

Clinical interpretation. HNC survivors with a history of ototoxic drug exposure (eg, cisplatin cumulative dose >100 mg/m²) are at risk for chronic, potentially progressive sensorineural hearing loss.⁹⁵ Ototoxic agents first affect the high-frequency range (frequencies above those needed for speech processing). For this reason, hearing loss may not be detected until it progresses to the lower frequency range and interferes with routine communication. Hearing loss may also occur from local effects of surgery or RT from persistent swelling of the Eustachian tube. Treatment-related hearing loss can progress over time. Late neurotoxic effects of both cytotoxic agents and RT on the cochlear nerve, over and above normal age-related hearing loss, are implicated as the source of progressive hearing loss years after initial treatment in long-term HNC survivors.⁹⁶ On the basis of level III studies, it is recommended that HNC survivors with hearing loss be referred to an audiologist.⁹⁷ Proactive baseline and on-treatment monitoring for ototoxicity is favored for early recognition and management of hearing loss. Complete audiologic examination includes tympanometry, pure tone testing (air conduction and bone conduction), speech reception threshold and word-recognition testing, and distortion product otoacoustic emissions.^{98,99} Audiologic intervention may include education to reduce noise exposure or fitting of hearing aids.

Sleep disturbance/sleep apnea

Recommendation 3.12. It is recommended that primary care clinicians: a) should screen HNC survivors for sleep disturbance by asking HNC survivors and partners about snoring and symptoms of sleep apnea (LOE = 0); b) should refer HNC survivors to a sleep specialist for a sleep study (polysomnogram) if sleep apnea is suspected (LOE = 0); c) should manage sleep disturbance similar to patients in the general population (LOE = 0); d) should recommend nasal decongestants, nasal strips, and sleeping in the propped-up position to reduce snoring and mouth-breathing. Room cool mist humidifiers can aid sleep as well by keeping the airway moist (LOE = 0); and e) should refer to a dental professional to test the fit of dentures to ensure proper fit and counsel HNC survivors to remove dentures at night to avoid irritation (LOE = 0).

Clinical interpretation. OSA appears to be common in HNC patients.¹⁰⁰ Primary radiation or chemotherapy can create long-term swelling of the tongue and larynx in these patients. Reconstructive techniques, especially flaps replacing the posterior tongue, can compromise the airway even after a tracheostomy is allowed to close. Radiation fibrosis may also restrict neck ROM and affect positioning during sleep. Recognition of any preexisting airway difficulties

should be assessed, as these patients will be especially at risk.

The complications of OSA include hypoxia, hypertension, cardiac arrhythmias, and cardiopulmonary stress. It can lead to myocardial infarction, pulmonary hypertension, heart failure, and stroke. Sleep deprivation from the consequences of apnea will create excessive fatigue, daytime drowsiness, and cognitive difficulties. It may also slow reaction time, potentially contributing to motor vehicle accidents and falls. OSA can amplify recovery difficulties in HNC survivors.

Interventions can include continuous positive airway pressure (CPAP),¹⁰⁰ referral to behavioral therapy, education, weight-loss programs emphasizing diet and exercise, complementary therapy (eg, aromatherapy, guided imagery), and possible managed pharmacologic interventions.

Speech/voice

Recommendation 3.13. It is recommended that primary care clinicians: a) should assess HNC survivors for speech disturbance (LOE = 0); and b) should refer HNC survivors to an experienced speech-language pathologist if communication disorder exists (LOE = IA, IIA).

Clinical interpretation. Speech, voice, and/or resonance disturbance may alter understandability or acceptability of verbal communication in HNC survivorship.¹⁰¹ New or progressive hoarseness or dysarthria can indicate new cancer and should be evaluated first by the HN surgeon. While rare (prevalence, $<5\%$), de novo, radiation-associated, lower cranial neuropathies may cause delayed speech or voice deterioration in long-term survivors (eg, typically cranial nerve XII palsy causing dysarthria and cranial nerve X causing dysphonia).^{102,103} Behavioral voice/speech therapies and prosthetic rehabilitation options should be considered. On the basis of two level IA RCTs and various level IIA studies, HNC survivors with communication disorders should be referred to a speech-language pathologist for assessment and management of speech, voice, and resonance disturbance. Early assessment and intervention are preferred.^{104,105} In certain clinical scenarios, prosthetic rehabilitation is supported by numerous level IIA studies. Tracheoesophageal voice using a valved voice prosthesis optimizes QoL and intelligibility of speech after a total laryngectomy.¹⁰⁶ Tracheoesophageal prostheses are managed by speech-language pathologists. Prosthetic obturators fabricated by maxillofacial prosthodontists can improve speech resonance in patients with palatal defects, and palatal drop prostheses can improve articulation after subtotal or total glossectomy.¹⁰⁷ Prosthetic rehabilitation can be costly, and outcomes are highly dependent on familiarity of the provider (level 0); thus, referring clinicians are encouraged to seek expert teams for these specialty services.