

The Dental Practicality Index – assessing the restorability of teeth

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In brief

A new index is described which provides a framework for assessing teeth and planning treatment.

Each aspect of the restorative state is assessed along with the local and general context of the tooth/dentition.

Use of the index simplifies and supports planning decisions including tooth retention, suitability of abutment teeth, and the need for referral.

The Dental Practicality Index (DPI) has been designed to describe on a clinical level, the 'practicality' of dental restorative treatment. Applicable to everyday clinical practice, the DPI also aims to assist the clinician in deciding when to seek advice and/or refer a patient for secondary or tertiary dental care. It is hoped that this tool will aid in the systematic assessment of dental restorative problems, enhance communication between collaborating practitioners and help to manage patient expectations before carrying out restorative treatment(s).

Introduction

We are living in exciting times in dentistry; advances in materials, techniques, and an extensive array of treatment options allow the dental team to provide effective, predictable, and long-lasting restorative treatments for their patients – even when a tooth is in a highly compromised state. Where a tooth appears to be unsalvageable, replacement with a denture, bridge or dental implant may well be indicated and worthwhile, but only after careful consideration of the long established and well-proven restorative options that are also readily available.

Between them, the two authors of this paper are specialists in prosthodontics, periodontics and endodontics. The Dental Practicality Index (DPI) has been developed over the last 19 years in which they have worked together planning, treating and reviewing patients with a simple to complex range of restorative problems in secondary and tertiary care. The index has evolved through the teaching and mentoring

of, and feedback from dental colleagues with different levels of experience.

The decision to retain a (restorable) tooth may well be straightforward, for example, a molar tooth in an intact arch diagnosed with an endodontic problem, with adequate sound coronal tooth structure and periodontal support. However, a tooth with a similar endodontic problem might be considered unrestorable if it had insufficient sound coronal tooth structure to provide an adequate ferrule for a crown.

A holistic approach must be taken when considering whether to restore a problematic/diseased tooth, or to advise the patient that restoration is not practical, and that the tooth may be better left alone or extracted. Not only must the restorative status (endodontic, periodontal and structural integrity) be assessed,¹⁻³ but the patient's medical and dental condition, as well as their expectations must all be carefully considered in the decision-making process.^{4,5} Taking these inter-related factors into account can sometimes make treatment planning challenging. Furthermore, treatment decisions and the treatment plan may well depend upon the skillset and experience of the clinician who is managing the patient.⁵ Appropriate case selection is more likely to result in a successful outcome.⁶

Guidelines on the treatability of teeth have been published, however, some of these are limited to the assessment of only one aspect

(that is, the prosthodontic or periodontal status) of the tooth.⁷⁻⁹ Other guidelines, such as the American Association of Endodontist's Case Difficulty Assessment guide is used by less than 10% of general dental practitioners in the USA due to being too comprehensive, and therefore time-consuming to complete.^{10,11}

The aim of this paper is to describe a simple, clinician-friendly 'dental practicality' (tooth restorability) index, which takes into account each aspect of a tooth's restorative state. Crucially, it also contextualises the status of the tooth within the dentition as a whole, taking into account the patient's unique dental needs, expectations, and any relevant medical and dental history.

The Dental Practicality Index

This index describes the practicality of restorative treatment. Each of the restorative categories; structural integrity, periodontal state and endodontic state are assessed and weighted according to their current state and the complexity of potential treatment. These levels are inevitably somewhat arbitrary and therefore will vary between clinicians depending upon their own unique skillset, experience, and also the facilities that are available to them.^{12,13}

Finally, the context of treatment is considered and scored in relation to local and general factors, including the state of or absence of

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nearby teeth, and/or health-related issues which may broadly influence treatment.

In all categories a score of '0' means that no intervention is required, '1' means that simple treatment is needed, '2' suggests that treatment is more complex, perhaps requiring treatment delivered by individuals with enhanced skills, training, and experience. A score of '6' in any category means that treatment would not generally be considered to be practical.

The overall DPI score is determined by adding together the scores of each of the categories (structural integrity, periodontal status, endodontic status, context). A DPI score >6 indicates that attempting to restore the tooth may not be advisable.

A tooth that is stable and healthy in an intact dentition needs no or minimal intervention even if it is extensively restored, successfully treated for periodontal disease and/or has been root treated. The DPI only comes into use when an intervention is required or planned. For example, if there is active secondary caries, periodontal disease, or if there is a plan to use the tooth as a bridge abutment.

The DPI may change with initial investigations and stabilisation. Before making a definitive assessment it will often be necessary to carry out initial investigations to establish a baseline condition; for example, it may be necessary to remove an existing restoration to assess the residual sound coronal tooth structure, carry out initial periodontal therapy to assess response, and access a root canal in order to confirm the ability to negotiate to the working length.

Structural integrity

Level 0

Intact and healthy unrestored coronal tooth structure, or a tooth restored with a well-adapted restoration – no treatment required.

Level 1

A tooth requiring a simple (in)direct restoration, which may be a replacement restoration, or the first cycle of operative treatment required. Teeth in this category will have adequate volume of sound coronal tooth structure to support the planned restoration.

Level 2

Typically, a tooth with minimal sound tooth structure which may require a post-retained foundation, and/or have a sub-gingival margin(s). Such teeth may have been extensively restored in the past.

This level would also include situations where the tooth to be restored has a significant role in the occlusion, or is contributing to occlusal problems (for example, extensive non-working side contacts).

Level 6

Insufficient tooth structure to allow the tooth to be restored with a well-adapted restoration. An inadequate ferrule, deep subgingival margins and vertical root fractures are examples of factors, which may mean that it is impractical to treat a tooth.

Periodontal treatment need

Level 0

A periodontal condition; where gingivitis and/or calculus may be present would still score at this level. A BPE score of 0-1 would be unlikely to make restorative treatment impractical.

Level 1

Where root surface debridement is necessary; it is envisaged that treatment is well within the scope of a hygienist, therapist, or general practitioner, and may require the use of a local anaesthetic. Typically, there would be probing depths <3.5 mm, poor hygiene and/or presence of calculus are all factors, which may indicate that the situation may be reversed with excellent home care and simple professional treatment.

Level 2

Treatment may require non-surgical and/or surgical intervention. This level would also include cases where restoration margins broadly impinge upon biological width necessitating crown-lengthening surgery.

A stable, but limited periodontal support/clinical attachment would also be included in level 2. This level would include teeth with short roots (unfavourable crown/root ratio), unfavourable root morphology, that is, short conical roots, grade 2-3 furcation involvement, and teeth with or requiring root resection.

Level 6

Impractical to treat; typically where there is untreatable or refractory periodontal disease, advanced bone loss and mobility.

Endodontic treatment need

Level 0

No clinical or radiographic signs of pulpal (for example, deep caries) or periapical (for

example, chronic periapical periodontitis) disease. This category would also include a tooth that has already been root treated under rubber dam, and has a well-compacted root filling which terminates within 2 mm of the radiographic apex.

Level 1

A primary endodontic treatment is indicated where the clinician is confident he/she can locate the root canal(s), prepare, disinfect and obturate the entire root canal system to the anatomical working length.

This level may also include secondary (re-treatment) endodontic treatment, typically, poorly compacted and easily retrievable existing root fillings.

Level 2

This level of complexity would typically include root canal systems that are challenging to prepare, disinfect and/or obturate. Examples of primary endodontic treatment falling into this category range would include roots with sclerosed canals, canal curvatures >30°, limited internal or external cervical root resorption, and dens in dente teeth. Other examples of complex primary endodontic cases included in this category include vital pulp therapy (eg, regenerative and apexification treatments).

Secondary (re-root canal treatment) endodontic cases included in level 2 include fractured instrument removal, perforation repair, and negotiation of a negotiable canal aberration, for example, a ledge or blockage. Management of complex dental trauma, this may include pulp involvement and/or significant displacement of injured teeth. This category would also include surgical endodontics.

Level 6

Typically, root canals that are not amenable to predictable disinfection and/or obturation. For example there may be an existing canal aberration or irretrievable fractured instrument where periapical microsurgery may not be possible due to limited access and/or the close proximity of adjacent vital anatomical structures (eg, the inferior dental nerve or maxillary sinus). The tooth may or may not be symptomatic, and/or have signs of chronic periapical periodontitis.

The 'context'

This category relates to the oral environment, the patient's ability to maintain their dentition (local

context), and the practicality of restorative treatment in the context of 'the bigger picture'. A holistic view of the patient, taking into account not only their overall restorative needs, but also the impact of treatment in the wider context of their social, dental, and medical history (general context) must be taken.

Level 0

In this level the treatment plan is weighted towards tooth retention.

Local context

An isolated dental problem where the adjacent teeth are present and healthy.

General context

Where removal of a strategic tooth is inadvisable, for example, extraction and/or replacement may be excessively complicated, and/or result in an increased likelihood of complications, for example, a patient who has a history of IV bisphosphonate medication, radiotherapy etc.

This level includes patients who are fully informed and motivated who wish to retain a tooth despite a guarded medium- to long-term prognosis.

Level 1

Local context

Limited fixed or removable prosthodontic treatment planned on the immediately adjacent tooth/teeth, which may be modified to include replacement of the tooth being assessed.

A tooth being planned to be used as a bridge or denture abutment is weighted 1.

General context

Medical conditions where the consequences of failure of a complex treatment would be potentially detrimental, for example, endodontic and/or periodontal treatment level 2, where radiotherapy of the area of interest is imminent.

Existing medical conditions, or planned treatment, which may have an impact of the outcome of restorative treatment being carried

out, for example, severely immunocompromised patients.

Level 2

Local context

Extensive fixed or removable prosthodontic treatment planned on multiple teeth, including neighbouring teeth.

General context

A patient with problematic parafunctional habits and/or an extensively worn dentition. A patient with generalised active periodontal disease, or a high caries rate is also considered in this level.

Patients who are very anxious and/or need to be sedated would be considered level 2. Significant medical conditions such as a patient who requires immunosuppressive drugs will score 2; not because of restorative concerns but because they may need careful management in a hospital or specialist environment for all but the most straightforward treatments.

Table 1 The categories that the tooth should be assessed in; structural integrity, periodontal and endodontic treatment need as well as context are summarised in the grey shaded columns. Each row shows examples of different levels (0,1,2,6) of complexity for each category. An overall DPI score of >6 indicates that treatment may be impractical, this is reduced to 4 if the tooth to be treated is to be used as a bridge abutment

Weighting	Structure integrity	Periodontal treatment need	Endodontic treatment need	Context
0 No treatment required	Unrestored or existing well-adapted restoration	Probing <3.5 mm (BPE 0-2) previously successfully treated periodontal disease	Vital pulp previously successfully treated endodontic disease	Local: Isolated dental problems where adjacent teeth are healthy General: Replacing of a strategic tooth may be excessively complex History of IV bisphosphonates, head & neck radiotherapy
1 Simple treatment required	Simple (in)direct restoration	Probing 3.5-5.5 mm (BPE 3) root surface debridement indicated	Simple root canal system with endodontic disease (eg, radiographically easily identifiable root canal[s], easily retrievable root canal filling material)	Local: Prosthodontic treatment planned of neighbouring teeth which may influence treatment plan for tooth being assessed Tooth to be used as a bridge abutment General: Radiotherapy of head and neck region planned Immunocompromised patient
2 Complex treatment required	Minimal residual sound tooth structure (eg subgingival margins, post-core restoration required etc)	Probing >5.5 mm (BPE 4) compromised support (eg short root, crown lengthening required, grade 2 mobility). Grade 2-3 furcation involvement	Complex root canal system with endodontic disease (eg, sclerosed root canal, acute curvatures). Complex re-root canal treatment (eg, fracture instrument removal, perforations) Difficulty in obtaining anaesthesia	Local: Prosthodontic treatment planned of multiple, including adjacent teeth General: High caries rate Poor oral hygiene Parafunctional habits, extensive tooth surface loss Active periodontal disease
6 Impractical to treat	Inadequate structure for ferrule	Untreatable periodontal disease	Untreatable root canal system	Local: Retention of the tooth being assessed would constrain and/or compromise an otherwise simple and predicable treatment plan (for example extensive bridge work) General: Potentially life threatening medical conditions which should be managed in tertiary care

Level 6

Local context

Not practical to retain as retention of the tooth, which may or may not be restorable, would severely constrain, complicate or compromise an otherwise straightforward and predictable restorative plan. For example, a single intact tooth remaining where extensive implant-retained bridgework is planned.

General context

These are extreme and rare cases that should be managed in tertiary care. Patients with life-threatening medical conditions, for example, a patient undergoing chemotherapy or severe congestive cardiac failure, where the objective of dental treatment is pain relief only.

Determining practicality

After a comprehensive assessment of the patient, the DPI score (Table 1) is derived by adding together the scores allocated in each of the four previously described categories.

An overall DPI score of 1–2 implies that if there is a periodontal, endodontic, and/or structural issue that may be simply and predictably treated. Where a level 2 score is recorded for any one of the restorative categories, advanced training and expertise in managing complex problems would be desirable; these cases may be referred for secondary or tertiary care.

The decision on whether to restore, refer for an opinion, or extract a tooth can be challenging; this may be further complicated when the tooth is contextualised as part of the patient's dentition (local context), and even further when taking into account the patient's overall health/well-being (general context). The 'context' weighting increases if extraction, or referral to secondary or tertiary care may be indicated.

The level a tooth has initially been assigned to may well need to be changed, if upon commencing treatment a complication and/or unplanned response to treatment has occurred.

For example, in the endodontic category when the clinician cannot locate or negotiate the entire root canal, and/or when complete anaesthesia is difficult to achieve.

While an extensively restored tooth may function well in an intact dentition, the consequences of failure may be of limited significance. Successful use of the tooth as a bridge abutment may be impractical when all the dental practicality aspects are considered together. When considering a tooth as a bridge abutment, in acknowledgement of the additional demands and potential complications upon the abutment teeth, it is weighted by at least 1 in the 'context' category).^{14,15} In addition, a DPI threshold of 4 is suggested, beyond which use of the tooth as bridge abutment is deemed to be inadvisable.

As the DPI score increases, treatment is potentially more complex, less practical and therefore should be approached with a greater degree of circumspection. A DPI score ≥ 6 suggests that it is not practical to carry out definitive treatment to a tooth and other treatment modalities such as an implant might be considered. A DPI Score ≥ 6 does not necessarily mean that a tooth should not be restored, or that it should be immediately extracted, but it does accentuate a need for further careful reflection and/or possible referral to secondary or tertiary care for multi-disciplinary specialist consideration.

Concluding remarks

The DPI assists and expedites a structured and formalised analysis of the many interplaying factors that should be considered in the decision-making process – including when to consider seeking advice and/or referral to secondary or tertiary care.

The authors have found the DPI to be a useful and straightforward guide for treatment planning. Not only because the DPI score helps to express the practicality of treatment for a particular tooth, but also because it confirms that the various aspects of assessing restorability have been considered.

The index encourages reflection upon the unique needs of the patient and assists in the delivery of holistic patient-centred care.¹⁶

Each patient and their dental need is unique; like any guideline, the DPI exists to assist rather than rigidly dictate how a dental problem is managed.

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