Barriers Related to Dental Implant Treatment Acceptance by Patients

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Dental implants present a viable treatment option for the replacement of partial and full edentulism. Since their initial creation in the 1960s, implants have proceeded to become popular among both patients and dental practitioners due to their high success and survival rates. Despite the promising results, there remains some patient hesitation toward the acceptance of implant treatment. This hesitance mainly stems from four key factors that have greatly influenced patient decision-making: financial barriers, awareness and cultural sensitivity issues, treatment timespan, and the varying possible complications. Financial barriers generally arise from the lack of insurance benefits for the surgical aspect of treatment and the differing socioeconomic statuses of the patient population. Though dental implants have become more widespread, public knowledge of the matter is still insufficient. Patients may have altered conceptions of the procedure due to insufficiently credible information sources. In addition, dental practitioners need to consider the cultural restrictions that may be existent for some patients. The long timespan of the dental implant treatment, including healing time, may result in some patients opting for fixed or removable prostheses, which have comparatively shorter treatment spans. Biomechanical overload, infection, and inflammation are varying types of complications that alter osseointegration, ultimately leading to many complications, such as peri-implantitis. These universal barriers may hinder patient acceptance of implant treatment. However, as dental health care professionals, it is important to understand this hesitance and help mitigate these obstacles through patient education and continual reassurance and support.


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In modern dentistry, dental implants have become a well-recognized and utilized form of treatment for the replacement of missing teeth. The technology involved with dental implants has advanced tremendously in the 60 years since their invention, and general survival and success rates are high.1 Even with relatively successful treatment outcomes, some patients still have hesitations about dental implants.2 For dental health professionals to truly understand the patient decision-making process when the implant treatment option is presented, the dentist must recognize the factors evoking hesitation. The main barriers related to patient acceptance are treatment cost, knowledge of and cultural sensitivities to treatment, treatment timespan, and the risk of complications. This review aims to discuss these factors and provide dental practitioners with a clearer image of the reasons for patient hesitancy.

Currently, missing teeth are still a fairly common phenomenon. Many studies have examined the epidemiology of missing teeth in relation to caries, periodontal disease, and dental trauma. In the United States, it is estimated that from 2015 to 2018, complete tooth loss was > 12.9% among adults 65 years of age and older.3 A recent study reported that edentulism is highest in low socioeconomic groups. The population in the lowest income bracket had an edentulism rate of 10.3%, compared with 2.0% and 0.5% in the middle- and highest-income brackets, respectively.4

As a sequela of oral diseases and trauma, tooth loss can affect oral health–related quality of life (OHRQoL). Many studies have explored the association between tooth loss and a deterioration in OHRQoL, with some going on to show that the location and distribution of missing teeth can also highly impair OHRQoL. A meta-analysis by Gerritsen et al5 compared subjects with 25 to 32 teeth to subjects who had 21 to 24 teeth, 17 to 20 teeth, 9 to 16 teeth, and 1 to 8 teeth. The results revealed that having fewer teeth negatively impacted OHRQoL, with a significantly greater impact once the number of remaining teeth was reduced to less than 17. The same meta-analysis found that, independent of
the country of examination and measurement methods, there were notable relationships between missing teeth and adverse OHRQoL scores. The negative OHRQoL scores from tooth loss mainly come from the impairment of “the ability to speak, smile, smell, taste, touch, chew, swallow, ...”, etc.

There are many ways to save and/or replace teeth. Implantology was first introduced in Sweden in the 1960s, with notable advancement by the 1980s due to recognition of its therapeutic possibilities, leading to the modern ability to—at least in theory—rectify all tooth loss incidents with an implant placement. Some contraindications still persist, such as psychiatric disorders, severe cardiovascular issues, and hematologic malignancies, as well as special consideration for patients receiving intravenous bisphosphonates due to the high chance of developing osteonecrosis of the jaw. The data that most dentists and patients gravitate toward are the survival and success rates of dental implants. A systematic review revealed that the cumulative mean rate of dental implant survival was 94.6%, with a mean follow-up period of 13.4 years and approximately 70% of all implant losses resulting after abutment placement and prosthetic loading. The same systematic review found a mean success rate of 89.7%, with a mean follow-up period of 15.7 years. Even though the survival and success rates are promising, it must be remembered that the only requirement for a dental implant to be categorized as “surviving” is that it is still in the mouth. Therefore, all implants with peri-implant mucositis, peri-implantitis, severe bone loss, and sleeping implants are included. The importance of maintenance therefore contributes directly to the survival and success of the implant. A precise follow-up schedule with a dental professional should be introduced to monitor the implant and surrounding teeth for disease. The patient should be encouraged to follow consistent home care to prevent the occurrence of peri-implantitis, which will increase the chance of successful implants.

Several other options are available for the treatment of missing teeth. These options include full and partial removable prostheses, fixed prostheses, orthodontic treatment, and no therapy at all.

**Prosthodontics**

The American Dental Association estimates that 36 million people are edentulous in the United States and that 90% of those patients own a denture. Even with the high prevalence of removable dentures, there are disadvantages for users that often stem from the deformation and/or fracture of the prosthesis. These complications are reported to arise from improper usage, accidents like dropping or hitting, or insufficient prosthesis strength. The restoration of partial edentulism via the prescription of removable partial dentures has been questioned, as poor treatment results in increased risks for carious and periodontal damage to the remaining dentition. Partial removable prostheses also yield a 10-year survival rate of 50% for metal framework-based acrylic resin removable partial dentures. A systematic review has also revealed that dental implants with a fixed dental prosthesis improved short-term OHRQoL more than conventional removable prostheses. In terms of tooth-supported fixed dental prostheses, Pjetursson et al determined that there was a 5-year survival rate of 93.8% and a 10-year survival rate of 89.2%. Loss of retention is reported to be the most frequent technical complication of tooth-supported reconstructions, which is seen through fracture of the luting cement and results in a 5-year loss rate of 3.3%.

**Orthodontics**

Another treatment method for missing teeth is orthodontic movement of the remaining teeth. This method works best for a young, growing patient, as it will yield a better prognosis and the most ideal results. This technique is often used for congenitally missing teeth, especially lateral incisors. For hypodontia, orthodontic treatment is the most conservative approach; however, occlusion and esthetics must be considered when evaluating this approach. Canine repositioning at the site of the lateral incisor is most common, but there are two specific malocclusions that permit this substitution. These include Angle Class II malocclusions with no crowding in the mandibular arch and Angle Class I malocclusions with severe crowding in the mandible where it is necessary to extract. The size, shape, and color of the canine must be evaluated if canine substitution is considered. This will predict if only recontouring is necessary for an esthetic result or if subsequent restorative treatment is needed.

**Short Arch**

Another approach is to provide no treatment, which sometimes results in a shortened dental arch. Many studies have associated the loss of teeth with reduced masticatory function, with the number of occluding pairs found to be especially crucial for mastication. The chewing efficiency and capacity to break down food can be decreased by 50% with the loss of posterior teeth, and insufficient nutritional intake can result. The occlusal stability of the shortened dental arch must be considered, as tooth migration is prevalent in incomplete dentitions. Though minor, changes in occlusal contacts, interdental spacing, and alveolar bone support may result from tooth loss and migration. However, a shortened arch can provide the necessary support for oral function in certain situations, as studies have shown that 20 or more teeth can supply adequate masticatory performance. With a shortened arch of 20 or
more teeth, patients can still chew and enjoy almost all foods, regardless of texture. Not only is adequate function preserved with a shortened dental arch of 20 teeth, but this treatment option is also determined to be cost effective for the patient. These are the reasons why this treatment approach has been generally well-accepted by patients and dental practitioners alike.

**MATERIALS AND METHODS**

To best understand and present the barriers regarding patient acceptance of dental implant treatment, a literature review was conducted in order to objectively discover the current knowledge on this topic. A narrative review was then selected as the fitting review format to present the comprehensive overview of patient avoidance, as it puts this information into perspective for interested readers. Of the various types of narrative reviews, a narrative overview, also known as an unsystematic narrative review, was chosen as the educational vessel to report a condensed summary of all findings.

The literature review finalized the extrapolation of crucial factors relating to barriers that affect dental implant treatment acceptance. After referencing existing literature, it was concluded that major and minor contributing categories can be grouped into four final factors: financials, awareness and cultural considerations, time sensitivity, and complications (Fig 1).

**Patient Avoidance**

Barriers related to patient acceptance of dental implants are an important component of adequate patient care that should be considered by dental health care practitioners. The element of hesitation from the patient perspective can be understood through the different factors of finances, awareness and cultural considerations, time sensitivity, and complications, in order to determine the best standard of care for each particular patient.

**Finances.** From the patient perspective, one of the greatest factors limiting acceptance to dental implant treatment is cost. It has been shown that both the public population (89%) and patients receiving implant consultation (90%) ranked finances as the primary barrier to receiving implants. On a global scale, dental care is generally privatized. Most parts of Europe and countries such as the United States, Canada, Australia, and New Zealand adopt either a fully privatized or a hybrid system. Though hybrid systems generally cover children, adults are almost always excluded. Therefore, most patients rely heavily on their dental benefit insurance to cover the majority of their annual dental expenses. In the United States in the early 1970s, annual dental coverage was approximately $1,000 USD. With the assumption of 6% inflation each year, coverage today should be approximately $5,000 USD; however, it has only increased to approximately $1,500 USD. With the cost of implant treatment ranging from $2,000 to $50,000 USD, dental insurance seldom covers dental implant procedures. Although some dental insurance plans do not reimburse the surgical aspect of implant treatments, some benefit plans will provide some level of coverage for implant restoration as part of the prosthetic benefits. For the patient, the implant itself only accounts for approximately 15% to 20% of the entire dental implant procedure cost. Therefore, the dentist and their team should work closely with the insurance company to determine if the case can qualify for some benefit, and additional information about the case may be needed to ensure maximum benefits. Many meta-analyses have shown that tooth loss is related to socioeconomic status, and subjects of lower socioeconomic status have a far greater chance of tooth loss. A high percentage of tooth loss in the lower income bracket indicates that many of these patients are not able to afford the cost of implant treatment at all, even if there was some coverage from their respective insurances. This has resulted in dental implants being coined as a treatment for the rich or even considered as a luxury treatment. Due to the high financial costs, many patients are reluctant to receive implants.

![Diagram of the different barriers restricting patient acceptance of dental implant treatment. Financials, knowledge/cultural constraints, time, and complications/longevity barriers are the most influential factors related to rejection of treatment. These topics are of importance to dental professionals in understanding the patient’s decision-making process.](image-url)
**Awareness and cultural sensitivity.** Public awareness of the subject and procedure of dental implants plays a huge role in patient acceptance of the treatment and, ultimately, the treatment outcome. The source and accuracy of the information are also significant in determining patient knowledge. In a cross-sectional study that compared the dental implant awareness of the general public to that of patients about to receive implant consultations, it was found that 76% of the general population have heard of dental implants, in contrast to 94% of implant consultation patients. Since almost a quarter of the general public did not know what a dental implant was, it is clear that more public education on the topic is necessary. In the same study, it was reported that the implant consultation group was more likely to obtain their primary source of implant information from their dentist, while the general public was more likely to obtain this information from friends and family. This means that the accuracy of the information acquired by the general public may be compromised, and dental professionals will need to spend some time re-educating them if they require dental implants in the future. The average patient may not be able to properly assess the level of evidence behind the source from which they received the information, as it is frankly too easy in this day and age to create and spread fake information. Therefore, it is the duty of health care professionals to properly inform patients and make sure that patients understand the difference between a medical opinion by a medical professional and a random, non-credible source. It has also been reported that, following the surgical placement of an implant, 55% of the patients reported that more extensive preoperative information would have been appreciated. Patients with a lack of preoperative knowledge will feel more apprehensive of the dentist, while adequate preoperative information will contribute to overall patient satisfaction with the treatment outcome.

Cultural sensitivity to the topic of dental implants is also another factor to be considered. When considering different populations globally, the awareness of implants notably varies. It has been reported that in a survey of 10,000 people in an urban population in India, only 23.24% had heard of dental implants as a modal-ity of treatment, whereas 76.76% had not. Another study in a Turkish subpopulation found that the rate of patient awareness of implants was only 27.7%. This can be contrasted with the 95% of the participants in the Saudi population and the 88.1% of the Croatian population that had heard about dental implants. It was found that there were some cultural constraints in receiving implants as well. Highly significant cultural constraints were exhibited by African traditional religious worshippers, and this population preferred the nonmetallic partial dentures as an alternative to dental implants. Awareness of these cultural restraints for patients will allow dental practitioners to be more considerate and sensitive to these constraints. Dental professionals can listen to the patient while being mindful when providing more information about treatment. In this way, a more thoughtful and respectful environment for the patient can be built when discussing treatment options.

**Time sensitivity.** The course of treatment for dental implants is not an expedient one compared to conventional fixed and removable prostheses. Upon extraction, the placement of a denture can be immediate or range from 1 to 3 weeks later; a relatively similar time span is seen with the placement of a fixed partial denture after extraction. The amount of time the patient remains edentulous is confined to several weeks at the longest, which greatly decreases the esthetic and functional anxiety of the patient. Dental implants, however, can have a treatment span of anywhere from immediate to 4 to 18 months or more, which can be tedious for the patient. The variability of the dental implant treatment span occurs because of the different placement methods (immediate, early, or conventional) that suit each particular patient. Immediate placement involves the placement of implants directly into the extraction site. This method greatly shortens the treatment course; however, it can increase the risk of infection and may cause insufficient hard and soft tissue volume. Immediate placement is also not a suitable method for all patients, especially when the site does not have adequate bone width and height. Early placement allows for soft tissue healing of the extraction site, which may take approximately 3 to 8 weeks, thereby permitting enhanced tissue volume and local pathology resolution. Lastly, conventional placement includes a healing period of at least 6 months postextraction, as the classical belief is that this healing period will benefit osseointegration. A meta-analysis comparing the success rates of each of the placement methods found that a delayed placement is favorable, as immediate placement increased failure rates by 3%. Bone grafting on the site of implant placement adds another 6 to 8 months onto the treatment. Implant loading is important, and it can take another 4 months after loading before the definitive prosthesis can be placed on the implant. The overall course of treatment for a dental implant can be quite long, and this must be clearly communicated with the patient before this treatment option is selected. Many patients might be reluctant to choose this treatment modality due to the time-span required, especially those who have missing anterior teeth. The long wait for the definitive crown to be placed for missing anterior teeth could result in the patient having a gap in their smile line for months or even years, depending on healing. This could be detrimental.
to the patient’s confidence in their appearance, resulting in reluctance toward receiving dental implants.

Complications and longevity. An important area of concern is the complications and longevity of dental implants. A systematic review evaluating the success and survival rate of dental implants revealed a mean survival rate of 94.6%, with a mean marginal bone resorption of 1.3 mm over the mean course of 13.4 years. The reported values show that osseointegrated implants present high survival rates and minimal marginal bone resorption in the long term. However, there are complications that can arise with implant placement. The basic categories of complications include biomechanical overload, infection or inflammation, and other causes. More specifically, complications such as implant fracture, implant loosening or osseointegration failure, inflammation, failure to preserve bone and soft tissue, injury to the surrounding structures, and peri-implantitis/per-implant mucositis can be observed. With that said, there are other factors that can contribute to complications arising. These factors must be evaluated, as they may lead to patient hesitation toward dental implant treatment.

Lack of osseointegration around the dental implant is due to a biologically similar response to periodontitis and is not prevented with the absence of the periodontal ligament. Factors such as genetics, stem cell tissue regeneration, and the function of the innate and adaptive immune systems all contribute to the development of peri-implantitis. The genetics of the host determine the composition of the oral microbiome, which dictates the susceptibility of patients to chronic periodontitis and to peri-implantitis. The activity of various stem cells and the immune systems are important in tissue regeneration in the periodontium, ultimately contributing to osseointegration. Therefore, these factors must be considered and disclosed to the patient before initiating implant treatment. These implant failure risks due to genetic influences could hinder the patient’s willingness to receive dental implants.

There have been many reported instances of mechanical complications in implant-supported overdentures, with the most common associated complication being maladjustment of the attachment system sustaining the overdenture, regardless of the type of attachment used. Other mechanical issues include the loss of retention of attachment systems, replacement or activation of retentive elements, loosening of screws, the need for relining or repairing the resin portion of the denture base, pop-out of denture teeth, and implant fracture. These mechanical complications can cause discomfort for the patient, inhibiting them in their everyday activities.

Patient factors such as smoking, radiotherapy, and diabetes mellitus also contribute to the longevity of the implant. A study by Chen et al found that smokers had a 35% higher chance of implant failure compared to non-smokers, and that patients undergoing radiotherapy had a 75% increased chance of failure compared to those not undergoing this therapy. Another meta-analysis found that between nonsmokers and subgroups smoking < 20 or > 20 cigarettes/day, there was almost twice the relative risk of implant failure in the latter group. In a meta-analysis comparing diabetic groups and non-diabetic groups, the diabetic group showed higher marginal bone loss, significantly higher probing depth, and worse bleeding upon probing than the control group. It was concluded that though dental implants are feasible for diabetic patients, they are more likely to have long-term clinical complications. Patients who smoke, have diabetes mellitus, and/or receive radiotherapy may be less inclined to receive dental implants due to the higher rates of complications and failures.

Periodontal disease should be considered when evaluating not only the survival of a dental implant, but the success of one as well. One cohort study with a mean follow-up period of 54.4 ± 35.6 months showed that out of the 43 implants that failed during the surgical phase, 5.2% were from patients with severe periodontal disease; this can be compared to a 3% failure rate among healthy patients without periodontitis. Out of the 50 implants that failed during the prosthetic phase, 3.2% and 0.9% were observed in patients with severe periodontal disease and healthy patients, respectively. Transmission of periodontal pathogens from teeth to implants has been reported, which can indicate that reservoirs of bacteria reside in the periodontal pockets around implants. Periodontal pathogens may also be related to failing implants and peri-implant infections, as the microbial flora between periodontitis and peri-implantitis are generally similar. Patients with periodontal disease may experience more complications with dental implants and therefore be hesitant in receiving treatment.

Lastly, bruxism in patients should be considered, as a meta-analysis comparing the failure rate of dental implants between bruxers and nonbruxers revealed that prostheses in bruxers had a higher failure rate than nonbruxers. This is because the strength of occlusal force is higher in bruxers, resulting in overloading of the implants during mastication, which may be more likely to cause technical complications, such as porcelain chipping, screw/implant loosening, screw/implant fracture, and loss of retention/implant. These technical complications may hinder the patient’s desire for dental implants.

Mitigating Patient Concerns
The factors listed above all contribute to patient reluctance to receive dental implant treatment; however,
dental health professionals can help mitigate these challenges. The first step would be to ensure that the patient is informed on what an implant is and the steps of the treatment procedure. This ultimately involves many informational conversations with the patient, where effective communication is key. Next, details about the timeline of the procedure and the necessary healing process must be discussed to ensure patient understanding. In this step, patient concerns must also be listened to, in order to understand where these concerns are arising from and provide reassurance to soothe patient worries. Then, finances can be determined after working together with the patient's insurance company to determine the exact coverage and benefits. Lastly, it is important to focus on patient education regarding home care and maintenance so as to avoid complications and ensure both the survival and success of the implant. Here, the patient should be supported with repeated explanations if necessary, with time made available for follow-up to ensure successful implant treatment.

CONCLUSIONS

It is the duty of dental health professionals to inform patients of all information regarding the implant procedure. They should understand the major barriers that prevent patients from accepting this treatment—including financial considerations, awareness and cultural constraints, time sensitivity, and treatment complications—and try to reassure and support the patient in their decision-making process and eventually the treatment process. During this time, work should be done to mitigate patient acceptance barriers by providing evidence-based information to expel procedural fears, communicating effectively to increase understanding of dental implants, and helping to effectively allocate finances, thereby reducing fear of and resistance toward the treatment.

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