

# Guidelines for Selecting Appropriate Patients to Receive Treatment with Dental Implants: Priorities for the NHS

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## Foreword

Since the first RCS guidance was published in 1997 there has been a realisation in the dental profession that implants offer a significant benefit to a wide group of patients. This is particularly the case when the long-term health benefit is considered alongside the biological impact and predictability of some alternative therapies. Implant therapy is no longer considered an “exceptional” treatment modality.

This update aims to reflect these realisations. However, this document is produced at a time when the NHS in parts of the UK is undergoing major reorganisation; resources are at a premium and demand for complex care is predicted to increase as the population ages.

Therefore the aim of these guidelines is not to produce a definitive list of those patients who should have routine access to dental implants within the NHS; rather their purpose is to provide a framework to facilitate informed discussion between providers and commissioners, both locally and nationally, to identify those groups of individuals who should have routine access to, and funding for, dental implants.

The outcome may vary from region to region based on the demands of the population and local services. However, the aim is to provide consistent and speedy access to care for these agreed groups, negating the need for case-by-case authorisation where this currently exists.

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## Introduction

The aim of these guidelines is to assist commissioners of clinical dental services to make informed assessment of patients who may be considered suitable for treatment with dental implants within the National Health Service. A number of health authorities and providers have produced initial patient selection guidelines for their own use but there is a general lack of consistency and it would be useful to establish nationally acceptable guidelines.

The clinical situations in which osseointegrated implant-retained restorations can be recommended have expanded over the past 20-25 years.<sup>1</sup> Initially, the main focus was on individuals who were edentulous, but the demand for treatment of partially dentate subjects has grown and is now more common. In addition, there are a number of people who have more extensive loss of oral and facial tissues for whom osseointegrated implants can offer an improvement over previous treatment modalities.<sup>2,3</sup> Osseointegrated implants have been shown to be a highly successful and predictable treatment modality to replace missing teeth by providing support for fixed bridge prostheses, individual crowns and overdentures.<sup>4,5,6,7,8,9,10,11,12</sup> They are also used to provide support for obturators and related maxillofacial prostheses.<sup>13,14</sup>

These guidelines developed for the NHS consider eight main groups who may benefit from treatment with osseointegrated implants:

- Patients with developmental conditions resulting in deformed and/or missing teeth
- Patients who have lost teeth due to trauma
- Patients who have undergone ablative surgery for head and neck cancer
- Patients with extra-oral defects
- Patients who are edentulous in one or both jaws
- Patients with severe denture intolerance
- Patients with aggressive periodontitis
- Patients requiring implant-borne orthodontic anchorage

The above listing is a convenient clinical categorisation and in no way implies priority rating. Although considerable thought has been given to this, it is not possible to easily compare the disabilities and potential benefit of treatment between subjects in the various groups. The magnitude or impact of the patient's disability does not necessarily correlate with the aetiology or the size of the deformity.

Where patients are being considered for implant-base rehabilitation the relative risks, benefits and outcomes need to be discussed using current evidence-based research. Implant-related treatment is

a significant source of complaints to the GDC particularly with regard lack of informed consent and collateral damage to adjacent structures. As such the consent process needs to be systematic and thorough, identifying all risks and the nature of the likely outcome such as restoration design and number of implants required. Alternatives to implant therapy need to be outlined citing the advantages and disadvantages of the different treatment modalities in addition to the expected longevity. These alternatives may be preferred and can be delivered without exhausting the implant option (for example resin-bonded bridgework for congenitally missing lateral incisors). Prior to making a decision to progress with implant-based treatment patients need to be aware of the various stages in provision (surgical phase and the restorative phase) and the expected timescale in fitting the definitive restoration. In all cases patients need to be aware that implant-based restorations require long-term maintenance and care and can suffer from significant morbidities such as peri-implantitis which can effect prognosis and longevity.

## **I. General factors**

### **I.1 Patient factors**

There are a number of general medical and oral/dental factors, which should be taken into consideration which may contraindicate or modify treatment.<sup>15,16,17,18</sup>

#### **I.1.1 Age**

There is no upper age limit providing the patient is capable of undergoing the surgical phase and the subsequent self-maintenance. In contrast implant treatment should be delayed in young individuals until growth is complete.<sup>19</sup> Patients should be at least 18 years of age with sufficient bone volume and maturity to prevent any related post-operative complications linked to further bone growth. Clinicians should be aware that facial growth continues after 18 years of age and that this can cause complications.

#### **I.1.2 General health**

The general health of the patients should be good enough to undergo surgical and restorative

treatment. Caution must be exercised in patients with the following conditions:

Diabetes mellitus should be adequately controlled. These patients have been shown to be at a greater risk of developing peri-implant disease.<sup>20</sup>

Oral bisphosphonates (BPs) may pose a greater risk of failure of osseointegration but implants are not contra-indicated where short-term oral BPs are being prescribed but are considered high risk in intravenous BP therapy.<sup>21,22</sup>

Special precautions should be taken with patients who have undergone irradiation to the jaws.

Any type of smoking compromises treatment success. Failure rates have been reported to be approximately twice as high in smokers.<sup>23</sup> Subjects should be counseled to quit or reduce their smoking habits or refused treatment, especially where other factors could contribute to failure.

Treatment is usually contraindicated in subjects with severe psychoses/neuroses.

Other factors which may contraindicate treatment include immunodeficiency, bleeding disorders, drug/substance misuse (including alcohol) and bone disorders.

### **I.2 Dental factors**

Patient should have healthy mucous membranes and it is inadvisable to treat patients with severe erosive or ulcerative lesions.

Dentate subjects should have healthy periodontal tissues and sound teeth.

Poor oral hygiene, untreated periodontal disease and ongoing caries are contraindications.

Caution should be exercised in accepting patients with suspected bruxism or other parafunctional activities.<sup>24,25</sup>

There should be adequate bone quality and volume in relation to anatomical structures and the planned restoration. Bone-grafting or augmentation maybe required to achieve this.

The anticipated restoration (including adjunctive procedures such as grafting) should result in an aesthetically and functionally stable and acceptable result. The restoration should be easy for the patient to maintain with appropriate hygiene procedures.

In complex cases or where anatomical factors are a concern, 3D-imaging in conjunction with computer-aided planning software may be appropriate.<sup>26,27</sup> Such advanced imaging may reduce the chance of collateral damage to vital structures such as the inferior alveolar nerve and maxillary sinus which can result in severe lifelong morbidities.<sup>28</sup>

### 1.3 Informed consent

Patients should be fully informed of all treatment options including treatment alternatives with the advantages and disadvantages of each approach. In addition patients should be made aware of:

- The likely outcome and success rates
- Any potential complications
- Long-term care implications
- Commitment to long-term maintenance

The patient should be motivated, have realistic expectations and be able and willing to care for the restoration after being discharged from hospital care.

### 1.4 Provider recommendations

Provider units should have an implant team lead who is a specialist and who has the demonstrable competencies to co-ordinate both the prosthetic and surgical elements of implant care. This should also include the skills to be able to adequately consider all treatment options available. Ideally a specialist in restorative dentistry would provide the requisite skill mix for such a role but depending on local arrangements this may not always be achievable.

In addition to the lead the team will include suitably trained specialists (such as oral surgery, oral and

maxillofacial surgery or prosthodontics) with the individuals involved at any specific time dependant on the demands of each case.<sup>29,30,31,32</sup> The team should also consist of suitably trained support staff such as appropriately trained DCPs.

It will be the collective responsibility of the team to continue professional development by keeping abreast of developments in implantology by way of team study days, journal clubs and tutorials. Laboratory staff would be expected to have undergone training in the construction of the majority of implant-supported or -retained restorations.

A suitable database detailing clinical activity of the team should be kept and reviewed at regular intervals. The activity of the team should be audited in terms of patient selection for implants and treatment outcomes (including the development of complications such as peri-implantitis). Where appropriate, team meetings may be organised to discuss patients' suitability for implant treatment.

### 1.5 Legal/insurance implications

Any patients pursuing damages through the legal/insurance system which include costs for implant treatment may be encouraged to pursue treatment outside the NHS to reserve resources for patients with no financial help.

### 1.6 Success

It is important when discussing the possible outcome of implant therapy that a patient is adequately informed on the risk factors both in general and more specifically to their particular case. When referring to outcome figures, care should be taken to use those that have been published in appropriate independent literature whenever possible and accurately reflect the clinical situation, the type of implant system that is being used, time periods and the experience of the operator. It is also important that data is interpreted accurately, particularly in relation to whether 'success' or 'survival' data is being used.

## 1.7 Long-term maintenance

Once implants are provided and definitively restored the aspect of ongoing monitoring and maintenance can be delivered in primary care. Where appropriate locally agreed protocols can be outlined and the patients primary care practitioner could deliver this aspect of care. This may include the provision of replacement restorations and ongoing periodontal maintenance if required.

## 2. Clinical Indications

### 2.1 People with congenital conditions resulting in deformed and/or missing teeth

#### 2.1.1 Hypodontia/Oligodontia/Anodontia

This category ranges from young patients with 1 or 2 developmentally missing anterior teeth to those who have very few permanent teeth.<sup>33,34</sup> In these latter cases the few permanent teeth are often small and conical, providing poor retention for conventional bridges or dentures.

#### 2.1.2 Cleft palate

Repaired clefts with sufficient bone are often amenable to implant placement. Unrepaired clefts and those requiring bone grafts are more complex and are likely to require a multidisciplinary approach.

#### 2.1.3 Ectopic teeth

Patients presenting with ectopic teeth that have failed to respond to conventional orthodontic/surgical approaches should be considered for implant provision for replacement of the ectopic tooth or teeth rendered unrestorable due to collateral damage.

#### 2.1.4 Congenitally malformed teeth and supporting structures

2.1.4.1 Patients presenting with structural defects in dentine and enamel (eg dentinogenesis imperfecta and amelogenesis imperfecta) that are unrestorable despite previous attempts or have a hopeless long-term prognosis.

2.1.4.2 Patients presenting with complex root canal morphology that has rendered anterior teeth non-vital (such as dens invaginatus Type II and III). Root canal treatment should be attempted in the first instance and if unsuccessful only then should an implant be considered.

The above list is not exhaustive, any condition whereby teeth are congenitally malformed (or their supporting structures) that are otherwise unrestorable should be considered for implant replacement.

#### 2.1.5 Treatment options for people with congenital conditions resulting in deformed and/or missing teeth

These cases require a team approach and will often need input from specialists in restorative dentistry, orthodontics, paedodontics and oral and maxillofacial surgery. Where patients present as adolescents initial treatment planning decisions should aim to optimise the patients' dentition for implant placement when growth is complete.

Where alveolar bone mass and quality is compromised the provision of a bone graft may be required prior to implant provision.

Where periapical infection is present on structurally compromised teeth (such as in dentinogenesis imperfecta and dens invaginatus) root canal treatment should be attempted in the first instance with the aim of optimising hard and soft tissue healing for implant placement at a later date. The stabilisation of compromised teeth in the growing patient is important for maintaining bone for future implant placement.

Treatment options for these patients can range from the placement of one implant to restore a single space to multiple implant placement supporting bridgework or overdentures. Appropriate diagnostic work up may provide various treatment options for tooth replacement. Indeed a combination of restorative modalities such as implants and resin bonded bridges may be favoured by the clinician and patient due to simplification of the treatment

pathway and ongoing maintenance. The use of implants to rehabilitate this patient group has been shown to be advantageous with lower cumulative long-term costs and higher success rates than conventional bridgework.<sup>35,36</sup>

## 2.2 People who have lost teeth due to trauma

Loss of one or more anterior teeth in cases where the alveolar bone is mostly intact can be readily treated. Patients who have suffered major bone loss in addition to multiple teeth through trauma may require bone grafts. It is in the best interest of the patient that the dentition is carefully assessed initially as late presenting pathology (such as undiagnosed loss of vitality) could complicate the implant provision pathway. Similar to patients in 2.1, root canal treatment may be considered in traumatised teeth where adolescent patients are growing with the aim of maintaining bone by preventing or ceasing the development of periapical lesions.

Patients presenting with historical trauma with previous failed attempts (otherwise optimal) at saving tooth units should be considered with equal opportunity as those who present soon after an episode of trauma.

2.2.1 Treatment options for patients who have lost teeth due to trauma

Treatment options for this group are similar to those detailed in 2.1.5.

## 2.3 People who have undergone ablative surgery for head and neck cancer

The size of the defect can vary but this does not equate to larger defects being a higher priority for implant provision. As in other cases the non-implant-retained prosthesis should be considered and ideally provided before deciding upon the need for additional support and retention provided by implants. Mandibular defects may provide suitable bone for implant placement and greater possibilities for purely implant supported prostheses.<sup>3,37</sup> An unsuccessful outcome may have a greater impact in this very difficult treatment group.

This group of patients may be missing considerable amounts of hard and soft tissues and teeth. The defects may be categorised as:

- Ridge deformities
- Patent clefts or sub-mucous clefts
- Major jaw resections and reconstructions

2.3.1 Treatment options for people who have undergone ablative surgery for oral cancer

These special cases require detailed team-based treatment planning to provide restorations such as fixed bridge prostheses, intraoral frameworks and obturators.<sup>31</sup> For this patient cohort zygomatic implants have become more popular where remaining residual alveolus is limited to place conventional implants.<sup>31</sup> Prostheses may be purely implant-supported or combined mucosal- and implant-supported. These cases are more likely to be complicated by:

- lack of adequate bone volume and quality requiring large and complex grafting procedures;
- lack of good mucosal support;
- irradiation in patients treated for malignancy (these patients should be aware that the placement of implants is at a greater risk of failure due to the detrimental effects of irradiation on the bone vasculature.<sup>38</sup> Clinicians may consider the prescription of antibiotics pre- and/or post-operatively to limit possible complications in this patient group).<sup>39</sup>
- poor quality mucosal tissues resulting from irradiation; and
- implants placed in grafted bone and irradiated bone have a significantly higher failure rate and the following recommendations are given:<sup>38</sup>
  - placement of additional implants to compromise for failure rate
  - careful consideration of the effects of failure on the patient

Due to the above complicating factors coupled with the radical change in anatomy post resection and/or reconstruction placement of implants in this patient cohort may be best performed by the oral and maxillofacial surgeon who performed the initial ablative surgery. The use of cone beam computed

tomography to aid in implant planning and placement should be utilised if available.

## 2.4 People with extraoral defects

This group of patients is included here for completeness in terms of utilisation of osseointegrated implants:

- Ears
- Congenital absence or deformity of pinna
- Loss of pinna following trauma or surgical ablation of malignant disease
- Eyes
- Loss of globe of eye with exenteration of orbit due to malignant disease
- Nose
- Partial or total loss of nose following trauma or surgical ablation of malignant disease

### 2.4.1 Treatment options for people with extraoral defects

These patients are a specialised group covering maxillofacial, craniofacial, ENT and plastic surgery.

Craniofacial implants can be used to anchor prosthetic replacements for ears, eyes and noses in case of congenital deformity or following their loss due to trauma or surgery.<sup>14,38,39</sup> Such rigidly fixed prostheses are readily tolerated and accepted by the patient and represent a substantial improvement on previously used methods of attaching prostheses or attempts by plastic surgery to reconstruct these tissues.

## 2.5 People who are edentulous in one or both jaws

The provision of two implants in the mandible to retain an overdenture is now widely recognised as the first choice treatment for the completely edentate.<sup>40,41</sup> The provision of this type of prosthesis has been shown to improve oral health-related quality of life, function, satisfaction and is considered a cost-effective approach when compared to conventional dentures.<sup>42,43,44</sup>

Those patients presenting with an intact and stable dentition in one arch opposing an edentate arch can

also be considered for implants especially if they fall into one of the other categories detailed in this document.

### 2.5.1 Treatment options for people who are edentulous in one or both jaws

Existing complete dentures would otherwise be judged as satisfactory for most patients or attempts should be made to provide optimal dentures by an experienced clinician. The purpose of denture optimisation is two-fold. The optimised denture may result in patient satisfaction without the need for implant provision. Once optimised the denture can be utilised to produce a surgical guide or radiographic stent.

The treatment plan should take into account the effect on the stability/retention of the prosthesis in the opposing jaw, eg the provision of a lower implant supported bridge may cause problems with an opposing complete maxillary denture. This could in turn lead to more bone loss in the opposing jaw and make future management difficult. The aim should be to produce a stable occlusion between the opposing prostheses (or teeth if present).

## 2.6 People with severe denture intolerance: treatment options

### 2.6.1 Physical due to severe gagging

This normally applies to the upper denture and in the severest cases patients are unable to wear the denture at all. Reduction of palatal coverage to overcome this problem may result in a denture with unacceptable retention.

Patients who suffer from severe gagging may require sedation or a general anaesthetic for the surgical phase of implant treatment due to their intolerance.<sup>47</sup> In some cases acupuncture has been shown to aid in the treatment of these patients.<sup>48</sup> The restorative phase may also result in similar difficulties.



2.6.2 Physical due to severe ridge resorption with unacceptable stability or pain.

This problem is seen most frequently in the lower jaw. The degree of ridge resorption would be class v to vi according to the classification of Cawood and Howell.<sup>49</sup> The denture bearing mucosa is also often severely compromised.

2.6.3 Psychological

Patients who claim that implant-based treatment will measurably/miraculously improve social aspects of their life need to be assessed carefully. There may be merit in referral to a clinical psychologist or psychiatrist.<sup>50</sup> It is important to differentiate these patients, from those with severe psychiatric problems in whom implants are contraindicated.

These patients need to be carefully consented for treatment as their expectations may not match what is achievable with implant restorations.

## 2.7 People with aggressive periodontitis

Patients presenting with either localised or generalised aggressive periodontitis in the absence of secondary modifying factors (such as smoking) can be considered once disease has been stabilised and where there is a requirement for tooth replacement.<sup>51,52</sup>

2.7.1 Treatment options for people with aggressive periodontitis

Where patients have localised aggressive disease that has resulted in loss of teeth in dentitions that are otherwise stable, implants may be considered. Where patients have become completely edentulous as a result of generalised aggressive periodontitis the provision of implant-retained mandibular overdentures can be considered.

This patient cohort will require long-term monitoring and maintenance due to their previous susceptibility to attachment loss.

## 2.8 People with malocclusions requiring implant-borne anchorage: treatment options

2.8.1 Temporary anchorage devices

Adolescent patients may present with malocclusions that require non-tooth borne anchorage source. In these cases the use of temporary implant anchorage devices can be considered.<sup>53</sup>

2.8.2 Conventional implants utilised for anchorage

In contrast partly dentate patients may present with severe malocclusions that may benefit from the placement of dental implants to initially provide anchorage for the required tooth movements and subsequently restore edentate spaces once orthodontics is completed.<sup>54,55</sup>

These cases require careful planning in a multidisciplinary environment involving restorative dentistry and orthodontics. Diagnostic wax set-ups can aid clinicians in deciding the best position of implants for anchorage initially and restoration post-orthodontics.

In summary, implants can provide a significant health improvement for many patients but both the risks and benefits must be fully understood by patient and clinician alike. The patients expectations must be realistic and where indicated patient care should be planned in an appropriately trained multidisciplinary team. Appropriate consultations, records, and correspondence should aid in achieving an optimal patient outcome.

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