



## Page Proof Instructions and Queries

**Journal Title:** Primary Dental Journal

**Article Number:** 963303

Thank you for choosing to publish with us. This is your final opportunity to ensure your article will be accurate at publication. Please review your proof carefully and respond to the queries using the circled tools in the image below, which are available in Adobe Reader DC\* by clicking **Tools** from the top menu, then clicking **Comment**.

Please use *only* the tools circled in the image, as edits via other tools/methods can be lost during file conversion. For comments, questions, or formatting requests, please use . Please do *not* use comment bubbles/sticky notes .



\*If you do not see these tools, please ensure you have opened this file with **Adobe Reader DC**, available for free at [get.adobe.com/reader](http://get.adobe.com/reader) or by going to Help > Check for Updates within other versions of Reader. For more detailed instructions, please see [us.sagepub.com/ReaderXProofs](http://us.sagepub.com/ReaderXProofs).

No.	Query
	Please confirm that all author information, including names, affiliations, sequence, and contact details, is correct.
	Please review the entire document for typographical errors, mathematical errors, and any other necessary corrections; check headings, tables, and figures.
	Please ensure that you have obtained and enclosed all necessary permissions for the reproduction of art works (e.g. illustrations, photographs, charts, maps, other visual material, etc.) not owned by yourself. Please refer to your publishing agreement for further information.
	Please note that this proof represents your final opportunity to review your article prior to publication, so please do send all of your changes now.

## KEY WORDS

Shared decision making, endodontic treatment, decision aids, decision boards, evidence-based dentistry

## LEARNING OBJECTIVES

- To review current requirements regarding shared decision making in endodontics
- To appreciate the use of decision aids to support SDM in endodontic therapy
- To consider the value of a 'Montgomery-era' endodontic decision board

## AUTHORS

**Sandhya Rajagopal BDS (Bris), MSc Endodontology (UCLan), MFDS (RCS Eng)**

Endodontist, Collingham Dental Care, Wetherby

**Aengus Kelly BDS PhD MA PGCert LTHE FHEA MDTFed MFDS RCPSCG**

Clinical Lecturer in Dental Education, Peninsula Dental School, Plymouth University

**SANDHYA RAJAGOPAL, AENGUS KELLY**

Prim Dent J. 2020;9(4):1-6

# SHARED DECISION MAKING IN ENDODONTICS

## ABSTRACT

Engaging patients in shared decision making (SDM) is a professional requirement since the Montgomery ruling in 2015. Endodontic treatments present a specific challenge to achieving SDM, both for the clinician and the patient. The treatments are often perceived as more challenging to complete by the clinician, and the assessment of risk and likely outcome requires a deep understanding of the (limited) evidence base. For the patient, decisions can be required at a time of acute symptoms and prolonged treatments. There are health literacy demands in comparison to some less complex dental treatments. Treatment decisions may be based more on inherent biases and prior experiences than objective probabilities. This article discusses options and supports effective shared decision making in endodontic treatment.

## Introduction

The high level of uncertainty over the nature of the delivery of dental care in the time of a pandemic will likely persist into the early years of this decade.<sup>1</sup> In endodontic treatment, the challenge of communicating essential information and ultimately agreeing a shared treatment decision will be further complicated by additional discussions of topics such as viral load and aerosols, and decisions on multi-visit versus single-visit protocols. Even before Covid-19, the goal of achieving shared decision making in endodontic treatment was inherently challenging. For many dentists there is uncertainty over the clinical outcome, and their ability to successfully complete the treatment; for patients, 'root canals' are often misunderstood and unappealing.<sup>2</sup>

## What is shared decision making (SDM)?

Shared decision making (SDM) has been defined as a process in which the patient

and the clinician consider outcome probabilities and patient preferences, and reach a mutual agreement on the appropriate health care decision.<sup>3</sup> In the wake of the Montgomery ruling,<sup>4</sup> the notion of, and guidelines around, 'consent' have shifted away from the paternalistic style of decision making, the outdated standard whereby the clinician makes the decision on the patient's behalf, on the basis that they are the ones who have all the technical knowledge and understanding.<sup>5</sup> The current guidelines reflect the significant change in the way the law approaches the issue of consent following the judgement of the Supreme Court in the case of *Montgomery v Lanarkshire* in March 2015.<sup>6</sup> The Montgomery ruling has resulted in a new understanding of consent, namely that the appropriate amount of information required to inform the patient is determined by that specific patient's context and background, and by that patient's expectations and

individual perspective. The duty is firmly with the clinician to ensure that the patient understands the information and engages in an SDM process, even if they ultimately follow a bespoke recommendation tailored to them by the dentist.

Clinicians in the United Kingdom and around the world are now compelled to adopt a shared style of decision making, which has become synonymous with a model of healthcare centred on the patients' needs. Patient centred care (PCC) incorporates treatment decisions that are '*respectful of ... individual patient preferences, needs, and values*'.<sup>7</sup> It is clear that it is a substantial challenge for clinicians to continue achieving high-quality, precision medical treatments while also conforming to the expectations and requirements of regulators, indemnifiers and legislators when it comes to achieving consent post-Montgomery. In the National Health Service (NHS), there is a great focus on patient choice and measuring quality outcomes which is central to the NHS policy. The NHS constitution protects in law the patient's right to 'information about [. . .] options [. . .] and their risks and benefits',<sup>8</sup> whilst regulatory bodies, such as the General Medical Council (GMC) and General Dental Council (GDC), have set out strict standards for their members on gaining informed consent where the patients are actively involved in the decision making process.<sup>9</sup> The third of the GDC's principles, 'obtain valid consent', advises that the registrant '*must check and document that patients have understood the information*' [italics added].<sup>10</sup> This potentially adds to the clinician's challenge. How will you convey the information, and then how will you check that the patient understands? Indemnifiers have published guides to SDM, but where the clinician is expected to facilitate the patient in making 'a clear choice' the practical process of encouraging a choice between complex treatment options is not straightforward.<sup>11</sup> What is "enough" information?<sup>12</sup> Dentists are also reminded that consent and SDM is a dynamic process, and multi-visit treatment planning requires answers to the question 'does the patient still understand?'<sup>12</sup> Or indeed, 'do they still consent?'

It has been found that clinician-patient interactions play a vital role in treatment decision making, as well as patient acceptance of treatment and willingness to be involved in shared decision making, but there has been little research on these processes in dentistry.<sup>6,13</sup> A recent review of the dental literature revealed that although the concept of patient centred care exists as a theory, evidence of how it is being implemented in clinical practice is lacking.<sup>7</sup>

### Inherent difficulties

Some barriers to taking part in PCC that have been postulated include patient-related factors, such as patients who wished to have either too much or too little involvement in the consultation, and context-related factors, such as limitations in appointment duration in an NHS environment.<sup>14</sup>

### Decision making in endodontics

Research has shown that there are vast variations in the treatment decisions of dental practitioners when it comes to treating disease of endodontic origin.<sup>15-18</sup> There tended to be more agreement in treatment decisions amongst endodontists or practitioners with further training in endodontics<sup>15-18</sup> than clinicians in other specialties or general dentists and undergraduate students.<sup>19</sup> One can assume that this difference in treatment decision will have an impact on the consent process.

It has been found that newly qualified dentists perceive endodontics to be one of the areas where they lack confidence in their competency and would ideally like further training and experience.<sup>20,21</sup> Undergraduate teaching of endodontology has been scrutinised in the past for not meeting standards set by the likes of the European Society of Endodontology<sup>22</sup> and for the huge variation there is in clinical teaching, practical exercises and assessments in each of the dental schools.<sup>23</sup> Qualtrough also discussed that the main challenges that dental schools face with endodontic teaching is the lack of appropriate clinical cases for students to learn from and that not all teaching is provided by specialist endodontists or even dentists with a special interest in endodontics.<sup>23</sup> One can argue that the lack of standardised

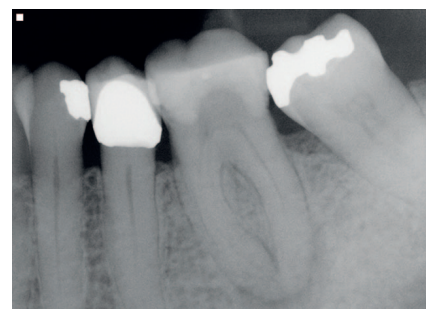


Figure 1: A typical presentation (LL6) - what would you recommend?

training at an undergraduate level then makes way for variations in clinical practice post qualification both in terms of communication and practical skills. In a typical presentation of periapical pathology, such as the one shown in Figure 1, what options should we give our patients, and is there a clear recommendation? Could you confidently and accurately advise about likely treatment outcomes, based on contemporary evidence? A model for how to structure this information is presented in in this paper.

Often the decision to be made in endodontics is whether to embark on endodontic treatment to retain the tooth or to extract the tooth in question and either accept the gap or replace the gap with a denture/bridge or implant.<sup>24</sup> With endodontic treatment and implant treatment having very high success rates in the literature, there is enough evidence to show that both treatment modalities have good overall success rates in the long term.<sup>25-27</sup> The perceptions of implant treatment and root canal treatment amongst dentists and patients is an important point to consider.

One of the hot topics in dentistry currently is whether clinicians appreciate the different criteria for ascertaining the outcomes of root canal and implant treatment and when one should opt for one treatment modality over the other.<sup>28</sup> Stockhausen et al. found that although there was no evidence that clinicians were increasing their prescription of implant therapy, there was a perceived superior outcome of implant compared with endodontic treatment amongst dentists.<sup>29</sup>

When it came to patient perceptions of implants, it was found that patients were

seeking information from a number of different sources of media as well as the information given by clinicians. This led to unrealistic expectations of implant treatment in terms of overestimating their functions and longevity, and underestimating the level of expertise required for implant placement and the need for ongoing post treatment maintenance.<sup>30,31</sup> This could then end up with the patient opting for implant therapy when an alternative therapy could have been more appropriate for their clinical needs. Setzer and Kim concluded in their article that both implants and endodontic therapy have high success rates provided that case selection is carried out appropriately.<sup>28</sup> They drew attention to the fact that neither treatment option comes with a lifetime guarantee, but that in order to serve the long term health and benefit of the patient, decision making can only be carried out successfully if the treating clinician is fully aware of the true long-term outcomes of both treatment options.

### Communication of uncertainty and risk

Given the importance placed on patient centred care and shared decision making in current health care situations, risk communication forms a big part of this process. It is vital that more efficient means of executing this is achieved, so that the communication of risks involved with a procedure does not lead to 'information overload'<sup>32</sup> for the patient. In the absence of clear guidelines, the dentist, particularly the less experienced clinician, may well feel compelled to provide a lot of information to the patient in order to try to avoid litigation.

Even where a suitable amount of information has been conveyed, the style in which it is communicated may have an effect. Gurm and Litaker's seminal study on positive and negative framing found that the way a clinician describes a procedure's risk can significantly influence the likelihood of consent.<sup>33</sup> For example, telling a patient that there is a 5% chance of failure compared to telling them there is a 95% chance of success can bring about very different emotions in the patient.

'Shared' decision making implies a two-way interaction in which the patient also has an impact on the communication.

Inherent biases and the emotional or cognitive state of the individual may alter the decision process. Kahneman describes the 'endowment effect', the idea that 'the response to a loss is stronger than the response to a corresponding gain'.<sup>34</sup> In other words, patients should be primed to prefer retaining the tooth, to choose RCT over extraction and implant.

Consequently, how we discuss the relative risks and costs can be hugely influential. The dentist's communication needs to be candid, clear and evidence-based (see Table 2 below). Kahneman further describes two modes of thinking ('fast' and 'slow') based on whether we are in a state of cognitive ease or cognitive strain.<sup>34</sup> The typical patient will experience cognitive strain in a dental setting where there are increased risks (pain, financial costs, tooth loss), distractions (unfamiliar setting and language, anaesthesia and operative treatment), and demands (health literacy and jargon, decision making responsibility). This cognitive strain will often result in 'fast' ('System 1')<sup>34</sup> thinking, characterised as more prone to bias and influence. The challenge for the dentist is to effectively communicate a complex message with a strained conversational partner.

There are numerous barriers to effective communication in a scenario like endodontic treatment. A final one to consider is the ability of dentists and patients alike to understand the concept of probability and frequency estimation. Research has found that even highly educated people find it very hard to understand and process statistical information relating to risk.<sup>35</sup> This in turn can lead to inappropriate treatment decisions on the clinicians and patients' part.

### Minimising uncertainty in the clinical setting

Data mining can be used to formulate decision aids to help clinicians communicate evidence based treatment options, associated risks, benefits and potential outcomes in a more standardised manner. These decision aids can be formulated to include financial implications for each of the treatment options and hence the patient can have a more transparent tool to help them engage in shared decision making with

the clinician. A recent Cochrane review found that patients who have been exposed to decision aids feel more knowledgeable, better informed, and clearer about their values.<sup>36</sup> These patients are more likely to have an active role in decision making given their increased knowledge and tend to have more accurate risk perceptions.<sup>36</sup>

The dental practicality index (DPI)<sup>37</sup> was designed to help dentists assess the restorability of a tooth by considering the current structural integrity, endodontic state, periodontal state, and the context (EPIC) of treatment. A recent study found that utilising the DPI gave a good prediction for the outcome of endodontic retreatments although further validation is required.<sup>38</sup> Although not specifically an aid for SDM, this would help dentists to be able to decide predictably what treatment options need to be offered to the patient, thereby reducing the variations in clinical decision making. In a similar way, when the clinician has an up to date awareness of what the evidence base tells us about treatment outcomes, this will also support SDM.

The endodontic decision board (EndoDB) devised by Johnson et al. was introduced to help dentists communicate the different treatment options with the patient.<sup>39</sup> One limitation found with the EndoDB was that despite helping with patient communication, it was not practical for use in complex scenarios or busy clinical settings.<sup>40</sup> Decision trees is another useful decision aid that has been implemented and utilised successfully in the medical sector but lacking in the dental field.<sup>41</sup> Decision trees are seen as a beneficial clinical decision analysis tool that overcomes the complexity and uncertainty associated with certain clinical scenarios.<sup>42</sup> It does this by providing the decision maker with objective evidence in order to make a judgement, highlighting other variables that need to be taken into consideration before making a decision, and by helping with cost analysis.<sup>42</sup> Cost is of course just one factor, but for the patient it might be the most tangible. Nisbett outlines the concept of 'expected value analysis' to support decision making.<sup>43</sup> All available options are presented and a value (typically monetary) is calculated along with the likelihood of each outcome. Variations of this tool have

TABLE 1

### GUIDELINES FOR SDM FOR DENTIST AND PATIENT IN ENDODONTIC CASES BASED ON THE LITERATURE REVIEW (BES: BRITISH ENDODONTIC SOCIETY, ESE: EUROPEAN SOCIETY OF ENDODONTOLOGY, AAE: AMERICAN ASSOCIATION OF ENDODONTISTS)

#### Be prepared for SDM: dentist recommendations

- Utilise the DPI<sup>37</sup> to assess the tooth and determine best clinical treatment option
- Keep up to date with possible outcomes for different endodontic scenarios based on best available recent literature
- If conflicting evidence on outcomes in literature, be able to give an indication and be able to discuss prognostic indicators which are likely to work for or against the patient in terms of a successful outcome
- Develop a decision board for endodontic treatment

#### Empower the patient for SDM: patient recommendations

- Adapting the 'three questions model' may enable the patient to engage in the decision making process.<sup>45</sup> Create an environment where the patient is encouraged to ask:
  1. What are my options?
  2. What are the possible risks and benefits of those options for me?
  3. How likely are the benefits and risks of each option for me?
- Make further information available to the patient in the form of leaflets/endodontic society websites (BES/ESE/AAE)
- Be able to reassure the patient that there will be some uncertainty or risk associated with any procedure, but that this exercise will hopefully identify the attributes of the treatment that impact the patient the most and hence help them make a right decision for them

been used to support health care decision making.

'Option grids' as designed by Elwyn et al. are another form of decision aid aimed to facilitate SDM in a clinical setting.<sup>44</sup> The option grid summarises the treatment options in a tabular format along with answers to frequently asked questions (FAQs) by patients. It is intended to allow horizontal comparison of each of the treatment options. Option grids are based on the assumptions that clinical treatment decisions often must be made with limited information and in a short time frame.

Research has shown that although there was some initial reluctance by clinicians to utilise option grids, both clinicians and patients did see value in the use of this decision aid once they had trialled it.<sup>44,45</sup> Some of the hesitancy to use it was due to the assumption that their use would take up more clinical time and potentially lead to information overload for the patient. Some of the reluctance was also down to the inexperience of using decision aids in a practical clinical setting.<sup>44,45</sup>

Proposing the use of checklists in medical settings to avoid error, Gawande suggests that checklists may also have a democratising function as a medical or physical prop that might

empower those lower on the hierarchy.<sup>46</sup> The concept of the decision aid is based on a similar notion of democratising the interaction with the patient. Where a checklist might empower a nurse in theatre, a decision aid might empower a patient in an endodontic consultation. Another tool that was found to empower patients in a consultation scenario was to encourage the patients to ask three simple questions.<sup>47</sup> These questions (about options, risks and benefits) were developed for consumer health advice book *Smart Health Choices*<sup>48</sup> in order to help the patient engage in SDM and allow the clinician to give more information to the patient which would then help them reach a suitable informed decision (see Table 1 for recommendations for SDM).

A review of the literature on SDM indicates that there are some simple recommendations that may help the clinician navigate the difficulties of achieving SDM in endodontic cases. The list provided in Table 1 considers both perspectives in the surgery. It is not comprehensive and is presented as a starting point for consideration and adaptation in your practice.

At the beginning of this article, the reader was prompted to consider potential treatment options and

recommendations for the case suggested by the radiograph in Figure 1. In Table 2, an updated decision board is presented as a template structure for a decision aid for such a conversation. It is based on the original EndoDB<sup>39</sup> but updated for the post-Montgomery era to incorporate the specific context and needs of the patient into the decision process. In this format, it is being presented as an untested tool, and any decision-making process would also need to conform to standards of record-keeping and clinical accuracy. The reader is encouraged to develop a similar decision board for endodontic cases. It might act as both a checklist<sup>46</sup> or aide-memoire for the dentist, and as a decision aid to support SDM and encourage patient participation.

## Conclusion

To limit the amount of uncertainty for clinicians in the decision making process, appropriate training should be given at undergraduate level and further learning opportunities should be available post qualification. Furthermore, evidence based decision aids should be developed. In turn, this will eliminate some of the uncertainty that patients may feel and help them engage in the decision making process. Patient values and preferences can still be taken into

**TABLE 2**

**A TEMPLATE ENDODONTIC DECISION BOARD ADAPTED FOR MONTGOMERY-ERA SDM**

Treatment	Description	Risks (with likelihood)	Benefits	Cost (+ costs if fails)	Factors specific to you specifically (your preferences, needs, values)	Your choice/ my recommendations
No treatment						
Extraction with NO replacement						
Extraction with bridge replacement						
Extraction with Implant placement						
Endodontic treatment with filling						
Endodontic treatment with cuspal coverage crown/onlay						

consideration, indeed, this will reduce the risk of inappropriate treatments being carried out and ensure better treatment outcomes with greater patient satisfaction. Further research is recommended into developing decision aids and it would also be beneficial if further research into the cognitive aspects of clinical decision making in

an endodontic scenario could be carried out. Uncertainty in endodontic scenarios is a reality and it can be limited, however, not eliminated.

*‘Even the best decisions about intervention are probabilistic and run a real risk of failure, but the failure wouldn’t necessarily make the decision wrong.’<sup>49</sup>*

Further research to understand methods and means of supporting clinicians in managing this uncertainty and embracing the risk of failure, especially when it comes to patient communication is crucial in ensuring better patient outcomes when it comes to treating endodontic disease.

**REFERENCES**

- Izzetti R, Nisi M, Gabriele M, et al. COVID-19 Transmission in Dental Practice: Brief Review of Preventive Measures in Italy. *J Dent Res*. 2020 Aug;99(9):1030-1038.
- Jain A, Bansal R. An insight into patient’s perceptions regarding root canal treatment: A questionnaire-based survey. *J Family Med Prim Care*. 2020 Feb; 9(2):1020-1027.
- Frosch D, Kaplan R. Shared decision making in clinical medicine: past research and future directions. *Am J Prev Med*. 1999 Nov;17(4):285-94.
- Campbell M. Montgomery v Lanarkshire Health Board. *Common Law World Review*. 2015;44(3):222-228.
- Charles C, Gafni A, Whelan T. Shared decision-making in the medical encounter: What does it mean? (or it takes at least two to tango). *Soc Sci Med*. 1997 Mar;44(5):681-92.
- Bayliss C. Informed consent: what’s new? *Dent Update*. 2017;44(2):109-113.
- Scambler S, Delgado M, Asimakopoulou K. Defining patient-centred care in dentistry? A systematic review of the dental literature. *Br Dent J*. 2016;221(8):477-484.
- Dept of Health and Social Care. The NHS Constitution - Patients and the public: your rights and the NHS pledges to you. [internet]. London: NHS; 2015. Available at <https://www.gov.uk/government/publications/the-nhs-constitution-for-england/the-nhs-constitution-for-england#patients-and-the-public-your-rights-and-the-nhs-pledges-to-you> [Accessed 01/05/2020].
- Vernazza C, Rousseau N, Steele J, et al. Introducing high-cost health care to patients: dentists’ accounts of offering dental implant

- treatment. *Community Dent Oral Epidemiol.* 2015 Feb; 43(1): 75-85.
- 10 General Dental Council (GDC). The Nine Principles - Standards for the Dental Team. [Internet]. London: GDC; 2013. Available at <https://standards.gdc-uk.org/pages/principle3/principle3.aspx> [Accessed: 01/05/2020].
  - 11 Dental Protection. Consent: UK excluding Scotland. [Internet]. London: Dental Protection; 2013. Available at <https://www.dentalprotection.org/uk/articles/consent-advice-booklet> [accessed 01/05/2020].
  - 12 Dental Defence Union (DDU). Guide to Consent to Dental Treatment. [Internet]. London: DDU; 2020. Available at <https://www.theddu.com/guidance-and-advice/guides/quick-guide-to-consent?Region=England> [accessed 01/05/2020].
  - 13 Scambler S, Asimakopoulou K. A model of patient-centred care – turning good care into patient-centred care. *Br Dent J.* 2014;217(5):225-228.
  - 14 Asimakopoulou K, Gupta A, Scambler S. Patient-centred care: barriers and opportunities in the dental surgery. *Community Dent Oral Epidemiol.* 2014;42(6): 603-610.
  - 15 Reit C, Kvist T. Endodontic retreatment behaviour: the influence of disease concepts and personal values. *Int Endod J.* 1998 Sep;31(5):358-63.
  - 16 Aryanpour S, Van Nieuwenhuysen J, D'Hoore W. Endodontic retreatment decisions: no consensus. *Int Endo J.* 2000;33(3): 208-218.
  - 17 Al-Ali K, Marghalani H, Al-Yahya A, et al. An assessment of endodontic re-treatment decision-making in an educational setting. *Int Endo J.* 2005;38(7):470-476.
  - 18 McCaul L, McHugh S, Saunders W. The influence of specialty training and experience on decision making in endodontic diagnosis and treatment planning. *Int Endo J.* 2001;34(8):594-606.
  - 19 Dechouniotis G, Petridis X, Georgopoulou M. Influence of Specialty Training and Experience on Endodontic Decision Making. *J Endo.* 2010;36(7):1130-1134.
  - 20 Ali K, Zahra D, Coelho C, et al. Academic performance of undergraduate dental students with learning disabilities. *Br Dent J.* 2017;222(3):205-208.
  - 21 Stewardson D, Shortall A, Lumley P. Endodontics and new graduates, Part 2: Undergraduate experience and course evaluation. *Euro J Prosthodont Rest Dent.* 2003;11(1):15-21.
  - 22 Gatley S, Hayes J, Davies C. Requirements, in terms of root canal treatment, of undergraduates in the European Union: an audit of teaching practice. *Br Dent J.* 2009;207(4):165-170.
  - 23 Qualtrough A. Undergraduate endodontic education: what are the challenges? *Br Dent J.* 2014;216(6):361-364.
  - 24 Azarpazhooh A, Dao T, Ungar W, et al. Patients' Values Related to Treatment Options for Teeth with Apical Periodontitis. *J Endo.* 2016;42(3):365-370.
  - 25 Torabinejad M, Corr R, Handysides R, et al. Outcomes of Nonsurgical Retreatment and Endodontic Surgery: A Systematic Review. *J Endo.* 2009;35(7):930-937.
  - 26 Salehrabi R, Rotstein I. Endodontic Treatment Outcomes in a Large Patient Population in the USA: An Epidemiological Study. *J Endo.* 2004;30(12):846-850.
  - 27 Simonis P, Dufour T, Tenenbaum H. Long-term implant survival and success: a 10-16-year follow-up of non-submerged dental implants. *Clin Oral Implant Res.* 2010;21(7):772-777.
  - 28 Setzer F, Kim S. Comparison of Long-term Survival of Implants and Endodontically Treated Teeth. *J Dent Res.* 2013;93(1):19-26.
  - 29 Stockhausen R, Aseltine R, Matthews J, et al. The perceived prognosis of endodontic treatment and implant therapy among dental practitioners. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2011 Feb;111(2):e42-7.
  - 30 Wang G, Gao X, Lo E. Public perceptions of dental implants: a qualitative study. *J Dent.* 2015;43(7):798-805.
  - 31 Grey E, Harcourt D, O'Sullivan D, et al. A qualitative study of patients' motivations and expectations for dental implants. *Br Dent J.* 2013;214(1):E1-E1.
  - 32 Asimakopoulou K, Rhodes G, Daly B. Risk communication in the dental practice. *Br Dent J.* 2016;220(2):77-80.
  - 33 Gurm H, Litaker D. Framing Procedural Risks to Patients. *Academ Med.* 2000;75(8): 840-842.
  - 34 Kahneman D. *Thinking: Fast and Slow.* London: Penguin; 2012.
  - 35 Gigerenzer G, Gaissmaier W, Kurz-Milcke E, et al. Helping Doctors and Patients Make Sense of Health Statistics. *Psychol Sci Public Interest.* 2007 Nov;8(2): 53-96.
  - 36 Stacey D, Légaré F, Lewis K. Patient Decision Aids to Engage Adults in Treatment or Screening Decisions. *JAMA.* 2017;318(7):657.
  - 37 Dawood A, Patel S. The Dental Practicality Index – assessing the restorability of teeth. *Br Dent J.* 2017;222(10):755-758.
  - 38 Tifooni A, Al-Nuaimi N, Dawood A, et al. Validation of the effectiveness of the Dental Practicality Index in predicting the outcome of root canal retreatments. *Int Endo J.* 2019;52(10):1403-1409.
  - 39 Johnson B, Schwartz A, Goldberg J, et al. A Chairside Aid for Shared Decision Making in Dentistry: A Randomized Controlled Trial. *J Dent Ed.* 2006;70(2):133-141.
  - 40 Park S, Lee S, Kim M, et al. Shared decision support system on dental restoration. *Exp Syst Applicat.* 2012;39(14):11775-11781.
  - 41 Rohlin M, Mileman P. Decision analysis in dentistry - the last 30years. *J Dent.* 2000;28(7): 453-468.
  - 42 Bae J. Clinical Decision Analysis using Decision Tree. *Epidemiol Health.* 2014:e2014025.
  - 43 Nisbett R. *Mindware: tools for smart thinking.* London: Penguin Random House UK; 2016.
  - 44 Elwyn G, Lloyd A, Joseph-Williams N, et al. Option Grids: Shared decision making made easier. *Patient Educ Couns.* 2013 Feb;90(2):207-12.
  - 45 Elwyn G, Rasmussen J, Kinsey K, et al. On a learning curve for shared decision making: Interviews with clinicians using the knee osteoarthritis Option Grid. *J Eval Clin Practice.* 2016;24(1):56-64.
  - 46 Gawande A. *The Checklist Manifesto: how to get things right.* London: Profile Books; 2011.
  - 47 Shepherd H, Barratt A, Jones A, et al. Can consumers learn to ask three questions to improve shared decision making? A feasibility study of the ASK (AskShareKnow) Patient-Clinician Communication Model® intervention in a primary health-care setting. *Health Expect.* 2015;19(5):1160-1168.
  - 48 Irwig J, Irwig L, Sweet M. *Smart health choices.* St. Leonards, NSW: Allen & Unwin; 1999.
  - 49 Rubin R, Weinsberg J. *In an uncertain world.* New York: Penguin Random House; 2004.