

Ear, Nose, Throat, and Related Structures



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Introduction

This chapter provides criteria for evaluating permanent impairments resulting from principal dysfunction of the ear, nose, throat, and related structures. Assess permanent impairment ratings of these structures by evaluating losses in structure or the following functions: hearing; equilibrium; respiration; mastication, olfaction, and taste; speech and voice; and the effect of these losses on the ability to perform activities of daily living. Impairment criteria, listed in earlier editions of the *Guides*, were adapted from the American Academy of Otolaryngology–Head and Neck Surgery.¹ Abbreviations and their definitions are listed in the Glossary.

The following sections have been revised for the fifth edition: a new section has been added on the evaluation of voice impairment, facial disorders and disfigurements have been combined, and case examples have been added to the impairment classes.

11.1 Principles of Assessment

Before using the information in this chapter, the *Guides* user should become familiar with Chapters 1 and 2 and the Glossary. Chapters 1 and 2 discuss the *Guides*' purpose, applications, and methods for performing and reporting impairment evaluations. The Glossary provides definitions of common terms used by many specialties in impairment evaluations.

Assistive devices *must not* be used during the determination of a hearing impairment rating. The use of such devices might give a false impression of a subject's sensitivity and distort the need to take hearing conservation or other indicated measures. As stated in Chapter 1, report measured hearing with and without an assistive device. However, only the measurement without the assistive device should be used to determine the impairment rating.

11.1a Interpretation of Symptoms and Signs

Begin the evaluation with an inquiry into specific symptoms and their severity, duration, and manner of onset. The history, physical examination, and diagnostic studies may enable identification of the diagnosis, a management plan, and prognosis. Since the ear, nose, throat, and related structures have distinct functions, disorders of each system will be covered separately in this chapter. Permanent impairments of each system with nonoverlapping functional losses are evaluated separately and then combined.

Some impairment classes refer to limitations in the ability to perform daily activities. When this information is subjective and possibly misinterpreted, it should not serve as the sole criterion upon which decisions about impairment are made. Rather, obtain objective data about the severity of the findings and the limitations and integrate the findings with the subjective data to estimate the degree of permanent impairment.

11.1b Description of Clinical Studies

Multiple and diverse tests are used to investigate the ear, nose, throat, and related structures. Some of these tests are discussed in the relevant organ system section and summarized in Table 11-10.

11.2 The Ear

The ear consists of the auricle, the external canal, the tympanic membrane, the ossicles, the middle ear, the eustachian tube, the mastoid, and the internal ear. The auditory and vestibular systems include the ear and central nervous system pathways.

The ear provides sensorineural input critical to the senses of hearing and balance. Hearing enables contact with environmental cues (eg, those that alert) and enables us to communicate socially. Balance contributes to maintenance of equilibrium in relation to the environment. Balance function is mediated by dynamically monitoring information about the position of the head, eyes, trunk, and joints at rest and with activity. Although hearing and balance disturbances can be objectively measured, other conditions, such as chronic otorrhea, otalgia, and tinnitus,² are subjective, should be noted, but cannot be measured independently of the individual's self-reports.

Permanent hearing impairment is a permanently reduced hearing sensitivity, outside the range of normal for the individual or based on population normal values.³ Hearing should be evaluated after maximum rehabilitation has been achieved and when the impairment is no longer accelerating beyond an age-appropriate rate.⁴ Evaluate hearing impairment based upon the individual's binaural hearing, determined from the pure-tone audiogram.

11.2a Criteria for Rating Impairment Due to Hearing Loss

Criteria for evaluating hearing impairment are established through hearing threshold testing, which serves as the most reproducible of the measures of hearing. Therefore, estimate an impairment percentage based on the severity of the hearing loss, which accounts for changes in the ability to perform activities of daily living. **Tinnitus** in the presence of unilateral or bilateral hearing impairment may impair speech discrimination. Therefore, add up to 5% for tinnitus in the presence of measurable hearing loss if the tinnitus impacts the ability to perform activities of daily living.

In the calculation of a hearing impairment rating, no correction for presbycusis should be made because: (1) the method below calculates the degree of hearing and assigns a rating, regardless of cause (eg, age, injury, or noise exposure); (2) age correction would result in a reduced binaural impairment score that would thus underestimate the true magnitude of the hearing impairment; and (3) estimation of the relative contributions of various causes of binaural hearing impairment is a clinical process (apportionment or allocation) that is separate from the calculation of binaural hearing impairment.

Hearing impairment is measured by evaluating hearing in each ear separately and both ears together, based on audiometric measurements. Hearing impairment is reported in each ear separately and both ears together.

Audiometric Measurements to Determine Hearing Impairment

In determining impairments, the following steps should be taken.

1. Test each ear separately with a pure-tone audiometer and record the hearing levels at 500, 1000, 2000, and 3000 Hz. It is necessary that the hearing level for each frequency be determined in every subject. The following rules apply for extreme values:
 - a. If the hearing level at a given frequency is greater than 100 dB or is beyond the range of the audiometer, the level should be taken as 100 dB.
 - b. If the hearing level for a given frequency has a negative value (eg, -5 dB), the level should be taken as 0 dB.
2. Add the four hearing levels (dB) for each ear separately. Hearing levels are determined according to ANSI Standard S3.6-1996.⁴
3. Consult Table 11-1 to determine the percentages of monaural hearing impairment for each ear.
4. Consult Table 11-2 to convert the monaural hearing impairment percentages to a binaural hearing impairment rating.
5. Consult Table 11-3 to determine the impairment of the whole person.

Table 11-1 Monaural Hearing Loss and Impairment*

DSHL†	%	DSHL†	%	DSHL†	%
100	0	190	33.8	285	69.3
		195	35.6	290	71.2
105	1.9	200	37.5	295	73.1
110	3.8			300	75.0
115	5.6	205	39.4		
120	7.5	210	41.2	305	76.9
		215	43.1	310	78.8
125	9.4	220	45.0	315	80.6
130	11.2			320	82.5
135	13.1	225	46.9		
140	15.0	230	48.8	325	84.4
		235	50.6	330	86.2
145	16.9	240	52.5	335	88.1
150	18.8			340	90.0
155	20.6	245	54.4		
160	22.5	250	56.2	345	91.9
		255	58.1	350	93.8
165	24.4	260	60.0	355	95.6
170	26.2			360	97.5
175	28.1	265	61.9	365	99.4
180	30.0	270	63.8	≥370	100.0
		275	65.6		
185	31.9	280	67.5		

*Audiometers are calibrated to ANSI Standard S3.6-1996 reference levels.⁴

†Decibel sum of the hearing threshold levels at 500, 1000, 2000, and 3000 Hz.

*The axes are the sum of hearing levels at 500, 1000, 2000, and 3000 Hz. The sum for the worse ear is read at the side; the sum for the better ear is read at the bottom. At the intersection of the row for the worse ear and the column for the better ear is the hearing impairment (%).

*The axes are the sum of hearing levels at 500, 1000, 2000, and 3000 Hz. The sum for the worse ear is read at the side; the sum for the better ear is read at the bottom. At the intersection of the row for the worse ear and the column for the better ear is the hearing impairment (%).

50.6
50.9 52.5
51.3 52.8 54.4

51.6 53.1 54.7 56.3
51.9 53.4 55.0 56.6 58.1
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55.3 56.9 58.4 60.0 61.6 63.1 64.7 66.3 67.8 69.4 70.9 72.5 74.1 75.6 77.2 78.8
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56.3 57.8 59.4 60.9 62.5 64.1 65.6 67.2 68.8 70.3 71.9 73.4 75.0 76.6 78.1 79.7 81.3 82.8 84.4
56.6 58.1 59.7 61.3 62.8 64.4 65.9 67.5 69.1 70.6 72.2 73.8 75.3 76.9 78.4 80.0 81.6 83.1 84.7 86.3
56.9 58.4 60.0 61.6 63.1 64.7 66.3 67.8 69.4 70.9 72.5 74.1 75.6 77.2 78.8 80.3 81.9 83.4 85.0 86.6 88.1
57.2 58.8 60.3 61.9 63.4 65.0 66.6 68.1 69.7 71.3 72.8 74.4 75.9 77.5 79.1 80.6 82.2 83.8 85.3 86.9 88.4 90.0
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58.8 60.3 61.9 63.4 65.0 66.6 68.1 69.7 71.3 72.8 74.4 75.9 77.5 79.1 80.6 82.2 83.8 85.3 86.9 88.4 90.0 91.6 93.1 94.7 96.3 97.6 99.4
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235 240 245 250 255 260 265 270 275 280 285 290 295 300 305 310 315 320 325 330 335 340 345 350 355 360 365 ≥368

Clinical Studies: Tympanograms: B pattern for right ear and C pattern for left ear. Speech discrimination score: 95% for right ear; 80% for left ear. Acoustic immittance: reveals normal external auditory canal volumes for both ears. Pure tone audiometry reveals the following threshold levels in decibels (dB):

	Right Ear (thousands)							Left Ear (thousands)						
Frequency, Hz	0.5	1	2	3	4	6	8	0.5	1	2	3	4	6	8
Air Conduction	40	55	60	70	80	95	NR	25	30	30	40	40	60	70
Bone Conduction	20	30	15	—	35	—	—	Not tested in left ear						

Diagnosis: Mixed (sensorineural + conductive) hearing impairment, right ear. Mild sensorineural hearing impairment, left ear.

Impairment Rating: 5% impairment of the whole person.

Comment: The decimal sum of hearing threshold levels (DSHL) for the right ear is 225 (40 + 55 + 60 + 70), and the DSHL for the left ear is 125 (25 + 30 + 30 + 40). Combine 225 (worse ear) and 125 (better ear) using Table 11-2 for a binaural hearing impairment rating (BI) of 15.6%. Use Table 11-3 to obtain the 5% whole person impairment rating.

Example 11-2

8% Impairment Due to Hearing Loss

Subject: 65-year-old woman.

History: Repeated ear infections for many years. Hearing loss in both ears and roaring, pulsing, rushing-water tinnitus in both ears. No history of dizziness. Tympanoplasty, left ear, 4 months ago.

Current Symptoms: Difficulty hearing in both ears, but hearing much improved in left ear since tympanoplasty. Still has tinnitus in both ears, which impacts some activities of daily living.

Physical Exam: Retracted right tympanic membrane.

Clinical Studies: Left tympanic membrane shows well-healed graft. Tympanograms: B pattern for right ear. Tympanometry was not performed for left ear due to recent otologic surgery. Speech discrimination scores: 80% for right ear; 85% for left ear. Pure tone audiometry reveals the following threshold levels in decibels (dB):

	Right Ear (thousands)							Left Ear (thousands)						
Frequency, Hz	0.5	1	2	3	4	6	8	0.5	1	2	3	4	6	8
Air Conduction	50	50	55	55	60	85	NR	25	30	40	40	40	60	85
Bone Conduction	15	35	35	—	20	—	—	0	5	25	—	15	—	—

Diagnosis: Mixed (sensorineural + conductive) hearing impairment, bilaterally.

Impairment Rating: 8% impairment of the whole person.

Comment: The DSHL for the right ear is 210 (50 + 50 + 55 + 55), and the DSHL for the left ear is 135 (25 + 30 + 40 + 40). Combine 210 (worse ear) and 135 (better ear) using Table 11-2 for a BI of 17.8%. Add 5% for the presence of tinnitus, giving a BI of 22.8%. Use Table 11-3 to obtain the 8% whole person impairment.

Example 11-3

8% Impairment Due to Hearing Loss

Subject: 64-year-old man.

History: Progressive hearing loss for 13 years. Worked in several noisy environments; used hearing protectors fairly regularly. Exposure to gunfire during 4 years of service in the Marines. General health good. No history of tinnitus or vertigo.

Current Symptoms: Difficulty with communication at home, in restaurants, driving a car, and in noisy environments.

Physical Exam: No abnormalities.

Clinical Studies: Audiologic tests: speech reception threshold of 20 dB. Pure tone audiometry reveals the following threshold levels in decibels (dB):

	Right Ear (thousands)							Left Ear (thousands)						
Frequency, Hz	0.5	1	2	3	4	6	8	0.5	1	2	3	4	6	8
	20	15	60	80	85	85	70	25	15	60	60	65	65	60

Diagnosis: Sensorineural hearing impairment, bilateral.

Impairment Rating: 8% impairment of the whole person.

Comment: The impairment calculated from this audiogram is based on the DSHL. The DSHL for the right ear is 175 (20 + 15 + 60 + 80), and the DSHL for the left ear is 160 (25 + 15 + 60 + 60). Combine 175 (worse ear) and 160 (better ear) using Table 11-2 for a binaural hearing impairment of 23.4%. Use Table 11-3 to obtain the 8% whole person impairment.

11.2b Equilibrium

Equilibrium, or orientation in space, is maintained by the visual, kinesthetic, and vestibular mechanisms. When impairments of equilibrium are predominantly due to or have effects on other organ systems, the impairment should be evaluated in the relevant organ system, eg, disorders of the nervous system (Chapter 13), cardiovascular system (Chapters 3 and 4), and visual system (Chapter 12).

Disturbances of equilibrium may be classified as follows: (1) **vertigo**, a sensation of rotation of the subject or of objects about the subject in any plane; (2) giddiness or lightheadedness, distinguished from vertigo by the absence of feelings of movement²; and (3) abnormalities of postural stability and/or standing balance with or without vertigo. Vertigo may be produced by disorders of the vestibular mechanism and its central nervous system components, including the cerebral cortex, cerebellum, and brain stem, and by eye movements.

Permanent impairment may result from any disorder causing vertigo or disorientation in space. Three regulatory systems—vestibular, ocular (visual), and kinesthetic (proprioceptive)—are related to the vestibulo-ocular reflex. The evaluation of impairments of equilibrium may include consideration of one or more of these mechanisms.^{5,6} This chapter addresses only disturbances in equilibrium due to vestibular disorders.

Clinical evaluations may include electronystagmography,² caloric irrigation, positional and rotatory tests, dynamic posturography, Romberg and tandem Romberg tests, and radiological brain imaging studies. The results of these laboratory tests should be correlated with validated clinical measures of balance and ambulation to determine the true state of equilibratory dysfunction. For other causes of disequilibrium, see the relevant chapter, such as the neurologic system (Chapter 13), for central nervous system disorders.

Vestibular System

Permanent impairment can result from defects of the vestibular (labyrinthine) mechanism and its central connections. The defects are evidenced by loss of equilibrium produced by disturbance or loss of vestibular function.

Complete loss of vestibular function may be unilateral or bilateral. When the loss is unilateral, adequate central nervous system compensation may or may not occur. With total bilateral loss of vestibular function, equilibrium is totally dependent on the kinesthetic and visual systems, which usually are unable to compensate fully for movement or ambulation. Depending on the ability to perform activities of daily living, the percentage of permanent impairment of the whole person may range from 0% to 95%.

Disturbances of vestibular function are evidenced by vertigo (vestibular dysequilibrium) as defined above. Lightheadedness and abnormalities of gait not associated with vertigo are not defined here as being disturbances of vestibular function.

Vertigo may be accompanied by varying degrees of nausea, vomiting, headache, immobility, ataxia, and nystagmus. Movement may increase the vertigo and the accompanying signs and symptoms. Peripheral vestibular (labyrinthine) disorders are often associated with hearing loss and tinnitus. Vestibular disorders may result in temporary or permanent impairments. Evaluation of vestibular impairment should be performed when the condition is stable and maximum adjustment has been achieved, which generally is considered to occur months after resolution of the disease or injury.^{5,6}

The classification in Table 11-4 has been developed for evaluation of those individuals with permanent disturbances of the vestibular mechanism. The impairment ratings reflect the severity of the permanent impairment and the ability of the individual to perform activities of daily living. Since vestibular disorders are dynamic, assessment of permanent impairment should be based on determination of the person's condition after it is stable. Although symptoms may be intermittent, the examiner needs to gauge functioning during episodes with exacerbations. Vestibular impairment as defined here is rated similarly in Chapter 13.

Table 11-4 Criteria for Rating Impairment Due to Vestibular Disorders

Class 1 0% Impairment of the Whole Person	Class 2 1%-10% Impairment of the Whole Person	Class 3 11%-30% Impairment of the Whole Person	Class 4 31%-60% Impairment of the Whole Person	Class 5 61%-95% Impairment of the Whole Person
Symptoms or signs of vestibular dysequilibrium present without supporting objective findings and activities of daily living can be performed without assistance	Symptoms or signs of vestibular dysequilibrium present with supporting objective findings and activities of daily living can be performed without assistance, except for complex activities (eg, riding a bicycle) or certain types of demanding activities related to the individual's work (eg, walking on girders or scaffolds)	Symptoms or signs of vestibular dysequilibrium present with supporting objective findings and activities of daily living cannot be performed without assistance, except for simple activities (eg, self-care, some household duties, walking, and riding in a motor vehicle operated by another person)	Symptoms or signs of vestibular dysequilibrium present with supporting objective findings and activities of daily living cannot be performed without assistance, except for self-care	Symptoms or signs of vestibular dysequilibrium present with supporting objective findings and activities of daily living cannot be performed without assistance, except for self-care not requiring ambulation and home confinement is necessary

Class 1 0% Impairment of the Whole Person
Symptoms or signs of vestibular dysequilibrium present without supporting objective findings and activities of daily living can be performed without assistance

Class 2 1%-10% Impairment of the Whole Person
Symptoms or signs of vestibular dysequilibrium present with supporting objective findings and activities of daily living can be performed without assistance, except for complex activities (eg, riding a bicycle) or certain types of demanding activities related to the subject's work (eg, walking on girders or scaffolds)

Example 11-4**0% Impairment Due to Floating Vestibular Otoconia****Subject:** 70-year-old man.

History: Retired physician; onset of **dizziness** last week when leaning head to right or to left side. Sensation of giddiness with positional change of body but not with turning of head when upright. No nausea or vomiting. Uses the Epley maneuver to reposition otoconia.

Current Symptoms: Asymptomatic; the dizziness has not recurred; no disruption of activities of daily living.

Clinical Studies: ENG study: normal. Dix-Hallpike test: positive, with head rotation to the left and to the right.

Diagnosis: Floating vestibular otoconia.

Impairment Rating: 0% impairment of the whole person.

Comment: Treatment to be repeated as necessary.

Example 11-5**1% to 10% Impairment Due to Labyrinthitis****Subject:** 50-year-old woman.

History: Sudden onset of severe vertigo, nausea, and vomiting. No history of upper respiratory infection, fever, cough, or chills. Confined to bed. Spontaneous nystagmus to left noted. Hearing normal; no tinnitus. Treated with vestibular suppressors. Gradual, slow recovery of ability to ambulate, but unable to walk in the dark for about 1 year.

Current Symptoms: Can perform activities of daily living without assistance. Slightly unsteady when fatigued. Does not tolerate rocking motion (sailboat) without visual fixation of horizon. Unable to ride bicycle, but can drive automobile at night.

Physical Exam: Normal.

Clinical Studies: ENG and caloric studies: no vestibular function of right ear. Other neuro-otologic findings: within normal limits. Audiogram: normal hearing bilaterally. Mastoid X-rays: normal. CT scans of temporal bones: normal.

Diagnosis: Labyrinthitis, probably viral, with total loss of vestibular function, right ear.

Impairment Rating: 10% impairment of the whole person.

Comment: Class 2 impairment, with moderate loss of function.

Class 3

11%-30% Impairment of the Whole Person

Symptoms or signs of vestibular dysequilibrium present with supporting objective findings

and

activities of daily living cannot be performed without assistance, except for simple activities (eg, self-care, some household duties, walking, and riding in a motor vehicle operated by another person)

Example 11-6

11% to 30% Impairment Due to Vestibular Disorders

Subject: 40-year-old woman.

History: Nurse; progressive hearing loss in left ear, increased difficulty with gait, some loss of balance with falling to the left, and slurred speech when fatigued for 3 months. History of hypertension, controlled with beta-blockers. Audiogram showed normal hearing in right ear, 80-dB sensorineural hearing loss in left ear. Tympanograms were type A bilaterally. Acoustic reflex was absent in left ear. Vestibular tests suggested marked left peripheral end-organ lesion. Changes in oculomotor testing suggested brainstem involvement on the left side. Other neuro-otologic tests showed minimal left facial nerve weakness. MRI studies showed large left cerebellopontine angle (CPA) mass involving the left internal auditory canal. At surgery, via the translabyrinthine route, a 4-cm tumor of the left CPA, with secondary brain stem compression, was removed.

Current Symptoms: Walks with broad-based gait with slight limp. Has fallen twice since surgery.

Physical Exam: Slight weakness in lower extremities and control motions of left upper and lower extremities. Left facial paralysis. Total hearing loss in left ear. Left cerebellar tremor, in the upper extremity more than in the lower. Ophthalmologic exam reveals exposure keratopathy without microbial keratitis, left eye.

Clinical Studies: Neuro-otologic and neurologic: total loss of hearing and of vestibular function, left ear. No evident tumor, but changes in brain stem area noted on MRI. Electroencephalogram: no evidence of epileptiform activity. Gait and

balance scores: abnormal for age. Left lateral canthoplasty with insertion of gold weights in left upper eyelid was performed, plus a cross-face sural nerve graft to the left face.

Diagnosis: Large left acoustic neuroma with postoperative total left auditory and vestibular impairments and left facial nerve paralysis.

Impairment Rating: 30% impairment due to vestibular disorders; combine with appropriate ratings for other impairments to determine whole person impairment (see Combined Values Chart, p. 604).

Comment: Preoperatively active. Exercises; walks with some difficulty; can perform self-care and limited household activities; unable to drive a car or to continue to work.

Class 4

31%-60% Impairment of the Whole Person

Symptoms or signs of vestibular dysequilibrium present with supporting objective findings

and

activities of daily living cannot be performed without assistance, except for self-care

Example 11-7

31% to 60% Impairment Due to Chronic Vestibular Disorder

Subject: 43-year-old woman.

History: Dizziness for the past 6 years. Has consulted many physicians. In the past has had gall bladder problems and recurrent renal infections. No history of trauma or surgery. No history of chronic drug ingestion, but currently taking an antidepressant. Nonsmoker.

Current Symptoms: Occasional double vision during past year. Cannot drive. Does self-care slowly because of dizziness. Denies hearing loss. Self-rated as moderately impaired. Requires assistance with daily tasks.

Physical Exam: Hearing within normal limits. Blood pressure is normal.

Clinical Studies: Posturography: abnormal. Exhibits 50% caloric weakness in right ear. No directional preponderance. Rotatory tests: normal. Dix-Hallpike test: normal. Oculomotor tests: normal. Responded poorly to habituation exercises.

Diagnosis: Chronic vestibular disorder.

Impairment Rating: 31% to 60% impairment of the whole person.

Comment: Ophthalmologic evaluation required to evaluate visual complaints.

11.3 The Face

The face, its parts, and its structural components serve multiple functions: protection of underlying structures and organs (such as the eyes), portals of entry for deglutition and respiration, and communication through expression and speech.

The skin covers the body, acts as a physical barrier to underlying structures, provides sensory perception, regulates temperature and body fluids, and resists trauma. See Chapter 8 for primary skin impairments.

The portal for deglutition is the mouth and lips. Disturbances in function can result in drooling or inability to keep food or liquid in the mouth while eating. The lips and mouth also serve in vocal articulation, adding intelligibility to speech. The nose and mouth are the portals of entry for respiration. Impairment may be a result of neurologic disorders, such as partial or complete paralysis of the lips; scar formation and contracture of the lips; or loss of tissue.

The face plays a unique role in communication. No other part of the body serves as specific a function for personal identity and for the expression of thought and emotion. Facial expressions are an integral part of normal living postures. A degree of normalcy is needed for effective verbal and nonverbal communication. Facial anatomy contributes to identity, expression, and normal functioning, and to the appearance of the forehead and cheeks; eyes, eyelids, and eyebrows; lips and mouth; nose; and chin and neck. The face is such a prominent feature that it plays a critical role in the individual's physical, psychological, and emotional makeup. Facial disfigurement can affect all of these components and can result in social and vocational handicaps and even psychiatric impairment.

11.3a Criteria for Rating Impairment Due to Facial Disorders and/or Disfigurement

To evaluate permanent impairment due to a disorder or disfigurement of the face, consider changes in anatomy and function and the effect of the impairment on the ability to perform activities of daily living. This section deals with permanent impairment as it relates mainly to the face's structural integrity. For loss of function involving other aspects of the functioning of the face, refer to the specific organ system involved and combine the structural integrity loss with the relevant loss of function. Loss of structural integrity can result from cutaneous disfigurement, such as that due to abnormal pigmentation or scars, or from loss of supporting structures, such as soft tissue, bone, or cartilage of the facial skeleton. Other information on cutaneous disfigurement appears in Chapter 8 (The Skin).

Disfigurement of the face can result from many causes, particularly burns, traumatic injury, surgery, infections, or dysplasia. Effects on individuals can vary tremendously, as can remaining function. Total disfigurement of the face after treatment should be deemed a 16% to 50% impairment of the whole person, dependent also upon the degree of functional loss. For the assessment of psychosocial impairment due to disfigurement, refer to Chapter 14 on mental and behavioral disorders.

Facial disfigurement may be considered total if it is severe and grossly deforming of the face and features. Such disfigurement must involve at least the entire area between the brow line and the upper lip on both sides. Severe disfigurement above the brow line should be deemed to be, at a maximum, 1% impairment of the whole person. If disfigurement is severe below the upper lip, it may be deemed to be 8% impairment of the whole person. Specific, prominent facial disfigurements are estimated as shown in Table 11-5.

Table 11-5 Criteria for Rating Impairment Due to Facial Disorders and/or Disfigurement

Class 1 0%-5% Impairment of the Whole Person	Class 2 6%-10% Impairment of the Whole Person	Class 3 11%-15% Impairment of the Whole Person	Class 4 16%-50% Impairment of the Whole Person
Facial abnormality limited to disorder of cutaneous structures, such as visible scars or abnormal pigmentation (refer to Chapter 8 for skin disorders) or mild, unilateral, total facial paralysis or nasal distortion that affects physical appearance	Facial abnormality involves loss of supporting structure of part of face, with or without cutaneous disorder (eg, depressed cheek, nasal, or frontal bones)	Facial abnormality involves absence of normal anatomic part or area of face, such as loss of eye or loss of part of nose, with resulting cosmetic deformity; combine with any functional loss, eg, vision (Chapter 12) or severe, unilateral, total facial paralysis or mild, bilateral, total facial paralysis	Massive or total distortion of normal facial anatomy with disfigurement so severe that it precludes social acceptance; combine with any mental and behavioral impairment (Chapter 14) or severe, bilateral, total facial paralysis or loss of a major portion of or entire nose

Class 1
0%-5% Impairment of the Whole Person

Facial abnormality limited to disorder of cutaneous structures, such as visible scars or abnormal pigmentation (refer to Chapter 8 for skin disorders)

or

mild, unilateral, total facial paralysis

or

nasal distortion that affects physical appearance

Example 11-8

0% to 5% Impairment Due to Facial Disorders and/or Disfigurement

Subject: 25-year-old woman.

History: Struck in nose with baseball bat 1 year previously; sustained 2-cm laceration across dorsum of nose with minimally displaced nasal bone fractures. Underwent closed reduction of fractures of nasal bones and repair of laceration. Returned to normal activities after normal recovery.

Current Symptoms: Small scar on top of nose.

Physical Exam: Normal nasal region except for well-healed, stable 1.5-cm scar across glabellar region. Scar falls in skinfold lines.

Clinical Studies: None.

Diagnosis: Residual scar on dorsum of nose from compound nasal bone fracture.

Impairment Rating: 1% impairment of the whole person.

Comment: No loss of nasal function or nasal bone structural integrity. Appearance of nose did not change. Scar falls in skinfold line and is barely visible.

Example 11-9

0% to 5% Impairment Due to Facial Disorders and/or Disfigurement

Subject: 36-year-old man.

History: Fell off tractor at work 18 months previously and sustained deep abrasion over right cheek and fracture of right zygomatic arch. Surgery was performed with closed reduction of zygomatic arch fracture and debridement of right cheek wound. Fracture healed well and maintained its normal anatomical position. Deep abrasion healed well with additional topical wound care. Returned to normal activities shortly after injury.

Current Symptoms: Injured skin area on right cheek is lighter than normal surrounding skin, especially after sun exposure, but does not require medical care, even with prolonged sun exposure.

Physical Exam: 3- to 4-cm area of skin on right cheek is lighter than uninjured skin. Injured skin has irregular, rough “cobblestone” appearance in some areas. Right zygomatic arch has normal appearance and projection compared to left side.

Clinical Studies: None.

Diagnosis: Stable scar on right cheek with loss of normal skin color and residual skin texture changes. Healed fracture.

Impairment Rating: 3% impairment of the whole person.

Comment: No permanent loss of structural integrity of arch. Injured skin area has lost some structural integrity, but healed without surgery. Area has abnormal pigmentation and appearance compared to surrounding skin.

Class 2

6%-10% Impairment of the Whole Person

Facial abnormality involves loss of supporting structure of part of face, with or without cutaneous disorder (eg, depressed cheek, nasal, or frontal bones)

Example 11-10

6% to 10% Impairment Due to Facial Disorders and/or Disfigurement

Subject: 35-year-old woman.

History: Struck across nasal region 19 months previously by a box that had fallen off a shelf in a store. Sustained crush injury to face with compound fracture of nasal bones and compound fracture of frontal bone that goes into frontal sinus. Fractures and wounds were surgically repaired. Wounds and bones healed well. Frontal sinus and nasal respiratory function returned to normal. No additional surgery. Returned to normal activities.

Current Symptoms: Affected area is darker than surrounding skin; hollow area over nasofrontal region.

Physical Exam: Slightly brown discoloration of skin over superior dorsal nasal and glabellar regions. 3-cm depression 3 to 4 mm deep over frontal sinus region.

Clinical Studies: None.

Diagnosis: Healed compound nasal and frontal bone fractures. Residual skin pigmentation changes. Loss of structural integrity of frontal bone.

Impairment Rating: 6% impairment of the whole person.

Comment: Although initial injury required extensive surgery, permanent loss of structural integrity of skin and frontal bone involves relatively small area, with no anticipated problems with function of nose or nasal passages.

Example 11-11

6% to 10% Impairment Due to Facial Disorders and/or Disfigurement

Subject: 35-year-old man.

History: Struck on right side of face with a heavy pipe 14 months previously. Sustained crush injury to right facial region; deep laceration along inferior orbital rim; and fractures of malar (“tripod”), orbital floor, and nasal bones. Refused additional surgery. Quickly recovered and returned to normal activities after surgical repair of injuries.

Current Symptoms: Scars on right lower eyelid and lateral orbital regions. Sunken appearance of right eye and right cheekbone. Nose is wider and flatter than it was before injury. Individual is embarrassed by his appearance but has no complaints of loss of vision or nasal function.

Physical Exam: Well-healed, stable, 1- to 2-cm scars over right inferior and lateral orbital rim regions, with palpable metal plates beneath scars. 1-cm depression of right malar eminence (compared to left side). Mild to moderate enophthalmos of right orbit. Nasal bones have smooth, flat depression in nasofrontal region.

Clinical Studies: None.

Diagnosis: Depression of right malar bone and nasal bones; enophthalmos of right orbit; scars on right lower eyelid and lateral orbital skin.

Impairment Rating: 10% impairment of the whole person.

Comment: Structural integrity of right orbital and nasal regions was lost, leaving permanent, measurable depressions and enophthalmos.

Class 3**11%-15% Impairment of the Whole Person**

Facial abnormality involves absence of normal anatomic part or area of face, such as loss of eye or loss of part of nose, with resulting cosmetic deformity; combine with any functional loss, eg, vision (Chapter 12)

or

severe, unilateral, total facial paralysis

or

mild, bilateral, total facial paralysis

Example 11-12**11% to 15% Impairment Due to Facial Disorders and/or Disfigurement**

Subject: 35-year-old woman.

History: Sustained gunshot wound to face 9 months previously. Bullet blew off portion of left side of nose and created open, deep wound on left cheek. Returned to most normal activities after undergoing several operations.

Current Symptoms: Scar on left cheek. Missing tip of nose on left side. She is uncomfortable with her appearance.

Physical Exam: Significant depression on left tip of nose due to loss of left lateral cartilage and nasal tissue. Alar region on left has significant shortening compared to right side and partially consists of grafted tissue, which has whiter, thicker appearance than skin on right side. Left cheek has a stable, soft scar approximately 4 cm long by 2 mm wide running from left nasolabial fold to left lateral orbital region.

Clinical Studies: None.

Diagnosis: Loss of skin and cartilage on left tip of nose and scar on left cheek.

Impairment Rating: 15% impairment of the whole person.

Comment: Reconstructive surgery was able to somewhat correct cosmetic defect. But loss of an anatomical part and a significant scar on left cheek have affected self-image.

Example 11-13**11% to 15% Impairment Due to Facial Disorders and/or Disfigurement**

Subject: 55-year-old man.

History: Struck with large hook in left eye while working on fishing boat 18 months previously. Eye was destroyed due to injury and replaced with prosthetic eye. Returned to most normal activities.

Current Symptoms: Loss of function of left eye.

Physical Exam: Loss of left eye.

Clinical Studies: None.

Diagnosis: Loss of left eye.

Impairment Rating: 15% impairment of the whole person.

Comment: Combine impairment with impairment resulting from total loss of vision in left eye, as determined according to criteria in Chapter 12.

Class 4**16%-50% Impairment of the Whole Person**

Massive or total distortion of normal facial anatomy with disfigurement so severe that it precludes social acceptance; combine with any mental and behavioral impairment (Chapter 14)

or

severe, bilateral, total facial paralysis

or

loss of entire nose

Example 11-14**16% to 50% Impairment Due to Facial Disorders and/or Disfigurement**

Subject: 34-year-old man.

History: Thrown and kicked in face by a bull 26 months previously. Sustained crush injury to right side of face and compound fractures of mandible, nasal bones, and orbital bones. Subsequently developed severe infection in face, which required multiple surgical procedures. Operations resulted in loss of most of the normal skin and muscle on right side of nose, right cheek, and right side of upper lip. Nasal septum cartilage and tip were lost. Bones of right side of nose, right half of mandible, and right anterior maxillary region were lost. Underwent no further reconstructive procedures but has been fitted with facial prostheses. Condition is stable. Required speech therapy due to loss of articulatory function. Required help

in management of diet because of permanent dietary restriction to semisolid or soft foods.

Current Symptoms: Altered speech with loss of ability to speak well. Loss of skin and bones on right side of face. Loss of ability to eat normal food.

Physical Exam: Loss of normal skin, muscles, and bone structures on right side of nose and in right mandibular and right anterior maxillary regions. Speech is poorly articulated and has low intensity due to loss of skin and muscle on right side of mouth.

Clinical Studies: None.

Diagnosis: Massive loss of normal structural integrity of right side of face and loss of normal speech function and mastication.

Impairment Rating: 25% impairment of the whole person.

Comment: Combine with other impairments for loss of speech (Section 11.4d) and mastication (Section 11.4b).

Example 11-15

16% to 50% Impairment Due to Facial Disorders and/or Disfigurement

Subject: 45-year-old woman.

History: Sustained severe electrical injury to face 26 months previously with loss of left orbital structures, skin on left cheek, and anterior maxillary sinus bones.

Current Symptoms: Lost vision in left eye and is missing left side of face. Individual says she looks like a freak.

Physical Exam: Loss of left orbital structures with open orbital region. No bones remain on orbital floor or inferior orbital rim. Left anterior maxillary sinus regions and overlying skin and muscles are gone, leaving large, residual, open orbital and maxillary cavity.

Clinical Studies: None.

Diagnosis: Massive loss of normal facial structural integrity.

Impairment Rating: 40% impairment of the whole person.

Comment: Combine with other impairments from the vision chapter (Chapter 12) and mental and behavioral chapter (Chapter 14).

11.4 The Nose, Throat, and Related Structures

The nasal region includes the external part of the nose, the nasal cavity, and the nasopharynx. The oral region includes the mouth and lips, teeth, temporomandibular joint, tongue, hard and soft palate, region of the palatine tonsil, and oropharynx. The neck and chest region includes the hypopharynx, larynx, trachea, esophagus, and bronchi.

The functions of these structures, and the order in which they will be discussed, are as follows: (1) respiration, (2) mastication and deglutition, (3) olfaction and taste, and (4) speech. Permanent impairment may result from a deviation from normal in any of the above functions, and, because of their close relationship, more than one structure may be involved.

11.4a Respiration

Respiration may be defined as the act or function of breathing, that is, the act by which air is inspired and expired from the lungs. The respiratory mechanism includes the lungs and the air passages; the latter includes the nares, nasal cavities, mouth, pharynx, larynx, trachea, and bronchi.

In this chapter, discussion of permanent impairments related to respiration is limited to defects of the air passages. Refer to Chapter 5 on the respiratory system for a discussion of impairments of the lower airways and lung parenchyma.

The most commonly encountered defect of the air passages is obstruction, which may be partial, as with stenosis, or complete, as with occlusion. Obstructions and other air passage defects are evidenced primarily by dyspnea or so-called unusual breathlessness. Sleep apnea, which is covered in Chapter 5, may be related to functional upper-airway obstruction.

Dyspnea is a cardinal factor that contributes to an individual's diminished capacity to carry out activities of daily living and to permanent impairment. This subjective complaint or symptom, which indicates an awareness of respiratory distress, usually is noted first and is most severe during exercise. When dyspnea occurs at rest, respiratory dysfunction probably is severe. Dyspnea may or may not be accompanied by related signs or symptoms.

Individuals with air passage defects may be evaluated in accordance with the classification in Table 11-6. Permanent impairments involving obstructive sleep apnea should be evaluated with the respiratory system criteria described in Chapter 5.

Table 11-6 Criteria for Rating Impairment Due to Air Passage Defects

Class 1 0%-10% Impairment of the Whole Person	Class 2 11%-29% Impairment of the Whole Person	Class 3 30%-49% Impairment of the Whole Person	Class 4 50%-89% Impairment of the Whole Person	Class 5 90%+ Impairment of the Whole Person
<p>Dyspnea <i>does not occur</i> at rest</p> <p>and</p> <p>dyspnea is not produced by walking freely, climbing stairs freely, or performance of other usual activities of daily living</p> <p>and</p> <p>dyspnea is not produced by stress, prolonged exertion, hurrying, hill-climbing, or recreational or similar activities requiring intensive effort*</p> <p>and</p> <p>examination reveals partial obstruction of the oropharynx, laryngopharynx, larynx, upper trachea (to the fourth cartilaginous ring), lower trachea, bronchi, or complete (bilateral) obstruction of the nose or nasopharynx</p>	<p>Dyspnea <i>does not occur</i> at rest</p> <p>and</p> <p>dyspnea is not produced by walking freely on a level surface, climbing one flight of stairs, or performance of other usual activities of daily living</p> <p>but</p> <p>dyspnea is produced by stress, prolonged exertion, hurrying, hill-climbing, or recreational or similar activities (except sedentary forms)</p> <p>and</p> <p>examination reveals partial obstruction of the oropharynx, laryngopharynx, larynx, upper trachea (to the fourth cartilaginous ring), lower trachea, bronchi, or complete (bilateral) obstruction of the nose or nasopharynx</p>	<p>Dyspnea <i>does not occur</i> at rest</p> <p>and</p> <p>dyspnea is produced by walking more than one or two level blocks, climbing one flight of stairs even with periods of rest, or performance of other usual activities of daily living</p> <p>and</p> <p>dyspnea is produced by stress, prolonged exertion, hurrying, hill-climbing, or recreational or similar activities</p> <p>and</p> <p>examination reveals partial obstruction of the oropharynx, laryngopharynx, larynx, upper trachea (to the fourth cartilaginous ring), lower trachea, or bronchi</p>	<p>Dyspnea <i>occurs</i> at rest, although individual is not necessarily bedridden</p> <p>and</p> <p>dyspnea is aggravated by the performance of any of the usual activities of daily living (beyond personal cleansing, dressing, or grooming)</p> <p>and</p> <p>examination reveals partial obstruction of the oropharynx, laryngopharynx, larynx, upper trachea (to the fourth cartilaginous ring), lower trachea, and/or bronchi</p>	<p>Severe dyspnea <i>occurs</i> at rest and spontaneous respiration is inadequate</p> <p>and</p> <p>respiratory ventilation is required</p> <p>and</p> <p>examination reveals partial obstruction of the oropharynx, laryngopharynx, larynx, upper trachea (to the fourth cartilaginous ring), lower trachea, and/or bronchi</p>

*Prophylactic restriction of activity, such as strenuous competitive sport, does not exclude subject from class 1.

Note: Individuals with successful permanent tracheostomy or stoma should be rated at 25% impairment of the whole person.

Class 1**0%-10% Impairment of the Whole Person**

Dyspnea *does not occur* at rest

and

dyspnea is not produced by walking freely, climbing stairs freely, or performance of other usual activities of daily living

and

dyspnea is not produced by stress, prolonged exertion, hurrying, hill-climbing, or recreational or similar activities requiring intensive effort

and

examination reveals partial obstruction of the oropharynx, laryngopharynx, larynx, upper trachea (to the fourth cartilaginous ring), lower trachea, bronchi, or complete (bilateral) obstruction of the nose or nasopharynx

Class 2**11%-29% Impairment of the Whole Person**

Dyspnea *does not occur* at rest

and

dyspnea is not produced by walking freely on a level surface, climbing one flight of stairs, or performance of other usual activities of daily living

but

dyspnea is produced by stress, prolonged exertion, hurrying, hill-climbing, or recreational or similar activities (except sedentary forms)

and

examination reveals partial obstruction of the oropharynx, laryngopharynx, larynx, upper trachea (to the fourth cartilaginous ring), lower trachea, bronchi, or complete (bilateral) obstruction of the nose or nasopharynx

Example 11-16**0% to 10% Impairment Due to Right Vocal Fold Paralysis**

Subject: 26-year-old man.

History: Spinal cord tumor removed 4 years ago, with right anterior cervical fusion. Persistent hoarseness since surgery. Had to give up coaching.

Current Symptoms: Voice stable, but weak, with poor volume and projection. Coughing and clearing of throat develop after drinking cold liquids. No shortness of breath or difficulty swallowing.

Physical Exam: Ear, nose, and throat examination: within normal limits.

Clinical Studies: Fiberoptic laryngoscopy: right vocal cord in paramedian position, with a 2-3-mm gap on attempted phonation.

Diagnosis: Right vocal fold paralysis.

Impairment Rating: 5% to 10% impairment due to vocal fold paralysis; combine with appropriate rating for musculoskeletal impairment to determine whole person impairment (see Combined Values Chart, p. 604).

Comment: Partial obstruction of the laryngeal airway.

Example 11-17**11% to 29% Impairment Due to Bilateral Vocal Fold Paralysis and Permanent Tracheostomy**

Subject: 29-year-old man.

History: Tracheostomy performed 10 years ago after traumatic tracheal intubation. Diagnosed with Arnold-Chiari syndrome and underwent successful neurosurgical decompression. Developed meningitis of unknown etiology, hemiparesis, and other neurologic sequelae. Past history reveals hearing loss, hypertension, and diabetes. 20-year cigarette use.

Current Symptoms: Wheelchair dependent. Metal tracheotomy tube in place. With tube occluded, has good voice but poor airway.

Physical Exam: Right-side hemiparesis and right-side hearing loss.

Clinical Studies: Fiberoptic laryngoscopy: both vocal folds in midline position with very poor abduction.

Diagnosis: Bilateral vocal fold paralysis with poor airway. Permanent tracheostomy.

Impairment Rating: 29% impairment due to vocal fold paralysis; combine with appropriate ratings for musculoskeletal and hearing impairments to determine whole person impairment (see Combined Values Chart, p. 604).

Comment: Monitor for tracheostomy patency.

11.4b Mastication and Deglutition

The act of eating includes mastication and deglutition. Numerous conditions of nongastrointestinal origin, singly or in combination, may interfere with these functions.

Dysfunction of the temporomandibular joint may impede mastication, affect speech, cause lower facial deformity, and produce pain.^{7,8} In this section, the effect of temporomandibular joint dysfunction on eating is considered; other effects may be considered in conjunction with parts of the *Guides* that deal with the nervous system or pain.

In accordance with the philosophy of the *Guides*, when mastication and deglutition are evaluated, the ability to eat should be stable and maximal rehabilitation should have been achieved. When mastication or deglutition is impaired, the imposition of dietary restrictions usually results. Such restrictions are the most objective criteria by which to evaluate permanent impairment of these functions.⁹⁻¹⁴ The relationship of the restrictions to impairments of mastication and deglutition are shown in Table 11-7.

Table 11-7 Relationship of Dietary Restrictions to Permanent Impairment

Type of Restriction	% Impairment of the Whole Person
Diet is limited to semisolid or soft foods	5%-19%
Diet is limited to liquid foods	20%-39%
Ingestion of food requires tube feeding or gastrostomy	40%-60%

Example 11-18

5% to 19% Impairment Due to Inflammation and Scarring of the Left Temporomandibular Joint

Subject: 58-year-old woman.

History: Following removal of an impacted upper left third molar, individual developed a left oro-antral fistula and acute left maxillary sinusitis, confirmed by x-ray. Dental films confirmed a tooth remnant in the maxillary area. Despite use of antibiotics, she developed persistent drainage from the fistula and pain in the left maxillary area of the face. Severe pain was noted in the left temporomandibular joint (TMJ), and she experienced

progressive loss of mobility of the mandible, with the ability to open the jaws limited to a 1-cm excursion. The left oro-antral fistula was explored surgically 6 weeks later, and the residual tooth fragment was removed. A left naso-antral window was placed in the inferior meatus for drainage of the maxillary sinus. Extensive scarring in and about the left TMJ was found. The scars were released, but full mobility of the mandible was not obtained until the left coronoid process was released from the surrounding tissues. She received postoperative steroid therapy; physical therapy exercises maintained mandibular mobility. A stent to keep the jaws apart was created and used for several months while individual was sleeping.

Current Symptoms: On a soft diet because of discomfort in the left TMJ.

Physical Exam: Maxillary mobility limited to about 60% of mobility noted at surgery, with a well-healed oral fistula area.

Clinical Studies: Paranasal sinus x-rays: normal.

Diagnosis: Inflammation and scarring of the left TMJ; reduced mandibular mobility.

Impairment Rating: 10% impairment of the whole person.

Comment: Individual is able to talk satisfactorily, but dietary choices are limited. Speech is not affected. No facial deformity, but she may need to continue exercises to maintain maxillary mobility. No problem in maintaining body weight.

11.4c Olfaction and Taste

Only rarely does complete loss of the closely related senses of olfaction and taste seriously affect an individual's performance of the usual activities of daily living. For this reason, a value of 1% to 5% impairment of the whole person is suggested for use in cases involving partial or complete bilateral loss of either sense due to peripheral lesions. This value is to be combined with any other impairment of the individual (see the Combined Values Chart, p. 604).

11.4d Speech

In this chapter, speech is defined as the capacity to produce vocal signals that can be heard, understood, and sustained over a useful period of time. Speech ought to allow effective communication in the activities of daily living.

This chapter does not consider the causes and characteristics of abnormal speech. Rather, it considers how an impairment relates to the individual's ability or efficiency in using speech to make himself or herself understood in activities of daily living. It is assumed that speech evaluation pertains to the production of voice and articulate speech and not to the language content or structure of the individual's communication. On the basis of these assumptions, the primary problem is estimating proficiency in the use of oral language or measuring the utility of speech as defined above. This section also considers esophageal speech.

At this time there is no single, acceptable, proven test that will measure objectively the degrees of impairment due to the many varieties of speech disorders. Therefore, it is recommended that speech impairment be evaluated by examining the audibility, intelligibility, and functional efficiency of speech.

- Audibility is based on the ability to speak at a level sufficient to be heard.
- Intelligibility is based on the ability to articulate and to link phonetic units of speech with sufficient accuracy to be understood.
- Functional efficiency is based on the ability to produce a satisfactorily rapid rate of speaking and to sustain this rate over a useful period of time.

Other definable attributes of speech—such as voice quality, pitch, and melodic variation—are evaluated only when they affect one of the three primary characteristics noted above.

The classification chart, oral reading paragraph, and examining procedure used in estimating speech impairment are described below.

Classification Chart

Judgments as to the amount of impairment should be made with reference to the classes, percentages, and examples provided in the classification chart (Table 11-8). The 15 categories in the chart suggest activities or situations with different levels of impairment. Data gathered from direct observation of the individual or from interviews should be compared with these categories, and values should be assigned on the basis of the specific impairments that are present.

Oral Reading Paragraph

The following paragraph, entitled “The Smith House,” is composed of 100 words and 10 sentences. It provides a uniform means of comparing a speech sample of the person being evaluated with the speech of normal speakers. The phonetic elements of the paragraph are selected particularly for their relevance to the intelligibility of the person's speech.

The Smith House

Larry and Ruth Smith have been married nearly 14 years. They have a small place near Long Lake. Both of them think there's nothing like the country for health. Their two boys would rather live here than any other place. Larry likes to keep some saddle horses close to the house. These make it easy to keep his sons amused. If they wish, the boys can go fishing along the shore. When it rains, they usually want to watch television. Ruth has a cherry tree on each side of the kitchen door. In June they enjoy the juice and jelly.

Examining Procedure

General Orientation

The examiner should have normal hearing as defined in the earlier section in this chapter on hearing. The setting of the examination should be a reasonably quiet room that approximates the noise levels of everyday living.

The examiner should base judgments of impairment on two kinds of evidence: (1) attention to and observation of the individual's speech in the office—for example, during conversation, during the interview, and while reading and counting aloud—and (2) reports pertaining to the individual's performance in everyday living situations. The reports or the evidence should be supplied by reliable observers who know the person well. The standard of evaluation is an average speaker's performance in average situations of everyday living. It is assumed in this context that an average speaker can usually perform according to the following criteria:

- Talk in a loud voice when the occasion demands it.
- Sustain phonation for at least 10 seconds after one breath.
- Complete at least a 10-word sentence in one breath.
- Form all of the phonetic units of American speech and join them intelligibly.
- Maintain a speech rate of at least 75 to 100 words per minute and sustain a flow of speech for a reasonable length of time. A speech rate of 125 words per minute enables a speaker to read approximately one 8½ x 11-inch page of double-spaced text in 2 minutes.

Specific Instructions

1. Place the individual approximately 8 ft from the examiner.
2. Interview the individual. This will permit observation of his or her speech in ordinary conversation while pertinent historical information is obtained.
3. Have the individual's back toward the examiner and keep a separation of 8 ft between the examiner and the examinee. Instruct the person as follows: "You are to read this passage so I can hear you plainly. Be sure to speak so I can understand you." Then ask him or her to read aloud the short paragraph, "The Smith House."
4. If additional reading procedures are required, simple prose paragraphs from a magazine may be used. A person who cannot read may be requested to give his or her name and address and name all the days of the week and months of the year. Additional evidence regarding the person's rate of speech and ability to sustain it may be obtained by noting the time required to count to 100 by ones. Completion of this task in 60 to 75 seconds is accepted as normal.
5. Record judgment of the individual's speech capacity with regard to each of the three rows of the classification chart (Table 11-8). The degree of impairment of speech is equivalent to the greatest percentage of impairment recorded in any one of the three rows of the classification chart.

For example, a person's speech capacity is judged to be the following: audibility, 10% (class 1); intelligibility, 50% (class 3); and functional efficiency, 30% (class 2). The individual's speech impairment is judged to be equivalent to the greatest impairment (50%). A speech impairment of 50% is judged to be an 18% impairment of the whole person, according to Table 11-9.

11.4e Voice

Voice, as the term is used in this section, refers to the production of audible sounds by the vibration of the true vocal folds of the larynx. Voice, or phonation, is therefore the generator of speech—the shaping of sounds into intelligible words. Alternative physiological sound generators, such as the false vocal folds or the esophagus, are not considered here.

This section does not consider the causes of voice disorders. Rather, it recognizes that voice disorders may present such definable symptoms as abnormal volume (voice fatigue, weakness, or low sound intensity), abnormal control (pitch and/or melodic variation), and/or abnormal quality (hoarseness, harshness, or breathiness). These symptoms indicate abnormal physiological functioning of the phonatory mechanism and may contribute to impairment of speech.

At this time, there is no single, acceptable, proven test that will measure objectively the degrees of impairment associated with the many varieties of voice disorders. Tests such as laryngoscopy, acoustical analysis of voice, stroboscopy, analysis of phonatory function, and laryngeal electromyography are recognized as appropriate and useful.¹⁵⁻¹⁷ The significance of current normative data is unclear when confined to consideration of impairment.

Table 11-8 Classification of Voice/Speech Impairment

	Class 1 0%-14% Voice/ Speech Impairment	Class 2 15%-34% Voice/ Speech Impairment	Class 3 35%-59% Voice/ Speech Impairment	Class 4 60%-84% Voice/ Speech Impairment	Class 5 85%-100% Voice/ Speech Impairment
Audibility	Can produce speech of an intensity sufficient for <i>most</i> needs of everyday speech, although this sometimes may require effort and occasionally may be beyond individual's capacity	Can produce speech of an intensity sufficient for <i>many</i> needs of everyday speech and is usually heard under average conditions; however, may have difficulty being heard in noisy places—such as cars, buses, trains, train stations, or restaurants	Can produce speech of an intensity sufficient for <i>some</i> needs of everyday speech such as close conversation; however, has considerable difficulty at a distance or in noisy places—such as cars, buses, trains, train stations, or restaurants—because the voice tires easily and tends to become inaudible after a few seconds	Can produce speech of an intensity sufficient for a <i>few</i> needs of everyday speech, but can barely be heard by a close listener or over the telephone and may be able to whisper audibly but with no louder voice	Can produce speech of an intensity sufficient for <i>no</i> needs of everyday speech
Intelligibility	Can perform <i>most</i> articulatory acts necessary for everyday speech, but may occasionally be asked to repeat and find it difficult or impossible to produce some phonetic units	Can perform <i>many</i> articulatory acts necessary for everyday speech and be understood by a stranger, but may have numerous inaccuracies and sometimes appears to have difficulty articulating	Can perform <i>some</i> articulatory acts necessary for everyday speech and can usually converse with family and friends, but may be understood by strangers only with difficulty and often may be asked to repeat	Can perform a <i>few</i> articulatory acts necessary for everyday speech, can produce some phonetic units, and may have approximations for a few words such as names of own family members, but is unintelligible out of context	Can perform <i>no</i> articulatory acts necessary for everyday speech
Functional Efficiency	Can meet <i>most</i> demands of articulation and phonation for everyday speech with adequate speed and ease, but occasionally may hesitate or speak slowly	Can meet <i>many</i> demands of articulation and phonation for everyday speech with adequate speed and ease, but sometimes speaks with difficulty and speech may be discontinuous, interrupted, hesitant, or slow	Can meet <i>some</i> demands of articulation and phonation for everyday speech with adequate speed and ease, but can sustain consecutive speech only for brief periods and may give the impression of being easily fatigued	Can meet a <i>few</i> demands of articulation and phonation for everyday speech with adequate speed and ease (such as single words or short phrases), but cannot maintain uninterrupted speech flow; speech is labored and rate is impractically slow	Can meet <i>no</i> demands of articulation and phonation for everyday speech with adequate speed and ease

For voice and/or speech impairments, the classifications in Table 11-8 and Table 11-9 should be used. Note that the impairment ratings for speech and/or voice impairments are not evaluated separately. The degree of impairment of speech and/or voice is equivalent to the greatest percentage of impairment recorded in any one of the three sections (audibility, intelligibility, or functional efficiency) of the classification chart (Table 11-8).

Table 11-9 Voice/Speech Impairment Related to Impairment of the Whole Person

% Voice/ Speech Impairment	% Impairment of the Whole Person	% Voice/ Speech Impairment	% Impairment of the Whole Person
0	0	50	18
5	2	55	19
10	4	60	21
15	5	65	23
20	7	70	24
25	9	75	26
30	10	80	28
35	12	85	30
40	14	90	32
45	16	95	33
		100	35

Class 1:**0%-14% Voice/Speech Impairment**

Audibility: Can produce speech of an intensity sufficient for most needs of everyday speech, although this sometimes may require effort and occasionally may be beyond individual's capacity

Intelligibility: Can perform most articulatory acts necessary for everyday speech, but may occasionally be asked to repeat and find it difficult or impossible to produce some phonetic units

Functional efficiency: Can meet most demands of articulation and phonation for everyday speech with adequate speed and ease, but occasionally may hesitate or speak slowly

Example 11-19**0% to 14% Voice/Speech Impairment**

Subject: 47-year-old woman.

History: Professional operatic soprano and voice teacher; had sudden onset of dysphonia 1 year previously; diagnosis was vocal fold hemorrhage. Developed vocal fold mass secondary to hemorrhage. Gastroesophageal reflux. Five vocal fold surgeries for repeated vocal fold masses. Had operations to attempt to reduce vocal fold scar. Advised to undergo another surgical procedure that would implant fat into vocal fold.

Current Symptoms: Husky speaking voice; lowered pitch; oral dryness; postnasal drip. Unable to sing or perform professionally since vocal fold hemorrhage.

Physical Exam: Voice is mildly hoarse, mildly soft, and slightly breathy. Left vocal fold posthemorrhagic cyst, right vocal fold mass, left vocal fold scar, possible mild superior laryngeal nerve paresis, muscular tension dysphonia, and gastro-esophageal reflux disease on laryngeal examination by stroboscopy. Singing technique was very good and was able to correct minor technical deficiencies.

Clinical Studies: Mild decrease in maximum phonation time and air-conduction flow.

Diagnosis: Recurrent vocal fold hemorrhage and vocal fold scar. Intermittently uncontrolled gastroesophageal reflux disease. Obesity. Inability to regain singing voice she had prior to the vocal fold injury. Altered and diminished self-image.

Impairment Rating: 0% to 14% voice/speech impairment; 0% to 5% impairment of the whole person.

Comment: Afraid her career is over. Traumatic change in self-image. Unable to resume her living as an internationally known opera star. Resigned her teaching position in Europe and moved to the

United States to receive necessary voice care. Voice is now of a sufficient intensity for most everyday speech needs. However, because of her emotional distress, loss of her previous occupation as an international opera star, and change in activities of daily living, an impairment rating is warranted.

Example 11-20**0% to 14% Voice/Speech Impairment**

Subject: 58-year-old man.

History: Attorney; underwent thoracoscopic excision of mediastinal schwannoma 2 months previously. Postoperatively immediately developed hoarseness, breathiness, and dysphagia. Was diagnosed with bilateral vocal fold weakness. Underwent speech therapy but voice did not improve. Computed tomography (CT) scan of larynx 1 month later revealed dislocated arytenoid cartilage.

Current Symptoms: Hoarseness; breathiness; decreased volume; lower pitch; voice fatigue. Cannot effectively communicate with clients in courtroom.

Physical Exam: All symptoms were noted, but examination of head and neck was otherwise normal. Left arytenoid dislocation and left vocal fold paresis on stroboscopy. Sulcus vocalis.

Clinical Studies: Laryngeal electromyogram: left superior laryngeal nerve paresis with 50% decreased recruitment of left posterior cricoarytenoid and vocalis muscle and 70% decreased recruitment response of left cricothyroid muscle. Normal right superior laryngeal nerve function. Evidence of right recurrent laryngeal nerve paresis. CT scan of larynx: widening of left cricoarytenoid joint with anteromedial rotation of left arytenoid cartilage.

Diagnosis: Markedly decreased intensity, frequency range, and phonation time. All acoustic measurements were severely abnormal.

Impairment Rating: 0% to 14% voice/speech impairment; 0% to 5% impairment of the whole person.

Comment: Had surgical correction of arytenoid dislocation. After surgery his voice was nearly normal, with only slight voice breaks and slightly decreased volume.

Class 2**15%-34% Voice/Speech Impairment**

Audibility: Can produce speech of an intensity sufficient for many needs of everyday speech and is usually heard under average conditions; however, may have difficulty being heard in noisy places—such as cars, buses, trains, train stations, or restaurants

Intelligibility: Can perform many articulatory acts necessary for everyday speech and be understood by a stranger, but may have numerous inaccuracies and sometimes appears to have difficulty articulating

Functional efficiency: Can meet many demands of articulation and phonation for everyday speech with adequate speed and ease, but sometimes speaks with difficulty and speech may be discontinuous, interrupted, hesitant, or slow

Example 11-21**15% to 34% Voice/Speech Impairment**

Subject: 28-year-old man.

History: Rock-and-roll singer/songwriter; developed new onset of vocal difficulties while recording album 1 year previously. Had been singing and performing for 10 years with no prior vocal difficulties. Loss of midrange, decreased volume, breathiness, and hoarseness while singing. Diagnosed with left vocal fold polyp 3 months later. Underwent surgical excision of lesion 1 month after that. Treated for laryngopharyngeal reflux with usual medical therapy.

Current Symptoms: Breathiness; hoarseness; loss of vocal stamina; loss of volume; loss of lower range. Voice is worse in morning, with frequent throat-clearing and sensation of lump in throat.

Physical Exam: Right vocal fold mass, left vocal fold scar, reflux laryngitis, and neurolaryngologic asymmetries on stroboscopy. Excess tension in jaw and tongue, hoarseness, and decreased range while singing.

Clinical Studies: Laryngeal electromyogram: 20% decreased function of left superior laryngeal nerve. Abnormalities in electroglottogram (EGG), quasi-open quotient, air-conduction flow, minimal flow, maximum flow rate, S/Z ratio, maximum phonation time, and acoustic measurements.

Diagnosis: Persistent vocal fold mass and vocal fold scar after recent vocal fold surgery; superior laryngeal nerve paresis; laryngopharyngeal reflux disease.

Impairment Rating: 15% to 34% voice/speech impairment; 5% to 12% impairment of the whole person.

Comment: Class 2 on the basis of audibility and activities of daily living, not including work. Unhappy with his vocal progress. Totally disabled as a professional singer because of this work-related injury.

Example 11-22**15% to 34% Voice/Speech Impairment**

Subject: 46-year-old man.

History: Voice teacher/singer; involved in motor vehicle collision 4 months ago in which he screamed loudly and seat belt tightened across anterior part of neck. Experienced immediate hoarseness and throat pain. Seen for treatment of sore throat 3 days later. Negative cultures. Attempted to give two 30-minute performances 3 days after collision. Voice became hoarse, strained, and fatigued quickly. Experienced problems with pitch control. Has not performed or sung since. Does not smoke or drink. Had direct laryngoscopy and biopsy, flexible bronchoscopy, and rigid esophagoscopy.

Current Symptoms: Hoarseness; voice fatigue; pain. Unable to sing or speak extensively. Weak, strained voice. Unable to project voice.

Physical Exam: Gastroesophageal reflux disease, height disparity of vocal folds, and white, irregular, firm, vocal fold mass on laryngeal exam by stroboscopy.

Clinical Studies: Laryngeal electromyogram: left superior laryngeal nerve paresis with 50% decreased recruitment response and left recurrent laryngeal nerve paresis with 30% decreased recruitment, both from vocalis and posterior cricoarytenoid muscles. Objective voice measures: mild acoustic abnormalities including increased mean flow rate and decreased maximum phonation time. Laryngeal CT scan: normal cricoarytenoid joint and no focal lesions. Normal magnetic resonance imaging (MRI) scan with gadolinium of larynx.

Diagnosis: Infiltrating keratinizing squamous cell carcinoma of left vocal fold with evidence of focal chronic inflammatory infiltrate. Lesion was classified T2 N0 M0. Has undergone radiation therapy, reflux treatment, and voice therapy.

Impairment Rating: 15% to 34% voice/speech impairment; 5% to 12% impairment of the whole person.

Comment: May not be able to continue as a voice teacher and singer, with subsequent loss of income and life alteration. Will have to make frequent visits to physician for cancer surveillance, probably for life. Motor vehicle collision probably caused hemorrhage into previously asymptomatic cancerous tumor. Reflux was the only known risk factor in this nonsmoker. Voice became worse after surgery and radiation therapy.

Class 3
35%-59% Voice/Speech Impairment

Audibility: Can produce speech of an intensity sufficient for some needs of everyday speech such as close conversation; however, has considerable difficulty at a distance or in noisy places—such as cars, buses, trains, train stations, or restaurants—because the voice tires easily and tends to become inaudible after a few seconds

Intelligibility: Can perform some articulatory acts necessary for everyday speech and can usually converse with family and friends, but may be understood by strangers only with difficulty and often may be asked to repeat

Functional efficiency: Can meet some demands of articulation and phonation for everyday speech with adequate speed and ease, but can sustain consecutive speech only for brief periods and may give the impression of being easily fatigued

Example 11-23

35% to 59% Voice/Speech Impairment

Subject: 52-year-old woman.

History: Chronic hoarseness and dysphonia for 10 years. Gastroesophageal reflux disease for at least 10 years. Multiple laryngeal surgeries, including vocal fold polypectomy, microlaryngoscopy, excision of left vocal fold mass, and vaporization of laryngeal vocal fold varices. Initial improvement with voice therapy; deteriorated after heavy voice use in classroom. Developed recurrent vocal fold mass. Had vocal fold hemorrhage after yelling. Multiple bouts of acute laryngitis secondary to voice overuse. Recurrent vocal fold nodules that were initially treated with voice therapy. Experienced voice fatigue by Wednesday of each week. Developed severe upper respiratory infection that resulted in vocal fold hemorrhage. Vocal fold stiffness and scar secondary to recurrent vocal fold hemorrhages. Relatively asymptomatic for about a year.

Thereafter had ongoing treatment for reflux disease and underwent voice therapy. Reflux disease became more problematic. Referred to gastroenterologist for problem with gastroesophageal reflux. Considered surgical treatment of reflux disease.

Current Symptoms: Recurrent hoarseness, despite strictly adhering to antireflux treatment and voice therapy modifications.

Physical Exam: Left vocal fold scar, new right vocal fold mass (probably a cyst), evidence of reflux laryngitis, and muscle-tension dysphonia on stroboscopy. Voice hoarse, soft, and strained.

Clinical Studies: Abnormal acoustic measures, including harmonic measures and harmonic to noise ratio.

Diagnosis: Vocal fold mass and scar; muscle-tension dysphonia; reflux laryngitis.

Impairment Rating: 35% to 59% voice/speech impairment; 12% to 21% impairment of the whole person.

Comment: Direct microlaryngoscopy and excision of right vocal fold mass; left vocal fold autologous fat injection and, possibly, fat implantation for treatment of scar recommended. Rated class 3 on basis of audibility.

Example 11-24

35% to 59% Voice/Speech Impairment

Subject: 40-year-old man.

History: Recurrent sinusitis and progressive hoarseness for 2 years. Voice worse after vocal fold “polypectomy” for leukoplakia. Had septoplasty and functional endoscopic sinus surgery. No complaint of nasal/sinus disease. Speaks about 14 hours a day over loud noise. Must talk loudly or yell frequently. Is regularly exposed to car fumes, asbestos, and aerosols. Does not smoke. Rarely drinks alcohol.

Current Symptoms: Constant hoarseness. Difficulty speaking, but without pain, by afternoon. Frequently clears throat. Complains of lump in throat.

Physical Exam: Leukoplakia on left vocal fold and stiffness of vibratory margin secondary to scar on stroboscoped laryngoscopy. Erythema and edema of glottis consistent with gastroesophageal reflux disease. Improper speaking technique and significant muscle-tension dysphonia.

Clinical Studies: Laryngeal electromyogram: left superior laryngeal nerve paresis and muscle-tension dysphonia. No evidence of neuromuscular junction abnormalities. Severely abnormal harmonic to noise ratios, decreased intensity, decreased frequency range, and decreased phonation time.

Diagnosis: Vocal fold scar, leukoplakia (hyperkeratosis), muscle-tension dysphonia, and gastroesophageal reflux disease.

Impairment Rating: 35% to 59% voice/speech impairment; 12% to 21% impairment of the whole person.

Comment: Leukoplakia requires biopsy. Hoarseness caused by scarring from previous injury and from surgery is permanent.

Class 4
60%-84% Voice/Speech Impairment

Audibility: Can produce speech of an intensity sufficient for a few needs of everyday speech, but can barely be heard by a close listener or over the telephone and may be able to whisper audibly but with no louder voice

Intelligibility: Can perform a few articulatory acts necessary for everyday speech, can produce some phonetic units, and may have approximations for a few words such as names of own family members, but is unintelligible out of context

Functional efficiency: Can meet a few demands of articulation and phonation for everyday speech with adequate speed and ease (such as single words or short phrases), but cannot maintain uninterrupted speech flow; speech is labored and rate is impractically slow

Example 11-25
60% to 84% Voice/Speech Impairment

Subject: 40-year-old man.

History: Involved in motor vehicle collision 20 years previously. Sustained massive brain stem trauma and multiple injuries including fractured clavicle, shoulder, and hands. Was comatose for 8 weeks. Underwent tracheotomy and gastrostomy 3 days after collision. Left hemiparesis, cognitive deficits, memory loss, and “personality change.” Completed occupational therapy, physical therapy, and speech and cognitive rehabilitation.

Current Symptoms: Unable to be heard on telephone; cannot carry on sustained conversation; cannot raise voice above soft whisper.

Physical Exam: Extremely breathy, soft voice. Halting speech pattern. Short phrasing. Can only count up to “eight” on one breath. Has left facial weakness, dysphagia, and chronic cough. Bilateral vocal fold immobility with patent but narrow airway on stroboscoped laryngoscopy.

Clinical Studies: Laryngeal electromyogram: bilateral vocal fold paralysis. Severely short phonation times. All acoustic measures: highly abnormal.

Diagnosis: Bilateral vocal fold paralysis.

Impairment Rating: 60% to 84% impairment due to bilateral vocal fold paralysis; 21% to 30% whole person impairment. Combine with appropriate ratings due to other impairments to determine whole person impairment (see Combined Values Chart, p. 604).

Comment: Underwent voice therapy. Conservative, anterior vocal fold medializations. Cannot be heard in office setting or anywhere with background noise. Is dysfluent and has halting speech (often interpreted by others as intellectual deficits). Unable to use the telephone. Unable to carry on sustained conversation. Unlikely to ever regain voice he had prior to motor vehicle collision. Requires ongoing medical care (not only for voice) and will require multiple laryngeal surgical procedures for voice improvement. Is prone to aspiration pneumonia secondary to vocal fold paralysis. Requires ongoing voice therapy and voice-assistive devices.

Example 11-26

60% to 84% Voice/Speech Impairment

Subject: 42-year-old woman.

History: Taught elementary school 7 years previously. Experienced sudden onset of hoarseness 1 month after starting teaching. Continued to teach for several months with hoarseness before seeking medical attention. Otolaryngologist diagnosed vocal fold nodules and recommended resting voice for 4 days. She complied, but with no improvement in voice. Saw speech therapist weekly for 2 years with minimal voice improvement. Underwent excision of bilateral vocal fold masses. Voice improved until 6 months later, when recurrent hoarseness developed. Had recurrent vocal fold masses. Diagnosed with gastroesophageal reflux disease. Had surgery after aggressive medical treatment for reflux disease and after voice therapy. No improvement in appearance of vocal fold lesions. Had excisional biopsy for definitive pathology.

Current Symptoms: Constant hoarseness and voice fatigue. Unable to project voice well and unable to sing. Year-round allergy symptoms.

Physical Exam: Moderately hoarse and breathy voice. Broad-based, solid, white mass of right vocal fold and fibrotic mass of left vocal fold on stroboscopy. Arytenoid erythema and edema consistent with gastroesophageal reflux disease, bilateral superior surface varicosities, and scars on stroboscopy. No neuromuscular junction abnormalities were noted.

Clinical Studies: Laryngeal electromyogram: mild bilateral superior laryngeal nerve paresis. Decreased intensity, phonation time, harmonic to noise ratio, acoustic measures, and S/Z ratio.

Diagnosis: Adult-onset laryngeal papillomatosis.

Impairment Rating: 60% to 84% voice/speech impairment; 21% to 30% impairment of the whole person.

Comment: Required two subsequent laryngeal surgeries in attempt to eradicate disease and improve phonatory function. Requires ongoing surveillance by laryngologist for recurrence of papillomas and surveillance for development of laryngeal carcinoma. Requires ongoing voice therapy and treatment for reflux disease. Will require personal amplification system to help with vocal projection for job. Vocal prognosis is guarded.

Class 5

85%-100% Voice/Speech Impairment

Audibility: Can produce speech of an intensity sufficient for no needs of everyday speech

Intelligibility: Can perform no articulatory acts necessary for everyday speech

Functional efficiency: Can meet no demands of articulation and phonation for everyday speech with adequate speed and ease

Example 11-27

85% to 100% Voice/Speech Impairment

Subject: 38-year-old man.

History: Worked with rubber, plastics, and chemicals for 20 years (described as responsible for “everything that blows up”). Suffered inhalation injury from heavy exposure to vinyl chloride fumes due to reactor malfunction. Had microlaryngoscopy and excision of bilateral vocal fold polyps 1 year after inhalation injury. Voice improved after surgery; remained off work for 6 weeks after operation. Exposed to ammonia fumes 1 month after returning to work. Experienced immediate dyspnea and sudden and severe hoarseness. Required a second microlaryngoscopy and vocal fold polypectomy. Became aphonic after 3 days back at work. Required two vocal fold surgeries since initial injury. Undergoing psychological counseling for stress-related problems secondary to voice problems. Quit smoking.

Current Symptoms: Voice deterioration after using voice and after any exposure to fumes, perfume, smoke, or gasoline; hoarseness associated with shortness of breath; chronic sensation of lump in throat.

Physical Exam: Voice is harsh, hoarse, slightly breathy, and strained. Bilateral vocal fold scarring, decreased mucosal wave, hypervascularity, and mucosal irregularities on stroboscopy.

Clinical Studies: Marked abnormalities in harmonic to noise ratio, shimmer, and maximum flow rate.

Diagnosis: Mucosal vocal fold injury secondary to inhalation of noxious fumes, initially vinyl chloride. Airway hyperactivity that causes dysphonia and dyspnea.

Impairment Rating: 85% to 100% voice/speech impairment; 30% to 35% impairment of the whole person.

Comment: Third surgery is recommended. Vocal fold mucosa and voice quality have never returned to normal. Had progressive dysplastic vocal fold changes (leukoplakia) 5 years later. Would be rated class 3 on basis of audibility if in an environment (such as home) protected from fumes or pollution. However, in activities of daily living, has a class 5 impairment.

Example 11-28

85% to 100% Voice/Speech Impairment

Subject: 50-year-old man.

History: Had large endolaryngeal tumor without airway obstruction. Hoarseness for 1 year. Enlarging anterior neck mass for 2 weeks. Dysphagia and 4.5-kg (10-lb) weight loss over 2 months. Forty to 50 pack-year history of smoking. Moderately heavy alcohol user. Underwent total laryngectomy with radical neck dissection and excision of malignant laryngeal cutaneous fistula. Surgery was followed by radiation therapy. Underwent four esophageal dilatations and stomal revisions in preparation for Singer-Blom prosthesis after laryngectomy and radiation therapy. Had submental swelling that required full mouth dental extraction and alveoloplasty. Smokes through tracheostoma. Eats well; weight is stable. Has virtually no family to assist him in his care.

Current Symptoms: Unable to speak. Unable to develop esophageal speech or use electrolarynx. Remains totally aphonic.

Physical Exam: No evidence of cancer. Has very dense and deep scarring of neck musculature. Stoma appears epithelialized and open.

Clinical Studies: Four esophageal dilatations. Stoma remains open, but he has not been able to accommodate Singer-Blom prosthesis.

Diagnosis: Laryngeal cancer; laryngectomy.

Impairment Rating: 85% to 100% voice/speech impairment; 30% to 35% impairment of the whole person.

Comment: Altered self-image secondary to disfigurement from cancer, radical neck surgery, and tracheostomy. Unable to achieve speech with Singer-Blom assistive device or by alternative means. Lacks motivation and dexterity for use of assistive voicing devices due to chronic alcohol abuse.

11.5 Ear, Nose, Throat, and Related Structures Impairment Evaluation Summary

See Table 11-10 for an evaluation summary for the assessment of impairment of the ear, nose, throat, and related structures.

Table 11-10 Ear, Nose, Throat, and Related Structures Impairment Evaluation Summary

Disorder	History, Including Selected Relevant Symptoms	Examination Record	Assessment of Physical Function
General	Ear, nose, and throat symptoms (eg, hearing loss, dizziness, or vertigo) and general symptoms; impact of symptoms on function and ability to do daily activities; prognosis if change anticipated; review medical history and any resulting limitation of physical function	Comprehensive physical examination; detailed relevant system assessment	Data derived from relevant studies (eg, audiometry)
Hearing Impairment	Comprehensive history including family history, developmental history of trauma, noise, and drug exposure; surgical procedures; symptoms of imbalance (eg, unsteadiness or vertigo); ear-popping; history of tinnitus; age; associated metabolic and/or endocrine disorders	General physical examination; ear, nose, and throat examination; findings from pneumotomography, tuning-fork tests, hearing tests, balance function tests, and radiographic tests; metabolic evaluation	Otologic examination on tuning-fork tests; tympanometry; behavioral, audiometry, and auditory brain (evoked) response tests; electrocochleography tests; electronystagmography; metabolic and endocrine studies as necessary
Vestibular Impairment	Discuss symptoms and antecedent events; determine associated symptoms (eg, nausea, vomiting, or tinnitus); review medications; trauma; disorders associated with dizziness	Complete physical examination findings; audiologic evaluation; balance tests; electronystagmogram; blood pressure; radiologic studies	Blood pressure tests; provocative maneuvers; audiometry; electronystagmogram tests; x-rays as appropriate
Structural Facial Impairment	Case history (including symptoms) relative to facial structure and integrity; relate to other organ systems (eg, skin, eye, alimentary tract, and upper airway); social acceptability	Description of comprehensive examination of head and neck, especially the face; cutaneous abnormalities; description of supporting structures of the face such as lips; record of eye examination; photographic records; radiologic records; records of psychosocial behavior	Consider data from relevant physical findings; assess cutaneous findings, structural abnormalities, and neurologic impairments
Facial Disfigurement	History of burns, trauma, or infection; dysplasia; social factors	Records of physical findings of face, head, and neck; neurologic studies; photographic records	Consider data from clinical examination of face and facial nerve studies; photographic studies
Impairment of Respiration (Air Passage Defects)	Medical history (especially respiratory function) related to upper airway, lower airway, and lungs; consider signs and symptoms of breathiness and dyspnea; limitations of exercise; sleep disorders; consider related systems (eg, pulmonary, cardiac, allergy, metabolic, neurologic, or psychological systems)	Data from examination of head and neck, especially nasal, oropharyngeal, and tracheobronchial airways; rhinometric studies; endoscopic findings; pulmonary function tests; radiologic findings; ultrasound studies	Examination of airway; rhinometry; endoscopy; pulmonary function tests; radiologic studies; ultrasound studies of airway

	Physical Findings	Diagnosis	Degree of Impairment
	Assessment of sequelae including end-organ damage and impairment	Record all pertinent diagnoses; note if they are at maximal medical improvement; if not, discuss under what conditions and when stability is expected	Criteria outlined in this chapter
	Assess relevant organs; external ear and middle ear functions; eustachian tube function; status of hearing by audiometry; status of electrophysiologic tests as applicable	Conductive, sensorineural, mixed, and functional hearing loss; tinnitus; Meniere's disease	See Table 11-5
	Signs of otitis media and head trauma; audiogram; auditory brain (evoked) response findings; electronystagmogram findings; evidence of cardiovascular, endocrine, metabolic, and/or ocular disorders	Otitis media; head trauma; drug side effects; vestibular neuronitis; seizure disorder; syncope; hyperventilation; benign positional vertigo; endolymphatic hydrops; CPA tumor Cardiovascular, endocrine, metabolic, functional, and/or ocular disorders	See Table 11-4
	Examine cutaneous aspects of face; examine supporting (structural) aspects of face, head, and neck; consider integrity and appearance of lips, nose, eyebrows, and eyelids; radiologic studies of head and neck; CT scans; MRI scans; assess related systems (eg, visual, cutaneous, respiratory, neurologic, and psychosocial)	Visible scars; abnormal pigmentation; depressed fracture of facial bones and/or nasal cartilage; mutilation of nose or ear; distortion of anatomic facial structure; notable facial distortion; loss of social acceptance	See Table 11-5
	Examine face; assess physical findings; perform facial nerve function tests; make photographic records	Facial nerve paresis or paralysis; deformity or loss of external ear or nose	See Table 11-5
	Partial obstruction of nose and/or oropharynx, larynx, trachea, or bronchi; complete obstruction of nose and/or nasopharynx; tracheotomy or tracheostomy	Air passage defect with no, mild, moderate, severe, or profound dyspnea; permanent tracheotomy or tracheostomy	See Table 11-6

Table 11-10 continued

Disorder	History, Including Selected Relevant Symptoms	Examination Record	Assessment of Physical Function
Impairment of Mastication and Deglutition	History and symptoms of mastication and/or deglutition difficulty; history of dietary habits and restrictions; history of burns or trauma; records of related systems (eg, gastrointestinal, neurologic, endocrine, or dental systems)	Comprehensive examination of nose and throat; records of temporomandibular joint function; results of speech articulation tests; esophageal function tests; endocrine studies; neurologic reports; assessment of pain if present; dental reports	Examination of nose, throat, and oropharynx; examination of temporomandibular joint function; x-rays of head and neck; swallowing studies; esophageal examination; esophageal studies; dental findings
Impairment of Olfaction and/or Taste	Ear, nose, and throat infections; head trauma; structural or foreign body nasal obstruction; nasal allergy; infections of nose and sinuses; history of head and neck tumors; drug use	Tests for odor identification; tests for taste identification; results of x-rays of head and neck; results of MRI and CT studies of head and neck; allergy tests	Subjective tests for odor identification; subjective tests for taste identification; electrical taste tests; x-rays of head and neck; MRI and CT studies of head; cranial nerve function tests; test for nasal allergens
Voice and Speech Impairment	History of general health and development; history of speech development and dysfluency; history of onset of speech and/or voice symptoms; history of surgery, trauma, infections, tumors, and treatment	Records of general medical examination; ear, nose, and throat examination; reports of hearing tests, neurologic evaluations, and pulmonary function studies; reports of laryngeal surgery and endocrine and metabolic evaluations	Records of general medical examination; examination of ears, nose, throat, and larynx; laryngoscopy; voice analysis; stroboscopy; speech analysis; pulmonary function tests; laryngeal electromyography

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	Physical Findings	Diagnosis	Degree of Impairment
	Abnormal temporomandibular joint function; pain (see Chapter 18); contributory dental conditions; gastroenterologic findings (see Chapter 6)	Temporomandibular joint disorder; pain (see Chapter 18); neurologic diagnoses (see Chapter 13); gastroenterologic diagnoses (see Chapter 6)	See Table 11-7
	Nasal obstruction due to mucosal edema, nasal polyps, septal or turbinate occlusion of airway, or nasal tumor; physical findings may be normal except for presenting symptom; surgery sequela	Nasal septal deviation; nasal airway occlusion by turbinate bone; allergic rhinitis; nasal polyps; sinusitis; foreign body in nose; traumatic anosmia; drug toxicity; dermoid encephalocele; meningocele; intracranial or other tumor	See Olfaction and Taste (Section 11.4c)
	Assess laryngeal structures; assess vocal cord function and articulators of oropharynx; assess palatal function; assess phonation, articulation, and speech intelligibility; consider esophageal speech; include assessment of respiratory, neurologic, and psychiatric findings when applicable	Pulmonary function disorder; phonatory disorder (eg, voice fatigue, weak voice, abnormal pitch, melodic variation, hoarseness, harshness, or breathiness); articulatory disorder; larynx or airway tumor; myasthenia gravis; esophageal speech	See Table 11-8

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