propensity to preserve and maintain life, the person on HD is at risk for adverse intradialytic events (IDEs) during the treatment such as cramping, loss of consciousness, and death. A few studies have explored stressors and coping strategies of persons on HD, yet none have specifically focused on stress appraisal and coping strategies related to IDEs. Thus, the purposes of this study were to: a) describe the types and associations of IDEs to stress and examine primary cognitive appraisals of IDEs on stress towards HD; and b) examine the association between coping strategies and HD stress.

A cross sectional correlational design was used. A convenience sample of persons (N = 73) on HD consented to participate in the study and completed the Hemodialysis Demographic Form, the Dialysis Symptom Index, the Cognitive Appraisal of Health Scale, the Ways of Coping Questionnaire, and the Hemodialysis Stress Visual Analog Scale. The majority of the sample was African American (95%) and male (52%). The mean age was 57 (SD = 11.98) years and participants averaged 41 (SD = 31.55) months on HD.

Frequently reported IDEs were lack of energy (70%), followed by dry skin (64%), and itching (54%). Women reported higher stress towards HD and were more bothered by IDEs than men. Additionally, women used more emotion focused coping and younger aged participants

used confrontive coping compared to older participants. When controlling for age, sex, and months on HD, primary cognitive appraisal explained 22% of the variance in stress towards HD related to an IDE (F (7, 65) = 2.58; p = .021) and coping strategies explained 34% of the variance in stress towards HD (F (11, 61) = 2.89; p = .004) with escape avoidance (p = .37), sex (p = .03), and planful problem solving (p = .02) contributing to the model.

Understanding coping strategies associated with IDE stress will allow the healthcare team to formulate interventions to support the physiological and psychological wellbeing of persons undergoing HD, thus improving their quality of life.

COGNITIVE APPRAISAL OF STRESS AND COPING OF INTRADIALYTIC EVENTS IN PERSONS ON HEMODIALYSIS

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by

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DEDICATION

I would like to dedicate this dissertation to my grandparents, John and Nina Gay, for showing me that the world was bigger than the town of Plain Dealing, Louisiana. I thank my grandparents for guiding my mom to be the best mother she could be as a teenage parent to my brother and me. Although, my brother, Micheal, died at an early age, he continues to inspire me to be the change I want to see. To my mother, Rose Griffin, who went to be with the Lord during my five-year quest to achieve my doctoral degree, you were my biggest fan and instilled in me that I was meant for greatness. To my Aunt Terisa, who allowed me to have summers in Houston, Texas and taught me to be a city girl! To my dad, John Griffin, I understand now that you did the best you knew how to do, so I am grateful. To my best friend, Nannette Johnson, you have been my confidant since junior high school and I treasure your friendship. Mayfield Johnson, my father-in-law, taught me the meaning of a father's love toward a daughter and raised a sensitive and caring son to be my husband. I would like to thank my husband and soulmate, Darrick Johnson, for loving me unconditionally. To my sister, Kay, thanks for looking at me through eyes of perfection and never seeing the bad. To my daughters, Cydney and Chelsea, who embody the best of me, now you see that anything is possible.

Last but not least, to my dear beloved Bella, twinkle twinkle little star!

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Finally, I would like to thank God for making this possible.

For in him we live, and move, and have our being; as certain also of your own poets have said, for we are also his offspring. *Acts* 17:28

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CHAPTER 1: INTRODUCTION

Persons with end stage renal disease (ESRD) have unique challenges compared to persons suffering from other chronic illnesses (Al-Arabi, 2006; Bapat, Kedlaya, & Gokulnath, 2009; Tu, Shao, Wu, Chen, & Chuang, 2014). They must adapt to a frequent dialysis modality to support life, while simultaneously experiencing adverse events associated with the therapy (Herlin & Wann-Hansson, 2010; Kallenbach, 2016; Saran et al., 2003). In America, there were 678,383 prevalent cases of ESRD in 2014 (United States Renal Data System [USRDS], 2016). Approximately 61% of all prevalent ESRD cases receive hemodialysis and 87.9 % of incident (newly reported) ESRD cases began renal replacement therapy with hemodialysis (USRDS, 2016).

The U.S. spends over 40 billion in healthcare dollars in public and private funds to provide hemodialysis treatments (U.S. Department of Health and Human Services, National Institute of Health, National Institute of Diabetes and Digestive and Kidney Diseases [NIDDK], 2012). Of those with ESRD, 88% of them receive hemodialysis in a hemodialysis center. The average cost of this treatment is $87,638 per patient totaling an annual hemodialysis cost in the U.S. of approximately $32.8 billion (USRDS, 2016).

Before 1973 the costs associated with provision of dialysis for kidney failure was prohibitive for a significant portion of the American population (Swaminathan, Mor, Mehrotra, & Trivedi, 2012). In 1973, the Medicare program for ESRD was implemented to provide health insurance coverage to people who are diagnosed with kidney failure regardless of their age (Swaminathan et al., 2012). Prior to the implementation of this program, persons with ESRD would die without having undergone dialysis, especially if they could not afford the treatment, or they were voted unworthy of dialysis by the Seattle Artificial Kidney Center Admissions and

Policy Committee (Blagg, 2007). The Medicare program coverage of dialysis costs for persons with ESRD has proven significantly beneficial for this population's survival.

Although hemodialysis has the propensity to preserve and maintain life, the person on hemodialysis is at risk for adverse events during the treatment including death. Among persons starting hemodialysis, all-cause mortality is 382 deaths per 1,000 patient-years in month 2 of treatment, with mortality decreasing thereafter to 189 per 1,000 patient-years in month 12 of treatment (USRDS, 2016). After one year of treatment, persons on dialysis have a 20-25% mortality rate, with a 5-year survival rate of 42% (Collins, Foley, Gilbertson, & Chen, 2009; USRDS, 2016). The widespread availability of hemodialysis in the U.S. may lead to tolerance of the therapy for the life sustaining benefit, despite potential adverse intradialytic events (IDEs) including cramping, loss of consciousness, bleeding, allergic reactions, and death (National Kidney Foundation [NKF], 2006; Pierce & Manley, 2012; Song, 2013). The desire to stay alive for persons on hemodialysis serves as motivation to endure IDEs that may occur during their three to four times per week hemodialysis treatments (Russ, Shim, & Kaufman, 2005).

Although Medicare coverage affords this life sustaining therapy to reduce morbidity and mortality for persons with ESRD, the IDEs may be viewed as inordinately stressful despite the benefits of the treatment (Cinar, Barlas, & Alpar, 2009; Denhaerynck et al., 2007; Ibrahim, Taboonpong, & Nilmanat, 2010; Koca Kutlu & Eren, 2014). These events include (a) headache in 5%, (b) chest pain in 2-5%, (c) back pain in 2-5%, and (d) itching in 5% (Daugirdas, Blake, & Ing, 2012; Davenport, 2006; Zumrutdal, 2013). The most frequent IDEs are hypotension (20-40%), cramps (5-20%), and nausea and vomiting (5-15%; Daugirdas et al., 2012; Lai et al., 2007; Singh et al., 2015). These events may result in pain, discomfort, lengthened overall duration of the hemodialysis treatment, risk of hospitalization, and death. Additionally, IDEs

related to vascular access can pose significant risks for persons on hemodialysis.

Vascular access is used as a conduit for implementation of hemodialysis treatments. Sixty-three percent of prevalent cases in the U.S. receive their treatment via an arteriovenous fistula (AVF) and 19% receive theirs via an indwelling central venous catheter (USRDS, 2016). During the first 30 days of ESRD, most incident cases (80%) received dialysis via a central venous catheter (USRDS, 2016). Persons on hemodialysis undergo at least one vascular access procedure per year (Mishler et al., 2006). Events related to vascular access are often referred to as technical complications (Lameire & Mehta, 2000).

These events can occur due to catheter insertions, arteriovenous fistulas (AVFs), and/or arteriovenous grafts (AVGs) malfunctions. Complication rates for catheter insertion can be as high as 5.9% (Lameire & Mehta, 2000). These rare events include (a) pneumothorax, (b) hemothorax, (c) hemomediastinum, (d) recurrent laryngeal nerve palsy, and (e) bleeding. Additional events inherent to catheter use post insertion include infection and thrombus ranging from 14-54% (Lameire & Mehta, 2000; NKF, 2006).

Events related to an AVF, created using the person's native vein and artery, and an AVG, created using a piece of artificial tubing, are similar. These include (a) poor inflow, (b) poor maturation, (c) ischemia, (d) venous stenosis, (e) thrombosis, (f) aneurysm formation, (g) infection, and (h) delayed wound healing (Akoh, 2001; Lameire & Mehta, 2000; NKF, 2006). AVG use results in increased occurrences of stenosis and thrombus as compared to AVFs, but collectively these events occur at rates of approximately 1-1.5 times per patient per year (Lameire & Mehta 2000; Besarab, Allon, & Robbin, 2008). Vascular access events can be viewed as stressful for persons on hemodialysis by increasing mortality and morbidity. Similarly, these events are responsible for 24% of all hospital admissions (Casey et al., 2014; Sehgal, Dor,

& Tsai, 2001).

IDEs, whether related to the person (often referred to as patient related) or those related to technical issues (i.e., vascular access), may result in significant physical and psychological stress (Gorji, 2013; Logan, Pelletier-Hibbert, & Hodgins, 2006; Tu et al., 2014). Similarly, these events add additional costs compounding psychological stress with financial burdens (Logan et al., 2006; Ramer, Germain, Dohar, & Unruh, 2011; Yeh, Haung, & Chuo, 2008; Yeh & Chou, 2007). Consequently, IDEs can have deleterious effects on the person's psyche depending on that person's primary appraisal of the event as a stressor and subsequent coping strategies (Lazarus & Folkman, 1984). Stress appraisal and coping strategies intradialytically can contribute to increased rates of morbidity and earlier mortality if the stressful events are viewed as harmful or threatening (Lazarus & Folkman, 1984; Yeh et al., 2008; Yeh, & Chou, 2007). Therefore, research focused on stress appraisal and coping responses intradialytically is needed to guide healthcare teams in planning individualized care and creating standards for designing interventions that will improve overall quality of life for persons undergoing hemodialysis.

Background and Significance

Hemodialysis can be considered burdensome due to psychosocial stressors, physiological stressors, and IDEs. (Al Nazly, Ahmad, Musil, & Nabolsi, 2013; Cinar et al., 2009; Ibrahim et al., 2010; Logan et al., 2006; Yeh & Chou, 2007). Frequently reported psychosocial problems include (a) anger, (b) fear, (c) sleep disturbances, (d) uncertainties about the future, (e) depression, and (f) anxiety. Family, social isolation, and time limitations are also contributing factors to psychological stress (Ahmad, 2010; Tu et al., 2014; Yen, Huang, Chou, & Wan, 2009). Mok and Tam (2001) found that persons on hemodialysis experience more physiological stressors than psychosocial stress. This may be partially related to dependency on hemodialysis

and the adverse events that occur for persons undergoing this treatment modality (Dantas et al., 2013).

Physiological stressors negatively influence daily activities for persons on hemodialysis (Dantas et al., 2013). Often these stressors impose limitations that restrict the lives of person living with ESRD (Harwood, Wilson, Locking-Cusolito, Sontrop, & Spittal, 2009). According to Bezerra and Santos (2008), these stressors can include (a) fluid and diet restrictions, (b) itching, (c) fatigue, (d) activity limitations, (e) medications, (f) events associated with the treatment, (g) vascular access surgeries, and (h) length of treatment.

Additionally, multiple studies have indicated that persons on hemodialysis experience significant stressful events intradialytically (Al Eissa et al., 2010; Al Nazly et al., 2013; Dantas et al., 2013). While these IDEs can be associated with negative clinical outcomes, persons undergoing hemodialysis treatments may experience varying levels of stress in response to the events that occur (Collins, Foley, Gilbertson, & Chen, 2009). Persons on hemodialysis incorporate different approaches to quantify the stressor and use various coping strategies (Gorji, 2013; Logan et al., 2006; Tu et al., 2014; Yeh, Haung, & Chuo, 2008), but no study was found that focused on cognitive appraisal of IDEs and subsequent coping that occurs during these events.

Determining cognitive appraisal of IDEs and coping strategy is important because ineffective coping can contribute to psychological manifestations of depression and anxiety, increase in morbidity, and earlier mortality (Ng, Tan, Mooppil, Newman, & Griva, 2015; Silva Junior et al., 2014; Tu et al., 2014; Yeh & Chou, 2007). IDEs may lead to psychological and physiological stressors resulting in decreased adherence to prescribed hemodialysis treatment,

missed treatments, increased number of hospitalizations, and premature mortality, especially if the person appraises the event as threatening or harmful (Denhaerynck et al., 2007).

Treatment Non-adherence and Hospitalizations

The prevalence of treatment non-adherence to prescribed hemodialysis times or missed treatments have been estimated to be as high as 50% (Obialo et al., 2008; Obialo, Hunt, Bashir, & Zager, 2012). This prevalence has been referenced as an indicator for poor survival in persons with ESRD in the U.S. compared to other countries (Obialo et al., 2012). The estimated frequency of missed treatments can be as high as 10% (Obialo et al., 2012). In addition, missed hemodialysis treatments are associated with increased mortality and hospitalizations (Saran et al., 2003), with a 14-25% higher risk of patient death per month for each skipped hemodialysis treatment (Held et al.,1996; Leggat et al., 1998). Even shortening prescribed treatment times by 10 minutes per treatment is associated with increased mortality related to interdialytic weight gains that can cause increased stress on cardiovascular functionality (Obialo et al., 2012; Saran et al., 2003). Similarly, persons who miss treatments usually become hyperkalemic and experience cardiac dysrhythmias that can result in death (Saran et al., 2003).

As the number of missed hemodialysis treatments increase, risk of hospitalization also increases (Obialo et al., 2012; Nissenson, 2014). Missing hemodialysis treatments contribute to poor control of anemia, bone mineral milieu, blood pressure, and severe electrolyte imbalance with resultant life-threatening arrhythmias and recurrent volume overload (Obialo et al., 2012). Saran and colleagues (2003) reported risk of hospitalization is higher in persons who miss hemodialysis due to high phosphorous levels, another contributing factor to increased mortality and hospitalizations. All these factors can contribute independently to hospitalizations for

persons on hemodialysis, or they may have a collective effect on morbidity and mortality (Khalil & Darawad, 2014).

Persons on hemodialysis often experience IDEs that warrants transport to the hospital from the hemodialysis unit for evaluation or admission. Hospital admissions present significant burdens for persons with ESRD. Persons with ESRD are admitted to the hospital, on average, at least twice per year, and their readmission rate within 30 days of discharge from the hospital is approximately 30% (CMS, 2014; USRDS, 2016). According to USRDS (2016) annual data report, the adjusted rate of hospitalization for persons on hemodialysis has decreased over the years to 1.7 per patient year with causes of admission related to cardiovascular events, infections, and vascular access events, respectively. These events are stressors and represent a significant financial burden as they account for approximately 40% of total Medicare expenditures for persons on dialysis and contribute to the increased morbidity and mortality (CMS, 2014; Nissenson, 2014).

Mortality

Persons on hemodialysis experience higher levels of mortality and morbidity (Collins, et al., 2009; De Meester et al., 2009; Medicare Payment Advisory Commission [MedPAC], 2007). Hospitalizations and readmission rates reflect increased morbidity and morbidity. Among persons starting hemodialysis, there is a steep rise in mortality rates between months 1 and 2 of treatment (Foley et al., 2014; USRDS, 2016). Although mortality rates have declined for the prevalent population of persons on hemodialysis, the incident population continues to have higher risk of mortality in the first year of hemodialysis. Collins and colleagues (2009) reported despite time on dialysis, infections, vascular access, and cardiovascular disease are major contributors to mortality and morbidity rates in persons on hemodialysis. Improvements

continue to be made with the hemodialysis treatment modality, but clearly, IDEs are common and stressful, whether they are related to the treatment or vascular access.

Empty Chair

Medicare has developed programs to educate their recipients about kidney disease to help reduce the number of individuals with chronic kidney disease progressing to ESRD. If progression to ESRD occurs, these programs aim to reduce the high incidence of morbidity and mortality within the first year of hemodialysis (Collins et al., 2009). As persons on hemodialysis survive the first year of treatment, dialysis related apprehension towards subsequent treatments continue to ensue.

Lin and colleagues (2015) studied the social implications of long-term dialysis. The participants in the study longed for a peaceful death. The perception of being "stuck" in an endless process of dialysis treatments was shared among the recipients of hemodialysis in the units. The participants expressed that they muddle through life, day by day, and their future was shaped by fate controlled by dialysis. The proclivity to believe there will be no end to a life sustaining reoccurring therapy is also perceived as stressful.

Lastly, the proximity of each station (treatment space) in the hemodialysis unit leads to a familiarity among persons on hemodialysis (Klenow, 1979; Walton, 2002). An empty chair may symbolize one's own mortality. When a person on hemodialysis is missing from their chair due to illness, hospitalization or death, the empty chair serves as a talisman to other persons on hemodialysis. In addition, witnessing another person on hemodialysis experience an IDE evokes stress and an ominous perception of impending disability and/or death (Bayhakki & Hatthakit, 2012; Walton, 2002).

Stress

Lazarus and Folkman (1984) defined stress as a relationship between a person and the

environment that is appraised as taxing. The person's perception of stress can impact their health status (Rosengren et al., 2004; Vasunilashorn, Glei, Weinstein, & Goldman, 2013). According to Vasunilashorn and colleagues (2013) the cognitive appraisal or perception of an event is not the mediator to physiological symptoms, but the actual emotional response to the event as a stressor. The event appraised as a stressor can be associated with poor health outcomes, especially when the event exceeds the person's available resources to cope with the stress, thus endangering his or her wellbeing (Lazarus & Folkman, 1984; Vasunilashorn et al., 2013).

Selye (1976) defined stress as a non-specific response of the body to any demand. Stress can also be viewed as "disturbance of homeostasis" produced by the environment (Lazarus & Folkman, 1984, p.15). Selye claimed that stress differs from other physical responses because it disrupts homeostasis whether it is considered good or bad stress. Stress can lead to growth and progression ("eustress"), or it can influence disruption of growth ("distress"). "Distress" can lead to inflammatory response as well as tissue injury. Implications of prolonged stress are sickness and disease, if coping is ineffective; therefore, effective coping strategies are important to both physical and psychological health.

Multiple studies have discovered an association between higher levels of perceived stress and increased rates of mortality (Arnold, Smolderen, Buchanan, Li, & Spertus, 2012; Khang & Kim, 2005; Nielsen, Kristensen, Schnohr, & Gronbaek, 2008; Russ et al., 2012). Rutters and colleagues (2014) found that persons with greater than three stressful life events experienced increased mortality. Russ and colleagues (2012) determined a direct correlation between psychological distress and mortality. More importantly, they concluded that physiological changes could occur after psychological stress, thereby increasing risk of death (Brotman, Golden, Wittstein, 2007; Russ et al., 2012). Physiological changes can include dysregulation of

the hypothalamic-pituitary-adrenal axis, resulting in increased inflammatory markers (C reactive protein, interleukin 6, and tumor necrosis factor) and cortisol release (Dinan, 2009; Johnson, Abbasi, & Master, 2013; Russ et al., 2012; Segman & Stein, 2015; Steptoe, Hamer, & Chida, 2007). In fact, circulating inflammatory markers appear after an acute stressor (Steptoe et al., 2007). The exact time of this physiological cascade has not been determined, but the psychoneuroimmunological process is influenced by individual perception of stress and health status at the time of stressor onset (Steptoe et al., 2007).

Persons and the environments are dynamic and interdependent, leading to a transactional process of stress appraisal (Ahmad & Al Nazly, 2015). Stressors are circumstances that are appraised as stress and threaten to exceed the available resources to overcome stress (Lazarus & Folkman, 1984). Persons on hemodialysis must appraise the events inherent within their treatment and consistently employ coping strategies with each IDE. Each event is appraised and evaluated based on the person's internal skill set. The cognitive appraisal process begins with evaluation of an IDE being defined as a potential stressor and concludes with of utilization of coping strategies to manage the person-environment relationship (Lazarus & Folkman, 1984).

The disruptions of everyday life by hemodialysis treatments, hospital admissions, and readmissions increase the demands placed on this population requiring constant appraisal of stressors and weighting the relevance of the stressor at the moment of impact. Understanding how persons appraise IDEs and potential hospitalizations related to the events may offer insight into targeted strategies for increasing coping skills to prevent or minimize negative effects of stress (Lazarus & Folkman, 1984; Van Walraven et al., 2011).

Purpose

The purposes of this study were to: a) describe the types of IDEs that influence stress and coping, b) examine the cognitive appraisals of IDEs and coping strategies that occur in response to these events, and c) explore the relationship between primary appraisal and secondary appraisal (coping options) related to IDEs.

Conceptual Framework

Folkman's (1997) transactional model of stress and coping was used to guide this study (see Figure 1). The transactional model of stress and coping is a cognitive phenomenological theory of stress, appraisal, and coping. The theory is described as relational and process oriented (Folkman, 1984). Folkman (1984) explained the transactional model of stress and coping as relational, because it depicts "stress as a relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well-being" (p. 840). This definition of stress differs from the historical definitions of stress as a stimulus, a property of the person or environment, or a response or stimulus (Folkman, 1984).

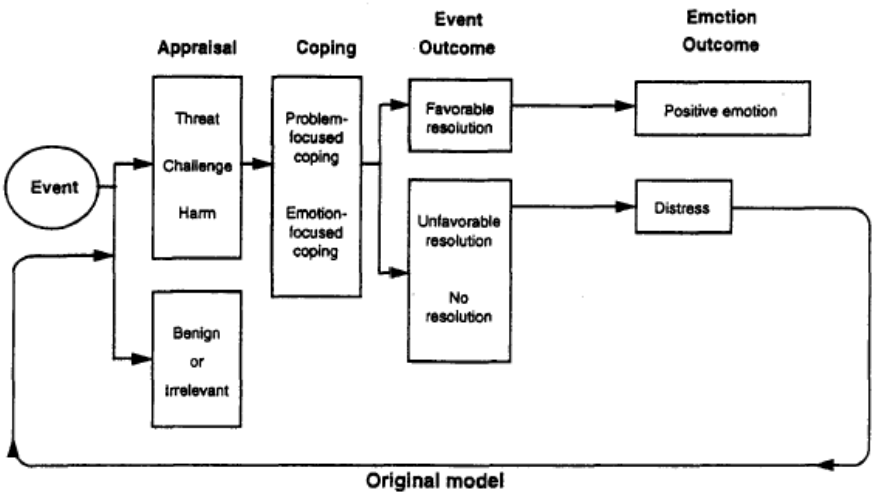

Figure 1. The transactional model of stress and coping (Folkman, 1997, p. 1217). (S. Folkman, personal communication, December 22, 2015 [see Appendix A])

According to Folkman (1984) the process orientation is the constantly changing cognitive appraisal of the event that occurs during stressful encounters between the person and his or her environment. The appraisal-based model is bidirectional versus the traditional stress appraisal models that are unidirectional. The person and his or her immediate environment are constantly changing. The relationship is dynamic and the unfolding event is the mediating factor for ongoing appraisal (Folkman, 2008; Lazarus & Folkman, 1984). As new information from the environment is introduced and the event continues to unfold, the appraisal of the significance of the event vacillates (Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986).

Lazarus and Cohen (1977) described stressors as demands by the internal and external environment that upset balance. Any imbalance perpetuated by a stressor affects physical and psychological wellbeing. Action is required by the individual experiencing stress to restore previous balance. In the transactional model of stress and coping, stress is a transactional phenomenon dependent on the meaning of the stimulus to the perceiver (Lazarus, 1966).

The person's perception of the situation will vary depending on individual beliefs, values, and social supports accessible during the mediating process. The cognitive appraisal process is unique to each person (Folkman, 1984). According to Glanz and Schwartz (2008), primary appraisal and secondary appraisal occur in response to an event. Primary and secondary appraisal shapes the meaning of every encounter. Lazarus and Folkman (1984) utilized the terms primary and secondary appraisal not to imply that one is more important than the other or precedes the other in time; rather, these processes are continuous, interdependent, and simultaneous.

During primary appraisal, a person judges the stressor. It is an evaluative process that includes information processing. Relevance and significance are assigned to each event during the primary appraisal process. The person appraises the severity of the stressor, the susceptibility to the stressor, the relevance of the stressor, and the cause of the stressor (Lazarus & Folkman, 1984). During primary appraisal, the context of the situation is important. The appraisal of the event may differ depending on whether it is familiar or unfamiliar. According to McEwen and Stellar (1993), stress responses vary among persons based on genetics, developmental influences, and experiences. The event can be appraised as harmful, threatening, challenging, or irrelevant. Although each of these cognitive components of primary appraisal will be described separately, they are not mutually exclusive, and they can occur simultaneously during the appraisal process.

Harmful appraisals reflect emotions such as anger and sadness. Damage has occurred to the person during harm appraisal (Lazarus & Folkman, 1984). Threat is perceived as an anticipated harm or loss; it has potential negative implications for the future. Anxiety, resentment, and fear accompany a threatening appraisal. Harm/loss and threat appraisal involve negative emotions (Folkman, 1984).

A challenging appraisal of stress brings about eagerness, excitement, and confidence in relation to the stressor (Folkman & Lazarus, 1984). Challenged persons are positive about the demands brought on by the stressor. They view the stress as a potential for gain or growth. When an encounter with a stressor carries no implication for a person's wellbeing, it is considered irrelevant (Lazarus & Folkman, 1984).

A cognitive appraisal of an event as irrelevant has no value to the person. The person perceives that nothing will be lost or gained through the encounter with the stressor. Irrelevant appraisal can occur through frequent exposure to an event and can be a result of habituation over time or familiarity. Persons will adapt to certain events and assign no relevance to a familiar reoccurring event when they have determined nothing relevant will occur. Essentially, the person feels indifferent about the event. Coping processes are a direct response to a person's appraisal of the stressor.

Secondary appraisal is an assessment of the person's coping resources and options (Cohen, 1984). When an event is appraised as harmful, threatening, or challenging, further appraisal is salient. Secondary appraisal occurs when the person decides what can be done about the situation. It is an evaluative process for deciding which coping strategy to employ (Lazarus & Folkman, 1984). Coping resources include (a) physical, (b) social, (c) psychological, and (d) material assets. In addition, situational appraisal occurs during secondary appraisal phase of the specific event and what can be done at that moment. The person appraises the stressor and determines whether it can be controlled or emotionally managed. This appraisal process allows for deliberation of the intended versus unintended consequences of the potential coping method. Coping self-efficacy has been used to describe the person's perceived manageability of the stressor during the secondary appraisal process (Bandura, 1977; Folkman & Moskowitz, 2004;

Glanz & Schwartz, 2008; Lazarus & Folkman, 1984).

Coping is defined as cognitive and/or behavioral efforts to master, reduce, or tolerate the demands of a specified situation. Events that are appraised as stressful require either problem or emotion-focused coping to manage or regulate the distress (Folkman, 1997). Problem-focused coping is directed towards resolving the situation and emotion-focused coping is directed towards managing the emotions evoked by the stressor. Problem-focused coping is used when the person perceives something can be done to resolve the stressor or situation. The person seeks more information about the issue and actively engages in finding a solution that will result in a satisfactory resolution. Emotion-focused coping is used when the person perceives the stressor must be accepted rather than reduced or eliminated (Lazarus & Folkman, 1984). Strategies for emotional regulation include changing the thinking or feeling about the event. Coping processes lead to an event outcome: favorable, unfavorable, or without resolution. A favorable event outcome leads to positive emotion and concludes coping activity. An unfavorable resolution or lack of resolution leads to distress and the employing of additional coping efforts (Folkman, 1997). Coping is used to manage the event regardless of the success of the effort (Folkman, 1984).

This study focused on the stressful event, cognitive appraisal, and coping components of the transactional model of stress and coping (see Figure 2).

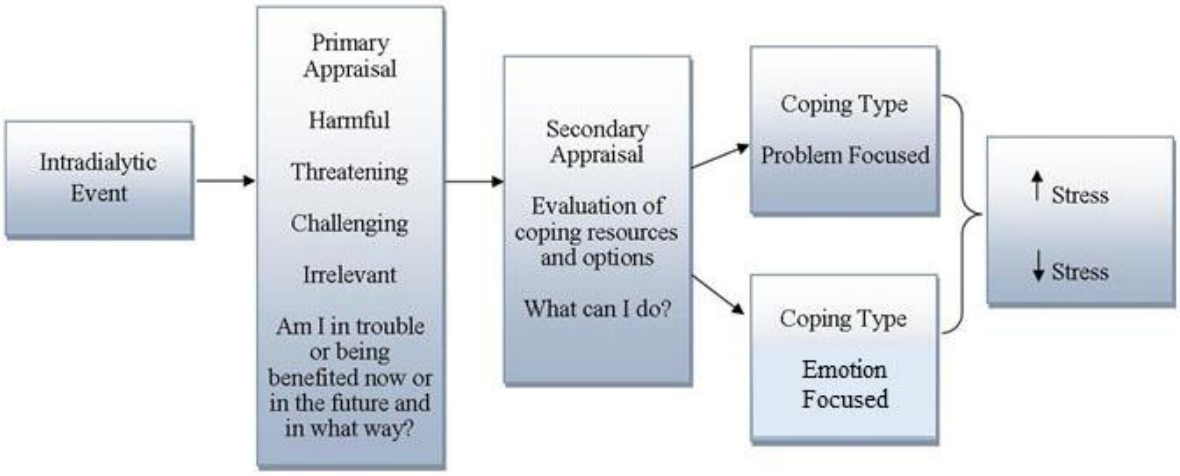

Figure 2. The transactional model of stress and coping of IDEs for persons on hemodialysis. Adapted from "Positive psychological states and coping with severe stress," by S. Folkman, 1997, *Social Science & Medicine, p. 1217.*

The stressful event is a complication that occurs during a hemodialysis treatment. The events can be classified as patient-related or technical. Any IDE will fall into this category. Primary appraisal involves evaluation by the person on hemodialysis of the IDE as harmful, threatening, challenging, or irrelevant. Secondary appraisal is the evaluation of coping resources and options to address the event. The cognitive integration of primary and secondary appraisal leads to either problem or emotion focused coping to address the IDE.

Specific Aims and Research Questions

The specific aims and research questions for the study were as follows:

1. Describe the type of events persons self-report they experienced intradialytically.

   Q1: What events occur intradialytically?

2. Examine the cognitive appraisals, coping types, and stress that occur in response to an IDE.

Q2: Is there an association between coping strategies (confrontive coping, distancing, self-controlling, seeking social support, accepting responsibility, escape avoidance, planful problem solving, positive reappraisal) and intradialytic stress (VAS)?

Q3: Does primary appraisal (threat, challenge, harm/loss, benign/irrelevant) of an IDE explain intradialytic stress (VAS)?

Q4: Do coping strategies (confrontive, distancing, self-controlling, seeking social support, accepting responsibility, escape-avoidance, planful problem solving, and positive reappraisal) explain intradialytic stress (VAS)?

Q5: When controlling for age, sex, and time on hemodialysis (months) does primary appraisal (threat, challenge, harm/loss, benign/irrelevant) explain intradialytic stress?

Q6: When controlling for age, sex, and time on hemodialysis (months) does coping strategy (confrontive coping, distancing, self-controlling, seeking social support, accepting responsibility, escape avoidance, planful problem solving, positive reappraisal) explain intradialytic stress?

3. Explore the relationship between primary appraisal and secondary appraisal of IDEs.

Q7: Is there a relationship between primary appraisal (harmful, threatening, challenging, and irrelevant) and secondary appraisal (coping options) of IDEs?

Definitions

The following terms are defined for this study:

1. Intradialytic event: A complication that occurs during a hemodialysis treatment. The definition is operationalized for this study as a complication that occurs during hemodialysis. It can be classified as patient related or technical.

2. Primary appraisal: An evaluative process of the significance of a stressor or threatening event (Glanz et al., 2002). This is operationally defined for this study as the evaluative process that occurs in response to an IDE. For this study, primary appraisal was operationalized as a score on the Cognitive Appraisal of Health Scale (CAHS). The event is appraised as either harmful (8 items on the scale); scores range from 8 to 40, threatening (5 items on the scale); scores range from 5 to 25, challenging (6 items on the scale); scores range from 6 to 30, or irrelevant (4 items on the scale); scores ranged from 4 to 20.

3. Secondary appraisal: The evaluation of the controllability of the stressor and a person's coping resources **(**Glanz et al., 2002). For this study, secondary appraisal was operationalized as the evaluative process that occurs simultaneously with primary appraisal after an IDE is appraised as harmful, threatening, challenging, or irrelevant. Secondary appraisal was measured on the CAHS based on answers to questions 12, 16, 20, 22 and 27; scores range from 1 to 5 for each item.

4. Harmful appraisal: A subscale of primary appraisal used to describe a cognitive appraisal of a stressor as damage that has already occurred (injury or illness). For this study, this was operationally defined as a sense of loss. Harmful appraisal of an IDE during primary appraisal was measured by a score on the CAHS.

5. Threatening appraisal: A subscale of primary appraisal used to describe a cognitive appraisal of a stressor having negative implications for the future, potential harm. Negative emotions fear,

anxiety, and anger are exhibited during a threatening appraisal. This was operationally defined for this study as a threat appraisal of an IDE measured by a score on CAHS.

6. Challenging appraisal: A subscale of primary appraisal used to describe a cognitive appraisal of a stressor as a potential for gain or growth and characterized by pleasurable emotions (i.e., eagerness, eagerness, exhilaration). This was operationally defined for this study as a challenging appraisal of an IDE measured by a score on CAHS

7. Irrelevant appraisal: A subscale of primary appraisal used to describe a cognitive appraisal of a stressor assessed as no risk to the person; nothing is lost or gained during the transaction. This was operationally defined for this study as an irrelevant appraisal of an IDE measured by a score on CAHS.

8. Coping: The process through which the person manages the demands of the person-environment relationship appraised as being stressful and generates emotions (Lazarus & Folkman, 1984). This was operationally defined for this study as a process that is happening concurrently during primary and secondary appraisal in response to primary appraisal of an IDE. Coping is categorized by coping types on the Ways of Coping Questionnaire (WCQ).

9. Problem-focused: A cognitive process to attempt to change a stressful situation **(**Glanz et al., 2002). This was operationally defined for this study as a coping type in reference to an IDE measured by a score that correlates with coping strategies on the WCQ.

10. Emotional-focused: A cognitive process to attempt to change or alter the perception of a stressful situation **(**Glanz et al., 2002). This was operationally defined for this study as a coping type in reference to an IDE measured by a score that correlates with coping strategies on the WCQ.

Assumptions

Several assumptions framed this study. First, stress is a transactional process, experienced during IDEs and this stress is dependent on what the event means to the person affected. Second, when a person experiences an IDE, an appraisal process of the event begins, and a judgment is made. There is a primary appraisal of the event as harmful, threatening, challenging, or irrelevant. The third assumption is during the primary appraisal of an event, a concurrent process of secondary appraisal is occurring. Fourth, secondary appraisal is an evaluation of coping options and resources. The fifth assumption is that coping is either problem-focused or emotional-focused. The final assumptions are that answers to questions on instruments, tools, and scales reflect truthful and accurate responses from the participants, and the medical record reflects reality.

Summary

Hemodialysis continues to evolve as a life sustaining treatment modality for persons with ESRD. Despite advances in technology and healthcare, intradialytic events continue to occur. IDEs occur due to patient complications related to comorbidities, treatment complications due to mechanics of hemodialysis, and technical complications related to vascular access for dialysis.

The appraisal of an IDE as a stressor varies among persons on hemodialysis. These variations are dependent on life experiences, age, sex, and time (months) on Hemodialysis dialysis by the person undergoing the treatment. Identifying the person's cognitive appraisal process of IDEs as stressors and subsequent coping strategies during hemodialysis treatments will provide essential information to individualized care for adjustment to the hemodialysis experience (Thomas, 2006). The person's perception of IDEs during future hemodialysis treatments as threatening versus nonthreatening may enhance adherence to prescribed treatments,

self-management skills, and outcomes guiding the healthcare team towards individualized care plans and interventions.

CHAPTER 2: LITERATURE REVIEW

This literature review provides an overview of cognitive appraisal of stress and coping of IDEs by persons on hemodialysis. Selected components of the transactional model of stress and coping are described as related to persons on hemodialysis. The transactional model of stress and coping provides the theoretical model for cognitive appraisal of IDEs in this study.

ESRD is a life threatening chronic condition. ESRD is defined as an irreversible decline in a person's kidney function, which is fatal without dialysis or transplantation (NKF, 2006). Hemodialysis is a life sustaining treatment modality for persons with ESRD. Hemodialysis is one of three ESRD treatment options: hemodialysis, peritoneal dialysis, or renal transplantation. Thus, a person with ESRD has the choice of treatment, or death is inevitable from the complications of kidney failure.

At the end of 2014, there were 678,383 prevalent dialysis cases and 120,688 incident cases of ESRD reported. The rate of incident ESRD is roughly 3-fold higher for African Americans than for other races, and 1.4-fold higher for Hispanics versus non-Hispanics (USRDS, 2016). According to USRDS (2016) only 56% of persons on hemodialysis are still alive three years after starting the therapy reflecting the high mortality rate of this population.

ESRD imposes severe stress and limitations on persons on hemodialysis including diet restrictions, extensive drug regimens, and strict dialysis schedules (Avramovic & Stefanovic, 2012). In addition, persons who elect to use hemodialysis as a treatment modality are attached to a dialysis machine for up to five hours three to four times per week. During the hemodialysis process, the person’s mobility is limited. The spatial orientation of the person receiving hemodialysis requires sitting in a chair with the dialysis access exposed to the nurses to observe

for hemorrhage. During the hemodialysis procedure, each client sits in a "silo" surrounded by other persons on hemodialysis. Each person has time during the procedure to cogitate and envisage the direction his or her life will potentially take in the ensuing four to five hours. The uncertain progression that accompanies the treatment can be emotionally demanding. The emotional liability of these persons can range from gratefulness to despair during a hemodialysis treatment (Jadhav & Lee, 2014).

The environment of the hemodialysis unit is one of nurturing and support to the persons on hemodialysis (Wilson et al., 2015). The nurses and technicians are accessible in the unit and the persons on hemodialysis usually have a sense of security because they are monitored during their treatments. This can lull them into a false sense of security. The person on hemodialysis often experiences complacency until discharged from the hemodialysis unit. When IDE occur, the dialysis staff is available to evaluate the events and determine if transference to the hospital is warranted. Many of the events resolve during the hemodialysis treatment and no hospitalization is required, but when persons on hemodialysis are away from the unit and experience delayed symptoms from the IDEs, feelings of fear and uncertainty can occur compounding the stress related to hemodialysis. Although many of the events, away from the unit, are often manageable without hospitalization, the absence of guidance and reassurance from the hemodialysis multidisciplinary team, often leads to a visit to the emergency department. This may seem like the only logical recourse for evaluation by the person on hemodialysis contributing to hospitalization rates.

Although the overall 2014 hospitalization rate among persons on hemodialysis indicates a declining trajectory, re-hospitalizations are associated with morbidity, mortality, and reduced quality of life (USRDS, 2016). Hospital readmissions with associated death are more common

among persons with ESRD than the general population. The costs associated with readmissions are higher for persons on hemodialysis being treated in dialysis facilities. Among persons on hemodialysis 35% of discharges from a hospitalization (for any cause) were readmitted within 30 days (USRDS, 2016). This statistic holds more relevance when compared to heart failure readmissions of approximately 20%-30% for all cause (Fleming & Kociol, 2014; Shah, Rahim, & Boxer, 2013; Sherer, Crane, Abel, & Efird, 2016).

According to USRDS (2016) annual data report, persons on dialysis had an expected 6.2 years of remaining life, whereas the general population had an expected 22.5 years of remaining life. After initiation of hemodialysis, persons' ages 40 to 44 have a seven to ten-year life expectancy while those ages 60 to 64 have a four to five-year life expectancy (Gorji et al., 2013; Finkelstein, F., & Finkelstein, S., 2000; USRDS, 2016). The average yearly death rate is highest in the first year of hemodialysis, but drops in the second year (Slinin et al., 2010). Among persons starting hemodialysis in 2014, the reported all-cause mortality peaked at 382 deaths per 1,000 patient-years in month 2, and decreased thereafter to 189 per 1,000 patient-years in month 12 (Foley et al., 2014). This early mortality is multifactorial and has been attributed to measurable and intangible factors, such as vitamin D deficiency, late nephrology referrals, mental health, and self-care knowledge (Wingard, Chan, Lazarus, & Hakim, 2009). Since 1996, the net reduction in mortality was 26% for persons on dialysis (USRDS, 2016). For persons on hemodialysis net reductions in mortality fell 24% from the years 2004 to 2014; mortality rates for persons on hemodialysis are 169 per 1,000 patient-years (USRDS, 2016). The decline in mortality and hospitalization rates for persons on hemodialysis leads to prolonged exposure to hemodialysis increasing risks for IDEs.

Hemodialysis Stressors

Physiological and psychological stressors are common among persons on hemodialysis and their families (Cantekin & Tan, 2013; Casey et al., 2014; Gorji et al., 2013). Physiological stressors for persons on hemodialysis include (a) fatigue, (b) reduced mobility, (c) hypotension, (d) muscle cramps, (e) nausea, and (f) vomiting. These stressors can impose limitations and create disruption of daily life (Gerogianni & Babatsikou, 2014; Gorji et al., 2013; Kaze et al., 2012). Psychological stressors present unique daily challenges, such as (a) fluid and food intake restrictions, (b) limitations on physical activities, (c) low quality of life, (d) travelling difficulties to dialysis center, (e) treatment cost, (f) low life expectancy, (e) functional impairment, (f) scheduling problems secondary to dialysis sessions, and (g) employment problems (Bayhakki & Hatthakit, 2012; Gerogianni & Babatsikou, 2014; Takaki et al., 2005; White & McDonnell, 2014). In addition, there are psychological stressors that occur intradialytically such as embarrassment from incontinence, vulnerability of dependency on family, healthcare providers, and the hemodialysis machine for survival (Hagren, Pettersen, Severinsson, Lützén, & Clyne, 2005). Helplessness becomes a psychological stressor because the person on hemodialysis is attached to the machine during the treatment and has limited ability to do move. The healthcare staff has all the control and the hemodialysis machine alarms serve as the catalyst for attention if required by the person on the machine. Lastly, self-image of the person on hemodialysis is affected because the dialysis access in their arms, necks, and femoral areas must be visible during hemodialysis allowing possible exposure of their bodies to others in the unit.

Moran and colleagues (2009) described the hemodialysis experience of waiting before, during, and after treatment as "killing time" and "wasting time". Waiting for persons on hemodialysis leads to anticipatory stress. The stress is related to the length of the wait for the

hemodialysis treatment. Furthermore, they are exposed to others on hemodialysis while waiting who have experienced various outcomes associated with long-term dialysis and chronic illnesses (i.e., blindness, limb loss, post stroke syndrome, heart failure). The milieu becomes filled with conversations surrounding other's hemodialysis experiences to include (a) cutting your dialysis time, (b) eating on the machine, (c) stopping dialysis, (d) IDEs and (e) perceived lack of attention or experience of the hemodialysis staff (i.e., who is the best cannulator). The anticipatory wait stress soon extends to contemplating the hemodialysis treatment lasting 3-5 hours, speculations about IDE occurrence during the treatment, and implications of the IDE (i.e., hospitalizations, embarrassment, or prolongation of the hemodialysis treatment due to the event). Lastly, the stress of waiting leaves time to speculate and discuss with other persons on hemodialysis concerns about the post dialysis period related to access bleeding or complications, and near syncopal, or syncopal episodes due to volume depletion. The stress is compounded for the person on hemodialysis due to misinformation from others awaiting hemodialysis and fear of uncertainty of the next treatment.

Healthcare providers need to be empathetic to the plight of persons on hemodialysis realizing that the many restrictions can lead to stress. Additionally, the IDEs may be appraised as stressors. We know little about this stress experience. It is important to understand the extent of stress experienced during IDEs and the relationship between the coping strategies and the stressors.

A review of the literature found few substantial qualitative and quantitative research studies on stressors related to the hemodialysis experience (Cantekin & Tan, 2013; Casey et al., 2014; Gerogianni & Babatsikou, 2014; Gorji et al., 2013; Polaschek, 2003; Hmwe, Subramanian, Tan, & Chong, 2015). It is surprising that there is not more science to understand the

hemodialysis experience. There remains a gap in the literature about the stress persons on hemodialysis experience intradialytically. Understanding the cognitive appraisal of events that occur intradialytically and how these events influence stress and coping related to hemodialysis will provide insight into the psychological and physiological plight of those on hemodialysis. These events affect attitudes toward future treatments. This study fills a gap in current research by adding to the existing science of persons on hemodialysis regarding cognitive appraisal during IDEs. Understanding this process is essential for healthcare teams working in hemodialysis settings, because lifestyles are markedly impacted by the complex hemodialysis therapy requiring ongoing education, family, and social supports to cope effectively with the challenges related to hemodialysis treatments.

Intradialytic Events

Persons on hemodialysis experience intradialytic events or complications during hemodialysis treatments. IDEs can be experienced at each treatment or intermittently. Prabhakar and colleagues (2015) conducted a retrospective study of 2325 persons with renal failure on conventional hemodialysis. In the chronic renal failure group, complications reported were hypotension, nausea and vomiting, fever and chills, chest and back pain, hypertension, headache, cramps, hematoma, intracerebral hemorrhage, and catheter tip migration (Prabhakar, Singh, Singh, Rathore, & Choudhary, 2015). The most common IDEs are (a) hypotension, followed by (b) muscle cramps, (c) nausea and vomiting. Some less common IDEs that may require hospitalization include (a) dialysis disequilibrium, (b) headache, (c) chest pain, (d) itching, (e) fever and chills, (f) arrhythmias, (g) hypoglycemia, (h) hemorrhage, (i) dialysis access, and (j) blood-membrane interaction (Casey et al., 2014; Davenport, 2006; Jensen, 1997; Prabhakar, 2015; Schreiber, 2001; Sherman, Daugridas, & Ing, 2007). The causes of the IDEs

are multifaceted. Each event has different effects on the physiological and psychological wellbeing of those on hemodialysis.

Hypotension is the most common intradialytic problem (Bradshaw, 2014; Bradshaw & Bennett, 2015; Cavalli, Tucci, & Locatelli, 2010; Flythe, Xue, Lynch, Curhan, & Brunelli, 2015) and is more common in female, elderly, and those with diabetes (Davenport, 2006). Unfortunately, episodes of intradialytic hypotension (IDH) occur in approximately 25% of all treatment sessions. Short-term consequences of IDH are symptoms of fatigue, cramps, and vomiting, leading to premature termination of the treatment, whereas long-term consequences include permanent heart damage (Schreiber, 2001). In addition, multiple episodes of IDH can occur during a single hemodialysis treatment and these frequent episodes represent a significant and independent risk factor for increased morbidity and mortality in persons on hemodialysis (Tislér et al., 2003; Shoji, Tsubakihara, Fujii, & Imai, 2004).

Fluid is removed from the intravascular compartment during hemodialysis. The intradialytic intravascular blood volume is reduced by at least 350 milliliters. The rate of fluid removal may exceed that of refilling from the extra and intracellular spaces, resulting in a reduction in circulating blood volume (Davenport, 2006; Jensen, 1997). A reduction in circulating blood volume is compounded by a reduction in venous capacitance reactivity, which results in reduction in cardiac filling pressures. Initially, this is compensated by increased sympathetic nervous and neuroendocrine activity, but for some persons on hemodialysis these compensatory mechanisms fail, resulting in the “Bezold–Jarisch” reflex (Davenport, 2006, p. 163). The “Bezold-Jarrish reflex is described as “a cardio-depressant reflex typified by reduced sympathetic nervous system activity with increased parasympathetic response, leading to relative bradycardia and hypotension” (Davenport, 2006, p. 163). Occasionally, IDH may occur because

of human error in measuring pre-dialysis weight, or when the dialysis machine is programmed to remove excessive weight during treatment (Davenport, 2006).

This hypotension contributes to (a) muscle cramps (b) abdominal pain due to mesenteric angina and/or ischemic pancreatitis, (c) cardiac angina, (d) transient ischemic brain damage and in severe cases, (e) unconsciousness, (f) stroke, or (g) myocardial infarction (Davenport, 2006). Persons on hemodialysis have loud verbal outbursts during muscle cramps that occur intradialytically causing embarrassment and leading to decrease self-image and vulnerability. Vomiting can result from abdominal pain and hypotension, leaving the person on hemodialysis stained and malodorous from emesis during the remainder of the treatment. Unconsciousness and stroke results in bladder and bowel incontinence. If chest pain ensues or cardiac arrest occurs, the person on hemodialysis may have body parts exposed in the hemodialysis unit in front of other clients during lifesaving interventions. Additionally, returning to the unit may be embarrassing and taxing after these events. Repetitive insults of hypotension may result in numerous small cerebral infarcts resulting in cognitive impairments, which infringe on activities of daily living as well as communication and decision-making contributing to stress.

Transient ischemic attacks (TIAs) and stroke (hemorrhagic and ischemic) may occur during intradialytic hypotensive episodes (Davenport, 2006). The increased risk of hemorrhage is related to the combination of hypertension, coupled with platelet dysfunction, prescription of antiplatelet agents and/or oral anticoagulants, and the use of systemic anticoagulation during hemodialysis (Davenport, 2006). The TIAs further compound cognitive impairments that result from multiple episodes of hypotension increasing the stress for those on hemodialysis. Their functional and cognitive abilities are impaired by these events decreasing independence.

Nausea and vomiting is the second most common IDE, usually due to intradialytic hypotension (Davenport, 2006; Prabhakar et al., 2015). Other causes of nausea and vomiting are dialysis disequilibrium syndrome (DDS), high dialysate sodium and calcium concentration, and gastroparesis, especially in persons with diabetes (Prabhakar et al., 2015). Nausea and vomiting may indicate inadequate dialysis and symptoms of uremia (Noble, Meyer, Bridge, Johnson, & Kelly, 2010). Nausea has long-term effects on protein intake resulting in lower albumins, which increase mortality for those on hemodialysis. Intradialytic vomiting is stressful and embarrassing for many because the hemodialysis unit is an open area. Lack of privacy contributes to stress when these events occur, because the expectation is to continue hemodialysis following the event, if hospitalization is not warranted. Unfortunately, these events influence attitudes and emotions towards the next hemodialysis treatment. For example, seizures that occur due to disequilibrium syndrome during hemodialysis initiation may lead to apprehension about the next treatment in the incident population.

Fever and chills mainly occur due to vascular access-related infection and pyrogenic reactions. Headaches may occur as a result manifestation of DDS (Prabhakar et al., 2015). Muscle cramps are common due to excessive ultrafiltration and low dialysate sodium (Prabhakar et al., 2015). Back pain complications are mainly related to dialyzer mediated type B reaction (Prabhakar et al., 2015). Hypertension is also a common complication due to excessive ultrafiltration rate and subsequent volume depletion-induced rennin-angiotensin secretion causing increased sympathetic tone during ultrafiltration or anti-hypertensive medication removal during hemodialysis (Prabhakar et al., 2015). Additional IDEs include chest pain, acute myocardial infarction, pericarditis, pleuritis, air embolism, gastroesophageal reflux, and complications after insertion of a central venous catheter (Ferring, Justice, Pitt, & Dasgupta,

2005). Dialysis-associated complications, like intravenous catheter-associated complications are common. Sudden death may also occur; 42% of deaths during hemodialysis were documented as sudden or cardiac in origin and 22% of deaths related to cardiac arrest and arrhythmias (Prabhakar et al., 2015). Witnessing an intradialytic death contributes to stress for others on hemodialysis.

Electrolyte exchanges during hemodialysis lead to changes in blood volume and coronary artery perfusion pressures causing cardiac arrhythmias (Davenport, 2006). Additionally, IDH can induce cardiac arrhythmias, which increase the risk of sudden cardiac death (Selby & McIntyre, 2007). Atrial fibrillation is a common sustained arrhythmia during hemodialysis, occurring in up to 20% of treatments (Davenport, 2006). In many cases, atrial fibrillation resolves spontaneously within a few hours of dialysis, but during a typical hemodialysis session, potassium is removed which can also cause arrhythmias during the treatment. The arrhythmias increase anxiety and further compound the stress related to hemodialysis.

Although hemodialysis is a routine treatment for ESRD, clearly it is associated with a number of complications, some of which are life threatening (Prabhakar et al., 2015). In fact, many on hemodialysis experience multiple events with each hemodialysis session. The adverse events are often technical problems with the extracorporeal treatment combined with underlying co-morbidities. The repeated exposure to events induces stress for the person experiencing the event as well as those observing the events. Because hemodialysis sessions are in open dialysis units, which lack privacy, witnessing the events add to the stress experience. Assessing cognitive appraisal of stress and coping of persons on hemodialysis during IDEs allows for individualized care plans to address the physical and psychosocial needs this population as they adapt to hemodialysis.

Cognitive Appraisal

Cognitive appraisal is an integral process of stress and coping (Lazarus & Folkman, 1984). The cognitive appraisal process involves an individual evaluation of a potentially stressful event for significance to wellbeing. The processes occur simultaneously in reaction to the relevance of a perceived stressor. According to Lazarus and Folkman (1984), cognitive appraisal involves "categorizing an encounter, and its facets, with respect to its significance for well-being" (p. 31). Cognitive appraisal of stressful events impacts mental and physical health perceptions. In addition, cognitive appraisal can influence morale, psychological adjustments, and health status (Carpenter, 2016; Lazarus & Folkman, 1984). Bargiel-Matusiewicz (2011) demonstrated that cognitive appraisal is a modifiable psychosocial determinant of mental health.

Cognitive appraisal is formed by the mental operations of thinking and reasoning when an individual experience a potentially stressful event. Even if cognition is impaired, an individual still has the ability to cognitively appraise an event for meaning and significance to wellbeing (Lazarus & Folkman, 1984). As the stressful event unfolds, the cognitive appraisal process remains dynamic (Carpenter, 2016; Lazarus & Folkman, 1984) becoming a response with emotional and physiological responses to events perceived as stressful. According to Laudański and colleagues (2010), once cognitive appraisal of an event occurs a strategy is adopted to cope with the stressor. The assessment of the stressor is from the person's point of view and contextual factors associated with the event. Cognitive appraisal leads to strategy development to cope with the disease related stress. Unfortunately, the strategy may be inappropriate leading to maladaptive processes, such as denial.

In the transactional model of stress and coping (Lazarus & Folkman, 1984) there are two types of cognitive appraisals: primary and secondary. Cognitive appraisal occurs because of the

interdependent and interactive process of primary and secondary appraisal. During primary appraisal, the individuals evaluate a potentially stressful situation with respect to their own wellbeing (i.e. stressful or irrelevant). Stressful appraisals include harm/loss, threat, and challenge. Harm/loss describes damage that has already occurred, threat describes anticipated (not taken place yet), and challenge describes a threat that can be met or overcome (potential for gain/growth) (Lazarus, 1998; Lazarus & Folkman, 1984). Primary appraisal is shaped by personal and situational factors, such as personal beliefs and commitments.

Secondary appraisal is the evaluation of coping resources and options. Secondary appraisal addresses the question "What can I do?" This facet of the appraisal process is based on the extent that the event can be changed, accepted, or requires more information (Peacock & Wong, 1990). The answer to the question is dependent on whether the event is appraised as harm/loss, threat, challenge, or irrelevant. Such appraisal has three forms: (a) irrelevant, when the encounter with the environment has no effect on the wellbeing; (b) benign-positive, when the encounter with environment is perceived as positive; and (c) stressful. According to Lazarus and Folkman (1984), events appraised as irrelevant or benign positive do not require coping. There is inconsistency in the literature regarding coping for irrelevant or benign positive appraisal of events. According to Kessler (1998) cognitive appraisal has not been well studied, but Kessler believes that even in benign/irrelevant appraisal of events, coping occurs. Lazarus and Folkman (1984) defined the evolving process as the transactional model of stress and coping.

Cognitive Appraisal of Persons on Hemodialysis

The literature is sparse regarding cognitive appraisal in persons on hemodialysis; therefore, cognitive appraisal in other chronic diseases will be included in this literature review. Nowak and Laudański (2014) study use an appraisal model to compare perceptions of persons on

hemodialysis and continuous peritoneal dialysis (CAPD). Newark and Laudański found that all persons perceived ESRD in terms of a loss and a threat, similar to having a diagnosis of cancer, which is usually primarily appraised as posing a threat greater than that of other serious diseases (Bigatti, 2012; Krause, 1991; Lev, 1992). Men with prostate cancer perceived the diagnosis of cancer as a threat, but in the terms of primary appraisal, men identified threat appraisal with less frequency than appraisals of harm/loss or challenge (Ahmad, 2005; Bjorck, Hopp, & Jones, 1999), whereas women with breast cancer had higher appraisals of harm/loss during primary appraisal. Meade and colleagues (2010) used structural equation modeling to reveal greater HIV-related stress and found threat appraisal in this group. Although there were no isolated studies related to gender and cognitive appraisal in persons on hemodialysis, there are variations in appraisal based on age (Jadhav & Lee, 2014; Laudanski, 2013).

Laudański and colleagues (2013) studied younger and elderly persons on hemodialysis. Younger persons on hemodialysis appraised hemodialysis as loss or challenge. Coping strategies included distractive and emotional coping strategies. Although both younger and elderly persons on hemodialysis expressed depression, confusion, and bewilderment, the emotions were more prevalent in the younger cohort. Younger persons on hemodialysis also complained more about lack of energy, mobility limitations, and sleep disturbances compared to elderly persons on hemodialysis and continuous ambulatory peritoneal dialysis (CAPD) counterparts. Jadhav and Lee (2014) found that younger persons on hemodialysis were usually shocked by the diagnosis and sought problem-focused strategies whereas older persons on hemodialysis were mentally prepared to accept diagnosis and transition to hemodialysis. Laudański and colleagues (2013) purport that younger people require more ESRD-oriented support and need extensive psychological assistance to cope with negative emotions related to the disease and treatment.

Life experience and situations of elderly participants made them more resistant to illness related problems. The elderly cohort was apt to avoid personal involvement with their disease process (ESRD) and remained passive related to the dialysis treatment (Jadoulle, Hoyois, & Jadoul, 2005). Although the elderly participants perceived dialysis as less of a challenge and threat, they often used avoidance and denial based techniques. Denial was viewed in the study as a strategy used by the elderly to cope with illness related stress, but may result in lower compliance with treatments (Jadoulle, Hoyois, & Jadoul, 2005). Yeh & Chou (2007) described hemodialysis as a passive process and elderly persons on hemodialysis have lower levels of anxiety and do not feel the need to get involved in the treatments. Chan and colleagues (2011) considered passivity as a characteristic of elderly persons on hemodialysis making them less likely to confront ESRD related stress.

Kutner and colleagues (2002) found that elderly persons on hemodialysis showed better psychosocial adjustment to dialysis than younger patients, but it warrants consideration that the elderly adjustment may be appraised as passivity. Similarly, Parvan and colleagues (2015) found with increased age, Iranian persons on hemodialysis used less coping strategies. Parvan et al. (2015) hypothesized that the combination of increased age, progression of disease, physical, developmental, and psychological complication played a role in lack of adequate coping methods, but Logan and colleagues (2006) argue that older persons on hemodialysis (65 and older) use fewer coping strategies and found them less helpful. There was no association between sex, cognitive appraisal of stressors, and coping use in the Logan et al. study (2006). Lastly, some of the older persons on hemodialysis in the study used palliative coping, which included strategies to reduce or control stress by making the person feel better, such as “doing things that you enjoy or trying to keep busy” (Logan et al., 2006, p. 389).

The Transactional Model of Stress and Coping

The transactional model of stress and coping (Lazarus & Folkman, 1984) was selected to guide this study. The model defines coping strategies as a dichotomy: problem focused and emotion focused coping. In addition, the model appraisal of stressful events determines the way in which individuals perceive the stressful situation and cope with the events. Lazarus and Folkman (1984) reported in stressful encounters people use a mixture of coping types. Specifically, when an event is appraised as nothing can be done (not controllable), emotion focused coping is in effect versus trying to change or fix the situation, which is more problem-focused coping (Gurkan, Pakyuz, & Demir, 2015; Lazarus, 1998).

In the transactional model of stress and coping, cognitive appraisal is influenced by internal demands or external demands. Internal demands include cultural values, beliefs, commitment, and vulnerability. External demands are novelty, predictability, event uncertainty, ambiguity, and the timing of stressful events (Lazarus & Folkman, 1984). The Lazarus and Folkman (1984) model emphasizes the influence of cognitive appraisal of an event by the individual to employ coping types.

Measurement of Appraisal

The process of evaluating an individual's appraisal of an event is a dynamic process and instrument development continues to evolve in the literature (Carpenter, 2016). Carpenter conducted a review of instruments that measure cognitive appraisal as theoretically described in the transactional model of stress and coping by Lazarus and Folkman (1984). Five instruments operationalized the items in the scales and subscales in adherence to the theoretical concepts of primary and secondary appraisals. The five instruments are as follows: (a) Meaning of Illness Questionnaire, (b) Stress Appraisal Measure, (c) Appraisal of Illness Scale, (d) Cognitive

Appraisal of Health Scale (CAHS), and (e) Primary Appraisal/Secondary Appraisal scale (Carpenter, 2016). The CAHS scale is used in this study to provide a detailed assessment of primary and secondary appraisal in persons on hemodialysis.

Kessler (1998) purports that cognitive appraisal is a multidimensional process and designed the CAHS scale to capture the process. The CAHS scale measures primary and secondary appraisal. There are four separate scales for primary appraisal (harm/loss, threat, challenge, benign/irrelevant) and five items that measure aspects of secondary appraisal. Lazarus and Folkman (1984) did not identify benign/irrelevant as a concept of primary appraisal, but the transactional model of stress and coping allows for evaluation of events as benign/positive. Kessler (1998) addition of benign/irrelevant appraisal was added to capture evaluation of non-stressful events. Ahmad (2005) found in persons with prostate cancer that Kessler's addition of benign/irrelevant did not have any effects on outcome measures for appraisal of a cancer diagnosis. This was consistent with Lazarus and Folkman (1984) assertion that coping strategies are stimulated by stressful events (threat, harm/loss, and challenge) not benign/irrelevant events. However, it is not known if those on hemodialysis develop coping related to benign/irrelevant to certain stressors. Because the CAHS measures cognitive appraisal as conceptualized by the transactional model of stress and coping (Carpenter, 2016), and little is known about stress and appraisal in those on hemodialysis with IDEs, this tool was chosen for assessing cognitive appraisal.

Coping

The concept of coping has been researched with animals and humans (Lazarus & Folkman, 1984). Coping, in the animal experimentation model, is considered simple and lacking the cognitive-emotion of complexity that is an integral part of human functioning (Lazarus &

Folkman). On the other hand, coping in the psychoanalytic model is considered realistic allowing for flexibility and actions that solve problems and reduce stress (Lazarus & Folkman, 1984). There is no consensus on a definition of coping, but Lazarus and Folkman (1984) defined coping as "constantly changing cognitive and behavioral efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person" (p. 141).

Skinner, Edge, Altman, and Sherwood (2003) suggested that understanding coping is fundamental to an understanding of how stress affects people. Studying the way people deal with stress can reduce or amplify the effects of adverse life events and conditions. Skinner et al. (2003) assert that coping has an effect on short-term functioning and long-term functioning, in addition to physical and mental health. Effective coping strategies play an essential role in maintaining one's physical and psychological well-being when dealing with life stressors by lessening stress, resolving uncomfortable feelings, and maintaining a positive self-concept that promotes good quality of life (Ibrahim, Taboonpong, & Nilmanat, 2010).

Coping has also been described as adaptive and individualized (Krause, 1991; Lev, Dodd, & Hinds, 1992). Lev and colleagues (1992) used coping interchangeably with adaptation to describe strategies for adapting to cancer treatments. Coping is also compared with seeking resolution to a situation deemed as stressful regardless of outcome (Lazarus and Folkman, 1984). Baldacchino and Draper (2001) assert that illness can be a source of stress, especially when perceived as threatening, unpleasant or overwhelming, and a stressor requires mobilization of resources to adapt and cope with it. Overall, Lazarus and Folkman (1984) purport that coping is a complex process.

Lazarus and Folkman (1984) reported that the length of time after stressful events assists individuals with coping. O'Connor and colleagues (1990) studied time and coping in persons with lung cancer, breast cancer, and colorectal cancer two weeks to six months following the diagnosis. The ages for the participants in the study ranged from 36-67 years. The themes identified were: (a) understanding personal significance, (b) considering the consequences of the diagnosis, (c) reviewing life, (d) altering outlook of life for self and others, (e) living with cancer, (f) and using hope (O'Connor, Wicker, & Germino, 1990). According to O'Connor et al. (1990) persons with a new illness diagnosis will try to contextualize how the disease process will influence their lives. They attempt to seek understanding. The new diagnosis of a life-threatening illness preempts the reality of one's mortality. Therefore, time with diagnosis may affect coping.

Lazarus (1998) considered time to be a principal component of coping. According to Lazarus during early stages of coping with stressful events the person's resources are not sufficient to cope in a problem focused manner. Later, after a person has had time to adjust to the stress or contemplate the implications of the stress, the person will recognize the reality of the condition; the person will cope in a practical, problem-focused way (Lazarus, 1998). Lazarus reported that that emotion-focused coping, especially denial, is a valuable coping strategy, in early stages after the stressful encounter. Lazarus and Folkman (1984) reported that each type of appraisal is expected to stimulate different types of coping strategies.

Coping is a dynamic process that occurs to manage internal and external demands appraised as taxing (Lazarus, 1998). Coping is bimodal, either problem focused or emotional focused. Problem focused is used when a situation is appraised as controllable. Emotional focused is used when a situation is appraised as unable to be changed (Lazarus and Folkman,

1984). Depending on the appraisal of the stressor, the two coping processes may overlap.

Coping in Persons on Hemodialysis

Persons on hemodialysis use different coping methods, but several studies have indicated that emotion focused coping is used more than problem focused coping (Baykan, & Yargic, 2012; Cinar, Unsal, & Alpar, 2009; Mok, Lai, & Zhang, 2004; Nofarast, Sherbaf, & Yaghoubi, 2014; Yeh & Chou, 2007). Age influenced coping in Tu and colleagues (2014) study of Taiwanese person's ages 20 to 45 years on hemodialysis. The group had higher levels of stress than those reported in other studies. The stress was related to fluid and food limitations, and fatigue (Tu et al., 2014). The coping strategy used was problem oriented, which differs from the usual emotional focused coping strategy (Parvan et al., 2015).

Persons on hemodialysis who used more problem focused than emotion focused coping strategies are younger and more educated (Gurkan et al., 2015). The difference reflects that younger groups are reluctance to accept things as they are and are more apt to question procedures and ask questions. The choice of coping type is also dependent upon the availability of social support and personal resources (Mollaoglu, 2006).

Parvan and colleagues (2015) reported in their study that the choice of dialysis modality might have an effect on coping strategy. Persons on hemodialysis used more emotion oriented coping styles whereas those on peritoneal dialysis used problem-oriented methods (Parvan et al., 2015; Blake & Courts, 1996). Blake and Courts (1996) purported that persons on hemodialysis have low tendency to use confrontive coping style, but primarily use evasive and palliative coping styles (emotion focused coping). Nowak and colleagues (2015) also found the use of avoidance and denial strategies in those on hemodialysis related to their approach to the hemodialysis treatments. The passivity that is generated by hemodialysis leads to a feeling of

having something done to the person versus the independence and control of peritoneal dialysis. Both modalities are used for end stage renal disease, but the stressors are different and the locus of control shifts from dependence (hemodialysis) to independence (peritoneal dialysis) and influences coping strategies.

Coping and Gender Differences on Hemodialysis

Kohli and colleagues (2011) described persons on hemodialysis as having an internal source of control compared to healthy subjects. An internal locus of control is frequently related to emotional strategies whereas external locus of control may be related to problem solving strategies (Takaki & Yano, 2006). Other relevant findings in the study were related to gender of persons on hemodialysis. Coping strategies based on denial and avoidance was more prevalent in men on hemodialysis. Females on hemodialysis were expected to fulfill cultural expectations based on gender roles despite illness. This was similar for female spouses of persons who had myocardial infarctions and females affected with cardiac disease (Modica et al., 2014; Salminen-Tuomaala, Åstedt-Kurki, Rekiaro, & Paavilainen, 2013).

Studies of gender differences in coping strategies in persons on hemodialysis are sparse. Studies of healthy populations assert that men use more problem focused than women and women prefer emotional focused coping strategies (Dehkordi, & Shahgholian, 2013; Folkman et al., 1986; Yeh & Chou, 2007). Tamres and colleagues (2002) meta-analysis of gender and coping asserts that men engage in more problem focused and avoidant coping than women, but women engage in more coping overall than men. Similar to the general population, men on hemodialysis use primarily problem focused coping, specifically seeking social support (Cormier-Daigle & Stewart, 1997). Men considered themselves better able to cope with the physical symptoms incurred with hemodialysis and used more problem oriented focused coping than women (Lindqvist, Carlson, & Sjoden, 1998; Yeh, Huang, Chou, & Wan, 2009). Yeh and

Chou (2007) found that women on hemodialysis reported greater stress related to physical symptoms than men. According to Gorji and colleagues (2013), stress levels were higher in women who were married, younger, less dialysis time, and lower educational level.

Although men are more inclined to adapt a problem focused approach and women have the tendency to be more emotional focused, there remains variability related to gender and coping strategies related to hemodialysis. Blake and Courts (1996) found no gender differences in the total stress level or coping strategies in their study, but female persons on hemodialysis had greater psychosocial stressors than male patients. Despite gender differences coping remains a dynamic and fluid process dependent on the individual (Lazarus, 1998).

Time and Coping on Hemodialysis

Several studies found a correlation between time and coping strategies (Curtin, Mapes, Petillo, & Oberley, 2002; Fawzy, 1995; Heim, Augustiny, Schaffner, & Valach, 1993; Heim, Valach, & Schaffner, 1997). When people are exposed to stressors over time, they become less passive and seek problem-solving strategies to deal with stressors (Fawzy, 1995; Kvillemo & Bränström, 2014). Therefore, the effects of the cognitive appraisal at both short and long-time periods after disease diagnoses are influential on coping types.

Yeh and Chou (2007) reported that as the length of time on hemodialysis increases the stress experienced by persons on hemodialysis decreases, but Lok (1996) contradicted these findings suggesting that total stressors by persons on hemodialysis increased as the length of time on hemodialysis increases. Age is an additive factor in the research, persons ages 20 to 45 years on hemodialysis for longer periods of time had fewer stressors because they perceived the treatments as a routine activity and found appropriate coping strategies to adapt to their treatments (Tu et al., 2014).

There is inconclusive evidence to support if length of time on hemodialysis affects stress and coping, in fact, Mok and Tam's (2001) study of Chinese persons on hemodialysis showed no association between the length of time spent on hemodialysis, psychosocial stressors, and coping. They found that once a person becomes accustomed to the dialysis routine and established their coping behaviors, the number of years on the dialysis does not change coping behaviors and acceptance results. Providing more focused attention on persons new to hemodialysis by providing detailed and accurate information regarding hemodialysis was suggested by Tu et al. (2014) to assist in coping with the routine procedure of hemodialysis.

Summary

Persons on hemodialysis have unique coping strategies when dealing with hemodialysis treatments, but the same individual may have different coping strategies in different situations specific to event occurrence during the hemodialysis treatments (Lazarus and Folkman, 1984). When the treatment for the disease process is redundant and life sustaining, the cognitive appraisal of stress and coping begins a dynamic process of primary and secondary appraisal.

Primary appraisal is initiated after a stressful stimulus challenges the person on hemodialysis status quo, such as an IDE. If the event is perceived as a benign or neutral one, it will be ignored or even appreciated. If the event is deemed stressful or dangerous, it will be categorized as a loss, challenge, or threat. Coping processes differ between individuals according to each person's predisposition towards certain stress assessment and coping types (Nowak & Laudański, 2014). The adequacy of an individual's coping type is evaluated in secondary appraisal when the individual places the primary appraisal of stress into the context of his/her own expectations and wellbeing (Lazarus, 2000). Perception of disease is one of the most important factors determining the health-related quality of life in persons on hemodialysis

(Chan et al., 2011). The healthcare team must first understand how the persons on hemodialysis cognitively appraise IDEs to formulate interventions to support physiological and psychological health during hemodialysis.

CHAPTER 3: METHODS

Introduction

Chapter three describes the methodology used in this study of cognitive appraisal of stress and coping in persons on hemodialysis during IDEs. The research design, setting, sample, protection of human subjects, instruments, procedures, and data analyses are included in this chapter. In addition, limitations of this study were addressed.

Design

This non-experimental research study employed a cross-sectional correlational design to examine stress appraisal and coping responses of persons on hemodialysis to IDEs. A cross-sectional design allows data to be measured at a specific point in time to examine the association between variables (Polit & Beck, 2012). Data were collected from participants during a single interview process regarding an IDE; concurrent stress and coping processes related to the event were explored. A correlational design was used to examined the association between variables that are not manipulated (Gliner, Morgan, & Leech, 2009; Polit & Beck, 2012); therefore, it was suitable for this study.

Setting

Participants were recruited from a single industry sponsored hemodialysis center in Eastern North Carolina. A national, for-profit company operates the hemodialysis center. The center serves persons on hemodialysis from all socioeconomic backgrounds. The majority of persons on hemodialysis at the center are African American. A local nephrology practice provides care for the persons on hemodialysis at the center. The combined number of persons attending regular scheduled hemodialysis at the center is approximately 150. The single center was used for recruitment to achieve an adequate sample size of persons who have had an IDE.

Sample

A convenience sampling design was used to obtain participants from the outpatient dialysis center. A convenience sample is a non-probability sampling technique where potential participants for a study are selected because of convenience and accessibility to the researcher (Polit & Beck, 2012). A query was conducted using the dialysis facility database to identify persons on hemodialysis who had a documented IDE. In addition, the principal investigator (PI) asked persons on hemodialysis at the center if they have ever had an IDE including, but not limited to, the following: (a) chest pain, (b) loss of consciousness, (c) bleeding, (d) cramping, and (e) cardiac arrest (Daugirdas, Blake, & Ing, 2012; Pierce & Manley, 2012; Song, 2013). The nephrologists and charge nurses at the center referred potential participants for the study to the PI. The collective review of the charts, referral by nephrologists, charge nurses, and screening by the PI generated a comprehensive list of eligible participants for the study.

Inclusion criteria for the study included persons (a) on outpatient hemodialysis (b) 18 years of age and older, (c) able to speak and understand English, and (d) have experienced a least one IDE. Exclusion criteria for the study consisted of the following: (a) mental impairment that precluded understanding of survey or questions, and (b) cognitive disability, including diagnosis of dementia, or diagnoses that caused cognitive deficits impairing the participant's ability to read or comprehend questions.

The PI approached each of the persons identified as eligible for the study to explain the study and assess their willingness to participate in the study. Informed consent was obtained from eligible participants interested in being in the study. An interview was set up with each participant before, during, or after hemodialysis based on their preference. If the participant's choice was before or after hemodialysis, the participant was accompanied to a quiet private

setting in a conference room at the hemodialysis center. Participants requesting to be interviewed during their hemodialysis treatment were informed that the PI would make every effort to speak quietly at their chair side during the interview to maintain confidentiality. Although the chairs at the hemodialysis center are side by side, the PI made every effort to maintain the participant's confidentially during the interview. Each participant was given $10.00 cash as a token of appreciation for participating in the study. Recruitment continued until enough participants were recruited to power the study.

The sample size was computed based on multiple regression and correlation analyses. Because data on the effect size of relationship between cognitive appraisal of stress and coping types in persons on hemodialysis during IDEs were not available, a medium effect size was used for power analysis. A medium effect size is 0.20 in a multiple regression test (Polit & Sherman, 1990). A sample size for correlation and multiple regression analysis was computed for 9 independent variables (IV), an alpha of 0.05, a power of 0.80, and a medium effect size of 0.20 (Cohen,1988; Gatsonis & Sampson, 1989). The included control variables were: time on hemodialysis (months), sex, and age. A sample size of 72 participants was required to power this study (Appendix B). A pilot study (n = 2) was conducted prior to the proposed larger study to examine recruiting, ease of tool use, and procedures.

Human Subjects Protection

Institutional Review Board (IRB) approval was obtained from Fresenius Medical Care Department of Clinical Studies (see Appendix C) and East Carolina University (see Appendix D) for the pilot study and modified for this study to increase enrollment of participants from the outpatient hemodialysis center. The study and data collection commenced once IRB approval was obtained. A Health Insurance Portability and Accountability Act (HIPAA) form was signed

and obtained from participants in the study to allow access to their medical records at the dialysis center and hospital.

Informed consent was obtained from all participants prior to participation in the study. The consent form was written at a fifth-grade level (see Appendix E). The consent form clearly stated that participation in the study was voluntary and the participants were free to withdraw from the study at any time without repercussions. A copy of the consent was given to each participant and the PI kept a copy of the signed consent form in a locked file separate from the data.

Confidentiality was maintained for all data forms. All data forms were locked with a secure code in a secure file on a computer in the PI's office behind a locked door. Data collection forms were locked in a separate file from the signed consent form in the PI's locked office. Data collection forms used codes to de-identify participants. Codes were used for names and personal identifiers. No items of information that would enable the identification of any subject were recorded. No linking list of any sort were kept that would enable someone to look up the code number assigned to a subject and determine the identity of that subject.

Instruments

Five instruments were used for data collection: (a) Hemodialysis Demographic Form [HDF] (see Appendix F), (b) Cognitive Appraisal of Health Scale [CAHS] (see Appendices G and H), (c) Ways of Coping Questionnaire [WCQ] (see Appendix I), (d) Hemodialysis Stress Visual Analog Scale [HS-VAS] (see Appendix J), and (e) Dialysis Symptom Index [DSI] (see Appendix K).

Hemodialysis Demographic Form

The HDF is an investigator-designed form to collect data related to demographic characteristics of the sample**.** The form was used to collect the following demographics: (a) age, (b) gender, (c) race, (d) marital status, (e) socioeconomic status (income/number of persons in household), (f) education, (g) length of time on dialysis in months, (h) prescribed treatment time on dialysis in minutes, (i) estimated number of IDEs based on participant's memory, and (j) self-report of number of times the participant had a IDE, and (k) self-report of witnessing another person on hemodialysis have a IDE. Information for the HDF was obtained from the medical record from the dialysis center, hospital chart, and by self-report during interviews.

Cognitive Appraisal of Health Scale

The CAHS is a self-report instrument used to measure multidimensionality of primary and secondary appraisals associated with stressful health-related events (Kessler, 1998). The items in the instrument are representative of primary appraisal which includes cognitive appraisal of stress: threat, challenge, harm/loss, and benign/irrelevant. Secondary appraisal is evaluated by individual items on the scale to assess coping options.

The scale was developed based on the transactional model of stress and coping. The scale was designed to conceptually measure primary and secondary appraisal at the same time. The CAHS is a 28-item scale scored on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The CAHS has been studied in persons with acute and chronic illnesses, stroke, and persons with prostate cancer (Ahmad, 2005; Ahmad, 2010; Ahmad, Musil, Zauszniewski, & Resnick, 2005).

Primary appraisal is assessed by calculating scores for four scales (threat, challenge, harm/loss, and benign/irrelevant). Five separate items are used to measure secondary appraisal.

Secondary appraisal is perceived control over an event, because the individual decides during secondary appraisal if anything can be done about the event (Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986). Subjects are asked to respond to each item based on their cognitive appraisal of their current health condition. Higher scores correlate with agreement with the appraisal item.

Initial psychometric testing for the CAHS instrument included a pilot study of 26 women with breast cancer. Internal consistency coefficients for the four primary appraisal scales were: threat .75, challenge .85, harm/loss .62, and benign/irrelevant .71 (Kessler, 1998). Due to the internal consistency of the harm/loss being low, three additional items were added to the scale totaling 32 items. Further psychometric testing with 201 women with breast cancer resulted in the scale being reduced to 28 items. The 28-item scale represented the primary appraisal dimension. Internal consistency of the primary appraisal scale ranged from 0.76-0.88 (Kessler, 1998). Primary and secondary correlations were consistent with theoretical predictions ($p < .01$) based on Lazarus and Folkman (1984) transactional model of stress and coping. The findings in the study suggested secondary appraisal items might be related to certain primary appraisal items, but further research in measuring secondary appraisal as a single item is warranted.

Ways of Coping

The WCQ was derived from the Ways of Coping checklist and developed by Folkman and Lazarus (1980). The WCQ was revised in 1988 (Folkman & Lazarus, 1988). The revised 66-item version retained cognitive and behavioral strategies that comprised the Ways of Coping checklist. The WCQ has been used in multiple clinical settings to include persons with breast cancer, multiple sclerosis, chronic fatigue syndrome, and Parkinsonism (Cronan, Serber, Walen, & Jaffe, 2002; Jean, Paul, & Beatty, 1999; Rosberger, Edgar, Collet, & Fournier, 2002; Sanders-

Dewey, Mullins, & Chaney, 2001; Wonghongkul, Moore, Musil, Schneider, & Deimling, 2000). Literature on the use of the WCQ specifically involving persons on hemodialysis is limited.

The transactional model of stress and coping is the conceptual model for the questionnaire. The questionnaire is designed to measure behavioral and cognitive coping types used during a potentially stressful event. The response format was changed from a *yes-no* format to a 4-point Likert scale (0-*does not apply or not used*; 1-*used somewhat*; 2-*used quite a bit*; 3-*used a great deal*). The WCQ can be a self-administered tool or used as an interview tool. The tool takes approximately 15 minutes to complete.

There are eight subscales in the WCQ to denote coping strategies: Confrontive Coping, Distancing, Self-Controlling, Seeking Social Support, Accepting Responsibility, Escape Avoidance, Planful Problem Solving, and Positive Reappraisal. The subscales are categorized into two coping types: problem focused or emotional focused coping. Problem focused coping encompasses the individual's attempt to change a stressful event (attempts to control situation, seeks additional information, weights pros and cons). Emotional focused coping occurs when the individual changes their perception of the event (praying and distracting self). Internal consistency for the eight scales ranged from .61 to .79; intercorrelations between the scales are 0.1 to 0.39 (Folkman & Lazarus, 1985; Kieffer & MacDonald, 2011).

Hemodialysis Stress Visual Analog Scale

The HS-VAS was used to measure the participant's feeling of stress towards hemodialysis treatments related to an IDE. A VAS is used to measure subjective responses (Polit & Beck, 2012). The scale consists of a 100 mm line anchored by perpendicular lines measuring the participant's perceived level of stress towards hemodialysis based on an IDE. A score was taken from the HS-VAS to denote the participant's measurable response to stress of

hemodialysis in relation to the specific event. On the left anchor of the HS-VAS, a score of 0, denoted not stressed by hemodialysis in relation to an IDE. The right anchor of the HS-VAS, a score of 100, indicated extremely stressed by hemodialysis in relation to an IDE. The participant's mark on the HS-VAS correlated to a score that indicated the perceived level of stress related to hemodialysis treatments based on the identified IDE. A high number on the HS-VAS indicated a greater perception of stress related to hemodialysis based on the IDE.

Dialysis Symptom Index

Weisbord and colleagues (2005) developed the Dialysis Symptom Index to assess symptom burden of persons on hemodialysis. The index was developed in four steps: a comprehensive review of quality of life instruments, focus groups, content experts for validity, and test and retest reliability. The index included 75 symptoms initially, which was narrowed to 46 by the focus group agreement of common symptoms. Of the 46 symptoms identified, 12 were grouped into other symptoms and 4 were not considered pertinent, leaving 30 symptoms for the index. The index has good reliability based on test-retest procedures and Kappa statistic of 0.48 (SD = 0.22) indicated moderate agreement (Weisbord et al., 2005).

Procedures

The PI oriented nephrology providers, charge nurses, and dialysis technicians at the dialysis center to the study and data collection methods. The nephrology providers identified eligible participants for the study. The charge nurse and dialysis technicians identified additional participants for the study. The PI approached the eligible persons to assess interest in study. In addition, the PI answered any questions about the study from eligible participants, obtain written consent, and HIPAA waiver for access to participant's dialysis and hospital medical records.

Each participant was asked to sign a consent form to participate in the study. A signed copy was given to the participant for their records. In addition, the PI retained a signed copy. The PI begin data collection after obtaining consent from eligible participants. The PI administered the instruments before, during, or after a hemodialysis treatment. The PI delegated the choice for time of administration of the instruments to the participant. If the participant chose to be interviewed or fill out the tools during a hemodialysis treatment, the PI waited until the hemodialysis treatment started then to begin the data collection. There is an initial start up to hemodialysis that involves accessing the access site (fistula, graft, or cannula), this would cause disruption of the data collection and lack of concentration of the participant; therefore, a lag time of at least 30 minutes was needed before data collection commenced during a hemodialysis treatment.

Participants were asked to complete the five instruments. The instruments were read to the participants who preferred interview style. Participants who did not prefer interview were given the instruments to complete. The participant was asked to think of an event that happened to them during one of their hemodialysis treatments to use as the antecedent to fill out the instruments. The PI remained in the hemodialysis unit while the instruments were being completed to answer questions and provide clarification as needed. The total time to complete instruments was approximately 1 hour. The instruments were administered in the following order: Hemodialysis Demographic Form (HDF), Dialysis Symptom Scale (DSI), Cognitive Appraisal of Health Scale (CAHS), Ways of Coping Questionnaire (WCQ), and the Hemodialysis Stress Visual Analog Scale (HS-VAS). Each participant received $10.00 in cash upon completion of all the tools during the interview. The PI verbally thanked each participant for participating in the study and sharing their experiences.

Data Analyses

The SPSS v.23 software program was used for data analyses. The data were coded and entered into SPSS and examined for accuracy, missing data, and outliers. Patterns of missing data were assessed using descriptive statistics. Descriptive statistics and frequency distributions were used to analyze continuous variables. Frequency tables (counts) and bar graphs were used to examine categorical variables. Frequencies, means, and standard deviations were computed to describe the continuous variables and identify outliers.

The continuous variables were checked for normality, linearity, and homoscedasticity. To check for normality, histograms were visually inspected and the skewness and kurtosis examined. A normal distribution has a skewness and kurtosis of zero (Tabachnick & Fidell, 2007). In addition, probability plots were used to assess normality; a distribution close to normal will resemble a straight line (Mertler & Vannatta, 2013).

Kolmogorov-Smirnov statistic with Lilliefors significance level were calculated to test the null hypothesis that the population was normally distributed (Tabachnick & Fidell, 2007). If data deviated from normal, data transformation was conducted. The Mann-Whitney U test was used for non-normally distributed continuous variables and cross-tabulations with Chi-Square test was used for categorical variables (Gliner, Morgan, & Leech, 2009). In addition, scatterplots were used to inspect linearity and homoscedasticity.

Total scores were calculated for subscales in the CAHS, HS-VAS, WCQ, and the DSI. Cronbach's alpha was calculated for each instrument with an acceptable range of .75 to .9 indicating adequate reliability (Gliner, Morgan, & Leech, 2009). Data were considered statistically significant if *P* values were less than or equal to .05.

Data Analyses for Specific Aims

Data analysis for each specific aim and research question is detailed below.

1. Describe the type of events persons self-report they experienced intradialytically.

Q1: What events occur intradialytically?

The DSI score was used to rate events associated with stress and to rate the severity of the symptom on the index to determine the type of events that influence stress and coping intradialytically. DSI items are representative of the events that occur intradialytically; therefore, the symptoms were used synonymously for the IDEs. Each symptom was coded as *yes* or *no* and the responses were summed for a total symptom score and bothersome severity score. Basic descriptive statistics were used to answer this research question. Descriptive statistics included the mean, standard deviation, minimum, and maximum to summarize variables. Frequency distribution of the outcome data from the DSI were examined.

2. Examine the cognitive appraisals, coping types, and stress that occur in response to an IDE.

Q2: Is there an association between coping strategies (confrontive coping, distancing, self-controlling, seeking social support, accepting responsibility, escape avoidance, planful problem solving, positive reappraisal) and intradialytic stress (HS-VAS)?

Pearson correlation coefficient (r) was used to analyze this research question for parametric data and Spearman's Rank-Order Correlation was used for nonparametric data. Pearson correlation coefficient is a bivariate parametric statistic used when both variables are approximately normally distributed. Prior to the analyses, all data were examined for accuracy of data entry and missing values.

Q3: Does primary appraisal (threat, challenge, harm/loss, benign/irrelevant) of an IDE explain intradialytic stress (HS-VAS)?

The CAHS (threat, challenge, harm/loss and benign/irrelevant) was correlated with the participant's response on the HS-VAS. Prior to the analyses, all data were examined through SPSS programs for accuracy of data entry, missing values, fit between their distributions and the assumptions of multivariate analysis. The items were examined for correlations through multiple regression and assumptions checked: normality, linearity, and homoscedasticity. To check for multicollinearity tolerance and variance inflation factor (VIF) was calculated. Tolerance of 1 indicates no multicollinearity (for the predictor) and tolerance values approaching 0 indicate multicollinearity. Although, there is debate regarding tolerance target values, a tolerance value of .1 or higher is generally considered acceptable (Tabachnick & Fidell, 2007). Each value was examined for VIF, values greater than 10 indicate collinearity. Standard multiple regression was conducted by entering all IVs into the analysis simultaneously. The effect of the model was determined. If significant, then each IV was evaluated in terms of what it adds to the prediction of the DV (Mertler & Vannatta, 2005). The test of significance (F statistic) was used to determine a relationship between the IV and DV. The coefficient of determination (R^2) was reported.

Q4: Do coping strategies (confrontive, distancing, self-controlling, seeking social support, accepting responsibility, escape-avoidance, planful problem solving, and positive reappraisal) explain intradialytic stress (HS-VAS)?

Prior to the analyses, all data were examined through SPSS programs for accuracy of data entry, missing values, fit between their distributions and the assumptions of multivariate analysis. The items were examined for correlations through multiple regression and assumptions

were checked: normality, linearity, and homoscedasticity. To check for multicollinearity, tolerance, and variance inflation factor (VIF) were calculated. Tolerance of 1 indicates no multicollinearity (for the predictor) and tolerance values approaching 0 indicate multicollinearity. Each value was examined for VIF, values greater than 10 indicate collinearity. Standard multiple regression was conducted by entering all IVs into the analysis simultaneously. The effect of the model was determined. If significant, then each IV was evaluated in terms of what it adds to the prediction of the DV. The test of significance (F statistic) was used to determine a relationship between the IV and DV. The coefficient of determination (R^2) was reported.

> Q5: When controlling for age, sex, and time on hemodialysis (months) does primary appraisal (threat, challenge, harm/loss, benign/irrelevant) explain intradialytic stress?
>
> Q6: When controlling for age, sex, and time on hemodialysis (months) do coping strategy (confrontive coping, distancing, self-controlling, seeking social support, accepting responsibility, escape avoidance, planful problem solving, positive reappraisal) explain intradialytic stress?

Hierarchical multiple regression was used for the analysis of this question. In this question, the control variables were age, sex, and time on hemodialysis (months). Age, sex, and time on hemodialysis (months) were entered as a set in the first block. The second set included the four subscales of cognitive appraisal (harm/loss, threat, challenge, and benign/irrelevant) for Q5, and coping strategies (confrontive, distancing, self-controlling, seeking social support, accepting responsibility, escape-avoidance, planful problem solving, and positive reappraisal) for Q6 were entered in the second block of the regression. Data were

checked for multicollinearity, multivariate normality, linearity, homoscedasticity, and outliers.

The R^2 and Sig. F change were examined in Model 1 (first block of variables entered) and Model 2 (calculated based on all variables entered) for percentage of variance and significance of variables in blocks. The R square change was used to explain the overall variance of the model after controlling for age, sex, and time on hemodialysis (months).

The ANOVA table was examined for overall significance of the model, which was defined as a *P* value less than or equal to .05. If significant, each variable was examined to determine the contribution to the final model by examining beta values in a coefficient table.

3. Explore the relationship between primary appraisal and secondary appraisal of IDEs.

   Q7: Is there a relationship between primary appraisal (harmful, threatening, challenging, and irrelevant) and secondary appraisal (coping options) of IDEs?

Pearson correlation coefficient (r) was used to analyze this research question if the data were parametric and Spearman's Rank-Order Correlation was used if data nonparametric. Pearson correlation coefficient is a bivariate parametric statistic used when both variables are approximately normally distributed. Prior to the analyses, all data were examined for accuracy of data entry and missing values.

Limitations

Limitations of this study included a convenience sample of persons on hemodialysis at a local dialysis center**;** therefore, generalizability is limited. In addition, the sample is in a dialysis center in Eastern North Carolina limiting external validity. For the participants completing the instruments during hemodialysis, there was a potential for events to occur intradialytically and the data collection to cease or be completed at another time if the participant does not lose

interest. Lastly, the cross-sectional design limits the participants to a sample that is concentrated on one event in time instead of allowing a longitudinal study to capture stress appraisal and coping of multiple events over time on hemodialysis. Unfortunately, a snapshot in time may not capture the influence multiple events may have on the stress appraisal and coping processes.

Summary

A non-experimental cross-sectional correlational design was used to explore stress appraisal and coping responses of persons on hemodialysis to IDEs. A convenience sample was recruited from a local hemodialysis center in Eastern North Carolina. The IRB of East Carolina University and Fresenius Medical Care Department of Clinical Studies approved the research study. The PI administered five instruments either prior to dialysis, during dialysis or after dialysis treatments. Data analyses were used to describe characteristics of the sample. Multiple regression models were used to determine predictor variables on stress appraisal and coping strategies related to IDEs

CHAPTER 4:
PRIMARY APPRAISAL OF INTRADIALYTIC EVENTS AND STRESS TOWARDS HEMODIALYSIS ABSTRACT

Background: Persons on hemodialysis experience significant stress events intradialytically. Thus, it is important to understand how persons on hemodialysis appraise intradialytic events (IDEs). Determining the influence of cognitive appraisal of IDEs on stress towards hemodialysis is important, because the intradialytic event (IDE) associated psychological and physiological stressor may include decreased adherence to prescribed hemodialysis treatment plans, missed or shorten treatments, and increased number of hospitalizations. Therefore, the purposes of this study were to: a) describe the types and associations of IDE to stress; and b) examine the primary cognitive appraisals (benign/irrelevant, threat, harm/loss, challenge) of IDE on stress towards hemodialysis.

Methods: A cross sectional correlational design was used. A convenience sample of 73 persons on hemodialysis consented to participate in the study and completed the Hemodialysis Demographic Form, The Dialysis Symptom Index, the Cognitive Appraisal of Health Scale, and the Hemodialysis Stress Visual Analog Scale.

Results: The majority of the sample was African American (96%) and male (52%). The mean age was 57 (*SD* = 11.98) years, and participants averaged 41 (*SD* = 31.55) months on HD. The most frequently reported IDE included lack of energy (70%), followed by dry skin (64%), itching (54%), and cramping (53%). When controlling for age, sex and time on dialysis, primary cognitive appraisal significantly predicted stress $R^2 = .22$; (F (7, 65) = 2.58; $p = .021$).

Conclusion: The cognitive appraisal an IDE by the person on hemodialysis may influence adherence to treatments and hemodialysis associated stress. Further investigation is warranted to understand how cognitive appraisal of IDE stress affect persons on hemodialysis.

Primary Appraisal of Intradialytic Events and Stress Towards Hemodialysis

Persons on hemodialysis experience significant stress events intradialytically (Al Eissa et al., 2010; Al Nazly et al., 2013; Dantas et al., 2013). Although these events are associated with negative clinical outcomes (Collins, Foley, Gilbertson, & Chen, 2009), persons on hemodialysis cognitively appraise the stressful events differently (Gorji, 2013; Logan et al., 2006; Tu et al., 2014; Yeh, Haung, & Chuo, 2008). Common intradialytic events (IDE) include (a) hypotension, (b) cramps, (c) nausea, (d) vomiting, (e) itching, and (f) cardiac arrhythmias (Daugirdas, Blake, & Ing, 2012; Singh et al., 2015; Zumrutdal, 2013). These events may result in pain, discomfort, lengthened overall duration of the hemodialysis treatment, risk of hospitalization, and death (Davenport, 2006; Lai et al., 2007). Because those on hemodialysis spend from 12 to 16 hours a week receiving their treatments, these events significantly affect their quality of life. Thus, it is important to understand how individuals appraise IDE to determine treatment goals and monitor efficacy to decrease stress and improve quality of life.

Determining the influence of cognitive appraisal of IDE on stress towards hemodialysis is important because of potential psychological manifestations of depression and anxiety, an increase in morbidity, and premature mortality (Ng, Tan, Mooppil, Newman, & Griva, 2015; Silva Junior et al., 2014; Tu et al., 2014; Yeh, & Chou, 2007). In addition, the IDE associated psychological and physiological stressor outcomes may include decreased adherence to prescribed hemodialysis treatment plans, missed or shorten treatments, and increased number of hospitalizations, especially if the person appraises the event as threatening or harmful (Denhaerynck et al., 2007).

Primary appraisal of an IDE involves characterization of the event with respect to wellbeing: “Am I in trouble?” (Lazarus & Folkman, 1984). It is a continuous evaluative

cognitive process which focuses on the significance of the event as benign/irrelevant or stressful. A benign/irrelevant appraisal of an intradialytic event is assessed as no threat to the person, but a stress appraisal of an event includes either threat, harm/loss, or challenge (Lazarus & Folkman, 1984). A threat appraisal includes anticipated damage or injury. A challenge appraisal is a threat that can be met or overcome, and a harm/loss appraisal is damage that has already occurred (Lazarus, 1998; Lazarus & Folkman, 1984). Unfortunately, no studies were found focusing on the influence of primary cognitive appraisal of IDE on stress towards hemodialysis. Therefore, the purposes of this study were to: a) describe the types and associations of IDE to stress; and b) examine the primary cognitive appraisals (benign/irrelevant, threat, harm/loss, challenge) of IDE on stress towards hemodialysis.

Methods

A cross sectional correlational design was used to examine the relationships between primary cognitive appraisal of IDE and stress towards hemodialysis. A convenience sample of persons on hemodialysis were recruited from a national for-profit industry sponsored hemodialysis center in Eastern North Carolina. After approved by the Institutional Review Board (IRB) and the industry's Department of Clinical Studies, the Principal Investigator (PI) asked persons if they have ever had an event during hemodialysis including, but not limited to, (a) chest pain, (b) loss of consciousness, (c) bleeding, (d) cramping, and (e) cardiac arrest (Daugirdas, Blake, & Ing, 2012; Pierce & Manley, 2012; Song, 2013). The sample was composed of persons on hemodialysis who were recruited by querying the dialysis facility's database to identify potential participants who had a documented IDE. In addition, the healthcare team at the dialysis center referred potential participants for the study to the PI. Inclusion criteria for the study included persons (a) on outpatient hemodialysis for a minimum of

one month, (b) 18 years of age and older, (c) with the ability to speak and understand English, and (d) who had experienced at least one IDE. Exclusion criteria for the study consisted of a diagnosis in the electronic medical record (EMR) of dementia or other diagnoses that caused cognitive deficits impairing the participant's ability to read or comprehend the questions. The collective review of the EMR, referrals by the healthcare team, and screening by the PI generated a comprehensive list of 75 eligible participants for the study.

Each of the eligible persons was contacted to explain the study, assess their willingness to participate, and if willing, obtain informed consent. One refused to participate, and one was hospitalized and refused to participate after hospital discharge yielding a final sample of 73. Participants were asked to complete four instruments: (a) Hemodialysis Demographic Form (HDF), (b) Cognitive Appraisal of Health Status Scale (CAHS), (c) Hemodialysis Stress Visual Analog Scale (HS-VAS), and (d) Dialysis Symptom Index (DSI). The instruments were administered in the following order: HDF, DSI, CAHS, and the HS-VAS, and participants were asked to think of IDE they experienced as the antecedent prior to completing the instruments. The instruments were either read to participants who preferred interview style or the participants completed the instruments independently. The PI was available to answer questions and provide clarification to the participants as each instrument was completed. Each participant received $10.00 for participation in the study.

A priori sample size was calculated based on multiple regression. Because data on the effect size of the relationship between primary cognitive appraisal of IDE and stress towards hemodialysis were not available in the literature, we used a medium effect size for the power analysis. Including 9 independent variables with an alpha of 0.05, a power of 0.80, and an effect size of 0.20 (Cohen, 1988; Gatsonis & Sampson, 1989), a minimum sample size of 72 was

sufficient to answer the research questions: (a) Are symptom burden (total number of symptoms) and symptom bothersome scores associated with stress towards hemodialysis? (b) When controlling for age, sex, and time in months on hemodialysis, does primary appraisal (threat, challenge, harm/loss, benign/irrelevant) of an IDE explain stress towards hemodialysis?

Instruments

Demographic Data Tool. The HDF is an investigator-designed form to collect data related to demographic characteristics of the sample**.** Information for the HDF was obtained from the participant's EMR and by self-report during interviews. The HDF is comprised of 25 items and includes basic demographic and clinical data such as age, race, sex, marital status, comorbidities, duration of dialysis therapy, educational level, and annual household income. This form took approximately 10 minutes to complete.

Cognitive Appraisal of Health Scale. The CAHS is a self-report instrument used to measure multidimensionality of primary and secondary appraisals associated with potentially stressful health-related events (Kessler, 1998). The CAHS has been studied in persons with acute and chronic illnesses, stroke, and persons with prostate cancer (Ahmad, 2005; Ahmad, 2010; Ahmad, Musil, Zauszniewski, & Resnick, 2005). The CAHS is a 28-item scale scored on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*) with 23-items representing primary appraisal and five items assessing secondary appraisal. Primary appraisal is assessed by summing the scores for four scales: threat, challenge, harm/loss, and benign/irrelevant. Previous internal consistency coefficients for the four primary appraisal scales were: threat .75, challenge .85, harm/loss .62, and benign/irrelevant .71 (Kessler, 1998). Internal consistency for the four primary appraisal scales for this study were: threat .75, challenge .67, harm/loss .87, and benign/irrelevant .83.

Hemodialysis Stress Visual Analog Scale. A 100 mm HS-VAS was used to measure the participant's feeling of stress towards hemodialysis related to IDE. The scale consisted of a horizontal line with the left anchor denoting no stress (*score 0*) and right anchor indicating extreme stress (*score 100*). A higher number on the HS-VAS indicates a greater perception of stress towards hemodialysis related to IDE.

Dialysis Symptom Index. Weisbord and colleagues (2004) developed the DSI to assess symptom burden of persons on hemodialysis. The index was developed in four steps: a comprehensive review of quality of life instruments, focus groups, content experts for validity, and test and retest reliability. The index included 75 symptoms initially, which was narrowed to 46 by the focus group agreement of common symptoms. Of the 46 symptoms identified, 12 were grouped into other symptoms and 4 were not considered pertinent, leaving 30 symptoms for the index. The index has good reliability based on test-retest procedures with a Kappa statistic of 0.48 (SD = 0.22) indicating moderate agreement (Weisbord et al., 2004).

We used the 30-item DSI to assess both the presence of IDE and how bothersome each intradialytic event was to the participants. To complete the DSI, each was asked to report which of 30 individual symptoms had been present intradialytically over the past year. For each symptom identified, the participants were then asked to rate if the symptoms were bothersome on a 5-point Likert scale ranging from "*not at all bothersome*" to "*very bothersome*." An overall intradialytic symptom burden score ranging from 0 to 30 was generated by summing the number of symptoms reported as being present. In addition, an overall symptom bothersome score was generated by summing the bothersome scores. A score of zero was assigned for symptoms that were not bothersome and the possible range was 0-120. Although constipation, decreased interest in sex, and difficulty becoming sexual aroused are symptoms listed on the DSI that appear not to

relate to an intradialytic event, we still asked the participants to indicate "*yes*" or "*no*" to experiencing the symptom and added the symptom's bothersome severity if they answered yes.

Data Management

The SPSS version 23 software program was used for data analyses. The data were coded, entered into SPSS, and examined for accuracy. Descriptive statistics and frequency distributions were used to analyze continuous variables. Frequency tables (counts) were used to examine categorical variables. Continuous variables were checked for normality, linearity, and homoscedasticity. Two variables (benign/irrelevant of CAHS and DSI symptom bothersome score) were transformed. Benign/irrelevant scale was transformed using logarithm and DSI symptom bothersome score using square root to meet assumptions for regression. A Pearson's correlation was used to examine the associations of symptoms and stress. After adjusting for age, sex, and months on hemodialysis, a multiple linear regression was used to determine the influence of primary appraisal on stress towards hemodialysis. A $p < .05$ indicates significance.

Results

The sample ($N = 73$) was comprised of almost equal numbers of men and women (males 52%) with a mean age of 57 years ($SD = 11.98$; range 21-81). Most (60%) of the participants had a high school diploma or less education and average time on hemodialysis was 41 months ($SD = 31.55$). The mean stress score was 44.23 ($SD = 32.90$). Only 7 people (10%) indicated no stress (*score 0*) and 9 people (12%) reported experiencing maximum amount of stress (*score 100*). One-fourth of the sample had stress scores of 67 or more. See Table 1 for socio-demographic characteristics of sample.

Intradialytic Events Reported

The average number of IDE reported by participants was 10.58 (*SD* = 6.79; range 1-28). The most frequently reported IDE was lack of energy (69.9%) followed by dry skin (64.6%), and cramping (53.4%). The least reported IDE were cognitive and emotional symptoms including difficulty concentrating (30.1%) and sadness (30.1%). Neither age (r = -.118, p = .32) nor months on hemodialysis (r = .221, p = .06) significantly correlated with the DSI symptom burden. There was also no difference in the mean symptom burden score by sex (t = -.47(71); p = .64).

The DSI bothersome symptom scores range from 1-81 (*M* = 20.86; *SD* = 17.61). There were no significant relationships between age (r = -.088, p =.459), months on hemodialysis (r = .108, p = .364), nor sex. While the difference between sex was not significant (t = -1.61(59); p =.11), women had higher mean scores (*M* = 24.34; *SD* = 20.52) than men (*M* = 17.66; *SD* = 13.94). Only the DSI symptom bothersome score was significantly correlated with intradialytic stress (r = .235, p = .045).

Primary Appraisal and Stress Towards Hemodialysis

The CAHS mean scores were harm/loss (*M* = 23.40, *SD* = 7.74), challenge scale (*M* = 21.19, *SD* = 4.15), threat scale (*M* = 13.96, *SD* = 4.84), and benign (*Mdn* = 11, range 4-51). Only 2 of the scales significantly correlated with stress: threat appraisal was weakly correlated (r = .243, p = .038), and harm/loss appraisal was moderately correlated (r = .341, p = .003) with stress (see Table 3).

To investigate how well the four primary appraisal scales of the CAHS explain stress towards hemodialysis when controlling for age, sex, and time on hemodialysis, a hierarchical linear regression was computed. Age, sex, and time on dialysis were entered into Model 1 and

did not significantly influence stress towards hemodialysis (F (3, 69) = 1.57; p = .20). The four scales were then entered. The final model explained 22% of the variance in stress towards hemodialysis (R^2 = .218, R^2_{adj} = .133; F (7, 65) = 2.58; p = .021). None of the variables uniquely contributed to the model (see Table 4).

Because the DSI symptom bothersome score was significantly correlated with stress, we conducted a second regression to explore if this score affected the amount of variance in stress towards on hemodialysis explained by our previous model. Age, sex, and months on hemodialysis comprised Model 1, symptom bothersome score was entered into the next block, and benign, challenge, threat, harm/loss were entered last. The final model was significant and explained 23% of the variance in stress towards hemodialysis (F (8, 64) = 2.31, p = .030). While the model was significant, none of the variables uniquely contributed.

Discussion

In our study, the vast majority of participants indicated stress related to IDE. These results compare with other studies on stress associated with hemodialysis (Cho, & Shin, 2016; Gurkan, Pakyuz, & Demir, 2015; Kargar Jahromi, Koshkaki, Javadpour, Taheri, & Poorgholami, 2015; Tagay, Kribben, Hohenstein, Mewes, & Wolfgang, 2007). Because many of their participants defined hemodialysis as a traumatic experience, Tagay and colleagues (2007) classified hemodialysis in the context of post-traumatic stress disorder. Participants in our study also considered hemodialysis as harmful or causing loss related to their wellbeing similar to effects of a traumatic event. Most of the studies associating stress with hemodialysis were conducted in other countries with different cultural norms. Clearly, stress is a common emotion associated with hemodialysis that crosses cultural boundaries and as such, is psychologically taxing for persons on hemodialysis (Abdel-Kader, Unruh, & Weisbord, 2009).

A high proportion of African Americans participated in this study which was representative of the hemodialysis population in Eastern North Carolina. The average length of time on hemodialysis was approximately 3.5 years and compares with other studies of persons on hemodialysis (Laudański, Nowak, & Niemczyk, 2013; Nowak & Laudański, 2014). While similarity in time on hemodialysis allows comparisons across studies, this consistent time frame may be a reflection of the estimated 5-year mortality for persons on hemodialysis.

Because individual's appraisal of a stressful event is related to their experiences and development state, we examined age and primary cognitive appraisal. Age was only associated with benign/irrelevant cognitive appraisal in our study. This result differs from Laudański and colleague's (2013) findings that younger age was associated with higher primary appraisals of *loss* and *challenge.* This difference may be related to their defining a "young cohort" with a mean age of 45 years and the "old cohort" with a mean age of 69 years. Our study found that increased age was associated with benign/irrelevant, and there were no significant associations with decreased age. As generational differences may influence primary cognitive appraisal, further research should include age when examining primary cognitive appraisal.

As with our study, other studies noticed differences by sex related to stress towards hemodialysis: females had more stress than males (Weisbord, 2005; Yeh et al., 2009). Sex contributed significantly to our final model with women reporting higher stress scores than men. Weisbord (2005) reported an overall higher symptom burden, or more symptoms, in women, which contrasted our study findings of similar symptom burdens for men and women. Surprisingly, in our study, the influence of symptoms on stress had more to do with perception of the symptom as bothersome than the total number of symptoms. Hence, interventions focused on

appraisal of symptoms as bothersome may be more important when developing strategies to decrease stress towards hemodialysis.

In this study, the symptom bothersome score mean differed by sex, and while clinically significant, this difference was not statistically significant. Men reported lower bothersome scores compared to women. Men are more apt to be stoic and try to gain a sense of control of the situation, and women seek more social support during stressful events (Cho & Shin, 2016; Weisbord, 2005). Consequently, there may be gender differences in reporting how bothersome a symptom is to an individual. Clinicians should not only assess the presence of the symptoms, but also how bothersome the symptom is during hemodialysis. Because this bothersome score is dynamic and individualized, this score should be conceptualized like the pain scale used in an acute care settings and documented in the medical record to provide a reference for stress associated with IDE.

Threat and harm/loss appraisal were both significantly correlated with stress towards hemodialysis. Nowak and Laudański (2014) findings of cognitive primary appraisal in persons on peritoneal dialysis and hemodialysis revealed that persons on hemodialysis appraised their disease as either a threat or harm/loss, which is a common appraisal to chronic disease (Ahmad, 2009). Conversely, persons on peritoneal dialysis viewed their dialysis as a challenge. Nowark and Laudański postulated that differences in the appraisals between persons on peritoneal dialysis and hemodialysis were related to hospitalizations, independence, and autonomy. Because persons on hemodialysis have more hospitalizations, less independence due to rigid hemodialysis schedules, and less autonomy related to hemodialysis treatments, they may view their hemodialysis treatment as causing harm or facilitating loss of choice thus increasing their stress towards hemodialysis. Chan and colleagues (2012) asserted that cognitive appraisal is an

important predictor of quality of life; therefore, interventions targeted at modifying a threat or harm/loss appraisal may improve quality of life for persons on hemodialysis and decrease stress.

The most frequently reported IDE by the participants in our study were similar to other studies (Chan et al., 2011; Laudański, et al., 2013; Nowak & Laudański, 2014; Wang et al., 2016). Lack of energy was the most frequently reported intradialytic event in our study. This was similar to O'Sullivan and McCarthy (2007) findings of lack of energy reported by persons on hemodialysis as being common and burdensome. Pratt (2002) purported that fatigue experienced by persons on hemodialysis is multifactorial and influenced by hemodialysis adequacy, the presence of depression, sleep disturbances, and anemia (Chan et al., 2011; Laudański, et al., 2013; Li, Foley, & Collins, 2005; Weisbord, 2005). Despite the assertions that fatigue is common place in these persons, the lack of energy should not be dismissed as a byproduct of hemodialysis. The ripple effect of fatigue in persons on hemodialysis may decrease quality of life, hinder activities of daily living, and decrease psychological wellbeing. Because lack of energy was rated as the most frequently reported intradialytic event in our study, it warrants a more in-depth assessment by the healthcare team.

It was surprising that dry skin was rated higher than other IDE in our study. Itching is frequently associated with dry skin (Lopes, 2012; Szepietowski, Reich, & Schwartz, 2004) and may account for both symptoms reported as the most frequent IDE. Interventions at alleviating these symptoms with antihistamines, focused education on phosphorus binders, dietary phosphorus restrictions, and emollients can provide persons on hemodialysis with self-management options to control the itching and dry skin. Offering therapeutic options for dry skin and itching should occur in hemodialysis units during rounding to decrease overall stress towards hemodialysis (Manenti, Tansinda, & Vaglio, 2009).

Sleep disturbance was also reported during dialysis and noted as an IDE. Lopes and colleagues (2012) reported an increased severity of pruritus was associated with sleep disturbance. Therefore, improving the dry skin and pruritus has further implications for improving sleep in persons on hemodialysis. Dry mouth was also a common intradialytic event. This finding was not surprising as there are large amounts of ultrafiltration during hemodialysis, fluid restrictions, and higher intravascular sodium concentrations post hemodialysis. Simple intradialytic interventions to alleviate xerostomia such as chewing gum, mouthwash or pharmacologic agents may reduce stress and improve the quality of life in those on hemodialysis.

Participants' primary appraisal in this study explained a small amount of stress towards hemodialysis related to IDE, but none of the cognitive appraisal scales independently contributed to the variance. There remains a need for individualized anticipatory care planning due to ensuing stress towards hemodialysis. There is a paucity of data to support assessing primary cognitive appraisal of a chronic disease to develop individualized cognitive behavioral strategies that may assist in coping with the disease as well as assist in treatment interventions to decrease stress and improve quality of life (Ahmad et al. 2005; Laudański, Nowak, & Wańkowicz, 2010). According to the transactional theory of stress, the perception of the disease affects the general perception of health status and quality of life (Lazarus, 2000). A process to identify IDE stress during hemodialysis and intervene to affect quality of life will require a collaborated effort between the person on hemodialysis and the healthcare team.

Limitations

The present study has several limitations. Various factors, such as the number of questionnaire items, fatigue, physiological, and psychological conditions of participants during hemodialysis that may have affected their responses. Because the current study was conducted

with predominately African Americans in Eastern North Carolina in a single industry sponsored hemodialysis center, the results cannot be generalized to other dialysis centers or persons on hemodialysis. Further studies in other geographical areas to assess cultural variants in cognitive appraisals and stress are needed. Finally, the cross sectional correlational design assumes cognitive appraisal is static and limits the ability of the study to trend hemodialysis associated stress over time and to examine the summative or potentiated effects of IDE over time.

Conclusion

Because persons on hemodialysis have at least one intradialytic event during the treatment course, empowering these persons to explore and express their concerns regarding IDE can provide them avenues to mitigate stress. The healthcare team needs to be sensitive to cues from persons on hemodialysis because passivity and dismissal of bothersome symptoms may not reflect an accurate picture of current stress towards hemodialysis.

Lazarus and Folkman (1984) asserted that stressful events are appraised concurrently. As more information is introduced during the appraisal process the person/environment relationship continues to change. The outcome of this appraisal process is the classification of an event as a threat, harm/loss, challenge or benign/irrelevant. Continuous assessment of the appraisal process by the healthcare team is required during hemodialysis to intervene in this dynamic process. This study found that persons reported multiple symptoms as IDEs and the primary cognitive appraisal affected stress during hemodialysis. While Weisbord and colleagues (2007) recommended a standardized approach to assess symptoms during hemodialysis to improve recognition and treatment, this study supports assessing cognitive appraisal of IDE to increase understanding of stress towards hemodialysis. These findings suggest that there is a cognitive appraisal process that occurs during an IDE that is relevant to stress towards hemodialysis. More

studies are needed to understand how IDEs affect persons on hemodialysis, especially if these events are repetitive or increase in severity with hemodialysis treatments.

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Disclosures

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Table 1

Distribution of Socio-demographic Data of Persons on Hemodialysis (*N* = 73)

Characteristics	*n*	*%*
Age *M* (*SD*); Range	57.04 (11.98); 21.0-81.0	
Sex		
Males	38	52.0
Females	35	48.0
Race		
Caucasian	3	4.0
African American	69	95.0
Hispanic	1	1.0
Highest educational level		
Less than 12th grade	13	17.8
12th grade, no diploma	4	5.5
High school diploma	24	32.9
GED or equivalent	2	2.7
Some community college	10	13.7
Graduated community college	9	12.3
Some 4-year college	8	11.0
Graduated 4-year college	2	2.7
Completed graduate school	1	1.4
Months on hemodialysis *M* (*SD*)	40.85 (31.55)	

Table 2

Intradialytic events reported from Dialysis Symptom Index (*N = 73*)

Intradialytic events	*n**	*%*
Lack of Energy	51	69.9
Dry Skin	47	64.6
Cramping	39	53.4
Itching	39	53.4
Dry Mouth	37	50.7
Trouble Falling Asleep	36	49.3
Bone Pain	35	47.9
Cough	32	43.8
Trouble Staying Asleep	30	41.1
Restless Legs	29	39.7
Muscle soreness	28	38.4
Nausea	27	37.0
Numbness in Feet	26	35.6
SOB	24	32.9
Dizziness	24	32.9
Worrying	23	31.5
Difficulty Concentrating	22	30.1
Sad	22	30.1

* Option to select multiple symptoms

Table 3

Intercorrelations Among Nine Continuous Variables for Stress Towards Hemodialysis

Measure	1	2	3	4	5	6	7	8	9
1. DSI bother	_								
2. DSI burden	.878**	_							
3. Stress towards hemodialysis treatments	.235*	.216	_						
4. Age	-.135	-.118	-.088	_					
5. Length of time on hemodialysis	.107	.221	.108	.077	_				
6. Threat	.264*	.205	.243*	.036	.065	_			
7. Challenge	.260*	-.310**	-.018	-.036	-.208	.013	_		
8. Harm/loss	.362**	.289*	.341**	.047	.037	.794**	-.078	_	
9. Benign/Irrelevant	-.188	-.252*	-.153	.298*	-.121	.021	.152	-.057	_

* $p < .05$. ** $p < .01$

Table 4

Regression Analysis Summary for Stress Towards Hemodialysis Treatments

Variables	*B*	*SE B*	*β*	R^2	ΔR^2
Step 1				.06	
Age	-.284	.321	-.104		
Sex	12.566	7.622	.192		
Months HD	.149	.122	.143		
Step 2				.11	.05
Age	-.223	.317	-.081		
Sex	9.983	7.629	.153		
Months HD	.106	.122	.101		
DSI bother	3.932	2.156	.217		
Step 3				.22*	.13
Age	-.098	.337	-.036		
Sex	13.290	7.706	.203		
Months HD	.061	.121	.059		
DSI bother	1.722	2.339	.095		
Benign	-4.990	5.810	-.107		
Threat	-.138	1.250	-.020		
Challenge	.951	.951	.120		
Harm/Loss	1.385	.817	.326		

Note. Months HD = length of time on hemodialysis (months); DSI bother = dialysis symptom index total summed bothersome score transformed square root; Benign = benign/irrelevant scale transformed logarithm. * $p < .05$

CHAPTER 5:
STRESS AND COPING OF INTRADIALYTIC EVENTS IN PERSONS ON HEMODIALYSIS ABSTRACT

Background: Hemodialysis is burdensome due to physiological and psychosocial stressors affecting quality of life. One major stressor is adverse intradialytic events (IDEs). Understanding coping strategies associated with intradialytic event (IDE) stress will allow the healthcare team to formulate interventions to support the physiological and psychological wellbeing of persons undergoing hemodialysis. The purposes of this study were to identify coping strategies used by persons on hemodialysis during IDEs and examine the association between coping strategies and level of stress associated with hemodialysis.

Methods: We used a cross sectional correlational design to answer the research questions. A convenience sample of persons on hemodialysis consented to participate in the study (N=73) and completed the Hemodialysis Demographic Form, Ways of Coping Questionnaire, and the Hemodialysis Stress Visual Analog Scale.

Results: The majority of the sample were African American (95%) and male (52%). The mean age was 57 (SD=11.98) years, and participants averaged 41 (SD=31.55) months on HD. There was a moderate relationship between coping strategies and stress towards hemodialysis. Coping strategies explained 34% of the variance in stress towards hemodialysis (F (11, 61) = 2.89; p = .004).

Conclusion: Persons on hemodialysis experience IDEs. Findings of this study revealed emotional focused coping strategies were used by the majority of our participants. This study also found that stress towards hemodialysis is significantly influenced by coping strategies. Future studies are needed to understand how coping strategies mitigate stress and increase quality of life for persons on hemodialysis.

Stress and Coping of Intradialytic Events in Persons on Hemodialysis

Hemodialysis is a life sustaining therapy for persons with end stage renal disease (ESRD). It is the most common renal replacement therapy with 87.9% of incident cases beginning with hemodialysis and 61.1% of prevalent cases receiving hemodialysis (Bertolin, 2016; United States Renal Data System [USRDS], 2016). The vast majority (88%) of hemodialysis occurs in-center, which is complicated by schedule and fluid restrictions, loss of autonomy, and complications (USRDS, 2016).

Complications are burdensome for persons undergoing hemodialysis (Al Nazly, Ahmad, Musil, & Nabolsi 2013; Cinar, Barbas, & Alpar, 2009; Kaze, Ashuntantang, Kengne, Hassan, Halle, & Muna, 2012; Moist, 2014; Singh, Singh, Rathore, Choudhary, & Prabhakar, 2015). Intradialytic events (IDEs) are complications that occur during hemodialysis. These IDEs are characterized as stressors and require adaptation (Bapat & Kedlaya, 2009; Bertolin, 2016). The most common IDEs are chest pain, syncope, hypotension, cramping, nausea, and vomiting (Daugirdas, Blake, & Ing, 2012; Johnson, 2017; Singh et al., 2015; Zumrutdal, 2013). Because these IDEs occur during the hemodialysis treatments, the effects of living with ESRD are compounded by additional physical and psychological factors (Gurkan, Pakyuz, & Demir, 2015; Laudański, Zbigniew, Nowak, & Wańkowicz, 2010).

Persons receiving hemodialysis experience considerable stress and use various coping strategies to deal with these stressors (Logan, Pelletier-Hibbert, & Hodgins, 2006; Mok & Tam, 2001; Nabolsi, Wardam, & Al-Halabi, 2015; Yeh, Huang, & Chuo, 2008). Stressors for persons on hemodialysis may exceed available resources to cope and hinder positive acceptance of this treatment; therefore, potentially having a negative effect on treatment adherence and quality of life, but reliance on supportive coping strategies results in reduction of anxiety and decreases

stress (Herlin & Wann-Hansson, 2010). Strategies used by those on hemodialysis to cope with IDEs can mitigate the effects of stress and favor adaptation (Herlin & Wann-Hansson, 2010). For example, treatment adherence, medication adherence and participation in chairside care planning may all result from utilizing supportive coping strategies. Lazarus (2000) asserted that coping partially depends on how the stressor is appraised and is a complicated multifaceted process.

Stressors for those receiving hemodialysis vary based on the person's sex, age, and hemodialysis vintage. Historically, various cognitive and behavioral coping strategies have been identified as useful to manage IDEs (Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986). The application of these strategies depends on personal experiences, social support systems, and personal beliefs (Lazarus & Folkman, 1984). The choice of coping strategies may decrease stress towards hemodialysis, and influence hemodialysis treatment outcomes, and adherence. (Welch & Austin, 2001).

The purposes of this study were to identify coping strategies used by persons on hemodialysis during IDEs and examine the association between coping strategies and level of stress associated with hemodialysis. According to Lazarus and Folkman (1984) there are eight coping strategies that individuals use in stressful situations: (a) Confrontive coping, (b) distancing, (c) self-controlling, (d) seeking social support, (e) accepting responsibility, (f) escape-avoidance, (g) planful problem-solving, and (h) positive reappraisal. The eight coping strategies are often grouped into two major categories: emotion focused and problem focused (Folkman & Lazarus, 1980).

Emotion focused coping involves cognitively restructuring the person/environment relationship to alter the meaning of the relationship rather than acting to change it. An attempt to change the relationship is referred to as problem focused coping (Folkman & Lazarus, 1980).

The selection of appropriate coping strategies during a stressful interaction may reduce the amount of stress for the individual resulting in increased adherence to the dialysis treatment plan and quality of life. The appropriate goals of care for persons on hemodialysis should include fostering effective coping leading to acceptance of the disease and hemodialysis treatments.

Methods

A cross-sectional correlation design was used to conduct this study between November 2016 and April 2017. A convenience sample was recruited from a single dialysis center in Eastern North Carolina. The principal investigator (PI) met with the dialysis unit's medical director and facility administrator to explain the study and eligibility criteria of participants. Eligible participants were (a) on hemodialysis for at least one month, (b) at least 18 years of age, (c) able to read and write English to complete and understand the questionnaires, and (d) reported as having had at least one IDE. The electronic medical record (EMR) was used to exclude study participants with known cognitive impairments or documented diagnoses of cognitive impairments (e.g., stroke, dementia, Alzheimer's disease). Data collection packages included three paper and pen self-report questionnaires: Hemodialysis Demographic Form (HDF), Ways of Coping Questionnaire (WCQ) (Folkman & Lazarus, 1988), and Hemodialysis Stress Visual Analog Scale (HS-VAS). Each participant was asked to reference an IDE within the last year prior to completing the forms.

Approvals were granted from the Institutional Review Board and the dialysis facility's corporate Department of Clinical Studies prior to initiation of the study. Potential participants were informed of the purpose of the study by the PI. Risks, such as fatigue from completing the questionnaires, were explained, as well as study benefits that may lead to better understanding of stressors and coping strategies used by persons on hemodialysis. Eligible participants were

informed that they could withdraw from the study at any time for any reason. Informed consent was obtained from participants agreeing to be in the study. Each participant received $10.00 as a token of appreciation.

An a priori power analysis for multiple regression was conducted and noted a sample size of 72 was needed to obtain an alpha of .05, a power of .80, a medium effect size .20. There were 75 eligible participants, one person refused to participate in the study and another was hospitalized and decided not to participate after returning to the dialysis unit post hospitalization. The final sample was 73.

Measures

Hemodialysis Demographic Form. The HDF is an investigator-designed 28-item form to collect information including the following demographics: (a) age, (b) gender, (c) race, (d) marital status, (e) socioeconomic status (income/number of persons in household), (f) education, (g) length of time on dialysis in months, (h) prescribed treatment time on dialysis in minutes, (i) estimated number of IDEs based on participant's memory, and (j) self-report of number of times the participant witnessed another person on hemodialysis have an event. Information for the HDF was obtained from the EMR and by self-report during interviews. The HDF took about 10 minutes to complete.

Ways of Coping Questionnaire. Coping strategies were measured using the WCQ. The WCQ was derived from the Ways of Coping checklist developed by Folkman and Lazarus (1980). The revised 66-item version retained cognitive and behavioral strategies that comprised the Ways of Coping checklist, but changed the original *yes* or *no* format to a 4-point Likert scale to improve clarity of responses. The WCQ has been used in multiple clinical settings to include persons with breast cancer, multiple sclerosis, chronic fatigue syndrome, and Parkinsonism

(Cronan, Serber, Walen, & Jaffe, 2002; Jean, Paul, & Beatty, 1999; Rosberger, Edgar, Collet, & Fournier, 2002; Sanders-Dewey, Mullins, & Chaney, 2001; Wonghongkul, Moore, Musil, Schneider, & Deimling, 2000). Literature on the use of the WCQ specifically involving persons on hemodialysis is limited.

The questionnaire is designed to measure behavioral and cognitive coping types used during a potentially stressful event (Folkman & Lazarus, 1988). The response to statements is based on a 4-point Likert scale and the answers are scored as follows: "*does not apply or not used*" (0), "*used somewhat*" (1), "*used quite a bit*" (2), and "*used a great deal*" (3). The eight ways of coping subscales are (a) *confrontive coping*: aggressive efforts to alter situation; (b) *distancing*: cognitive efforts to detach oneself and minimize significance; (c) *self-controlling*: efforts to regulate one's feelings and actions; (d) *seeking social support*: seeks informational, tangible, and emotional support; (e) *accepting responsibility*: acknowledges one's own role in the problem and tries to put things right; (f) *escape-avoidance*: wishful thinking and behavioral efforts to escape or avoid the problem; (g) *planful problem-solving*: deliberate efforts to alter the situation and analytical approach to problem solve; and, (h) *positive reappraisal*: efforts to create positive meaning by focusing on personal growth (Folkman & Lazarus, 1988).

The transactional model of stress and coping is the conceptual model that frames the questionnaire. The subscales are categorized into problem focused or emotion focused coping. Problem focused coping encompasses the individual's attempt to change a stressful event. Emotion focused coping occurs when the individual changes their perception of the event. Internal consistency for the eight subscales ranged from .61 to .79; intercorrelations between the scales are 0.1 to .39 (Folkman & Lazarus, 1985; Kieffer & MacDonald, 2011). The scale has demonstrated good internal consistency reliability, test–retest reliability and construct validity

(Rexrode, Peterson, & O'Toole, 2008).

Cronbach's alpha for the total coping scale in this study was .94. The alphas for the subscales in this study were confrontive coping .60, distancing .77, self-controlling .84, seeking social support .85, accepting responsibility .73, escape avoidance .79, planful problem solving .82, and positive reappraisal .87. These are higher than the previously reported alphas of the coping scales in dialysis populations: Cronbach's alpha .89 for the total coping scale, .47 for confrontive coping, .69 for distancing, .42 for self-controlling, .64 for seeking social support, .55 for accepting responsibility, .68 for escape-avoidance, .61 for planful problem-solving, and .64 for positive reappraisal subscales (Ahmad & Al Nazly, 2015; Cormier-Daigle & Stewart, 1997). The WCQ can be a self-administered tool or used as an interview tool and took approximately 15 minutes to complete.

A raw score is calculated by summing the participants' responses to a given scale. A relative score is computed by (a) calculating the average item score by dividing the sum of the ratings on the scale by the number of items on that scale, (b) calculating the sum of the average item scores across all eight scales, and (c) dividing the average item score for a given scale by the sum of the average item scores across all eight scales. The raw score was used for this study.

Hemodialysis Stress Visual Analog Scale. The HS-VAS was used to measure the participant's feeling of stress towards hemodialysis treatments in relation to IDE. The scale consists of a 100-mm line anchored by perpendicular lines. On the left (HS-VAS) anchor, a score of 0, denotes *no stress* towards hemodialysis treatments in relation to an IDE. On the right anchor, a score of 100, indicates *extremely stressed* towards hemodialysis treatments in relation to an IDE. The participant's mark on the HS-VAS correlates to a score that indicates perceived level of stress towards hemodialysis treatments based on an IDE. A high number on the HS-VAS

indicated a greater perception of stress towards hemodialysis treatments based on IDE.

Data Management

Using SPSS 23.0 data were examined using univariate statistics to identify outliers, skewness, and missing data. Descriptive analyses were calculated for all variables. Values of less than .05 were considered statistically significant. The means, frequencies, and standard deviations were computed and reported for continuous variables. Frequency tables were used for categorical variables. Pearson product correlation was used to examine relationships between coping strategies and stress towards hemodialysis. Independent T-tests were performed to examine gender differences. Analysis of variance (ANOVA) was performed to compare age groups.

Results

The majority of the sample (N = 73) were African American (95%) with a mean age of 57 (SD=11.98) years. The participants averaged 41 (SD=31.55) months on hemodialysis. There were more males (52.1%) in the study than females. The majority of the sample (60%) had a high school diploma or less (see Table 1).

Stress Towards Hemodialysis

Stress measures (HS-VAS) ranged from 0 to 100 (M = 44.23; SD = 32.90) with 7 participants having no stress (*score 0*) and 9 people marking maximum stress (*score 100*) towards hemodialysis. The relationship between coping strategies and stress (see Table 2), noted a moderate, negative correlation between planful problem solving coping (r = -.33, p = .002) and stress towards hemodialysis and a small negative correlation between hemodialysis stress and positive reappraisal (r = -.24, p = .019). To investigate how well the eight coping strategies of the WCQ scale explained stress towards hemodialysis when controlling for age, sex and time on

dialysis, a hierarchical linear regression was computed. Coping strategies explained 34% of the variance in stress towards hemodialysis (F = 2.89 (11, 61); p = .004) with escape avoidance (p =.037), sex (p =.034), and planful problem solving (p =.016) significantly contributing to the model.

Coping Strategies by Sex, Age, and Hemodialysis Vintage

Positive Reappraisal was the coping strategy used most by the participants (*M* = 8.44; *SD* 6.26) followed by self-control (*M* = 7.11; *SD* 5.55), escape avoidance (*M* = 6.53; *SD* 5.19) and distancing (*M* = 6.56; *SD* 4.73). The least used coping strategy was accepting responsibility (*M* = 3.55; *SD* 3.31). An independent samples *t*-test indicated women had higher mean scores in all eight categories than men, but only confrontive coping, self-controlling, escape avoidance, planful problem solving and seeking social support were statistically significant between the groups (see Table 3). Age was categorized by those below 50th percentile (*less than 59*) and greater than 50th percentile (*greater than or equal 59*). Confrontive coping was the only coping strategy that showed statistical significance between the groups (see Table 4). Participants < 59 years of age had higher mean scores in this category.

Coping strategies were examined for length of time on hemodialysis by quartiles. The average length of time on dialysis was approximately 3.5 years. A one-way ANOVA was conducted to explore hemodialysis vintage on coping strategies. Participants were divided into four groups according to their hemodialysis vintage: (a) 12 months or less, (b) 13 to 36, (c) 37 to 60, and (d) 61 months or greater. There were no significant differences between hemodialysis vintage and coping strategies.

Discussion

Coping Strategies

Identifying coping strategies of persons on hemodialysis contributes to better understanding of behaviors that may facilitate positive adaptation to the treatment. In this study, the majority of the participants used emotion focused coping strategies. The reliance on emotion focused coping during hemodialysis was similar to other studies of this population (Ahmad & Al Nazly, 2015; Blake & Courts, 1996; Gurkan et al., 2015). Because emotion focused coping includes strategies that encompass avoidance, minimization, and distancing, behaviors reflecting these strategies may be seen during hemodialysis. A person on hemodialysis may display minimization and distancing by covering their heads during the treatments or verbalizing no complaints when asked about the hemodialysis treatment. Conversely, they may avoid by missing treatments. Therefore, understanding the person's coping strategy may undergird development of more individualized care plans to minimize hindrances to treatment adherence and engagement that may be seen with emotional focused coping.

Although the majority of the participants used emotion focused coping more than problem focused coping, our study corroborated other recent studies that suggested different populations of people undergoing hemodialysis may vacillate between emotion and problem focused coping (Bertolin, 2016; Gurkan et al., 2015; Mok, Lai, & Zhang, 2004). For example, during an IDE, the person on hemodialysis may become combative if there is not an immediate response from the healthcare team, whereas if a member of the healthcare team is immediately available and responsive, the person may incorporate a self-controlling strategy. The healthcare team's awareness that these behaviors are reflective of coping strategies may assist in guiding

interventions to address the stressor. Viewing these behaviors as coping strategies allows the healthcare team to be focused on the stress of the event without judging the behavior.

There were statistical differences between men and women in utilization of coping strategies; women used emotion focused coping strategies more than men. This was consistent with other studies affirming women's use of emotion coping (Blake & Courts, 1996; Yeh, Huang, Chou, & Wan, 2009). Multiple studies reported that women tended to lean more on emotional focused coping than men signaling that women may be intrinsically more emotional than men (Bertolin, 2016; de Guzman, Chy, Concepcion, Conferido, & Coretico, 2009; Mok, Lai, & Zhang, 2004; Yeh et al., 2008; Yeh et al., 2009). Interestingly, Ahmad and Al Nazly (2015) found no statistical difference in coping strategies between men and women but reported that more women than men used confrontive coping strategy, a problem focused coping behavior. Ahmad and Al Nazly (2015) theorized that Jordanian women's use of confrontive coping warranted further investigation. Differences in our findings may reflex cultural differences. Confrontive coping was the least used strategy by women in our study, with the most utilized strategy being positive reappraisal. Because positive reappraisal is an effort to create positive meaning and has religious dimensions (Folkman & Lazarus, 1988), it is possible that there may be a faith based component embraced by the women in our study that warrants further investigation.

This study found women relied on self-control and seeking social support following positive reappraisal. Yeh and colleagues (2009) reported similar findings and associated seeking social support with women's tendency to affiliate with social groups and share emotions with others. The healthcare team can capitalize on this coping mechanism by recommending support groups, counseling, or therapy for women dealing with stress towards hemodialysis.

Emotion focused coping strategies were used by the majority of men in our study. Positive reappraisal had the highest utilization followed by self-control and distancing. Men in studies similar to ours also used self-controlling, distancing, and escape avoidance coping strategies (Ahmad & Al Nazly, 2015; Bertolin, 2016; Cormier-Daigle & Stewart, 1997). The healthcare team may notice lack of engagement in chairside care planning (e.g. nonadherence to phosphorus binders or diet), in addition to missed or shortened treatments with distancing. These avoidance coping strategies often reflect uncertainty in how to manage their concerns or feelings of inadequacy to deal with the hemodialysis stressors (Welch, & Austin, 2001).

Cormier-Daigle and Stewart (1997) found that men used both problem focused coping and emotional focused coping. Conversely, other studies of men reported more problem focused coping (Blake & Courts, 1996; Yeh et al., 2009). Interestingly, seeking social support can have combined components of problem focused coping and emotional focused coping. Men use seeking social support to gain information to try to problem solve their dialysis stressor (Cormier-Daigle & Stewart, 1997), unlike female participants in our study who used the emotional components of seeking social support by seeking comradery and friendships. Men on hemodialysis encountering an IDEs may exhibit emotional detachment or a sense of apathy during the treatments. IDEs were often dismissed unless requiring hospitalization. Focused interventions by the healthcare team to engage the men on hemodialysis may lessen stress towards the treatment, but further investigation into the differences between sex and coping strategies of persons on hemodialysis may assist in understanding behaviors during IDEs.

Participants' ages in our study indicated that those less than 59 years of age on hemodialysis used more confrontive coping than older participants. This is consistent with findings in other studies (Logan et al., 2006; Mok & Tam, 2001; Yeh et al., 2008; Yeh et al.,

2009). These researchers attributed the confrontive coping to the stress of being breadwinners for their families, having responsibility of young children, and being married. Contributing factors for persons on hemodialysis in this age range may also include concerns related to body image, physical appearance, and intimacy concerns. Comparable findings were evidenced in other studies but included persons within the age range of 18-65 years of age (Cristovao, 1999; Logan et al., 2006; Tu, Shao, Wu, Chen, & Chuang, 2014). Similarly, Dehkordi and Shahgholian (2013) reported a significant association between age and coping with older participants using less confrontive coping and more emotion focused strategies. Recognition of coping strategies used by older participants will enable the healthcare team to be proactive with supportive interventions despite absence of complaints. The healthcare team may need to be more reassuring and supportive during the hemodialysis treatments for older people undergoing hemodialysis.

Kidachi and colleagues (2007) purported that the elderly population are more agreeable and are less apt to challenge or ask questions of the healthcare team than their younger counterparts. In our study population, the older age group used more emotional focused coping with positive reappraisal and distancing having the highest means. Thus, they either used religion or tried to create a positive outlook. Distancing, although common in all groups, may reflect a feeling of helplessness or dependency for the aging population on hemodialysis. In the hemodialysis unit, the elderly person may manifest this coping strategy by not complaining or engaging with staff or other persons on hemodialysis. Since people 65 to74 years of age compose the majority of the ESRD prevalent population and people 75 years of age and older are starting dialysis [incident] (USRDS, 2016), it is important to conceptualize how coping strategies vary across generations, especially with baby boomers and the silent generation. The healthcare team

should consider how coping strategies are influenced by age and adapt care plans to incorporate characteristics of different age groups. Understanding the generational differences will assist with cultivating strategies for effective coping during hemodialysis treatments.

The mortality rates for persons on hemodialysis increases by 20% annually potentiating IDEs. As IDEs become more frequent, there may be a tendency to use more problem focused coping to abate the stressor. Thus, hemodialysis vintage has been studied to determine the influence of months on hemodialysis towards stress and coping (Ahmad & Al Nazly, 2015; Blake & Courts, 1996; Mok & Tam, 2001). Although there were no statistically significant findings in this study related to hemodialysis vintage and coping strategies, there was a pattern of increased utilization of coping strategies at dialysis initiation and again after spending many years undergoing the treatment. Problem focused coping was common after the person on hemodialysis had spent many years undergoing the treatment. Blake and Courts (1996) asserted that longer hemodialysis vintage led to adjustment and acceptance, leaving energy for problem solving challenges. Ahmad and Al Nazly (2015) found as the length of time on HD increases the use of emotional focused coping decreased. Mok and Tam (2001) asserted that once a person becomes accustomed to the hemodialysis routine, IDEs are no longer appraised as stressors and coping becomes an established behavior. This was also supported by Littlewood and colleagues (1990) who reported that participants receiving hemodialysis therapy for more than 5 years had learned to solve problems by using problem focused coping styles.

Limitations

The present study has several limitations. The physiological and psychological condition of the persons on hemodialysis may have affected the responses to the questions on the instruments. The instruments were administered during a hemodialysis treatment limiting

privacy which may have influenced responses to sensitive questions. The vast majority of the participants were African American; therefore, the results cannot be generalized to other dialysis centers or persons on hemodialysis. Further studies in other geographical areas focusing on culture, generations, and sex are warranted to understand coping strategies of persons on hemodialysis to guide the healthcare team in decreasing stress towards hemodialysis.

Conclusion

Findings of this study revealed emotional focused coping strategies were used by the majority of our participants. This study also found that stress towards hemodialysis is significantly influenced by coping strategies. Although individuals on outpatient hemodialysis are susceptible to many psychosocial stressors, many of these are potentially manageable and individuals should be encouraged to address those that can be controlled. A deliberate effort from the healthcare team to understand coping strategies employed by persons on hemodialysis is warranted. Instead of becoming frustrated with the person displaying confrontive coping, introduction of alternative coping strategies may add to the person's cognitive resources allowing other coping options. Coping strategies are dynamic and change as the person/environment changes. The healthcare team must remain vigilant in adjusting the plan of care to meet the needs of the person on hemodialysis during each treatment to affect stress and quality of life.

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Disclosures

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Table 1

Distribution of Socio-demographic Data of Persons on Hemodialysis (*N* = 73)

Characteristics	*n*	*%*
Age *M* (*SD*); Range	57.04 (11.98); 21.0-81.0	
Sex		
Males	38	52
Females	35	48
Race		
Caucasian	3	4
African American	69	95
Hispanic	1	1
Highest educational level		
Less than 12th grade	13	17.8
12th grade, no diploma	4	5.5
High school diploma	24	32.9
GED or equivalent	2	2.7
Some community college	10	13.7
Graduated community college	9	12.3
Some 4-year college	8	11.0
Graduated 4-year college	2	2.7
Completed graduate school	1	1.4
Months on hemodialysis *M* (*SD*)	40.85 (31.55)	
Marital status		
Married	22	30.1
Never Married	21	28.8
Divorced/Separated	24	32.9
Widowed	6	8.2

Table 2

Intercorrelations for Coping Strategies and Stress Towards Hemodialysis

Measure	M	SD	1	2	3	4	5	6	7	8	9
1. Confrontive	4.45	3.74	_								
2. Distancing	6.56	4.73	.66**	_							
3. Selfcontrol	7.11	5.55	.71**	.85**	_						
4.AcceptingResp	3.55	3.31	.70**	.80**	.81**	_					
5. EscapeAvoid	6.53	5.19	.60**	.73**	.75**	.75**	_				
6. PlanfulProb	5.37	4.77	.63**	.80**	.78**	.81**	.69**	_			
7. PositiveReapp	8.44	6.26	.59**	.78**	.81**	.78**	.70**	.88**	_		
8.SeekingSocial	6.15	5.20	.60**	.72**	.73**	.74**	.68**	.85**	.78**	_	
9. StressHD	44.23	32.90	.04	-.21	-.18	-.17	.01	-.33**	-.24*	-.19	_

Note. AcceptingResp = Accepting Responsibility; EscapeAvoid = Escape Avoidance; PlanfulProb = Planful Problem Solving; PositiveReapp = Positive Reappraisal; SeekingSocial = Seeking Social Support; StressHD = Stress Towards Hemodialysis.
*$p < .05$. **$p < .01$.

Table 3

Gender Differences for Coping Strategies

	Male		Female				
Measures	*M*	*SD*	*M*	*SD*	*t*(71)	*p*	*d*
Confrontive	3.58	3.70	5.40	3.60	-2.13	.037	.50
Distancing	5.71	4.85	7.49	4.49	-1.62	.110	.38
Selfcontrol	5.82	5.33	8.51	5.51	-2.13	.037	.50
AcceptingResp	2.94	3.27	4.20	3.28	-1.63	.107	.38
EscapeAvoidance	5.29	4.82	7.89	5.31	-2.19	.032	.51
PlanfulProblem	4.21	4.60	6.63	4.70	-2.22	.030	.52
PositiveReappraisal	7.11	6.07	9.89	6.23	-1.93	.057	.43
SeekingSocialSupport	4.47	4.85	7.97	5.01	-3.03	.003	.71

Note. AcceptingResp = Accepting Responsibility.

Table 4

Age Differences for Coping Strategies

	≤58		≥59				
Measures	*M*	*SD*	*M*	*SD*	*t*(71)	*p*	*d*
Confrontive	5.30	3.57	3.42	3.73	2.19	.032	.52
Distancing	7.12	4.56	5.87	4.90	1.12	.265	.27
SelfControl	8.23	5.45	5.76	5.44	1.93	.058	.46
AcceptingResp	3.95	3.21	3.06	3.42	1.14	.256	.27
EscapeAvoidance	7.60	5.00	5.24	5.20	1.97	.053	.47
PlanfulProblem	5.62	4.42	5.06	5.22	0.50	.619	.12
PositiveReappraisal	9.08	6.24	7.67	6.28	0.96	.342	.23
SeekingSocialSupport	6.68	4.83	5.52	5.62	0.95	.347	.23

Note. AcceptingResp = Accepting Responsibility.

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APPENDIX A: EAST CAROLINA UNIVERSITY INSTITUTIONAL REVIEW BOARD APPROVAL

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Mail
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Contacts
Deleted Items (7)
Drafts
Inbox (237)
Junk E-Mail
Sent Items
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RX: Your study has been approved
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To help protect your privacy, some content in this message has been blocked. If you're sure this message is from a trusted sender and you want to re-enable the blocked features, click here.
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EAST CAROLINA UNIVERSITY
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Office **252-744-2914** · Fax **252-744-2284** · www.ecu.edu/irb

Notification of Initial Approval: Expedited

From: Biomedical IRB
To: Sharona Johnson
CC: Patricia Crane
Sharona Johnson
Date: 7/21/2016
Re: UMCIRB 16-000996
Cognitive Appraisal Intradialytic Events (CAINE)

I am pleased to inform you that your Expedited Application was approved. Approval of the study and any consent form(s) is for the period of 7/20/2016 to 7/19/2017. The research study is eligible for review under expedited category #5,7. The Chairperson (or designee) deemed this study no more than minimal risk.

Changes to this approved research may not be initiated without UMCIRB review except when necessary to eliminate an apparent immediate hazard to the participant. All unanticipated problems involving risks to participants and others must be promptly reported to the UMCIRB. The investigator must submit a continuing review/closure application to the UMCIRB prior to the date of study expiration. The investigator must adhere to all reporting requirements for this study.

Approved consent documents with the IRB approval date stamped on the document should be used to consent participants (consent documents with the IRB approval date stamp are found under the Documents tab in the study workspace).

The approval includes the following items:

Name	Description
CAINE ICF ver2revised 6.16.16.doc	Consent Forms
CAINE.prepresearchrevised 6.16.16.pdf	HIPAA Authorization
CAINEdemographic form 6.13.16.docx	Data Collection Sheet
CAINEdemographic form 6.13.16.docx	Surveys and Questionnaires
Chapter1 Background/Significance	Study Protocol or Grant Application
Cognitive Appraisal of Health Scale	Surveys and Questionnaires
Dialysis symptom scale	Surveys and Questionnaires
HIPAArevised ECU 6.16.16.docx	HIPAA Authorization
Methodology revised 6.16.16.docx	Study Protocol or Grant Application
Visual Analog Scale-Stress on Hemodialysis	Surveys and Questionnaires
ways of coping questionnaire	Surveys and Questionnaires

The Chairperson (or designee) does not have a potential for conflict of interest on this study.

IRB00000705 East Carolina U IRB #1 (Biomedical) IORG0000419
IRB00000761 East Carolina U IRB #2 (Behavioral/SS) IORG0000412

APPENDIX B: EAST CAROLINA UNIVERSITY INFORMED CONSENT APPROVAL

Study ID:UMCIRB 16-000996 Date Approved: 7/20/2016 Expiration Date: 7/19/2017

East Carolina University

Informed Consent to Participate in Research
Information to consider before taking part in research that has no more than minimal risk.

Title of Research Study: Cognitive Appraisal of Stress and Coping in Persons on Hemodialysis during Intradialytic Events (CAINE)

Principal Investigator: Sharona Johnson PhD (c), FNP-BC
Institution, Department or Division: East Carolina University College of Nursing
Address: Health Sciences Building, Greenville, NC 27858
Telephone #: 252-847-8177

Participant Full Name: _____ Date of Birth: _____
Please PRINT clearly

Researchers at East Carolina University (ECU) study issues related to society, health problems, environmental problems, behavior problems and the human condition. To do this, we need the help of volunteers who are willing to take part in research.

Why am I being invited to take part in this research?
The purpose of this research is to examine stress and coping of events (i.e. passing out, vomiting, chest pain, shortness of breath, etc.) that occur during a hemodialysis treatment. By doing this research, we hope to learn how persons on hemodialysis appraise (think about) events that occur during their dialysis treatments and if the events influence or cause stress towards future hemodialysis treatments. Your participation is completely voluntary.

You are being invited to take part in this research because you have been identified as having an event during your hemodialysis treatment. The decision to take part in this research is yours to make. By doing this research, we hope to learn how persons on hemodialysis appraise (think about) and cope (adjust to) with events that occur during their hemodialysis treatments.

If you volunteer to take part in this research, you will be one of about four people to do so.

Are there reasons I should not take part in this research?
I understand I should not volunteer for this study if I am having problems with my memory or ability to make decisions.

What other choices do I have if I do not take part in this research?
You can choose not to participate.

Where is the research going to take place and how long will it last?
The research will be conducted at your dialysis center, which is Fresenius Medical Care. You will continue to come to your dialysis center as usual at Fresenius Medical Care located at 2355 W. Arlington Boulevard

Who will know that I took part in this research and learn personal information about me?
ECU and the people and organizations listed below may know that you took part in this research and may see information about you that is normally kept private. With your permission, these people may use your private information to do this research:

- Any agency of the federal, state, or local government that regulates human research. This includes the Department of Health and Human Services (DHHS), the North Carolina Department of Health, and the Office for Human Research Protections.
- The University & Medical Center Institutional Review Board (UMCIRB) and its staff have responsibility for overseeing your welfare during this research and may need to see research records that identify you.
- If you are a patient at ECU a copy of the first page of this form will be placed in your medical records.

How will you keep the information you collect about me secure? How long will you keep it?
The survey results will be stored on a secure network drive at ECU for 6 years. All paper records will be stored in a locked file cabinet.

What if I decide I don't want to continue in this research?
You can stop at any time after it has already started. There will be no consequences if you stop and you will not be criticized. You will not lose any benefits that you normally receive.

Who should I contact if I have questions?
The people conducting this study will be able to answer any questions concerning this research, now or in the future. You may contact the Principal Investigator at 252-847-8177 (days, between 8:00 am-5:00 pm).

If you have questions about your rights as someone taking part in research, you may call the Office of Research Integrity & Compliance (ORIC) at phone number 252-744-2914 (days, 8:00 am-5:00 pm). If you would like to report a complaint or concern about this research study, you may call the Director of the ORIC, at 252-744-1971.

I have decided I want to take part in this research. What should I do now?
The person obtaining informed consent will ask you to read the following and if you agree, you should sign this form:

- I have read (or had read to me) all of the above information.
- I have had an opportunity to ask questions about things in this research I did not understand and have received satisfactory answers.
- I know that I can stop taking part in this study at any time.
- By signing this informed consent form, I am not giving up any of my rights.
- I have been given a copy of this consent document, and it is mine to keep.

_____

Participant's Name (PRINT) **Signature** **Date**

Person Obtaining Informed Consent: I have conducted the initial informed consent process. I have orally reviewed the contents of the consent document with the person who has signed above, and answered all of the person's questions about the research.

Person Obtaining Consent (PRINT)	Signature	Date

APPENDIX C: FRENOVAL RENAL RESEARCH INSTITUTIONAL REVIEW BOARD APPROVAL

Frenova Renal Research
Renal Site Network

Internal Memo

Fresenius Medical Care North America
920 Winter Street, Waltham, MA 02451
Phone: 781.699.4204
Fax: 781.699.4281
Email: Adelia.Romeo@FrenovaRenalResearch.com

To: Study approvers; study-associated patient care staff
From: Adelia Romeo
Date: 29JUN2016
RE: Research study summary

TITLE:	Cognitive Appraisal of Stress and Coping in Persons on Hemodialysis during Intradialytic Events
SPONSOR	n/a Student initiated
PHASE	n/a
PRINCIPAL INVESTIGATOR	Sharona Johnson, FNP
FACILITY/IES	ECU #1528
OBJECTIVE(S)	Examine stress appraisal and coping responses of person on HD to intradialytic events.
DESIGN	PI will provide 5 short surveys to study participants. Participants must have had an intradialytic event (e.g. chest pain, loss of consciousness, bleeding, cramping, cardiac arrest). Pts will complete surveys on their own, or PI will read to them if they are unable. PI will also be chairside, available for questions/clarification. Should the study participant wish to take their surveys home, they will be allowed to do that. PI states surveys should take approximately 30-45 mins, depending on their level of engagement.
SIZE/ DURATION	Small pilot study of ~4 patients. Part of larger study. Once surveys are complete, there will be no more participation required.

APPENDIX D: PERSONAL COMMUNICATION DR. KESSLER: APPROVAL FOR INSTRUMENT USE

From: **Sharona Johnson** shajohns63@gmail.com
Subject: Re: Cognitive Appraisal of Health Scale
Date: March 15, 2016 at 1:18 PM
To: Terry Kessler terry.kessler@valpo.edu

Thank you so much! I am very excited about what the CAHS will reveal in the hemodialysis population.

Sharona

Sent from my iPhone

On Mar 15, 2016, at 1:07 PM, Terry Kessler <terry.kessler@valpo.edu> wrote:

> Hi Sharona,
>
> Sorry for the delay in getting back with your. We have a full 2 week spring break and I was gone traveling and just returned on the weekend.
>
> Yes, you have permission to use the the CAHS. I am attaching the instrument with the instructions for use. I ask for one thing in return. Please share the psychometric properties of the instrument in your population when you complete your work.
>
> Good luck with your work. If you have any questions about the CAHS, please do not hesitate to contact me.
>
> Terry
>
> On Tue, Mar 15, 2016 at 11:49 AM, Sharona Johnson <shajohns63@gmail.com> wrote:
>
>> Dr. Kessler, I am sending a follow up email requesting to use the Cognitive Appraisal of Health Scale.
>>
>> Thank you for your consideration.
>>
>> Sharona Johnson
>>
>> Sent from my iPhone
>>
>> Begin forwarded message:
>>
>>> **From:** Sharona Johnson <shajohns63@gmail.com>
>>> **Date:** March 3, 2016 at 11:13:49 PM EST
>>> **To:** Terry.Kessler@valpo.edu
>>> **Subject: Cognitive Appraisal of Health Scale**
>>>
>>> Dr. Kessler-
>>>
>>> I am a doctoral student at East Carolina University in Greenville, NC. I am in the dissertation phase of my studies and would like to use the CAHS with persons on hemodialysis.
>>> What is the process for me to obtain the scale for administration in this population to complete my research?
>>>
>>> I would appreciate any guidance.
>>>
>>> Thank you-
>>>
>>> Sharona Johnson PhD (c), FNP-BC
>>> shajohns63@gmail.com
>>> cell 919-344-5810
>
> --
>
> **
> Theresa A. Kessler, PhD, RN, ACNS-BC, CNE
> Professor
> Kreft Endowed Chair for the Advancement of Nursing Science
> Valparaiso University
> College of Nursing & Health Professions
> LeBien Hall 118
> Valparaiso, IN 46383, USA
> 219.464.5298 office
> 219.464.5425 fax

APPENDIX E: PERSONAL COMMUNICATION DR. FOLKMAN: TRANSACTIONAL MODEL OF STRESS AND COPING

From: **Sharona Johnson** shajohns63@gmail.com
Subject: Re: Diagram or schematic of Transactional Model of Stress and Coping
Date: December 22, 2015 at 10:27 PM
To: Folkman, Susan Susan.Folkman@ucsf.edu

Thank you and MERRY CHRISTMAS!

Sharona

Sent from my iPhone

On Dec 22, 2015, at 6:53 PM, Folkman, Susan <Susan.Folkman@ucsf.edu> wrote:

Dear Sharona, There is no "one" original diagram. It was modified as we went along, emphasizing facets of the model that were pertinent to the issue at hand. The 1984 model is fine to use. I'm attaching a revised model that appeared in 1997.

Best wishes,
Susan Folkman

From: Sharona Johnson [shajohns63@gmail.com]
Sent: Tuesday, December 22, 2015 12:25 PM
To: Folkman, Susan
Subject: Diagram or schematic of Transactional Model of Stress and Coping

Dr. Folkman-

I am a doctoral nursing student at East Carolina University, Greenville, NC. I am using the Transactional Model of Stress and Coping in my dissertation research. My proposed research study is with patients on hemodialysis. My dissertation chair has asked me to include an original diagram of the Transactional Model of Stress and Coping. I have seen many adapted versions, but I am trying to find an original diagram.

Is the model on page 305 the conceptual model for the theory?

Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. New York: Springer

I would appreciate any advice.

Sharona Johnson PhD(c), FNP-BC
shajohns63@gmail.com

<Folkman SSM '97.pdf>

APPENDIX F: MULTIPLE LINEAR REGRESSION

nQuery Advisor

Multiple linear regression, test that $R^2 = 0$ for k normally distributed covariates

Column	1	2	3	4	5	6
Test significance level, α	0.050	0.050	0.050	0.050	0.050	0.050
Number of variables, k	8	8	8	8	8	9
Squared multiple correlation, R^2	0.1000	0.1500	0.2000	0.2500	0.3000	0.1000
Power (%)	80	80	80	80	80	80
n	144	94	69	54	44	150

table continued...

Column	7
Test significance level, α	0.050
Number of variables, k	9
Squared multiple correlation, R^2	0.2000
Power (%)	80
n	72

REFERENCES for ROT3-tmpD586:

Gatsonis, C., Sampson, A.R. "Multiple Correlation: Exact Power and Sample Size Calculations" Psychological Bulletin 106(1989) pp. 516-524

APPENDIX G: DIALYSIS DEMOGRAPHIC FORM

Dialysis Demographic Form

Part A:
To be completed by PI from the electronic medical record (EMR)/participant.

1. Date:_____

2. Age: _____

3. Gender: □ Male
   □ Female

4. Race: _____

5. BMI: _____

6. Marital Status:
   - ❑ Never married
   - ❑ Married
   - ❑ Divorced/separated
   - ❑ Widowed
   - ❑ Prefer not to answer

7. Education:
   - ❑ Less than 12th grade- list grade completed _____
   - ❑ 12th Grade, No Diploma
   - ❑ High School Graduate
   - ❑ GED or Equivalent
   - ❑ Some Community College
   - ❑ Graduated Community College
   - ❑ Some 4-year College
   - ❑ Graduated 4-year College
   - ❑ Some graduate school
   - ❑ Completed graduate school
   - ❑ Other

8. Length of time (months) on hemodialysis _____

9. Prescribed time (minutes) on hemodialysis____

10. Prescribed number of dialysis days per week____

11. Number of hospitalizations in the last year. _____

12. Dialysis access: Fistula, Graft, Catheter
    Location: _____

13. Psychotropic medication (Antidepressants/Anxiolytics): yes/no
    13a. If yes, classification/name/dose of medication.

14. Comorbid Conditions (documented in EMR):
    (Adapted from the End Stage Renal Disease Medical Evidence Report Medicare Entitlement form [2728 form])

    - ❑ Congestive heart failure
    - ❑ Atherosclerotic heart disease ASHD
    - ❑ Other cardiac disease
    - ❑ Cerebrovascular disease, CVA, TIA*
    - ❑ Peripheral vascular disease*
    - ❑ History of hypertension
    - ❑ Amputation
    - ❑ Diabetes
    - ❑ Diabetic retinopathy
    - ❑ Chronic obstructive pulmonary disease
    - ❑ Malignant neoplasm, Cancer
    - ❑ Other

15. Instruments (documented by Dialysis Social Worker in EMR):

    Center for Epidemiological Studies Depression Screening Index **(CES-D)** _____
    Date of Screening_____

    The Kidney Disease Quality of Life **(KDQOL)** survey_____
    Date of Screening_____

16. How many people in your household? _____

17. What is your annual household income? _____

18. Are you a smoker?
    - ❑ Yes
    - ❑ No

    18a. If yes, how many cigarettes per day? _____

19. Do you dip or chew (i.e. tobacco or snuff)? ____

20. Do you drink alcohol?
    - ❑ Yes
    - ❑ No

    20a. If yes, how much/week?

Part B: To be asked of participants:
(Administered after the Dialysis Symptom Index [DSI])

1. How many events have you had during hemodialysis in the last year? _____

2. How many events have you had within the last month during hemodialysis? ____

3. Did experiencing these events cause you to choose to miss any of your hemodialysis treatments?
   - ❑ Yes
   - ❑ No

4. Have you witnessed anyone else in the hemodialysis unit have an event during a hemodialysis treatment? Yes___ No____

4a. If yes, how many times? _____

4. Were you stressed by witnessing the event?
   - ❑ Yes
   - ❑ No

5. Did witnessing the event cause you to choose to miss any of your hemodialysis treatments?
   - ❑ Yes
   - ❑ No

APPENDIX H: COGNITIVE APPRAISAL OF HEALTH SCALE

Cognitive Appraisal of Health Scale

I do not have permission from the author to reproduce this instrument. For details regarding the Cognitive Appraisal of Health Scale contact Theresa Kessler Ph.D., RN, ACNS-BC, CNE at terry.kessler@valpo.edu or refer to psychometric evaluation:

Kressler, T.A. (1988). The cognitive appraisal of health scale: Development and psychometric evaluation. *Research in Nursing and Health*, 21, 73-82. doi:10.1002/(SICI)1098-240X(199802)21:1<73::AID-NUR8>3.0.CO;2-Q

APPENDIX I: WAYS OF COPING QUESTIONNAIRE

Please provide the following information:

Name:_____ Date:_____
Month / Day / Year

Identification Number (optional):_____ Gender (Circle): **M** **F** Age:____

Marital Status (check): ❑ Single ❑ Married ❑ Widowed ❑ Separate/Divorced

TO THE COUNSELOR

Fill out your Institutional Address below:

_____

Name/ Institution:

_____

Address

Instructions

To respond to the statements in this questionnaire, you must have a specific stressful situation in mind. Take a few moments and think about the most stressful situation that you have experienced in the *past week*.

By "stressful" we mean a situation that was difficult or troubling for you, either because you felt distressed about what happened, or because you had to use considerable effort to deal with the situation. The situation may have involved your family, your job, your friends, or something else important to you. Before responding to the statements, think about the details of this stressful situation, such as where it happened, who was involved, how you acted, and why it was important to you. While you may still be involved in the situation, or it could have already happened, it should be the most stressful situation that you experienced during the week.

As you respond to each of the statements, please keep this stressful situation in mind. **Read each statement carefully and indicate, by circling 0, 1, 2 or 3 , to what extent you used it in the situation.**

Key: **0 =** Does not apply or not used **1 =** Used somewhat
2 = Used quite a bit **3 =** Used a great deal

Please try to respond to every question.

0 = Does not apply or not used 1 = Used somewhat 2 = Used quite a bit 3 = Used a great deal

1. I just concentrated on what I had to do next – the next step.	0	1	2	3
2. I tried to analyze the problem in order to understand it better.	0	1	2	3
3. I turned to work or another activity to take my mind off things.	0	1	2	3
4. I felt that time would have made a difference – the only thing was to wait.	0	1	2	3
5. I bargained or compromised to get something positive from the situation.	0	1	2	3
6. I did something that I didn't think would work, but at least I was doing something.	0	1	2	3
7. I tried to get the person responsible to change his or her mind.	0	1	2	3
8. I talked to someone to find out more about the situation.	0	1	2	3
9. I criticized or lectured myself.	0	1	2	3
10. I tried not to burn my bridges, but leave things open somewhat.	0	1	2	3
11. I hoped for a miracle.	0	1	2	3
12. I went along with fate; sometimes I just have bad luck.	0	1	2	3
13. I went on as if nothing had happened.	0	1	2	3
14. I tried to keep my feelings to myself.	0	1	2	3
15. I looked for the silver lining, so to speak; I tried to look on the bright side of things.	0	1	2	3
16. I slept more than usual.	0	1	2	3
17. I expressed anger to the person(s) who caused the problem.	0	1	2	3
18. I accepted sympathy and understanding from someone.	0	1	2	3
19. I told myself things that helped me feel better.	0	1	2	3
20. I was inspired to do something creative about the problem.	0	1	2	3
21. I tried to forget the whole thing.	0	1	2	3
22. I got professional help.	0	1	2	3

Go on to next page

0 = Does not apply or not used 1 = Used somewhat 2 = Used quite a bit 3 = Used a great deal

23. I changed or grew as a person.	0	1	2	3
24. I waited to see what would happen before doing anything.	0	1	2	3
25. I apologized or did something to make up.	0	1	2	3
26. I made a plan of action and followed it.	0	1	2	3
27. I accepted the next best thing to what I wanted.	0	1	2	3
28. I let my feelings out somehow.	0	1	2	3
29. I realized that I had brought the problem on myself.	0	1	2	3
30. I came out of the experience better than when I went in.	0	1	2	3
31. I talked to someone who could do something concrete about the problem.	0	1	2	3
32. I tried to get away from it for a while by resting or taking a vacation.	0	1	2	3
33. I tried to make myself feel better by eating, drinking, smoking, using drugs, or medications, etc.	0	1	2	3
34. I took a big chance or did something very risky to solve the problem.	0	1	2	3
35. I tried not to act too hastily or follow my first hunch	0	1	2	3
36. I found new faith.	0	1	2	3
37. I maintained my pride and kept a stiff upper lip.	0	1	2	3
38. I rediscovered what is important in life.	0	1	2	3
39. I changed something so things would turn out all right.	0	1	2	3
40. I generally avoided being with people.	0	1	2	3
41. I didn't let it get to me; I refused to think too much about it.	0	1	2	3
42. I asked advice from a relative or friend I respected	0	1	2	3
43. I kept others from knowing how bad things were	0	1	2	3
44. I made light of the situation; I refused to get too serious about it.	0	1	2	3

Go on to next page

0 = Does not apply or not used 1 = Used somewhat 2 = Used quite a bit 3 = Used a great deal

45. I talked to someone about how I was feeling..... 0 1 2 3
46. I stood my ground and fought for what I wanted..... 0 1 2 3
47. I took it out on other people..... 0 1 2 3
48. I drew on my past experiences; I was in a similar situation before.... 0 1 2 3
49. I knew what had to be done, so I doubled my efforts to make things work..... 0 1 2 3
50. I refused to believe that it had happened..... 0 1 2 3
51. I promised myself that things would be different next time..... 0 1 2 3
52. I came up with a couple of different solutions to the problem. 0 1 2 3
53. I accepted the situation, since nothing could be done. 0 1 2 3
54. I tried to keep my feeling about the problem from interfering with other things. 0 1 2 3
55. I wished that I could change what had happened or how I felt..... 0 1 2 3
56. I changed something about myself..... 0 1 2 3
57. I daydreamed or imagined a better time or place than the one I was in. 0 1 2 3
58. I wished that the situation would go away or somehow be over with. 0 1 2 3
59. I had fantasies or wishes about how things might turn out..... 0 1 2 3
60. I prayed. 0 1 2 3
61. I prepared myself for the worst. 0 1 2 3
62. I went over in my mind what I would say or do. 0 1 2 3
63. I thought about how a person I admire would handle this situation and used that as a model. 0 1 2 3
64 I tried to see things from the other person's point of view. 0 1 2 3
65. I reminded myself how much worse things could be. 0 1 2 3
66. I jogged or exercised. 0 1 2 3

Stop Here.

Scoring the Ways of Coping Questionnaire

Raw Scores

To score the Ways of Coping Questionnaire, add the raw score for each item on the scale to get a total score. There are four possible responses 0, 1, 2, and 3. These are also the weights that should be used to get the raw score. Note that not all 66 items are scaled.

# of items	Item in the scale	Scale
6	6, 7, 17, 28, 34, 46	Confrontive Coping
6	12, 13, 15, 21, 41, 44	Distancing
7	10, 14, 35, 43, 54, 62, 63	Self-Controlling
6	8, 18, 22, 31, 42, 45	Seeking Social Support
4	9, 25, 29, 51	Accepting Responsibility
8	11, 16, 33, 40, 47, 50, 58, 59	Escape-Avoidance
6	1, 26, 39, 48, 49, 52	Planful Problem Solving
7	20, 23, 30, 36, 38, 56, 60	Positive Reappraisal

Raw scores describe the coping effort for each of the eight types of coping. High raw scores indicate that the person often used the behaviors described by that scale in coping with the stressful event.

Relative Scores

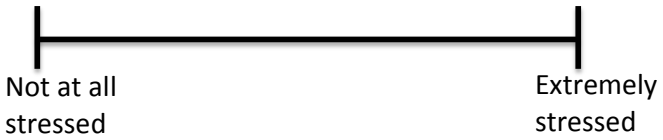
Relative scores describe the proportion of effort represented for each type of coping and are expressed as a percentage that ranges from 0 to 100. A high relative score on a scale means that the person used those coping behaviors more often than they used other behaviors.

To calculate the relative scores:

1. Calculate the average response per scale by dividing the total raw score by the number of items in the scale. For example, if the raw score for Confrontive Coping is 15 then the average response is 2.5 because there are 6 items on this scale.
2. Sum the average responses per scale across all the scales. For example, take the eight averages derived from 1 above and sum them.
3. Divide the average score for each scale (from 1) by the sum of the averages (from 2 above) for all 8 scales. This value is the relative score for the scale.

APPENDIX J: HEMODIALYSIS STRESS VISUAL ANALOG SCALE

Mark how stressed you feel towards hemodialysis when you think about the event.



APPENDIX K: DIALYSIS SYMPTOM INDEX

Appendix

Dialysis Symptom Index

Instructions

Below is a list of physical and emotional symptoms that people on dialysis may have. For each symptom, please indicate if you had the symptom during the past week by circling "yes" or "no." If "yes," please indicate how much that symptom bothered you by circling the appropriate number.

During the past week: Did you experience this symptom?		*If "yes": How much did it bother you?*				
		Not At All	A Little Bit	Some-what	Quite a Bit	Very Much
1. Constipation	NO					
	YES →	0	1	2	3	4
2. Nausea	NO					
	YES →	0	1	2	3	4
3. Vomiting	NO					
	YES →	0	1	2	3	4
4. Diarrhea	NO					
	YES →	0	1	2	3	4
5. Decreased appetite	NO					
	YES →	0	1	2	3	4
6. Muscle cramps	NO					
	YES →	0	1	2	3	4
7. Swelling in legs	NO					
	YES →	0	1	2	3	4
8. Shortness of breath	NO					
	YES →	0	1	2	3	4
9. Lightheadedness or dizziness	NO					
	YES →	0	1	2	3	4

During the past week: Did you experience this symptom?		If "yes": How much did it bother you? Not At All	A Little Bit	Some-what	Quite a Bit	Very Much
10. Restless legs or difficulty keeping legs still	NO YES →	0	1	2	3	4
11. Numbness or tingling in feet	NO YES →	0	1	2	3	4
12. Feeling tired or lack of energy	NO YES →	0	1	2	3	4
13. Cough	NO YES →	0	1	2	3	4
14. Dry mouth	NO YES →	0	1	2	3	4
15. Bone or joint pain	NO YES →	0	1	2	3	4
16. Chest pain	NO YES →	0	1	2	3	4
17. Headache	NO YES →	0	1	2	3	4
18. Muscle soreness	NO YES →	0	1	2	3	4
19. Difficulty concentrating	NO YES →	0	1	2	3	4
20. Dry skin	NO YES →	0	1	2	3	4
21. Itching	NO YES →	0	1	2	3	4
22. Worrying	NO YES →	0	1	2	3	4

During the past week: Did you experience this symptom?		If "yes": How much did it bother you? Not At All	A Little Bit	Some -what	Quite a Bit	Very Much
23. Feeling nervous	NO					
	YES →	0	1	2	3	4
24. Trouble falling asleep	NO					
	YES →	0	1	2	3	4
25. Trouble staying asleep	NO					
	YES →	0	1	2	3	4
26. Feeling irritable	NO					
	YES →	0	1	2	3	4
27. Feeling sad	NO					
	YES →	0	1	2	3	4
28. Feeling anxious	NO					
	YES →	0	1	2	3	4
29. Decreased interest in sex	NO					
	YES →	0	1	2	3	4
30. Difficulty becoming sexually aroused	NO					
	YES →	0	1	2	3	4

Are there any other symptoms not mentioned on this questionnaire that you have experienced during the past week? _____

The University of Pittsburgh Medical Center

VA Pittsburgh Healthcare System