

4-29-2019

## Implementing Fluid Education and Adherence with Hemodialysis Patients

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Doctor of Nursing Practice  
Final Project Report for Students Graduating in August 2019

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Date of Submission: April 29th, 2019

**Table of Contents**

Abstract .....3

Introduction .....5

    Background .....5

    Problem Statement.....7

    Organizational “Gap” Analysis of Project Site.....8

Review of the Literature .....9

Theoretical Framework/Evidence Based Practice Model/Conceptual Model.....14

Goals/Objectives/Expected Outcomes .....16

Project Design/Methods .....16

    Project Site and Population .....16

    Measurement Instrument(s) .....16

    Data Collection Procedure .....16

    Ethical Considerations/Protection of Human Subjects .....17

Data Analysis and Results.....18

Conclusion .....19

References .....20

Appendix

    Appendix A.....24

    Appendix B.....25

    Appendix C.....26

Abstract

*Background:* Outpatient hemodialysis (HD) requires patient compliance and adherence to their prescribed treatment, including fluid and dietary restrictions. Without compliance and adherence, patients are at an increased risk of morbidity and mortality. Regardless, hemodialysis patients continue to struggle with compliance and continue to have increased hospitalizations and mortality.

*Purpose:* The purpose of this project was to examine whether individualized education on the importance of fluid and dietary restrictions is done with hemodialysis patients will increase compliance.

*Methods:* An educational intervention was done with hemodialysis patients who were given a pre-assessment questionnaire to assess baseline knowledge before education. After education, a post-assessment questionnaire was completed to assess if the individualized education increased their knowledge.

*Implementation Plan:* Implementation of this project included pre-and post-assessment of hemodialysis patients' knowledge of fluid and dietary restrictions. Comparison of patients' pre- and post-intervention fluid weight gain was assessed, documented, and compared. The findings were shared with the dialysis unit staff and patients.

*Conclusions:* The post-assessment showed that there was an increase of knowledge among patients who participated. There was no significant correlation between understanding of fluid gain and patients' demographics. Patients' who adhered to their fluid restrictions had decreased fluid weight gain between their treatments and reported feeling better overall. As with some

hemodialysis patients, there were outlying factors that went beyond the control of the patient, including family involvement, living environment, and multiple chronic diseases which had conflicting dietary needs.

*Keywords: Chronic renal failure, hemodialysis, fluid restrictions, hemodialysis education*

## Introduction

Almost 30 million Americans are affected by chronic kidney disease (CKD) with hypertension and diabetes being the leading cause of CKD (National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), 2019b). End-stage renal disease, (ESRD) is often treated with hemodialysis (HD), but less than half of hemodialysis patients are compliant with their required fluid restrictions. Current evidence has shown that educating patients and their families helps patients have better compliance. A new educational model has the potential to help patients become more compliant, while decreasing the risk of mortality, morbidity, and hospitalization. By taking a step back from the current educational protocols and using the evidence that shows best practices for educating patients, advancement can be made towards implementing a protocol that is better aimed at increasing patient compliance. The purpose of this DNP project was to assess a new education model on fluid adherence for hemodialysis patients.

## Background

Chronic kidney disease is the presence of kidney damage for a period greater than three months (Levin et al., 2008). Currently, there is an estimated 370,000 patients who are now in end-stage renal disease and require hemodialysis (Center for Disease Control and Prevention [CDC], 2018). Patients who require hemodialysis have three treatments a week, with the annual cost of treating a single patient nearly \$88,000 (National Kidney and Urologic Disease Information Clearinghouse [NKUDIC], 2019).

Hemodialysis is the removal of electrolytes, harmful toxins, and fluids, and requires that the patient adhere to a prescribed fluid and dietary regimen (Barnett, Li Yoong, Pinikahana, & Si-Yen, 2008). Patients must adhere to a recommended restricted intake of no more than 32

ounces of fluid a day (NIDDK, 2019a). This restriction is due to the decreased kidney function, as the kidneys are unable to excrete excess fluid and they are unable to regulate electrolytes (Russell et al., 2011). When a patient is compliant with their prescribed treatment regimen, including fluid restrictions, dietary modifications, and medication regimens, a patient is more likely to have successful hemodialysis treatments (Shi et al., 2013). It is estimated that half of hemodialysis patients are non-compliant with their 32 ounces or less a day fluid intake (Beerendrakumar, Ramamoorthy, & Haridasan, 2018).

The high rate of non-compliance of hemodialysis patients with their restricted fluid regimen is directly correlated to increased morbidity and mortality within this population (Baraz, Broumand, Mohammadi & Parvardeh, 2010). Patients who adhere to their hemodialysis treatment have improved quality of life and decreased risk of stroke, heart attacks, and death (NIDDK, 2019a). A lack of knowledge pertaining to the importance of fluid restriction has been associated with non-compliant behavior in hemodialysis patients (Ibrahim, Hossam, & Belal, 2015). An educational intervention aimed to both hemodialysis patients and their families in hopes of increasing compliance would help to decrease morbidity, mortality, and hospitalizations.

The National Kidney Disease Education Program (NIDDK, 2019b) recommends education for all hemodialysis patients before their first hemodialysis treatment along with ongoing education. It has been shown that patients who receive education that is accurate, timely, complete, and unambiguous are more likely to understand, manage, and be involved in their own health. The goal of this project is to implement an educational model for patients to be able to follow and understand in hopes of decreasing their non-compliance as it pertains to their fluid regime.

### **Problem Statement**

There is a current lack of adequate education given to end-stage renal failure patients, leading to increased mortality and morbidity as well as increased hospitalizations. Currently, patients are educated on restricting their fluids upon admission to an outpatient hemodialysis unit. While education may be reiterated, it is not evaluated to see if patients understand the education given. With a lack of education understanding, there is an increase of mortality and morbidity with hemodialysis patients. This lack of education understanding leads to the question: Do end-stage renal failure patients who receive education on the importance of fluid adherence that has been tailored to them, have better outcomes compared to patients who only receive education upon admission?

### **Practice Gap Analysis**

A large outpatient dialysis clinic is currently doing education on the importance of adherence to fluids only upon admission to the dialysis units. While there are reminders to stay within the limits of 32 ounces or less per day, there is no continued or on-going education. There is a lack of on-going education that is seen throughout most FMC facilities.

### **Stakeholder Assessment**

The stakeholders for this project include: administrators (clinical managers, director of operations, and quality managers), organizational liaisons [Staci Price and Betsey McIntyre], advanced providers (doctors, nurse practitioners and physician assistants), nurses, patients, and patients' family members. All the above-mentioned stakeholders helped with the influence of direction as related to the project. The directors were key in helping facilitate communication among stakeholders and be champions in supporting change. The nurses were actively involved



in educating patients. They also provided feedback and facilitated patient involvement. Patients were active in making changes through education and giving feedback.

### **Perceived Barriers**

The main barriers to this project were implementation of the education as most dialysis units were extremely short staffed. Other anticipated barriers were provider buy in and patient buy in. Often the providers do quick education, however, they tend to not spend a lot of time educating patients, leaving it to the nurses. Patients may verbalize that they want this education, but once given the education, they do not want to follow through. While change is almost always difficult to embrace, once the nurses, providers, and patients are committed to the process, the change will have a positive effect on the patients.

### **Organizational Readiness/SWOT**

A SWOT assessment was been performed to determine issues inside of the organization and their organizational readiness. See Appendix A for the SWOT evaluation.

### **Procedure for Implementation**

This project moved forward due to initial buy from the administrators to allow this researcher to gain access to the other stakeholders. Once access was granted stakeholders, education was done with the above-mentioned stakeholders (administrators, clinical managers, director of operations, quality managers, organizational liaisons [Staci Price and Betsey McIntyre], advanced providers nurses, patients, and patient's family members) on how evidence-based research helped adhere to their dialysis treatment. A pre-intervention questionnaire was completed to assess the patient's baseline knowledge of fluid adherence and side effects of not

complying. After six dialysis treatments, the questionnaire was again given to patients to see if the educational intervention made a difference.

### **Literature Review**

As noted previously, non-compliance of hemodialysis patients with their restricted fluid regimen is directly correlated with increased morbidity and mortality within this population (Baraz, Broumand, Mohammadi & Parvardeh, 2010). Chilcot, Wellstend, & Farrington (2010) examined whether hemodialysis patients who were non-adherent to their fluid restrictions had more illnesses compared to patients who were compliant with their fluid restrictions. The authors concluded that fluid compliance was a predictor in the patients' ongoing health; patients who were more compliant had better health outcomes compared to their non-compliant counterparts.

Hong, Wang, Chan, Mohamed, and Chen (2017) examined hemodialysis patient perceptions of fluid restrictions. Patients reported a daily struggle pertaining to their fluid intake, along with frustration with the fluid restrictions and how their lives are controlled by the restrictions of being on hemodialysis. The patients talked about the constant temptations and daily struggles, the time it took to adjust to fluid restrictions, and negative reinforcement. The patients' perception of the quality of their support system weighed heavily with patients. Family, social, and religious support were acknowledged as pillars for all patients and professional support was noted as an important influence to adhering to fluid restrictions. However, patients reported that they were often frustrated with the recommendations that nurses, dieticians, and doctors gave, saying that the restrictions were unrealistic. Lastly, patients reported that they had a knowledge deficit related to fluid restriction. While patients tried to control their fluid restriction, they noted that most of their fluid consumption was done with estimation, not

measuring. The study concluded that fluid restrictions are better followed when a patient is educated and supported, leading to better health outcomes (Hong et al., 2017). Yokoyama et al. (2009), examined the effects of dialysis staff and their encouragement of patients to adhere to their fluid restrictions concluding that while family and social support are important to helping a patient be compliant, the dialysis staff is a positive factor in helping patients improve their fluid control adherence. Barnett, Yoong, Pinikahana, & Si-Yen (2007) found that nephrology nurses, due to their ongoing relationships with patients, are well placed to provide continued encouragement and education to their hemodialysis patients.

Beerendrakumar, Ramamoorthy, & Haridasan (2018), in a cross sectional survey looking at adherence to fluid restrictions in the CKD population, utilized education, led by hemodialysis nurses, on the importance of patient compliance. The authors concluded that after education with the nurse, only 6% of the patients had continued non-adherence to their fluid restrictions and that improved education, as well as communication with patients and their family, increased their compliance (Beerendrakumar et al., 2018). Yue-Xian, and colleagues (2013), also concluded that nurse-led education makes a difference in patient's compliance to their fluid, dietary, and medication restrictions. Patients receiving routine education on fluid, dietary, and medication restriction were compared to patients who received intensive, individualized education on fluid restriction, led by hemodialysis nurses. Authors Matteson and Russell (2010) explored a systematic review of randomized-controlled trials done to analyze different interventions to increase patient adherence. The findings of the review showed that 75% of the studies that used increased education as the intervention had statistically significant improvement in patient's adherence to fluid restrictions.

A randomized controlled trial conducted by Sharp, Wild, Gumley, & Deighan (2005), examined whether hemodialysis patients who underwent cognitive behavioral group therapy were more likely to adhere to their fluid restrictions. Patients who were part of the experimental group had increased adherence to their fluid restrictions compared to the patients who were part of the controlled group. The authors concluded that patients who were provided education with cognitive behavioral group therapy had better outcomes.

Collectively research has shown that an educational intervention to hemodialysis patients does increase the patient's adherence to their fluid restrictions. This is significant as adherence can increase the longevity and quality of a patient's life, while decreasing their mortality. However, the research shows that there is not one set way to educate this patient population. Often education needed to be done on a case by case basis for what will work best for the clinic staff and the patients.

### **Theoretical Framework/Evidence Based Practice Model**

#### **The Health Belief Model**

The Health Belief Model (HBM) is a middle range theory that puts an emphasis on a patient having an active role in their own health to prevent or manage a disease. It also seeks to predict how a patient will behave and react under certain conditions (Rosenstock, 1974). The HBM states that a patient's behavior with regards to their health is molded by their perception of these areas: susceptibility of an illness, severity of an illness, benefits, and barriers. A hemodialysis patient perceived susceptibility to an illness- how a patient will perceive their risk of developing complications from non-compliance of their fluid regimen, leading to fluid overload. The severity of their illness and a patient's opinion of how serious a disease and its

consequences would be. The benefits of taking preventive actions- a patient is more likely to establish healthy behavior that will lead better health outcomes. The barriers that a patient must make to change their behavior- if the hemodialysis patient is able to see the benefits of adhering to their prescribed hemodialysis treatment, there will be an increased likelihood of the patient changing.

### **Change Model**

Lewin's Change Theory is based on the concept that there are forces that are working against each other and in opposite directions; they need to be better understood in order to promote change (Wojciechowski, Murphy, Pearsall, & French, 2016). Lewin's Change Theory focusing on three stages: unfreezing, change, and refreezing (Wojciechowski et al., 2016). During the unfreezing stage, it is important to let go of processes and protocols that do not work in order to implement practices, processes, and protocols which are evidence-based. During the second stage, change must occur, this change could be done by education, coaching, or training to show the benefits of change. Lastly, the final stage is refreezing, this occurs when the new practice, process, or protocol becomes standardized (Wojciechowski et al., 2016). By using this theory, it will allow change to be accepted even when the change is met with resistance.

### **Goals/Objectives/Expected Outcomes**

The large outpatient dialysis unit needed to consider alternative methods for educating their patients on adhering to their prescribed fluid restrictions. By educating the patients individually and using Lewin's Change Model, patients could have better outcomes. The expected outcome for this project was that individualized education would be done with patients and there would be an increase in their fluid restriction adherence. Recommendations to the dialysis unit would include ongoing education with patient, better education with patients upon

admission, and more education with the hemodialysis staff on how to best educate patients on the importance of fluid restriction.

## **Design and Methods**

### **Project Site and Population**

The project took place in an outpatient dialysis unit outside of Indianapolis, Indiana. In this area, the median income is \$90,852 compared to \$53,470 for the nation (US Census Bureau, 2010). Caucasians make up the majority (84%) of the residents in Noblesville. African American (4.4%), American Indian and Alaska Native (0.2%), and ASIAN (6.2%) represent the rest of the race. Persons who hold a high school diploma or higher make up 96.2% of the population and more than 59% of the population have a bachelor's degree or higher.

The sample of outpatient hemodialysis patients included 20 participants. Inclusion criteria for this project included patients who were 18 years old and older, without any cognitive impairment, able to read, write, and speak in English, and were willing to be part of the project. Patients were excluded if they had any cognitive impairment or were unwilling to participate in the project. A total of 20 hemodialysis patients participated in the study, 15 (75%) were white, 3 (14%) were African American, and 2 (1%) were Latino or Hispanic. The patient's education level varied, with 12 (60%) of the patients having completed college. The remaining 6 (40%) patients had obtained a high school diploma or completed their General Educational Development (GED). Ten (50%) of the patients were male and 10 (50%) of the patients were female. The marital status of the patients was as follows; eight patients were married (40%), 4 (20%) were widowed, 7 (35%) were single, and 1 (0.5%) was divorced. The mean age of all 20

patients was 62 years old with a standard deviation of 17.70; the youngest patient was 35 years old and the oldest patient was 92 years old. Thirteen patients (65%) had been on dialysis for less than five years, and 7 (35%) had been on dialysis for greater than five years (see Table 1). The demographic questionnaire that was used can be found in Appendix B. This project was carried out in outpatient hemodialysis units while patients were attending their dialysis treatments. All education and interventions were provided during each patient's hemodialysis time.

Table 1

<b>Race</b>	<b>n (%)</b>
White	15 (75%)
African American	3 (14%)
Hispanic	2 (1%)
<b>Gender</b>	<b>n (%)</b>
Male	10 (50%)
Female	10 (50%)
<b>Years on Dialysis</b>	<b>n (%)</b>
1-5 years	13 (65%)
>5 years	7 (35%)
<b>Mean Age</b>	62 (sd 17.70)
<b>Age Range</b>	35-92

### Data Collection

All 20 patients were assessed for their prior knowledge of fluid restrictions for hemodialysis patients using a pre-intervention questionnaire. This questionnaire (see appendix C) was given to the patient prior to any educational interventions. After the intervention, the patients completed the same questionnaire to assess their increase in knowledge.

### Educational Intervention

Education was done one-on-one with patients, while they were undergoing their hemodialysis treatment. Two different sessions were done with each patient, lasting 45 minutes. The following information was included in the intervention:

- 1) Prevalence of ESRD, how the kidneys function, and potential complications of ESRD.
- 2) The importance of fluid restriction,
- 3) Identifying fluid content of various foods
- 4) How to best control patient's fluid intake, using measuring cups and water bottles.
- 5) Appropriate strategies for when a patient is in fluid overload.

### **Materials**

The educational intervention materials used included full 12-ounce water bottles, empty 12-ounce water bottles, 1 cup measuring cups, and folders that were provided to the patient to take home. Inside of the folders were a pen, a notebook, and handouts on fluid restrictions and what fluids were. All handouts were available in either Spanish or English as needed per the patients' request. All education handouts were obtained from The American Kidney Fund.

### **Ethics and Human Subject Permission**

The Institutional Review Board (IRB) for site-specific approval was been obtained as necessary prior to initiating this DNP project. Exempt status from Marian University IRB was granted. Confidentiality of patient information was maintained by keeping all forms in a locked file at all times, unless data was being used. The locked file was kept in the primary researcher's home office, the researcher had the only key. Patients were informed of how their personal information would be protected and what would be done with the data collected.



**Data Analysis and Results**

To best analyze the data, the Statistical Package for the Social Science® (SPSS) was used. Dry weight before education for six treatments were collected and mean weights were calculated using SPSS; dry weights after education for six treatments were collected and mean weights were calculated using SPSS.

Patients were first educated on the first Monday of the month, with their second session on the first Wednesday of the month. Prior to starting the educational intervention, the average fluid weight gain was 4.1kgkg (SD 1.39). Patients were monitored for six hemodialysis treatments after both educational session; from the first Friday of the month to the third Friday of the month. During those treatments, the average fluid weight gain was 2.41kg (SD 0.46). See Table 2 for this data.

**Table 2**

Patient	Pre-Educational Weight gain	Post-Education Weight gain,					
		TX 1	TX 2	TX 3	TX 4	TX 5	TX 6
1	3.6kg	3.5kg	2.8kg	2.5kg	2.5kg	2.5kg	1.8kg
2	4.8kg	4.0kg	3.7kg	3.0kg	2.8kg	2.5kg	1.6kg
3	5.2kg	3.4kg	3.0kg	2.8kg	2.5kg	2.5kg	1.8kg
4	1.8kg	1.9kg	1.6kg	1.6kg	1.6kg	1.6kg	1.2kg
5	3.5kg	3.6kg	2.9kg	2.5kg	2.5kg	2.5kg	1.6kg
6	4.2kg	3.2kg	2.5kg	2.5kg	2.5kg	2.5kg	1.8kg
7	2.1kg	2.0kg	2.0kg	2.0kg	2.0kg	2.0kg	1.2kg
8	5.4kg	4.5kg	3.9kg	3.5kg	2.8kg	2.5kg	1.8kg
9	3.8kg	3.5kg	3.0kg	2.8kg	2.5kg	2.5kg	1.6kg
10	3.7kg	2.9kg	2.5kg	2.5kg	2.5kg	2.5kg	1.8kg
11	4.1kg	3.2kg	3.0kg	2.8kg	2.5kg	2.5kg	1.6kg

12	3.8kg	3.4kg	2.8kg	2.5kg	2.5kg	2.5kg	1.8kg
13	3.3kg	2.0kg	1.6kg	1.6kg	1.6kg	1.6kg	1.2kg
14	6.2kg	4.0kg	3.7kg	2.8kg	2.5kg	2.5kg	1.6kg
15	4.6kg	3.6kg	2.8kg	2.5kg	2.5kg	2.0kg	1.7kg
16	4.3kg	3.2kg	3.0kg	2.8kg	2.8kg	2.5kg	1.8kg
17	2.8kg	1.9kg	1.9kg	1.9kg	1.6kg	1.4kg	1.2kg
18	2.6kg	3.4kg	3.0kg	2.6kg	2.5kg	2.0kg	1.6kg
19	7.8kg	4.5kg	4.1kg	3.6kg	2.8kg	2.5kg	1.7kg
20	2.6kg	2.0kg	2.0kg	1.6kg	1.6kg	1.4kg	1.2kg
	<b>Mean:</b>						
	<b>4.1kg</b>	<b>3.1kg</b>	<b>2.7kg</b>	<b>2.52kg</b>	<b>2.35kg</b>	<b>2.25kg</b>	<b>1.58kg</b>
	<b>SD: 1.39</b>	<b>0.8</b>	<b>0.7</b>	<b>0.54</b>	<b>0.41</b>	<b>0.4</b>	<b>0.23</b>

### Qualitative Data

All patients that participated verbalized the importance of the educational intervention. Only two patients (15%) stated that they would not be using the educational materials utilized during the intervention. However, the remaining 18 patients (85%) found the education helpful and would likely continue monitoring their fluids more carefully. Comments about the intervention included:

*"I don't understand why this wasn't done when I first started... it was so helpful"* (45-year-old White female).

*"I have been a dialysis patient for 23 years and I thought that I understood how to control my fluids. This helped show me how to control them"* (92-year-old African American male).

*"I understand the importance of my fluid restriction; it isn't just something my doctor tells me to do"* (35-year-old Hispanic female).

Overall, all 20 patients agreed that they felt better following their fluid restrictions and had a greater understanding of the importance of restricting their fluids.

### **Conclusion**

Prior to patients completing the educational intervention, there is a knowledge deficit in the hemodialysis patient population. By providing one-on-one education with patients, their knowledge of the importance of fluid restrictions increased. By reducing their fluids between hemodialysis treatments, patients felt that their overall health was better. In 2018 Beerendrakumar et al., conducted a study that was confirmed by what this doctoral project found: Patients who received education by hemodialysis nurses on the importance of fluid adherence were more likely to decrease their intake of their daily allowed fluid and increase their adherence. In a prospective randomized controlled trail by Yue-Xian et al., (2013), the results were echoed that patients were more likely to adhere to their fluid restriction if tailored education was done on their educational level.

This doctoral project found that patients do struggle with adhering to their fluid restrictions, which Hong et al., (2017) found as well. In the study by Hong et al., (2017), patients were often frustrated with the staff on the lack of education given, which echoed the findings of this doctoral project. Furthermore, during this project patients reported the daily struggled of fluid control, which Hong et al., (2017) also found to be true during their exploratory qualitative study.

The literature as well as this doctoral project, shows that hemodialysis patients need to have one-on-one education done more than once and not just at the time of admission. Patients

who have tailored education and ongoing education are more likely to adhere to the fluid restrictions. By adhering to their daily fluid restrictions, patients had better control over their estimated dry weights, which decreases their chances of mortality and hospitalizations.

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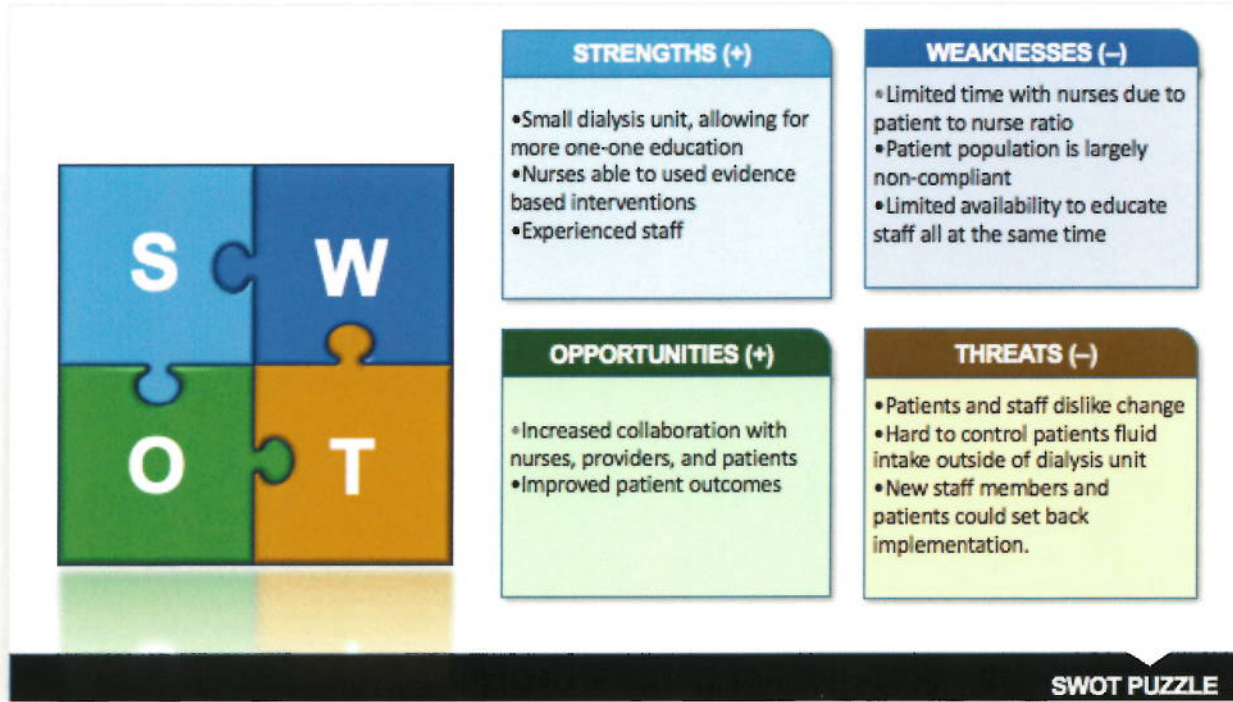
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### Appendix A

#### SWOT Analysis





## Appendix B

### Demographic Questionnaire

- 1) Gender
  - a. Male
  - b. Female
- 2) Race/Ethnicity
  - a. American Indian or Alaska Native
  - b. Asian
  - c. Black or African American
  - d. Caucasian or White
  - e. Hispanic or Latino
- 3) Level of Education
  - a. Graduate Degree
  - b. Undergraduate Degree
  - c. Attended college but did not complete
  - d. High School diploma or equivalent
  - e. Less than high school
- 4) Number of years on hemodialysis
  - a. 1-5 years
  - b. 6-10 years
  - c. 11-15 years
  - d. Greater than 15 years
- 5) Age: \_\_\_\_\_

Appendix C

Fluid Questionnaire

- 1) I know my estimated dry weight
  - a. No
  - b. Yes
- 2) Hemodialysis helps to remove waste and fluids from my body, replacing all kidney function
  - a. No
  - b. Yes
  - c. Unsure
- 3) To help control my fluid intake, I can:
  - a. Suck on frozen grapes
  - b. Use smaller cups to drink from
  - c. Measure my fluid intake
  - d. All of the above
- 4) I would like to have help understanding how to best control my fluid intake
  - a. No
  - b. Yes
- 5) I understand what fluid restriction is
  - a. No
  - b. Yes
- 6) The importance of fluid restriction has been explained to me
  - a. No
  - b. Yes
- 7) There is ongoing education given to me about fluid restriction.
  - a. No
  - b. Yes
- 8) The risks of not adhering to my fluid restriction intake have been explained to me
  - a. No
  - b. Yes
- 9) Drinking or eating too much fluid can cause:
  - a. Increased blood pressure
  - b. Difficulty breathing
  - c. Edema
  - d. Being hospitalized
  - e. Death
  - f. All of the above
- 10) Anything that melts from a solid into a liquid at room temperature is considered fluid
  - a. No
  - b. Yes
  - c. Unsure
- 11) Please list what you consider to be a liquid
  - a. \_\_\_\_\_
- 12) Estimated dry weight before education:

- a. \_\_\_\_\_kg
  - b. \_\_\_\_\_pounds
- 13) Estimated dry weight after education
- a. \_\_\_\_\_kg
  - b. \_\_\_\_\_pounds