

## COMPLICATIONS DURING THE HOSPITALIZATION OF KIDNEY TRANSPLANT RECIPIENTS

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### ABSTRACT

The objective of the study was to identify the complications in patients that have received a renal transplant. A Historical cohort performed in a university hospital from January/2007 through January/2009 with a sample of 179 patients; data collected retrospectively from the medical history of patients and submitted to statistical analyses. Mean age of patients was 43(SD=13.7) years, 114(63.7%) men, 95(65.1%) non smokers and 118(66.3%) received the graft from a deceased donor. The main complications were rejection 68(32.1%) and infection 62(29.2%). There was statistical significance between rejection and median days of hospital stay ( $p<0.001$ ); days of use of central venous catheter ( $p=0,010$ ) and smoking status ( $p=0.008$ ); infection and central venous catheter ( $p=0.029$ ); median days of hospital stay ( $p<0,001$ ) and time of use of urinary catheter ( $p=0,009$ ). It was concluded that it is important to reduce the days of hospital stay and permanence of catheters, which may be considered in the planning of nursing care.

**Descriptors:** Kidney transplantation. Postoperative complications. Graft rejection. Infection.

### RESUMO

*O objetivo do estudo foi identificar complicações ocorridas em pacientes receptores de transplante renal. Coorte histórica realizada em hospital universitário entre janeiro de 2007 e janeiro de 2009 com amostra de 179 pacientes; dados coletados retrospectivamente em base de dados e prontuário e, em seguida, analisados estatisticamente. A média de idade dos pacientes foi de 43 (DP=13,7) anos, sendo 114 (63,7%) homens, 95 (65,1%) não fumantes e 118 (66,3%) receptores de doadores falecidos. As principais complicações foram rejeição 68 (32,1%) e infecção 62 (29,2%). Houve associação estatisticamente significativa entre rejeição e mediana dos dias de internação ( $p<0,001$ ); dias de uso de cateter venoso central ( $p=0,010$ ) e status tabágico ( $p=0,008$ ); infecção e cateter venoso central ( $p=0,029$ ), mediana dos dias de internação ( $p<0,001$ ) e tempo de uso de sonda vesical ( $p=0,009$ ). Concluiu-se ser importante diminuir os dias de internação e a permanência de cateteres, o que pode ser levado em consideração no planejamento do cuidado de enfermagem.*

**Descritores:** Transplante de rim. Complicações pós-operatórias. Rejeição de enxerto. Infecção.

**Título:** Complicações durante a internação de receptores de transplante renal.

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## RESUMEN

*El objetivo del estudio fue identificar las complicaciones en los pacientes que recibieron trasplante renal. Cohorte histórica realizada en hospital universitario de enero/2007 hasta enero/2009 con una muestra de 179 pacientes, los datos recogidos retrospectivamente de la historia clínica de los pacientes y analizados estadísticamente. La edad promedio de los pacientes fue 43 (SD=13,7) años, 114 (63,7%) hombres, 95 (65,1%) no fumadores y 118 (66,3%) receptores de donantes fallecidos. Las principales complicaciones fueron rechazo 68 (32,1%) e infección 62 (29,2%). Hay asociación estadísticamente significativa entre el rechazo y la mediana de días de hospitalización ( $p < 0,001$ ); días de uso de catéter venoso central ( $p = 0,010$ ) y tabaquismo ( $p = 0,008$ ); infección y catéter venoso central ( $p = 0,029$ ); mediana de días de hospitalización ( $p < 0,001$ ) y tiempo de uso del catéter urinario ( $p = 0,009$ ). Se concluye que es importante reducir los días de hospitalización y la permanencia de los catéteres, que puede ser considerado en la planificación de los cuidados de enfermería.*

**Descriptor:** *Trasplante de riñón. Complicaciones postoperatorias. Rechazo de injerto. Infección.*

**Título:** *Complicaciones durante la hospitalización de receptores de trasplante renal.*

## INTRODUCTION

In Brazil, in recent years, there has been an increase in chronic diseases due to the aging of the population; among them, notably, chronic kidney disease. Patients with end-stage chronic renal failure require renal replacement therapy to survive. The therapies available are dialysis (hemodialysis and peritoneal dialysis) and kidney transplantation. Kidney transplantation is considered the treatment of choice because it improves the quality of life of the recipient and has lower financial costs to the health system in relation to other substitution treatments<sup>(1)</sup>.

A ten-year follow-up study of kidney transplants in Brazil showed that most of them occurred in patients who were male (61%), white (69%) and aged between 18 and 40 years old, both the donor and recipient (48%). Most recipients underwent transplantation with living donors (53%), in 90% of related cases. The survival rate of patients over the 10 years was 68.1% and 45% for the graft, with the longer survival rate coming from living donors<sup>(2)</sup>.

In 2012, 5385 kidney transplants occurred in Brazil, with 1488 living donors and 3897 deceased donors. Of this number, 548 were performed in Rio Grande do Sul (RS)<sup>(3)</sup>. In 2011, at the field institution of this study, there were 124 transplants<sup>(4)</sup>, which demonstrates the relevance of studying this subject.

In clinical practice, it is clear that some transplant patients develop successfully and quickly in the recovery period, others have postoperative complications, mainly those of an infectious and immunological origin. Many factors interact with the risk of infections, among which stand out im-

munosuppression, exposure to infectious diseases and quality of postoperative care<sup>(5)</sup>.

It has been shown<sup>(2)</sup> that the main causes of graft loss among kidney recipients are of immunological origin (48%), which is directly related to acute post-transplant rejection and the principal cause of death is of infectious origin (50%).

This study aimed to identify the complications that occurred in patients receiving kidney transplants. The purpose of the study is to contribute to the qualification of the planning actions for the care of these patients and thus helping in their recovery.

It is well-known that it is necessary to understand the clinical and sociodemographic profile as well as the postoperative complications in these patients, so that nursing, with other members of the multidisciplinary team, can implement effective care that will impact on the quality of life of the patient and survival of the graft.

## METHOD

A historical cohort study that evaluated renal transplant recipients who underwent surgery between January 2007 and January 2009, in a large university hospital in the Southern region of Brazil. The study sample consisted of 179 patients transplanted in the period analyzed, which corresponds to 99% of transplants performed in the institution during the period defined for research.

The inclusion criteria were adult patients, of both sexes, who underwent renal transplantation during the study period. There were no exclusion criteria, as it sought to analyze all patients transplanted in the data collection period; however, two

cases did not have their registrations completed, which led to the loss thereof. Any problem related to the transplant that compromised the health of the patient and/or survival of the graft were considered as complications.

Data collection began on the patient's admission date for renal transplantation, and the records were monitored for a period of up to one year after the date of the transplantation. Thus, patients transplanted in 2007 were monitored until 2008, those transplanted in 2008, until 2009, and those transplanted in 2009, until 2010. All patients were monitored for one year, except for those who died during the research period.

The data collection was retrospective, through the analysis of electronic/paper records and specific registries about the kidney transplant patient at the institution. Data were collected by nursing students, undergraduate science research scholarship holders and nurses.

Data were collected using an instrument developed by the researchers (nurses, doctors, students and teachers from the nursing course), which dealt with information pertaining to the following data: sociodemographic (age, sex, race, marital status, level of education, active professionally or not), clinical (date of admission, date of transplant, date of discharge, weight, height, type of donor, smoking status), use of indwelling urinary catheters (IUC), central venous catheter (CVC), peripheral venous catheter (PVC), dialysis catheter, nephrostomy, urostomy, drains and presence of arteriovenous fistula (AVF). The period of hospitalization and assessment of the presence of infection or multidrug-sensitive bacteria was also collected. A pilot test of the instrument was carried out, to collect data with 10 patients who had undergone content validation and adjustments, as per suggestions from researchers.

The *Statistical Package for Social Science (SPSS)* program, version 18.0, was used to statistically analyze the data. Categorical variables were described by absolute and relative frequencies; the continuous by means of mean and standard deviation or median and percentiles 25 and 75%, depending on whether or not to normal distribution was followed. For comparisons of categorical data, the Pearson Chi-Square and Fisher's Exact tests were used; and for continuous variables, the Mann-Whitney. Every associa-

tion and difference with a p value of  $<0.05$  was considered statistically significant.

The project was approved by the Ethics and Research Committee under protocol 09-465. The authors have undertaken to maintain the confidentiality of the information and privacy of patients by means of signing an agreement for the use of data.

## RESULTS

The average age of the 179 patients analyzed was 43 (SD = 13.7) years, and most of them were male, white, married, educated to a primary school level, professionally active, with weight within the normal range, non-smokers and recipients of organs from deceased donors. It was also observed that patients presented a median of 24 days of hospitalization (16-39), 13 days using a central venous catheters and an average stay of six days with a urinary catheter (Table 1).

There were 212 postoperative complications in 121 (67.6 %) patients, considering that some transplant patients had more than one complication. The main complications were: rejection, infection, graft-related problems (acute tubular necrosis, thrombosis and rupture of arterial anastomosis) and surgical intervention (nephrectomy, nephrostomy and ureteroplastia saphenectomy) (Figure 1).

Infections occurred at one or more sites, distributed as follows: 51 (28.5%) in the urinary tract, 10 (5.6%) in the surgical wound and central venous catheter, 8 (4.5%) in the respiratory tract and 6 (3.4%) at other sites (herpes cytomegalovirus infection of the gastrointestinal tract and sepsis). Of these infections, 27 (43.5%) were due to multidrug-resistant organisms.

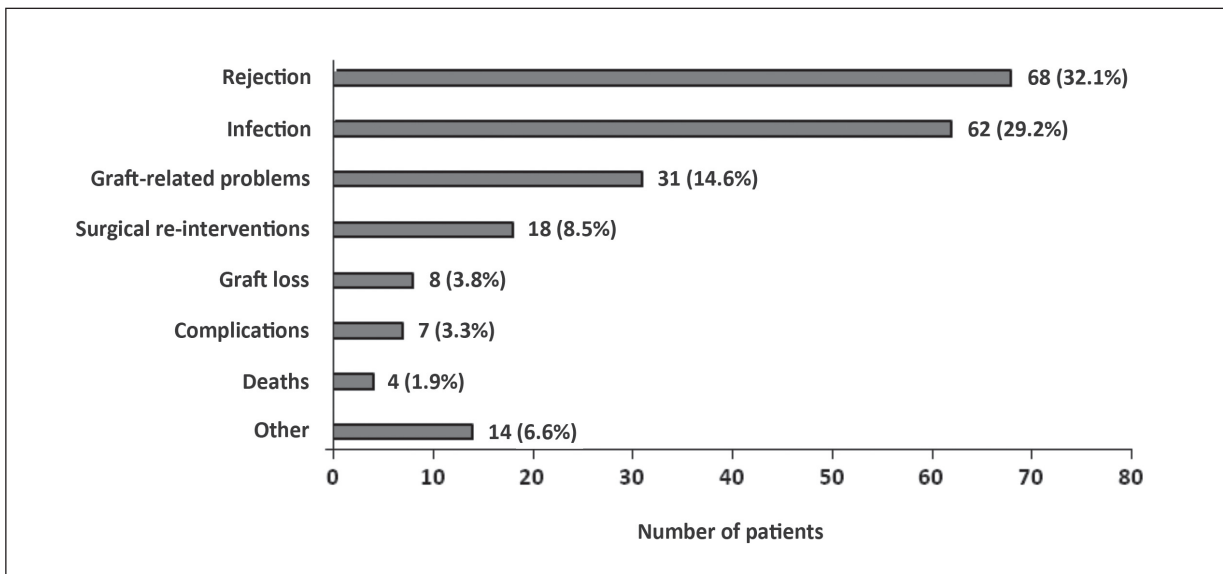
A statistically significant association was found ( $p = 0.037$ ) between rejection and infection. Of the patients who developed infection, 44.1% presented rejection and 28.8% showed no rejection. As for patients without infection, 71.2 % had no rejection and 55.9 % did have.

The association of sociodemographic variables analyzed with or without the presence of rejection and infection was not statistically significant for gender ( $p = 0.307$  and  $p = 0.514$ ), race ( $p = 0.305$  and  $p = 0.804$ ), marital status ( $p = 0.068$  and  $p = 0.588$ ) and level of education ( $p = 0.287$

**Table 1** – Socio-demographic and clinical characteristics of renal transplant recipients. Porto Alegre, RS, January 2007 to January 2009.

Characteristics	n = 179
<b>Age (years)*</b>	43 SD = 13.7
<b>Sex (male)</b>	114 (63.7)
<b>Race (white)</b>	159 (88.8)
<b>Marital status</b>	
Married	98 (54.7)
Single	66 (36.9)
Separated/Divorced/Widowed	15 (8.4)
<b>Level of education<sup>†</sup></b>	
Primary complete or incomplete	111 (63.1)
Secondary complete or incomplete	55 (31.3)
Higher Education complete or incomplete	10 (5.7)
<b>Professionally active<sup>†</sup></b>	134 (80.7)
<b>Body mass index<sup>†</sup></b>	
Malnutrition (<17.9 Kg/m)	8 (4.8)
Healthy weight (=18 and <24.9 Kg/m)	74 (44.6)
Overweight (=25 and <29.9 Kg/m)	58 (34.9)
Obesity Grade I or II (=30 and <39.9 Kg/m)	26 (15.6)
<b>Smoking status<sup>†</sup></b>	
Non-smoker	95 (65.1)
Smoker	32 (21.9)
Smoker in withdrawal	19 (13)
<b>Type of donor<sup>†</sup></b>	
Deceased	118 (66.3)
Living relative	45 (25.3)
Living non-relative	15 (8.4)
<b>Central venous catheter</b>	35 (19.5)
<b>Peripheral venous catheter<sup>†</sup></b>	172 (92.6)
<b>Dialysis catheter<sup>†</sup></b>	29 (16.4)
<b>Arteriovenous fistula<sup>†</sup></b>	150 (84.7)
<b>Nephro/urostomy<sup>†</sup></b>	4 (2.2)
<b>Drains<sup>†</sup></b>	17 (9.6)
<b>Period of hospitalization (in days)<sup>‡</sup></b>	24 (16-39)
<b>Time using indwelling catheter (in days)*</b>	6.1 SD = 6.4
<b>Time using central venous catheter (in days)<sup>‡</sup></b>	13 (6-23.5)

Categorical data presented as n (%); \*variables expressed as mean and standard deviation; <sup>†</sup>variables that did not get responses in all questionnaires; <sup>‡</sup>variables expressed as median and interquartile intervals (25-75).



**Figure 1** - Complications occurring during hospitalization for kidney transplant recipients. Porto Alegre, RS, January 2007 to January 2009.

and  $p = 0.693$ ), with the value  $p$  for rejection and infection, respectively.

The association of clinical variables and the use of catheters with the presence or absence of rejection and infection was not statistically significant for body mass index ( $p = 0.341$  and  $p = 0.568$ ), type of donor ( $p = 0.126$  and  $p = 0.660$ ), peripheral venous catheter ( $p = 0.582$  and  $p = 1$ ), dialysis catheter ( $p = 0.634$  and  $p = 0.088$ ), nephrostomy and urostomy ( $p = 0.494$  and  $p = 0.117$ ) and drains ( $p = 0.441$  and  $p = 0.106$ ) with the value  $p$  for rejection and infection, respectively.

Patients with rejection had a lower mean age ( $p = 0.011$ ). Smokers had more rejection than non-smokers ( $p = 0.008$ ). Rejection was also associated with longer length of stay ( $p < 0.001$ ) and the duration of using the CVC ( $p = 0.010$ ). There was a positive association between infections and invasive procedures, patients using CVC had more cases of infection ( $p = 0.029$ ) and those with AVF had fewer cases ( $p = 0.046$ ). The occurrence of infection was also associated with increased length of hospitalization ( $p < 0.001$ ) and prolonged use of indwelling urinary catheters IUC ( $p = 0.009$ ). The associations are shown in Table 2.

## DISCUSSION

The characteristics of the study sample were similar to those found in research carried out with

kidney transplant patients in Northeastern Brazil, with a prevalence of men, married, with a complete primary education, an average age of 40.86 years<sup>(6)</sup>. In this study, the majority of transplants also occurred with deceased donors, which supports the Brazilian statistical data<sup>(9)</sup>.

The types of postoperative complications in this study are similar to those found in another study<sup>(7)</sup>, highlighting rejection, infection, and problems related to the graft as the most prevalent. These factors may be related to the profile of the recipients, environmental conditions, care practices, surgical techniques, among others. So it is important that health professionals know the main complications which affect kidney transplant recipients and seek strategies to prevent and/or alleviate complications.

Rejection was the most common post transplant complication in this study, similar to that found in literature<sup>(8-9)</sup>. It has been observed in clinical practice that the main signs and symptoms that characterize rejection include fever, hypertension, increased volume and pain upon the graft, decreased urine volume and an increased serum creatinine value without any other explanation for the rise. Early diagnosis of acute rejection is crucial for graft function and survival, which the care team requires, especially nurses carefully assessing patients for signs and symptoms to be able to intervene quickly and efficiently.

**Table 2** - Association between variables studied with or without the presence of rejection and infection. Porto Alegre, RS, January 2007 to January 2009.

Variables n = 179	With rejection	Without Rejection	P	With infection	Without infection	P
<b>Age (in years)*</b>	40 (SD = 12.8)	45.1 (SD = 12.9)	0.011	42.7 (SD = 13.8)	43.4 (SD = 12.6)	0.821
<b>Smoking status</b>			0.008			0.061
Non-smoker	29 (54.7)	66 (71)		29 (30.5)	66 (69.5)	
Smoker	19 (35.8)	13 (14)		16 (50)	16 (50)	
Smoker in withdrawal	5 (9.4)	14 (15.1)		4 (21.1)	15 (78.9)	
<b>CVC</b>			0.785			0.029
Yes	21 (60.0)	14 (40.0)		18 (51.4)	17 (48.6)	
No	90 (62.5)	54 (37.5)		44 (30.6)	100 (69.4)	
<b>AVF†</b>			0.873			0.046
Yes	92 (61.3)	58 (38.7)		46 (30.7)	104 (69.3)	
No	17 (63.0)	10 (37.0)		14 (51.9)	13 (48.1)	
<b>Hospitalization (in days)‡</b>	35 (20-47)	20 (14-32.7)	<0.001	36 (23.2-49)	20 (14-32)	<0.001
<b>Time with IUC (in days)*</b>	5.7 (SD = 4)	6.3 (SD = 7.5)	0.524	8.05 (SD = 9.8)	5 (SD = 2.7)	0.009
<b>Time with CVC (in days)‡</b>	16 (12.5-27)	10 (5.5-14)	0.010	16 (7.5-27)	11 (5-14)	0.068

Categorical data presented as n (%); \*variables expressed as mean and standard deviation; †variables that did not get responses in all questionnaires; ‡variables expressed as median and interquartile intervals (25-75).

The infection sites found in this study, urinary tract infection, respiratory tract infection, central venous catheters and surgical wound, have also been described in other studies<sup>(10-11)</sup>. The fact that transplant patients need postoperative immunosuppression and IUC makes them more susceptible to pathogens<sup>(12)</sup>. In this sense, there is the need for the healthcare team to be able to perform care practices with aseptic techniques, as well as making sure that the length of stay of these devices is minimized, in order to reduce the incidence of infections. It is also recommended that institutions have the infrastructure available for hand hygiene in strategic locations, personal protective equipment, assessment indicators for infection and feedback to staff regarding the incidence rates of the same.

In the treatment of rejection, the renal transplant recipient requires additional immunosup-

pressants to that already in use, which increases the chances of occurrence of infectious episodes by increasing their vulnerability<sup>(12)</sup>. Study<sup>(13)</sup> reveals the importance of clinical and bacteriological assessment after the transplant for prevention of infection and thus preventing acute rejection after surgery.

The results showed that younger patients presented more cases of rejection, similar to findings in literature<sup>(14)</sup>. Another study<sup>(15)</sup> shows that elderly patients have lower immunity, which would lead to lower rates of rejection; but, when it actually occurs, the damage to the graft is more serious. Thus, specific care is necessary both for young transplant patients, due to greater chances of rejection due to increased immunity, and for elderly patients, due to comorbid conditions and severity of a rejection episode, which compromises the survival of the graft.

In this study, there is no association between being a smoker and the occurrence of rejection ( $p = 0.008$ ). Smoking is a risk factor for rejection, influencing the survival of the graft in transplant patients and, therefore, there is the need for smoking to be considered as a chronic disease and be treated with a cognitive behavioral approach by healthcare professionals<sup>(16)</sup>. These findings reveal the importance of the patient, candidate for kidney transplant, receiving support and suitable for professional monitoring, so that smoking cessation occurs prior to the surgical procedure, thereby decreasing the risk of postoperative complications.

The median length of stay in this study was 24 days with a positive association to higher rates of rejection and infection. Study<sup>(17)</sup> points to a lower median, as it describes an average of 16 days of hospitalization. This difference is worrisome, because the longer the hospitalization of the recipient, the greater the chances of complications. In this sense, healthcare practices for kidney transplant need to be revised in order to decrease the length of stay of patients in hospital.

The use of a central venous catheter is common practice in renal transplant recipients. In this study we found a correlation between the use of a central venous catheter, rejection and infection. Another study<sup>(18)</sup> shows that infections by use of central catheters are among the most prevalent in the post operative transplant period. It is essential that healthcare staff receive training to take care of central venous catheters, with a view to installing sterile barriers during catheter insertion; using antiseptic for skin antisepsis; properly handling the catheter, cannulas and connections; exchanging extension and occlusion equipment as per the routine of the institution; changing dressing and assessing presence of signs of logistics; properly sanitizing hands and seeking strategies to reduce the usage time of the catheter.

The association between infection and AVF was statistically significant, indicating that patients with fistula have lower risk for infections. When the patient does not use AVF for hemodialysis, there is the need for the use of venous catheters. In this study, there was a tendency for patients with central catheters of acquiring infection more frequently, whereas another study<sup>(19)</sup>

described that patients using central venous catheters for dialysis are 34 times more likely to be infected than those who use AVF. Thus, this association can be justified since most patients in this study used AVF for hemodialysis sessions, a technique with less risk of infection when compared to the use of vascular catheters.

The use of indwelling urinary catheters is a routine procedure in renal transplant recipients being used for surgical recovery, rigorous control of urine output and fluid balance. Nevertheless, their use makes patients more susceptible to infectious agents<sup>(12)</sup>. The present study found that the average number of days of IUC usage is higher among patients who had developed infection. The literature describes IUC usage for the shortest time reduces the risk of infection<sup>(20)</sup>. In this sense, the healthcare team has an important role in the prevention of this complication, as it should prevent the transplant patient from being contaminated by the mishandling of these catheters as well as arranging their removal as soon as possible.

The success of renal transplantation depends on the quality of care delivered to the patient. Among these, the orientation of the healthcare team regarding the principal care inherent in this type of procedure, the improvement of surgical techniques, the search for best practices in preventive care, especially regarding infections and signs and symptoms of rejection, are of great relevance. Taking into account the severity of an infection/rejection is imperative to empower healthcare professionals with the development of the knowledge, skills and attitudes for adequate professional practice. This could promote patient safety, the environment and the care team.

Knowing the main problems that affect the health of their renal transplant recipient, health professionals have a responsibility to carry out safe and resolute practices based on consolidated knowledge so as to ensure quality of care given to the patient.

Limitations of the study are related to the period of data collection and to the reduced number of subjects, thus making it difficult to generalize the results. It is suggested to carry out further studies of this nature, in order to generate new knowledge about the incidence of

complications in renal transplantation, as well as prevention strategies.

## CONCLUSION

The main post renal transplantation complications were rejection and infection and these variables are strongly related. The incidence of rejection is associated with younger patients, longer duration of hospitalization, the use of central venous catheters and smoking. Cases of infection were related to longer hospitalization, the use of indwelling urinary catheters and central venous catheters.

Thus, indicated as clinical implications are the need for a multidisciplinary team to rethink their practices with respect to length of stay, invasive procedures and care with patients that are smokers, because these situations demonstrated to directly affect the recovery of patients and the survival of the graft.

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