Clinical Practice Guideline

May 2025

Summary

Tooth wear of permanent elements

KENNIS INSTITUUT MONDZORG KIMO

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INTRODUCTION

Target group

- The guideline is aimed at professional oral care in general.
- The target group of this guideline is primary: dentists, dental hygienists and orthodontists.
- In addition, the guideline deserves the attention of oral and oral surgeons, general practitioners, ENT specialists and MDL doctors.
- The target population of this guideline is all people with permanent teeth.

INTRODUCTION

Glossary

Tooth wear: a multifactorial (chemical-mechanical) process, which leads to cumulative loss of the hard dental tissues (enamel, dentin, cement). It is not the result of caries, resorption or an accident. Tooth wear is (almost) always a combination of processes previously known as erosion, attrition and abrasion.

Functional Dental Wear: Established Tooth Wear in combination with:

- patient complaints, such as sensitivity and/or pain, impaired aesthetics, difficulty chewing and/or speaking, crumbling teeth and/or restorations, impaired oral health-related quality of life and/or;
- estimation that the function of the teeth is threatened and/or;
- estimating that preventive action does not slow down the progression of tooth wear.

Dental functions: In addition to a role in food processing (e.g. chewing), teeth have important functions in speech articulation and contribute to cultural and aesthetic values with social and psychological impact.

Causes of tooth wear:

- mechanical intrinsic: wear and tear due to tooth-to-tooth contact on occluding and articulating contact surfaces of the teeth (e.g. clenching, grinding);
- mechanical extrinsic: wear and tear, not due to function or parafunction, as a result of, for example, biting your nails, chewing on hard food, biting down on a pen or brushing hard with a brush;
- chemical intrinsic: wear and tear due to acids, due to intrinsic factors (e.g. stomach acid problems or eating disorders);
- chemical extrinsic: wear and tear due to acids, due to food intake (e.g. acidic drinks and/or food, or other exposure to acids),

Screening: process of systematically checking patients for oral health problems without there being any previous indications (e.g. complaints or previously recorded problems) for such oral health problems. The goal of screening is to identify oral health problems at an early stage so that timely intervention is possible and serious consequences can be prevented.

Diagnostics: process of identifying and diagnosing oral health problems and conditions in patients. The goal of diagnostics is to make an accurate diagnosis so that appropriate treatment and monitoring can be instituted. **Monitoring:** process of systematically tracking changes, improvements or deteriorations, of the oral health situation of patients after an intervention. The purpose of monitoring is to recognize and prevent potential problems early and to evaluate the effectiveness of treatment.

Preventive measures: measures/advice aimed at preventing oral health problems or their worsening. By applying these preventive measures, patients can improve their oral health (in the long term) and prevent (further) problems.

Bite protection plate: also known as protection plate, grinding plate, bite plate or splint. It is a custom-made plastic plate on the upper or lower dentition, which aims to protect the teeth. This is distinguished from a stabilization bite plate, which is used for complaints in the masticatory system (temporomandibular joint pain and/or chewing muscle pain).

TABLE. TWES 2.0

Table. TWES 2.0 quantification

TWES 1: Mild wear • Occlusal/incisal: wear limited to the enamel • Non-occlusal/non-incisal: abrasion limited to the enamel
TWES 2: Moderate wear • Occlusal/incisal: wear with dentin exposure and loss of clinical crown height ≤1/3 • Non-occlusal/non-incisal: abrasion with dentin exposure (<50% surface area)
TWES 3: Severe wear and tear • Occlusal/incisal: wear with dentin exposure and loss of clinical crown height >1/3 - <2/3 • Non-occlusal/non-incisal: abrasion with dentin exposure (≥50% surface area)
TWES 4: Extreme wear • Occlusal/incisal: wear with dentin exposure and loss of clinical crown height ≥2/3 • Non-occlusal/non-incisal: abrasion with dentin exposure (complete loss of enamel or with exposure of the pulp)

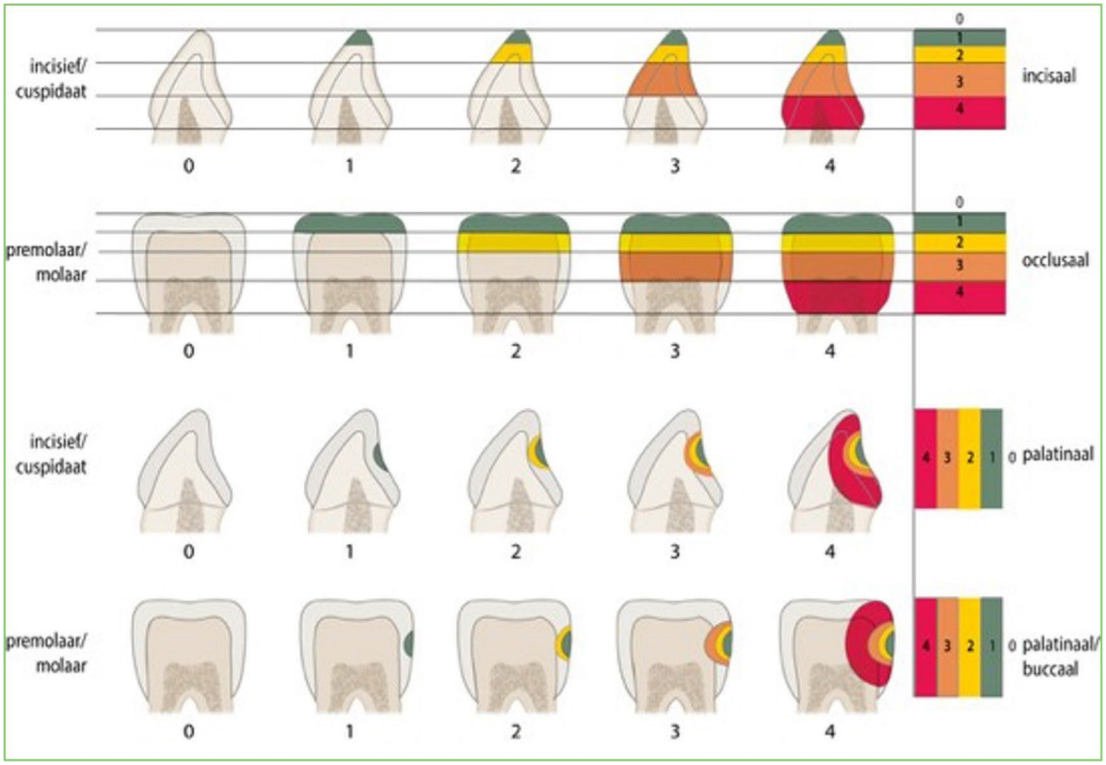
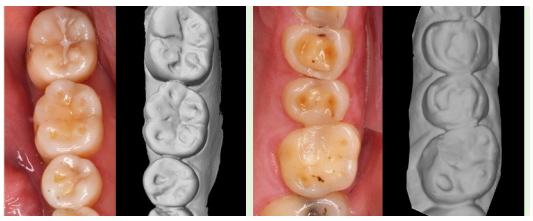
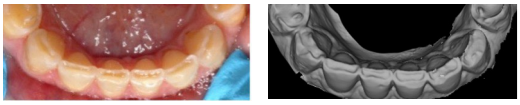
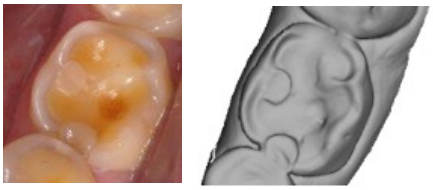
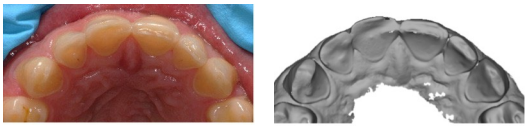


Figure. Quantification of tooth wear using TWES 2.0

Etiology

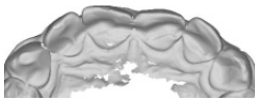
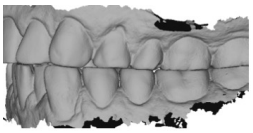
The etiology of tooth wear is (almost) always multifactorial. Nevertheless, it is important to try to estimate the proportion of chemical and mechanical causes of the observed tooth wear, so that preventive measures can be taken accordingly.

There are clinical signs that indicate the influence of mainly chemical factors:

Cupping and cratering Cupping is the concave loss of enamel on the nodules of premolars and molars, resulting in small dimples. As the wear process progresses, this wear leads to larger defects, known as cratering.	 Cupping Cratering
Grooving Longitudinal wear (slot formation) due to abrasion of enamel and exposure of dentin to the incisal edges of incisives. Due to the higher demineralization sensitivity of dentin and mechanical abrasion, a discrepancy in height arises between the higher enamel and the deeper dentin.	
High-quality restoration Restoration materials (amalgam, composite) that protrude above hard dental tissues (enamel, dentin). This phenomenon is a Result of the increased resistance of restorative materials to acid action.	
Enamel cuff A persistent, thin enamel band/border along the gingiva, mainly on the palatal surfaces of the upper front and occasionally on premolars and molars. This is attributed to the protective role of crevicular fluid against acid action.	

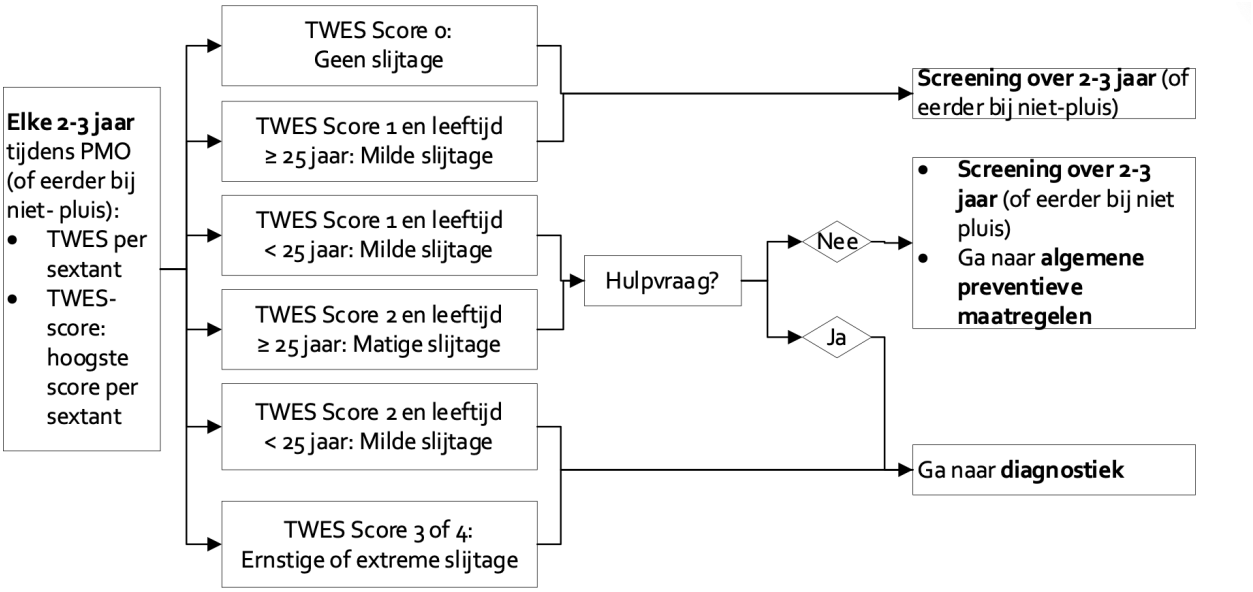
ETIOLOGY

And there are clinical signs that indicate the influence of mainly mechanical factors:

Inbite lower front in upper front Imprint of the lower incisives on the palatal plane of the upper incisives, at the site of maximum occlusion.	
Teeth that fit together during proal or lateral movements Pattern of antagonizing teeth being worn together. The location depends on the (mal)occlusion and articulation.	
Enamel and dentin wear to the same extent Uniform breakdown of enamel and dentin, resulting in a flat wear pattern reminiscent of a 'cheese slicer effect'. This phenomenon is typically observed on occlusal and articulating surfaces, where there is no (significant) height difference between enamel and dentin. This contrasts with patterns such as grooving or cupping, with deeper wear of the dentin.	

SCREENING

Screening



Entry table for TWES screening

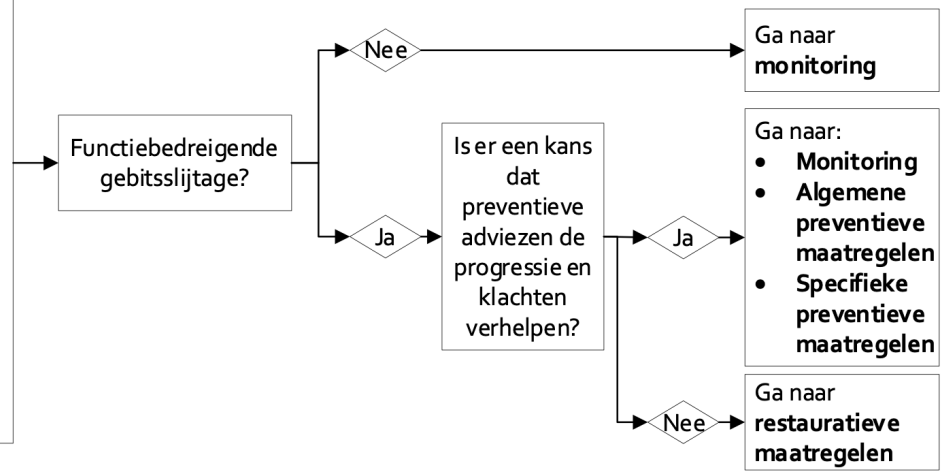
Sextant 1 occlusaal:	Sextant 2 incisaal:	Sextant 3 occlusaal: .....
	Sextant 2 palatinaal:	
Sextant 6 occlusaal:	Sextant 5 incisaal:	Sextant 4 occlusaal: .....

Diagnostics

Bij de patiëntengroepen:
- TWES 1 < 25 jaar met hulpvraag/klachten
- TWES 2 < 25 jaar
- TWES 2 ≥ 25 jaar met hulpvraag/klachten
- TWES 3 of 4

Breng oorzaken, risicofactoren en symptomen in kaart middels:
- TWES-kwantificatie per element (intraoraal of scans of lichtfoto's of modellen)
- TWES-kwalificatie o.b.v. verschijningsvormen
- Vragenlijst(en) en evt. speekselonderzoek

Stel Diagnose o.b.v. kwantificatie, kwalificatie en vragenlijst



Input table for TWES diagnostics

	Sextant 1					Sextant 2						Sextant 3				
Elementen bovenkaak	18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28
Buccaal																
Occlusaal/ incisaal																
Palatinaal																
Elementen onderkaak	48	47	46	45	44	43	42	42	31	32	33	34	35	36	37	38
Buccaal																
Occlusaal/ incisaal																
Linguaal																
	Sextant 6					Sextant 5						Sextant 4				

Causal and risk factors questionnaire

General health

Drug use, depression, stress and/or the use of medicines can potentially have an effect on tooth wear. Have you had experience of drug use, depression or stress, or long-term use of drugs in your life?

	Ja	Nee	Zo ja, kunt u dit kort toelichten?	Wanneer speelde dit?
Geneesmiddelen*	O	O		
Depressie of stress/spanning	O	O		
Drugsgebruik	O	O		

* dit is aanvullend op de medische anamnese en actueel medicatieoverzicht (zoals beschreven in de KNMT-richtlijn Patiëntendossier, 2020)

Heartburn and reflux

How often have you suffered in the past week from:

	Aantal keer			
	0	1	2-3	4-7
Een brandend gevoel achter uw borstbeen (brandend maagzuur)?	O	O	O	O
Dat uw maaginhoud (drank of voedsel) weer naar boven komt naar uw keel of mond (regurgitatie)?	O	O	O	O
Moeite met een goede nachtrust vanwege brandend maagzuur en/of regurgitatie?	O	O	O	O
Hoe vaak heeft u extra medicijnen geslikt voor uw brandend maagzuur en/of regurgitatie, ander dan wat uw arts u heeft aangeraden/voorgeschreven? (zoals Rennie®)?	O	O	O	O

	Ja	Nee
Geeft u vaak over?	O	O
Is bij u een eetstoornis vastgesteld?	O	O

Causal and risk factors questionnaire

Oral activities

Things you do with your mouth can affect the wear and tear of your teeth. That is why we would like to get an impression of how often you perform each of the activities below. Base your answers on the **past month**. If the frequency of the activity varies, choose the highest option.

	Nooit	Soms	Vaak
Tanden of kiezen op elkaar klemmen of knarsen als u slaapt	O	O	O
Tandenknarsen als u wakker bent	O	O	O
Tanden of kiezen op elkaar klemmen als u wakker bent	O	O	O
Uw tong hard tegen uw tanden of kiezen duwen	O	O	O
Voorwerpen zoals haar, pijp, potlood, pen, vingers, nagels, vape, piercing etc. tussen uw tanden of kiezen houden, of erop bijten	O	O	O
Op een muziekinstrument spelen waarbij uw mond of kaak betrokken zijn (bijv.: houten of koperen blaasinstrumenten)	O	O	O
Voedsel alleen aan één kant kauwen	O	O	O

Nutritional information

Laat u drinken wel eens 'walsen' (bijv. wijn) of 'bruisen' (bijv. frisdrank) in uw mond?	O Nooit	O Zelden	O Vaak	O Altijd
Als u wat te drinken neemt (bijv. een glas frisdrank), hoe zou u het drinken daarvan dan omschrijven?	O Ik drink het vlot op (bijv. binnen enkele minuten)	O Ik doe er wel een tijdje mee	O Ik doe bijv. wel een dagdeel met één consumptie	

Have you drunk any of the following drinks in the past period? If so, what have you drunk and how many glasses per week?

	Ja	Nee	Zo ja, wat?	Hoeveel consumpties per week?
Frisdrank (incl. water met smaak), vruchtensap, mixdrank, sportdrank, energiedrank	O	O		
Wijn	O	O		

Causal and risk factors questionnaire

Nutritional information

Have you eaten any of the following in the past period? If so, what and how many times a week?

	Ja	Nee	Zo ja, wat?	Hoe vaak per week?
Fruit	O	O		
Snoep	O	O		
Kauwgom	O	O		
Zure sauzen of dressings, inclusief azijnproducten	O	O		
Andere zure producten	O	O		

Mouth dryness

	Ja	Nee
Mijn mond voelt vaak droog aan wanneer ik eet	O	O
Mijn mond voelt vaak droog aan	O	O
Het kost mij vaak moeite om droog voedsel te eten	O	O
Ik heb vaak moeite met het doorslikken van bepaalde voedingsmiddelen	O	O
Mijn lippen voelen vaak droog aan	O	O

DIAGNOSTICS

Possibly chewing-stimulated saliva testing

- Have patients chew a piece of paraffin for 1 minute;
- Then collect saliva for 2 minutes in a plastic cup, which has been weighed in advance on a scale;
- Then weigh the cup again and determine the saliva weight;
- Determine the saliva secretion rate in ml/minute;
- Determine the pH of the saliva with a pH strip;
- If measurements have been taken at different times, measurements must be consistent over time.

Interpretation of chewing-stimulated saliva research

Secretiesnelheid in ml/min	Interpretatie	Zuurgraad (pH)	Interpretatie
> 2,00	Hypersalivatie	> 8,0	Abnormaal
2,00-0,70	Normaal	8,0-7,0	Normaal
0,70-0,50	Hyposalivatie	6,9-6,0	Riskant
< 0,50	Ernstige hyposalivatie	< 6,0	Pathologisch

Diagnosis

Make the diagnosis based on quantification, qualification and questionnaire with the following options*: The tooth wear can be described as:

generalized or Localized	mild moderately severe extreme	not a threat to the job or Function-threatening	, both chemical and mechanical in nature , mainly chemical in nature , mainly mechanical in nature

* E.g. 'Female of 22 years with local (sextant 2) mild (grade 1) tooth wear, mainly mechanical in nature (bite and fit together)' or 'Male of 47 years with generalized (sextants 1, 3, 4 and 6) moderate (grade 2) tooth wear and localized (sextants 2 and 5) extreme (grade 4) function-threatening (see list) tooth wear, both chemical (cratering, high-quality restorations, enamel cuff) as mechanical in nature (bite and fitting together)'

MONITORING

Monitoring

Bij de patiëntengroepen: - TWES 1 < 25 jaar met hulpvraag/klachten - TWES 2 < 25 jaar - TWES 2 ≥ 25 jaar met hulpvraag/klachten - TWES 3 of 4

Determine every 2-3 years (or earlier if not fluffy) whether there is progress compared to previous measurements. This can be done with:

- Visual inspection per element (TWES) and/or
- In order of preference of the guideline development committee:
  1. Intraoral 3D scan
  2. Light photos
  3. Plaster models

Pay attention to modifiable risk factors and preventive measures used.

Preventive measures

General preventive measures

See the patient leaflet 'Tooth wear' of the Ivoren Kruis.

Specific preventive measures

Specific preventive measures should be tailored to modifiable risk factors that have been identified in the patient in question.

Important interventions are:

- Focusing on acid-related factors:
  - In case of reflux: refer to the GP with the request to do a 1-month PPI test (proton pump inhibitor) and possibly to set up additional policy;
  - In case of frequent intake of acidic foods: limit consumption;
- Targeting saliva-related factors:
  - In the case of xerostomia and/or hyposialia: stimulate optimal saliva production (see KIMO guideline for xerostomia and hyposialia related to medication and polypharmacy);
- Focused on mechanical factors:
  - Stimulate awareness of clenching and grinding habits and brushing behavior; consider bite protection plate, consider referral to dentist-gnathologist or orofacial physiotherapist in case of functional problems;
  - Unlearning parafunctions;
  - Limit the use of products that encourage dry mouth and/or clenching/grinding behavior.

As a preventive measure, canine guidance is not recommended.
Evaluate preventive measures in the short term (e.g. after a month).

INDICATION OF RESTORATIVE TREATMENT

Indication of restorative treatment

- In patients without functional tooth wear, restorative treatment of tooth wear is not indicated.
- In patients with function-threatening tooth wear in whom there is a chance that preventive measures limit the symptoms and progression of tooth wear, restorative treatment of tooth wear is not indicated.
- In patients with function-threatening tooth wear in whom there is no (longer) chance that preventive measures are effective against complaints and limiting the progression of tooth wear, restorative treatment of tooth wear can be considered. A minimally invasive treatment is preferable. Discuss this with the patient.
  The implementation of any restorative treatment plan falls outside the scope of this guideline.

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