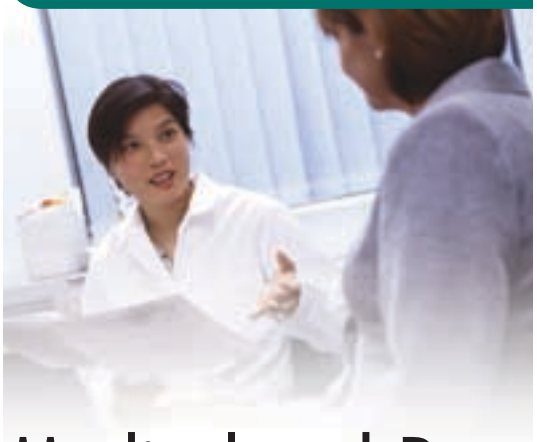
Read, Learn and Earn
CE
CONTINUING EDUCATION



Medical and Dental Standardization for Solid Organ Transplant Recipients

Mea A. Weinberg, D.M.D., R.Ph., M.S.D.; Stuart L. Segelnick, D.D.S., M.S.;

Lawrence B. Kay, D.D.S.; Vinay Nair, D.O.

ABSTRACT

Communication between the organ transplant team and dentist is important in formulating individualized care plans to reduce the incidence of pre- and post-transplant complications. Periodontal diseases and other oral infections may present serious risks that could compromise the success of a solid organ transplant. This article reviews why dentistry is an important component of total transplant care while the patient is on the waiting list for a transplant and after the transplantation. Recommendations regarding the care of the organ transplant patient are given.

Dental clearance is the action or process of removing all acute dental disease and chronic dental conditions that can become acute. Dental clearance includes conducting pre- and post-treatment, comprehensive oral and radiographic examinations and providing a full written report that the patient has been treated. This report will be required by the medical team to inform its members that the patient's dental status should have no effect on his or her medical treatment.

There are several important factors to be considered by both the organ transplant team and the dentist before a patient can undergo a major organ transplant, including heart, kidney, lung, liver, intestine and pancreas. Patients who are immunosuppressed due to the antirejection medications needed for successful organ transplant surgery may be at greater risk of developing systemic complications and transplant rejection relating to odontogenic inflammation and infections.[1-3] Histologically, gingival connective tissue in patients taking cyclosporine, an antirejection drug, has been reported to have high levels of interleukin-6 (IL-6), which is a destructive pro-inflammatory cytokine produced by cells in the presence of inflammation.[1] It has been documented that renal transplant recipients with chronic periodontitis had significantly higher serum IL-6 levels.[2] Thus, inflammation and elevated serum IL-6 levels may increase the risk of organ transplant dysfunction. The dentist becomes an important part of the transplant team in controlling the cause of the inflammation (e.g., infection) before and after the surgery.

Compared to being on dialysis, having a kidney transplant decreases long-term mortality and improves the quality of life.[4] Therefore, it is strongly advocated for transplantation as soon as possible unless there is a direct contraindication.[5] Chronic inflammation is not a direct contraindication and does not need to be eliminated before the actual transplant surgery, but it is more important to the organ's future survival. Thus, based on the time of the actual transplant surgery, the dentist must first expedite elimination of active acute inflammation (e.g., periodontal and endodontic abscesses) by performing periodontal surgery, endodontics or extraction, and then, as best as possible, in the re-

maining time, eliminate chronic inflammation (e.g., dental caries, periodontal disease). In addition, long-standing deep caries must be treated to prevent an acute dental "flare-up." Knowing the relative timeframe for the impending transplant surgery will help the dentist formulate a care plan so that any acute inflammation can be eliminated as soon as possible.

The main concerns of a transplant physician are whether the patient can tolerate the surgery and whether he or she is at risk for any severe infections immediately post-transplant.[4,6] A care plan must be developed while the patient is on the wait list and following transplant surgery. This is universal in terms of chronic inflammation and disease. For example, transplant patients with active chronic hepatitis C and even HIV have an improved survival as compared to patients remaining on dialysis.[7,8] However, although patients with chronic disease benefit from transplantation, this benefit may be less than if they did not have a chronic disease.

Currently, a patient on a waiting list for an organ transplant must be evaluated by the dental professional for diagnosis and treatment of oral disease, with the objective of stabilizing his or her oral health prior to transplantation.[9] Unfortunately, there is no definitive criteria assessment between the physician and the dentist regarding the level of inflammatory disease of the patient and the scope of therapy required to eliminate or reduce oral inflammation in the pre- and post-transplant patient.[10,11]

Criteria must be standardized so that all transplant centers/clinics and dentists can communicate effectively with each other. Unfortunately, it may be years after the initial exam that the transplant physician will see the patient again. The minimal level of dental health must be defined and achieved so that medical treatment can be started. Additionally, the physician must assess whether the dental evaluation meets the requirements for transplant surgery. Currently, there are no definitive criteria for physicians and dentists to follow to determine the level of dental care needed for individual patients both pre- and post-transplant surgery.

Organ-specific Dental Considerations

Pre-transplant patient

Dental care for the pre-transplant patient differs from that of the post-transplant patient. General dentists also need to be cognizant of the specific underlying end-stage disease in the pre-transplant patient and how to deal with it. Consultation with the patient's physician is necessary if antibiotics or anti-inflammatory/analgesics have to be prescribed to a patient with end-stage liver or kidney disease. Several of these medications may require a decrease in dosage or an increased dosing interval, and some drugs, such as NSAIDs, should be avoided in patients with chronic kidney disease and liver cirrhosis to prevent renal failure. In addition, narcotics should be avoided or prescribed with limitations to prevent encephalopathy.[12] The amount of acetaminophen should be limited to less than or equal to 2 to 3 g/d in patients with liver disease (cirrhosis) but without renal failure, and these patients monitored for adverse drug events.[12]

The severity of chronic kidney disease is determined by the glomerular filtration rate (GFR). These values are obtained from the patient's physician. There may be comorbid systemic diseases that the dentist has to be aware of before rendering dental care. Dentists must take into consideration the compromised health and immune system in pre-transplant patients, which places them at increased risk for systemic and oral infections.

Managing oral health before organ transplantation involves obtaining a medical consultation from the patient's medical team regarding the need for antibiotic prophylaxis to prevent systemic infections from dental procedures. Dental management involves obtaining a dental and medical history and a dental and periodontal examination. It is best to avoid procedures that cause bleeding until a physician's consult is obtained. The pre-transplant patient is usually taking several medications, including anticoagulants such as warfarin and antihypertensives such as beta blockers or calcium channel blockers. The dentist should know all the adverse effects of these medications, including xerostomia, orthostatic hypotension, gingival enlargement (with calcium channel blockers) and drug interactions and be prepared to avoid and manage

them.[13] INR (international normalized ratio) and platelets values must be obtained in anticoagulated patients or in patients with end-stage liver disease within 24 but not more than 72 hours of performing invasive dental procedures to determine if the dental procedure can be done without complications of bleeding.

After formulation of a treatment plan, any active infections must be eliminated if time allows; periodontal treatment, including surgeries, should be completed before transplantation and extraction of unrestorable teeth. The patient should be instructed about the importance of maintaining optimum oral hygiene. If the patient is undergoing hemodialysis, it is recommended that the patient have dental treatment one day after dialysis. Sometimes surgical procedures may have to be performed in a hospital setting.

TABLE 1
Pre-treatment Transplant Questions (answered by transplant team when assessing an organ recipient patient for referral to the dentist)

1. What type of transplant is the patient being listed for?
   _____
2. What is the cause of organ failure?
   _____
3. List chronic medical conditions
   _____
   _____
   _____
   _____
4. Does the patient have any known contraindications to anesthesia or dental procedures?
( ) No
( ) Yes _____
5. How imminent is the transplant surgery?
   Within the next:
( ) Less than 1 year
( ) Greater than 1 year
( ) Unknown
6. The highest risk for infections will be during:
( ) 1-6 months
( ) Up to 1 year
( ) Indefinitely
7. The level of immunosuppression of this patient post-transplant will be:
( ) Low
( ) Moderate
( ) High
8. After transplantation the medical status of the patient will allow dental care:
( ) Immediately
( ) After post-transplant month _____
( ) Unknown
   Exceptions to treatment _____
9. After transplantation the necessary medical precautions to be taken prior to dental treatment will include: _____
( ) Prophylactic antibiotic therapy
   suggested medication: _____
( ) Corticosteroid supplementation: _____
( ) Medications to be stopped: _____
( ) Limitations on the use of local anesthetics: _____
( ) Limitations on the use of epinephrine: _____
( ) Other suggestions: _____
10. Other suggestions: _____

Post-transplant Patient

Dental care of the post-transplant patient is different from that of the pre-transplant patient. Essentially, all dental treatment, except for emergencies, must be avoided for at least three and up to six months following organ transplantation, as well as in patients with organ rejection.[14] This is the time it takes for the graft to be stabilized and the immune system to partially recover. If emergency dental treatment is needed before the six months are up, the patient must have antibiotic prophylaxis. The impact of organ transplantation on the general health status, including systemic low-grade inflammation, must be recognized in the post-transplant patient.

The post-transplant patient will be taking many immunosuppressive medications, including cyclosporine, tacrolimus, prograf, azathioprine and corticosteroids. Cyclosporine, an immunosuppressive drug, may cause gingival enlargement, which makes oral hygiene more difficult for the patient.[15-17] Additionally, patients taking a calcium channel blocker for hypertension may further aggravate the gingival enlargement.[14] There are a few dental drug interactions with cyclosporine. These are: 1. erythromycin, clarithromycin (Biaxin) and fluconazole (Diflucan) may increase cyclosporine levels and can cause toxicity; 2. carbamazepine (Tegretol) may decrease cyclosporine levels; and 3. nonsteroidal and anti-inflammatory drugs such as ibuprofen should be avoided with cyclosporine because of kidney damage.

Dental drug interactions with tacrolimus include erythromycin and clarithromycin, which may increase tacrolimus levels, and nonsteroidal anti-inflammatory drugs, which may cause oliguria or anuria. Tacrolimus has not been documented to cause gingival enlargement.[17]

Azithioprine (Imuran) is an antimetabolite that can cause bone marrow suppression by inhibiting the production of bone-forming cells. Azithioprine causes leukopenia (inhibits production of white blood cells) and thrombocytopenia (decreased platelets). The complete blood count (CBC) value must be known before the start of dental treatment.[13]

Over the years, the rate of organ transplant success has increased due to improved screening and evaluation, as well as to newer surgical procedures and immunosuppressive drugs.[18] However, oral infections can be a cause of patient morbidity and transplant dysfunction.[19] The importance of treating inflammatory periodontal and dental diseases cannot be overemphasized. Knowing the degree of immunosuppression of the patient, the

nature and severity of the oral inflammation present and the amount of time before the transplant surgery will help the dentist develop a dental treatment care plan. For example, if a patient is going to die in a few months if a transplant is not performed, or if finding a compatible donor is becoming very tenacious, then a compromise must be reached where oral disease may not be totally eliminated. Some patients may require a high level of dental treatment, including periodontal surgery and extractions, whereas other patients may require a less invasive level of care, including scaling and root planing, local drug delivery and antimicrobial mouthrinses.[20]

Once it has been established that the patient's graft is stable, the following steps should be performed:[13]

1. The dentist must obtain a medical consultation from the patient's transplant team to ascertain the patient's immunosuppressive state, adrenal suppression and bone marrow suppression. There is a definite risk for infection with bone marrow suppression, and an appropriate antibiotic may be necessary after consultation with the patient's physician. The patient usually will be taking steroids, such as prednisone, which is an immunosuppressant that prevents the body from rejecting the transplanted organ and could result in adrenal insufficiency, especially with stressful surgical procedures. Symptoms of an adrenal crisis include weakness, nausea and vomiting, and hypertension. This is a medical emergency and can be avoided with a comprehensive medical consultation. Laboratory blood values are important in evaluating the patient's immune system and risk for infection due to immunosuppression and bone marrow suppression. Important lab values consist of:
   - Total white blood cell count (WBC)
     - Normal: 4,000-10,000/ mm^3
     - Leucopenia: < 4,000/mm^3
   - Absolute neutrophil count (ANC)
     - Normal: 1,500-7,200 cells/mm^3
     - Values below 1,500 cells/mm^3 predict the risk for infection
2. Obtain INR and platelet values to determine the risk of bleeding. The patient is usually taking anticoagulants.
   - International Normalized Ratio (INR)
     - Normal (not on an anticoagulant): INR 1
     - In order to perform invasive dental procedures the INR must be < 3.5.
   - Platelet count[21]
     - Normal: 150,000-400,000/mm^3
     - For dental procedures: > 50,000/mm^3
3. The patient's blood pressure should be monitored before and after dental treatment.
4. The patient should bring in all medications taken, including over-the-counter, to avoid any potential adverse event.
5. Check for any drug interactions that could occur with the medications the patient is taking. In addition, many medications given to an organ transplant patient or patients with end-stage renal or liver dysfunction can cause further organ damage. Consult with the patient's physician before prescribing any antibiotic, analgesic or anti-inflammatory agent that may require a dosage adjustment either in the amount or increase in the interval of administration. Most infections during the first month post-transplant are associated with surgical complications. Opportunistic infections usually occur from the second to the sixth month post-transplant. Beyond six months or during the late post-transplant phase, transplantation recipients suffer from the same infections seen in the general community.[22] Fever secondary to odontogenic infections following successful renal transplantation has been reported.[23] Complications and failures after renal transplant may be due to active viral infections.[24] Nowzari et al. found the presence of cytomegalovirus (CMV) in saliva and gingival crevicular fluid of these patients with associated periodontal disease.[25] Controlling oral inflammation is also important during the post-transplant period to improve organ survival.[26]

How to Use Data Collection Worksheets

The physician should follow specific guidelines and criteria relating to the patient's pre-transplant inflammatory state and then forward the results to the treating dentist. This information will help the dentist formulate an individualized treatment plan for the patient. Furthermore, the dentist can then inform the physician about the patient's post-transplant dental/periodontal inflammatory condition and how the patient can be maintained.

Periodontal inflammation is extremely important in controlling both the morbidity and mortality rates in patients on hemodialysis as well as in post-transplant patients.[27,28] This is accomplished by identifying the inflammatory oral risk factors and other non-oral risk factors, such as heart conditions, obesity and tumors.[29] The dentist needs to know how much inflammatory disease is acceptable for the surgery to proceed and what is the level of disease or what level of dental health can be attained that is acceptable for medical treatment. In order to answer these questions a risk assessment must be performed. We are proposing a series of easy-to-follow care plan recommendations for the pre- and post-transplant patient that are based on the medical and dental expertise of the authors of this article. These recommendations should be utilized for clinical assessment and as guidelines by the organ transplant team and referring general dentists and periodontists.

Physicians generally do not have the same in-depth understanding of dental disease and how to treat it as dentists do. Therefore, they may have difficulty relaying to the dentist their pre- and post-medical/dental requirements. These care plan recommendations are designed to bridge this gap. They will provide

the dentist with knowledge of what the physician feels is the minimal dental health the transplant patient may have prior to transplant surgery, the timeframe the dentist has to work within and the medical restrictions placed on the dental treatment. Once a dentist has this information, he or she will be able to develop a tailored treatment plan for the patient. If the physician's expectations cannot be attained, then further consultation with the physician and dentist is necessary.

Table 1 lists specific questions that are answered by the transplant coordinator and sent with an introductory referral letter to the dentist. Table 2 contains selective questions that need to be filled out by the dentist and sent back to the transplant coordinator. The answers to these questions will determine the care plan while the patient remains on the wait list and post-transplant. Additionally, a standardized form (Table 3) pertaining to dental care for the post-transplant patient should be recorded by the dentist and communicated to the transplant team.

Conclusions

Prudent management of transplant patients is essential prior to their surgery, postsurgically and over the remainder of their lives. Currently, there is no definitive guidance from the transplant physician and dentist regarding the dental needs of transplant patients. The development of care plan recommendations will enable more comprehensive medical and dental treatment of immunosuppressed patients through better communication between the transplant physician and dentist. These recommendations will help treating doctors formulate a comprehensive patient management program.

The guidelines presented here were developed in response to a lack of direction with regard to the dental needs of transplant patients. The forms are based upon our clinical experiences and the result of communication between dentists and transplant physicians. To date there are no studies linking patients' dental health and complications with transplants. At this time we really do not know what constitutes "clearance" for these patients or how much inflammation is tolerable. Future work needs to be done, including surveying multiple transplant centers to better understand what the transplant physician is asking for. We need to educate physicians as to what is practical for the dentist to accomplish.

A recent article found that there was a major concern regarding underutilization of preventive dental services in medically transplant children undergoing renal and liver transplants.[15] Many dentists may not feel comfortable in pre- and postoperative monitoring and treating these patients as well as other transplant patients. The intent of these forms is to ease the responsibility of the dentist and improve preventive care by providing better communication with the physician and by giving the physician a better understanding of what the dentist must accomplish during patient care.

It is just as important to recognize that when the dentist is communicating with the physician, the dentist is actually requesting a

TABLE 2

Pre- and Post-transplant Patient Assessment. To be filled out by the dentist (check in the box after procedure is completed) and sent to the transplant physician.

1. Recommended therapies prior to transplantation:
   a. _____
   b. _____
   c. _____
   d. _____

2. Expected time until completion of treatment:
   _____

3. Recommended ongoing care for patient (pre- or post-transplant)
   a. _____
   b. _____
   c. _____
   d. _____

☐ Full mouth radiograph taken: date: _____

Treating Acute Dental Disease

Presence of dental caries:
- Tooth number and surface: _____
- Treated (tooth # & restoration): _____
- Endodontically treated?

Endodontically involved teeth (e.g., acute or chronic abscess)
- Tooth number: _____
- Treated: _____

Teeth requiring extraction # _____

Treating Chronic Dental Disease

Root caries
- Tooth number: _____
- Treated (tooth # & treatment) _____

Ailing, failing or failed implants
- Tooth number: _____
- Treated: _____

Periodontal Diseases

Treating Acute Periodontal Conditions

Necrotizing ulcerative gingivitis or necrotizing ulcerative periodontitis

Periodontal abscess

Treating Chronic Periodontal Conditions

Chronic gingivitis (localized or generalized; severity: mild, moderate or severe)
- Circle: plaque-induced, medication-induced, systemic disease-induced
- Treatment: _____
- Is patient adherent to plaque control
  - ( ) NO
  - ( ) YES
- Periodontal abscess
- ☐ Chronic periodontitis
- Circle: localized or generalized
- Circle: severity: mild, moderate or severe
- risk factors
- Circle all that apply: plaque-induced; smoking; diabetes or other
- treatment: _____
- Is patient adherent to plaque control
  - ( ) NO
  - ( ) YES

Aggressive periodontitis
- Circle: localized or generalized
- Circle: severity: mild, moderate or severe

☐ Status of third molars

Impacted third molars should be extracted
- List tooth number: _____
- Treatment: _____

medical consultation rather than a medical clearance from the transplant physician. Essentially, the dentist needs to know about the patient and how well he or she will be able to get through a dental procedure.[30] These recommendations or guidelines give the dentist an idea of the patient's medical status, timelines and postsurgical needs prior to the transplant surgery. The dentist will be able to assess whether he or she can meet the physician's expectations. If not, then further communication needs to be initiated between the dentist and the physician. Once the transplant physician and dentist come to a consensus, they will be able to inform the transplant patient what is expected of them both before and after transplant surgery.

Post-transplant dental care is often overlooked. These guidelines give the dentist follow-up guidelines for postsurgical care. Periodontal diseases and dental caries must be monitored in these patients to lessen the incidence of life-threatening postsurgical infections. Furthermore, post-transplant patients are usually severely immunosuppressed from medications taken to prevent rejection of the organ.

Queries about this article can be sent to Dr. Segelnick at EperioDr@aol.com.

TABLE 3
Dental Care Guidelines for Post-transplant Recipients

1. Medical history
   a. Consult with transplant physician
   b. Medications (e.g., cyclosporine, calcium channel blockers)
   c. Antibiotic prophylaxis for periodontal maintenance visits
      - ☐ Medication usage
        - ( ) Presence of medication-induced gingivitis
          Circle: cyclosporine, nifedipine, tacrolimus, sirolimus
          Dosage: _____
      - ☐ Antibiotic prophylaxis required
        - ( ) Yes
          Antibiotic & dosage: _____
        - ( ) No
2. Radiographs as needed
3. Oral hygiene assessment
   a. Nonadherent
   b. Good
   c. Improving
4. Reinforce oral hygiene
   a. Devices used (e.g., soft-bristled toothbrush, interdental)
   b. Technique (e.g., modified Bass)
5. Gingival and periodontal assessment (gingival evaluation, bleeding, probing depths)
6. Caries assessment
   a. Fluoride application
7. Prescribe antimicrobial mouthrinse, if needed
8. Three-month maintenance schedule

REFERENCES

1. Atilla G, Kutukculer N. Crevicular fluid interleukin-1beta, tumor necrosis factor-alpha, and interleukin-6 levels in renal transplant patients receiving cyclosporine A. J Periodontol 1998;69(7):784-790.
2. Ioannidou E, Kao D, Chang N, et al. Elevated serum interleukin-6 (IL-6) in solid organ transplant recipients is positively associated with tissue destruction and IL-6 gene expression in the periodontium. J Periodontol 2006;77(11):1871-1878.
3. Raasveld MH, Bloemena E, Wilmink JM, Surachno S, Schellekens PT, ten Berge RJ. Interleukin-6 and neopterin in renal transplant recipients: A longitudinal study. Transpl Int 1993;6:89-97.
4. Wolfe RA, Ashby VB, Milford EL, Ojo AO, Ettenger RE, Agodoa LYC, Held PJ, Port FD. Comparison of mortality in all patients on dialysis, patients on dialysis awaiting transplantation, and recipients of a first cadaveric transplant. N Engl J Med 1999;341:1725-1730.
5. Meier-Kriesche HU, Prort FK, Ojo AO, Rudich SM, Hanson JA, Cibrik DM, Leichtman AB, Kaplan B. Effect of waiting time on renal transplant outcome. Kidney International 2000;58:1311-1317.
6. Silverstein DM. Inflammation after renal transplantation: role in the development of graft dysfunction and potential therapies. J Organ Dysfunction 2009;5(4):233-241.
7. Stock PG, Barin B, Murphy B, Hanto D, et al. Outcomes of kidney transplantation in HIV-infected recipients. N Engl J Med 2010 Nov 18;363(21):2004-14. Erratum in: N Engl J Med 2011 Mar 17;364(11):1082.
8. Roth D, Gaynor JJ, Reddy KR, et al. Effect of kidney transplantation on outcomes among patients with Hepatitis C. J Am Soc Nephrol 2011 Jun;22(6):1152-60. Epub 2011 May 5.
9. Segelnick SL, Weinberg MA. The periodontist's role in obtaining clearance prior to patients undergoing a kidney transplant. J Periodontol 2009;80 (6):874-876.
10. Cochran D. Shifting the paradigm of treatment of periodontal diseases – implications for patient care. AAP News 2009; April-June:11.
11. Guggenheimer J, Mayher D, Eghtesad B. A survey of dental care protocols among US organ transplant centers. Clin Transplant 2005;19:15-18.
12. Chandok N, Kymberly DS. Pain management in the cirrhotic patient: the clinical challenge. Mayo Clinic Proc 2010, 85(5): 451–458.
13. National Institute of Dental and Craniofacial Research. Dental Management of the Organ Transplant Patient. www.nidcr.nih.gov (Accessed August 15, 2011).
14. Ganda K. Organ transplants, immunosuppressive drugs, and associated dental management guidelines. In: Dentist's Guide to Medical Conditions and Complications. 1st Ed. Wiley-Blackwell 2008:467-472.
15. Shiboski CH, Kawada P, Megan G, Tornabene A, Krishnan S, Mathias R, Den Besten P, Rosenthal P. Oral disease burden and utilization of dental care patterns among pediatric solid organ transplant recipients. J Public Health Dent 2009;69(1);48-55.
16. Kilpatrick NM, Weintraub RG, Lucas JO, Shipp A, Byrt T, Wilkinson JL. Gingival overgrowth in pediatric heart-lung transplant recipients. J Heart Lung Transplant 1997;16:1231-1237.
17. Greenberg KV, Armitage GC, Shiboski CH. Gingival enlargement among renal transplant recipients in the era of new-generation immunosuppressants. J Periodontol 2008;79:453:460.
18. Provenzano R. The importance of dental care for transplant recipients. Renalife 2005;21(1):12.
19. Schander K, Jontell M, Johansson P, Nordén G, Hakeberg M, Bratel J. Oral infections and their influence on medical rehabilitation in kidney transplant patients. Swed Dent J 2009;33(3):97-103.
20. Cerveró AJ, Bagán JV, Soriano YJ, Roda RP. Dental management in renal failure: patients on dialysis. Med Oral Pathol Oral Cir Bucal 2008;1:13(7):E419-426.
21. Radmand R, Schilsky M, Jakab S, et al. Pre-liver transplant protocols in dentistry. Oral Surg Oral Med Oral Pathol Oral Radiol 2013;115:426-430.
22. Patel R, Paya CV. Infections in solid-organ transplant recipients. Clin Microbiol Rev 1997;10(1): 86-124.
23. Wilson RL, Martinez-Tirado J, Whelchel J, Lordon RE. Occult dental infection causing fever in renal transplant patients. Am J Kidney Dis 1982;2(3):354-356.
24. V. Jha. Post-transplant infections: an ounce of prevention Indian J Nephrol. 2010 October; 20(4):171–178.
25. Nowzari H, Jorgensen MG, Aswad S, Khan N, Osorio E, Safarian A, Shidban H, Munroe S. Human cytomegalovirus-associated periodontitis in renal transplant patients. Transplant Proc 2003;35(8):2949-2952.
26. Naugle K, Darby ML, Bauman DB, Lineberger LT, Powers R. The oral health status of individuals on renal dialysis. Ann Periodontol 1998; 3:197-205.
27. Yeun JY, Levine RA, Mantadilok V, Kaysen GA. C-reactive protein predicts all cause and cardiovascular mortality in hemodialysis populations. Am J Kidney Dis 2000;35: 469-476.
28. Lobo SM, Lobo FR, Bota DP, Lopes-Ferreira F, Soliman HM, Mélot C, Vincent JL. C-reactive protein levels correlate with mortality and organ failure in critically ill patients. Chest 2003;123: 2043-2049.
29. Jofre´ R, Rodriguez-Benitez P, Lo´pez-Go´mez JM, Pe´rez-Garcia R. Inflammatory syndrome in patients on hemodialysis. J Am Soc Nephrol 2006;17: S274–S280.
30. Gary CJ, Glick M. Medical clearance: an issue of professional autonomy, not a crutch. J Am Dent Assoc 2012 Nov;143(11):1180-1.