Decreasing Fluid Overload in Hemodialysis Patients in a Rural Clinic: Providing Multilingual Educational Brochure with Images

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Practice Inquiry Project

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Abstract

Fluid overload is a common issue for hemodialysis (HD) patients due to required fluid restrictions. Maintaining fluid restriction can be very difficult for this population. Chronic kidney disease is defined as kidney injury or damage resulting in an inability to filter the blood efficiently. Kidney damage results in waste and fluid accumulation in the body, which causes other organs to malfunction. With end-stage renal disease (ESRD) or kidney failure, patients without kidney transplants who receive HD treatment have regimented fluid and diet restrictions. The alteration of fluid intake and diet modifications are often very challenging for ESRD patients. With the coexistence of other diseases, such as diabetes and hypertension, these patients take many different types of medications concurrently. This often creates a substantial financial burden, depression, and other personal issues for these patients. Fluid overload in patients undergoing HD treatment is common due to difficulty managing fluid intake, which may be related to language barriers. Filipino patients with language barriers may not completely understand the English language during educational orientation regarding fluid and sodium restrictions. Providing a brochure with images and translations into Tagalog (Philippines national language) dialects could be very helpful. There are approximately 60 Filipino HD patients served by the project clinic, and Tagalog is primarily spoken by approximately 50% of these patients. The brochure should aid HD patients in understanding fluid intake restrictions. Education of fluid and sodium restrictions should be performed with HD patients frequently and continuously each treatment reinforcing the patient's knowledge of the previous teaching with a multilingual educational brochure with images.

***Keywords**:* Filipino, Tagalog, dialysis, fluid overload, ESRD, end-stage renal disease, kidney failure

Chapter One: Statement of the Problem, Aims, and Objectives

Hemodialysis (HD) is a type of treatment that includes the removal of extra fluid and waste that accumulates in the body for patients with end-stage renal disease (ESRD) or kidney failure. The National Institute of Diabetes and Digestive and Kidney Diseases (2021) states that in 2020, there were 786,000 individuals with ESRD living in the United States. Furthermore, as of 2021, approximately 71% or 558,060, were undergoing HD treatment, and 29%, or 227,940, received renal transplants in the United States (National Institute of Diabetes and Digestive and Kidney Diseases, 2021). The annual expenditures for chronic kidney disease rose from 34.8 billion in 2009 to 49.2 billion in 2018 (United States Renal Data System, 2020). Fluid overload occurs in more than 50% of HD patients, causing difficulty for patients tolerating HD treatment because of a direct decrease in cardiac reserve (Sangala et al., 2020). Approximately 17% of patients experience hypotension during dialysis treatment, which is also known as intradialytic hypotension (IDH). Furthermore, asymptomatic hypotension is experienced in nearly 26% of ESRD patients during dialysis treatment (Sangala et al., 2020). The sudden removal of large excess fluid in the body could result in hypotension for some HD patients.

Following fluid restrictions can be challenging for HD patients; due to this, fluid overload often results. Fluid overload is defined as intradialytic weight gain (IDWG) of ≥ two kilograms (kg) above the HD patient's estimated dry weight (EDW) (Fresenius Kidney Care, 2020). Fluid overload is one of the causes of HTN, heart failure, and increased morbidity and mortality in HD treatment patients (Hansen, 2021; Loutradis et al., 2021; Sangala et al., 2020). One of the most common challenges in HD patients is managing interdialytic weight gain (IDWG). Interdialytic weight gain is the fluid weight gain between two successive treatments (Sangala et al., 2020). Significant IDWG produces complications such as hypertension, peripheral edema, ascites,

pleural effusion, heart failure, decreased quality of life, and death (Loutradis et al., 2021; Palmer & Clegg, 2020).

Controlling sodium intake is a significant element of maintaining fluid volume and should be monitored by monthly blood work (National Kidney Foundation, 2017; Palmer & Clegg, 2020). Continuing education concerning fluid intake and lifestyle changes is a long-term commitment. Providing education on keeping track of fluid intake, such as via a diary and controlling sodium intake to manage thirst, is highly significant for HD patients (Wong et al., 2017).

Patient understanding of fluid and sodium restrictions is critical to reduce fluid overload and its complications. Amongst the HD population at an outpatient rural HD clinic in Hilo, Hawai'i, fluid overload and its complications are common. Evidence showed that an educational brochure provided in a regional language was a beneficial and effective tool in adherence to fluid restrictions when patients were provided education along with a brochure (Amin et al., 2023; Baser & Mollaoğlu, 2019). Thus, the fluid overload complications experienced by the clinic HD patients may be due in part to language barriers. An intervention to revise the current fluid and sodium intake educational handout from the project HD clinic using evidence-based culturally congruent translation and images may help to decrease this issue. Tagalog is the official language of the Philippines and is commonly spoken by first-generation Filipinos (Imperio et al., 2008). The clinic serves 250 total patients. Of these 250 total patients, approximately 60 HD Filipino patients were diagnosed. Of the 60 Filipino patients, 50% speak Tagalog as their first language, 5% speak only Ilocano, and 45% speak English as their first language. The educational brochure for the HD clinic was revised and includes detailed instructions in both English and Tagalog languages. The brochure also features images that demonstrate how to measure fluid

and sodium intake, making it easier for patients to understand and follow. Furthermore, the brochure provides information on the recommended fluid gain or intake between HD treatments, helping patients maintain the appropriate levels of hydration.

Background of Problem Significance

In Hawai‘i, the prevalence of diabetes is exceptionally high, and it is the leading cause of kidney failure (Uchima et al., 2019). Native Hawaiian/Other Pacific Islanders (NHOPIs) and Filipinos have the highest prevalence of diabetes in Hawai’i (Hawai’i Health Data Warehouse, 2014). The recommendation is that more studies are needed to reduce diabetes disparities in NHOPIs and Filipinos. The significance of education and understanding of the disease may help prevent the ever-increasing amount of diabetes in NHOPIs and Filipinos (Uchima et al., 2019). Filipino Americans are the third-largest Asian group living in the United States. However, they have higher rates of type 2 diabetes than other Asian Americans, with a prevalence rate of 10%. This rate is higher than the prevalence rate for Chinese Americans (5.6%) and other Asian Americans (9.9%) (Tolentino & Brynes, 2024).

Moreover, NHOPIs and Filipinos are at the greatest risk of CKD since type 2 diabetes is highly prevalent among them (Kovesdy, 2022). Kidney failure occurs when the kidneys stop functioning due to chronic kidney disease (CKD) progression or acute kidney injury (Gupta et al., 2021). Dialysis is a treatment option for individuals with kidney failure. HD and PD are two types of treatments for ESRD. Fluid overload, caused by unmanaged fluid intake, is a common complication for HD patients (Lopez & Banerjee, 2021).

Excessive fluid intake in HD patients can cause discomfort in mild cases; however, severe fluid overload can cause damage to the body and organs (Assimon et al., 2016; Fresenius Kidney Care, 2020; Saha & Allon, 2017). Signs and symptoms of fluid overload include

tachycardia, rapid weight gain, evident edema in arms, legs, and face, edema in the abdomen, cramping, headache, stomach bloating, shortness of breath, high blood pressure, heart failure, other cardiac issues (Fresenius Kidney Care, 2020; Khan et al., 2016; National Kidney Foundation, 2017). Chronic fluid overload can contribute to the development of systemic hypertension, enlargement of the left ventricular chamber of the heart, and cardiovascular mortality (Khan et al., 2016; Park et al., 2020; Tsai et al., 2015). Furthermore, HD patients with fluid overload have been shown to experience respiratory system disorders such as "pulmonary edema, pleural effusion, acute respiratory distress syndrome, pulmonary fibrosis and calcification, pulmonary hypertension, hemosiderosis, pleural fibrosis, and sleep apnea syndrome" (Yilmaz et al., 2016 para 5). The annual expenditures for chronic kidney disease rose from 34.8 billion in 2009 to 49.2 billion in 2018 (United States Renal Data System, 2020).

The critical shortage of nephrologists is also why ESRD is significantly high in Hawai‘i (Na'ai & Raphael, 2019). This shortage creates a huge problem because a high number of dialysis patients are NHOPIs and often will not fly or travel to Oahu; hence, most of the first initiation of HD is emergent treatment due to fluid overload and azotemia. For emergency HD treatment, a vascular access placement of the central venous catheter is established. Often, patients have to travel several times to secure vascular access for dialysis treatment. These issues significantly increase the costs for patients and families, which can be unaffordable or very costly for those with low income and can lead to significant delays in receiving medical care (Na'ai & Raphael, 2019).

Problem Statement

Fluid overload in patients undergoing HD treatment was common due to difficulty managing fluid and sodium intake, which may be related to language barriers. Some patients

may not entirely understand fluid restrictions and complications of fluid overload because of language barriers.

Nurses should provide education to HD patients and reinforce previous teaching with visual tools or handouts (Sharaf, 2016). Additionally, education should be available in primary languages with images to increase HD patients' understanding regarding the nature of the fluid restrictions, monitoring sodium intake, and the complications of fluid overload (Amin et al., 2023).

Goals of the Project

The practice inquiry project's (PIP) primary goal was to decrease fluid overload in patients undergoing HD treatment in the project clinic.

Specific Aims and Objectives

Aim 1

Measure baseline data of patients experiencing fluid overload at the project's clinic site.

Objective 1. Collect baseline data on patient fluid overload at the project's HD clinic site.

Objective 2. Collect baseline data on the number of clinic HD patients with fluid overload Emergency Department (ED) admissions.

Objective 3. Analyze the pre-intervention baseline data.

Aim 2

Design the project intervention.

Objective 1. Select appropriate evidence-based interventions to be included in the revised HD clinic handout.

Objective 2. Revise the project HD clinic fluid intake handout.

Objective 3. Design the project implementation phase plans/guidelines.

Aim 3

Implement the project intervention.

Objective 1. Present the revised fluid and sodium intake brochure, project implementation phase plans/ guidelines, stages of implementation, and baseline data results to the Medical Director of the project HD clinic.

Objective 2. Provide RNs, dieticians, and staff copies of the revised brochure and educate them regarding the revised brochure in the project's HD clinic. Implement the brochures by following the guidelines of the project.

Objective 3. Give HD patients continuous feedback on their progress.

Aim 4

Collect outcome data and analyze the effectiveness of the project interventions on decreasing fluid overload and related hospital ED visits in the HD clinic patients.

Objective 1. During the time period of the intervention (four weeks), record the number of patients who had IDWG ≥ of two kg above their EDW and record the number of HD patients who had ED with IDWG ≥ of two kg above their EDW.

Objective 2. Analyze the data gathered to determine if there was a decrease in the frequency of HD clinic patients of IDWG of ≥ two kg over their EDW between the pre-and post-intervention and the number of HD patients with ED visits with IDWG of ≥ two kg over their EDW during the four-week period of the intervention.

Objective 3. Disseminate project results.

Chapter 2: Review of Literature and Conceptual Framework

In conducting the literature review for the project, the author utilized keywords such as fluid overload, HD, rural, Hawai‘i, Filipino, Tagalog, ESRD, hospitalizations, readmission, education, complications, and knowledge. The search engines utilized for this literature review were Medline, EBSCO, Cochrane Library, PubMed, and Google Scholar. During the search, each article's abstract was read for relevancy. Relevant articles were downloaded or printed for utilization in the project.

Review of Literature

In the United States, Filipinos are 1.44 times more likely, and Native Hawaiians are 1.50 times more likely to face a higher risk of early kidney damage than other racial/ethnic groups in Hawai‘i. This may be partially explained by their higher chronic disease rates (Rowan, 2020). Chronic kidney disease (CKD) is described as acute or chronic damage of the kidneys due to unmanaged diabetes mellitus type 2, hypertension, polycystic kidney disease, glomerulonephritis, and trauma (Johansen et al., 2022; Vaidya & Aeddula, 2022). Chronic kidney disease progresses to different stages of increasing severity, finally ending in ESRD. The following listed below are the stages of CKD, as provided by the National Kidney Foundation in 2024.

- Stage 1- the estimated glomerular filtration rate (eGFR) ≥ 90 and kidney damage for ≥ 3 months
- Stage 2- eGFR 60-89 and kidney damage for ≥ 3 months
- Stage 3a- mild to moderate loss of kidney function with the eGFR 45-59 and kidney damage for ≥ 3 months

- Stage 3b- moderate to severe loss of kidney function with the eGFR 30-44 and kidney damage for $\geq$ 3 months
- Stage 4- severe loss of kidney function with the eGFR 15-29 and kidney damage for $\geq$ 3 months
- Stage 5- kidney failure with eGFR $<$ 15 and kidney damage for $\geq$ 3 months. At this time, the patient is receiving dialysis treatment.

If not detected early, CKD advances faster to renal failure and requires dialysis treatment or renal transplant (National Institute of Diabetes and Digestive and Kidney Diseases, 2021; National Kidney Foundation, 2024; Vaidya & Aeddula, 2022).

Patients with ESRD undergoing HD treatment are at high risk of complications; the most common is fluid overload, which can be life-threatening (Lopez & Banerjee, 2021; Ogbu et al., 2015). Patients undergoing hemodialysis treatments face difficulties in monitoring fluid and diet restrictions, especially those with low health literacy and language barriers (Muscat et al., 2018).

Chronic Kidney Disease Complications and Contributing Factors

Patients with kidney disease may not present symptoms until it is too late and frequently progresses to ESRD, which can also lead to stroke or heart attack (National Institute of Diabetes and Digestive and Kidney Diseases, 2023). ESRD patients require dialysis or kidney transplants for survival (Hashmi et al., 2023). Fifty percent of deaths in ESRD patients are caused by cardiovascular, pulmonary edema or acute heart failure, pleural effusion, and chronic heart failure (Assimon et al., 2016; Fresenius Kidney Care, 2020; Park et al., 2020). Fluid overload is by itself a high predictor of cardiovascular death in patients undergoing dialysis treatment (Antlanger et al., 2013; Tsai et al., 2015; Zoccali et al., 2017). Patients diagnosed with ESRD have difficulty managing fluid, diet restrictions, and sodium intake, which are significant life

changes that the patients must undertake to maintain a healthier quality of life (Sangala et al., 2020; Zoccali et al., 2017). According to Angeles-Agdeppa and Custodio (2020), Filipinos consume a high amount of sodium, with 52% exceeding the recommended intake. Support and continuous education must be provided to HD patients to help them maintain balance and to decrease or prevent fluid overload, which can have life-threatening consequences (Inkeroinen et al., 2021; Murali et al., 2019).

A study by Tsai et al. (2015) of 478 participants with stage 4 and stage 5 CKD diagnoses in Taiwan found that fluid overload is a frequent sign of renal advancement to ESRD or CKD. In this study, the age of the patients was not mentioned, although there were some exclusions, such as patients with disabilities, pacemaker implantation, and impaired skin integrity. The participants received HD treatment for at least three months or more to ensure the EDW stabilized. The study examined the relationship between fluid overload, cardiovascular morbidity, and all-cause-related death in ESRD patients. The association between the severity of the fluid status and clinical results in the progression of ESRD or CKD was studied (Tsai et al., 2015). The researchers utilized a bioelectric impedance spectroscopy system to determine the overall amount of fluid in the body in patients with stage 4 and stage 5 CKD. The results showed that fluid overload is linked with cardiovascular morbidity and high risk for all-cause mortality (Antlanger et al., 2013; Tsai et al., 2015) and is one of the worst consequences in stage 4 and stage 5 CKD patients (Tsai et al., 2015). The study described the effect of fluid overload in CKD patients on the blood vessels and endothelial levels, including hardening of the arteries, atherosclerosis, and enlargement of the left ventricle (Tsai et al., 2015).

There were a few limitations to this study. The first limitation was that the study was done in a single HD clinic. Second, the fluid level, clinical considerations, and medications that

the patients took were assessed or examined only once during initial registration to the clinic. Third, no measurements or urine samples were taken from the participants to examine sodium and sodium intake. Urine sodium levels are important to consider because hypernatremia may cause high arterial pressure that can influence the development of edema (Canaud et al., 2019; Tsai et al., 2015). Not assessing sodium retention on the fluid level can cause an underestimate of fluid overload (Tsai et al., 2015). Fourth, the allotment time for follow-up was short, and the average follow-up period was about 23.2 months. The limitations of this study may create confusion in the interpretation of the correlation between fluid overload and the deaths of patients undergoing HD treatment (Tsai et al., 2015).

In this study, fluid overload was linked with significant risks for all-cause deaths or cardiovascular morbidity in patients with stages 4 and 5 CKD (Tsai et al., 2015). The recommendation was to conduct future randomized control trials, preferably double-blind, to assess if rigorous fluid volume management may enhance clinical outcomes in CKD patients (Tsai et al., 2015).

A validation study by Assimon et al. (2016) examined if fluid overload claims based on billing codes were accurate for HD patient hospitalizations at the University of North Carolina Hospitals. This study was conducted due to a significant increase in hospital admissions in HD patients diagnosed with fluid overload and to validate the accuracy of the fluid overload diagnoses. A random sample of 315 adult HD patients admitted to the medical or surgical unit from January 2010 until June 2013 was included. The exclusions were patients who were undergoing peritoneal dialysis, home HD, and recently diagnosed ESRD patients who had been in HD treatment for less than six months (Assimon et al., 2016).

The results showed that there were varieties of fluid overload definitions among the 315 hospital admissions. There was no agreed upon definition of fluid overload. The researchers reviewed medical records and noted clinical signs of the patients admitted and the impression of the admitting health care provider to develop an algorithm to decide if a patient needed emergent HD or not. The researchers found that 59 of the 315 HD patients admitted fit their algorithm and received HD treatment within 24 hours, while only 39 of the patients had fluid overload codes meeting this requirement to receive emergent HD treatment.

Examiners and regulators may need to be concerned about the consequences of making mistakes in identifying the patient's diagnoses when assessing and monitoring patients with fluid overload hospitalization (Assimon et al., 2016). The accuracy of claims-based definitions should be reflected in patients' actual diagnoses during admission to the hospital. Inaccurate diagnoses in patients undergoing HD also increase the risk of readmission within 30 days, which is costly, resulting in significant financial drain and poor quality of life (Mathew et al., 2017).

Ethnicity Related Risk Factors

According to research, ethnicity has been identified as a risk factor for CKD. A population study conducted in Hawai'i over 10 years by Kataoka-Yahiro et al. (2020) found that individuals of Native Hawaiian and Filipino descent have the highest risk profiles for CKD. The study used an abnormal albumin creatinine ratio (ACR) as a marker for early kidney damage, which is defined as ACR ≥30 mg/g (Kataoka-Yahiro et al., 2020). Rates of renal failure among different ethnicities in Hawai'i were also examined. The study found that Filipinos have the highest rate, at 14.5%, followed by Japanese and Native Hawaiians with rates of 13.6% and 5.9%, respectively (Kataoka-Yahiro et al., 2012).

A reason for the high CKD rates amongst the ethnicities may be related to the high rates of other chronic diseases that increase the risk of CKD. In Hawai‘i, the prevalence of type 2 diabetes is extremely high, and it is the leading cause of ESRD among Native Hawaiians and other Pacific Islanders (NHPIs) (Na'ai & Raphael, 2019). NHPIs refer to persons of Hawai‘i origin and other Pacific Islanders from Guam, Samoa, and other Pacific Islands (Na'ai & Raphael, 2019). About 1.3 million NHPIs currently live in the United States (0.4% of the total population), and 370,000 (28%) live in Hawai‘i. A 2019 study by Na'ai and Raphael conducted in Northern California showed that the incidence rate of diabetes amongst NHPIs was 19.9 per 1000 person-years compared to Native Americans at 12 per 1000 person-years. The study also found that the amount of ESRD associated with diabetes was higher in NHPIs (71%) than whites (41%). Because ESRD prevalence is significantly elevated in NHPIs in the United States, developing screening practices for kidney disease to slow down ESRD progress is crucial.

Diabetes is the major cause of ESRD; thus, it is vital to recognize or determine other causes to provide appropriate treatment (Na'ai & Raphael, 2019). A number of community-based organizations and clinics implemented approaches to better manage and prevent the complications of diabetes based on appropriate culture as NHPIs.

In Hawai’i, adults of Filipino-American descent are at a higher risk of developing type 2 diabetes compared to White adults, other Asian adults, and residents of the Philippines despite having a lower body weight (Raquinio et al., 2021). The prevalence of overweight and obesity among Filipino-American adults has increased from the first to the third generation, whereas rates of type 2 diabetes were only significantly higher in the second generation than the first generation (Raquinio et al., 2021). According to Hawaii Health Matters data, in 2022, 15.6% of adult Filipinos have diabetes, compared to 11.6% of the U.S. population.

Evidence-Based Interventions

In a study conducted by Alikari in 2018, it was found that HD patients who received an intervention reported a better quality of life compared to those who did not. The study was based on patients' perceptions and not on clinical data such as blood levels or interdialytic weight gain. The study analyzed 70 patients, with 25 of them receiving an educational booklet and an educational session, while the remaining 25 only received the booklet. The results showed that the intervention significantly increased the patients' knowledge and adherence, leading to an improved quality of life. After the intervention, there was no meaningful association between knowledge and adherence scores. Fluid and diet restriction scores showed a significant increase in the intervention group, as well as medication adherence scores. However, the study's limitations include its lack of generalizability to other areas beyond Greece and the limited time available to cover all areas during the educational session. Therefore, it is suggested to establish educational centers in hospitals and HD centers to educate patients before they start their HD treatment. Overall, the study highlights the importance of a patient-centered approach and knowledge adherence in improving HD patients' quality of life.

In order for educational materials to be effective, they need to be easy to read, easy to understand, and accompanied by oral education as well (Aldridge, 2004; Amin et al., 2023; Cassidy et al., 2018). A study conducted by Amin et al. (2023) found that translating a leaflet on CKD into the regional language significantly improved patients' knowledge after they had used both the English and the regional language versions of the leaflet. Aldridge (2004) discussed the importance of determining whether educational materials are easy to read and how to make them more user-friendly by simplifying the language and ensuring that they are culturally sensitive. In some cases, it may be necessary to translate

the materials into another language. Furthermore, other educational methods, such as oral, auditory, and visual learning, must be combined with written materials to cater to different learning styles.

One limitation of some of the literature was that it relied on patients' perceptions of their perceived change in knowledge and adherence to restrictions. Some studies attempted to gauge patients' adherence to restrictions by measuring laboratory values or interdialytic weight gains, but the results have been mixed. Nevertheless, the literature supports the idea that oral education and culturally sensitive written information, translated into regional languages, can help patients better understand how to manage their diseases and improve their quality of life.

Baser and Mollaoğlu (2019) conducted a study with 50 HD patients, 25 with interventions and 25 without intervention. The intervention was an educational program regarding fluid and adherence to diet restrictions. The educational training was done in the form of a questionnaire after the intervention (Baser & Mollaoğlu, 2019). The result showed a positive outcome in this study. The literature describes many evidence-based interventions that are shown to decrease fluid overload in HD patients. Cassidy et al. (2018) recommended providing patient-centered care for dialysis patients, including educational materials customized for the level of education or knowledge the patients may have. Thus, providing HD patients with brochures in English and Tagalog with images may be beneficial to decrease the incidence of fluid overload.

Studies of educational intervention with brochures increased compliance of HD patients following their treatment guidelines. Although Alikari et al. (2019) stated that educational intervention could enhance knowledge, it was not related to increasing

compliance with treatment. Dsouza et al. (2023) noted that educational intervention increased HD patients' knowledge and adherence to diet and fluid guidelines. Amin et al. (2023) determined that an educational brochure provided in a regional language was a beneficial and effective tool. Baser and Mollaoğlu (2019) also found positive outcomes in adherence to fluid restrictions when patients were provided education along with brochures.

Proposed Intervention

Based on the literature review findings, the proposed intervention was to revise the current HD clinic fluid overload brochure, adding images and information on how sodium intake affects fluid overload and translating it into Tagalog. Managing fluid intake is significantly complicated, especially for patients accustomed to eating salty foods. Some HD patients had difficulty understanding the amount of fluid intake allowed daily. The brochure had descriptions in English and Tagalog languages written under the image of bottled water or a cup, together with instructions and images of high sodium foods. This PIP author explained this educational brochure with images to the clinic's nursing staff and dietitians.

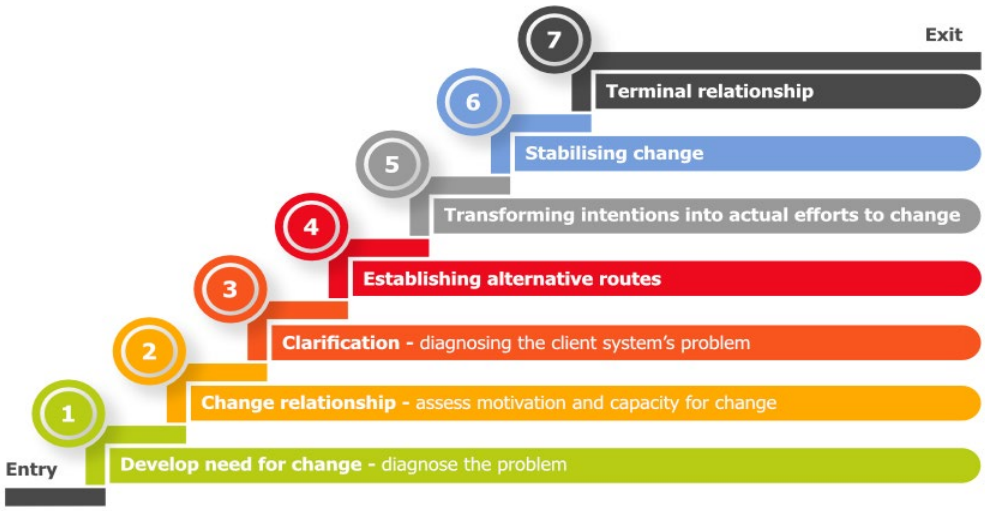
Theoretical Framework

The PIP project utilized Lippitt's seven step theory of change (LCT) as a framework for the study design (Lippitt et al., 1958). The LTC expands on Lewin's theory to emphasize the role of the change agent (Butts & Rich, 2018). In the 1940s, a behavioral scientist named Kurt Lewin developed the change theory utilized by various businesses. In this model, he described a force field in which the change process involved three stages: unfreezing, moving, and refreezing (Butts & Rich, 2018). The first step, Unfreezing, requires appraising the essential needs and organizing the members to change from the current situation to a more enriched practice (Butts

& Rich, 2018). In the Moving stage, the person and systems change to more satisfactory activities (Butts & Rich, 2018). Refreezing comprises a resume of the vigorous force fields shift to more desired change and then refreeze to maintain the desired change (Butts & Rich, 2018). This theory emphasizes the need to change for a better situation for an individual or a group of people, for example, in healthcare such as the HD clinic, where nursing staff and dietitians are looking for a better way to help HD patients decrease fluid overload. See Figure 1 below depicting Lippitt's seven stage theory of change model.

Figure 1

Lippitt's Seven Stage Theory of Change (Lippitt et al., 1958; Truyens, 2019)



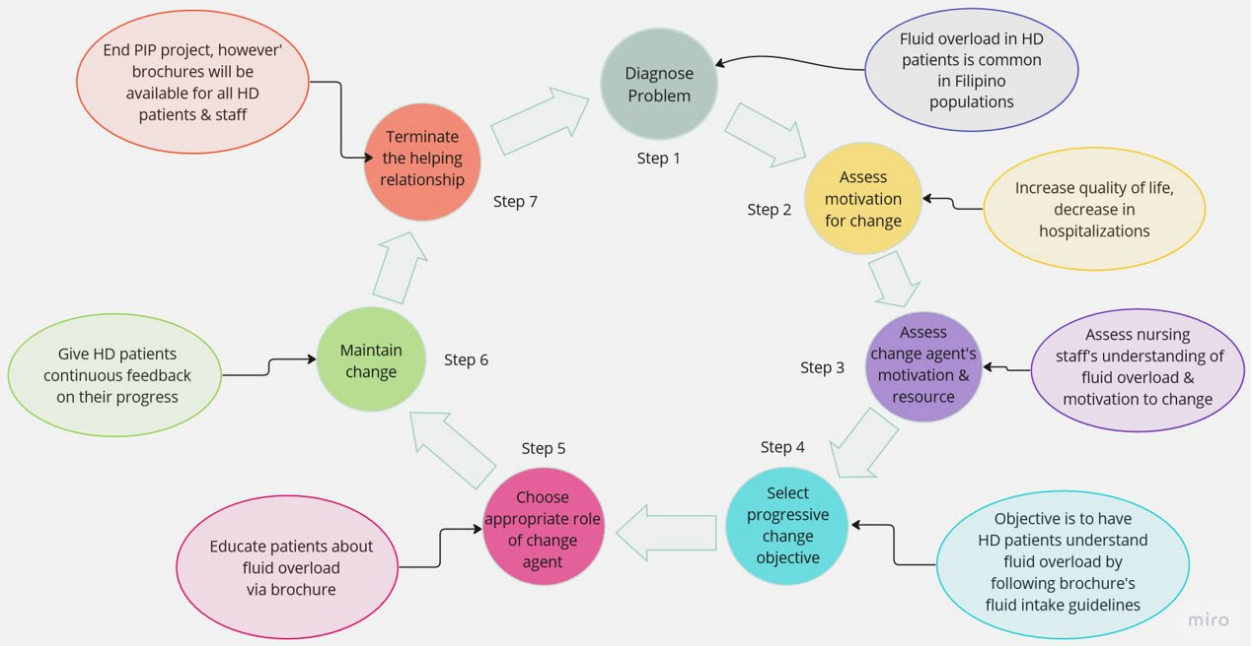
Note: Image used by permission of marcr.net

Nurses apply various concepts, principles, and theories from biology and public health in their profession. Nurse leaders need to follow the description of LCT as change is inevitable in the healthcare industry. Advanced nurse practitioners interact directly with patients regarding their fluid and sodium intake. Change is crucial and may influence the current situation, such as managing or controlling fluid and sodium intake to reduce fluid

overload. (Barrow et al., 2022). LCT, as it pertains to the proposed project, is depicted in Figure 2 below.

Figure 2

LCT Applied to Hemodialysis Patients Fluid Overload Education.



Step 1, labeled *Diagnose problem* or determining a need for change, comprises several elements.The first element was identifying the issues by investigating the contributing factors to a problem. Based on the literature review, findings showed that fluid overload was common among Filipinos in HD patients. The project clinic data also showed an increase in fluid overload among Filipino HD patients. It was determined that fluid overload may be related to health literacy barriers, including a lack of understanding of how to manage fluid and sodium intake. Health literacy barriers may also be related to language barriers among Filipino HD patients. This part of step 1 aligned with the project's Aim 1 to measure baseline data on patients experiencing fluid overload at the project's clinic site. Objective 1 was to collect baseline data on patient fluid overload at the project's HD clinic site, and Objective 2 was to collect baseline data

on the number of clinic HD patients with fluid overload Emergency Department (ED) admissions. This involved collecting baseline data at the project site on the number on the number of HD patients with fluid overload and the number of admissions to ED with fluid overload. Aim 2 of this project was aligned with step 1, designing the intervention for patients with fluid overload. Objective 1 involved reviewing the literature on fluid overload among HD patients and selecting evidence-based interventions to be included in the revised HD clinic handout. This objective entailed searching databases for articles that provide evidence-based recommendations to guide the project.

The next feature of Step 1 was to identify vital management personnel who would be in charge of correcting the problem. This part of Step 1 aligned with Aim 2, to design the project intervention, and Objective 3, to discuss the revised brochure with management, nursing staff, and dietitians. It involved the collection of the pre-intervention data of fluid overload and the use of the revised brochure with the nursing staff and the dietitians. The nursing staff and dietitians were in charge of educating patients along with providing brochures with images written in English and Tagalog languages so that they may understand more about fluid restrictions that, if not managed, can facilitate fluid overload. The last element of step 1 was to collect information on who would be affected by the change. This part of step 1 aligned with the project's Aim 1 to measure baseline data of patients experiencing fluid overload at the project's clinic site and Objective 1 to collect baseline data on patient fluid overload at the project's HD clinic site, Objective 2 to collect baseline data on the number of clinic HD patients with fluid overload ED admissions, and Objective 3 to analyze the baseline data which involved meeting with the clinic manager or charge nurse and looking at the numbers of pre-intervention patients who have EDW that have IDWG $\geq$ of two kg. The primary investigator reviewed the number of visits from the

HD project clinic to the ED. The data showed the total number of patients who have had issues with fluid overload in the pre-intervention period.

Step 2 evaluated the motivation and capability for change by identifying human resources. This step aligned with the project's Aim 2 to design the project intervention, Objective 3 to discuss the revised brochure with management, nursing staff, and dietitians and Objective 4 to design the project implementation phase plans/guidelines, which involved talking with the nurses and dietitians about the project, how it may help improve the numbers of patients who have trouble controlling their dry weights, and get the staff's buy in. The revised brochure was provided at no cost to the project clinic, nursing staff, and dietitians.

Step 3 assessed the change agent's motivation, experience, and dedication. This step aligned with project Aim 2 to design the project intervention, Objective 3, to discuss the revised brochure with management, nursing staff, and dietitians, and Objective 4, to design the project implementation phase plans/guidelines, which involved discussion regarding patients who were diagnosed with fluid overload and the nursing staff and dietitians' experiences caring for the patients. The discussion also involved asking the nursing staff and dietitians about previous educational materials that were successful or unsuccessful.

Step 4 selected progressive change objectives by defining the change process, developing action plans, and accompanying strategies. This step aligned with project Aim 2, to design the project intervention Objective 2, to revise the HD clinic fluid intake brochure, which involved the revised brochure with Tagalog language and images.

Step 5 explains the change agent's role to all involved employees (e.g., expert, facilitator, consultant) and ensures clear expectations (McEwen & Wills, 2019). This step aligned with project Aim 3 to implement the project intervention, Objective 1 to present the revised fluid and

sodium intake brochure, guidelines, stages of implementation, and the documentation of results of the baseline data to the medical director of the project HD clinic, and Objective 2, provide RNs, dieticians, and staff copies of the fluid intake brochure with images and educate them regarding the revised fluid and sodium intake brochure in the project's HD clinic. Implement the fluid intake brochures by following the guidelines of the PIP project, which involved updating the Medical Director about the initiation of the project and educating the nurses, dietitians, and staff about presenting the fluid overload education and brochure to the patients.

Step 6 involved maintaining change by facilitating feedback, enhancing communication, and coordinating change effects. This step aligned with project Aim 3 to implement the project intervention. Objective 3 is to give HD patients continuous feedback on their progress, which involves frequent input from nurses and staff when patients maintain the appropriate weight gain between treatments. This was helpful to patients with difficulty maintaining proper fluid intake.

During **Step 7**, the helping relationship of the change agent was gradually terminated. This step aligned with project Aim 4, to collect outcome data and analyze the effectiveness of the project interventions on decreasing fluid overload and related hospital ED visits. Objective 1: during the four weeks of the intervention, record the number of HD clinic patients who had IDWG of ≥ two kg above their EDW and record the number of HD patients who had ED visits with IDWG of ≥ two kg over their EDW, Objective 2 to analyze the data gathered to determine if there was a significant difference between the pre- and post-intervention incidents of fluid overload and visits to ED, and Objective 3, to provide the project results to management, medical director, staff, and patients of the HD clinic. Disseminate project results to other HD clinics in the community, which involved obtaining data from the clinic manager or charge nurse, comparing the pre-and post-intervention data, and performing McNemar exact test to see

if there was a significant difference. The patient may accept and be comfortable maintaining appropriate fluid intake. The revised brochures were available to all HD patients to reinforce maintaining proper fluid intake to prevent fluid overload.

Conclusion

Dialysis patients endure a significant burden of symptoms from ESRD and HD treatment; as a result, the patient has a decreased quality of life due to increased hospitalization and mortality. Fluid overload has debilitating complications, which include experiencing shortness of breath, generalized edema, hypertension, cardiovascular disease, increased morbidity, and mortality rate (Fresenius Kidney Care, 2020; Khan et al., 2016). Hemodialysis patients are significantly vulnerable to these complications due to the complexity of ESRD. Fluid overload is one of the most common complications of patients with CKD or ESRD (Lopez & Banerjee, 2021). This revised brochure provided a better learning tool for the patient's understanding of fluid restriction and sodium intake to prevent fluid overload, which is appropriate for patients with English as a second language to enhance fluid and sodium management.

Chapter 3: Project Design and Evaluation Plan

This chapter outlines the project design, methodology, setting, participants, data collection methods, ethical considerations, informed consent, and data analysis methods. This project aimed to reduce fluid overload in HD patients through a revised educational brochure. The brochures were given to patients during nursing education on fluid restrictions, sodium intake, and fluid overload management. The revised brochure was written in English and Tagalog with images and provided to the patients by the nurses and dietitians in the project HD clinic.

Project Description

The overarching project goal was to decrease fluid overload in patients diagnosed with ESRD undergoing HD treatments in a rural dialysis project clinic. Reducing fluid overload in patients undergoing HD treatment should increase their quality of life, decrease hospital admission, and decrease the number of patients suffering from financial drain, comorbidities, and deaths (Mathew et al., 2017; Ng et al., 2021). The primary project intervention was to implement a revised educational brochure written in English and Tagalog languages with images.

An in-person educational session was held at the project clinic to present the multilingual fluid overload brochure with images to nursing staff and dietitians before implementation. The fluid overload data was collected pre- and post-intervention, and data was analyzed. The clinical manager provided the fluid overload and ED visit data to the project leader. The project outcomes were shared with the medical director, clinical manager, nursing staff, dietitians, and clinical educators.

Project Design

The project design was a quasi-experimental design that enables examining knowledge and information of causality in conditions in which complete control is not possible (Grove & Gray, 2019). The quasi-experimental design was established to control as many threats to validity as possible in a state where some of the true or real experimental design elements were lacking. Furthermore, quasi-experimental designs have participants or samples not selected randomly for projects (Grove & Gray, 2019).

In social sciences, an untreated comparison group design with a pre-test and post-test is a common approach (Staffileno et al., 2022). By comparing the fluid overload rates before and after project implementation, we answered the original project question, which was whether the multilingual brochure with images helped to decrease fluid overload among HD patients. This project included all HD patients in the project clinic with and without fluid overload. Thus, the population used in this quality improvement project was not randomly chosen.

The investigator utilized McNemar's exact test to analyze the ranking in the counts of fluid overload. The purpose of the analysis was to determine whether there were differences between the data of pre- and post-project intervention. Additionally, the tests aimed to reveal whether there was a decrease in the frequency of fluid overloads in HD patients after the intervention in the sample population. However, it is important to note that the analysis cannot identify which individuals were prone to fluid overload.

Setting and Participants

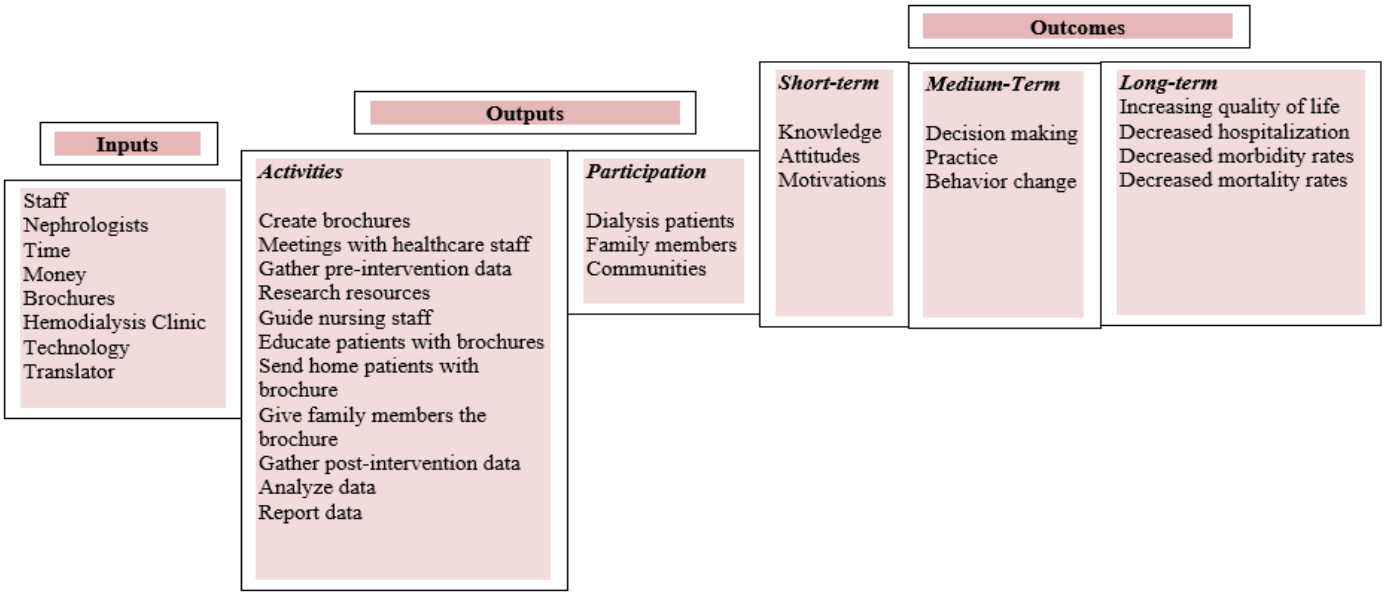
The sample location of participants was at an HD clinic in rural Hawai‘i. The HD clinic has 48 treatment chairs with three shifts. Treatments take place on three days:

Monday, Wednesday, and Friday or Tuesday, Thursday, and Saturday. Treatment time depends on the patient's needs, ranging from 2.5 to 6 hours. Generally, treatment time is prescribed by the nephrologist. The participants were all clinic patients diagnosed with ESRD and receiving HD treatments. The participants were of different ethnicities, and all were included in the interventions. Patients who had been receiving HD for less than six months were excluded from the project. The rationale for this exclusion was that these patients had not had time to stabilize their dry weights.

The logic model in Figure 3 below illustrates the description of the brochure to help Filipino hemodialysis patients in the management of fluid intake.

Figure 3

Logic Model for Management of Fluid Overload



Aims and Objectives

The overarching project goal was to decrease fluid overload in patients diagnosed with ESRD undergoing HD treatments in a rural dialysis project clinic.

Specific Aims and Objectives

Aim 1

Measure baseline data of patients experiencing fluid overload at the project's clinic site.

Objective 1. Collect baseline data on patient fluid overload at the project's HD clinic site for four weeks.

Method. Fluid overload was defined as IDWG of ≥ two kg above the patient's EDW. The clinic manager ran reports on the project sites' EHR and collected the numbers of patients who had IDWG of ≥ two kg above their EDW prior to implementing the project interventions. This data, with no personally identifiable information, for the time period of four weeks prior to the intervention was shared with the project leader.

Objective 2. Collect baseline data on the number of clinic HD patients with fluid overload Emergency Department (ED) admissions over four weeks.

Method. The clinic manager also ran reports on how many patients had to go to ED with a diagnosis of fluid overload during the pre-intervention period. This data, with no personally identifiable information, was shared with the project leader. The timeframe for data collection was the same as Aim 1, Objective 1.

Objective 3. Analyze the baseline data over one week.

Method. As stated above, the baseline data was collected for a four-week timeframe just prior to the intervention start date. The number of patients who exceeded their dry weights by ≥ two kg was calculated. The number of HD patients admitted to the ED during the 4-week pre-intervention period was calculated. None of this data had any personally identifiable information. This data **was** stored in an Excel spreadsheet file.

Aim 2

Design the project intervention.

Objective 1. Review literature on fluid overload amongst HD patients and select appropriate evidence-based interventions to be included in the revised HD clinic handout over one week.

Method. Peer-reviewed literature was collected utilizing multiple research engines such as EBSCOhost, MEDLINE, and Google Scholar using the search terms Filipino, Tagalog, dialysis, fluid overload, ESRD, end-stage renal disease, and kidney failure dated from 2013 to 2023 for HD patients.

Objective 2. Revise the project HD clinic fluid intake handout over a week.

Method. Using appropriate evidence-based interventions, the project clinic fluid restriction educational handout was revised, and images were integrated. Each paragraph was then translated into Tagalog and placed next to the English paragraph.

Objective 3. Discuss the revised brochure with the management, nursing staff, and dietitians.

Method. A date and time were set for a discussion of the revised brochure with management, nursing staff, and dietitians. The informed consents were collected from the nursing staff and dietitians.

Objective 4. Design the project implementation phase plans/guidelines over a week.

Method. A date and time were set to provide revised brochures to the staff nurses and dietitians. The nursing staff and dietitians were informed of the starting date of the intervention. On the first day of the intervention, the staff nurses and dietitians started educating each patient about the revised fluid overload brochure. They gave the brochure to

each patient. The project leader visited the clinic twice a week on Monday and Saturday to ensure the revised educational brochures were given to the HD patients and answered questions that the staff may have had. Four weeks after the start of the intervention, the project leader collected post-intervention data from the clinical manager.

Aim 3

Implement the project intervention.

Objective 1. Present the revised fluid and sodium intake brochure, guidelines, stages of implementation, and the documentation of results of the baseline data to the Medical Director of the project HD clinic over one week. (see Appendix C).

Method. Prior to the start of the intervention period, the project leader arranged a meeting with the project clinic Medical Director and presented the revised brochure, received feedback, and made needed adjustments. The project timeline and procedures were discussed, modified, and agreed upon. The baseline data was also shared with the Medical Director.

Objective 2. Provide RNs, dieticians, and staff copies of the brochure and educate them regarding the revised brochure in the project's HD clinic. Implement the brochures by following the guidelines of the project for four weeks.

Method. Each treatment day, prior to each shift, the nurses, dietitians, and staff huddled to get updates on procedures or discuss issues. During these huddles prior to the start of the project intervention, the project leader explained the project, its purpose and length, shared the revised brochure, and explained each participant's role in the project. Questions or concerns were addressed, and the project leader's contact information was provided.

Objective 3. Give HD patients continuous feedback on their progress for four weeks.

Method. Twice a week the project lead visited the clinic and answered questions that the staff had, and ensured there were adequate numbers of brochures. The project leader provided the staff updates on the project's progress, which they shared with the patients.

Aim 4

Collect outcome data and analyze the effectiveness of the project interventions on decreasing fluid overload in the HD clinic patients and hospital ED visits.

Objective 1. During the four weeks of the intervention, record the number of HD clinic patients who had IDWG of ≥ two kg above their EDW and record the number of HD patients who had ED visits with IDWG of ≥ two kg over their EDW.

Method. Met with the clinical manager and collected the de-identified post intervention data of HD clinic patients with IDWG of ≥ two kg over EDW and the number of HD patients with ED visits with IDWG of ≥ two kg over EDW during the four-week period of the intervention.

Objective 2. Analyze the data gathered to determine if there was a decrease in the number of HD clinic patients of IDWG of ≥ two kg over their EDW between the pre-and post-intervention and the number of HD patients with ED visits with IDWG of ≥ two kg over their EDW during the four-week period of the intervention.

Method. The post-intervention data was analyzed using McNemar's exact test and compared with the pre-intervention data. This helped to determine if there was a significant difference in the number of HD patients with IDWG of ≥ two kg over their EDW in the clinic and those who visited the ED with IDWG of ≥ two kg over their EDW. The project leader calculated

the frequencies of patients with fluid overload in the clinic and those who visit the ED to better understand the trends and patterns.

Objective 3. Provide the project results to management, medical director, staff, and patients of the HD clinic. Disseminate project results to other HD clinics in the community.

Method. Fluid overload cases were reported monthly during the project clinic's quality improvement conference. At this conference meeting, the results of the project were disseminated to the management, medical director, nurses, dietitians, and staff. The dissemination of the project results to other HD clinics is at the discretion of the clinic management.

Instrumentation or Sources of Data

The project clinic's electronic health record (EHR) contains data regarding the number of HD patients at a specific clinic with fluid overload and the number of ER visits due to fluid overload. The clinic EHR calculated the number of patients with fluid overload and or ED visits due to fluid overload for any time period without accessing patient identifiers. At the end of the pre-intervention period, the clinical manager collected this data from the EHR. To maintain patient privacy in accordance with HIPAA, the clinical manager accessed the data without collecting identifiable patient information. This same procedure was used to gather the post-intervention numbers of patients with fluid overload and ED visits at the end of the intervention. The pre- and post-intervention de-identified patient data was given to the project leader. The project leader did not access any medical records, and the data had no personally identifiable information.

Data Collection and Analysis Procedures

As stated in the project participants section, all patients undergoing HD treatment were included in the project. The sample size was approximately 198 participants. Of these 198 participants, at least 160 were included in the project to be large enough to produce significant results. Patients who have been receiving HD for less than six months were excluded from the data analysis but included in the education and also given the revised brochure. The exclusion rationale was that these patients had not had time to stabilize their dry weights. The fluid overload data were evaluated pre- and post-intervention to provide a comparison.

The initial data collection was the number of participants with fluid overload and fluid overload related ED visits before the intervention was implemented. The number of participants who experienced fluid overload and related ED visits was recorded four weeks after the intervention was implemented in order to compare the number of cases before and after the intervention.

The aim was to collect data on the number of cases of fluid overload within a month. The data were gathered for the four weeks prior to the start of the intervention and the four weeks following the intervention. To measure the effectiveness of the intervention on the same group of sample populations, McNemar's exact test was utilized for the before and after comparison.

Project Timeline

After receiving IRB approval, the project was completed within eight weeks. The timeline for the project is presented in Table 1.

Table 1

Project Timetable

Week 1: Recruitment Phase	The brochure was presented to the medical director. The staff and patients were educated regarding the revised brochures on fluid overload.
Week 2: Obtain Informed Consent	Nursing staff and dietitians filled out the consent form, and were collected by the project leader.
Week 3: Data Collection	Pre-intervention data were collected after informed consents were completed.
Week 4,5,6,7: Intervention Phase	Nurses and dietitians began fluid overload teaching to all HD patients using the revised multilingual brochure with images. The project leader made follow-up visits two times a week at the site to answer staff questions and, ensure there was an adequate supply of brochures, and make sure participating staff were using brochures during teaching.
Week 8: Data Analysis	Post-intervention data was collected from the clinic manager and analyzed.
Week 9: Preparing Final PIP Manuscript & Presentation	The results were added to the project paper.
Week 10: PIP Presentation	The final project was presented for presentation.

Ethical Considerations and Informed Consent

This project was a non-research, quality improvement (QI) project that did not involve the collection of any patient or staff identifiable information. The informed consents were obtained at the project site. The project leader collected the informed consent from the nurses and dietitians before the project brochure was presented. (see Appendix A). The University of Hawai‘i IRB approval was obtained before the start of project data collection.

The project author has completed Collaborative Institutional Training Initiative (CITI) training to ensure that the project was following proper procedures. (see Appendix B).

The number of HD patients with fluid overload recorded for four weeks was gathered from the clinical manager. This data did not contain patient identifiers. The project leader

educated the staff nurses and dietitians regarding the revised brochures on fluid overload. The revised fluid overload brochures were distributed to patients by staff nurses and dietitians, who also educated them about the importance of managing fluid intake.

There was a need to implement evidence-based education regarding fluid overload in patients undergoing HD treatment. The brochures did not accrue a significant financial burden; hence, the project leader covered all costs. As noted in Table 2, the total of all expenses was $1095.00.

Table 2

Project Expenditure

$475.00	Paper and Ink expenses (brochures
$420.00	Gift cards for nursing staff and dietitians
$150.00	Clinic appreciation gifts for all staff (pastries and sandwiches)
$50.00	Gas and other travel expenses

Memorandum of Understanding

The memorandum of understanding (MOU) has been established between the project clinic, Liberty Dialysis, and the University of Hawai‘i at Hilo. The medical director has accepted and signed the MOU. The project’s IRB from the University of Hawai‘i was approved on November 5, 2023. (see Appendix D).

Chapter 4: Results

In this chapter, we analyzed and interpreted the data collected to determine the frequency of fluid overload in patients who undergo HD treatment in both the clinic and during ED visits. The clinic provided objective data in the form of charts and numbers, which have been de-identified for privacy purposes.

Variables/QI/Outcome/Impact

The intervention/quality improvement/independent variable is the implementation of a Multilingual Educational Brochure with Images. The level of measurement is based on categories of the intervention, such as 1 = current practice or pre-implementation and 2 = implementation of Multilingual Educational Brochure with Images.

Impact/Outcome/dependent variable was two outcomes indicated in the PICO as the frequency of fluid overload defined as those who had IDWG of ≥ two kg above their EDW and admission to the ED for FO. The frequency of fluid overload was a count of events documented in the patient's medical record before implementation compared to the frequency of them after implementation in the same patients. The outcome of fluid overload was measured by IDWG of ≥ two kg above their EDW and was collected before and after implementation of the Multilingual Educational Brochure with Images. Admissions to the ED were collected from documentation in the patient's medical record.

Comparison/Analysis/Statistical tests: Descriptive statistics for the demographic characteristics were analyzed. Data on race/ethnicity were reported using counts and percentages. McNemar's exact test for counts of patients with fluid overload and admissions to the ED was performed in the same sample of patients before and after the implementation of the Multilingual Educational Brochure with Images.

The statistical significance was determined by a p level less than .05 of McNemar's exact test. This finding of $p < .05$ was interpreted as a significant difference in the measurable outcomes. Clinical significance was demonstrated by the implementation of a Multilingual Educational Brochure with Images with a decrease in the frequency of fluid overload and ED admissions.

Data Analysis Process

Data was collected from the patient's electronic medical record on demographic characteristics, frequencies of fluid overload in dialysis patients and admissions to the ED. Data was collected at baseline on 198 dialysis patients. After implementation, the patient's medical record was examined again for diagnoses of fluid overload and admissions to the ED.

The descriptive variable of race/ethnicity was described in counts and percentages. Fluid overload was measured in patients as those who had IDWG of ≥ two kg above their EDW and divided into those receiving dialysis for less than and greater than six months. Admissions to the ED were collected to determine the relation to fluid overload. Both of these outcomes were transformed using numerical codes and reported using counts and percentages. The data for $N =$ 198 patients were entered into an SPSS version 29 database for descriptive analysis and outcome assessment. The results of the analysis were described in the narrative and displayed in tables and figures.

McNemar's exact test was employed to assess the differences between the counts of fluid overload and admissions to the ED collected in the same sample of patients before and after. This analysis was based on the frequencies of the IDWG or admissions in the same sample of patients. McNemar's exact test was considered statistically significant if the p level was less than .05 or less. Clinical significance was demonstrated by a successful project implementation with a

decrease in the occurrence of fluid overload and a decrease in the frequency of admission to the ED related to fluid overload.

Narrative and Tables

Data was collected on $N = 198$ dialysis patients to assess the impact of quality improvement using a Multilingual Educational Brochure with Images. One sample of patients was identified using electronic medical records and data collected on race/ethnicity, occurrences of fluid overload, IDWG of ≥ two kg above their EDW and admissions to the ED. A sample of 198 patients was assessed before implementation. As noted in Table 3, the racial/ethnic make-up of the sample was 11% Asian, other (n =21), <1% Black (n = 1), 20% Caucasian (n =39), = 2% Chinese (n = 4), 26% Filipino (n = 52), 1% Hispanic (n =2), 14% Japanese (n = 27), 19% Hawaiian (n = 38), and 7% other Pacific Islanders (n =14).

Table 3

Ethnic Characteristics of Patient Sample

Baseline characteristic	Sample	
	N	*%*
Race/Ethnicity		
Asian, other	21	11%
Black/African American	1	<1%
Caucasian	39	20%
Chinese	4	2%
Filipino	52	26%
Hispanic	2	1%
Japanese	27	14%
Hawaiians	38	19%
Other Pacific Island	14	7%

Note. $N = 198$

The impact of the Multilingual Educational Brochure with Images was assessed using a statistical analysis to compare the frequencies of fluid overload and admissions to the ED. Prior to implementation, 88 patients (44%) of the 198 had previous history of fluid overload. After implementation, 84 patients had a diagnosis of fluid overload (42%). McNemar's exact test showed no statistically significant difference in the frequencies of fluid overload among the 198 patients (p = .125). The patients with fluid overload who had been receiving dialysis for less than six months or less were not included in the analysis. Eighty patients who had been receiving HD for six or more months also had fluid overload at baseline. After implementation, 74 patients (37%) who had been receiving HD for six or more months had fluid overload. McNemar's exact test showed a statistically significant decrease in the occurrence of fluid overload after implementation in these patients (p = .031). Admissions to the ED were assessed at baseline in the patients, and 23 admissions (12%) were noted at baseline, although none were noted to be specifically related to fluid overload. After implementation, 20 admissions (10%) to the ED were recorded. McNemar's exact tests showed no statistically significant difference in the frequencies of admission to the ED after implementation (p = .250).

Clinical significance was demonstrated by the successful implementation of the quality improvement project using a Multilingual Educational Brochure with Images. Further, a 2% reduction in the overall number of patients with fluid overload was measured (88, 44% versus 84, 42%). A 3% reduction in fluid overload diagnoses was measured in patients who had been having dialysis for six months or more (80, 40% versus 74, 37%). Lastly, three fewer ED admissions (2%) were measured after the implementation of the Multilingual Educational Brochure with Images. (see Table 4)

Table 4

Impact of Multilingual Educational Brochure with Images on Development of Fluid Overload and Admission to the Emergency Department

Frequency Outcome	Pre-implementation		Post-implementation		
	N	*%*	*N*	*%*	*P*
All Patients Diagnosed with Fluid Overload	88	44%	84	42%	.125
Fluid Overload in Patients receiving Dialysis > 6 months.	80	40%	74	37%	**.031***
Admission to the ED	23	12%	20	10%	.250

Note. $N = 198$, McNemar's test was used for comparison of the fluid overload and admissions to ED. * $p < .05$ is statistically significant

Figure 3

Bar Graph of Patients with Fluid Overload

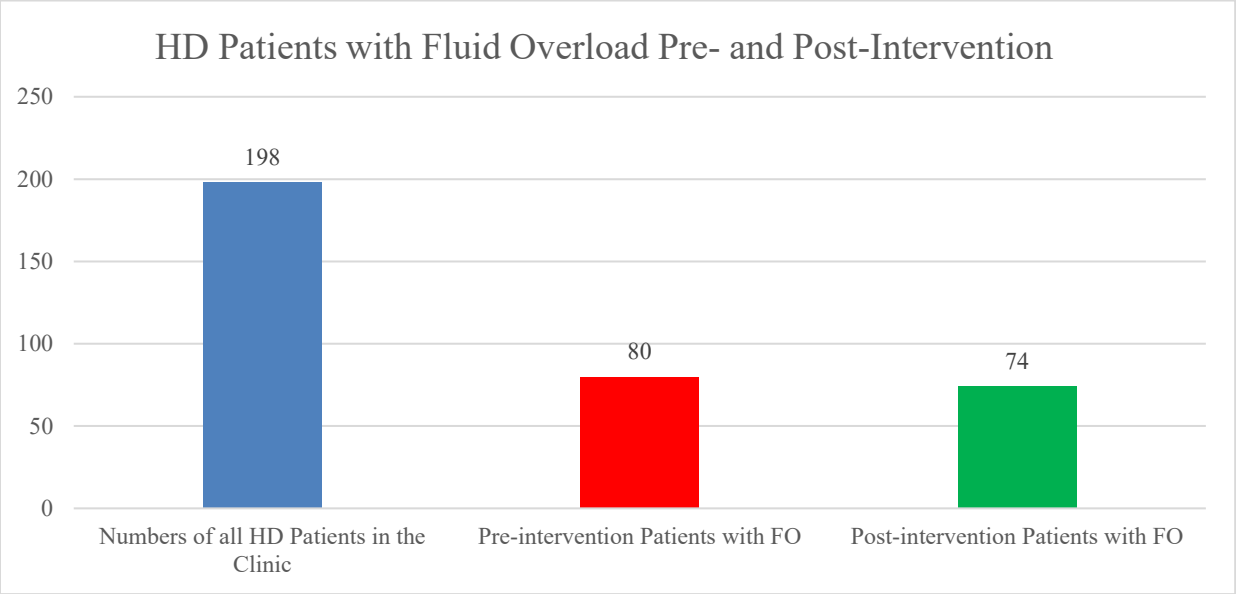
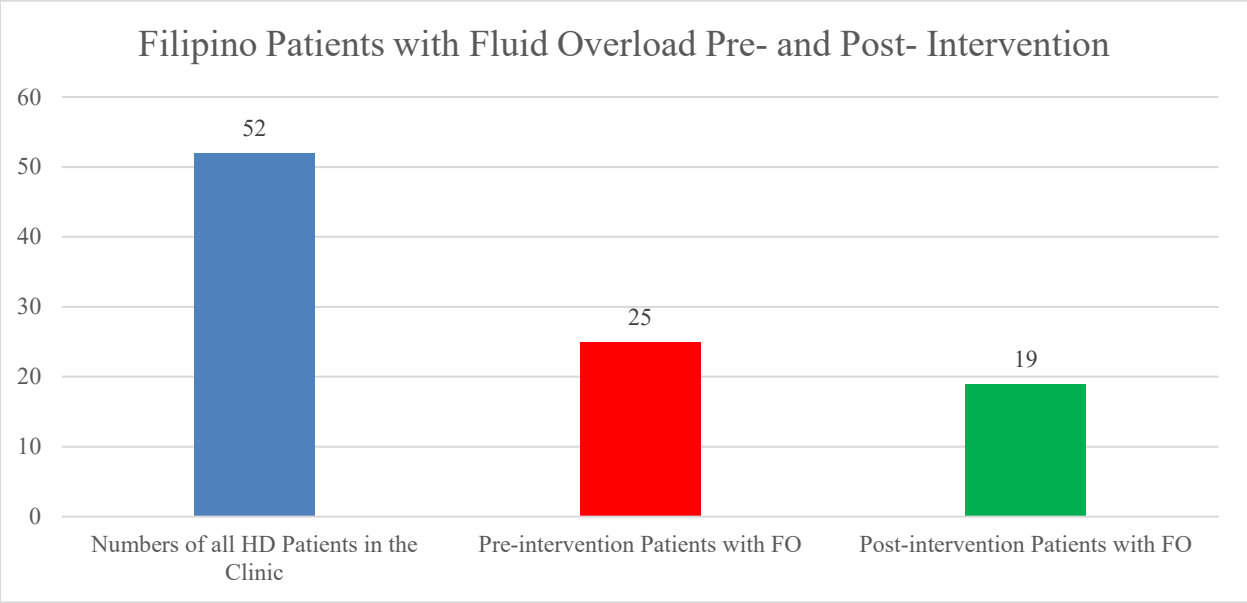


Figure 4

Bar Graph of Filipino Patients with Fluid Overload



Secondary analysis of FO in Filipino HD patients showed a decrease in the frequency of fluid overload.

Table 5

Impact of Multilingual Educational Brochure with Images on Development of Fluid Overload in HD Filipino Patients

Frequency Outcome	Pre-implementation		Post-implementation		
	N	*%*	*N*	*%*	*P*
Filipino Patients Diagnosed with Fluid Overload	25	93%	19	70%	**.031***
No Fluid Overload	2	7%	8	30%	

* $p < .05$ is statistically significant.

Chapter 5: Conclusion

This project aimed to revise an educational brochure written in English, adding Tagalog translations and images to help understand fluid and sodium restrictions, which are beneficial in patients undergoing HD in managing fluid and sodium intake. This intervention aimed to lower the frequency of HD patients with FO and reduce HD patient's visits to the ED. A literature review revealed that FO is common in HD patients and most often can result in an ED visit due to its multiple complications: pulmonary edema, respiratory distress, and heart failure. The literature review also showed that educational brochures written in regional languages with images were helpful in increasing the understanding and knowledge of the causes of FO.

The findings of this project suggest that educational interventions using brochures with images in a regional or primary language can be an effective way to improve the management of IDWG in patients with HD to prevent FO. It is worth noting that Filipino patients exhibited a reduction in FO after the intervention. This could be attributed to the fact that the brochure was revised and written in both Tagalog and English with images.

The nurses and dietitians were enthusiastic about providing education using the updated brochures as they now included translations and colorful images. The project clinic saw a significant reduction in FO among all HD patients, as indicated by Table 2 utilizing McNemar's exact test result ($p = .031$). The results of ED admission showed a decrease in the number of visits; however, it cannot be concluded that patient visits were due to FO. The most common ED visit diagnoses were pulmonary edema, heart failure, and respiratory distress, which, in the literature reviews, are complications of FO. However, there were fewer visits to the ED during the implementation period of the project.

Impact of Results on Practice

The findings of this project have supported the existing literature that suggests educational materials are better understood when translated into the regional language. This project has shown that educational brochures containing appropriate images, written in English and translated into a specific regional language, have the potential to reduce the frequency of fluid overload in hemodialysis patients. This is because these brochures can help improve patients' understanding of interdialytic weight gain between their HD treatments. By creating educational brochures in different languages, HD patients in other clinics across Hawai'i can also benefit from increased awareness of fluid overload. Reducing the occurrence of fluid overload and its complications could significantly improve the patient's quality of life, reduce their burden, and decrease healthcare costs.

After analyzing the data, it was concluded that the chi-square test is the appropriate method for measuring the sample population. In addition, the McNemar exact test is the most suitable tool for determining the frequency of fluid overload in the same population of HD patients. Furthermore, the statistical analysis showed that the total sample of patients was significant, with a *p*-value of .031. The results were both statistically and clinically significant for Filipino HD patients with a decreased fluid overload, also with a *p*-value of .031.

Strengths and Limitations of Project

The project had a significant strength in the enthusiasm shown by the Filipino HD patients. They were excited about the brochures translated into Tagalog, their regional language, and appreciated the colorful images included. The willingness of dialysis nurses and dietitians to educate patients using the revised brochure was also critical to the project's success.

However, the project had its limitations since it was implemented over a short period of four weeks during the Thanksgiving and Christmas holiday seasons. These periods may have made it difficult for HD patients to manage their fluid and diet restrictions.

The ED had no specific diagnoses of FO during admissions, although the diagnoses suggested that FO may be the cause of visiting the ED. The visits could have resulted from excessive fluid intake during the holiday seasons, as it is common for HD patients to forget fluid restrictions during this time. Other limitations included HD patients cutting and missing treatment due to several reasons such as transportation issues, not feeling well enough to go through HD treatment, and another appointment to see other healthcare providers.

Dissemination Plans

The outcomes of the project and the updated brochure can be distributed among other HD clinics located throughout the island and the state of Hawai'i. This is particularly important given the diversity of the community in the area. Additionally, the brochure could serve as a foundation for future translations into various languages. The publication of this quality improvement project would benefit other HD clinics in Hawaii by enabling them to offer translation services for other regional languages such as Micronesian, Marshallese, Chinese, and Japanese. Current literature emphasizes fluid and sodium restrictions to prevent FO in HD patients in the clinic. It is essential for nephrologists, nurses, and dietitians that HD patients may appear to have a complete understanding of the verbal education provided to them. However, HD patients may require assistance in understanding all the information provided by their healthcare provider.

Future Implications for Practice

Recent literature on HD patients showed that educational interventions have shown promising results in the potential to reduce fluid overload. As part of a quality improvement project, an educational intervention was carried out by translating brochures into Filipino and accompanying them with relevant images. This approach proved to be effective in reducing FO among Filipino HD patients. It can be a valuable model for educating HD patients who speak English as a second language in Hawai'i, such as Micronesian, Marshallese, Chinese, and Japanese. Future educational projects would benefit from extending the duration to one year or longer.

Further research is required to determine the importance of creating brochures or leaflets in multiple languages to improve patients' understanding of fluid overload in HD clinics. It is recommended that education be provided immediately upon the diagnosis of chronic kidney disease, allowing patients enough time to comprehend fluid and dietary restrictions. Educational materials containing multilingual content and images should be provided as soon as the patient is diagnosed with CKD. This could help them understand the consequences of missing or reducing treatment. In the future, the need for consistent and reliable transportation will also need to be examined.

Conclusion

One of the most common issues faced by patients with HD is the difficulty in managing or controlling fluid and sodium intake. If not managed properly, it can lead to excessive intradialytic weight gain, which can further worsen their health condition. However, a recent study has shown that educational intervention materials translated into regional language can significantly reduce the frequency of fluid overload in patients. This is crucial for maintaining

and improving their health. By understanding the importance of fluid restrictions, HD patients can reduce the risk of complications and improve their quality of life and possibly even their life expectancy. That is why proper educational interventions using brochures in the regional language, along with images, can play a vital role in managing fluid and sodium intake for HD patients.

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Appendix A

Consent Form

Dear Participant,

Aloha! I am a Registered Nurse completing the requirements for my Doctorate Nursing Practice Degree at the University of Hawai'i at Hilo.

The purpose of this event is to educate patients undergoing hemodialysis treatment on how to control fluid intake to prevent fluid overload utilizing the revised fluid and sodium intake brochure. I will stop by and talk with you after the huddle at the Hilo Liberty Dialysis. I will explain the brochure and provide the brochures to go over with your patients. The brochure will be in English with Tagalog translations. If you are willing to participate, I will provide you with a copy of the consent form for you to complete.

PARTICIPATION

Your participation in the project is voluntary. You may refuse to participate in the project or exit at any time, and it will be confidential.

BENEFITS

Each participant will be compensated with a gift card of $20.00 for each participant to a local restaurant or cafe.

CONTACT

If you have any questions, please email me, Alma Cremer, at cremera@hawaii.edu or leave a message at 808-935-3422 hemodialysis clinic.

- ➢ You have read the above information, and you voluntarily agree to participate,
- ➢ You work at Liberty Dialysis Clinic -Hilo as a registered nurse or dietitian.
- ➢ You are 18-70 years old.

I Agree to participate in the project.

I Decline to participate in the project.

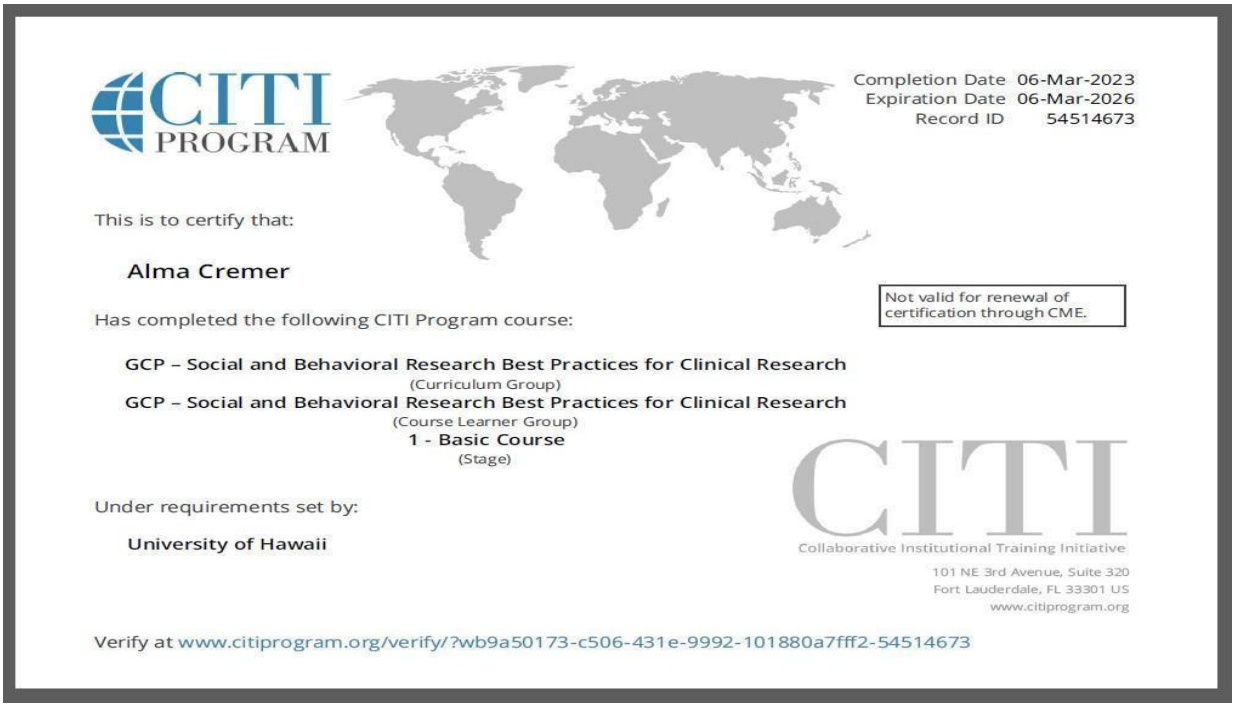
Appendix B

Citi Certification Completion

Information Privacy & Security

Revised Common Rule

GCP- Social and Behavioral Research Best Practice for Clinical Research



CITI PROGRAM

Completion Date 06-Mar-2023
Expiration Date 06-Mar-2026
Record ID 54514673

This is to certify that:

Alma Cremer

Not valid for renewal of certification through CME.

Has completed the following CITI Program course:

GCP – Social and Behavioral Research Best Practices for Clinical Research
(Curriculum Group)
GCP – Social and Behavioral Research Best Practices for Clinical Research
(Course Learner Group)
1 - Basic Course
(Stage)

Under requirements set by:

University of Hawaii

CITI
Collaborative Institutional Training Initiative
101 NE 3rd Avenue, Suite 320
Fort Lauderdale, FL 33301 US
www.citiprogram.org

Verify at www.citiprogram.org/verify/?wb9a50173-c506-431e-9992-101880a7fff2-54514673

Human Subjects Research

CITI PROGRAM

Completion Date 07-Mar-2023
Expiration Date 07-Mar-2026
Record ID 54514671

This is to certify that:

Alma Cremer

Not valid for renewal of certification through CME.

Has completed the following CITI Program course:

Human Subjects Research (HSR)
(Curriculum Group)
Non-Exempt Social & Behavioral Sciences Researchers and Key Personnel
(Course Learner Group)
1 - Basic Course
(Stage)

Under requirements set by:

University of Hawaii

CITI
Collaborative Institutional Training Initiative
101 NE 3rd Avenue, Suite 320
Fort Lauderdale, FL 33301 US
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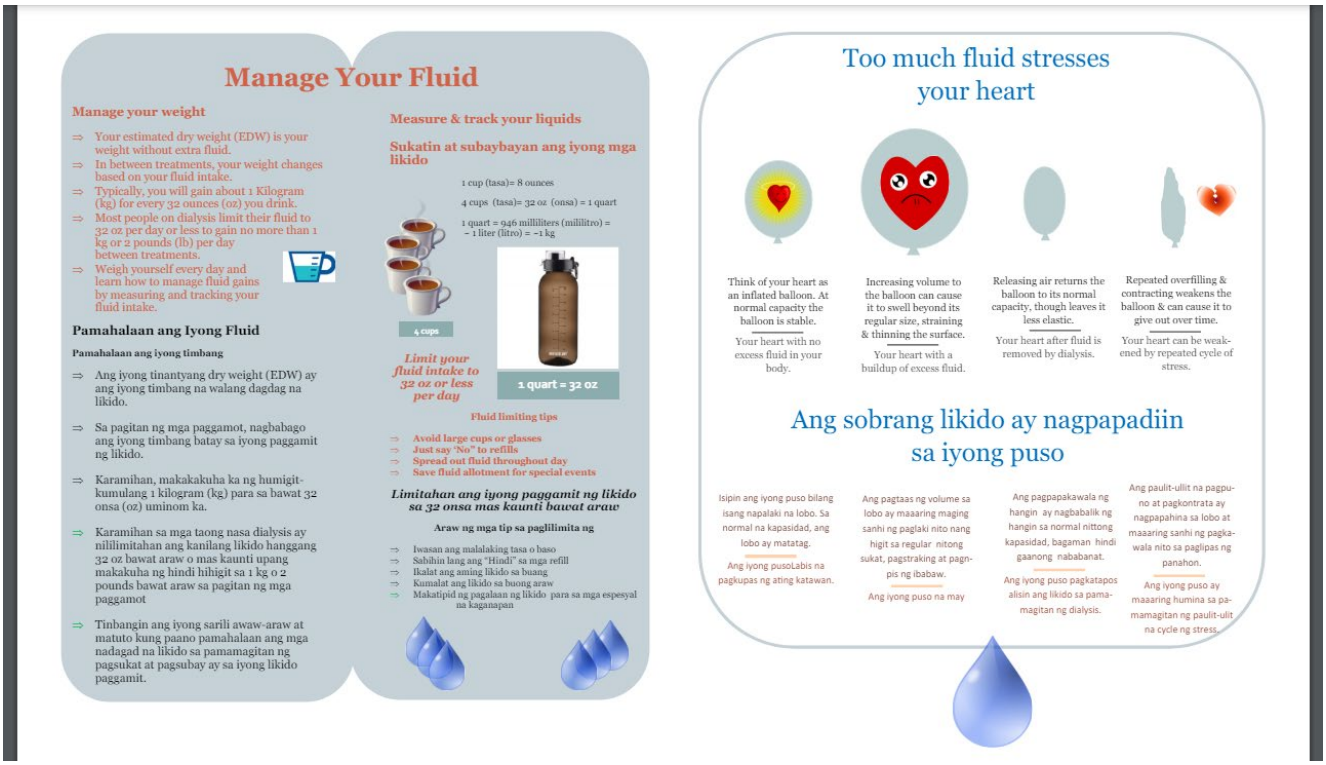
Verify at www.citiprogram.org/verify/?we99b2b67-87d0-4759-92c0-2e1a46bbd16f-54514671

Appendix C

Managing Your Fluids and Salt



Note: Use by permission of the HD Clinic Medical Director: Dr. Curtis Lee

Appendix D

IRB Approval Letter

UNIVERSITY of HAWAI'I® SYSTEM

Office of Research Compliance
Human Studies Program

DATE:	November 05, 2023
TO:	Ayers-Kawakami, Jeanette, DNP, MSN, TCN-B, RN, University of Hawaii at Hilo, College of Natural and Health Sciences Cremer, Alma, MSN-ED, BSN, RN, Hawaii Community College, Nursing and Allied Health, Hensley, Patricia, DNP, RN, University of Hawaii at Hilo, College of Natural and Health Sciences
FROM:	Rivera, Victoria, Dir, Ofc of Rsch Compliance, Social&Behav Exempt
PROTOCOL TITLE:	Decreasing Fluid Overload in Hemodialysis Patients in a Rural Clinic: Providing Multilingual Educational Brochure with Images
FUNDING SOURCE:	None
PROTOCOL NUMBER:	2023-00754
APPROVAL DATE:	November 05, 2023

NOTICE OF APPROVAL FOR HUMAN RESEARCH

This letter is your record of the Human Studies Program approval of this study as exempt.

On November 05, 2023, the University of Hawaii (UH) Human Studies Program approved this study as exempt from federal regulations pertaining to the protection of human research participants. The authority for the exemption applicable to your study is documented in the Code of Federal Regulations at 45 CFR 46.104(d) 3, 4.

Exempt studies are subject to the ethical principles articulated in The Belmont Report, found at the OHRP Website www.hhs.gov/ohrp/humansubjects/guidance/belmont.html.

Exempt studies do not require regular continuing review by the Human Studies Program. However, if you propose to modify your study, you must receive approval from the Human Studies Program prior to implementing any changes. You can submit your proposed changes via the UH eProtocol application. The Human Studies Program may review the exempt status at that time and request an application for approval as non-exempt research.

In order to protect the confidentiality of research participants, we encourage you to destroy private information which can be linked to the identities of

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Office of Research Compliance
Human Studies Program

individuals as soon as it is reasonable to do so. Signed consent forms, as applicable to your study, should be maintained for at least the duration of your project.

This approval does not expire. However, please notify the Human Studies Program when your study is complete. Upon notification, we will close our files pertaining to your study.

If you have any questions relating to the protection of human research participants, please contact the Human Studies Program by phone at 956-5007 or email uhirb@hawaii.edu. We wish you success in carrying out your research project.