### Oral Rehabilitation of Tooth Loss: A Systematic Review of Quantitative Studies of OHRQoL

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> Purpose: This study aimed to review published quantitative studies for evidence regarding the influence of oral rehabilitation following total or partial tooth loss on self-perceived oral health-related quality of life (OHRQoL). Materials and Methods: Three databases were searched using specified indexing terms. The reference lists of relevant publications were also searched manually. Quality of evidence was classified according to GRADE guidelines as high, moderate, low, or very low. Results: The search yielded 2,138 titles and abstracts, 2,102 of which were of a quantitative study design. Based on pre-established criteria, the full-text versions of 322 articles were obtained. After data extraction and interpretation, 5 publications of high or moderate study quality remained. The results of these 5 studies showed positive effects of oral rehabilitation on OHRQoL. Two studies showed substantial improvements. **Conclusions:** This is a relatively new field of research; there are very few quantitative studies of how patients perceive OHRQoL following tooth loss and subsequent rehabilitation. While this review indicates that treatment has positive effects on quality of life, the scientific basis is insufficient to support general conclusions about the influence of various interventions on the OHRQoL of patients who have experienced total or partial tooth loss. To achieve a more comprehensive analysis, it is recommended that future studies be based on a combination of quantitative and qualitative methods, ie, questionnaires and semi-structured interviews. The follow-up period must also be appropriate for the specific intervention studied. Int J Prosthodont 2012;25:543-552.

For the individual patient, tooth loss has both physiologic and social impacts. The number and location of missing teeth strongly influence the perceived severity of the disability. For most people, the anterior teeth play an important role in the perception of social acceptance and appearance. Further, speech can be adversely affected by the loss of anterior teeth. If several posterior teeth are missing, masticatory function may be compromised. It is claimed, however, that dentitions comprising 10 maxillary and 10 mandibular teeth are sufficient for masticatory function.<sup>1,2</sup>

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A recent systematic review<sup>3</sup> and meta-analysis of oral health-related quality of life (OHRQoL), ie, selfperceived oral health in relation to functional, social, and psychologic well-being, found a strong association between tooth loss and impaired OHRQoL.

The impact of oral rehabilitation on OHRQoL can be assessed using quantitative research methods (eg, questionnaires before and after treatment). In such studies, the measuring instrument should be well established and validated to provide reliable and comparable results at individual and group levels. For a high study quality, patient groups should be randomly selected according to specified inclusion and exclusion criteria. When the effects of different treatments are compared, the test groups should have a matched control group. Validated questionnaires used as measuring instruments have fixed answers that capture patients' views on OHRQoL but offer no opportunity for individual reflection.

Qualitative research methods can also be applied to study the self-perceived impact of total or partial tooth loss and subsequent oral rehabilitation. A combination of quantitative and qualitative methods may achieve a more comprehensive understanding of this issue.<sup>4,5</sup>

The patient's perception of treatment can be described as "patient satisfaction," which expresses the patient's view of how well the treatment has succeeded in restoring function and esthetics; however, this measures the patient's assessment of the treatment outcome and not of quality of life.<sup>6</sup>

The present study comprises a systematic review of quantitative studies that used a validated tool for measuring OHRQoL. The aim was to assess the evidence underlying pre- and posttreatment values of self-perceived OHRQoL among patients with total or partial tooth loss who underwent oral rehabilitation.

#### **Materials and Methods**

To ensure a systematic approach, the literature review was conducted according to Goodman's model,<sup>7</sup> which comprises the following steps: (1) definition of the research question, (2) formulation of a plan for the literature search, (3) literature search and retrieval of publications, and (4) data extraction, interpretation, and evaluation of evidence from the literature retrieved.

#### **Definition of the Research Question**

A patient's perception of tooth loss and oral rehabilitation is influenced by several factors, which can be evaluated using a combination of quantitative and qualitative methods. The question to be addressed in this study was as follows: How do patients perceive tooth loss and the subsequent change in OHRQoL after oral rehabilitation?

#### Formulation of a Plan for the Literature Search

The search was undertaken in collaboration with a specialist in informatics at the Swedish Council on Health Technology Assessment (Tables 1a and 1b). The period covered was 01/01/1950 to 1/4/2010. The following three databases were searched: PubMed (no limits on language), the Cochrane Central Registry of Controlled Trials, and Embase.

To ensure the widest possible literature search, the indexing terms were used as Medical Subject Headings (MeSH) and free text in the PubMed search, and the truncation symbol (\*) was used in the Cochrane Library and Embase searches. Both original research and systematic reviews were included.

#### Literature Search and Retrieval of Publications

Prior to reading the retrieved abstracts, consensus was reached on the inclusion criteria (Table 2). When at least one author considered a publication to meet the initial inclusion criteria, the full-text article was obtained. Two assessors independently read the articles for inclusion or exclusion of a publication. The second step of the search involved a manual search of the reference lists of included publications.

# Data Extraction, Interpretation, and Evaluation of Evidence

Quality of evidence was classified according to the GRADE system as high, moderate, or low.<sup>8</sup> Only studies graded as high or moderate in quality were included. The quality rating of a paper could be downgraded because of shortcomings in study design, study limitations, inconsistency of results, imprecision, and reporting bias. When the screening process was complete, the remaining studies for inclusion were tabulated (Table 3).

#### Results

#### Literature Search

Figure 1 shows a flowchart of the selection process. The search, which covered both quantitative and qualitative studies, yielded 2,138 abstracts, of which 2,102 were considered to be quantitative. Based on the initial inclusion criteria, the full-text versions of 322 articles were obtained; 252 were potentially

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 Table 1a
 Literature Search Strategy in PubMed<sup>†</sup>

Edentulous (TiAb)		
Jaw, edentulous (NoExp)		
Mouth, edentulous (NoExp)		
Edentulism (TiAb)		Qualitative research (MeSH)
Toothloss (TiAb)		Qualitative (TiAb)
Tooth loss (TiAb)		Grounded theory (TiAb)
Loss of teeth (TiAb)		Phenomenogra* (TiAb)
Toothless (TiAb)		Phenomenologi* (TiAb)
Tooth loss (MeSH)		Hermeneutic (TiAb)
Dental implants (NoExp)		Meaning (TiAb)
Dental implantation, endosseous (NoExp)		Lived experience (TiAb)
Blade implantation (MeSH)		Phenomenology (TiAb)
Denture, overlay (MeSH)		Content analysis (TiAb)
Denture, complete (MeSH)		Ethogra* (TiAb)
Denture, partial, removable (MeSH)	AND	Etnogra* (TiAb)
Dental prosthesis, implant-supported (MeSH)		Social systems theory (TiAb)
Denture, partial, fixed (NoExp)		Quality of life (MeSH, TiAb)
Denture (TiAb)		Life quality (TiAb)
Prosthesis (TiAb)		Lifequality (TiAb)
Dental prosthesis (MeSH)		QALY (TiAb)
Oral surgical procedures, preprosthetic (MeSH)		QALY's (TiAb)
		QALYS (TiAb)
Dentistry (MeSH)		Interview, psychological/methods (MeSH)
OR Dental (TiAb)		Interview/s (TiAb)
AND Osseointegration (MeSH, TiAb)		Interviewing (TiAb)
Dental (TiAb)		
AND Implant/s (TiAb)		

OR Implantation (TiAb)

MeSH = medical subjecting headings; NoExp = no expansion; TiAb = titles/abstracts; QALY = quality-adjusted life year. \*Abbreviation. Wildcard indication of a variable number of characters (including none).

<sup>†</sup>("Edentulous"[TiAb] OR "Jaw, edentulous"[MeSH:NoExp] OR "Mouth, edentulous"[MeSH:NoExp] OR "Edentulism"[TiAb] OR "Toothloss"[TiAb] OR "Tooth loss"[TiAb] OR "Loss of teeth"[TiAb] OR "Toothless"[TiAb] OR "Toothloss"[MeSH] OR "Dental Implants"[MeSH:NoExp] OR "Dental implantation, endosseous"[MeSH:NoExp] OR "Blade implantation"[MeSH] OR "Denture, overlay"[MeSH] OR "Denture, complete"[MeSH] OR "Denture, partial, removable"[MeSH] OR "Dental prosthesis, implant-supported"[MeSH] OR "Denture, partial, fixed"[MeSH:NoExp] OR "Denture"[TiAb] OR "Prosthesis"[TiAb] OR "Dental prosthesis, implant-supported"[MeSH] OR "Denture, partial, fixed"[MeSH] OR ("Denture"[TiAb] OR "Prosthesis"[TiAb] OR "Dental prosthesis"[MeSH] OR "Oral surgical procedures, preprosthetic"[MeSH] OR ("Centistry"[MeSH] OR "Dental"[TiAb] OR "Dental prosthesis"[MeSH] OR "Oral surgical procedures, preprosthetic"[MeSH] OR ("Dentistry"[MeSH] OR "Dental"[TiAb] OR "Dental prosthesis"[MeSH] OR "Osseointegration"[TiAb])) OR ("Dental"[TiAb] AND ("Implant"[TiAb] OR "Implants"[TiAb] OR "Implantation"[TiAb])) AND ("Qualitative research"[MeSH] OR "Qualitative"[TiAb] OR "Grounded theory"[TiAb] OR "Phenomenologa"[TiAb] OR "Phenomenologi"[TiAb] OR "Ethogras"[TiAb] OR "Meaning"[TiAb] OR "Lived experience"[TiAb] OR "Phenomenology"[TiAb] OR "Content analysis"[TiAb] OR "Ethogras"[TiAb] OR "Gaulity of Iife"[TiAb] OR "Content analysis"[TiAb] OR "Lifequality"[TiAb] OR "Quality of Iife"[TiAb] OR "Quality of Iife"[MeSH] OR "Lifequality"[TiAb] OR "Autive"[TiAb] OR "Quality of Iife"[MeSH] OR "Content analysis"[TiAb] OR "Lifequality"[TiAb] OR "Quality of Iife"[MeSH] OR "Lifequality"[TiAb] OR "Content analysis"[TiAb] OR "Lifequality"[TiAb] OR "Content analysis"[TiAb] OR "Lifequality"[TiAb] OR "Content analysis"[TiAb] OR "Lifequality

original research and 70 were methodologic studies of quantitative evaluation of self-perceived OHRQoL.

Of the five systematic reviews retrieved, two did not meet the inclusion criteria and two were not relevant to the research question. The remaining review did not present endpoint data and was therefore excluded. Of 322 publications evaluated in full text, 5 studies were finally included. The major reason for exclusion of studies (58%) was that they did not address the question of OHRQoL. Two other grounds for exclusion were no intervention (25%) and insufficient follow-up time (4%).

Table 1b	Literature Search Strategy in Embase	$e^{\dagger}$
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		Dentistry (de)		
Dental implant (TiAb)		OR Dental (TiAb)		
Tooth implantation (TiAb, de)		AND Osseointegration		
Complete denture/s (TiAb)				Qualitative research (de)
Full denture/s (TiAb)		Dental (TiAb)		Qualitative (TiAb)
Removable denture/s (TiAb)		AND Implant/s (TiAb)		Grounded theory (TiAb)
Complete removable denture/s (TiAb)		OR Implantation (TiAb)		Phenomenogra* (TiAb)
Complete removable prosthesis/es (TiAb)				Phenomenologi* (TiAb)
Full prosthesis/es (TiAb)		Denture/s (TiAb, de)		Hermeneutic (TiAb)
Overdenture/s (Ti)		AND Overlay (TiAb)		Meaning (TiAb)
Overlay denture/s (Ti)		OR Complete (TiAb)		Lived experience (TiAb)
Telescopic crown/s (Ti)		OR Removable (TiAb)		Phenomenology (TiAb)
Conical crown/s (Ti)		OR Implant-supported (TiAb)		Content analysis (TiAb)
Double crown/s (Ti)	AND	OR Fixed (TiAb)	AND	Ethogra* (TiAb)
Fixed bridge/s (TiAb)		OR Partial (TiAb)		Etnogra* (TiAb)
Fixed partial denture/s (TiAb)		OR Full (TiAb)		Social systems theory (TiAb)
Pontic/s (TiAb)				Quality of life (TiAb, de)
Single tooth restoration/s (TiAb)		Dentistry (de)		Life quality (TiAb)
Tooth prosthesis (TiAb, de)		OR Dental (TiAb)		Lifequality (TiAb)
Implant supported prosthesis/es (TiAb)		OR Tooth (TiAb)		QALY (TiAb)
Implant connected (TiAb)		AND Osseointegration (TiAb)		QALYs (TiAb)
Edentulousness (TiAb, de)				Interview (exp, TiAb)
Edentulous (TiAb)		Periimplantitis (TiAb)		Interviews (TiAb)
Edentulism (TiAb)		OR Periodontitis (TiAb)		Interviewing (TiAb)
Missing teeth (TiAb)		AND Failure (Ti)		
Tooth loss (TiAb)		OR Complication/s (Ti)		
		OR Success (Ti)		
		OR Survival (Ti)		

TiAb = titles/abstracts; exp = explosion; de = field label for Index (Emtree) Term; QALY = quality-adjusted life year.

\*Abbreviation. Wildcard indication of a variable number of characters (including none).

\*((("Dentistry":de OR "Dental":TiAb) AND "Osseointegration":TiAb OR ("Dental":TiAb AND ("Implant":TiAb OR "Implants":TiAb OR "Implants":TiAb OR "Complete":TiAb OR "Removable":TiAb OR "Implant-supported":TiAb OR "Fixed":TiAb OR "Partial":TiAb OR "Fixed":TiAb OR "Fixed":TiAb OR "Fixed":TiAb OR "Fixed":TiAb OR "Fixed":TiAb OR "Fixed":TiAb OR "Complete:TiAb OR "Success":TiAb OR "Survival":TiAb OR "Complete enduces":TiAb OR "Complete enduces":TiAb OR "Complete enduces: TiAb OR "Fixed enduces: "TiAb OR "Full denture":TiAb OR "Full denture":TiAb OR "Found enduces: TiAb OR "Full denture: TiAb OR "Full denture: TiAb OR "Full dentures":TiAb OR "Found enduces: "TiAb OR "Complete denture: TiAb OR "Complete denture: TiAb OR "Complete removable denture: "TiAb OR "Fixed partial denture: "TiAb OR "Edentulous: "TiAb OR "Fixed partial denture: "TiAb OR "Edentulous: "TiAb OR "Edentulous: "TiAb OR "Fixed partial denture: "TiAb OR "Edentulous: "TiAb OR "Edentulous: "TiAb OR "Implant supported pr

#### Interpretation of Data

**Treatment of patients with single tooth loss.** No studies were identified that addressed patients' experiences of rehabilitation of a single missing tooth as measured by OHRQoL.

#### Treatment of patients with multiple tooth loss.

One study<sup>9</sup> compared the effect of prosthodontic rehabilitation with double crown-retained removable partial dentures using either galvanoformed telescopic or cast conical crowns. Fifty-four patients with multiple tooth loss and two to six remaining abutment

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Population	Adults (> 18 years of age) with single and/or partial tooth loss in the maxilla or mandible Patients' perceived experience of tooth loss measured as OHRQoL in 1 of 3 conditions: single tooth loss, multiple tooth loss, or complete edentulism
Intervention	Oral rehabilitation by methods used in general practice $\ge$ 20 patients in each group Posttreatment follow-up $\ge$ 3 mo Attrition $\le$ 25%
Control	Oral rehabilitation by methods used in general practice $\ge$ 20 patients in each group Posttreatment follow-up $\ge$ 3 mo Attrition $\le$ 25%.
Outcome	Change in self-perceived quality of life (OHRQoL) estimated using validated and reliable scales

 Table 2
 PICO (Population, Intervention, Control, and Outcome) Inclusion Criteria

teeth were randomly assigned to one of the two study groups. Clinical treatment procedures were similar in the two groups. The Oral Health Impact Profile-49 (OHIP-49) questionnaire was used to evaluate OHRQoL before treatment and 6 and 12 months after treatment. Compared to pretreatment values, both follow-ups showed a significant increase in OHRQoL (expressed as a reduction in total OHIP-49 scores) (P < .01). There was no difference in OHIP-49 scores between the two study groups at any time point.

**Self-perceived OHRQoL before and after oral rehabilitation.** Two studies<sup>10,11</sup> evaluated the treatment effect, as measured by OHRQoL, in patients with extensive partial or total tooth loss whose rehabilitation comprised tooth-supported fixed prostheses, tooth-supported removable partial dentures, or complete dentures.

John et al<sup>10</sup> recruited a convenience sample of 107 patients seeking prosthodontic treatment at a German dental school. There was no randomization of patients into the three study groups because the patients could choose which treatment they preferred. OHRQoL was evaluated by application of OHIP-49 before treatment and at 1-, 6-, and 12-month followups. In 96% of cases, OHRQoL increased after treatment. One month after treatment, all groups reached the mean OHRQoL of the German population for individuals with similar oral statuses. OHIP-49 medians were below population norms 6 to 12 months after treatment, indicating superior OHRQoL compared to the general population. In patients treated with removable or complete dentures, the posttreatment OHIP-49 problem rate was higher than in patients treated with fixed partial dentures, particularly at the initial follow-up period.

The second study,<sup>11</sup> based on the same patient population, provided more detailed information about the distribution of problems (OHIP-49) reported by patients before and after treatment throughout the three study groups.

**Treatment of completely edentulous patients.** Two studies<sup>12,13</sup> compared the treatment effect of implant-supported overdentures and conventional dentures in edentulous patients using OHRQoL outcomes.

Allen et al<sup>12</sup> randomized 91 edentulous patients (65 women, 26 men) to one of two study groups based on treatment with either a mandibular implantsupported overdenture (n = 45) or new conventional mandibular denture (n = 46). All patients received a new conventional maxillary denture. OHRQoL, measured by the OHIP-49, was assessed before treatment and 3 months after treatment. On completion of treatment, there was a significant improvement in OHRQoL in both study groups (P < .001). Three months after treatment, there were no differences between the groups. In terms of magnitude, effect sizes for change in OHIP-49 score were 1.1 for the implant-supported overdenture group and 1.0 for the conventional denture group, indicating substantial changes in both groups (> 0.8).<sup>14</sup>

In the second study<sup>13</sup> of similar design, 55 patients were randomly selected for treatment with an implantsupported mandibular overdenture (n = 25) or a new conventional mandibular denture (n = 30). As in the previous study,<sup>12</sup> all patients received a new conventional maxillary denture. OHRQoL was evaluated using the OHIP-20 before treatment and 6 months after treatment. In addition, a general health questionnaire was completed at baseline and follow-up.

Study	Study design	Patients	Assessment
Allen et al, 2006 (United Kingdom) <sup>12</sup>	RCT Follow-up: 3 mo	91 patients (26 men, 65 women) ≥ 5 y edentulous Referred for conventional (new) denture treatment Implant group: 45 patients (mean age: 64.5 y [SD: 8.8]) Conventional group: 46 patients (mean age: 68.5 y [SD: 9.9])	OHIP-49 Denture satisfaction with 5-point Likert scale
Grossman et al, 2007 (Germany) <sup>9</sup>	Prospective, longitudinal; study groups randomized to treatment by 1 of 2 crown retention elements Follow-up: 6 and 12 mo	54 patients (34 men, 20 women; mean age: 64.6 y [SD: 9 y]) Patients requesting removable partial dentures at the prosthodontic department at University of Heidelberg	OHIP-49G Likert scale
Heydecke et al, 2003 (Canada) <sup>13</sup>	Prospective, longitudinal; study groups comprised people interested in replacement of their dentures (recruited through newspaper advertisements) randomized to mandibular ISOs or conventional CDs Follow-up: 6 mo	55 patients (24 men, 31 women) ISO group: 30 patients (14 men, 16 women; mean age: 68.9 y) CD group: 25 patients (10 men, 15 women; mean age: 69.4 y)	OHIP-20 SF-36
John et al, 2004 (Germany) <sup>10</sup>	Prospective, longitudinal, nonrandomized clinical trial to compare changes in OHRQoL with 3 types of prosthodontic treatment Follow-up: 6–12 mo	107 patients FPD group: 42 patients (52% women; mean age: $43.8 \pm 12.5 \text{ y}$ ) RPD group: 31 patients (61% women; mean age: $60.5 \pm 9.4 \text{ y}$ ) CD group: 34 patients (56% women; mean age: $68.1 \pm 7.1 \text{ y}$ )	OHIP-49G

Szentpétery Same as John et al<sup>10</sup>; focused on distribution of same as John et al<sup>10</sup> Same as John et al<sup>10</sup> (Germany)<sup>11</sup>

RCT = randomized controlled trial; SD = standard deviation; ISO = implant-supported overdenture; FPD = fixed partial denture; RPD = removable partial denture; CD = complete denture; OHIP = Oral Health Impact Profile; SF = Short Form Health Survey; OHRQoL = oral health-related quality of life.

Among patients treated with implant-supported overdentures, there was a significant improvement (P < .05) in OHRQoL, as measured by the OHIP-20, before and after treatment; at the 6-month follow-up, the total index score had decreased from 53.5 to 35.0. Although a change in total index score also occurred in the conventional denture group (56.3 to 47.8), this

result was not significant. At the 6-month follow-up, the index score among patients with overdentures (35.0) was significantly lower (P < .05) than that of patients treated with conventional dentures (47.8). The effect size for change in total index score for the OHIP-20 was high (< 0.8).

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Treatment	Results	Study quality/comments
Implant-supported mandibular denture Conventional mandibular denture	Large changes in both groups; no significant differences between groups ISOs not perceived to offer big improvement by patients who were not especially dissatisfied with current conventional dentures	High Simply offering a more expensive treatment option such as ISOs to patients with little prior knowledge of the treatment may not yield significant psychosocial benefits for patients willing to accept conventional dentures
Special clinic where 50% in each group were treated by students Galvanoformed telescopic double-crown RPDs or conical telescopic double-crown RPDs	OHRQoL improved significantly in both groups ( $P < .1$ ) after treatment; no significant difference between groups at any time	Moderate Short communication with limited data presented Are patients consecutively included? During what time? No analysis of dropouts Some patients (12%) given 2 partial dentures within the study Vague inclusion criteria
Mandibular ISO or conventional CD New maxillary denture for all patients	Comparison between groups showed significantly lower scores in 4 OHIP-domains in the ISO group No significant differences on psychologic discomfort, social disability, and handicap scales SF-36 is not sensitive to changes in oral health	Moderate Study well-conducted and well-described Attrition = 8%, all in CD group
FPD RPD CD	Patients had a considerably impaired OHRQoL before treatment compared to national values for subjects with a similar prosthodontic status Improvements in all groups were substantial and statistically significant Up to 12 mo after treatment, RPD and CD groups had poorer OHRQoL than FPD group	Moderate Convenience sample Well-described statistics Good discussion of study strengths and weaknesses Where were patients treated and by whom? Multicenter study? FPD and RPD groups include subgroups with different treatment solutions but are too small to analyze Attrition = 6 of 107 due to missing answers in the questionnaires Statistical analysis comprises OHRQoL changes over time in clinically relevant patient groups but does not include treatment efficacy
Same as John et al <sup>10</sup>	Groups differed in type of problems that decreased Largest number of problems with RPDs Problems disappeared fastest and most completely with FPDs No major differences between groups 6–12 mo after treatment For all treatments, most problems reported at baseline were eliminated after sufficiently long follow-ups Number of problems varied substantially between patients Some problems not reported at baseline appeared at follow- up visits, such as sore spots, sore jaws, painful gums (RPD and CD groups); problems with eating and chewing dominate pretreatment	Same as John et al <sup>10</sup>

**Systematic reviews.** Among the full-text publications evaluated, one systematic review was identified.<sup>15</sup> The aim of the review was to systematically synthesize published data on subjective assessment of the efficacy of implant-retained mandibular overdentures. The literature search was well conducted and clearly described, yielding 2,262 relevant

abstracts. After evaluation, 9 studies remained for inclusion. Only publications in English or French were accepted. The edentulous patients in the included studies were treated with an implant-supported mandibular overdenture with ball or clip attachments and a conventional maxillary complete denture. Several different implant systems were used across the



Fig 1 Flowchart of the selection process for quantitative studies.

studies. Recruitment of patients varied (referrals, consecutive enrollment, etc). Only 3 of the 9 studies used OHRQoL outcomes to evaluate the patients' perceptions of treatment. Only 1 study evaluated patient experience after at least 3 months of follow-up. A variety of indices were used for patients' self-reported treatment experience, such as "general satisfaction," "psychological well being," and "social and sexual activities." The authors concluded that the result of their meta-analysis was unclear. This systematic review was excluded from the present review because it did not meet the inclusion criteria; however, one of the included studies was also included in this literature search.<sup>12</sup>

#### **Evaluation of Evidence**

For patients with single tooth loss, multiple tooth loss, or complete edentulism, the scientific evidence was insufficient to assess patient perceptions of OHRQoL before and after various methods of oral rehabilitation.

#### Discussion

The impact of oral status on quality of life is a relatively new area of quantitative research. Few studies have compared OHRQoL before and after treatment; OHRQoL has been applied in many population studies of oral health but seldom as an outcome measure following intervention/rehabilitation for tooth loss. In studies evaluating treatment outcomes, the follow-up period is often too short (< 3 months), and different types of prosthetic rehabilitation are not compared. Thus, the present systematic review includes only five quantitative studies<sup>9-13</sup> evaluating the impact of treatment of total or partial tooth loss on OHRQoL. The literature search found very few OHRQoL studies of high quality. Further extensive research is warranted.

The included articles showed that rehabilitation after tooth loss has positive effects on quality of life. Two studies revealed substantial effects, which is in agreement with previous qualitative research. Many patients report major changes in their quality of life before and after treatment, not only regarding physiologic aspects (eg, chewing and speaking ability), but also in terms of psychologic and social aspects (eg, self-confidence, no longer feeling socially excluded, and ability to participate in various social situations without anxiety).<sup>16</sup>

The results of this review also indicate that a longer period of adjustment is required for removable dentures than for fixed constructions. The duration of follow-up should be tailored to the type of oral rehabilitation; there may be a more immediate response in OHRQoL scores after treatment with an implant-supported fixed prosthesis than with a removable denture. John et al<sup>10</sup> and Szentpétery et al<sup>11</sup> found that a follow-up period of

1 month was too short to assess changes in quality of life after treatment with removable dentures. However, after a longer follow-up interval (6 to 12 months), they found no differences in OHRQoL scores associated with fixed prostheses, removable partial dentures, or conventional complete dentures.

#### Validity and Quality of OHRQoL Studies

The importance of oral health is subjective and depends on the respondent's frame of reference.<sup>17</sup> Gift and Atchison<sup>18</sup> discussed the domains that may be relevant to measure the relationship between oral health, OHRQoL, health, and health-related quality of life in an aging population. The General Health Questionnaire with 12 fields (GHQ-12) was compared with the OHIP-14, and the authors found a strong correlation between the measurement procedures for patients who were treated with implant-supported fixed prostheses for multiple types of tooth loss.<sup>19</sup> Slade et al<sup>20</sup> reported on 11 OHRQoL instruments and concluded that it is unlikely that a single instrument can appropriately cover all dimensions of OHRQoL. However, there remains an urgent need for such an instrument that can be applied at both individual and population levels. This type of general instrument could then be supplemented by more refined, specialized instruments as needed for the specific research question addressed by a given study.

In general, questionnaires are considered adequate to identify sociodemographic variations and thus provide useful information for strategic health care decisions. However, Walton and MacEntee<sup>21</sup> noted that a structured questionnaire or psychometric instrument is less sensitive than interviews with open-ended questions for revealing subjects' feelings, expectations, and behavior.

McGrath and Bedi<sup>22</sup> compared a functional approach (questionnaire with fixed response options) with a hermeneutic approach (interviews subjected to content analysis). Both approaches produced similar results, but the fixed response options generated a higher proportion of subjects who reported social and psychologic impacts. This may be due to the dynamics of an interview, in which the respondent may focus on aspects which he or she assumes will interest the interviewer most, such as technical outcomes in the case of dentistry. This disadvantage can be circumvented by using a more structured interview, in which questions about social and psychologic factors are included.

When evaluating the results of studies that do include measurements of OHRQoL, it is important to note that the amount of time between the end of treatment and measurement can affect the responses.

Ring et al<sup>23</sup> evaluated how answers to questions about quality of life change over time, creating a "response shift." In patients who received conventional dentures, a 3-month follow-up revealed that patients' quality of life had been worse than they originally estimated at baseline because they had previously considered their problems as "a normal part of life." Initial underestimation of the effect of oral health problems on quality of life at baseline may therefore affect the estimated effect of the treatment. This finding may explain why patients with complete dentures who received new well-functioning prostheses do not show improved quality of life. In both quantitative and qualitative studies, the ability of patients to adapt to an ongoing problem should be taken into account when interpreting data based on patients' experiences. It should also be noted that individual answers are always context-bound.<sup>17</sup>

The patient's relationship to the clinician may also affect the evaluation, although this is more pronounced in measurements of patient satisfaction.<sup>24</sup> Patient satisfaction is not a measure of quality of life but can be a factor that affects quality of life.<sup>25</sup>

#### Conclusions

Few quantitative studies have evaluated OHRQoL with validated protocols. However, drawing from a handful of articles of high or medium quality, this review concluded that all oral rehabilitation methods investigated have positive effects on quality of life; some studies indicate that these effects may be substantial. The results from one study suggested that the adjustment period for removable dentures is longer than for tooth- or implant-retained prostheses.

This survey of quantitative studies using OHRQoL measures yielded meager results. The authors recommend that future studies should be based on a combined quantitative and qualitative approach to achieve a more comprehensive analysis of how missing teeth and various treatment methods affect patients' lives and quality of life.

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#### Literature Abstract

## Elective versus therapeutic neck dissection in the clinically node-negative neck in early oral cavity cancers: Do we have the answer yet?

This editorial examined current guidelines for the management of the clinically node-negative neck in early oral cancers with either elective or therapeutic neck dissection. The current guidelines recommend elective neck dissection (END) when the probability of occult metastasis is greater than 20%. However, these guidelines are based on a mathematic model proposed by Weiss et al and not validated clinically. There are also conflicting results from numerous retrospective studies on the superiority of END over therapeutic neck dissection for the clinically node-negative neck in early oral cancers. Only one of four randomized controlled trials (RCTs) that attempted to validate the guidelines was in favor of END. However, these RCTs had insufficient sample sizes and limitations in their methodologies. To overcome their small sample sizes, a meta-analysis was conducted by Fasunla et al. The meta-analysis concluded that the summary effect was significantly in favor of END (fixed-effects model RR = 0.57, 95% confidence interval [CI] = 0.36 to 0.89, P = .014; random-effects model RR = 0.59, 95% CI = 0.37 to 0.96, P = .034). However, there were numerous drawbacks in the meta-analysis, which resulted in the findings being considered as Level B evidence according to the Sackett classification. The authors of this editorial concluded that there is still no definitive evidence for the management of the clinically node-negative neck in early oral cancers. Hence, there is need for a well-conducted RCT with sufficient sample size and meticulous follow-up of patients.

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