

THE IMPORTANCE OF DENTAL TREATMENT FOR PREVIOUS PATIENTS AND POST KIDNEY TRANSPLANT: A LITERATURE REVIEW

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Abstract: Chronic kidney disease is characterized by the permanent loss of kidney functions, which need to be replaced artificially, through peritoneal dialysis, hemodialysis, or kidney transplantation. Pre- and post-kidney transplant patients present some systemic changes that can result in oral dysfunctions, such as hyposalivation (lack of salivation), xerostomia (dry mouth sensation), halitosis, uremic stomatitis, gingivitis, periodontal disease and infections. Furthermore, already transplanted patients are more prone to infections due to drug immunosuppression, and pre-transplant patients, in turn, due to immunosuppression resulting from the clinical picture of uremia. The oral cavity has great infectious potential due to the high number of active bacteria. Therefore, the present work aimed to present, through a literature review, the importance of dentistry in the multidisciplinary treatment provided to chronic kidney disease patients. Therefore, it is concluded that foci of oral infection can lead to severe systemic complications, due to the fragility of these patients' immune systems against infectious agents. In other words, the inclusion of a dental surgeon in the multidisciplinary care team for chronic kidney disease patients and the provision of adequate dental treatment, with the elimination of oral infectious foci, are fundamental to the success of kidney transplantation and replacement therapies, in a providing the patient with a better quality of life and longer survival.

Keywords: Chronic Kidney Patient. Chronic Renal Failure. Dental Care. Oral Health. Dental Risk.

INTRODUCTION

Chronic kidney disease is characterized by the permanent loss of kidney functions, altering human body homeostasis. Furthermore, if there is no artificial replacement of these functions, the disease can even lead to the individual's death (MIYAHIRA et al. 2016).

Kidney transplantation is considered the best treatment for patients with advanced chronic kidney diseases, as the regulatory and excretory functions of the kidneys can only be recovered, in fact, through transplantation, from a living or deceased donor, in order to significantly increase quality. of patients' lives (ROMÃO JÚNIOR, 2004).

Such renal dysfunctions presented by patients with chronic renal failure cause systemic and oral manifestations, which have relevant implications for dental treatment. Pre-renal transplant patients, for the most part, have notable characteristics that directly influence their oral condition, such as hyposalivation, which is the lack of normal salivation in the oral cavity (ARAÚJO et al. 2016), and immunosuppression, resulting from a clinical condition called uremia (BREITSAMETER; THOMÉ; SILVEIRA, 2008).

As already proven in numerous studies, human saliva has several important functions for oral and systemic health, such as keeping the oral cavity lubricated, removing excess bacteria and other microorganisms, facilitating the healing of oral wounds, initiating the swallowing of food and the digestion of starch during the digestive process, protecting the body against acid attacks, against opportunistic bacteria and viruses through immunoglobins, antibodies present in its composition, in addition to having the buffering capacity (CTS), which is the property that saliva has to maintain its neutral pH, in order to maintain the integrity of the teeth and oral mucosa (DAWES et al.,

2015). Therefore, due to hyposalivation, these patients become more prone to periodontal disease and opportunistic infections (ARAÚJO et al., 2016).

Patients already transplanted, in turn, are subjected to a regimen of drug immunosuppression that makes them more likely to develop systemic and secondary infections (SILVA, 2015). Therefore, a simple dental complication that involves the need for dental intervention can, if left untreated, evolve into systemic consequences, due to the weakness of the patient's immune system against infectious agents (SIQUEIRA JUNIOR et al., 2012).

Therefore, as the oral cavity has great infectious potential due to the high number of active bacteria, points of infection such as periodontal lesions, the need for endodontics and extractions represent a real risk for both the pre-transplant patient (PUPO et al., 2010), as well as for the post-transplant patient (SILVA, 2015), as they can result in severe systemic complications. Thus, the importance of eliminating any infectious focus in patients with chronic kidney disease and in patients already transplanted is highlighted in this discussion, as dental treatment has been linked to greater patient survival and higher transplant success rates. (SILVA, 2015; PUPO et al., 2010).

According to data from the Brazilian Society of Nephrology (SBN), in Brazil, it is estimated that more than ten million people have chronic kidney dysfunction (BRAZIL, 2019). And, according to the Ministry of Health, around 26 thousand people are on the kidney transplant queue (BRAZIL, 2021). In view of the above, therefore, it is clear how the success of kidney transplants is essential so that patients who have already obtained the organ do not return to the queue, and so that those who are still in the queue can obtain the long-awaited transplant and regain their

quality of life (PUPO et al. 2010).

Thus, the objective of this work is to collect data, through a literature review, on the need for dental treatments in chronic kidney disease patients, in order to discuss the dental care provided to these patients and their oral conditions. Since the priority during chronic kidney disease is to keep the patient alive, oral health often takes a backseat and ends up not being considered important by the integrated team. Therefore, this work also aims to highlight how the inclusion of a dental surgeon in the multidisciplinary care team for renal patients, as well as the provision of quality care, through the elimination of oral infectious foci, are essential for the success of kidney transplant therapy and to provide a better quality of life for the patient pre and post kidney transplant.

MATERIALS AND METHODS

The study carried out to formulate this work is of the bibliographical research type, characterized by non-systematized review, obtaining knowledge and basis through articles, reports, monographs, books, periodicals and publications in existing magazines and newspapers, about the need and importance of dental care for patients undergoing dialysis therapy and post-kidney transplantation. For Souza, Oliveira and Alves:

Bibliographical research is the survey or review of published works on the theory that will direct the scientific work, which requires dedication, study and analysis by the researcher who will carry out the scientific work and aims to gather and analyze published texts, to support scientific work (SOUZA; OLIVEIRA; ALVES, p. 70, 2021).

The platforms used for the research were open access, SCIELO (Scientific Electronic Library Online), Pubmed and Google Scholar. The keywords for the investigation were “chronic renal patient”, “chronic renal failure”,

“kidneys”, “dental care”, “oral health”, “dental risk”. The inclusion criterion adopted to select the literature found was temporal variation, with references published between 1999 and 2022 being considered of interest for the development of the work.

In total, 30 bibliographic references were found, excluding paid access publications that were not related to the proposed topic. This present work was subdivided into topics in order to facilitate understanding of the theme and the proposed content. Furthermore, to organize thoughts and formulate the work, the program chosen was Microsoft Word.

This research aims to clarify how oral health has a direct implication in the treatment of CKD, through a thorough bibliographical search in databases of recognized legitimacy. However, although the research does not deal directly with the patients covered by the topic, the data and information contained in this work may cause a certain discomfort to those affected by CKD, as well as to their families, and may serve as a trigger for feelings of sadness and distress.

This way, the information and data present here were organized and rewritten in order to minimize the negative effects of the research, however, without ceasing to fulfill its scientific role, prioritizing the knowledge and well-being of chronic kidney disease patients. Furthermore, plagiarism is a real risk that can affect bibliographic studies, as health topics have many similar scientific terms covered in various existing works and research. Therefore, in this present work, priority was given to rewriting the thoughts of the referenced authors, avoiding direct citations, in order to reduce the risk of plagiarism.

LITERATURE REVIEW

THE KIDNEYS

The kidneys are part of the urinary or excretory system (Figure 1), as it is also called, which, as the name suggests, have the main function of participating in the process of excretion of metabolic products resulting from chemical reactions in our body's cells. Such metabolic wastes are nitrogenous substances that cannot remain in the blood circulation, as they are considered toxic to the body, namely: ammonia, urea and uric acid. The main tests to assess renal function are creatinine clearance and the urea test (SANTOS, 2014).

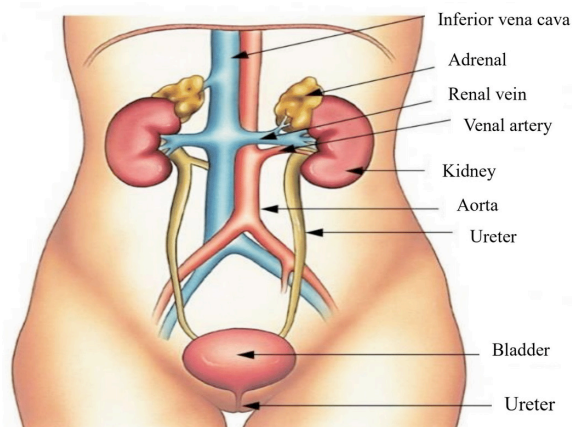


Figure 1: Anatomy of the urinary system.

Image available at www.anatomiadocorpo.com/sistemaurinario/rins/. Accessed on May 19, 2023.

Human beings have two kidneys (Figure 2), organs that are bean-shaped, dark red in color and are located in the posterior region of the abdomen, with the right one located just below the liver and the left one below the spleen. These organs are specifically responsible for filtering blood, giving rise to urine. Blood enters the kidneys through the renal artery and leaves through the renal vein.

The filtering units of the kidneys are the nephrons, which capture and excrete toxic substances from the body, with around 1

million nephrons in each kidney. Such toxic substances leave the kidney through the ureter, the excretory channel responsible for carrying urine from the kidney to the bladder (SANTOS, 2014).

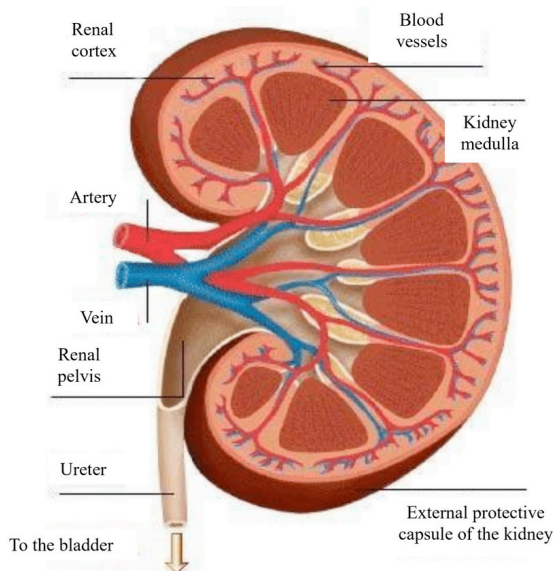


Figure 2: Anatomy of the kidneys.

Source: www.anatomiadocorpo.com/sistemaurinario/rins/. Accessed on May 19, 2023.

CHRONIC KIDNEY DISEASE

Chronic kidney disease (CKD), in turn, is the permanent loss of kidney functions, altering human body homeostasis, and, if there is no renal replacement therapy, it can even lead to the individual's death (MIYAHIRA, 2016). This condition is considered a major public health problem, as it results in high rates of morbidity and mortality, in addition to causing medical, social and economic problems for the patient (CESARINO; MARTINS, 2015).

The changes that occur in the body of chronic kidney disease patients (CRP), medications and even replacement therapy itself, can result in mental health problems, triggering emotional conflicts, distressing, traumatizing and complex experiences, which are capable of completely altering the patient's

life (BALDOINO, et al., 2022).

CKD, since the kidneys no longer perform their normal function, results in the accumulation of toxins, water-electrolyte and acid-base imbalance, hypovolemia, hyperkalemia, hyperphosphatemia, anemia, hormonal disorders, hyperparathyroidism, infertility, growth retardation, among other complications (BREITSAMETER; THOMÉ; SILVEIRA, 2008).

In the last decade, there has been a significant increase in the population with CKD, justified by the aging of the population, increased life expectancy associated with the evolution of medicine and replacement therapies. Furthermore, the aging of the population increases the number of cases of systemic arterial hypertension and diabetes, which are the main etiologies of CKD (BALDOINO et al., 2022).

At the beginning of the disease, treatment can be conservative, through medication, diet and water restriction (AGUILLAR; BARBOSA; BOEMER, 1999). However, kidney disease manifests itself in a slow, variable and often asymptomatic way, which makes early diagnosis and preventive monitoring difficult, making the disease likely to be discovered in its advanced stage (Figure 3) (CESARINO; MARTINS, 2015).

When kidney function reaches 15% or less, it becomes necessary to replace or complement it, which may be through kidney transplantation, which can come from a deceased donor or living donor, or through dialysis therapy, which can be peritoneal dialysis or hemodialysis (CRUZ; TAGLIAMENTO; WANDERBROCKE, 2016).

These treatments partially replace kidney function, alleviate the symptoms of the disease, preserve the patient's life and prolong their survival, however, none of them are curative, with the exception of kidney transplantation (CESARINO; MARTINS, 2015).

Stages of chronic kidney disease

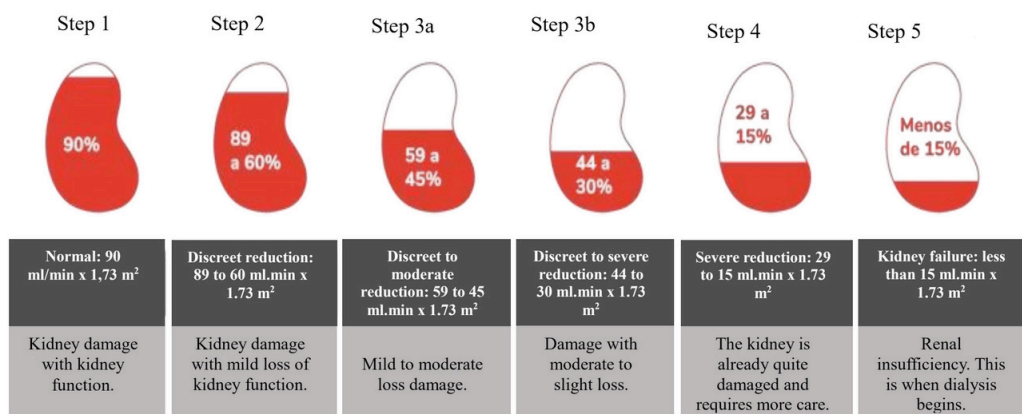


Figure 3: Stages of chronic kidney disease.

Source: www.nefroclinicas.com.br/doenca-renal-cronica/. Accessed on May 19, 2023.

RENAL FUNCTION REPLACEMENT THERAPIES

HEMODIALYSIS

It is estimated that the total number of patients undergoing dialysis treatment (dialysis and hemodialysis) is approximately 140 thousand in Brazil (LUGON et al., 2021), and, of these patients, 89.4% are undergoing hemodialysis treatment (MADEIRO et al., 2010). These data confirm that hemodialysis is the most used replacement therapy in Brazil (MATOS et al., 2020), even though it is considered the most physically restrictive (CRUZ; TAGLIAMENTO; WANDERBROCKE, 2016).

Hemodialysis consists of compensating kidney function by filtering the blood in a computerized machine (Figure 4), which receives the patient's blood through a vascular access, which can be a catheter or an arteriovenous access (fistula, union of an artery and a vein). Subsequently, the blood is driven by a pump to the dialyzer (dialysis filter), then it is exposed to the dialysis

solution (dialysate), through a semipermeable membrane responsible for removing excess liquid and toxic substances present in the blood. After this, the clean blood is returned to the patient through the same exit access (RAIMUNDO et al., 2017). This way, it is possible to monitor the work of eliminating excess salt, water and toxins extracorporeally (BRAZIL, 2009).



Figure 4: Chronic renal patient on hemodialysis therapy.

Source: CRUZ, 2021. Available at: www.agenciapara.com.br/noticia/29787/servico-de-hemodialise-do-hospital-ophir-loyola-jafunciona-com-25-maquinas-novas. Accessed on May 19, 2023.

Normally, hemodialysis sessions last an average of 4 hours and are performed 3 times a week. However, these indications can be changed by the responsible physician according to the clinical condition and needs of each patient (PUPO et al., 2010). This replacement therapy, despite being the most used, is not considered a comprehensive treatment, as it is not capable of replacing the endocrine function of the kidneys (BEANES et al., 2017).

PERITONEAL DIALYSIS

Peritoneal dialysis (Figure 5) has the same function as hemodialysis of removing, through filtration, the metabolites accumulated in excess in the blood due to chronic kidney disease, and in it the blood is also filtered through a membrane that allows the removal of water. However, the difference lies in the process, as, in peritoneal dialysis, it is the peritoneal membrane that acts as the filter (PUPO et al., 2010). In other words, it is a treatment option where the process takes place inside the patient's own body, with the help of a natural filter (the peritoneum) as a substitute for kidney function.



Figure 5: Chronic renal patient undergoing peritoneal dialysis therapy.

Source: <https://www.prorim.org.br/dialise-peritoneal/>. Accessed on May 19, 2023.

The peritoneum is a porous, semipermeable membrane rich in blood vessels that lines the main abdominal organs, and the space between these organs is called the peritoneal cavity. A dialysis liquid is infused into the peritoneal cavity through a catheter (biocompatible flexible tube), which is implanted through a minor surgery in the patient's abdomen (PUPO et al., 2009). The catheter, after healing, is permanent and painless, a feature that makes peritoneal dialysis less uncomfortable compared to hemodialysis, as it spares the patient the pain of perforations to access the fistula (BRAZIL, 2009).

Then, the infused dialysis solution remains for a certain time in the peritoneal cavity, where it comes into contact with the blood, allowing excess toxic substances, such as urea, creatinine and potassium, to be removed, in addition to eliminating excess liquid that the kidneys were unable to eliminate (PUPO et al., 2009). Subsequently, the solution is drained and disposed of directly into a drain, or directed to a container suitable for large-volume biological waste, and then discarded (Figure 6) (BRAZIL, 2009).

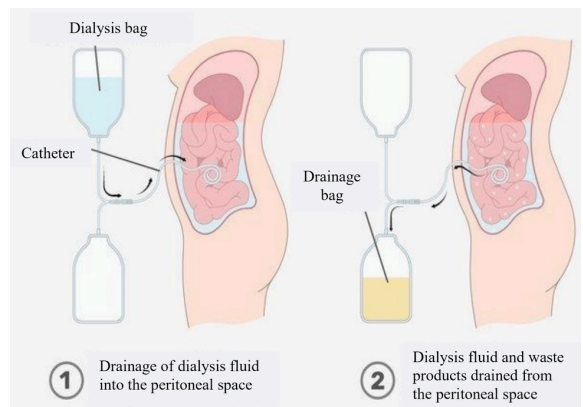


Figure 6: How peritoneal dialysis works.

Source: LEMOS, 2022. Available at: <https://www.tuasaude.com/dialise-peritoneal/>.

Accessed on May 19, 2023.

Peritoneal dialysis can be automated, carried out by a machine every night, or it can be continuous outpatient, which is carried out manually daily, requiring 4 changes per day, with each change carried out over a period of 30 minutes. Outside of exchange periods, the patient is free from the bags (BRAZIL, 2009). It is important to highlight that this replacement therapy is also not capable of replacing the endocrine function lost by the kidneys, therefore, it is also not considered a comprehensive treatment (BEANES et al., 2017).

TRANSPLANT

Kidney transplantation, in turn, is a treatment option in which a healthy kidney, from a living or deceased donor, is donated to a chronic kidney patient. In the case of a living donor, this does not necessarily need to be a relative of the kidney patient, despite this condition having the best success rates in transplants, as compatibility increases significantly between relatives (RAIMUNDO et al., 2017).

The donor's kidney is implanted into the recipient through surgery, and begins to perform the functions of filtering the blood, eliminating toxic substances and excess fluid. The recipient's kidneys remain where they are, unless they are harming the patient's health in some way (BRAZIL, 2009).

Compared to the other treatments mentioned, kidney transplantation guarantees a better quality of life, as it guarantees more freedom in routine and better physical conditions. According to the Brazilian Society of Nephrology (2009), "Kidney transplantation is considered the most complete alternative for replacing kidney function". However, despite being the most complete therapy, there are still few transplants performed in Brazil, a factor mainly related to the lack of donors, resulting from the resistance of families in donating

organs from deceased loved ones and the fear and lack of guidance of possible living donors (BRAZIL, 2009).

After the transplant, the recipient undergoes immunosuppressive treatment to avoid rejection phenomena of the implanted organ (BRAZIL, 2009), a factor that will be better described later.

THE CHRONIC KIDNEY PATIENT

The chronic kidney patient is a universe to be studied and understood. Their daily struggles and clinical conditions shape atypical behavior. After discovering the disease, they go through a period of denial and, later, acceptance, with a high probability of developing depression, since their lives change drastically from day to night and they need to learn to live with their illness. Furthermore, they need to adapt to rules and treatments that keep them alive. The fear of death is also a desperate factor that chronic kidney disease patients suffer during treatment, and with it comes anxiety and insomnia, making their daily lives even more difficult (BARBOSA; AGUILLAR; BOEMER, 1999).

According to authors Barbosa, Aguillar and Boemer: "they lead me to think about how much professionals in the healthcare team, and in particular in a dialysis team, need to understand this patient, so as not to be agents that trigger new conflicts. and tensions." In other words, professionals who work with these patients, including dental surgeons, need to be able to care for them with maximum seriousness and responsibility, in order to alleviate their tiring and distressing routines, and not be another obstacle in the lives of these patients (BARBOSA; AGUILLAR; BOEMER, p. 293-302, 1999).

ORAL AND SYSTEMIC IMPLICATIONS OF CKD

CKD presents systemic clinical conditions that require special care, preparation and skill from the professionals involved. Cardiovascular diseases (stroke, coronary disease and myocardial infarction) are considered the biggest causes of death among people with the disease (CASTRO et al., 2017).

Chronic kidney patients are very likely to present a clinical condition called uremia, which is an increase in urea levels in the blood. This condition results in changes such as: anemia, immunosuppression and platelet dysfunction, in addition to systemic impairment that affects several organs (chart 1) (BREITSAMETER; THOME; SILVEIRA, 2008).

Furthermore, it is important to highlight that around 90% of chronic kidney disease patients have oral manifestations. In other words, this disease also requires preparation and skill on the part of dental surgeons, as there are several oral disorders related to it. These disorders include: xerostomia, hyposalivation, periodontal disease, uremic stomatitis, changes in the jaw bones, candidosis, premature tooth loss and the formation of dental calculus due to the increased concentration of phosphate and calcium. These changes can be caused by the disease itself, as well as by dialysis therapy and the medications taken (BREITSAMETER; THOMÉ; SILVEIRA, 2008).

The progression of kidney disease and the patient's oral hygiene condition are inversely proportional. That is, the more the disease progresses, the less the patient takes care of their oral hygiene. This lack of hygiene predisposes the patient to periodontal disease, a very common condition among those with the disease (ZILIOLI et al., 2019).

Another very relevant implication for dental care is the use of heparin on days when the patient undergoes hemodialysis therapy. This medicine is used to prevent the formation

of blood clots (thrombi) that can form in the hemodialysis machine circuit. However, it is a medication that ends up influencing bleeding time, and therefore elective and invasive procedures must be avoided on days when hemodialysis therapy is performed (RAIMUNDO et al., 2017).

Despite the hyposalivation presented by these patients, a low rate of caries was reported. This is due to the high concentration of ammonia in the oral cavity, resulting from the hydrolysis of urea, which is also in high concentration, as previously mentioned. These factors make saliva alkaline, increasing its buffering capacity, inhibiting the formation of bacterial plaque and the growth of cariogenic bacteria. However, excessive ammonia concentration causes halitosis (characteristic odor), changes in taste and/or a metallic taste in the mouth (CASTRO et al., 2017).

Ultimately, these oral manifestations, when left untreated, can worsen the systemic clinical picture. This happens because patients are immunodebilitated and these manifestations result in inflammatory overload (ZILIOLI et al., 2019). Furthermore, the dental surgeon needs to be aware of the oral and systemic implications of patients, know how to deal with the possible complications of a service and, as far as possible, know how to alleviate the oral symptoms presented by them (CASTRO et al., 2017).

Therefore, it is clear that the integration of a dental surgeon into the multidisciplinary team is very important to promote a significant improvement in patients' quality of life. Furthermore, dental care, through the elimination of infectious foci, is essential for reducing the risk of systemic infection for patients who are on the kidney transplant waiting list, as well as for those who have already had a transplant (ZILIOLI et al., 2019).

SYSTEMIC CHANGES RESULTING FROM UREMIA	
Cardiovascular	Arrhythmias, cardiomyopathies, arterial hypertension, pericarditis
Dermatology	Pruritus, ecchymosis, pallor, hyperpigmentation, xerosis, pseudoporphyria
Endocrine	Amenorrhea, renal osteodystrophy, hyperparathyroidism, loss of libido and sexual function
Gastrointestinal	Nausea, anorexia, esophagitis, vomiting, gastrointestinal bleeding, pancreatitis, ascites, loss of appetite, hiccups
Hematological	Anemia, platelet dysfunction, decreased erythropoietin production
Neuromuscular	Fainting, dizziness, headache, convulsions
Neurological and psychological	Weakening, cramps, malnutrition/muscle wasting
Hydroelectrolytics	Inability to concentrate, sleep impairment, daytime drowsiness, peripheral neuropathy, anxiety, depression, coma, seizures
Bony	Hypocalcemia, hyperkalemia, hyperphosphatemia, metabolic acidosis
	Osteopenia, increased risk of fracture.

Table 1: Signs and symptoms of uremia.

Source: RAIMUNDO et al., 2017.

<i>Pre-dialysis patients</i>	<ul style="list-style-type: none"> • Provide guidance on the oral health care (1 month before dialysis treatment) • Inform the possibility of complications related to the failure of this care
<i>Dialysis patients</i>	<ul style="list-style-type: none"> • Know the patient's systemic status • Good communication between the dentist and the nephrologist <ul style="list-style-type: none"> ○ Anamnesis ▪ Know the status and level of control of CKD ▪ Know the medications the patient uses • Periodic/regular odontological monitoring to control and eliminate foci of infection, evaluation and institution of treatment (periodontal, surgical or restorative) • Efficient control of dental biofilm, through mechanical brushing and mouthwash or application of 0.12% chlorhexidine (chemical) to control infection and reduce pathogenic microorganisms in the oral cavity • Request tests to check blood disorders (bleeding time, platelet count, hematocrit and hemoglobin) and complete blood count • Monitor the patient's blood pressure before, during and after the procedure • Avoid measuring blood pressure in the arm with an arteriovenous shunt • Administer anxiolytics in cases of stress to bring comfort and safety • Perform good surgical technique and local hemostasis maneuvers in cases of hemorrhage • Perform antibiotic prophylaxis when necessary • Do not undergo dental treatment on the day of hemodialysis, due to the use of heparin • Carry out corticosteroid supplementation in cases of adrenal crisis • Avoid prescribing nephrotoxic drugs (acetaminophen, acyclovir, aspirin and NSAIDs) • Adjust drugs metabolized by the kidneys when necessary • Use of anesthetics metabolized in the liver, 2% lidocaine with vasoconstrictor in a controlled manner (attention for hypertensive patients) • Avoid dental treatment if CKD is unstable (little control or advanced)

<i>Pre-transplant patients</i>	<ul style="list-style-type: none"> • The care of this class is similar to the dialysis class; • Carry out re-education of appropriate oral hygiene
<i>Transplant patients</i>	<ul style="list-style-type: none"> • In the first 3 months of transplantation, only emergency dental treatment in a hospital environment is recommended. • After 3 months, some elective procedures may be performed • After 6 months of transplantation, it is the best time to perform dental procedures • Antibiotic prophylaxis • Carry out corticosteroid supplementation • In cases of kidney rejection, perform procedures only in cases of urgency • Pay attention to medications that are excreted by the kidneys

Chart 2 - Dental care protocol for chronic kidney disease patients.

Source: CASTRO et al., 2017.

DENTAL CARE PROTOCOL FOR CHRONIC KIDNEY PATIENTS

Due to the numerous physiological changes presented by these individuals, both those undergoing dialysis therapy and those already transplanted, which result in manifestations and changes in oral and systemic normality, a dental care protocol is necessary (table 2), in order to assist and train dentists so that they can provide quality, individualized and specific treatment for each clinical condition (CASTRO et al., 2017).

DISCUSSION

In view of the studies presented in the literature review, the agreement of the consulted authors on the essential need for the inclusion of a dental surgeon in the multidisciplinary team responsible for chronic kidney disease patients is evident. The authors Araújo et al. (2016) and Silva et al. (2022), also state that by improving the oral condition of these patients, it is possible to increase the quality of life and establish a more favorable prognosis for those still waiting for a transplant.

The authors Pupo et al. (2009) state, after a survey, that of the 104 deaths of patients undergoing hemodialysis treatment in 2007, 1/3 were related to some infection. In addition to them, authors such as Silva et al. (2022) and Zilioli et al. (2019) also highlight that it is

extremely important to eliminate infectious foci from the oral cavity prior to transplantation, as well as after, since oral infections can result in the translocation of microorganisms into the bloodstream, resulting in compromised dialysis treatment and kidney transplant.

According to Raimundo (2017), these simple oral infections represent such a high risk to chronic kidney disease patients due to the fragility of these patients' immune systems against invasive agents. They are immunosuppressed in a multifactorial way, as in patients already transplanted it is called drug immunosuppression, whereas in pre-transplant patients it can be related both to the clinical picture itself and to the treatments implemented.

Regarding the signs, symptoms and clinical characteristics presented by patients, the authors Araújo et al. (2016) list the most common ones, being: xerostomia, uremic stomatitis, radiographic changes in the jaw bones, periodontal disease, pallor of the oral mucosa, enamel hypoplasia, gingivitis, gingival enlargement, halitosis (uremic odor), changes in taste, high prevalence calculus, hyposalivation and changes in salivary composition. On the part of patients, xerostomia was identified as the most prevalent complaint, corroborating other studies in the literature, followed by halitosis. On the part of professionals, the main

oral manifestations identified were dental calculus and gingivitis.

Although the authors consulted presented very similar statements and a high level of agreement, there was a divergence of thoughts regarding the possibility of the manifestations of the disease having a negative or positive influence on the development of cavities. Silva et al. (2022) state that due to the lack of normal salivation in the oral cavity, chronic kidney disease patients are more likely to develop cavities, since human saliva has antibacterial properties and protects tooth enamel against acid attacks. However, Pupo et al. (2009) and Raimundo (2017), state that the high level of urea and ammonia in saliva inhibit the growth of bacteria that cause cavities. Some data analyzed during the process of this bibliographic research demonstrated a low incidence of cavities among patients. However, as there is a lack of scientific consensus on this matter, it was not possible to properly state the conclusion of this dilemma, requiring further studies.

Furthermore, the authors also disagree regarding the indication of antibiotic prophylaxis for patients. While Pupo et al. (2009) states that prophylactic antibiotic coverage has been suggested by some authors before invasive procedures, avoiding bacteremia, the author Raimundo (2017) states that the indication is still very controversial in the literature. Therefore, this is another issue that, due to lack of scientific consensus, was also unable to be concluded.

Among the research analyzed, many reports of complaints about access to dental care by patients were observed. According to Araújo et al. (2016), although the majority of patients with chronic renal failure have oral problems, the dental care provided to them is inefficient and insufficient.

Furthermore, another difficulty exposed was the resistance of the patients themselves

in relation to dental care. According to Pupo et al. (2009), many of these patients have difficulty adhering to or seeking dental care due to the change in routine and implications imposed by the systemic condition. According to Araújo et al. (2016), the fear of being denied assistance or not finding qualified care ends up preventing patients from seeking assistance.

In view of the above, therefore, it is clear that it is not enough to simply include a dental surgeon in the multidisciplinary team that cares for renal patients. It is also extremely necessary to train these professionals so that they are able to understand and serve this patient in the best possible way, through humanization and individualization, according to Zilioli et al. (2019).

CONCLUSION

The mouth is considered the body's main entry point for external agents, in addition to being home to various bacteria, good and bad. Therefore, deep caries, acute periodontitis, residual roots and necrotic pulps can become points of infection with systemic potential in patients with chronic renal failure and transplant recipients, due to the fragility of these patients' immune systems against invasive agents. This fragility of the immune system may be associated with both drug and dialysis therapies, as well as the patient's own clinical condition. Furthermore, there are many oral and systemic manifestations of the disease, which must be analyzed and treated, as far as possible. This way, it is clear that the presence of a CD in the multidisciplinary team responsible for treating chronic kidney disease patients, as well as providing qualified and quality dental care, removing points of oral infection and alleviating signs and symptoms of the disease, whether essential for greater success in kidney transplants and to provide a better quality of life and longer survival for both pre- and post-transplant patients.

REFERENCES

- AGUILAR, O. M.; BARBOSA, J. C.; BOEMER, M. R. O significado de conviver com a insuficiência renal crônica. **Revista Brasileira de Enfermagem**, Brasília, v. 52, n. 2, p. 293302, abr./jun. 1999.
- ANATOMIA do corpo. Disponível em: <https://www.anatomiadocorpo.com/sistemaurinario/rins/>. Acesso em 19 de maio de 2023.
- ARAÚJO, L. F.; BRANCO, C. M. C. C.; RODRIGUES, M. T. B.; CABRAL, G. M. P.; DINIZ, M. B. Manifestações Bucais e Uso de Serviços Odontológicos Por Indivíduos Com Doença Renal Crônica. **Revista da Associação Paulista de Cirurgiões Dentistas**, São Paulo, v. 70, n. 1, Jan./Mar. 2016.
- BARBOSA, J. C.; AGUILLAR, O. M.; BOEMER, M. R. O significado de conviver com a insuficiência renal crônica. **Revista Brasileira de Enfermagem**, Brasília, v. 52, n. 2, p. 293302, abr./jun. 1999.
- BRASIL, Ministério da Saúde. **Cerca de 10 mil transplantes deixam de ser realizados no país**. 2021. Disponível em: <https://agenciabrasil.ebc.com.br/saude/noticia/2021-09/cerca-de10-mil-transplantes-deixam-de-ser-realizados-no-pais>, Acesso em 23 out. 2022.
- BREITSAMETER, G.; THOMÉ, E. G. R.; SILVEIRA, D. T. Complicações que levam o doente renal crônico a um serviço de emergência. **Revista Gaúcha de Enfermagem**, Porto Alegre, ed. 4, v. 29, p. 543-50, dez. 2008.
- CASTRO, D. S.; HERCULANO, A. B. de S.; GAETTI-JARDIM, E. C.; COSTA, D. C. Alterações bucais e o manejo odontológico dos pacientes com doença renal crônica. **Arch Health Invest**, [S.l.], ed. 6, v. 7, p. 308-315, 2017.
- CESARINO, C. B.; MARTINS, M. R. I. Qualidade de vida de pessoas com doença renal crônica em tratamento hemodialítico. **Revista Latino-Americana de Enfermagem**, [S.l.], 13 (5), out. 2015.
- CRUZ, L. 2021. **Serviço de hemodiálise no Hospital Ophir Loyola já funciona com 25 máquinas novas**. Disponível em: <https://www.agenciapara.com.br/noticia/29787/servico-dehemodialise-do-hospital-ophir-loyola-ja-funciona-com-25-maquinas-novas>. Acesso em: 19 de maio de 2023.
- CRUZ, V. F. E. S.; TAGLIAMENTO, G.; WANDERBROOCKE, A. C. A manutenção da vida laboral por doentes renais crônicos em tratamento de hemodiálise: uma análise dos significados do trabalho. **Saúde e Sociedade**, [S.l.], ed. 4, v. 25, out./dez. 2016.
- DAWES, C.; PEDERSEN, A. M. L.; EKSTROM, J.; PROCTOR, G. B.; VISSINK, A.; AFRAMIAN, D.; MCGOWAN, R.; ALIKO, A.; NARAYANA, N.; SIA, Y. W.; JOSHI, R. K.; JENSEN, S. B.; KERR, A. R.; WOLFF, A. The functions of human saliva: A review sponsored by the World Workshop on Oral Medicine VI. **Elsevier**, [S.l.], p. 864, 2015.
- DIÁLISE peritoneal. Disponível em: <https://www.prorim.org.br/dialise-peritoneal/>. Acesso em 19 de maio de 2023.
- DOENÇA renal crônica: tudo o que você precisa saber. Disponível em: <https://nefroclinicas.com.br/doenca-renal-cronica/>. Acesso em 19 de maio de 2023.
- LEMONS, M. **Diálise peritoneal: o que é, como funciona e indicações**. 2022. Disponível em: <https://www.tuasaude.com/dialise-peritoneal/>. Acesso em 19 de maio de 2023.
- LUGON, J. R.; LOPES, A. A.; THOMÉ, F. S.; LUGON, J. R.; MARTINS, C. T. Inquérito brasileiro de diálise. **Jornal Brasileiro de Nefrologia**, [S.l.], ed. 2, v. 43, p. 217-227, 2021.
- MADEIRO, A. C.; MACHADO, P. D. L. C.; BONFIM, I. M.; BRAQUEAIS, A. R.; LIMA, F. E. T. Adesão de portadores de insuficiência renal crônica ao tratamento de hemodiálise. **Acta Paul Enferm.**, Fortaleza, ed. 4, v. 23, p. 546-551, abr. 2010.
- MATOS, G. C.; MOREIRA, P. R.; FIGUERÓ, M. F.; NICOLÓDI, G. V.; KRUG, R. de R.; KELLER, K. D. Avaliação da fragilidade de doentes renais crônicos em tratamento de hemodiálise. **Contexto & Saúde, Unijuí**, [S.l.], v. 20, n. 38, p. 28-33, jan./jun. 2020.

- MIYAHIRA, C. K.; MARTINS, M. R. I.; MENDONÇA, R. de C. H. R.; CESARINO, C. B. Avaliação da dor torácica, sono e qualidade de vida de pacientes com doença renal crônica. **Arquivos de Ciências da Saúde**, p. 61-66, 2016. Disponível em: <https://acervomais.com.br/index.php/saude/article/view/5475/3689>. Acesso em 25 out. 2022.
- PUPO, M. L. de M. G. S.; PARIZOTO, G. A.; GONZAGA, C. C.; LOPES, M. de G. K. Índice de Risco Odontológico para Pacientes Pré-Transplante Renal Submetidos à Hemodiálise. **Revista Sul-Brasileira de Odontologia**, v. 7, p. 50-56, Mar. 2010.
- RAIMUNDO, M. C.; BEANES, G.; FIGUEIREDO, A. L.; MACHADO, E. R. Manejo odontológico do paciente renal crônico: uma revisão de literatura. **Revista de Faculdade de Odontologia da Universidade Federal da Bahia**, Salvador, ed. 1, v. 47, p. 25-34, 2017.
- ROMÃO JÚNIOR, J. E. Doença Renal Crônica: Definição, Epidemiologia e Classificação. **Brazilian Journal of Nephrology**, v. 26, p. 1-3, 2004.
- SANTOS, N. C. M. **Anatomia e Fisiologia Humana**. ed. 2, p. 99-102. São Paulo: Erica, 2014. E-book. Disponível em: <https://integrada.minhabiblioteca.com.br/#/books/9788536510958/>. Acesso em: 25 out. 2022.
- SILVA, H. A. R. **O Paciente Transplantado e a Imunossupressão**. Dissertação (Mestrado em Ciências Farmacêuticas) - Universidade Fernando Pessoa (UFP), Porto, 2015.
- SILVA, S. A.; SILVA, F. M.; CAVALCANTE, A. E. O.; OLIVEIRA, E. T. A.; MATOS, M. H. F.; CARVALHO, A. R.; BALDOINO, A. C. de S.; ASSIS, L. dos S. L.; DOURADO, G. O. L.; RODRIGUES, J. A. Qualidade de vida e aspectos sociodemográficos de doentes renais crônicos. **Revista Eletrônica Acervo Saúde**, [S.l.], ed. 2, v. 13, fev. 2021.
- SIQUEIRA JUNIOR, J. F.; RÔÇAS, I. N.; LOPES, H. P.; ALVES, F. R. F.; OLIVEIRA, J. C. M.; ARMADA, L.; PROVENZANO, J. C. Princípios Biológicos do Tratamento Endodôntico de Dentes com Polpa Necrosada e Lesão Perirradicular. **Revista Brasileira de Odontologia**, Rio de Janeiro, v. 69, n. 1, Jan./Jun. 2012.
- SOCIEDADE BRASILEIRA DE NEFROLOGIA**. Disponível em: <https://www.sbn.org.br/orientacoes-e-tratamentos/tratamentos/hemodialise/>. Acesso em 18 out. 2022.
- SOCIEDADE BRASILEIRA DE NEFROLOGIA**. Disponível em: <https://www.sbn.org.br/orientacoes-e-tratamentos/tratamentos/transplanterenal/#:~:text=O%20que%20C3%A9%20transplante%20renal,de%20insufici%C3%AAnci a%20renal%20cr%C3%B4nica%20avan%C3%A7ada>. Acesso em 18 out. 2022.
- SOCIEDADE BRASILEIRA DE NEFROLOGIA**, 2019. Disponível em: <https://bvsmis.saude.gov.br/14-3-dia-mundial-dorim-2019-saude-dos-rins-paratodos/#:~:text=Segundo%20dados%20da%20Sociedade%20Brasileira,de%20pessoas%20tenham%20a%20doen%C3%A7a>. Acesso em 23 out. 2022.
- SOUZA, A. S.; OLIVEIRA, G. S.; ALVES, L. H. **A Pesquisa Bibliográfica: Princípios e Fundamentos**. **Cadernos da Fucamp**, v. 20, n.43, p. 64-83, 2021.
- ZILIOLI, T. A.; BONFIM-MENDONÇA, P. de S.; YAMADA, S. S.; PILEGE, A. de S. S.; ROCHA, M. F. E.; PIERALISI, N. **Pacientes doentes renais crônicos no departamento de odontologia da UEM: relato de experiência de um projeto de extensão**. Maringá, 2019.