The Effect of Pre-Transplant Creatinine on the Percent Improvement in Kidney Function after Kidney Transplantation

By

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Abstract

With 108,335 people on kidney replacement therapy in the United States, the need for kidney transplantation has increased. In 1998 there were 40,825 on the national waiting list for a kidney transplant in comparison to 71,862 in 2007 with a median wait time of over three years. At the same time the number of kidneys transplanted went from 9,761 to 13,156. One of the ways that people in need of a kidney transplant have found to fill the need is to look to living donors for a preemptive transplant as a way to stay off dialysis. The purpose of this study is to test the hypothesis that the percent improvement in kidney function in patients with similar MDRD GFR's across a spectrum of serum creatinine values is relatively constant across the entire range of pre-transplant creatinine values. A retrospective chart review study was conducted in a Kidney/ Kidney-Pancreas Transplant Center at a large university affiliated medical center with 350 beds in southern California. Medical records of patients who received a kidney from January 2005 through December 2006 were selected for this study. These findings support the hypothesis that the improvement in kidney function (as calculated from pre-and post-transplant MDRD GFR: MDRD Delta) is independent of pre-transplant MDRD. With the information obtained from this study it is hoped that the nursing staff will interact with the participants in a reflective and mindful manner when connecting with them and generate feelings of trust and safety while counseling them on the best timing of the kidney transplant so maximum utilization of the native and transplanted kidneys can be achieved.

Keywords: MDRD GFR, timing of kidney transplant

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CHAPTER ONE

Introduction

With 108,335 people on kidney replacement therapy in the United States, the need for kidney transplantation has increased. In 1998 there were 40,825 on the national waiting list for a kidney transplant in comparison to 71,862 in 2007 with a median wait time of over three years. At the same time the number of kidneys transplanted went from 9,761 to 13,156 in the same time period (Health Resources and Services Administration [HRSA], 2008). One of the ways that people in need of a kidney transplant have found to fill the need is to look to living donors for a preemptive transplant as a way to stay off dialysis.

It has been shown that preemptive kidney transplants have better outcomes, are cost effective, and improve the quality of life in kidney transplant recipients (Meier-Kriesche & Schold, 2005; Neipp, Jackobs, & Klempnauer, 2009). There is strong evidence showing the advantages of preemptive kidney transplantation, which is kidney transplant performed before maintenance dialysis is required (Meier-Kriesche & Schold, 2005). Some of the more noted advantages are those related to avoiding the dialysis-induced comorbidities attached to the quality of life of the kidney transplant recipients. A study by Liem & Weimar (2009) has been reported that these recipients have a higher posttransplant employment rate and there is not a need for the placement of an arteriovenous access for hemodialysis or catheter placement for peritoneal dialysis. In addition to this, it is also less costly to maintain a kidney transplant than to keep a patient on dialysis. It is estimated that the average cost is reduced by one third.

If preemptive kidney transplants can be timed so that the Modification of Diet in Renal Disease-Glomerular Filtration Rate (MDRD GFR) is low and the serum creatinine is high at the time of transplantation then the transplanted kidney would be better utilized (Yoo, Kwon, & Kang, 2009). Preferably the transplant would still happen before dialysis is needed but not too soon. It has been recommended that as long as the patients are asymptomatic, they should wait for the preemptive transplant (Yoo et al., 2009). If the timing of the transplant can be fine-tuned then there will be better utilization of a limited resource and better counsel will be available to the potential living donors.

Significance of the Problem

In 2007 there were over 73,000 patients on the waiting list for a kidney transplant. That is an increase of 8.3 percent from the previous year. During this same time period the number of kidneys transplanted decreased by 6.1%. Overall graft survival at 10 years is less than 50 which indicates that 50% of the patients who receive a kidney transplant will require retransplantation within 10 years. Growth in the number of wait-listed patients has been accompanied by a parallel increase in the number of deaths of patients on the list (HRSA, 2008). The median time to receive a kidney transplant in 2004 was 1,219 days, or just over 3 years. According to the Scientific Registry of Transplant Recipients' (SRTR) data, the one-, five- and ten-year patient survival rate is best for recipients of living kidney donors.

According to Organ Procurement and Transplantation Network (OPTN) data, since 1998, of the 229,352 kidney donors 103,814 (45%) were living donors in the United States. In 2007 only 42% of the transplanted kidneys came from living donors

(HRSA, 2008). The percentage of preemptive transplantation of all patients initiating renal replacement therapy is relatively low at 2.3% in the US (Liem & Weimar, 2009).

Problem Statement

Little is known about the percent improvement in kidney function across a wide-spectrum of patients who had similar pretransplant renal function, as measured by MDRD GFR. Findings of previous studies have shown that preemptive kidney transplant recipients can avoid significant increases in several comorbidities associated with End-Stage Kidney Disease (ESRD; Meier-Kriesche & Schold, 2005; Pérez-Flores et al., 2007; Yoo et al., 2009).

If there is an accurate way to counsel potential living donors and recipients to the best timing of preemptive kidney transplantation there would be an overall decrease in the need for frequent retransplantation. The first transplant would take place in a timely manner, before dialysis is needed but after the native kidneys have been used to their full capacity. The transplanted kidney, a gift from the living donor, would be better transplanted at the appropriate time and the patient stays off of dialysis and avoids the side effects of dialysis.

Purpose Statement

The purpose of this study is to test the hypothesis that the percent improvement in kidney function in patients with similar MDRD GFR's across a spectrum of serum creatinine values—as calculated from pre-and post-transplant MDRD GFR—is relatively constant across the entire range of pre-transplant creatinine values. This study hopes to show that regardless of the MDRD GFR all patients should wait until their serum creatinine is higher for the preemptive transplant. If a patient with a large body mass,

who has a MDRD GFR of 8 ml/min and a serum creatinine of 15 mg/dl, has a transplant and decreases the serum creatinine to 1.5 mg/dl they have had a ten-fold decrease in their serum creatinine. If a small framed person who has the same MDRD GFR of 8 ml/min but a serum creatinine of 5 mg/dl has a transplant they would have to decrease their serum creatinine to 0.5 in order to get the same utilization from the transplanted kidney. After the transplant the patients, regardless of body frame, will be on immunosuppression medication with the same risk of side effects and surgical risk. If those hazards can be delayed until absolutely necessary, the patients will be healthier for a longer period of time before transplant. Delaying the transplant will give the patient a better utilization of the transplanted kidney and overall there will be a decrease in the need for second transplant.

CHAPTER TWO

Literature Review

In this study, the following question was posed: Among patients with similar pretransplant renal function- as determined by the pretransplant MDRD GFR, is the percent improvement in kidney function comparable across various pre-transplant spectrum of serum creatinine values comparable? In order to answer this research question, a literature search was conducted using the search terms of *MDRD GFR* and *timing of kidney transplant* using online databases of PubMed.

End Stage Renal Failure

The Modification of Diet in Renal Disease Glomerular Filtration Rate (MDRD GFR) is an equation used to measure the performance of kidneys in chronic renal failure and is used to stage the degree of failure. Serum creatinine (S_{cr}) is used in the equation. Chronic renal failure is defined as a GFR of less than 60 ml/min per 1.73 m^2. The equation that will be used for the estimation of GFR is GFR=175 x (standardized S_{cr})$^{-1.154}$ x (age)$^{-0.203}$ x (0.742 if female) x (1.210 if African American; Coresh & Stevens, 2006).

Preemptive Kidney Transplant

Numerous studies have shown that a person who has a preemptive kidney transplant can avoid significant increases in several comorbidities; such as cardiovascular disease, diabetes, lymphoma, and an increased risk of certain types of cancer (Meier-Kriesche & Schold, 2005; Pérez-Flores et al., 2007; Yoo et al., 2009). With preemptive kidney transplant there is significant improvement in allograft and patient survival, decreased rejection rates and maintained recipient employment. In the younger patient, advantages of preemptive kidney transplantation include improved growth and quality of

life. Other benefits of early transplantation by avoiding dialysis are cost, lack of need for dialysis access, less hepatitis, less hypertension, fewer dialysis catheter-related infections and decreased overall hospitalizations (Davis, 2010).

Yoo, Kwon, and Kang, (2009) did a retrospective analysis of 499 cases of first living-donor kidney transplantations. The authors compared three groups according to graft survival, acute and chronic rejection, postoperative complications, and delayed graft function rates. Among 499 cases, 81 cases were preemptive renal transplantation with 418 cases (hemodialysis [HD], 343 cases, peritoneal dialysis [PD] 75 cases) performed after dialysis. The 1-, 5- and 10-year graft survival rates were 98.8%, 89.5%, 79.4% among the preemptive renal transplantation group compared to 92.4%, 78.2%, and 69.2% for HD group and 85.3%, 74.5%, and 68.2% for PD group, respectively (p=0.03. The graft survival rates in the HD group were not significantly higher than the PD group (p=0.61) and the duration of dialysis was not associated with graft survival, either.

Weng and Mange (2003) prospectively investigated 290 patients who were evaluated for their first renal transplant from living or cadaveric donors to understand the factors associated with the timing of evaluation for renal transplantation relative to initiation of dialysis. Of the 290 patients included in the analysis, 44.5% were not yet on dialysis. Non-dialysis-dependent persons had seen a nephrologist for a mean 71.0 (SD± 84.7) months before transplant evaluation, whereas persons who presented for nonpreemptive evaluation reported first seeing a nephrologist a mean of 25 (SD±42.8) months before dialysis initiation (p.01). First learning about transplantation from someone other than a nephrologist significantly increased the odds of undergoing nonpreemptive transplant evaluation (adjusted odds ratio [OR], 2.46; p=0.01). The odds

of nonpreemptive evaluation were decreased for every additional 3 months of chronic renal disease care by a nephrologist (adjusted OR. 0.96; $p<0.001$) and significantly decreased if the patient reported having a spouse as a potential donor (adjusted OR. 0.41; $p=0.03$). However this study was performed in a single institution and was not a randomized controlled trial.

Perez-Flores et al. (2007) studied 33 preemptive deceased donor kidney transplantations (PDDKT). The authors compared preemptive transplantations with patients who underwent dialysis before transplantation. The donors for both groups had similar characteristics; they were paired donor kidneys in most cases. The serum creatinine of the recipients was 6.9 (SD±1.8) mg/dL prior to transplantation, and the creatinine clearance was 14.6 (SD±3.6) ml/min (estimated by the Cockcroft- Gault formula). The Charlson comorbidity index adapted for patients with advanced chronic kidney disease was 0.8 ± 0.2 in the preemptive group versus 1.7 ± 0.4 in the dialysis group ($p<0.5$). Delayed graft function rates were 0% and 25% in preemptive and dialysis groups, respectively. No differences in 1-month and 1-year renal function as determined by serum creatinine were observed between groups. They did not observe differences in the incidence of acute rejection or 1- and 2- year graft and patient survivals. The authors concluded that PDDKT is the treatment of choice of advanced chronic kidney disease. It is associated with less delayed graft function, similar 2-year graft function, and patient survivals than kidney transplantation after dialysis.

Weng and Mange (2003) summarized studies that have investigated the impact of the timing of transplantation on outcomes. The authors concluded that preemptive renal transplantation is advantageous for patient and allograft survival. The avoidance of

dialysis-associated comorbidities such as access-related problems and infections, along with an increase in cardiac systolic dysfunction further supplements the benefits of preemptive renal transplantation.

Meier-Kriesche and Schold (2005) also summarized several studies that looked at pretransplant dialysis and the outcome in renal transplantation. In a single-center study, Cosio et al. (1998) were able to demonstrate that pretransplant dialysis was a significant risk factor for posttransplant death (p=0.0003) and overall graft loss (p=0.0003). Overall the review concluded that preemptive transplantation provides clear patient and graft survival benefits, reduces onset of comorbidities, and increases quality of life compared to transplantation after a period of dialysis.

Davis (2010) discussed the possibility that residual native kidney function could be a confounding variable when looking at the MDRD GFR of the pre-emptive kidney transplant (PKT) recipient. It was postulated that the residual kidney function of the native kidneys could falsely elevate the overall outcome of the transplanted kidney. Access to PKT was also addressed from the financial viewpoint in this paper. Potential recipients who are under 65 years of age may have difficultly. If renal failure is the only disability for persons under 65 years old they will not qualify for Medicare coverage until they have been on dialysis for 3 months. This can be financially prohibitive for most.

There were also differences in the underlying disease process when being listed preemptively for a kidney transplant. The researcher found that patients with polycystic kidney disease (41.9%) and glomerularsclerosis (24.6%) are more often listed preemptively than those with hypertension (12.2%) and diabetes (14.4%). Education level impacts preemptive listing with post-college graduate school (33.5%) having more

listings for PKT than a high school education (17.1%). Depending on the timing of referral from a primary care physician to a nephrologist is also an issue in the timing of preemptive referrals. The longer a patient is under the care of a nephrologist the sooner the patient is referred on to a transplant center for evaluation. It is thought that if a patient is referred to a specialist early in the disease process then the nephrologist can better judge when the patient should be referred to the transplant center and the patient has had better counseling and education on renal replacement therapy, including transplantation. It was also noted that at times the discussion about PKT can be delayed because the patient may be in poor general health with multiple medical problems, non-compliant, too old, or have limited financial/ insurance coverage. Some of the barriers cited by Davis (2010) include the belief of the patients that dialysis must precede transplantation, that transplantation is the last resort and the discomfort that is felt when asking a friend or family member for a living-donor transplant.

The dialysis units were discussed in the context of referral for transplant evaluation. They need be more efficient in referring 'healthy' patients for referral since it is not in their best interest to do so. The final point made by Davis (2010) was concerning the difficulties experienced by the living donors themselves; such as lost wages and costs of travel and lodging. Also, life and health insurance should not be affected by the decision to donate.

It has been hypothesized that the advantage of PKT was partly attributable to a higher GFR at transplantation instead of the avoidance of dialysis (Liem & Weimar, 2009). Many advocate deferring transplantation as long as possible as long, provided dialysis is avoided.

Preemptive Kidney Transplantation versus Patient and Graft Survival

Akkina, Connaire, Snyder, Matas, and Kasiske (2008) looked at 671 kidney-only transplants. They found that a higher pretransplant estimated Glomerular Filtration Rate (eGFR) was not associated with higher graft survival after transplantation. The MDRD was used to calculate the pretransplant estimated GFR and arbitrarily categorized the patient into three groups. Patients in Group1 had eGFR's <10.0; Group 2 had of eGFR's 10.0 to 14.9; and Group 3 had eGFR's of ≥ 15.0. They found that differences in eGFR decreased between the groups over time. On Postoperative day 1, the mean difference in eGFR between Group 1 and Group 2 was 16.3, but by 1 year post-transplant the mean difference in the GFR of Group 1 and Group 2 had decreased to only 4.5. There was not a clear reason found by these researchers for the rapid decline in native kidney function but it was postulated that the use of calcineurin inhibitor-induced renal constriction could be a part of the cause. The researchers cited several studies that reported transplantation before the need for chronic hemodialysis is associated with better patient and graft survival. Other studies were cited showing that patients who have been on dialysis longer are at higher risk for graft failure. There was an assumption that patients receiving a PKT who have a higher residual kidney function would have better graft survival than patients with lower residual pretransplant kidney function. However, as stated above, that did not hold true in this study.

A study done in Japan looked at 44 patients who received 44 living kidney transplantations done at one center. The 44 patients were divided into two groups: five were placed into Group 1 received PKTs and the other 39 were Group 2 received kidneys

after dialysis was initiated. The study showed in the short-term outcomes in patient and graft survival were equivalent between the two groups (Ishikawa et al., 2008).

Jung et al. (2010) studied 452 patients who were also divided into two groups. Group 1 included 390 patients who got a kidney transplant after long-term dialysis and Group 2 had the remaining 62 patients who had a PKT. Five- and 10-year graft survival in both Group 1 and Group 2 was 95.3% vs. 92.9% and 95.3 vs. 92.9%, respectively (p=.88). There were no significant effects on long-term outcome insofar as pretransplantation dialysis type (peritoneal, hemodialysis and preemptive) or duration.

Salvadori, Bertoni, Rosso, Larti, and Rosati (2009) also looked at groups of patients who were transplanted in their facility. They evaluated the probability of transplantation graft and patient survivals, incidences of delayed graft failure and rejection episodes as well as year serum creatinine values among patients with functioning grafts. A total of 163 patients were placed on the waiting list at their center including 120 on dialysis and 43 not yet being dialyzed. Two year graft (RR=0.43, CI=0.24-0.75, p=.003) and patient survivals (RR=1.17, CI=0.56-1.8, p=NS) were similar. The delayed graft function was significantly lower in the preemptive group (13% vs. 42%, p=.007). The 1-year serum creatinine was 1.56 ±0.43 in the preemptive group and 1.68±0.92 in the dialysis group (p=NS). No differences were observed concerning clinically suspected plus biopsy-confirmed rejection rates (20% vs. 17.1%, p=NS). When comparing the patient mortality and graft failure following kidney transplantation, no differences were observed between 2-year patient and graft survivals. This is possibly a result of the small numbers of patient and the short follow-up period.

Barriers to Preemptive Kidney Transplantation

In a review done by Kallab et al. (2010), one of the main barriers to preemptive transplantation mentioned was the cadaver kidney allocation policies. The United Network of Organ Sharing (UNOS) requires a creatinine clearance of less than or equal to 20 mL/min before a patient can be activated on the cadaver donor waiting list. Due to this UNOS regulation, preemptive transplantation is available in living donor cases. Another barrier to PKT is the late referral from nephrologists to transplant center. In addition, preemptive kidney transplantation may be delayed by patient concern about the consequences of kidney removal to the donor's health and financial issues. There is also a belief that patients may be less compliant with posttransplantation medical regimes if the patient has not first experienced the morbidity of dialysis (Kallab et al., 2010).

All of these studies look at some aspect of the timing of kidney transplantation. None of these studies have closely examined the timing of kidney transplantation using a combination of MDRD GFR and serum creatinine as a measure of appropriate timing for the transplant in order to best utilize the precious resource of the transplanted kidney.

Conceptual Framework

The nursing theory that will be used in this project is Watson's Theory of Loving and Caring. This theory holds that the foundation of healing is caring and love (Watson, 2009). It is the goal of Watson to reverse the non-caring, technical type of nursing that seems prevalent today and return to the more caring and compassionate manner of healing. Caring is an ethical contract that nurses and other healthcare providers have with the public in order to provide optimum healthcare. The focus is on the mind-body-spirit and aspects of person, environment, caring, healing and health. She believes that the connection between the nurse and patient is one of the most important needs that the

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patient has. Without this connection with the patient, genuine caring cannot take place and the nurse is merely a technician performing tasks and not truly caring or healing (Watson, 2008). She continues to discuss in her numerous publications the caring moment, where the nurse and patient come together, with their own unique histories, to create an occasion/moment greater than either individual. This requires the nurse to be in the moment; to pause, take a breath and be aware.

As stated by Clarke, Watson, and Brewer (2009), "What caring science and nursing offer universally is a deeper, moral, philosophical, knowledgeable, value-based approach relevant to sustaining the integrity and dignity of humanity worldwide as well as the profession of nursing." Watson discussed the qualities that she believes constitutes caring in nursing such as the practice of loving kindness and equanimity toward others and oneself, having to do with the cultivation and deepening of self-awareness, going beyond self and being authentically present in the encounter with the patient. There is also a need for the nurse to be supportive of both positive and negative feelings (Ranheim, Karner, & Bertero, 2012).

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It is felt that with the outcomes of this study the nursing staff will be able to counsel both the potential kidney donor and recipient on the best timing for the kidney transplant so maximum utilization of the native and transplanted kidneys can be obtained. With accurate information and honest counseling, the participants in the potential kidney transplant can make an informed and heartfelt decision that will be in the best interest of both parties.

It is hoped that with the use of the theory of love and caring while communicating with the potential recipient and donor in this interaction the nursing staff can be reflective

and mindful when connecting with the others and can generate trust and safety. Watson believes that the nurse being able to translate self-awareness and loving-consciousness into an informed practice in relation to self and others is a major task of professional practice. The caring relationship is considered a therapeutic intervention, but in order to get to this point it is imperative that the nurse be present in the moment and truly believes in caring for the mind-body-spirit of the donor and recipient equally.

CHAPTER THREE

Methods

The purpose of this study was to test the hypothesis that the percent improvement in kidney function in patients with similar MDRD GFR's across a spectrum of serum creatinine values (as calculated from pre-and post-transplant MDRD GFR) is relatively consistent across the entire range of pre-transplant creatinine values. There are very few studies looking at the timing of preemptive kidney transplantation in order to optimize the utilization of the transplanted kidney.

Design

A retrospective chart review study was conducted in a Kidney/ Kidney-Pancreas Transplant Center at a large university affiliated medical center with 350 beds in southern California. Medical records of patients who received a kidney transplant at the medical center from January 2005 through December 2006 were selected for this study.

Sample and Setting

A convenience sample of patients who received a kidney transplant at the center and had a functioning kidney at three months post-transplant from January 2005 through December 2006 were included in the study. The center performs, on average, 80-110 kidney transplants a year, for more than 2,500 total kidney transplants over four decades. This center performed its first transplant in 1968, which was also the first organ transplant ever performed in San Diego. Researchers at this facility regularly share data at national transplant meetings. The eligibility criteria were (a) male or female, and (b) kidney recipients during the study period. The patients who received both kidney and pancreas transplant were excluded from this study.

Instrumentation

Retrospective medical record review was undertaken using a standardized data collection tool. The information collected includes patient demographic information, such as age, sex, race, height, weight, and several data points from the patients charts having to do with kidney function both pre- and post- transplant. The collected data were medical record, demographic information, date of transplant, pretransplant creatinine, type of pretransplant treatment (hemodialysis, peritoneal dialysis or none), repeat transplant, date of clinic discharge, creatinine at discharge, immunosuppressive treatment (dose and serum level at discharge), if the patient received hemodialysis within the first seven days post transplantation and creatinine nadir (date, dosage and weight; Appendix A). Information included in these forms was used to calculate the MDRD GFR.

Ethical Consideration

The study was approved by Institutional Review Boards of the medical center and Point Loma Nazarene University (Appendices B, C). A waiver of informed consent was granted as this retrospective chart review could not be practicably carried out without the waiver of informed consent. This research also involved no more than minimal risk to the subject and the waiver will not adversely affect the rights and welfare of the subjects. For this retrospective chart review study, it was not appropriate to provide subjects with pertinent information later since no patient contact was occurred.

Data Collection

The list of kidney transplant recipients between January 2005 and December 2006 was obtained from the files of the transplant office. Data from the corresponding kidney

donor was also collected to insure that there were no obvious donor kidney variables that affected the recipient post-transplant recovery. This information included Medical Record Number (MRN), age, terminal hemoglobin and hematocrit, cause of death and mechanism of death (if the donor was not living), terminal creatinine, measured creatinine clearance (if available), CMV status and whether the donor was diagnosed with diabetes or not and if so, whether they were a Type 1 or Type 2 and was insulin prescribed.

The medical record number (MRN) was collected initially for data extraction with the study, however, the MRN was deleted in the final research database and instead a randomly blinded code number was assigned for each patient. A master list of all subjects, the study identification numbers as well as the data collection tool were maintained in a password-protected computer and in a secure, locked file cabinet during the study.

Data Analysis

The data were entered into an Excel database initially and then transferred to an SPSS database. SPSS software version 17.0 was used for data analysis. Descriptive statistics was utilized to calculate the frequencies, percentage, means, medians, and standard deviations. Bivariate correlation procedures were first performed to compute the association between percent improvement (maximum post-transplant MDRD-GFR minus pre-transplant MDRD-GFR) and patient demographic variables. Dummy codes were assigned for categorical variables as independent variables. The independent variables that had statistically significant correlations with percent improvement were selected as predictor variables. These statistically significant variables were entered into the first step

of the hierarchical multiple regression model. The pre-transplant MDRD-GFR was then entered into the second step of the hierarchical multiple regression model to determine its strength alone as a predictor variable. For the purpose of this study, the significance level was set at alpha < 0.05.

CHAPTER FOUR

Results

There were a total of 96 patients evaluated in this study ranging in age from 20 to 79 with a mean of 47.07 ±13.43 (Table 1). Forty-nine (51%) patients of the patients were between the ages of 41 and 60, 30 (31%) from 20-40 and 17 (18%) above the age of 60. Nationwide numbers as reported by OPTN on September 28, 2013, show a total of 97,731 people on the wait list for kidneys. Of those, 58,202 (60%) are male, 96,865 are above the age of 18 year old and 64,420 (65%) are non-African-American (HRSA, 2008).

Table 1

Age Group-

Donor Cross Tabulation

Age Group	Living Donor	Cadaveric Donor	Total
20-30	9	5	14
31-40	5	11	16
41-50	13	11	24
51-60	12	13	25
Age > 60	6	11	17
Total	45	51	96

Note: x^2= NS (Age Group and Donor Type [Living, Cadaveric] are unrelated.)

While evaluating the data in various manners a comparison was run looking at the age group and donor type (Table 1). The largest age group of recipients was between 41 and 60 years of age, comprising of 51% (49) of the total 96 subjects. The smallest number of

kidney transplant recipients was from 20-30 years old, however, this age group had the highest percentage of living donors compared to cadaveric 64% (9) out of a total of 14 transplants in that age group. Overall, the breakdown of living donor versus cadaveric donor transplants is 47% (45) living donor transplants and 53% (51) cadaveric.

In this study were 83 (86%) non-African-Americans. Sixty-six (68%) of the patients in this study were male (Table 2). When race and gender were evaluated, 13 (14%) of the total population were African-American while the remaining 83 (86%) were non-African-American, comprised of Caucasian, Asian Hispanic and other. The breakdown between males and females was consistent across both African-American and non-African-American populations with 31% being female.

Table 2

Race-Sex Cross Tabulation

Race	Male	Female	Total
Non-African American	57	26	83
African American	9	4	13
Total	66	30	96

Note: x^2= NS (Race and Gender [Male, Female] are unrelated.)

These findings support the hypothesis that the improvement in kidney function (as calculated from pre-and post-transplant MDRD GFR: MDRD Delta) is independent of pre-transplant MDRD. In addition, patients receiving repeat transplant have larger MDRD Delta and patients with low weight at the time of post-transplant nadir creatinine have larger MDRD Delta (additional statistical analysis presented in Tables 3-7 [Appendix D]).

CHAPTER FIVE

Discussion

The results of this study indicate that there is no correlation on the percent improvement in kidney function after kidney transplantation with the pre-transplant creatinine.

Future Research

In further study of the topic it is felt that the focus should be changed to include, and emphasis should be on, counseling the potential kidney transplant recipient and (if applicable) the potential living kidney donor on the timing of the transplantation so the participants are aware of the perceived benefits in the different schools of thought pertaining to the timing of the transplant. There should also be more awareness of the education level and health literacy of the potential recipients and donors. The subject matter of any teaching material should to be at a reading/ comprehension level that is appropriate for the education level of the audience. The content needs to be worded in such a way that even the non-medical layperson understands.

Significance to Nursing

The significance to nursing would include, mainly, increasing the amount of information that is available to all parties involved in the decision making process of the kidney transplantation. The community nephrologist and dialysis unit staff should be made more aware of the need to refer their patients earlier to a transplant center in order to facilitate better timing of the transplant. The patient in need of a transplant needs to be more aware of the advantage of a timely transplant. They should be aware of the consequences of getting a transplant too early in addition to being aware of the

consequences of dialysis for anything greater than a six-month period, before getting a transplant. It is also important for the potential recipient and living donor to be educated on the probable need for a second or even a third transplant that may be needed in the recipient's lifetime and the importance that the timing of the first transplant may have on the cascade of further possible transplants.

Limitations

The limitations of this study include the small number of subjects reviewed and that all of the subjects were from only one center. Perhaps if a larger sample size, including multiple centers was examined, there would have been a wider range of information available to analyze.

Conclusion

As stated earlier in this discussion, Watson's Theory of Loving and Caring holds that the foundation of healing is caring and love (Watson, 2009). With the information obtained from this study it is hoped that the nursing staff will interact with the participants in a reflective and mindful manner when connecting with them and generate feelings of trust and safety while counseling them on the best timing of the kidney transplant so maximum utilization of the native and transplanted kidneys can be achieved.

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Appendix A

Collection Tool

Date of Transplant:

Pt Initials: MRN: A/S/R:

Ht (in): Wt* (kg): LD, CAD:

Pretransplant Creatinine:

Type of Pretransplant Treatment; (HD, PD, Preemptive):

Repeat Transplant?

Date of Clinic discharge:

Creatinine @ Clinic discharge (or Max 3 months post op):

SR, CSA, FK @ final creatinine:(dose and serum level)

Receive Thymo or Similect postop Post Tx HD: (within 1 week postop)

Lowest Creatinine Post Transplant: Date: Weight:

FK or CSA level @ Nadir: (dose and serum level)

Comments:

* Clinic discharge weight.

Appendix B

Additional Recipient Information

MRN

Date of Transplant

Hemoglobin

-

Hematocrit

CMV Status

Diabetic Type Insulin

UNOS Donor ID

Comments:

Appendix C

Donor Information

UNOS DONOR ID

Age

Terminal Creatinine

Creatinine Clearance

Hemoglobin

Hematocrit

CMV Status

Diabetic Type Insulin

Cause of Death

Mechanism of Death

Comments:

Appendix D

Additional Statistical Analysis

Table 3

Descriptive Statistics

	N	Range	Minimum	Maximum	Mean	Mean Std. Error	Std. Deviation	Variance
Pretx_cr	96	19.7	3.1	22.8	8.284	.3388	3.3200	11.022
Age	96	59	20	79	47.07	1.371	13.430	180.363
Nadir	96	3.20	.20	3.40	1.2927	.04820	.47223	.223
GFR_MDRD	96	17.8	2.2	20.0	8.229	.3507	3.4361	11.807
DC_CR	96	4.1	.7	4.8	1.547	.0593	.5807	.337
Final	96	6.35	.10	6.45	1.2992	.10998	1.07757	1.161
GFR	94	21.7	3.8	25.5	12.736	.5403	5.2382	27.439
Inches_tall	96	23	56	79	66.73	.424	4.159	17.294
Weight	94	99.2	38.1	137.3	75.899	1.7947	17.4007	302.784
Valid N (listwise)	92							

Table 4

Sample Broken down by Race and Gender (Race = Non-African American, sex = male)

	N	Range	Minimum	Maximum	Mean	Mean Std. Error	Std. Deviation	Variance
pretx_cr	57	19.0	3.8	22.8	8.482	.4506	3.4018	11.572
age	57	59	20	79	49.39	1.761	13.297	176.813
nadir	57	2.60	.80	3.40	1.3895	.06424	.48502	.235
GFR_MDRD	57	14.7	2.2	16.9	8.305	.4251	3.2094	10.301
DC_CR	57	3.8	1.0	4.8	1.647	.0856	.6464	.418
Final	57	4.35	.10	4.45	1.2221	.11856	.89509	.801
GFR	56	21.7	3.8	25.5	13.307	.7433	5.5627	30.944
Inches_tall	57	18	56	74	66.88	.525	3.960	15.681
weight	56	79.2	38.1	117.3	76.966	2.1850	16.3510	267.355
Valid N (listwise)	55							

Table 5

Sample Broken Down by Race and Gender (Race = Non-African American, Sex = female)

	N	Range	Minimum	Maximum	Mean	Mean Std. Error	Std. Deviation	Variance
pretx_cr	26	11.0	3.1	14.1	7.073	.5918	3.0175	9.105
age	26	41	21	62	44.46	2.587	13.192	174.018
nadir	26	1.60	.20	1.80	.9885	.06571	.33505	.112
GFR_MDRD	26	17.0	3.0	20.0	8.265	.7773	3.9634	15.709
DC_CR	26	1.3	.7	2.0	1.227	.0596	.3040	.092
Final	26	6.24	.21	6.45	1.6231	.28256	1.44076	2.076
GFR	25	16.5	4.7	21.2	11.952	1.0003	5.0016	25.016
Inches_tall	26	20	59	79	66.69	.934	4.765	22.702
weight	26	90.1	47.2	137.3	72.215	3.8792	19.7801	391.254
Valid N (listwise)	25							

Table 6

Sample Broken Down by Race and Gender (Race = African American, Sex = male)

	N	Range	Minimum	Maximum	Mean	Mean Std. Error	Std. Deviation	Variance
pretx_cr	9	9.1	4.7	13.8	9.578	.9087	2.7262	7.432
age	9	41	25	66	42.78	5.115	15.344	235.444
nadir	9	1.40	1.10	2.50	1.5778	.14120	.42361	.179
GFR_MDRD	9	11.8	5.2	17.0	8.756	1.2132	3.6397	13.248
DC_CR	9	1.6	1.4	3.0	1.767	.1787	.5362	.288
Final	9	3.21	.41	3.62	1.1378	.33372	1.00116	1.002
GFR	9	14.1	7.1	21.2	12.900	1.3801	4.1404	17.143
Inches_tall	9	11	60	71	66.11	1.348	4.045	16.361
weight	8	41.9	54.5	96.4	76.313	5.6362	15.9415	254.133
Valid N (listwise)	8							

Table 7

Sample Broken Down by Race and Gender (Race = African American, Sex = female)

	N	Range	Minimum	Maximum	Mean	Mean Std. Error	Std. Deviation	Variance
pretx_cr	4	8.2	7.1	15.3	10.425	1.7848	3.5697	12.743
age	4	16	32	48	40.75	3.987	7.974	63.583
nadir	4	.40	1.00	1.40	1.2500	.08660	.17321	.030
GFR_MDRD	4	5.9	2.7	8.6	5.725	1.2298	2.4595	6.049
DC_CR	4	.7	1.4	2.1	1.700	.1472	.2944	.087
Final	4	1.03	.18	1.21	.6550	.21758	.43516	.189
GFR	4	7.1	4.8	11.9	9.275	1.5976	3.1952	10.209
Inches_tall	4	9	61	70	66.25	2.250	4.500	20.250
weight	4	47.8	60.4	108.2	84.075	10.0364	20.0728	402.916
Valid N (listwise)	4							