

Review Article



Quality and applicability of clinical practice guidelines developed for dental implantology: A systematic scoping review

Eduardo Enseldo-Carrasco¹, Buket Acar², Hanife Merva Parlak², Meltem Özdemir Kabalak², Nermin Tarhan²

¹Centro de Investigaciones en Ergonomía, Centro Universitario de Arte, Arquitectura y Diseño, University of Guadalajara, Jalisco, Mexico

²Department of Periodontology, Faculty of Dentistry, University of Hacettepe, Ankara, Türkiye

*Corresponding Author: Eduardo Enseldo-Carrasco, Email: eduardo.enseldo@gmail.com

Abstract

Background: Clinical practice guidelines (CPGs) facilitate safe and effective procedures in implant dentistry. However, approaches to their development are diverse and may vary in quality. This article evaluates the quality of clinical practice guidelines in dental implantology.

Methods: A scoping review of CPGs published in implantology was conducted. We searched for CPGs in implantology published between January 2000 and July 2020 in MEDLINE, EMBASE, and Google Scholar. Webpages of 52 national dental associations were also searched. Four researchers assessed the quality of the selected CPGs following the Appraisal of Guidelines for Research & Evaluation (AGREE) II instrument.

Results: Ninety CPGs were included for analysis. The 6-domain mean score (M) of all included CPGs was 4.3% with median (Mdn) and standard deviation (SD) values of 0.8 and 4.5, respectively. Domain-specific scaled scores revealed that “scope and purpose” (M=65.3) and “clarity of presentation” (M=61.1) were the domains with the highest scaled scores. In contrast, the “applicability” and “editorial independence” had the lowest scaled domain scores (M=13.7 and M=46.6, respectively). The mean overall CPG assessment score was 4.3 (Mdn=4.5; SD=0.8).

Conclusion: Standardized methods for guideline development are already available. Patients’ role is critical to ensuring that CPGs meet their values and needs. National dental associations, universities, and researchers need to collaborate in the dissemination of clinical practice guidelines (CPGs).

Keywords: Clinical practice guidelines, Dentistry, Implantology

Citation: Enseldo-Carrasco E, Acar B, Parlak HM, Kabalak MÖ, Tarhan N. Quality and applicability of clinical practice guidelines developed for dental implantology: A systematic scoping review. *J Oral Health Oral Epidemiol.* 2025;14:2403.1635. doi:10.34172/johoe.2403.1635

Received: April 24, 2024, **Revised:** May 22, 2025, **Accepted:** September 13, 2025, **ePublished:** October 19, 2025

Introduction

Ensuring quality in healthcare delivery is a global priority. Health professionals and healthcare systems are responsible for ensuring safety and weighing the benefits of interventions against their risks.¹ In 2002, the World Health Assembly (WHA) recognized adverse events as a public health concern.² Subsequently, member states of the World Health Organization (WHO) have developed strategies to enhance patient safety across their healthcare systems. Evidence-based care is fundamental to achieving quality dental care services in this context.³ Evidence-based dentistry (EBD) ensures the provision of dental care services based on the most relevant empirical research findings.⁴ EBD also concerns integrating practitioners’ individual clinical experience with empirical findings in their clinical decision-making to provide safe and patient-centered oral health care.⁵ The evidence-based approach in dentistry holds significant potential. It

encompasses a comprehensive variety of study designs and methodological approaches, which can increase dental practitioners’ ability to discern the best evidence to support their treatment decisions.⁶ Clinical practice guidelines (CPGs) can summarize studies, translate research findings into practice, and assist clinicians in making informed decisions about the most suitable approach.⁷

CPGs synthesize the best empirical evidence to guide general dental practitioners (GDPs) and specialists in their decision-making process to provide appropriate patient care.⁸ These documents are usually presented as a short evidence summary, a list of statements, or decision-making algorithms.⁹ Therefore, CPGs improve healthcare delivery, resulting in safer care and better patient outcomes.^{10,11} This requires robust and standardized methods for their development. Despite advancements in medicine, dentistry still needs more development in



CPG. Many published medical CPGs for various health conditions are available.¹² Additionally, methodological approaches for the development of clinical practice guidelines (CPGs) have been established in the field of medicine. A few examples include those published by the Scottish Intercollegiate Guidelines Network (SIGN), the National Institute for Health and Clinical Excellence (NICE)¹³, and the Australian National Health and Medical Research Council (NHMRC).¹⁴

These approaches have rarely been used in the development of Clinical Practice Guidelines (CPG) in dentistry. As a result, their development approaches are diverse and may vary in quality. Examples of this variation in quality are reported in CPGs concerning antenatal oral healthcare,¹⁵ orthodontics, and COVID-19-related recommendations in the dental office.^{16–18} Quality appraisal systems of CPGs for implant dentistry have also been developed. In their study, Faggion et al found quality scores below 50% in four of six quality domains, namely concerning the applicability, rigor of development, stakeholder involvement, and editorial independence.¹⁹ The scope of their study was confined to evaluating consensus guidelines that were published in six specialized journals dedicated to implant dentistry. In this study, we aimed to systematically scope the scientific literature for relevant CPGs in dental implantology. Additionally, we intended to evaluate the quality of the processes described in their development.

Methods

We conducted a scoping review of published clinical practice guidelines (CPGs) in dental implantology. A scoping review is a method proposed by Arksey and O'Malley²⁰ and further developed by Levac et al²¹ from which we employed a 5-stage methodological framework.

Stage 1: Identifying the research question

To systematically scope the scientific literature for relevant CPGs in the field of dental implantology, we developed the following research questions:

- What is the scope of available CPGs for implantology in dentistry?
- What is the quality of available CPGs?
- What are the potential lessons to be learned and the key areas for action?

Stage 2: Identifying relevant guidelines

We explored MEDLINE, EMBASE, SCOPUS, and Google Scholar from January 1st, 2000, to July 30th, 2020, through a comprehensive search strategy that comprised a list of Medical Subheadings (MeSH) and free-text terminology (Supplementary File, Table S1). Examples of MeSH terms included “guidelines as a topic,” “practice guidelines,” “dentistry,” “evidence-based dentistry,” and “dental implants.” Examples of free-text terms included “dental

implantology,” “guideline,” “recommendations for clinical practice,” and “consensus guidelines.” To ensure no eligible CPGs were overlooked, the official websites of 52 national and international dental associations were examined for additional guidelines not listed in reference databases (Supplementary File, Table S2). They included the Academy of Prosthodontics, the American Academy of Implant Dentistry, and the British Academy of Dental Implantology. Keywords such as “implantology guideline” and “implantology consensus report” were used. We included any CPGs published by either national or international dental associations. Specific state-level guidelines were excluded.

Stage 3: Guideline selection

Three reviewers (A, B, and C) independently screened the citations and explored the web pages of the dental associations described in Supplementary File, Table S2. All citations were imported into EndNote 20 software. Titles and abstracts were screened to identify potentially relevant CPGs. Full-text documents were then obtained and assessed to decide if they met the selection criteria (Figure 1). Disagreements were resolved through consultation by a fourth reviewer (D). The review process was recorded following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews checklist (PRISMA).²²

Stage 4: Charting the data

Data from included clinical practice guidelines were extracted into a form in Microsoft Excel software. Main features such as the first author, year of publication, country of origin, source (e.g., journal, dental association websites), guideline's main topic, targeted clinical procedure, and reported approach for guideline development were obtained. The included clinical practice guidelines were categorized under the World Bank's data on Gross National Income per capita (GNI) into developed economies (>12,436 USD), middle-income economies (1,036 – 12,535 USD), and low-income economies (<1,036 USD).²³ The methodological rigor of included CPGs was assessed per the AGREE II instrument. This instrument comprises 23 appraisal items into six domains: a) scope and purpose; b) stakeholder involvement; c) rigor of development; d) clarity of presentation; e) applicability; and f) editorial independence.²⁴ The detailed description of these items is shown in Supplementary File, Table S3.

Stage 5: Collating, summarizing, and reporting the results

We carried out an exploratory and descriptive analysis of the overall characteristics. As we anticipated a variation in the presentation of CPGs, they were conceptually grouped into GPGs reported as a) consensus reports, b) CPGs, c) literature reviews, and d) position statements. We

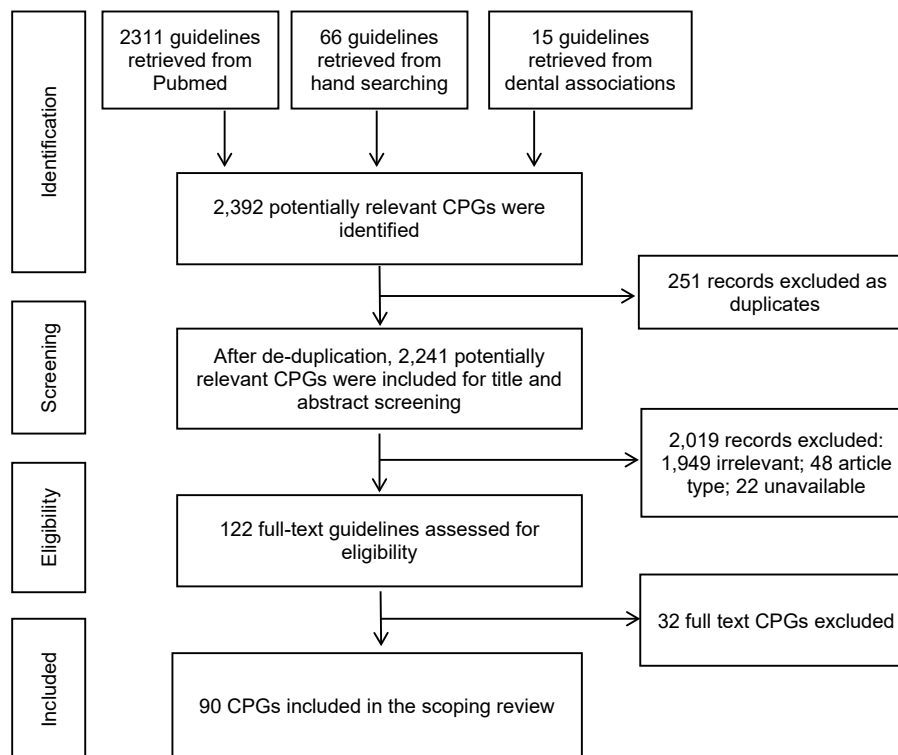


Figure 1. PRISMA flowchart

further assessed the overall reported empirical support for their development. Types of recommendations were grouped as clinical recommendations, recommendations for research, and consensus statements. Finally, four authors (A.B., P.H.M., Ö.K.M. and E.C.E.) independently assessed the documents following the AGREE II user's manual.²⁴ Each item was rated on a 7-point scale ranging from 1-strongly disagree to 7-strongly agree. Domain scores were calculated by summing up each item's scores in a domain. Scaled domain scores were calculated by summing the minimum possible scores per item in each domain and subtracting them from the score. This value was proportional to the difference between the maximum and minimum possible scores. These overall scores were expressed as a percentage.

Results

Out of 2,392 potentially relevant CPGs, we identified 90 CPGs (Figure 1). The general characteristics of these are shown in [Supplementary File, Table S4](#). The vast majority of the assessed CPGs originated from high-income economies (95.6%; $n = 86$), and four were from middle-income countries (4.4%). Most CPGs were from the United States of America (USA) and Germany (42.2%; $n = 38$), which accounted for 22.2% ($n = 20$) and 20.0% ($n = 18$) of the documents, respectively. This was followed by Spain, the United Kingdom, Switzerland (8.9%; $n = 8$ each), Italy (7.8%; $n = 7$), Sweden (6.7%; $n = 6$), China (4.4%; $n = 4$), and Canada (3.3%; $n = 3$). CPGs from Denmark, the

Netherlands, and Ireland were less commonly identified (2.2%; $n = 2$ each). Only 1.1% of the documents were from Australia and France ($n = 1$ each).

Our overall thematic assessment, as shown in [Figure 2](#), revealed a variation in the presentation of CPGs ($n = 90$) as they were published as a consensus report (83.3%; $n = 75$), a CPG (12.2%; $n = 11$), a literature review, or a position statement (2.2%; $n = 2$ each). Most CPGs were supported by empirical evidence synthesized from systematic reviews (68.9%; $n = 62/90$) and traditional literature reviews (12.2%; $n = 11$). In addition, 42.2% ($n = 38/90$) of the CPGs were developed with feedback from panelists, professionals, or clinical experience. However, although all analyzed CPGs mentioned reaching a panel-based consensus for CPG development, none provided details in this regard, and there were no reproducible descriptions of the methods employed for achieving consensus. Concerning the reported approaches to the CPG development process, most did not explicitly describe using any standardized method for CPG development (98.9%; $89/90$). An in-depth analysis of the recommendations, regardless of the presentation of the CPG, showed that there were three types of recommendations: clinical recommendations (78.9%; $n = 71/90$), consensus statements (62%; $n = 56/90$), and recommendations for research (48.9%; $n = 44/90$).

AGREE II general quality scores per clinical practice guidelines are shown in [Table 1](#).²⁵⁻¹¹⁴ The overall summary of the scaled domain quality scores of the 90 CPGs is shown in [Table 2](#). In general, the 6-domain mean score

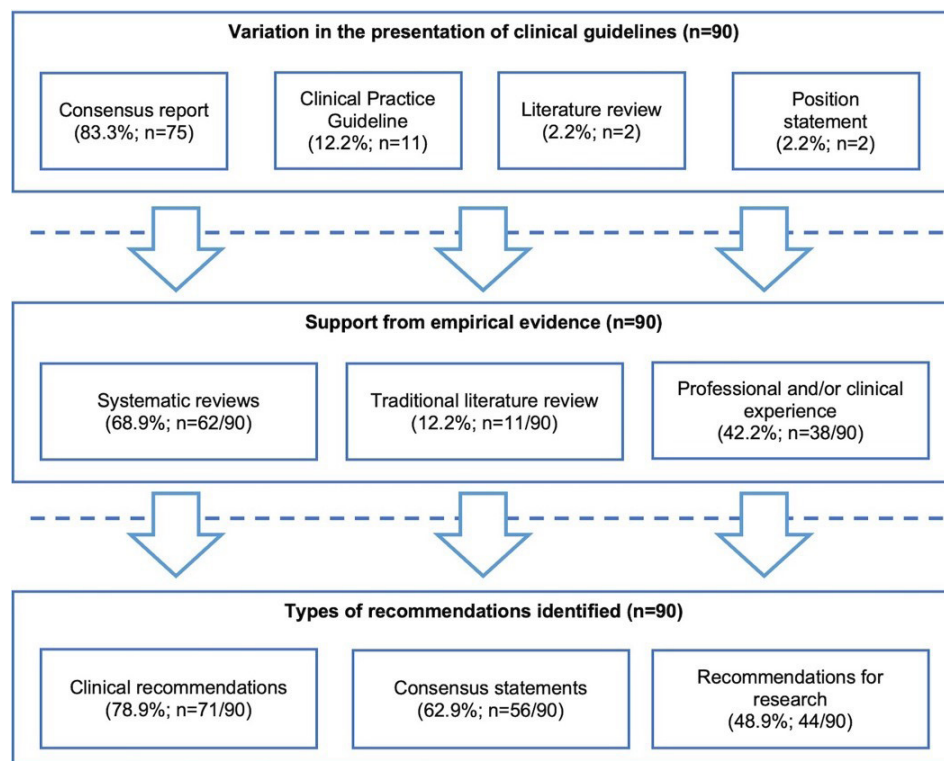


Figure 2. Conceptual model of clinical practice guidelines for implant dentistry developed between January 1, 2000, and July 30, 2020.

(M) of all included CPGs was 4.3% with median (Mdn) and standard deviation (SD) values of 0.8 and 4.5, respectively. In more detail, domain-specific scaled scores revealed that “scope and purpose” ($M=65.3$) and “clarity of presentation” ($M=61.1$) were the domains with the highest scaled scores. However, the “applicability” and “editorial independence” had the lowest scaled domain scores ($M=13.7$ and $M=46.6$, respectively). The mean overall CPG assessment score was 4.3 ($Mdn=4.5$; $SD=0.8$).²⁵⁻¹¹⁴

A more detailed analysis concerning the scaled mean (M), median (Mdn), and standard deviation (SD) scores (Table 2) and the distribution of ranges of scaled scores per AGREE II domains (Table 3) revealed that the mean score for the scope and purpose domain was the highest among all six domains ($M=65.3$; $Mdn=16.0$). However, this domain was also the one with the highest variation ($SD=65.3$), with minimum and maximum scores of 11.1 and 95.8, respectively (Table 3). Most scores under this domain ranged between 41.0 and 70.9 (55.6%; $n=50$). The second domain with the highest score concerned the clarity of presentation ($M=61.1$; $Mdn=16.8$) of CPGs, which also showed a wide degree of variation ($SD=65.3$). Most scores under this domain ranged between 41.0 and 70.9 (56.7%; $n=51$). The stakeholder involvement domain ranked third among all six domains ($M=48.2$; $Mdn=14.0$; $SD=48.6$). Most scores under this domain ranged between 41.0 and 70.9 (66.6%; $n=60$). This was followed by the rigor of development ($M=47.8$; $Mdn=14.4$; $SD=46.1$) and the editorial independence

($M=46.6$; $Mdn=26.4$; $SD=52.1$) domains. Most scores under these also ranged between 0.0 and 40.9, which accounted for 57.8% ($n=52$) and 43.3% ($n=39$), respectively. The applicability domain received the lowest ranking among all six domains ($M=13.6$; $Mdn=11.6$). However, it exhibited the least variation ($SD=12.0$). The vast majority of scaled scores under this domain ranged between 00.0 and 40.9 (97.8.7%; $n=88$).

Discussion

In this study, we assessed the quality of 90 CPGs related to implant dentistry over two decades. Our findings demonstrated a significant variation in CPGs both in the literature and within the national and international dental associations investigated (Figure 2). The sources considered to provide an evidence base to support its development also varied. In addition, although CPGs are usually considered a tool to support decision-making in the clinical area, our findings demonstrated that CPGs were also used to issue position statements or provide recommendations for research. Consequently, their practical applicability for guiding clinical dental care appears limited, as highlighted by our AGREE II quality appraisal analysis

In a comparison with earlier studies, Faggion et al found that guidelines published in six journals focused on implant dentistry had low median scaled scores. Specifically, the scores for applicability, rigor of development, stakeholder involvement, and editorial independence were all below 50%.¹⁹ Most available

Table 1. AGREE II general quality scores per clinical practice guideline

Reference	Main author	Year	1. Scope and purpose	2. Stakeholder involvement	3. Rigor of development	4. Clarity of presentation	5. Applicability	6. Editorial independence	Overall mean score
25	Iacono VJ et al	2000	52.8	11.1	26.6	30.6	4.2	4.2	3.3
26	Cawood JJ et al	2000	58.3	40.3	33.9	59.7	2.1	12.5	3.5
27	White SC et al	2001	72.2	48.6	56.8	66.7	22.9	27.1	4.0
28	Harris D et al	2002	58.3	55.6	38.0	72.2	25.0	52.1	4.8
29	Feine JS et al	2002	54.2	50.0	25.5	68.1	16.7	52.1	3.8
30	Aparicio C et al	2003	58.3	40.3	29.2	40.3	11.5	22.9	4.0
31	Misch CE et al	2005	45.8	43.1	28.6	20.8	5.2	60.4	3.0
32	Misch CE et al	2006	47.2	47.2	26.6	66.7	19.8	45.8	3.8
33	Hobkirk JA et al	2006	50.0	29.2	37.0	44.4	9.4	20.8	4.0
34	Handelsman M et al	2006	36.1	16.7	30.7	51.4	4.2	4.2	3.3
35	Neukam FW et al	2006	41.7	18.1	41.7	23.6	0.0	10.4	3.5
36	Klinge B et al	2006	37.5	22.2	50.5	44.4	2.1	4.2	3.5
37	Zöllner A et al	2007	43.1	25.0	33.3	19.4	0.0	4.2	2.5
38	Tonetti MS et al	2008	56.9	37.5	50.0	30.6	4.2	79.2	3.5
39	Misch CE et al	2008	75.0	61.1	38.5	50.0	16.7	18.8	3.3
40	Gotfredsen K et al	2008	75.0	54.2	60.9	73.6	0.0	47.9	4.8
41	Lindhe J et al	2008	43.1	40.3	36.5	77.8	18.8	100.0	4.5
42	Palmer RM et al	2008	58.3	33.3	48.4	56.9	8.3	85.4	4.8
43	Jokstad A et al	2007	47.2	45.8	44.3	47.2	0.0	10.4	3.8
44	Thomason JM et al	2009	68.1	55.6	31.3	34.7	16.7	20.8	3.5
45	Lang NP et al	2011	40.3	31.9	26.6	23.6	0.0	79.2	3.3
46	Gotfredsen K et al	2012	77.8	50.0	60.4	76.4	5.2	52.1	5.0
47	Tonetti M et al	2012	69.4	44.4	58.3	47.2	30.2	89.6	4.0
48	Albrektsson T et al	2012	65.3	45.8	58.3	56.9	29.2	68.8	4.0
49	Sanz M et al	2012	52.8	25.0	39.1	45.8	16.7	70.8	3.8
50	Benavides E et al	2012	55.6	55.6	40.6	65.3	16.7	31.3	3.8
51	Tyndall DA et al	2012	66.7	59.7	33.9	77.8	15.6	27.1	4.5
52	Harris D et al	2012	79.2	62.5	40.6	70.8	28.1	64.6	5.0
53	Lang NP et al	2012	48.6	51.4	44.3	37.5	13.5	85.4	3.8
54	Klinge B et al	2012	54.2	31.9	35.9	66.7	12.5	72.9	4.3
55	Testori T et al	2012	69.4	56.9	40.6	62.5	0.0	4.2	4.5
56	Albrektsson T et al	2012	11.1	37.5	20.3	34.7	0.0	4.2	2.5
57	Johal A et al	2013	84.7	51.4	49.5	72.2	14.6	58.3	4.5
58	Bornstein MM et al	2014	44.4	33.3	38.0	59.7	12.5	62.5	4.3
59	Schwarz F et al	2014	76.4	55.6	55.2	75.0	11.5	70.8	4.5
60	Tonetti MS et al	2014	61.1	54.2	55.7	61.1	19.8	81.3	3.0
61	Hämmerle CH et al	2014	59.7	37.5	32.3	27.8	0.0	60.4	3.8
62	Machuca-Portillo G et al	2014	73.6	22.2	32.3	59.7	8.3	18.8	4.0
63	Alani A et al	2014	65.3	51.4	24.5	58.3	13.5	8.3	3.5
64	Wismeijer D et al	2014	59.7	54.2	42.7	77.8	6.3	50.0	4.5
65	Gallucci GO et al	2014	70.8	59.7	68.2	83.3	11.5	50.0	5.3
66	No authors listed	2014	52.8	33.3	33.9	58.3	19.8	45.8	3.8
67	Canullo L et al	2015	79.2	30.6	64.6	61.1	0.0	50.0	3.8
68	Jepsen S et al	2015	84.7	47.2	53.1	75.0	26.0	72.9	4.8
69	Klinge B et al	2015	86.1	76.4	65.1	65.3	31.3	41.7	3.8
70	Sanz M et al	2015	76.4	48.6	58.9	69.4	16.7	70.8	5.3

Table 1. Continued.

Reference	Main author	Year	1. Scope and purpose	2. Stakeholder involvement	3. Rigor of development	4. Clarity of presentation	5. Applicability	6. Editorial independence	Overall mean score
71	Sicilia A et.al.	2015	65.3	51.4	54.2	65.3	4.2	16.7	5.0
72	Hämmerle CH et al	2015	59.7	52.8	46.4	70.8	6.3	22.9	5.0
73	Dula K et al	2015	34.7	44.4	37.5	58.3	7.3	10.4	3.5
74	Schwarz F et al	2016	80.6	56.9	40.1	72.2	27.1	35.4	4.5
75	Bidra AS et al	2016	94.4	77.8	70.8	91.7	57.3	72.9	6.0
76	Schwarz F et. al	2016	87.5	62.5	45.8	79.2	22.9	62.5	5.0
77	Butterworth C et al	2016	63.9	36.1	26.0	51.4	8.3	6.3	3.0
78	Alsahhaf A et al	2016	69.4	44.4	34.4	54.2	16.7	47.9	4.5
79	Stacchi C et al	2016	69.4	52.8	78.1	68.1	5.2	52.1	5.5
80	Suárez-López F et al	2016	69.4	54.2	72.4	65.3	6.3	52.1	4.8
81	Tözüm TF et al	2016	59.7	51.4	70.3	61.1	3.1	52.1	4.5
82	Albrektsson T et al	2016	72.2	44.4	44.3	43.1	0.0	16.7	3.8
83	No authors listed	2016	47.2	48.6	57.3	70.8	22.9	16.7	4.8
84	Aghaloo TL et al	2016	95.8	43.1	68.2	66.7	37.5	79.2	5.5
85	No authors listed	2016	83.3	43.1	49.5	62.5	27.1	68.8	5.0
86	No authors listed	2016	65.3	31.9	39.6	47.2	14.6	39.6	3.8
87	No authors listed	2016	86.1	56.9	65.1	76.4	47.9	87.5	6.0
88	No authors listed	2016	84.7	59.7	32.8	73.6	16.7	58.3	4.5
89	Yuan Q et al	2017	76.4	48.6	24.0	47.2	17.7	31.3	4.0
90	Tallarico M et al	2018	77.8	68.1	68.2	65.3	12.5	64.6	5.8
91	Morton D et al	2018	87.5	63.9	55.7	90.3	32.3	62.5	5.0
92	Jung RE et al	2018	90.3	81.9	60.4	87.5	35.4	31.3	5.3
93	Feine J et al	2018	84.7	93.1	59.9	87.5	20.8	68.8	4.8
94	Hämmerle CHF et al	2018	86.1	62.5	58.3	80.6	26.0	22.9	4.5
95	Schliephake H et al	2018	83.3	52.8	57.8	76.4	27.1	29.2	5.0
96	Sanz M et al	2018	81.9	79.2	56.3	70.8	32.3	20.8	4.5
97	Berglundh T et al	2018	73.6	54.2	53.6	56.9	12.5	85.4	4.3
98	Giannobile WV et al	2018	79.2	58.3	64.1	69.4	11.5	66.7	5.5
99	Heitz-Mayfield LJ et al	2018	79.2	48.6	74.5	76.4	8.3	12.5	6.0
100	Jung RE et al	2018	75.0	47.2	70.8	72.2	7.3	60.4	5.8
101	Schwarz F et al	2018	62.5	50.0	58.3	73.6	0.0	62.5	4.5
102	Wismeijer D et al	2018	62.5	55.6	70.3	87.5	10.4	18.8	5.8
103	Van Assche N et al	2018	29.2	45.8	34.4	41.7	10.4	18.8	3.0
104	Galindo-Moreno P et al	2019	54.2	44.4	45.8	58.3	3.1	52.1	3.8
105	Renvert S et al	2019	65.3	44.4	28.6	70.8	16.7	58.3	4.5
106	Jepsen S et al	2019	70.8	55.6	63.5	72.2	19.8	77.1	5.0
107	Sanz M et al	2019	63.9	55.6	56.8	50.0	8.3	66.7	4.5
108	Tonetti MS et al	2019	81.9	72.2	59.9	80.6	28.1	87.5	6.0
109	Giovannoli JL et al	2019	58.3	44.4	57.3	61.1	3.1	58.3	4.5
110	Khoury F et al	2019	58.3	43.1	44.8	63.9	6.3	64.6	4.5
111	Meyle J et al	2019	52.8	40.3	50.0	47.2	0.0	60.4	4.0
112	Schwarz F et al	2019	69.4	58.3	66.7	69.4	0.0	60.4	4.5
113	American College of Prosthodontists	2019	72.2	30.6	41.1	80.6	0.0	4.2	4.8
114	Del Amo FSL et al	2020	65.3	47.2	45.8	37.5	1.0	79.2	3.3

Table 2. Scaled domain scores of 90 clinical practice guidelines in implant dentistry.

Domain	Scaled mean score (M)	Scaled median score (Mdn)	Standard deviation scaled scores (SD)	Range of scaled scores	
				Minimum	Maximum
1. Scope and purpose	65.3	16.0	65.3	11.1	95.8
2. Stakeholder involvement	48.2	14.4	48.6	11.1	93.1
3. Rigor of development	47.8	14.4	46.1	20.3	78.1
4. Clarity of presentation	61.1	16.8	65.3	19.4	91.7
5. Applicability	13.7	11.6	12.0	0.0	72.9
6. Editorial independence	46.6	26.4	52.1	4.2	86.6
Overall guide assessment*	4.3*	4.5*	0.8*	2.5*	6.0*

* These values are presented as a general, non-scaled summary of the four reviewers

Table 3. Distribution of ranges of scaled scores per AGREE II domains.

Range of scores	Domain 1. Scope and purpose			Domain 2. Stakeholder involvement			Domain 3. Rigor of development			Domain 4. Clarity of presentation			Domain 5. Applicability			Domain 6. Editorial independence		
	n	%	Ref	n	%	Ref	n	%	Ref	n	%	Ref	n	%	Ref	n	%	Ref
0.0 - 40.9	6	6.7	34,36,45,56,73,103	24	26.7	25,26,30,33-38,41,42,45,49,54,56,58,61,62,66,67,77,86,111,113	35	38.9	25,26,28-34,37,39,41,44,45,49-52,54-56,58,61-63,66,73,74,77,78,86,88,89,103,105	12	13.3	25,30,31,35,37,38,44,45,53,56,61,114	88	97.8	25-74,76-86,88-114	35	38.9	25-27,30,33-37,39,43,44,50,51,55,56,62,63,71-74,77,82,83,86,89,92,94-96,99,102,103,113
41.0 - 70.9	50	55.6	26,28-33,35,37,38,41,42,44,47-51,53-55,58,60,61,63-66,71,72,77,78,80,81,83,86,101,102,104-107,109-112,114	60	66.7	27-29,31,32,39,40,43,44,46-48,50-53,55,57,59,60,63-65,68,70-74,76,78-85,87-91,94,95,97-107,109,110,112,114	52	57.8	27,35,36,38,40,42,43,46-48,53,57,59,60,64,65,67-72,81-85,87,90-98,100-102,104,106-114	51	56.7	58,60,62,63,66,67,69-73,77-86,89,90,96-98,103-105,107,109-112	2	2.2	75,87	39	43.3	28,29,31,32,40,46,48,49,52,57-59,61,64-67,69,70,76,78-81,85,88,90,91,93,98,100,101,104,105,107,109-112
71.0 - 100	34	37.8	27,39,40,46,52,57,59,62,67-70,74-76,82,84,85,87-100,108,113	6	6.7	69,75,92,93,96,108	3	3.3	(79,80,99)	27	30.0	(28,40,41,46,51,57,59,64,65,68,74-76,87,88,91-95,99-102,106,108)	0	0.0	---	16	17.8	38,41,42,45,47,53,54,60,68,75,84,87,97,106,108,114
Total	90	100		90	100		90	100		90	100		90	100		90	100	

guidelines did not explicitly outline specific clinical questions regarding their scope and purpose. This can be attributed, in part, to how CPG development was conceptualized. The primary objective of CPGs is to provide general dental practitioners and specialists with guidance to decide on an adequate clinical approach to treat their patients.⁷ Therefore, the questions that guide CPG development should provide conceptual guidance to assist this process. Yet, our analysis showed different types of recommendations (Figure 2). Although most CPGs

provided clinical recommendations (78.9%), consensus statements (or position statements) about a topic and recommendations for research were also presented. In contrast to clinical practice recommendations, consensus statements represent opinions on various domains, which may or may not provide clinical guidance, and their development is subject to minimal methodological requirements.¹¹⁵

According to the Institute of Medicine (IOM) report, developing reliable guidelines requires input from a panel

of experts across various disciplines and integration of patients' values and preferences.¹¹⁶ This latter aspect can be crucial for successful guideline development and implementation.¹¹⁷ Nonetheless, although our results positioned the stakeholder involvement domain among those with the highest scaled scores (Table 3), the results were highly variable. This can be attributed to a general lack of explicit and detailed descriptions in all CPGs, which fail to inform the features of stakeholders involved in the guideline development process. Stakeholders are defined as "any individual or group who is responsible for or affected by health- and healthcare-related decisions that can be informed by research evidence".¹¹⁸ They comprise healthcare professionals, faculties, researchers, and policymakers, as well as patients and the general public. As indicated in the AGREE II tool, the reviewers in this study explored authors' lists, acknowledgments, and appendices to understand the composition of the guideline development groups²⁴. In this process, we observed that only four CPGs were from middle-income countries (4.4%), and official consultations with patients or representatives of this group were not sought. As Guerra-Farfan et al. (2022) pointed out, variations in patient values, perspectives, and experiences can lead to diverse recommendations, and evidence alone is not sufficient for making conclusions¹¹⁹; this can limit the applicability of the statements. Therefore, as multiple-stakeholder engagement can improve healthcare outcomes,¹¹⁷ shared solutions and priorities established by patients, healthcare professionals, researchers, and academics are needed.

To provide recommendations and ensure their replicability and updates, the process of collecting, evaluating, and synthesizing the available evidence must also be documented. In this context, our evaluation of the rigor and development domain indicated that most CPGs were supported by empirical evidence derived from systematic reviews, and most did not provide a description of the process. Moreover, health benefits, side effects, and potential risks were commonly overlooked. The unsatisfactory scores in this domain can be attributed to the insufficient details provided to assess this information. Low scores may be related to how GCPs were conceptualized, as this can affect the research questions that guided their development (scope and purpose domain). As a result, the lack of standardization and reporting of CPGs development can lead to a perception of insufficient methodological trustworthiness.¹¹⁹ This problem is not specific to dentistry. Lunney et al. (2020) assessed the processes used to synthesize the evidence in randomly selected CPGs in medicine. They found that over half of the CPGs employed non-systematic methods to formulate their recommendations.¹²⁰ Therefore, it would be prudent to foster collaboration among researchers and professionals involved in guideline development based on standardized methods such as those described in SIGN,

NICE¹³, and NHMRC¹⁴ guidelines.

Clinical practice recommendations must be clear and robust to support clinicians in their decision-making. In our assessment, clarity of presentation ranked second-highest but varied among CPGs. This can be attributed to the non-standardized format in which the recommendations were presented. This resulted in a) structured (with clear subheadings) recommendations and b) unstructured narrative recommendations. The latter presented a challenge to the reviewers in discerning key recommendations from a general update on a given topic. In addition to improving the methodological robustness of guideline development, clinicians should be able to critically assess guidelines and decide if these apply to their settings and patients. The guidelines developed by Brignardello et al. (2021) perfectly fulfil this requirement.¹²¹ This is particularly noteworthy as our findings showed the limited applicability of the CPGs. In this domain (applicability), most guidelines failed to provide clear guidance to support decision-making in clinical procedures. This can potentially limit adherence to their recommendations. Compliance with CPGs is also affected by various barriers related to patients, clinicians, and the organizations that provide oral healthcare.¹²² For instance, patients' financial status may affect their needs and preferences, which may differ from what a CPG recommends. Consequently, clinicians may need to adapt their treatment to meet these preferences.¹¹⁹ Moreover, published studies have reported that, from the clinicians' perspective, CPGs are often regarded as either too time-consuming to consult or not sufficiently trustworthy.^{3,119,122} Therefore, strategies for improving compliance should also consider improving the applicability of CPGs through standardized methods and considering the patients' individual preferences in this process. Other strategies to consider include advocating among the professional community (supported by national dental associations, universities, and researchers) to disseminate CPGs as an aid to support their decision-making in clinical practice. Guideline development should include transparent information about editorial independence to enhance the overall trustworthiness perceived by clinicians, stakeholders, and the public.

Strengths and limitations

Scoping reviews are highly recommended for investigating broad areas of research, especially in fields that are currently underexplored.^{20,21} We implemented a thorough search strategy and also explored the webpages of National Dental Associations to include any clinical practice guidelines that may have been overlooked in the research databases reviewed in our study. Although this method allowed us to retrieve various clinical guidelines, their quality varied significantly. In our analysis, we identified a deficiency in standardization in the reporting of the

process for developing a clinical practice guideline (CPG). As planned, we employed the AGREE II methodology to score and report their quality.²⁴ This standardized approach was further strengthened by scoring the clinical practice guidelines by four researchers (A.B., P.H.M., Ö.K.M. and E.C.E.). Additionally, since the AGREE II user manual does not provide a cut-off to determine the quality level of CPGs, we decided to present a description of the range of scaled scores (Table 3) to support the discussion of our results. Nevertheless, this quality appraisal tool assesses the robustness of the methods used to develop and report a CPG, which has been used in dentistry to evaluate different parameters. These parameters may include the quality of CPGs concerning antenatal oral healthcare,¹⁵ orthodontics, or COVID-19-related recommendations in the dental office.¹⁶⁻¹⁸

Conclusion

CPGs are statements that aim to support clinical decision-making to improve patient outcomes and the quality of the processes of care. Our findings demonstrated variations in how CPGs have been conceptualized over a period of two decades, and highlighted variations in each of the six AGREE II quality dimensions. Among these quality dimensions, “applicability” and “editorial independence” received the lowest scores on the scale. This indicates that organized efforts to improve guideline development by employing available standardized and robust methods are pivotal. In this process, the role of patients or their representatives as stakeholders is critical to ensure that CPGs meet their values and needs. Moreover, the dissemination of CPGs should be supported by dentistry organizations and all stakeholders, including national dental associations, universities, patient groups, and researchers.

Acknowledgments

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Authors' Contribution

Conceptualization: Eduardo Enseldo-Carrasco, Nermin Tarhan.

Data curation: Eduardo Enseldo-Carrasco.

Investigation: Eduardo Enseldo-Carrasco, Buket Acar, Hanife Merva Parlak, Meltem Özdemir Kabalak.

Formal analysis: Eduardo Enseldo-Carrasco.

Methodology: Nermin Tarhan, Buket Acar, Hanife Merva Parlak, Meltem Özdemir Kabalak.

Project administration: Nermin Tarhan, Buket Acar, Hanife Merva Parlak, Meltem Özdemir Kabalak.

Supervision: Nermin Tarhan.

Writing-original draft: Eduardo Enseldo-Carrasco.

Writing-review & editing: Eduardo Enseldo-Carrasco, Nermin Tarhan, Buket Acar, Hanife Merva Parlak, Meltem Özdemir Kabalak.

Competing Interests

The authors declare that they have no conflict of interest.

Data Availability Statement

The data that support the findings of this study are available from

the corresponding author upon reasonable request. The data are not publicly available due to privacy or ethical restrictions.

Ethical Approval

Ethics committee approval was not necessary for the present study since the study was an online archive search.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Supplementary Files

Supplementary file contains Table S1-S4.

References

- Slawomirski L, Auraen A, Klazinga NS. The Economics of Patient Safety: Strengthening a Value-Based Approach to Reducing Patient Harm at National Level. Paris: OECD Publishing; 2017.
- World Health Organization (WHO). Quality of Care: Patient Safety (WHA55.18). WHO; 2012. Available from: https://apps.who.int/gb/archive/pdf_files/WHA55/ewha5518.pdf. Accessed April 6, 2023.
- Kishore M, Panat SR, Aggarwal A, Agarwal N, Upadhyay N, Alok A. Evidence based dental care: integrating clinical expertise with systematic research. J Clin Diagn Res. 2014;8(2):259-62. doi: 10.7860/jcdr/2014/6595.4076.
- Sadaf D. How to apply evidence-based principles in clinical dentistry. J Multidiscip Healthc. 2019;12:131-6. doi: 10.2147/jmdh.S189484.
- World Dental Federation. Evidence-Based Dentistry (EBD). 2016. Available from: <https://www.fdiworlddental.org/evidence-based-dentistry-ebd>. Accessed April 6, 2023.
- Elangovan S, Guzman-Armstrong S, Marshall TA, Johnsen DC. Clinical decision making in the era of evidence-based dentistry. J Am Dent Assoc. 2018;149(9):745-7. doi: 10.1016/j.adaj.2018.06.001.
- Kredo T, Bernhardsson S, Machingaidze S, Young T, Louw Q, Ochodo E, et al. Guide to clinical practice guidelines: the current state of play. Int J Qual Health Care. 2016;28(1):122-8. doi: 10.1093/intqhc/mzv115.
- Brouwers MC, Florez ID, McNair SA, Vella ET, Yao X. Clinical practice guidelines: tools to support high quality patient care. Semin Nucl Med. 2019;49(2):145-52. doi: 10.1053/j.semnuclmed.2018.11.001.
- Dizon JM, Machingaidze S, Grimmer K. To adopt, to adapt, or to contextualise? The big question in clinical practice guideline development. BMC Res Notes. 2016;9(1):442. doi: 10.1186/s13104-016-2244-7.
- Setkowski K, Boogert K, Hoogendoorn AW, Gilissen R, van Balkom A. Guidelines improve patient outcomes in specialised mental health care: a systematic review and meta-analysis. Acta Psychiatr Scand. 2021;144(3):246-58. doi: 10.1111/acps.13332.
- McGuirk B, King W, Govind J, Lowry J, Bogduk N. Safety, efficacy, and cost effectiveness of evidence-based guidelines for the management of acute low back pain in primary care. Spine (Phila Pa 1976). 2001;26(23):2615-22. doi: 10.1097/00007632-200112010-00017.
- Armstrong JJ, Goldfarb AM, Instrum RS, MacDermid JC. Improvement evident but still necessary in clinical practice guideline quality: a systematic review. J Clin Epidemiol. 2017;81:13-21. doi: 10.1016/j.jclinepi.2016.08.005.
- National Institute for Health and Care Excellence (NICE). Developing NICE Guidelines: The Manual. London: NICE; 2015. Available from: <https://www.nice.org.uk/process/>

- pmg20/resources/developing-nice-guidelines-the-manual-pdf-72286708700869.
14. National Health and Medical Research Council (NHMRC). Summary for Developers: Procedures and Requirements for Meeting the 2011 NHMRC Standard for Clinical Practice Guidelines. NHMRC; 2011. Available from: <https://www.nhmrc.gov.au/about-us/publications/meeting-2011-nhmrc-standard-clinical-practice-guidelines>. Accessed April 6, 2023.
15. Wilson A, Hoang H, Bridgman H, Crocombe L, Bettiol S. Clinical practice guidelines and consensus statements for antenatal oral healthcare: an assessment of their methodological quality and content of recommendations. *PLoS One*. 2022;17(2):e0263444. doi: [10.1371/journal.pone.0263444](https://doi.org/10.1371/journal.pone.0263444).
16. Arieta-Miranda J, Alcaychahua AS, Santos GP, Sevillano MC, Verástegui RL, Victorio DB, et al. Quality assessment of clinical practice guidelines for the management of paediatric dental emergencies applicable to the COVID-19 pandemic, using the AGREE II instrument. A systematic review. *Heliyon*. 2020;6(12):e05612. doi: [10.1016/j.heliyon.2020.e05612](https://doi.org/10.1016/j.heliyon.2020.e05612).
17. Soares RC, Rocha JS, da Rosa SV, da Silva Noll Gonçalves JR, Condori PL, Ribeiro AE, et al. Quality of biosafety guidelines for dental clinical practice throughout the world in the early COVID-19 pandemic: a systematic review. *Epidemiol Health*. 2021;43:e2021089. doi: [10.4178/epih.e2021089](https://doi.org/10.4178/epih.e2021089).
18. Deana NF, Zaror C, Seiffert A, Aravena-Rivas Y, Muñoz-Millán P, Espinoza-Espinoza G, et al. Quality appraisal of clinical practice guidelines on provision of dental services during the first months of the COVID-19 pandemic. *J Evid Based Dent Pract*. 2021;21(4):101633. doi: [10.1016/j.jebdp.2021.101633](https://doi.org/10.1016/j.jebdp.2021.101633).
19. Faggion CM Jr, Apaza K, Ariza-Fritas T, Málaga L, Giannakopoulos NN, Alarcón MA. Methodological quality of consensus guidelines in implant dentistry. *PLoS One*. 2017;12(1):e0170262. doi: [10.1371/journal.pone.0170262](https://doi.org/10.1371/journal.pone.0170262).
20. Arksey H, O'Malley L. Scoping studies: towards a methodological framework. *Int J Soc Res Methodol*. 2005;8(1):19-32. doi: [10.1080/1364557032000119616](https://doi.org/10.1080/1364557032000119616).
21. Levac D, Colquhoun H, O'Brien KK. Scoping studies: advancing the methodology. *Implement Sci*. 2010;5:69. doi: [10.1186/1748-5908-5-69](https://doi.org/10.1186/1748-5908-5-69).
22. Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. *Ann Intern Med*. 2018;169(7):467-73. doi: [10.7326/m18-0850](https://doi.org/10.7326/m18-0850).
23. The World Bank. World Bank Country and Lending Groups. 2020. Available from: <https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups>. Accessed April 6, 2023.
24. Brouwers MC, Kerkvliet K, Spithoff K. The AGREE reporting checklist: a tool to improve reporting of clinical practice guidelines. *BMJ*. 2016;352:i1152. doi: [10.1136/bmj.i1152](https://doi.org/10.1136/bmj.i1152).
25. Iacono VJ. Dental implants in periodontal therapy. *J Periodontol*. 2000;71(12):1934-42. doi: [10.1902/jop.2000.71.12.1934](https://doi.org/10.1902/jop.2000.71.12.1934).
26. Cawood JI, Stoelinga PJ. International research group on reconstructive preprosthetic surgery. Consensus report. *Int J Oral Maxillofac Surg*. 2000;29(3):159-62. doi: [10.1034/j.1399-0020.2000.290301.x](https://doi.org/10.1034/j.1399-0020.2000.290301.x).
27. White SC, Heslop EW, Hollender LG, Mosier KM, Ruprecht A, Shroot MK. Parameters of radiologic care: an official report of the American Academy of Oral and Maxillofacial Radiology. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2001;91(5):498-511. doi: [10.1067/moe.2001.114380](https://doi.org/10.1067/moe.2001.114380).
28. Harris D, Buser D, Dula K, Grondahl K, Haris D, Jacobs R, et al. E.A.O. guidelines for the use of diagnostic imaging in implant dentistry. A consensus workshop organized by the European Association for Osseointegration in Trinity College Dublin. *Clin Oral Implants Res*. 2002;13(5):566-70. doi: [10.1034/j.1600-0501.2002.130518.x](https://doi.org/10.1034/j.1600-0501.2002.130518.x).
29. Feine JS, Carlsson GE, Awad MA, Chehade A, Duncan WJ, Gizani S, et al. The McGill consensus statement on overdentures. Mandibular two-implant overdentures as first choice standard of care for edentulous patients. *Gerodontology*. 2002;19(1):3-4. doi: [10.1111/j.1741-2358.2002.00003.x](https://doi.org/10.1111/j.1741-2358.2002.00003.x).
30. Aparicio C, Rangert B, Sennerby L. Immediate/early loading of dental implants: a report from the Sociedad Española de Implantes World Congress consensus meeting in Barcelona, Spain, 2002. *Clin Implant Dent Relat Res*. 2003;5(1):57-60. doi: [10.1111/j.1708-8208.2003.tb00183.x](https://doi.org/10.1111/j.1708-8208.2003.tb00183.x).
31. Misch CE, Goodacre CJ, Finley JM, Misch CM, Marinbach M, Dabrowsky T, et al. Consensus conference panel report: crown-height space guidelines for implant dentistry-part 1. *Implant Dent*. 2005;14(4):312-8. doi: [10.1097/01.id.0000188375.76066.23](https://doi.org/10.1097/01.id.0000188375.76066.23).
32. Misch CE, Goodacre CJ, Finley JM, Misch CM, Marinbach M, Dabrowsky T, et al. Consensus conference panel report: crown-height space guidelines for implant dentistry-part 2. *Implant Dent*. 2006;15(2):113-21. doi: [10.1097/01.id.0000217907.18396.18](https://doi.org/10.1097/01.id.0000217907.18396.18).
33. Hobkirk JA, Wiskott HW. Biomechanical aspects of oral implants. Consensus report of working group 1. *Clin Oral Implants Res*. 2006;17 Suppl 2:52-4. doi: [10.1111/j.1600-0501.2006.01358.x](https://doi.org/10.1111/j.1600-0501.2006.01358.x).
34. Handelsman M. Surgical guidelines for dental implant placement. *Br Dent J*. 2006;201(3):139-52. doi: [10.1038/sj.bdj.4813947](https://doi.org/10.1038/sj.bdj.4813947).
35. Neukam FW, Flemmig TF. Local and systemic conditions potentially compromising osseointegration. Consensus report of working group 3. *Clin Oral Implants Res*. 2006;17 Suppl 2:160-2. doi: [10.1111/j.1600-0501.2006.01359.x](https://doi.org/10.1111/j.1600-0501.2006.01359.x).
36. Klinge B, Meyle J. Soft-tissue integration of implants. Consensus report of working group 2. *Clin Oral Implants Res*. 2006;17 Suppl 2:93-6. doi: [10.1111/j.1600-0501.2006.001366.x](https://doi.org/10.1111/j.1600-0501.2006.001366.x).
37. Zöllner A, Belser U. Factors influencing survival of reconstructions. Consensus report of working group 2. *Clin Oral Implants Res*. 2007;18 Suppl 3:114-6. doi: [10.1111/j.1600-0501.2007.01440.x](https://doi.org/10.1111/j.1600-0501.2007.01440.x).
38. Tonetti MS, Hämmerle CH. Advances in bone augmentation to enable dental implant placement: consensus report of the Sixth European workshop on periodontology. *J Clin Periodontol*. 2008;35(8 Suppl):168-72. doi: [10.1111/j.1600-051X.2008.01268.x](https://doi.org/10.1111/j.1600-051X.2008.01268.x).
39. Misch CE, Perel ML, Wang HL, Sammartino G, Galindo-Moreno P, Trisi P, et al. Implant success, survival, and failure: the International Congress of Oral Implantologists (ICOI) Pisa consensus conference. *Implant Dent*. 2008;17(1):5-15. doi: [10.1097/ID.0b013e3181676059](https://doi.org/10.1097/ID.0b013e3181676059).
40. Gotfredsen K, Carlsson GE, Jøstad A, Arvidson Fyrberg K, Berge M, Bergendal B, et al. Implants and/or teeth: consensus statements and recommendations. *J Oral Rehabil*. 2008;35 Suppl 1:2-8. doi: [10.1111/j.1365-2842.2007.01833.x](https://doi.org/10.1111/j.1365-2842.2007.01833.x).
41. Lindhe J, Meyle J. Peri-implant diseases: consensus report of the Sixth European workshop on periodontology. *J Clin Periodontol*. 2008;35(8 Suppl):282-5. doi: [10.1111/j.1600-051X.2008.01283.x](https://doi.org/10.1111/j.1600-051X.2008.01283.x).
42. Palmer RM, Cortellini P. Periodontal tissue engineering and regeneration: consensus report of the Sixth European workshop on periodontology. *J Clin Periodontol*. 2008;35(8 Suppl):83-6. doi: [10.1111/j.1600-051X.2008.01262.x](https://doi.org/10.1111/j.1600-051X.2008.01262.x).
43. Jøstad A, Türp JC. Function. Consensus report of working group 3. *Clin Oral Implants Res*. 2007;18 Suppl 3:189-92.

- doi: [10.1111/j.1600-0501.2007.01441.x](https://doi.org/10.1111/j.1600-0501.2007.01441.x).
44. Thomason JM, Feine J, Exley C, Moynihan P, Müller F, Naert I, et al. Mandibular two implant-supported overdentures as the first choice standard of care for edentulous patients--the York consensus statement. *Br Dent J*. 2009;207(4):185-6. doi: [10.1038/sj.bdj.2009.728](https://doi.org/10.1038/sj.bdj.2009.728).
 45. Lang NP, Berglundh T. Peri-implant diseases: where are we now?--Consensus of the Seventh European workshop on periodontology. *J Clin Periodontol*. 2011;38 Suppl 11:178-81. doi: [10.1111/j.1600-051X.2010.01674.x](https://doi.org/10.1111/j.1600-051X.2010.01674.x).
 46. Gotfredsen K, Wiskott A. Consensus report - reconstructions on implants. The Third EAO consensus conference 2012. *Clin Oral Implants Res*. 2012;23 Suppl 6:238-41. doi: [10.1111/j.1600-0501.2012.02549.x](https://doi.org/10.1111/j.1600-0501.2012.02549.x).
 47. Tonetti M, Palmer R. Clinical research in implant dentistry: study design, reporting and outcome measurements: consensus report of working group 2 of the VIII European workshop on periodontology. *J Clin Periodontol*. 2012;39 Suppl 12:73-80. doi: [10.1111/j.1600-051X.2011.01843.x](https://doi.org/10.1111/j.1600-051X.2011.01843.x).
 48. Albrektsson T, Donos N. Implant survival and complications. The Third EAO consensus conference 2012. *Clin Oral Implants Res*. 2012;23 Suppl 6:63-5. doi: [10.1111/j.1600-0501.2012.02557.x](https://doi.org/10.1111/j.1600-0501.2012.02557.x).
 49. Sanz M, Chapple IL. Clinical research on peri-implant diseases: consensus report of working group 4. *J Clin Periodontol*. 2012;39 Suppl 12:202-6. doi: [10.1111/j.1600-051X.2011.01837.x](https://doi.org/10.1111/j.1600-051X.2011.01837.x).
 50. Benavides E, Rios HF, Ganz SD, An CH, Resnik R, Reardon GT, et al. Use of cone beam computed tomography in implant dentistry: the International Congress of Oral Implantologists consensus report. *Implant Dent*. 2012;21(2):78-86. doi: [10.1097/ID.0b013e31824885b5](https://doi.org/10.1097/ID.0b013e31824885b5).
 51. Tyndall DA, Price JB, Tetradis S, Ganz SD, Hildebolt C, Scarfe WC. Position statement of the American Academy of Oral and Maxillofacial Radiology on selection criteria for the use of radiology in dental implantology with emphasis on cone beam computed tomography. *Oral Surg Oral Med Oral Pathol Oral Radiol*. 2012;113(6):817-26. doi: [10.1016/j.oooo.2012.03.005](https://doi.org/10.1016/j.oooo.2012.03.005).
 52. Harris D, Horner K, Gröndahl K, Jacobs R, Helmrot E, Benic GI, et al. E.A.O. guidelines for the use of diagnostic imaging in implant dentistry 2011. A consensus workshop organized by the European Association for Osseointegration at the Medical University of Warsaw. *Clin Oral Implants Res*. 2012;23(11):1243-53. doi: [10.1111/j.1600-0501.2012.02441.x](https://doi.org/10.1111/j.1600-0501.2012.02441.x).
 53. Lang NP, Zitzmann NU. Clinical research in implant dentistry: evaluation of implant-supported restorations, aesthetic and patient-reported outcomes. *J Clin Periodontol*. 2012;39 Suppl 12:133-8. doi: [10.1111/j.1600-051X.2011.01842.x](https://doi.org/10.1111/j.1600-051X.2011.01842.x).
 54. Klinge B, Meyle J. Peri-implant tissue destruction. The Third EAO consensus conference 2012. *Clin Oral Implants Res*. 2012;23 Suppl 6:108-10. doi: [10.1111/j.1600-0501.2012.02555.x](https://doi.org/10.1111/j.1600-0501.2012.02555.x).
 55. Testori T, Drago L, Wallace SS, Capelli M, Galli F, Zuffetti F, et al. Prevention and treatment of postoperative infections after sinus elevation surgery: clinical consensus and recommendations. *Int J Dent*. 2012;2012:365809. doi: [10.1155/2012/365809](https://doi.org/10.1155/2012/365809).
 56. Albrektsson T, Buser D, Chen ST, Cochran D, DeBruyn H, Jemt T, et al. Statements from the Estepona consensus meeting on peri-implantitis, February 2-4, 2012. *Clin Implant Dent Relat Res*. 2012;14(6):781-2. doi: [10.1111/cid.12017](https://doi.org/10.1111/cid.12017).
 57. Johal A, Katsaros C, Kuijpers-Jagtman AM. State of the science on controversial topics: missing maxillary lateral incisors--a report of the Angle Society of Europe 2012 meeting. *Prog Orthod*. 2013;14:20. doi: [10.1186/2196-1042-14-20](https://doi.org/10.1186/2196-1042-14-20).
 58. Bornstein MM, Al-Nawas B, Kuchler U, Tahmaseb A. Consensus statements and recommended clinical procedures regarding contemporary surgical and radiographic techniques in implant dentistry. *Int J Oral Maxillofac Implants*. 2014;29 Suppl:78-82. doi: [10.11607/jomi.2013.g1](https://doi.org/10.11607/jomi.2013.g1).
 59. Schwarz F, Alcoforado G, Nelson K, Schaer A, Taylor T, Beuer F, et al. Impact of implant-abutment connection, positioning of the machined collar/microgap, and platform switching on crestal bone level changes. *Camlog Foundation Consensus Report*. *Clin Oral Implants Res*. 2014;25(11):1301-3. doi: [10.1111/clr.12269](https://doi.org/10.1111/clr.12269).
 60. Tonetti MS, Jepsen S. Clinical efficacy of periodontal plastic surgery procedures: consensus report of group 2 of the 10th European workshop on periodontology. *J Clin Periodontol*. 2014;41 Suppl 15:S36-43. doi: [10.1111/jcpe.12219](https://doi.org/10.1111/jcpe.12219).
 61. Hämmerle CH, Giannobile WV. Biology of soft tissue wound healing and regeneration--consensus report of group 1 of the 10th European workshop on periodontology. *J Clin Periodontol*. 2014;41 Suppl 15:S1-5. doi: [10.1111/jcpe.12221](https://doi.org/10.1111/jcpe.12221).
 62. Machuca-Portillo G, Cabrerizo-Merino C, Cutando-Soriano A, Giménez-Prats MJ, Silvestre-Donat FJ, Tomás-Carmona I. Consensus report of the XI Congress of the Spanish Society of Odontology for the handicapped and special patients. *Med Oral Patol Oral Cir Bucal*. 2014;19(5):e495-9. doi: [10.4317/medoral.19569](https://doi.org/10.4317/medoral.19569).
 63. Alani A, Bishop K, Renton T, Djemal S. Update on guidelines for selecting appropriate patients to receive treatment with dental implants: priorities for the NHS--the position after 15 years. *Br Dent J*. 2014;217(4):189-90. doi: [10.1038/sj.bdj.2014.701](https://doi.org/10.1038/sj.bdj.2014.701).
 64. Wismeijer D, Brägger U, Evans C, Kapos T, Kelly JR, Millen C, et al. Consensus statements and recommended clinical procedures regarding restorative materials and techniques for implant dentistry. *Int J Oral Maxillofac Implants*. 2014;29 Suppl:137-40. doi: [10.11607/jomi.2013.g2](https://doi.org/10.11607/jomi.2013.g2).
 65. Gallucci GO, Benic GI, Eckert SE, Papaspyridakos P, Schimmel M, Schrott A, et al. Consensus statements and clinical recommendations for implant loading protocols. *Int J Oral Maxillofac Implants*. 2014;29 Suppl:287-90. doi: [10.11607/jomi.2013.g4](https://doi.org/10.11607/jomi.2013.g4).
 66. Patient-centred rehabilitation of edentulism with an optimal number of implants. A Foundation for Oral Rehabilitation (FOR) consensus conference. *Eur J Oral Implantol*. 2014;7 Suppl 2:S235-8.
 67. Canullo L, Schlee M, Wagner W, Covani U. International brainstorming meeting on etiologic and risk factors of peri-implantitis, Montegrotto (Padua, Italy), August 2014. *Int J Oral Maxillofac Implants*. 2015;30(5):1093-104. doi: [10.11607/jomi.4386](https://doi.org/10.11607/jomi.4386).
 68. Jepsen S, Berglundh T, Genco R, Aass AM, Demirel K, Derks J, et al. Primary prevention of peri-implantitis: managing peri-implant mucositis. *J Clin Periodontol*. 2015;42 Suppl 16:S152-7. doi: [10.1111/jcpe.12369](https://doi.org/10.1111/jcpe.12369).
 69. Klinge B, Flemming T, Cosyn J, De Bruyn H, Eisner BM, Hultin M, et al. The patient undergoing implant therapy. Summary and consensus statements. The 4th EAO consensus conference 2015. *Clin Oral Implants Res*. 2015;26 Suppl 11:64-7. doi: [10.1111/clr.12675](https://doi.org/10.1111/clr.12675).
 70. Sanz M, Donos N, Alcoforado G, Balmer M, Gurzawska K, Mardas N, et al. Therapeutic concepts and methods for improving dental implant outcomes. Summary and consensus statements. The 4th EAO consensus conference 2015. *Clin Oral Implants Res*. 2015;26 Suppl 11:202-6. doi: [10.1111/clr.12674](https://doi.org/10.1111/clr.12674).

71. Sicilia A, Quirynen M, Fontollet A, Francisco H, Friedman A, Linkevicius T, et al. Long-term stability of peri-implant tissues after bone or soft tissue augmentation. Effect of zirconia or titanium abutments on peri-implant soft tissues. Summary and consensus statements. The 4th EAO consensus conference 2015. *Clin Oral Implants Res.* 2015;26 Suppl 11:148-52. doi: [10.1111/clr.12676](#).
72. Hämmerle CH, Cordaro L, van Assche N, Benic GI, Bornstein M, Gamper F, et al. Digital technologies to support planning, treatment, and fabrication processes and outcome assessments in implant dentistry. Summary and consensus statements. The 4th EAO consensus conference 2015. *Clin Oral Implants Res.* 2015;26 Suppl 11:97-101. doi: [10.1111/clr.12648](#).
73. Dula K, Bornstein MM, Buser D, Dagassan-Berndt D, Ettlin DA, Filippi A, et al. SADMFR guidelines for the use of Cone-Beam Computed Tomography/ Digital Volume Tomography. *Swiss Dent J.* 2014;124(11):1169-83. doi: [10.61872/sdj-2014-11-01](#).
74. Schwarz F, Becker K, Bastendorf KD, Cardaropoli D, Chatfield C, Dunn I, et al. Recommendations on the clinical application of air polishing for the management of peri-implant mucositis and peri-implantitis. *Quintessence Int.* 2016;47(4):293-6. doi: [10.3290/j.qi.a35132](#).
75. Bidra AS, Daubert DM, Garcia LT, Kosinski TF, Nenn CA, Olsen JA, et al. Clinical practice guidelines for recall and maintenance of patients with tooth-borne and implant-borne dental restorations. *J Am Dent Assoc.* 2016;147(1):67-74. doi: [10.1016/j.adaj.2015.12.006](#).
76. Schwarz F, Sanz-Martín I, Kern JS, Taylor T, Schaer A, Wolfart S, et al. Loading protocols and implant supported restorations proposed for the rehabilitation of partially and fully edentulous jaws. *Camlog Foundation Consensus Report.* *Clin Oral Implants Res.* 2016;27(8):988-92. doi: [10.1111/clr.12736](#).
77. Butterworth C, McCaul L, Barclay C. Restorative dentistry and oral rehabilitation: United Kingdom National Multidisciplinary Guidelines. *J Laryngol Otol.* 2016;130(S2):S41-4. doi: [10.1017/s0022215116000414](#).
78. Alsahhaf A, Att W. Orthodontic extrusion for pre-implant site enhancement: principles and clinical guidelines. *J Prosthodont Res.* 2016;60(3):145-55. doi: [10.1016/j.jpor.2016.02.004](#).
79. Stacchi C, Andolsek F, Astramskaite I, Berton F, Di Lenarda R, Fernandes MH, et al. The 1st Baltic Osseointegration Academy and Lithuanian University of Health Sciences consensus conference 2016. Summary and consensus statements: group I - peri-implantitis aetiology, risk factors and pathogenesis. *J Oral Maxillofac Res.* 2016;7(3):e7. doi: [10.5037/jomr.2016.7307](#).
80. Suárez-López Del Amo F, Faria EAR, Cicciù M, Daugela P, Ramanauskaite A, Saulacic N, et al. The 1st Baltic Osseointegration Academy and Lithuanian University of Health Sciences consensus conference 2016. Summary and consensus statements: group III - peri-implantitis treatment. *J Oral Maxillofac Res.* 2016;7(3):e16. doi: [10.5037/jomr.2016.7316](#).
81. Tözüm TF, Dursun E, Galindo-Moreno P, Juodzbaly G, López-Martínez J, O'Valle F, et al. The 1st Baltic Osseointegration Academy and Lithuanian University of Health Sciences consensus conference 2016. Summary and consensus statements: group II - peri-implantitis diagnostics and decision tree. *J Oral Maxillofac Res.* 2016;7(3):e11. doi: [10.5037/jomr.2016.7311](#).
82. Albrektsson T, Canullo L, Cochran D, De Bruyn H. "Peri-implantitis": a complication of a foreign body or a man-made "disease". Facts and fiction. *Clin Implant Dent Relat Res.* 2016;18(4):840-9. doi: [10.1111/cid.12427](#).
83. Foundation for Oral Rehabilitation (FOR) consensus text on "The Rehabilitation of Missing Single Teeth". *Eur J Oral Implantol.* 2016;9 Suppl 1:S173-8.
84. Aghaloo TL, Misch C, Lin GH, Iacono VJ, Wang HL. Bone augmentation of the edentulous maxilla for implant placement: a systematic review. *Int J Oral Maxillofac Implants.* 2016;31 Suppl:s19-30. doi: [10.11607/jomi.16suppl.g1](#).
85. Clinical practice guidelines: role of implant design and systems in management of the edentulous maxilla. *Int J Oral Maxillofac Implants.* 2016;31 Suppl:s100-1. doi: [10.11607/jomi.16suppl.g2.cpg](#).
86. Clinical practice guidelines: role of imaging to guide implant placement in the edentulous maxilla. *Int J Oral Maxillofac Implants.* 2016;31 Suppl:s118-9. doi: [10.11607/jomi.16suppl.g3.cpg](#).
87. Clinical practice guidelines: role of biologics to assist in ridge development. *Int J Oral Maxillofac Implants.* 2016;31 Suppl:s165-7. doi: [10.11607/jomi.16suppl.g4.cpg](#).
88. Clinical practice guidelines: role of prosthetic management of the edentulous maxilla. *Int J Oral Maxillofac Implants.* 2016;31 Suppl:s198-200. doi: [10.11607/jomi.16suppl.g5.cpg](#).
89. Yuan Q, Xiong QC, Gupta M, López-Pintor RM, Chen XL, Seriwatanachai D, et al. Dental implant treatment for renal failure patients on dialysis: a clinical guideline. *Int J Oral Sci.* 2017;9(3):125-32. doi: [10.1038/ijos.2017.23](#).
90. Tallarico M, Caneva M, Baldini N, Gatti F, Duvina M, Billi M, et al. Patient-centered rehabilitation of single, partial, and complete edentulism with cemented- or screw-retained fixed dental prosthesis: the first Osstem advanced dental implant research and education center consensus conference 2017. *Eur J Dent.* 2018;12(4):617-26. doi: [10.4103/ejd.ejd_243_18](#).
91. Morton D, Gallucci G, Lin WS, Pjetursson B, Polido W, Roehling S, et al. Group 2 ITI consensus report: prosthodontics and implant dentistry. *Clin Oral Implants Res.* 2018;29 Suppl 16:215-23. doi: [10.1111/clr.13298](#).
92. Jung RE, Al-Nawas B, Araujo M, Avila-Ortiz G, Barter S, Brodala N, et al. Group 1 ITI consensus report: the influence of implant length and design and medications on clinical and patient-reported outcomes. *Clin Oral Implants Res.* 2018;29 Suppl 16:69-77. doi: [10.1111/clr.13342](#).
93. Feine J, Abou-Ayash S, Al Mardini M, de Santana RB, Bjelke-Holtermann T, Bornstein MM, et al. Group 3 ITI consensus report: patient-reported outcome measures associated with implant dentistry. *Clin Oral Implants Res.* 2018;29 Suppl 16:270-5. doi: [10.1111/clr.13299](#).
94. Hämmerle CHF, Cordaro L, Alccayhuaman KAA, Botticelli D, Esposito M, Colomina LE, et al. Biomechanical aspects: summary and consensus statements of group 4. The 5th EAO consensus conference 2018. *Clin Oral Implants Res.* 2018;29 Suppl 18:326-31. doi: [10.1111/clr.13284](#).
95. Schliephake H, Sicilia A, Nawas BA, Donos N, Gruber R, Jepsen S, et al. Drugs and diseases: summary and consensus statements of group 1. The 5th EAO consensus conference 2018. *Clin Oral Implants Res.* 2018;29 Suppl 18:93-9. doi: [10.1111/clr.13270](#).
96. Sanz M, Klinge B, Alcoforado G, Bienz SP, Cosyn J, De Bruyn H, et al. Biological aspects: summary and consensus statements of group 2. The 5th EAO consensus conference 2018. *Clin Oral Implants Res.* 2018;29 Suppl 18:152-6. doi: [10.1111/clr.13274](#).
97. Berglundh T, Armitage G, Araujo MG, Avila-Ortiz G, Blanco J, Camargo PM, et al. Peri-implant diseases and conditions: consensus report of workgroup 4 of the 2017 World Workshop on the classification of periodontal and peri-implant diseases and conditions. *J Periodontol.* 2018;89 Suppl 1:S313-8. doi: [10.1002/jper.17-0739](#).
98. Giannobile WV, Jung RE, Schwarz F. Evidence-based

- knowledge on the aesthetics and maintenance of peri-implant soft tissues: osteology foundation consensus report part 1-effects of soft tissue augmentation procedures on the maintenance of peri-implant soft tissue health. *Clin Oral Implants Res.* 2018;29 Suppl 15:7-10. doi: [10.1111/clr.13110](https://doi.org/10.1111/clr.13110).
99. Heitz-Mayfield LJ, Aaboe M, Araujo M, Carrión JB, Cavalcanti R, Cionca N, et al. Group 4 ITI consensus report: risks and biologic complications associated with implant dentistry. *Clin Oral Implants Res.* 2018;29 Suppl 16:351-8. doi: [10.1111/clr.13307](https://doi.org/10.1111/clr.13307).
 100. Jung RE, Heitz-Mayfield L, Schwarz F. Evidence-based knowledge on the aesthetics and maintenance of peri-implant soft tissues: osteology foundation consensus report part 3-aesthetics of peri-implant soft tissues. *Clin Oral Implants Res.* 2018;29 Suppl 15:14-7. doi: [10.1111/clr.13113](https://doi.org/10.1111/clr.13113).
 101. Schwarz F, Giannobile WV, Jung RE. Evidence-based knowledge on the aesthetics and maintenance of peri-implant soft tissues: osteology foundation consensus report part 2-effects of hard tissue augmentation procedures on the maintenance of peri-implant tissues. *Clin Oral Implants Res.* 2018;29 Suppl 15:11-3. doi: [10.1111/clr.13109](https://doi.org/10.1111/clr.13109).
 102. Wismeijer D, Joda T, Flügge T, Fokas G, Tahmaseb A, Bechelli D, et al. Group 5 ITI consensus report: digital technologies. *Clin Oral Implants Res.* 2018;29 Suppl 16:436-42. doi: [10.1111/clr.13309](https://doi.org/10.1111/clr.13309).
 103. Van Assche N, Fickl S, Francisco H, Gurzawska K, Milinkovic I, Navarro JM, et al. Guidelines for development of implant dentistry in the next 10 years regarding innovation, education, certification, and associations. *Clin Oral Implants Res.* 2018;29(6):568-75. doi: [10.1111/clr.13154](https://doi.org/10.1111/clr.13154).
 104. Galindo-Moreno P, Suárez López Del Amo F, Faria-Almeida R, Almeida BL, Astramskaite-Januseviciene I, Barootchi S, et al. The 2nd Baltic Osseointegration Academy and Lithuanian University of Health Sciences consensus conference 2019. Summary and consensus statements: group II - extraction socket preservation methods and dental implant placement outcomes within grafted sockets. *J Oral Maxillofac Res.* 2019;10(3):e9. doi: [10.5037/jomr.2019.10309](https://doi.org/10.5037/jomr.2019.10309).
 105. Renvert S, Hirooka H, Polyzois I, Kelekis-Cholakakis A, Wang HL. Diagnosis and non-surgical treatment of peri-implant diseases and maintenance care of patients with dental implants - consensus report of working group 3. *Int Dent J.* 2019;69(Suppl 2):12-7. doi: [10.1111/idj.12490](https://doi.org/10.1111/idj.12490).
 106. Jepsen S, Schwarz F, Cordaro L, Derks J, Hämmerle CH, Heitz-Mayfield LJ, et al. Regeneration of alveolar ridge defects. Consensus report of group 4 of the 15th European workshop on periodontology on bone regeneration. *J Clin Periodontol.* 2019;46 Suppl 21:277-86. doi: [10.1111/jcpe.13121](https://doi.org/10.1111/jcpe.13121).
 107. Sanz M, Dahlin C, Apatzidou D, Artzi Z, Bozic D, Calciolari E, et al. Biomaterials and regenerative technologies used in bone regeneration in the craniomaxillofacial region: consensus report of group 2 of the 15th European workshop on periodontology on bone regeneration. *J Clin Periodontol.* 2019;46 Suppl 21:82-91. doi: [10.1111/jcpe.13123](https://doi.org/10.1111/jcpe.13123).
 108. Tonetti MS, Jung RE, Avila-Ortiz G, Blanco J, Cosyn J, Fickl S, et al. Management of the extraction socket and timing of implant placement: consensus report and clinical recommendations of group 3 of the XV European workshop in periodontology. *J Clin Periodontol.* 2019;46 Suppl 21:183-94. doi: [10.1111/jcpe.13131](https://doi.org/10.1111/jcpe.13131).
 109. Giovannoli JL, Rocuzzo M, Albouy JP, Duffau F, Lin GH, Serino G. Local risk indicators - consensus report of working group 2. *Int Dent J.* 2019;69(Suppl 2):7-11. doi: [10.1111/idj.12511](https://doi.org/10.1111/idj.12511).
 110. Khoury F, Keeve PL, Ramanauskaitė A, Schwarz F, Koo KT, Sculean A, et al. Surgical treatment of peri-implantitis - consensus report of working group 4. *Int Dent J.* 2019;69(Suppl 2):18-22. doi: [10.1111/idj.12505](https://doi.org/10.1111/idj.12505).
 111. Meyle J, Casado P, Fourmouls I, Kumar P, Quirynen M, Salvi GE. General genetic and acquired risk factors, and prevalence of peri-implant diseases - consensus report of working group 1. *Int Dent J.* 2019;69(Suppl 2):3-6. doi: [10.1111/idj.12489](https://doi.org/10.1111/idj.12489).
 112. Schwarz F, Messias A, Sanz-Sánchez I, Carrillo de Albornoz A, Nicolau P, Taylor T, et al. Influence of implant neck and abutment characteristics on peri-implant tissue health and stability. Oral reconstruction foundation consensus report. *Clin Oral Implants Res.* 2019;30(6):588-93. doi: [10.1111/clr.13439](https://doi.org/10.1111/clr.13439).
 113. Ahmad KO, Chapokas AR. Position Statement: Diagnostic Imaging in the Treatment Planning, Surgical, and Prosthodontic Aspects of Implant Dentistry. Chicago: American College of Prosthodontics; 2019.
 114. Del Amo FS, Yu SH, Sammartino G, Sculean A, Zucchelli G, Rasperini G, et al. Peri-implant soft tissue management: Cairo opinion consensus conference. *Int J Environ Res Public Health.* 2020;17(7). doi: [10.3390/ijerph17072281](https://doi.org/10.3390/ijerph17072281).
 115. Aleksovska K, Bassetti CL, Berger T, Carvalho V, Costa J, Deuschl G, et al. Guidelines should be guidelines: time to leave the terms "consensus" and "position" for other purposes. *Eur J Neurol.* 2021;28(8):2461-6. doi: [10.1111/ene.14933](https://doi.org/10.1111/ene.14933).
 116. Steinberg E, Greenfield S, Wolman DM, Mancher M, Graham R. Clinical Practice Guidelines We Can Trust. Washington, DC: National Academies Press; 2011.
 117. Suman A, Dikkers MF, Schaafsma FG, van Tulder MW, Anema JR. Effectiveness of multifaceted implementation strategies for the implementation of back and neck pain guidelines in health care: a systematic review. *Implement Sci.* 2016;11(1):126. doi: [10.1186/s13012-016-0482-7](https://doi.org/10.1186/s13012-016-0482-7).
 118. Concannon TW, Meissner P, Grunbaum JA, McElwee N, Guise JM, Santa J, et al. A new taxonomy for stakeholder engagement in patient-centered outcomes research. *J Gen Intern Med.* 2012;27(8):985-91. doi: [10.1007/s11606-012-2037-1](https://doi.org/10.1007/s11606-012-2037-1).
 119. Guerra-Farfan E, Garcia-Sanchez Y, Jornet-Gibert M, Nuñez JH, Balaguer-Castro M, Madden K. Clinical practice guidelines: the good, the bad, and the ugly. *Injury.* 2023;54 Suppl 3:S26-9. doi: [10.1016/j.injury.2022.01.047](https://doi.org/10.1016/j.injury.2022.01.047).
 120. Lunny C, Ramasubbu C, Puil L, Liu T, Gerrish S, Salzwedel DM, et al. Over half of clinical practice guidelines use non-systematic methods to inform recommendations: a methods study. *PLoS One.* 2021;16(4):e0250356. doi: [10.1371/journal.pone.0250356](https://doi.org/10.1371/journal.pone.0250356).
 121. Brignardello-Petersen R, Carrasco-Labra A, Guyatt GH. How to interpret and use a clinical practice guideline or recommendation: users' guides to the medical literature. *JAMA.* 2021;326(15):1516-23. doi: [10.1001/jama.2021.15319](https://doi.org/10.1001/jama.2021.15319).
 122. Spallek H, Song M, Polk DE, Bekhuis T, Frantsve-Hawley J, Aravamudan K. Barriers to implementing evidence-based clinical guidelines: a survey of early adopters. *J Evid Based Dent Pract.* 2010;10(4):195-206. doi: [10.1016/j.jebdp.2010.05.013](https://doi.org/10.1016/j.jebdp.2010.05.013).