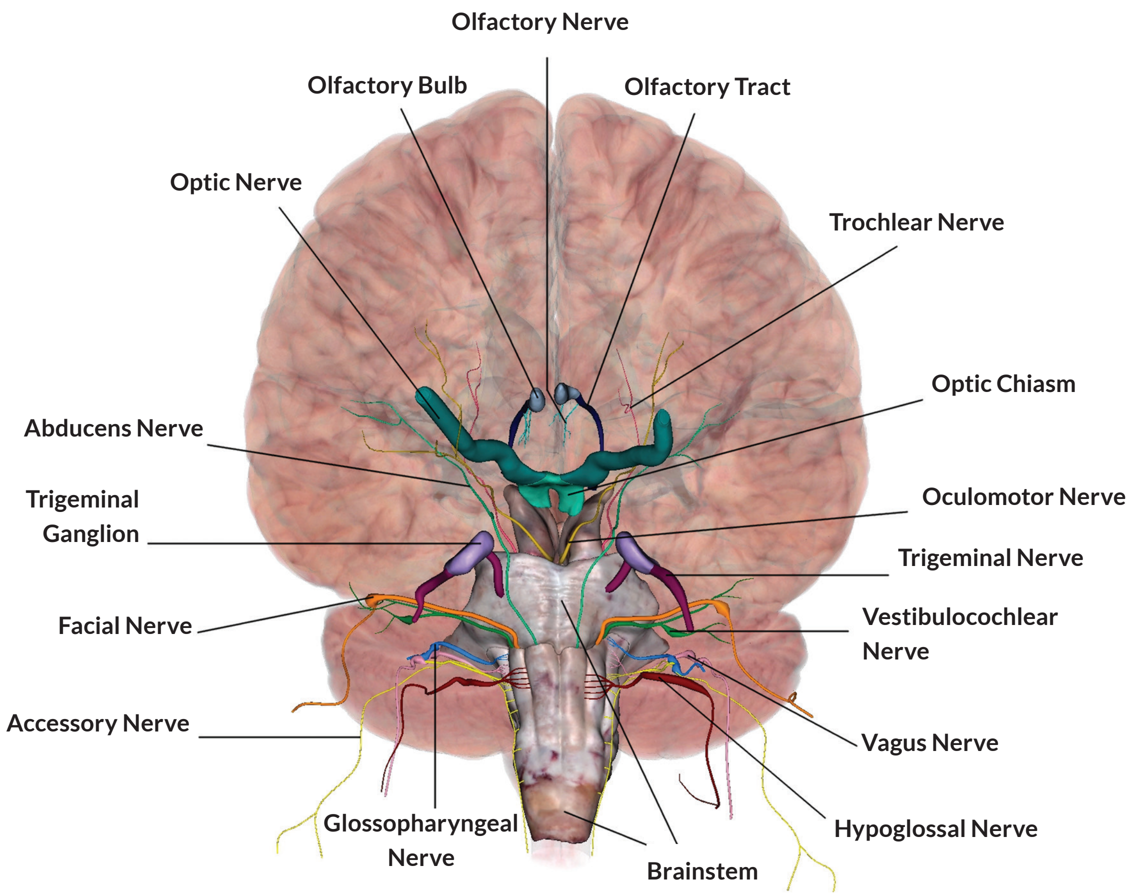

Figure 1.20 Cranial nerves. Used with permission from Anatomage.

Cranial nerves I, II, III, IV, and VI are not concerned with speech, language, or hearing.

- **Cranial nerve I (the olfactory nerve)** is a sensory nerve originating in the nasal cavity. It is involved with smell.
- **Cranial nerve II (the optic nerve)** is a sensory nerve originating in the retina. It is involved with vision.
- **Cranial nerve III (the oculomotor nerve)** and **cranial nerve IV (the trochlear nerve)** are motor nerves that originate in the midbrain area and innervate muscles corresponding to eye movement.
- **Cranial nerve VI (the abducens nerve)** is a motor nerve that controls eye movement.

Cranial nerves V and VII to XII *are* involved with speech, language, and hearing.

- **Cranial nerve V**, or the **trigeminal nerve**, is a mixed (both motor and sensory) nerve (see Figures 1.21a, b, and c).
- Its **sensory fibers** are composed of three branches: the ophthalmic, maxillary, and mandibular branches.
    - The **ophthalmic branch** has sensory branches from the nose, eyes, and forehead.

Types of Alaryngeal Speech

Because the vocal folds are not present after a laryngectomy, normal voicing is not possible and breathing is different. To allow the patient to breathe, the surgeon creates a **stoma**, or opening in the lower part of the neck, and connects it with the trachea. The patient now breathes through that opening.

Figure 7.14 illustrates the anatomy and physiology of the head and neck before and after a total laryngectomy. Because of the altered anatomy and physiology, a new source of sound is needed for voicing.

Laryngectomees produce vocalizations in three ways: with the use of external devices, via esophageal speech, or by having surgical modifications or implanted devices in the laryngeal area.

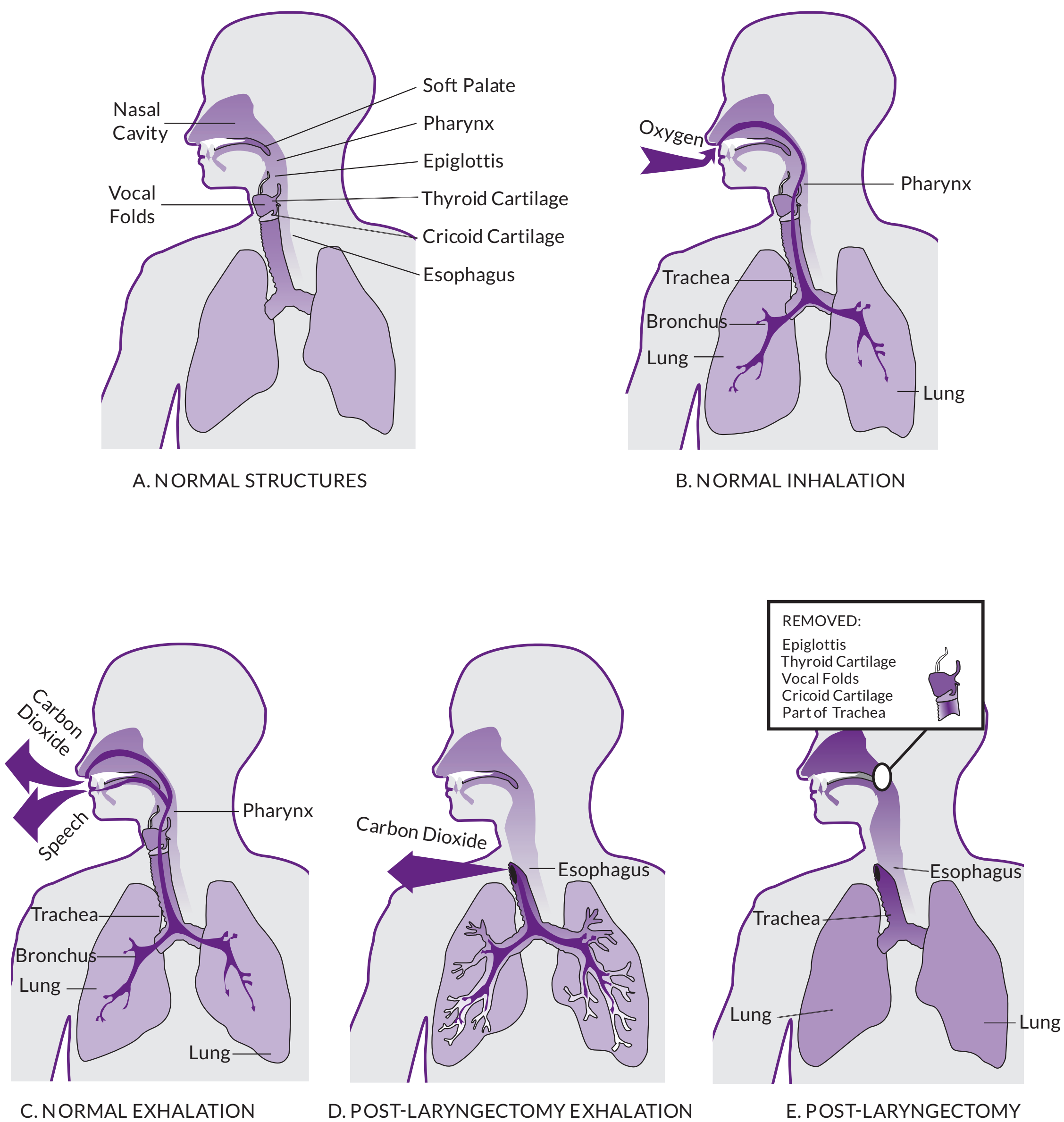

Figure 7.14 Before and after laryngectomy: physiology of the head and neck.

- Training on /k/ and /g/ may be inappropriate if the child's velopharyngeal functioning is inadequate.
- If stimulable, fricatives, affricates, or both may be trained; in any case, they may be trained after stops are mastered.
- Frequent presentation of auditory and visual cues and modeling may be helpful.
- Compensatory articulatory positioning, where appropriate, may be taught.
- The clinician may teach the child to avoid posterior articulatory placements and to articulate with less effort and facial grimacing.
- Tactile cues and instruction to improve tongue positioning may be useful.
- Some children benefit from a minimal pairs approach, especially if they delete final consonants. For example, the SLP can contrast pairs, such as *bee-beach*, *cow-couch*, *bye-bike*, *lie-line*, and others.

- Research has not shown that work on non-speech, oral–motor blowing exercises is helpful for children with cleft palates (Ruscello, 2008). Clinical outcome research is needed to assess the efficacy of exercises, such as blowing horns, on the speech production of children with SSDs associated with cleft palate.
- A promising technique for improving a child's speech sound production is electropalatography (EPG). In EPG, an orthodontist designs an artificial palate that contains 62 embedded electrodes connected to a computer. The palate is fitted in the child's mouth (somewhat like a retainer; see Figure 10.6a), and when the tongue contacts the electrodes during speech production, articulatory patterns can be seen on the computer screen (see Figure 10.6b).

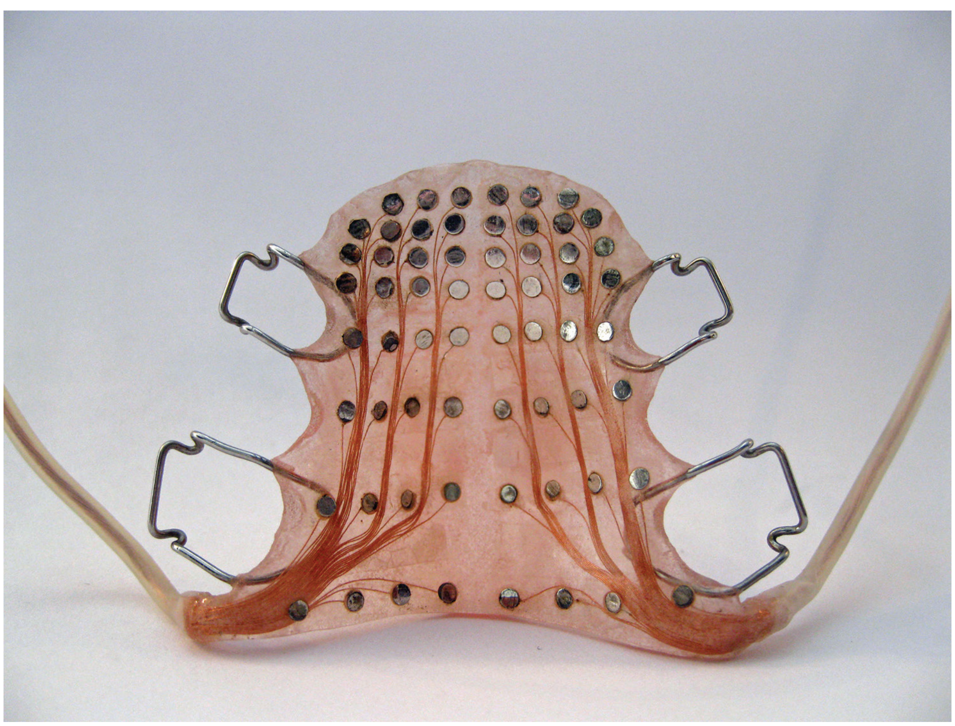

Figure 10.6a Electropalatography palate Copyright © Rose Medical Solutions Ltd. www.rose-medical.com.

- The **in-the-canal model**, which fits in the ear canal and is less visible. The receiver in the canal (RIC) model has a case behind the ear that contains the aid's amplifier and microphone and a small bud that contains the receiver located inside the ear canal. A tube connects the case to the receiver.
- The **completely-in-the-canal model**, which is smaller and even less visible than the in-the-canal model and terminates close to the tympanic membrane
- The **in-the-ear model**, which is a smaller unit that fits within the concha of the external ear.

- The **analog hearing aid** is not often used. They create patterns of electric voltage that correspond to the sound input. All analog hearing aids consist of the same basic components: a microphone, an amplifier, a receiver, a power source (batteries), and volume control. Analog hearing aids now comprise a very small proportion of the total—approximately 10%.
- Digital hearing provide superior sound and connectivity to other devices (i.e., Bluetooth) and now comprise 90% of the market.
- Hearing aid **transducers** include the **microphone**, which picks up sound, and the **receiver**, which delivers the sound to the ear. These transducers convert one form of energy into another.
- The microphone converts the sound energy into electrical energy. The **amplifier** is where the electrical signals are fed and signals are amplified, which is then delivered to the receiver. The amount of amplification applied to the signal is called **gain**. The receiver, housed in the ear mold, converts the electrical energy back into sound waves. The following figure is a schematic representation of how the parts of a hearing aid work to amplify sound and transmit it to the ear. Figure 12.21 displays a hearing aid schematic.

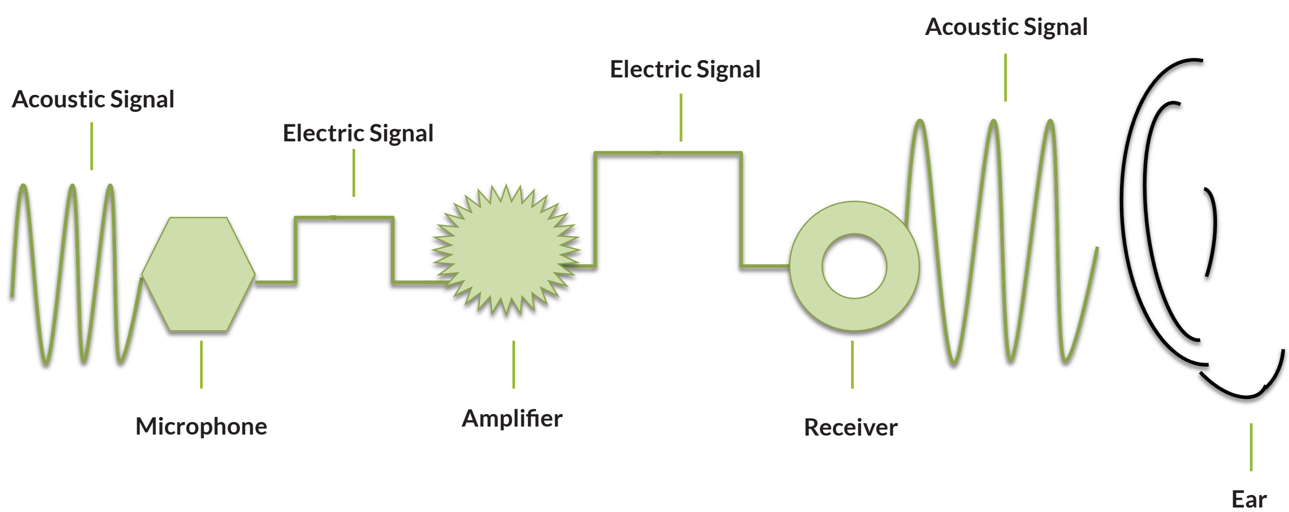

Figure 12.21 Hearing aid schematic.