



Guidance to

Nordic Orofacial Test - Screening

NOT-S



NOT-S was developed by Merete Bakke, Copenhagen; Birgitta Bergendal, Jönköping; Anita McAllister, Stockholm; Lotta Sjögren, Gothenburg; and Pamela Åsten, Oslo; with the support of the Nordic Association for Disability and Oral Health, NFH.

Nordic Orofacial Test NOT-S – screening

Directions for implementation

This screening is intended for persons from three years of age who have difficulties with speech, chewing and swallowing. You should ensure that the patient is able to take part in the examination and understands the instructions. In the case of children under the age of 12, the examination is carried out in collaboration with an adult with good knowledge of the child, for example a parent/close relative, guardian or assistant. The same applies to young people, adults and elderly persons with limited autonomy.

The aim is to be able to identify areas of affected orofacial dysfunction and that need to be further investigated (Bakke et al. 2007). NOT-S may also be used at group level to map out orofacial functions in the context of different diagnoses/diseases. This type of survey has been published for adenoid-tonsillar hypertrophy, ectodermal dysplasia, oromandibular dystonia, Parkinson's disease, Prader-Willi syndrome, Treacher Collins syndrome, TMJ problems, asthma, cerebral palsy and multiple sclerosis (Lundeborg et al. 2009, Bergendal et al. 2009, Bakke et al. 2011, Saeves et al. 2011, Bakke et al. 2012, Åsten et al. 2012; 2014, Kobayashi et al, Amato et al 2015, Edvinsson et al 2016, Pinto et al 2016 and Gonçalves et al 2016). By collecting reference data and identifying the degree and type of problem in different patient and age groups, *orofacial dysfunction profiles* can be created as a basis for comparative studies (e.g. McAllister and Lundeborg 2013).

NOT-S may be used by all types of dental personnel after brief instructions. There are no special requirements for equipment except the *NOT-S illustrated manual and examination form*.

The anamnestic part is carried out as a structured interview. The examiner asks the question, explains and asks further questions if necessary, interprets the answer and fills in the form with X = "Yes", 0 = "No" or — = "Not assessed".

The examination comprises typical symptoms and observations of various orofacial functions.

- The *NOT-S interview* contains six domains – sensory function, breathing, habits, chewing and swallowing, drooling and dry mouth (I-VI).
- The *NOT-S examination* contains six domains – face at rest, nose breathing, facial expression, masticatory muscle and jaw function, oral motor function and speech (1-6).
- The *NOT-S total score* may vary from 0 to 12. Each section produces a maximum of *one* score even if several questions in the same section have been given a positive score. Normal data for children typically vary between 0 and 4 and for young people and adults between 0 and 2.

Directions for continued investigation after screening with NOT-S

Questions to address before continued investigation and possible referral:

- Are the symptoms explained by a previously known diagnosis?
- Are the patient's difficulties congenital or acquired?
- If the patient has an inherited condition – when did the symptoms first occur?
- What course has the condition taken?

In the tables below interlocking questions are suggested (green background) that are intended as guidance for continued investigation. Associated issues (blue background) refer to other domains often associated with the domain in question. In the column to the far right (pink background) symptoms that may need to be further investigated are suggested. These symptoms are found in Table 2 which gives guidance in the matter of choosing a referral agency.

Table 1. NOT-S interview

	Sensory function	Symptom
	<p>A. Does brushing your teeth elicit a gag reflex? Does this happen almost every time?</p> <p><i>Description: Obvious discomfort such as queasiness, vomiting, or</i></p>	Hypersensitivity in the oral cavity
▶	<p><i>Supplementary question: Does choking or vomiting occur in other situations too?</i></p>	
	<p>B. Do you put so much food in your mouth that it becomes difficult to chew? Does this happen every day?</p> <p><i>Description: Doesn't know when the mouth is full.</i></p>	Reduced sensitivity in the oral cavity
▶	<p><i>Supplementary questions: Do you feel whether you have food particles around your mouth when you eat? Do you feel whether you have particles of food left in your mouth after a meal?</i></p>	
II	Breathing	
	<p>A. Do you use any breathing support?</p> <p><i>Description: CPAP, respirator, oxygen, other.</i></p>	
▶	<p><i>Supplementary question: Why do you have respiratory support?</i></p>	
	<p>B. Do you snore much when you sleep? Does this happen almost every night?</p> <p><i>Description: Snoring or apnoea. Does not apply to symptoms from asthma or allergies.</i></p>	Obstacles to breathing Weakened breathing muscles
▶	<p><i>Supplementary question: Does apnoea or strong intakes of air (gasping for air) occur during sleep?</i></p>	
III	Habits	
	<p>A. Do you bite your nails, or suck your fingers, or other objects every day?</p> <p><i>Description: Use of a pacifier/sucking on the fingers is not assessed under 5 yrs of age.</i></p> <p>B. Do you suck or bite your lips, your tongue, or your cheeks every day?</p> <p>C. Do you bite your teeth together hard or grind your teeth during the day?</p>	Bite deviation/malocclusion Tooth wear Changes in mucous membrane/ soft tissue injury
▶	<p><i>Supplementary questions: Are there neurological symptoms such as, for example, epilepsy or impaired motor function? Is there any psychological stress? Are there bite sores on lips, cheeks or tongue?</i></p>	

<p>IV Chewing and swallowing</p> <p>A. Does not eat with the mouth (nasogastric tube, gastrostomy or other). Skip question B–E.</p> <p>B. Do you find it difficult to eat foods with certain consistencies?</p> <p><i>Description: Exclude allergies and special diets such as vegetarian, vegan, and gluten-free.</i></p> <p>▶ <i>Supplementary question: Which consistencies are excluded and why? Is your chewing ability affected by tooth problems or pain?</i></p> <p>C. Does it take you 30 minutes or more to eat a main meal?</p> <p>▶ <i>Supplementary question: Why does it take such a long time to eat?</i></p> <p>D. Do you swallow large bites without chewing?</p> <p>▶ <i>Supplementary question: Why is the food swallowed unmasticated?</i></p> <p>E. Do you often cough during meals?</p> <p><i>Description: It happens at almost every meal.</i></p> <p>▶ <i>Supplementary questions: Do you have a gurgly voice quality after a meal? Have you had repeated bronchial infections/pneumonia? Do you often choke?</i></p> <p>▶ <i>Supplementary question: Is your weight satisfactory in relation to your height and age?</i></p>	<p>Delayed eating development</p> <p>Lack of appetite</p> <p>Chewing difficulties</p> <p>Poor oral health /poor dental status /denture problems</p> <p>TMJ problems</p> <p>Swallowing difficulties</p> <p>Malnutrition</p>
<p>V Drooling</p> <p>A. Do you get saliva in the corner of your mouth or on your chin almost every day?</p> <p><i>Description: Needs to wipe the mouth. Does not apply during sleep.</i></p> <p>▶ <i>Supplementary question: Is drooling a problem for you, for your family or for your environment?</i></p>	<p>Drooling</p> <p>Neurological disorder</p>
<p>VI Dryness of the mouth</p> <p>A. Do you have to drink to be able to eat a cracker?</p> <p>▶ <i>Supplementary questions: Do you use anything to wet your lips in daytime? Do you wake at night because you are thirsty? Are you troubled by dry and cracked lips practically every day? Do you take medicine/medicines every day?</i></p> <p>B. Do you suffer from pain in the mucous membranes in your mouth or on your tongue?</p> <p><i>Description: Recurrent pain or burning sensation at least once a week. Does not apply to toothache or vesicles (blister-like lesions) in the mouth.</i></p> <p>▶ <i>Supplementary questions: Do you have a fungus infection in your mouth? Do you have a vitamin or iron deficiency?</i></p>	<p>Dry mouth</p> <p>Fungus infection</p> <p>Vitamin or iron deficiency</p>

Table 2. NOT-S examination

1	Face at rest	Symptom
	<p>A. Asymmetry</p>	Facial palsy
	<p>Description: Concerns both the skeleton and soft tissues.</p>	Facial deformity
	<p>B. Deviant lip position</p>	Tonal deviation – Dystonia
	<p>Description: Open mouth or other deviations more than 2/3 of the time.</p>	Mouth breathing
▶	<p>Associated questions: Does drooling occur? Compare "V. Drooling" Is the patient's mouth dry? Compare "VI. Dry mouth". Are there breathing difficulties? Compare "II. Breathing" och "2. Nose breathing".</p>	Bite deviation /malocclusion
	<p>C. Deviant tongue position</p>	
	<p>Description: Tip of the tongue visible between the teeth more than 2/3 of the time.</p>	
	<p>D. Involuntary movements</p>	Tics
	<p>Description: Repeated involuntary movements in the face.</p>	Tremor
▶	<p>Associated questions: Are there oral motor difficulties? Compare "5. Oral motor function".</p>	Dystonia Spasticity
2	Nose breathing	
	<p>A. Close your mouth and take 5 deep breaths through your nose</p>	Obstacles to breathing
	<p>Criterion: Is unable to take 5 breaths in succession through the nose.</p>	Mouth breathing
	<p>If the patient cannot close their lips, the patient or the examiner can manually help the lips to close. Do not assess if the patient has a cold.</p>	
▶	<p>Associated questions: Are there breathing difficulties? Compare "II. Breathing" Does the patient for the most part have an open mouth? Compare "1. Face at rest". Is the patient's mouth dry? Compare "VI. Dry mouth".</p>	
3	Facial expression	
	<p>A. Close your eyes tightly</p>	Facial palsy
	<p>Criterion: The facial muscles are not activated in a strongly symmetrical fashion.</p>	Blefarospasm
▶	<p>Supplementary questions: Do you have eye problems? Can you close your eyes fully? Do you have difficulty in reopening your eyes?</p>	Muscle weakness
	<p>B. Show your teeth</p>	Hypokinesia
	<p>Criterion: The lip and facial muscles are not symmetrically activated so that the teeth are easily visible.</p>	Oral dyspraxia
	<p>C. Try to whistle (blow)</p>	
	<p>Criterion: Cannot pout and round the lips symmetrically.</p>	
▶	<p>Associated questions: Does drooling occur? Compare "V. Drooling" Is the face asymmetrical when at rest? Compare "1. Face at rest". Are there oral motor difficulties? Compare "5. Oral motor function". Are there speech difficulties? Compare "6. Speech".</p>	

<p>4</p>	<p>Masticatory muscle and jaw function</p> <p>A. Bite hard on your back teeth</p> <p>Criterion: <i>No marked symmetrical activity can be registered when two fingers are held on the jaw muscles (the musculus masseter on both sides).</i></p> <p>B. Open your mouth as wide as you can</p> <p>Criterion: <i>Cannot open their mouth a distance corresponding to the width of the forefinger and the middle finger on the patient's left hand. If the front teeth are missing, use a three-finger width as a measure.</i></p> <p>► Supplementary question: <i>Does it hurt when you chew? Does it hurt when you open your mouth wide? Do you have problems with teeth (dentures) or TMJ problems?</i></p> <p>► Associated questions: <i>Does difficulty in chewing occur? Compare "IV. Chewing and swallowing". Are there other oral motor difficulties? Compare "5. Oral motor function".</i></p>	<p>Muscle weakness</p> <p>TMJ problems</p> <p>Trismus - cramp/spasticity in jaw muscles</p>
<p>5</p>	<p>Oral motor function</p> <p>A. Stick out your tongue as far as you can</p> <p>Criterion: <i>Cannot reach outside of the Vermillion border of the lips with the tip of the tongue.</i></p> <p>B. Lick your lips</p> <p>Criterion: <i>Cannot use the tip of the tongue to wet the lips and cannot reach the corners of the mouth.</i></p> <p>C. "Blow up" your cheeks and hold for at least 3 seconds</p> <p>Criterion: <i>Cannot blow up the cheeks without air leaking out or without making sounds.</i></p> <p>► Supplementary question: <i>When you drink does the liquid go up your nasal passage?</i></p> <p>D. Open your mouth wide and say ah-ah-ah [a]!</p> <p>Criterion: <i>No marked elevation of the uvula and the soft palate can be observed.</i></p> <p>► Associated questions: <i>Are there chewing and swallowing difficulties? Compare "V. Chewing and swallowing". Does drooling occur? Compare "V. Drooling" Is the facial expression affected? Compare "1. Face at rest". Are there speech difficulties? Compare "6. Speech".</i></p>	<p>Impaired oral motor function</p> <p>Cranial nerve palsy</p> <p>Muscle weakness or neuromuscular disorder</p> <p>Oral dyspraxia</p> <p>Bite deviation /malocclusion</p> <p>Short lingual frenulum</p> <p>Cleft palate</p>
<p>6</p>	<p>Speech</p> <p>A. Does not speak. Skip task B-C.</p> <p>B. Count out loud to ten</p> <p>Criterion: <i>Speech is unclear with indistinct sounds or abnormal nasality. Under 5 years of age, exclude R, S, and TH sounds from the assessment.</i></p> <p>C. Say pataka, pataka, pataka</p> <p>Criterion: <i>Do not assess this in children under 5 years of age.</i></p> <p>► Supplementary question: <i>Do others have difficulty in understanding what you say? Do you have a hearing impairment?</i></p> <p>► Associated questions: <i>Are there other oral motor difficulties? Compare "5. Oral motor function". Are there chewing and swallowing difficulties? Compare "V. Chewing and swallowing". Does drooling occur? Compare "V. Drooling"</i></p>	<p>Delayed speech and language development</p> <p>Anarthria</p> <p>Dysarthria</p> <p>Verbal dyspraxia</p> <p>Stuttering – rapid speech</p> <p>Speech sound or voice disorder</p>

Table 3. Symptoms that may be cause for further investigation and relevant referral agencies

Symptoms for investigation		Proposed referral agencies		
		Doctor	Dentist	SLP*
Perceptual motor deviations				
	Hypersensitivity in the oral cavity	x	x	x
	Reduced sensitivity in the oral cavity	x	x	x
Respiratory difficulties				
	Obstacles to breathing	x	x	
	Weakened breathing muscles	x		
	Mouth breathing	x	x	x
Odontological problems				
	Bite deviation/malocclusion		x	
	Tooth pain		x	
	Fungal infection	x	x	
	Denture problems		x	
	Tooth wear		x	
	Changes in mucous membrane/soft tissue injury		x	
	Poor oral health		x	
	Dry mouth		x	
	TMJ problems		x	
	Orofacial pain		x	
	Short lingual frenulum	x	x	x
Craniofacial deformity				
	Cleft palate	x	x	x
	Facial deformity	x	x	
	Macroglossy/microglossy	x	x	x
Neurological disorder				
	Impaired oral motor function	x	x	x
	Cranial nerve palsy	x	x	x
	Muscle weakness	x	x	x
	Tonal deviation – Dystonia	x	x	x
	Blefarospasm	x		
	Tics	x		
	Tremor	x		
	Trismus - cramp/spasticity in jaw muscles	x	x	
Eating difficulties/Drooling				
	Malnutrition, vitamin deficiency	x		
	Lack of appetite	x		
	Delayed eating development			x
	Chewing difficulties		x	x
	Swallowing difficulties	x		x
Speech difficulties				
	Delayed speech and language development			x
	Oral/verbal dyspraxia			x
	Anarthria/dysarthria			x
	Stuttering – cluttering			x
	Speech sound or voice disorder	x		x
	Dry mouth		x	

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