

Current practices and attitudes of dental practitioners regarding the provision of dental treatment for patients with solid organ transplants

Fiona O'Leary  | Niamh Coffey  | Francis M. Burke | Anthony Roberts | Barry Plant | Martina Hayes

Restorative Dental Department, Cork University Dental School and Hospital, Cork, Ireland

Correspondence

Fiona O'Leary, University College Cork, Cork, Ireland.
Email: Fiona.oleary@ucc.ie

Funding information

Cystic Fibrosis Ireland; College of Medicine and Health interdisciplinary Seed Awards; Health Research Board of Ireland, Grant/Award Number: CSF-2020-003

ABSTRACT

Background: Solid organ transplant provides a lifeline for people with end stage organ failure. Each year the number of individuals in receipt of a solid organ transplant is increasing. Prevention of post-transplant sepsis and infection are critical for transplant success. The oral cavity contains more than 700 different species of bacteria and is a potential reservoir for disease causing pathogens. Prior to undergoing solid organ transplant, individuals must receive a certification of dental health from a dental practitioner. There are currently no guidelines or protocols for dental practitioners to follow when certifying a patient as dentally fit. This allows for a wide variation of the term 'dentally fit'. This survey was conducted as part of a larger study assessing the oral health of adults with cystic fibrosis ongoing in Cork University Dental School and Hospital. The aim of the study was to ascertain current practices and attitudes of dental practitioners regarding the provision of dental treatment pre and post solid organ transplantation.

Methods: An anonymous cross sectional survey of dental practitioners in Ireland was conducted.

Results: The data collected showed a wide variation in the provision of treatment for patient undergoing or in receipt of a solid organ transplant.

Conclusion: It demonstrates a need for further research to be conducted to ascertain the full impact solid organ transplant has on oral health, so that guidelines can be developed to aid both dental and medical professionals in the treatment of this vulnerable cohort.

KEYWORDS

certification of dental health, dental fitness, health education, oral health, solid organ transplant

This is an open access article under the terms of the [Creative Commons Attribution-NonCommercial-NoDerivs](https://creativecommons.org/licenses/by-nc-nd/4.0/) License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

© 2023 The Authors. *Clinical Transplantation* published by John Wiley & Sons Ltd.

1 | INTRODUCTION

Solid organ transplantation (SOT) offers life-saving treatment for terminal diseases or those associated with a significant impairment in an individual's quality of life such, as cystic fibrosis. Every year the number of people receiving solid organ transplants is increasing globally. In 2021, 41 354 organ transplants were performed in the United States, an increase of 5.9% by 2020.¹ In Europe, between 2008 and 2015, the number of organ donors increased by 21% from 12 000 to nearly 15 000.² The success rate of SOT has improved with technical advancement, pharmacological development, innovation in broadening the donor pool, and standardization of practices related to transplantation. After transplantation great care must be taken to reduce complications such as bacterial infection and sepsis. Infection is the leading cause of mortality between 1- and 12-month post-transplant, accounting for approximately 35% of deaths during that period.³ Potential sources of infection are widespread. Infections arising from an odontogenic or oral source are a legitimate concern given the extensive anaerobic and aerobic bacterial species that naturally inhabit the oral cavity. Several studies have drawn attention to inadequate oral hygiene behavior and deficits in oral health in patients receiving organ transplants.^{4,5} Three cases of dental abscesses causing systemic infection were reported in a study of 128 patients who had undergone kidney transplantation.⁴ The exact risk of oral pathogens on transplant success has not been unequivocally documented by scientific studies and there is a paucity of information in this area. A prerequisite certification of dental health from a dental practitioner is a necessity before undergoing SOT, in some transplant centers dental health certification is required for potential candidate evaluation. The current concept of "dental health" is ill-defined as the term does not account for infections or oral diseases that may arise in the weeks or months following a dental examination, nor are there clear parameters or guidelines for dental and medical practitioners to reference when providing or seeking a certification of dental health. Given the chronic nature of oral conditions such as periodontitis, will clinicians ever be able to provide a certificate of health? The paucity of such information makes the provision of appropriate dental treatment challenging. As part of a larger study evaluating the oral health of adults with CF at Cork University Dental School & Hospital a questionnaire was distributed to dentists in the Republic of Ireland. The purpose of this questionnaire was to ascertain current practices among dentists regarding the provision of care for recipients of SOTs and certification of dental health preceding SOT.

1.1 | Study design

A cross-sectional survey was conducted as part of a larger study assessing "oral health in adults with cystic fibrosis." Ethical approval (ECM 03/2022 PUB) was granted by the Clinical Research Ethics Committee of Cork Teaching Hospitals (CREC). The questionnaire was designed following extensive PPI (public and patient Involvement) involvement with representatives of the dental profession.

Participants were invited to participate via mailing lists from the Irish Association of Oral Surgeons, the Orthodontic Society of Ireland, Irish Society of Periodontology, and social media channels.

An anonymous questionnaire was distributed to dentists. The questionnaire consisted of 56 questions and multiple-choice answers. Thirteen questions were dedicated to the provision of dental care for patients undergoing or in receipt of a solid organ transplant. The participants provided written consent to participate in the survey. All the data collected from this survey was anonymous and was stored securely. IP addresses were not collected at any point, indicating that the data provided could not be traced back to the participants. Participants were not obliged to answer all the questions.

2 | RESULTS

In total 138 dental professionals responded to the survey. Three dentists did not consent. Therefore, data from 135 dental practitioners was collected and included. The survey respondents included general dental practitioners, oral surgeons, periodontists, orthodontists, community dentists, and endodontists.

2.1 | Provision of dental care for a patient in receipt of a solid organ transplant

Thirty-four percent of respondents currently or in the past have provided dental care for patients in receipt of a solid organ transplant. Sixty-one percent have not treated such patients and 6% of dental professionals were not sure.

Of the 34% who currently provide or had previously provided care for this cohort of patients, 34% had provided restorative dental care, 23% had provided periodontal care, 22% had provided preventative care, and 21% had provided oral surgery treatment.

2.2 | Provision of dental health certification preceding solid organ transplantation

Twenty-nine percent of respondents have provided dental health certification for a patient requiring a solid organ transplant, 66% of respondents had not provided this, and 5% of respondents did not know if they had undertaken dental health certification preceding transplantation.

2.3 | Guidance from the patient's medical team regarding a dental health assessment for a solid organ transplant candidate

Of the respondents who had provided dental health certification, only 11% had received guidance from the patients' medical transplant team regarding pre-transplant dental health. This guidance included

a "letter" from the medical team and instructions to "check overall dentition looking for possible sources of infection. Also, to complete any necessary work prior to the procedure." The majority, 81% of respondents had not received any guidance from transplant team, while 8% of respondents were not sure.

2.4 | Are current available literature/guidelines on pre-transplant dental health certification adequate?

Eighty-eight percent of responding dental professionals consider current available literature providing guidance for the provision of dental health certification inadequate. Only 12% of respondents think that it is adequate.

2.5 | Are the prescription of prophylactic antibiotics for the dental treatment of solid organ transplant recipients appropriate?

Thirty-six percent of dental professionals consider the prescription of prophylactic antibiotics appropriate prior to dental treatment for patient in receipt of a solid organ transplant. Eighteen percent of respondents did not consider it appropriate, whereas 46% did not know.

Of the 36% of respondents who would prescribe an antibiotic prophylactically, the vast majority would prescribe a broad-spectrum antibiotic such as Amoxicillin.

2.6 | When given the following clinical scenario

Following examination, a patient requires both general restorative and periodontal treatment. The patient is a recipient of a solid organ transplant (lung transplant) received over 12 months ago. The patient is taking Cyclosporin, Prednisolone, Omeprazole daily. Would you prescribe an antibiotic prophylactically for the above treatment?

Forty percent of dentists would prescribe an antibiotic prophylactically to the patient preceding dental treatment. Most dentists (58%) would prescribe 3 g Amoxil prophylactically, the remaining dentists (42%) would liaise with the patient's medical team or GP.

Sixty percent of respondents would not prescribe an antibiotic prophylactically for the above clinical scenario. Of these respondents 76% would liaise with the patient's medical team before proceeding with dental treatment, 22% think antibiotic prophylaxis is not warranted, and 3% would seek additional information before proceeding.

3 | DISCUSSION

A total of 135 dentists completed the questionnaire. This represents just under 10% of the total number of dentists registered to practice in Ireland. The respondents consisted of general dental practitioners,

oral surgeons, periodontists, orthodontists, community dentists, and endodontists all of whom provide a broad range of dental care, each with specific concerns. The information ascertained in this questionnaire demonstrates an absence of standardized dental practice in relation to the provision of dental health certification for solid organ transplantation and the provision of dental care to recipients of SOT.

Recipients of SOTs appear to be at a higher risk for developing oral disease. Studies have shown a deficit in oral hygiene amongst this vulnerable cohort. A study conducted in Yonsei University Dental Hospital reported that 53.8% of liver transplant recipients and 40.3% of kidney transplant recipients had poor oral hygiene.⁶ Comparable results were reported in a cross-sectional study of German transplant centers which found that recipients of SOTs demonstrated worse oral health when compared to the general population.⁷ Poor oral hygiene is a recognized risk factor for dental caries and periodontal disease. Furthermore, recipients of SOTs have been shown to have a significantly higher incidence of oral lesions in patients compared to control subjects. A study assessing the oral health of renal transplant patients found a 31% increase in the incidence of oral mucosal lesions including erythematous, keratotic lesions, and gingival hyperplasia compared to a control group.⁸ Oral lesions and gingival hyperplasia are associated with and induced by immunotherapeutic medications. Oral lesions may cause oral discomfort, and pain that interferes with masticatory function, swallowing, and speech. Symptoms such as halitosis, xerostomia, or oral dysesthesia, which interfere with daily social activities often accompany oral lesions.⁹ Gingival hyperplasia or gingival overgrowth often prevents thorough oral hygiene, which in turn can increase an individual's risk to periodontal disease or caries if not treatment appropriately.

While most respondents did not currently or previously provide dental care for recipients of a SOT, a significant percentage of respondents did (34%). It is fair to assume that with an annual increase in the number of SOT procedures performed both in Ireland and globally, dental practitioners will encounter more of these patients in the future.

Of the 29% ($n = 36$) of dentists who provided dental health certification for SOTs, only 11% of those dentists ($n = 4$) had received correspondence or guidance from the patient's medical transplant team. This can prove to be challenging for dental practitioners due to the lack of standardized guidelines. Transplant centers may have different requirements and/ or definitions of dental health. Due to an absence of a standardized dental health proforma in Ireland, the authors conducted an internet search and found the following: The Las Palmas Medical Centre dental certification form asks the dental evaluation to focus and to "assess for any existing infection" and for the dentist to describe the "outcome." It also requests that the "Patient is free of any source of infection" or "Patient has a source of infection and requires the following treatment: deep cleaning of the gums, filling(s), root canal, extraction(s) to address infection only (number of extractions recommended) and other." At the University of Washington Medicine Transplantation Services, certification asks the following YES/NO questions: "Is the dental condition good or poor?" Are teeth and gums free of infection, and if no, what is the treatment plan? Is any major restorative treatment needed, and if yes, what? And when?" Both proformas

allow for ambiguity in relation to dental health certification. There is a paucity of proformas and guidelines to ensure that all patients receive a standardized level of care to minimize risk of bacteremia or sepsis arising from a dental origin. The absence of such standards is recognized within the dental profession with 88% of respondents in this study considered current available information and literature inadequate. Failure to standardize care has been linked to inadequate treatment. One study states that standardization represents an effort to eliminate unnecessary complexity of care processes so that patients can receive "the correct treatment in a safer environment."¹⁰

It is reasonable to consider the routine use of antibiotic prophylaxis (both aerobic and anaerobic cover) with dental treatment when one considers the array of bacterial species naturally occurring in the mouth, particularly in light of anaerobic species. Anaerobes are usually implicated in dental infections, gingivitis, and periodontitis. Transient bacteremia with anaerobic components have been reported to occur following tooth extractions and oral surgeries.¹¹ These pathogens are rapidly eliminated from the bloodstream of patients who have a normal immune response, however in individuals who are immunocompromised they are associated with high levels of mortality. It is important to note that the extent of infection depends on the virulence factors of the bacterial species and the host immunity. Prescribing practitioners are becoming increasingly cautious with the prescription of antibiotics due to an increasing array of antibiotic resistance problems. The use of antibiotics prophylactically also raises concerns of drug interactions notably with immunosuppressive drugs of which SOT recipients have a lifelong commitment to. Postoperative guidelines for recipients of solid-organ transplants frequently recommend medication antibiotic prophylaxis before dental procedures, however there are no evidence-based data from controlled clinical trials to support this recommendation, nor is a consensus evident.¹² Thirty-six percent of respondents considered the prescription of prophylactic antibiotics appropriate prior to dental treatment for recipients of SOTs. Eighteen percent of respondents did not consider it appropriate, whereas 46% did not know. Of the 36% of respondents who would prescribe an antibiotic prophylactically, the vast majority would prescribe a broad-spectrum antibiotic such as Amoxil. This approach adheres to current American Heart Association guidelines for endocarditis that recommend a single-dose premedication regimen.¹³ There was a wide disparity in results when dentists were posed with a clinical scenario. Forty percent of dentists would prescribe an antibiotic prophylactically to the patient preceding dental treatment and 60% of respondents would not. This disparity shows the uncertainty in relation to pre-dental treatment prescribing and highlights an absence of clinical guidance in this area.

4 | CONCLUSION

Solid organ transplantation increases life expectancy and quality of life for people with end stage organ dysfunction. Educating physicians, as well as their patients, about the importance of early dental screening and pre-transplant dental treatment is essential. The entailed

lifelong immunosuppressive therapy concomitant with SOT has various unwanted oral effects that should be closely monitored by a dental practitioner. Bacteremia in the immunocompromised recipient of an organ transplant has the potential to cause sepsis and infection both of which are the leading cause of mortality during the first-year post-transplant. Furthermore, poor dental health, which is more likely in the recipient of a transplant, increases the potential for bacteremia. Good dental and oral hygiene can help minimize the risk of bacteremia. Patients diagnosed with conditions that may necessitate a solid organ transplant should be placed on an oral health program so that oral diseases can be treated swiftly, or ideally prevented. It does not suffice to promote and encourage oral health at the point of SOT evaluation.

It is evident from the results of this study that there is a lack of standardized guidelines and dental care for the vulnerable cohort of SOT recipients. Therefore, further research should be conducted to ascertain the full impact oral health has on SOTs so that standardized guidelines can be developed to ensure all recipients and potential recipients of solid organ transplant receive common levels of oral care. The authors fully appreciate that developing such guidelines at a national and/or international level may prove to be challenging, and guidelines developed at a local or center level may be a welcome starting point. It would be prudent to include dental practitioners as part of a patient's multi-disciplinary team so that all decisions regarding that patient's oral care and treatment particularly in the lead up to and following SOT are made in conjunction with the patient's specialized team. The decision to certify a patient as dentally fit should be made a collective team decision rather than the sole responsibility of a dental practitioner. This paper certainly highlights the need for further interdisciplinary education and collaboration between medical and dental practitioners.

AUTHOR CONTRIBUTIONS

Conception or design of the work: Dr Fiona O'Leary, Prof Barry Plant, Dr Martina Hayes. *Data collection:* Dr Fiona O'Leary, Dr Niamh Coffey. *Data analysis and interpretation:* Dr Fiona O'Leary. *Drafting the article:* Dr Fiona O'Leary, Dr Martina Hayes. *Critical revision of the article:* Dr Francis Burke, Prof. Anthony Roberts, Dr Martina Hayes. *Final approval of the version to be published:* Dr Fiona O'Leary, Dr Niamh Coffey, Dr Francis Burke, Prof Anthony Roberts, Dr Martina Hayes, Prof Barry Plant.

ACKNOWLEDGMENTS

The authors would like to acknowledge Cystic Fibrosis Ireland, the College of Medicine and Health interdisciplinary Seed Awards (CiSA), and the Health Research Board of Ireland (CSF-2020-003) who provided funding for this paper and ongoing research into the area of Oral Health in Adults with Cystic Fibrosis.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ORCID

Fiona O'Leary  <https://orcid.org/0000-0002-6254-4420>

Niamh Coffey  <https://orcid.org/0000-0001-9421-5392>

REFERENCES

- Bryant C. All-time records again set in 2021 for organ transplants, organ donation from deceased donors. *The Organ Donation and Transplantation Alliance blog*. 2022. <https://www.organdonationalliance.org/article/all-time-records-again-set-in-2021-for-organ-transplants-organ-donation-from-deceased-donors/>
- Van der Spiegel S, Schröder-Bäck P, Brand H. Organ transplantation and the European Union, 2009-2015 developments. *Transpl Int*. 2020;33(6):603-611. doi:10.1111/tri.13598
- Fishman JA. Infection in organ transplantation. *Am J Transplant*. 2017;17(4):856-879. doi:10.1111/ajt.14208
- Reyna J, Richardson JM, Mattox DE, Banowsky LH, Nicastro-Lutton JJ. Head and neck infection after renal transplantation. *JAMA*. 1982;247(24):3337-3339.
- Bassiri AG, Girgis RE, Theodore J. Actinomyces odontolyticus thoracopulmonary infections: two cases in lung and heart-lung transplant recipients and a review of the literature. *Chest*. 1996;109(4):1109-1111. doi:10.1378/chest.109.4.1109
- Kwak E-J, Kim D-J, Choi Y, Joo DJ, Park W. Importance of oral health and dental treatment in organ transplant recipients. *Int Dent J*. 2020;70(6):477-481. doi:10.1111/idj.12585
- Ziebolz D, Hráský V, Goralczyk A, Hornecker E, Obed A, Mausberg RF. Dental care and oral health in solid organ transplant recipients: a single center cross-sectional study and survey of German transplant centers. *Transpl Int*. 2011;24(12):1179-1188. doi:10.1111/j.1432-2277.2011.01325.x
- Gašpar M, Glavina A, Grubišić K, et al. The oral cavity state in renal transplant recipients. *Acta Stomatol Croat*. 2015;49(3):204-213. doi:10.15644/asc49/3/2
- Goyal R, Jadia S, Jain L, Agarawal C. A clinical study of oral mucosal lesions in patients visiting a tertiary care centre in Central India. *Indian J Otolaryngol Head Neck Surg*. 2016;68(4):413-416. doi:10.1007/s12070-015-0868-x
- Leotsakos A, Zheng H, Croteau R, et al. Standardization in patient safety: the WHO High 5s project. *Int J Qual Health Care*. 2014;26(2):109-116. doi:10.1093/intqhc/mzu010
- Mougeot FK, Saunders SE, Brennan MT, Lockhart PB. Associations between bacteremia from oral sources and distant-site infections: tooth brushing versus single tooth extraction. *Oral Surg Oral Med Oral Pathol Oral Radiol*. 2015;119(4):430-435. doi:10.1016/j.oooo.2015.01.009
- Guggenheimer J, Eghtesad B, Stock DJ. Dental management of the (solid) organ transplant patient. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2003;95(4):383-389. doi:10.1067/moe.2003.150
- Baddour LM, Wilson WR, Bayer AS, et al. Infective endocarditis in adults: diagnosis, antimicrobial therapy, and management of complications. *Circulation*. 2015;132(15):1435-1486. doi:10.1161/CIR.0000000000000296

How to cite this article: O'Leary F, Coffey N, Burke FM, Roberts A, Plant B, Hayes M. Current practices and attitudes of dental practitioners regarding the provision of dental treatment for patients with solid organ transplants. *Clin Transplant*. 2023;37:e15086. <https://doi.org/10.1111/ctr.15086>