

## European Head and Neck Society recommendations for head and neck cancer survivorship care

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### ABSTRACT

Survivors of head and neck cancer can experience long-term consequences of the cancer and subsequent treatments even after the cancer has resolved. Increasingly clinicians are aware of the social, psychological, financial, and emotional impacts of these cancers, in addition to the support required for the physical symptoms. This review provides recommendations on the long-term management and support required for survivors of head and neck cancer in the European healthcare setting.

### Introduction

Current estimates suggest that the incidence of head and neck cancer (HNC; including lip/oral cavity, oesophagus, larynx, oropharynx, hypopharynx, salivary glands and nasopharynx) in Europe is approximately 21.8 per 100,000, with mortality rates approximately 15.6 per 100,000 [1].

Patients with HNC can have long-term consequences due to the cancer and its treatment, with specific challenges relating to surgery, radiotherapy and chemotherapy [2–4]. Furthermore, patients with HNC have an increased risk of developing secondary primary cancers (SPCs),

particularly in the head and neck region and lungs [5]. Patients surviving HNCs can therefore have complex ongoing needs relating to the consequences of their cancer therapy, the risk of SPCs and significant physical and psychosocial rehabilitation needs [5–8].

Many local and national clinical practice recommendations and strategies for HNC survivors are based on the 2016 American Cancer Society (ACS) HNC Cancer Survivorship guidelines; however, survivors may still have unmet needs [6,7,9]. In the US healthcare system, post-cancer care is led by specialist primary care clinicians [9]; this is different to European healthcare systems, where, as with the treatment of the cancer, recovery and ongoing care will usually be handled by a

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**Table 1**  
Overall guidelines.

**Guideline overview**

- Target population: Adult post-treatment head and neck cancer (HNC) survivors
- Target audience: Primary care clinicians, secondary care oncologists, and other clinicians caring for HNC survivors
- Methods: An expert panel was convened to revise clinical practice guideline recommendations based on a systematic review of the medical literature and the American Cancer Society (ACS) key recommendations for HNC survivorship care

**Surveillance for HNC recurrence**

*History and physical*

- Recommendation 1.1. It is recommended that clinical care teams should: (a) conduct a detailed cancer-related history and physical examination every 1–3 months for the first year after primary treatment, every 2–6 months in the second year, every 4–8 months in years 3–5, and annually after 5 years (I/IIA) [5,10]; (b) individualise clinical follow-up care as suggested in (a) based on age, specific diagnosis, and treatment protocol as recommended by the treating oncology team (Level of evidence [LOE] 5 2A); (c) confirm continued follow-up with an otolaryngologist or HNC specialist for head and neck (HN)-focused examination (LOE 5 2A).

*Surveillance education*

- Recommendation 1.2. It is recommended that clinical care teams should: (a) educate and counsel all HNC survivors about the signs and symptoms of local recurrence (LOE 5 0) and that this education should be considerate of the anxiety that possible recurrence causes in HNC survivors; (b) refer HNC survivors to an HNC specialist if signs and symptoms of local recurrence are present (LOE 5 0).

**Screening and early detection of second primary cancers (SPCs)**

- Recommendation 2.1. It is recommended that clinical care teams should: (a) screen HNC survivors for other cancers as they would for patients in the general population by adhering to the ACS Early Detection Recommendations ([cancer.org/professionals](https://www.cancer.org/professionals); LOE 5 0). It is recommended that specialist clinical teams: (b) screen HNC survivors for lung cancer according to American Society of Clinical Oncology (ASCO) or National Comprehensive Cancer Network (NCCN) recommendations for annual lung cancer screening with low-dose computed tomography (LDCT) for high-risk patients based on smoking history (LOE 5 2A); (c) screen HNC survivors for another HNC and oesophageal cancer as they would for patients of increased risk (LOE 5 0, IIA, I).

**Assessment and management of physical and psychosocial long-term and late effects of HNC and its treatment**

- Recommendation 3.1. It is recommended that clinical care teams should assess for long-term and late effects of HNC and its treatment at each follow-up visit (LOE 5 0).
- Recommendation 3.1.1. It is recommended that clinical care teams should: (a) assess the information and supportive care needs of the HNC survivor related to HNC and its treatment, adverse effects, speech pathology, other health concerns, and available support services (LOE 5 0); (b) provide or refer HNC survivors to appropriate resources to meet identified needs (LOE IIA).

*Spinal accessory nerve palsy*

- Recommendation 3.2. It is recommended that clinical care teams should refer HNC survivors with spinal accessory nerve palsy occurring post-radical neck dissection to a rehabilitation specialist physical therapist to improve range of motion and ability to perform daily tasks (LOE 5 IA).

*Shoulder dysfunction*

- Recommendation 3.3. It is recommended that clinical care teams should: (a) conduct baseline assessment of HNC survivor shoulder function post-treatment for strength, range of motion, and impingement signs, and continue to assess as follow-up for ongoing complications or worsening condition (LOE 5 IIA); (b) refer HNC survivors to a rehabilitation specialist for improvement to pain, disability, and range of motion where shoulder morbidity exists (LOE 5 IA).

*Cervical dystonia/muscle spasms/neuropathies/pain*

- Recommendation 3.4. It is recommended that clinical care teams should: (a) assess HNC survivors for cervical dystonia, which is characterised by painful dystonic spasms of the cervical muscles and can be caused by neck dissection, radiation, or both (LOE 5 0); (b) refer HNC survivors to a rehabilitation specialist for comprehensive neuromusculoskeletal management if cervical dystonia or neuropathy is found (LOE 5 0); (c) receive assessment and consultation for the management of pain as part of regular follow-up (LOE IIA); (d) prescribe nerve-stabilising agents, such as pregabalin, gabapentin, and duloxetine, or refer to a specialist for botulinum toxin type A injections into the affected muscles for pain management and spasm control as indicated (LOE 5 0, IIA); (e) expect that these can occur as some of the very late effects of treatment (LOE 2 A).

*Trismus*

- Recommendation 3.5. It is recommended that clinical care teams should: (a) refer HNC survivors to rehabilitation specialists and the appropriate dental/maxillofacial specialists to prevent trismus and to treat trismus as soon as it is diagnosed (LOE 5 0); (b) prescribe nerve-stabilising agents to combat pain and spasms, which may also ease physical therapy and stretching devices (LOE 5 IIA); (c) provide patients with interactive self-management guidance where possible (LOE 2 A).

*Dysphagia/aspiration/stricture*

- Recommendation 3.6. It is recommended that clinical care teams should: (a) refer HNC survivors presenting with complaints of dysphagia, postprandial cough, unexplained weight loss, and/or pneumonia to an experienced speech-language pathologist for instrumental evaluation of swallowing function to assess and manage dysphagia and possible aspiration and oropharyngeal residue (LOE 5 IA, IIA); (b) recognise potential for psychosocial barriers to swallowing recovery and the need for psychosocial and psychological support and refer HNC survivors for appropriate clinical support (LOE 5 IIA); (c) refer patients to a speech-language pathologist for videofluoroscopy as the first-line test for HNC survivors with suspected stricture due to the high degree of coexisting physiological dysphagia (LOE 5 IIA); (d) refer HNC survivors with stricture to a gastroenterologist or head and neck surgeon for dilation (LOE 5 IIA); (e) provide patients with self-management tools and guidance (LOE 2 A).

*Gastroesophageal reflux disease*

- Recommendation 3.7. It is recommended that clinical care teams should: (a) monitor HNC survivors for developing or worsening gastroesophageal reflux disease, as it prevents healing of irradiated tissues and is associated with increased risk of HNC recurrence or SPCs (LOE 5 IIA); (b) counsel HNC survivors on the increased risk of oesophageal cancer and the associated symptoms (LOE 5 IIA); (c) recommend proton-pump inhibitors or antacids, sleeping with a wedge pillow or 3-inch blocks under the head of the bed, not eating or drinking fluids for 3 h before bedtime, tobacco cessation, and avoidance of alcohol (LOE 5 IIA); (d) refer HNC survivors to a gastroenterologist if symptoms are not relieved by treatments listed in 3.7c (LOE 5 IIA).

*Lymphoedema*

- Recommendation 3.8. It is recommended that clinical care teams should: (a) assess HNC survivors for lymphoedema using the National Cancer Institute Common Terminology Criteria for Adverse Events v.4.03, or refer for endoscopic evaluation of mucosal oedema of the oropharynx and larynx, tape measurements, sonography, or external photographs (LOE 5 IIA); (b) refer HNC survivors to a rehabilitation specialist for treatment consisting of manual lymphatic drainage and, if tolerated, compressive bandaging, or complete decongestion therapy (LOE 5 IIA, LOE 0).

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**Table 1** (continued)*Fatigue*

- Recommendation 3.9. It is recommended that clinical care teams should: (a) assess for fatigue and investigate any routine causative factors for fatigue, including anaemia, thyroid dysfunction, and depression (LOE 5 0); (b) offer treatment or referral for factors that may impact fatigue (e.g. mood disorders, sleep disturbance, pain) for those who do not have an otherwise identifiable cause of fatigue (LOE 5 I); (c) counsel HNC survivors to engage in regular physical activity and refer for psychosocial counselling or psychotherapy as appropriate (LOE 5 I).

*Altered or loss of taste and smell*

- Recommendation 3.10. It is recommended that clinical care teams should: (a) ensure all patients are assessed for possible taste and sense changes as part of their nutritional assessments; (b) refer HNC survivors with altered or loss of taste to a registered dietitian for dietary counselling and assistance in additional seasoning of food, avoiding unpleasant food, and expanding dietary options and (LOE 5 IIA); (c) encourage those with altered sense of smell to practise the nasal airflow-inducing manoeuvre (LOE II A); (d) offer psychosocial counselling or psychotherapy as appropriate (LOE II A).

*Hearing loss, vertigo, vestibular neuropathy*

- Recommendation 3.11. It is recommended that clinical care teams should refer HNC survivors to an otologist and/or neuro-otologist for loss of hearing, vertigo, or vestibular neuropathy related to treatment (LOE 5 IIA).

*Sleep disturbance/sleep apnoea*

- Recommendation 3.12. It is recommended that clinical care teams should: (a) screen HNC survivors for sleep disturbance by asking HNC survivors and partners about snoring and symptoms of sleep apnoea and about other forms of disturbed sleep (e.g., difficulties falling asleep, difficulties keeping asleep, changes of sleep-wake-rhythm, nightmares) (LOE 5 0); (b) refer HNC survivors to a sleep specialist for more detailed assessment (LOE 5 0); (c) manage sleep disturbance similar to patients in the general population (LOE 5 0); (d) 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 5 0); (e) refer patients 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 5 0); (f) assess whether patients are experiencing distress and, if so, refer to mental health specialists for psychotherapy (LOE 0).

*Speech and voice*

- Recommendation 3.13. It is recommended that clinical care teams should: (a) assess HNC survivors for speech pathology (LOE 5 0); (b) refer HNC survivors to an experienced speech-language pathologist if communication disorder exists (LOE 5 IA, IIA); (c) where appropriate provide patients with appropriate exercise to help self-manage their recovery (LOE IA); (d) provide support for the emotional and psychosocial issues surrounding speech difficulties (LOE IIA).

*Oral and dental surveillance*

- Recommendation 3.14. It is recommended that the post-cancer care team should: (a) counsel HNC survivors to maintain close follow-up with the dental professional and reiterate that proper preventive care can help reduce caries and gingival disease (LOE 5 IA); (b) counsel HNC survivors to avoid tobacco, alcohol (including mouthwash containing alcohol), spicy or abrasive foods, extreme temperature liquids, sugar-containing chewing gum or sugary soft drinks, and acidic or citric liquids (LOE 5 0); (c) refer HNC survivors to a dental professional specialising in the care of oncology patients (LOE 5 0); (d) provide patients with advice to enable self-management of oral pain (LOE I A) and the recommendations in 3.3 further apply here specifically for the management of oral pain.
- Recommendation 3.15. Dental professionals should provide any dental reconstruction required, in particular where prosthetics may be required in order to support functionality. Complex dental reconstruction may require the need for patients to be referred to specialists or specialist services where available (LOE IC)

*Dental health and caries*

- Recommendation 3.16. It is recommended that primary care clinicians should: (a) counsel HNC survivors to seek regular professional dental care for routine examination and cleaning and immediate attention to any intraoral changes that may occur (LOE 5 0); (b) counsel HNC survivors to minimise intake of sticky and/or sugar-containing food and drink to minimise risk of caries (LOE 5 0); (c) counsel HNC survivors on dental prophylaxis, including brushing with remineralising toothpaste, the use of dental floss, and fluoride use (prescription 1.1 % sodium fluoride toothpaste as a dentifrice or in customised delivery trays; LOE 5 IA, 0); (d) test fit dentures to ensure proper fit and counsel HNC survivors to remove them at night to avoid irritation (LOE 5 0); (e) counsel HNC survivors that nasal strips can reduce snoring and mouth-breathing and that room humidifiers and nasal saline sprays can aid sleep as well (LOE 5 0); (f) train HNC survivors to do at-home HN self-evaluations and be instructed to report any suspicions or concerns immediately (LOE 5 0).

*Periodontitis*

- Recommendation 3.17. It is recommended that primary care clinicians should: (a) refer HNC survivors to a dentist or periodontist for thorough evaluation (LOE 5 0); (b) counsel HNC survivors to seek regular treatment from and follow recommendations of a qualified dental professional and reinforce that proper examination of the gingival attachment is a normal part of ongoing dental care (LOE 5 0).

*Xerostomia*

- Recommendation 3.18. It is recommended that clinical care teams should: (a) encourage use of alcohol-free rinses if an HNC survivor requires mouth rinses (LOE 5 0); (b) counsel HNC survivors to consume a low-sucrose diet and to avoid caffeine, spicy and highly acidic foods, and tobacco (LOE 5 0); (c) encourage HNC survivors to avoid dehydration by drinking fluoridated tap water, but explain that consumption of water will not eliminate xerostomia (LOE 5 0); (d) consider the use of anticholinergic drugs to increase saliva and reduce xerostomia symptoms if other methods fail (LOE IA); (e) be aware that this can be a very late symptom of HNC treatment and to be mindful of this during long-term follow-up; (f) provide psychological support for the potential impact of xerostomia on quality of life (QoL) if required (LOE IIA).

*Osteonecrosis*

- Recommendation 3.19. It is recommended that primary care clinicians should: (a) monitor HNC survivors for swelling of the jaw and/or jaw pain, indicating possible osteonecrosis (LOE 5 0); (b) administer conservative treatment protocols, such as broad-spectrum antibiotics and daily saline or aqueous chlorhexidine gluconate irrigations, for early-stage lesions (LOE 5 0); (c) consider referral to HN surgeon for dental extractions particularly complex or surgical extractions to assess if needed to minimise the risk of osteonecrosis; (d) refer to an HN surgeon for consideration of hyperbaric oxygen therapy for early and intermediate lesions, for debridement of necrotic bone while undergoing conservative management, or for external mandible bony exposure through the skin (LOE 5 0).

*Oral infections/candidiasis*

- Recommendation 3.20. It is recommended that primary care clinicians should: (a) refer HNC survivors to a qualified dental professional for treatment and management of complicated oral conditions and infections (LOE 5 0); (b) consider systemic fluconazole and/or localised therapy of clotrimazole troches to treat oral fungal infections (LOE 5 0).

*Body and self-image*

- Recommendation 3.21. It is recommended that the post-cancer care team should: (a) assess HNC survivors for body and self-image concerns (LOE 5 IIA); (b) refer for psychosocial care as indicated (LOE 5 IA).

*Psychosocial problems and resilience*

- Recommendation 3.22. It is recommended that primary care clinicians should: (a) assess HNC survivors for psychosocial problems, such as symptoms of distress, depression, anxiety and adjustment disorder, fear of cancer recurrence, loneliness, and financial and employment challenges, as well as protective factors as coping and meaning, periodically (3 months

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**Table 1** (continued)

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post-treatment and at least annually), ideally using a validated screening tool (LOE 5 I), with frequency dictated by HNC sequelae severity and patient need (LOE I); (b) offer in-office counselling and/or pharmacotherapy and/or refer to appropriate psycho-oncology and mental health resources as clinically indicated if symptoms of fear of recurrence or other psychosocial problems are present (LOE 5 I); (c) refer HNC survivors to mental health specialists for specific QoL concerns, such as to social workers for issues, including financial and employment challenges, finding meaning in life and living, in adjusting to living beyond cancer (LOE 5 I).

*Dyspnoea*

- Recommendation 3.23. It is recommended that clinical care teams should: (a) perform a complete dyspnoea assessment on patients who report this symptom (LOE 0); (b) provide psychoeducational and self-management tools (LOE 0).

*Concentration and memory*

- Recommendation 3.24. It is recommended that clinical care teams should: (a) assess patients for cognitive function (LOE II A); (b) provide psychosocial support for cognitive difficulties (LOE IIA); (c) refer patients for additional support in coping with cognitive changes (LOE IIA).

*Sexuality and intimacy*

- Recommendation 3.25. It is recommended that clinical care teams: (a) offer advice and support in managing changes in sexual relationships (LOE IIB); (b) offer patients psychosocial support for the potential impact of these changes (LOE IIB).

**Health promotion**

*Healthy weight*

- Recommendation 4.1. It is recommended that clinical care teams should: (a) counsel HNC survivors to achieve and maintain a healthy weight (LOE 5 III); (b) refer patients for clinical dietitian support to counsel HNC survivors on nutrition strategies to maintain a healthy weight for those at risk for cachexia (LOE 5 0); (c) counsel HNC survivors if overweight or obese to limit consumption of high-calorie foods and beverages and increase physical activity to promote and maintain weight loss (LOE 5 IA).

*Physical activity*

- Recommendation 4.2. It is recommended that clinical care teams should counsel HNC survivors to engage in regular physical activity consistent with the ACS guideline, and specifically to: (a) avoid inactivity and return to normal daily activities as soon as possible after diagnosis (LOE 5 III); (b) aim for at least 150 min of moderate or 75 min of vigorous aerobic exercise per week (LOE 5 I, IA); (c) include strength training exercises at least 2 days/week (LOE 5 IA).

*Return to work and financial toxicity*

- Recommendation 4.3. It is recommended that, where possible, support is provided to help survivors return to work and that patients are referred to occupational therapists, or the relevant social care services (LOE 0).
- Recommendation 4.4. It is recommended that patients be assessed for risk of financial toxicity and are referred to the relevant social support services (LOE 5IA).

*Nutrition*

- Recommendation 4.5. It is recommended that clinical care teams should: (a) counsel HNC survivors to achieve a dietary pattern that is high in vegetables, fruits, and whole grains, low in saturated fats, sufficient in dietary fibre (unless otherwise recommended by a dietician), and avoids alcohol consumption (LOE 5 IA, I); (b) refer HNC survivors with nutrition-related challenges (e.g. swallowing problems that impact nutrient intake) to a registered dietician or other specialist (LOE 5 0); (c) include assessments regarding taste and smell changes as part of dietary assessments (LOE 0).

*Tobacco cessation and substance abuse*

- Recommendation 4.6. It is recommended that clinical care teams should: (a) counsel HNC survivors to avoid tobacco products and offer or refer patients to cessation counselling and resources (LOE 5 I); (b) refer patients for counselling and support regarding broader substance abuse issues (LOE 5 I).

**Care coordination and practice implications**

*Survivorship care plan*

- Recommendation 5.1. It is recommended that clinical care teams should collaborate to develop and continue survivorship and rehabilitation care plans (LOE 0).

*Communication with other providers*

- Recommendation 5.2. It is recommended that clinical care teams should: (a) maintain communication with the oncology team throughout diagnosis, treatment, and post-treatment care to ensure care is evidence-based and well-coordinated (LOE 5 0); (b) refer HNC survivors to a dentist to provide diagnosis and treatment of dental caries, periodontal disease, and other intraoral conditions, including mucositis and oral infections, and communicate with the dentist on follow-up recommendations and patient education (LOE 5 0); (c) maintain communication with specialists referred to for management of comorbidities, symptoms, and long-term and late effects (LOE 5 0).

*Inclusion of caregivers and patient support groups*

- Recommendation 5.3. It is recommended that clinical care teams should encourage the inclusion of caregivers and spouses in healthcare, and that they are provided with an understanding of symptoms, rehabilitation programmes and how to manage these.
- Recommendation 5.4. It is recommended that patients are referred to patient and self-management support groups to help deal with the consequences of HNC survivorship.

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multidisciplinary team [4]. With advancements in treatment and our understanding of the long-term consequences of HNC, there is a requirement for up-to-date guidelines to reflect the current landscape within the European healthcare setting and to set out how multidisciplinary teams can collaborate to provide comprehensive care to meet the multifaceted needs of these patients. Here we aim to adapt and update the American Head and Neck Society Guidelines to reflect recent study data since 2015, to propose how survivorship care is managed in European healthcare systems, and to recommend best practice for the European HNC patient population.

## Materials and methods

### Adoption and focus of the recommendations

These recommendations are developed as an adoption, i.e.

adaptation of existing guidelines, not changing aspects that continue to apply, but updating and amending as applicable to the European healthcare setting. This adoption has been developed based on the ACS HNC guidelines; as such, this clinical practice guideline also aims to address five key areas of HNC survivorship care to provide recommendations on best practices in the management of adults after HNC treatment, focusing on the role of the multidisciplinary teams who will provide post-treatment care to HNC survivors. The five areas covered include: (1) surveillance for HNC recurrence, (2) screening for SPCs, (3) assessment and management of physical and psychosocial long-term and late effects of HNC and treatment, (4) health promotion, and (5) care coordination and practice implications (see Table 1).

To adapt the guidelines, the process of the European Head and Neck Society (EHNS) Make Sense working group was to combine a literature search to identify study data that may impact clinical management since the ACS guidelines were developed and expert recommendations from

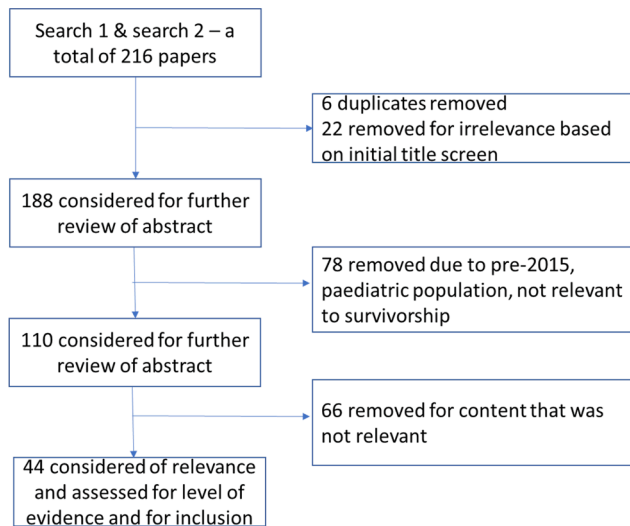


Fig. 1. The literature search process.

the working group.

#### Literature search

A literature search was performed using PubMed, from April 2015 to October 2021. Studies on childhood cancers, non-English publications and those considering thyroid and oesophageal cancers were excluded.

Two literature searches were performed, the first with no limitations and the terms: (((cancer survivor) AND (review OR meta-analysis OR systematic review OR guidelines OR guidance)) AND (head and neck cancer OR head and neck cancer survivor OR head and neck cancer patient post-treatment)) AND (symptom management OR late effects OR long-term effects OR psychosocial care OR palliative care OR health promotion OR surveillance OR screening new cancers OR self-management OR guidelines OR guidance OR follow up OR follow-up OR side effects OR (chemotherapy AND side effects) OR (radiation AND side effects), OR surgery OR treatment complications OR genetic counselling OR genetic testing OR survivor OR patient interventions OR provider interventions OR provider education OR barriers). The second search was performed with the limits: Consensus, Development, Conference, Guideline, Meta-Analysis, Observational Study, Review, Systematic Review, Humans, English, Cancer, Systematic Reviews, Adolescent: 13–18 years, Adult: 19 + years, Young Adult: 19–24 years, Adult: 19–44 years, Middle Aged + Aged: 45 + years, Middle Aged: 45–64 years, Aged: 65 + years, 80 and over, 80 + years. The second search also included the additional search terms inserted before the previously described terms: (head and neck cancer OR head and neck cancer survivor OR head and neck cancer patient post-treatment OR larynx\* cancer OR pharynx\* cancer OR “oral cavity” cancer AND survivor\* OR long-term OR late).

The abstracts were screened, filtered for duplicates and agreed for inclusion by the Working Group. The publications were then reviewed for evidence level according to supplemental Table 1, as guided by the ACS.

#### Guideline disclaimer

Where possible, literature evidence has been used to support the recommendations and adaptations made within this document. However, the study data to support the benefit of many interventions in HNC survivors are limited, and where there are gaps in the evidence, the EHNS Make Sense working group has provided recommendations based on its expert experience.

## Results

A total of 216 papers were identified using the search terms, 6 were removed as duplicates, 110 were considered for in-depth full text review and in total, 66 papers were considered for full text review and 44 papers were considered for evidence grading and of potential utility in the adaptation of the guidelines (Fig. 1).

## Recommendations

### *Recommendations for surveillance of HNC recurrence and screening and early detection of SPCs*

There is further evidence that continued follow-up of patients after completion of treatment is necessary to assess for recurrence or SPCs [5,10,11]. In a systematic review to assess the frequency of SPCs in patients who had history of HNC, Hoxaj et al. found that there was a high incidence of SPCs in patients with HNC, with up to 17.8 % (95 % confidence interval 6.79–46.77) standardised incidence rate from pooled studies [5]. The highest risk of SPCs was within head and neck sites, or along the upper aerodigestive tract, and most SPCs occurred within 3 years of the patient’s primary diagnosis; this provides good evidence to support current strategies to provide phased rigorous follow-up for 5 years. In 1155 patients surviving glottic squamous cell carcinoma in Denmark over 30 years, the cumulative incidence of SPCs after 5, 10 and 20 years was 10 %, 17 % and 25 %, respectively [11]. Furthermore, in a study monitoring the outcomes of patients followed up according to the DAHANCA guidelines, in 619 patient visits during a 6-week study period, 80 visits led to further work-up for suspicion of further disease. In this study, the incidence of asymptomatic recurrence was low, and 100 patients were needed to be seen to detect one asymptomatic recurrence [10]. However, this result indicates that there is still a clinical value in assessment for both symptomatic and asymptomatic recurrence in these populations as per current guidelines and as part of broader follow-up visits. The DAHANCA guidelines at the time of publication were similar to the recommendations made in the ACS guidelines [10].

Regarding patient education about recurrence, we additionally recommend that counsel is provided by an expert and that although patients should be aware of ‘what to look out for’ in terms of recurrence, clinicians should also be mindful that fear of recurrence can be a cause of anxiety in HNC survivors [12].

### *Assessment and management of physical and psychosocial long-term and late effects of HNC and its treatment*

We recommend that patients should be assessed for the late effects of HNC and HNC treatment during each long-term follow-up visit. However, for several late effects there is increasing evidence around the impact and prevalence of some of these conditions, which we will expand upon. We also include some additional late effects of treatments that were identified and that should be considered during follow-up visits.

### *Information*

There is strong evidence that HNC survivors benefit from clear information about possible effects of treatment and from support to self-manage the side effects of treatment [13–17]. Randomised controlled trials indicate that providing self-management information can improve patient recovery of some of the effects of HNC, such as oral pain [14,15]. Not all information has to be provided within the clinical setting; improvements in outcomes were noted when patients accessed web-based information [13–15].

*Cervical dystonia/muscle spasms/neuropathies/pain*

In addition to the recommendations of the ACS guidelines, we recommend that pain is specifically discussed as part of follow-up assessments. In a study of 175 patients, 45.1 % reported pain and 11.5 % reported severe pain [18]; of those patients, 46 % reported low overall quality of life (QoL) versus only 12 % of those without pain ( $P < 0.001$ ). In a study in patients who were an average of 6.6 years post-diagnosis, pain remained a significant issue which had a major impact on patient-reported QoL, anxiety and depression; as such, it is essential that patients are asked about their pain, how they are managing it and are provided with tools to manage. The guidance on neck fibrosis has been updated to note that this can emerge as a very late effect of HNC and that clinicians should be aware this may appear in patients up to 8 years post-treatment [19].

*Trismus, dysphagia/aspiration/stricture*

For trismus and dysphagia, we recommend that patients have access to robust and objective assessment of swallow competence by the Speech and Language Pathologist using either fiberoptic endoscopic evaluation of swallow (FEES) or video-fluoroscopy, with inclusion of standardised scoring of oral and pharyngeal residue and aspiration severity as part of the assessment, as residue and dysphagia has been shown to directly link to functional status and QoL in HNC survivors [20]. New data also highlight the impact of dysphagia on patients' emotional well-being and the need for psychosocial and psychological support to facilitate not only recovery, but also to enable patients to manage the emotional impact of dysphagia. As dysphagia impacts on many components of social, medical and emotional elements of life, rehabilitation interventions need to be created with comprehensive, holistic and person-centred aims to reflect these complex issues [21]. We also recommend patients provided with interactive self-management tools where possible. Van der Hout et al. demonstrated that trismus and dysphagia were among several aspects of patient care that could be in part improved using self-management tools which were adapted to the symptom information the patient provided [14,15].

*Lymphoedema*

There is limited controlled evidence regarding the management of lymphoedema in HNC survivors; however, a systematic review found that manual lymphatic drainage and complete decongestion therapy have the best evidence of benefit and are likely useful first-line treatments [22].

*Fatigue*

A systematic review in patients who had survived HNC found that physical activity can reduce fatigue in survivors; this applies to both traditional aerobics and strength-based activities and those such as yoga and tai chi [23]. Reducing fatigue in HNC survivors can also help to improve overall QoL, and patients should receive patient education and counselling to help manage both the symptoms and to also address any underlying psychological issues (especially depression) that could be contributing to fatigue [24].

*Altered or loss of sense of taste or smell*

HNC survivors can be impacted by changes in not only sense of taste, but also sense of smell. A systematic review of these outcomes found an association with taste and smell changes and impaired nutritional status; as such, patients would benefit from the inclusion of assessments for sense of taste/smell as part of the nutritional follow-up [25].

Several small studies found that the nasal airflow-inducing manoeuvre can help to rehabilitate some sense of smell [26–28].

QoL assessments in 114 patients > 12 months after completing cancer therapy found that taste and smell changes severely impacted QoL [24]. As such, we recommend that psychosocial counselling or psychotherapy is offered to help patients address the emotional and social impact of these symptoms.

*Sleep disturbance*

Sleep disturbances are a common negative effect of HNC, with one study reporting 53 % of patients had difficulty staying asleep, which was increased to 69 % in the patient cohort with 'high systemic symptoms' [29]. QoL studies indicate that sleep disturbances are strongly related to patients' QoL and mental health [29,30]; as such, we have updated the recommendations to include psychosocial support as a consideration for patients with this side effect.

*Speech and voice*

Speech and voice assessment by the Speech and Language Pathologist pre- and post-HNC treatment is recommended to ensure communication competence is maximised and rehabilitated effectively [31,32]. A randomised controlled trial demonstrated that providing patients with exercises to help self-manage their speech-related recovery could improve outcomes, particularly if these exercises were provided sooner after surgery [16]. In addition, a study assessing the impact of different clinical outcomes of HNC on QoL found that speech impairment had significant psychosocial implications for survivors of HNC and significantly impacted QoL [33]. As such, we recommend that support is given regarding the psychological and psychosocial impact of speech complications and that patients are provided with exercises and targeted rehabilitation from the Speech and Language Pathologist to help improve, and where appropriate, self-manage the speech and or voice consequences of cancer therapy.

*Oral dental surveillance*

In a case-controlled study, Fromm et al. demonstrated that patients who had HNC had significantly worse functionality even compared with patients who also underwent facial reconstructive surgery and prosthetic reconstruction [34], highlighting the need for dental reconstruction and prosthetics to be considered if they are required to aid oral functionality.

*Xerostomia*

A meta-analysis by Mercadante et al. found that across six studies, xerostomia symptoms were improved with the use of treatments; as such, in patients who are refractory to more conventional therapies, treatment with one of these saliva-inducing therapies is recommended [35]. Long-term follow-up in HNC survivors has indicated that xerostomia is a late effect of treatment, which can emerge up to 8 years post-treatment [19]; therefore, we recommend that clinicians are aware of the potential late onset of symptoms in their follow-up. A recent study in HNC survivors found that xerostomia contributes to poor QoL, and the aspect that patients found most impactful was functional limitation ( $P < 0.0001$ ) [36]. We also recommend that targeted counselling is considered, if needed, to cope with the QoL impact of functional limitation.

*Dyspnoea*

Dyspnoea was not specifically mentioned in the ACS cancer guidelines; however, this is an effect of HNC that significantly affects patients' QoL [37,38]. The recommendations that we include here are based on the ACS clinical practice guidelines for the management of dyspnoea in patients with cancer and adapted for patients in the survivorship phase [39].

### Concentration and memory

Several studies have now confirmed that cognitive impairment is a common adverse effect of HNC treatments such as radiotherapy, with 80 % of patients reporting memory complaints in one study [7,29,40–42]. Patients reported that they wish they had been prepared for these potential side effects [41]. We recommend that all self-management interventions and meetings with the clinical care team are designed in an uncomplicated way to accommodate this side effect in patients [41].

### Sexuality and intimacy

There is evidence from a cross-sectional study (N = 70) and a prospective longitudinal study (N = 223) that changes in sexual relationships contribute to poor QoL and to distress in HNC survivors and vice versa [43,44]. Evidence from a study in patients after total/partial laryngectomy for HNC found patients had reduced libido and sexual enjoyment and 60 % of patients felt this was important for their QoL [45]. As this is something that contributes to patients' overall well-being, we recommend that clinicians should actively enquire about sexual problems and that counselling should be offered to support patients with these changes. There is also some limited evidence that exercise can positively impact sexuality [46]; however, more evidence is required to support this as a recommendation.

### Health promotion

#### Return to work and financial toxicity

A literature review found that patients who have survived HNC return to work less often than survivors of other cancers [47]. Current evidence suggests that it would be beneficial to QoL to support patients' return to work [47]. Some of the barriers to return to work include anxiety and oral dysfunction such as xerostomia, trismus, sticky saliva, problems with teeth, and loss of appetite, problems with social eating and social contacts, which were all significantly associated with employment after treatment [48]. More research is needed to help clearly define what interventions would be of most benefit to facilitate return to work in HNC survivors; however, in the absence of clear data, we recommend defining with patients what interventions they feel could help, such as for fatigue, physical functioning and pain management.

Barriers in return to work and unemployment, time off from employment due to treatment can all lead to financial toxicity, which subsequently can cause significant distress in HNC survivors. Financial toxicity has been confirmed as an issue in several studies, with unmarried, younger patients, who had more severe disease at higher risk of financial toxicity [49–53].

### Nutrition

The recommendations regarding nutrition have been adapted, with the small addition that taste and smell changes should be included as part of nutritional assessments, as explained above [25]. However, although recommendations have changed very little, they are supported by increasing evidence regarding the benefits of nutritional support and how important this is to patient QoL [54]. There are several randomised clinical studies and literature searches highlighting the benefits of the Mediterranean diet in reducing all-cause mortality in patients with cancer [55,56]. In a multivariate analysis, increasing symptom severity of difficulty swallowing and dental problems was associated with restricted food intake, indicating the need for a holistic view of nutritional management [57]. Another study indicates that patients may be making their own dietary adjustments (e.g. longer mealtimes and softer foods) without being aware of their nutritional impact and, as such, it is important that clinical care teams actively investigate nutritional status

[58].

### Co-ordination of care practices

This section and every part of the guidelines have been revised to emphasise the role of clinical care teams; HNC survivorship must be managed by an integrated team of clinicians with different specialist insight, e.g. oncologists, dieticians, maxillofacial surgeons, speech and language pathologists, dentists, physiotherapists, nurses, psychologists [59]. A review of the literature found that co-ordinated care teams were best able to address the specific rehabilitation needs of patients with HNC. In addition, we have included recommendation 5.4. to confirm that importance of the role of patient support groups in helping individuals with the consequences of HNC, which have been identified as a support mechanism which patients want to have access to and frequently have difficulties in accessing [50,60].

### Summary

This adaption of the ACS HNC survivorship guidelines for the European HNC survivorship is adapted to consider the role of the integrated clinical care teams managing the ongoing care needs of cancer survivors. This adaptation also strengthens the call to consider the need for strong psychosocial support in line with the range of adverse effects and personal consequences that HNC survivors may be managing.

### Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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### References

- [1] Cancer IAFo. Cancer Today. 2020 [cited 2022 January 2022]; Available from: <https://gco.iarc.fr/today/home>.
- [2] Vissink A, Burlage F, Spijkervet F, Jansma J, Coppes R. Prevention and treatment of the consequences of head and neck radiotherapy. *Crit Rev Oral Biol Med* 2003;14: 213–25.
- [3] Brook I. Late side effects of radiation treatment for head and neck cancer. *Radiat Oncol J* 2020;38(2):84–92.
- [4] Pfister DG, Spencer S, Adelstein D, Adkins D, Anzai Y, Brizel DM, et al. Head and neck cancers, version 2.2020, NCCN clinical practice guidelines in oncology. *J Natl Compr Canc Netw* 2020;18(7):873–98.
- [5] Hoxhaj I, Hysaj O, Vukovic V, Leoncini E, Amore R, Pastorino R, et al. Occurrence of metachronous second primary cancer in head and neck cancer survivors: A systematic review and meta-analysis of the literature. *Eur J Cancer Care (Engl)* 2020;29(5). <https://doi.org/10.1111/ecc.v29.510.1111/ecc.13255>.
- [6] Nguyen N, Ringash J. Head and neck cancer survivorship care: a review of the current guidelines and remaining unmet needs. *Curr Treat Options Oncol* 2018;19: 44.
- [7] Ringash J, Bernstein LJ, Devins G, Dunphy C, Giuliani M, Martino R, et al. Head and neck cancer survivorship: learning the needs, meeting the needs. *Semin Radiat Oncol* 2018;28(1):64–74.
- [8] Rodriguez AM, Komar A, Ringash J, Chan C, Davis AM, Jones J, et al. A scoping review of rehabilitation interventions for survivors of head and neck cancer. *Disabil Rehabil* 2019;41(17):2093–107.
- [9] Cohen EEW, LaMonte SJ, Erb NL, Beckman KL, Sadeghi N, Hutcheson KA, et al. American cancer society head and neck cancer survivorship care guideline. *CA Cancer J Clin* 2016;66(3):203–39.

- [10] Pagh A, Vedtofte T, Lynggaard CD, Rubek N, Lonka M, Johansen J, et al. The value of routine follow-up after treatment for head and neck cancer. A national survey from DAHANCA. *Acta Oncol* 2013;52(2):277–84.
- [11] Lyhne NM, Johansen J, Kristensen CA, Andersen E, Primdahl H, Andersen LJ, et al. Incidence of and survival after glottic squamous cell carcinoma in Denmark from 1971 to 2011-A report from the Danish Head and Neck Cancer Group. *Eur J Cancer* 2016;59:46–56.
- [12] Dunne S, Mooney O, Coffey L, Sharp L, Desmond D, Timon C, et al. Psychological variables associated with quality of life following primary treatment for head and neck cancer: a systematic review of the literature from 2004 to 2015. *Psychooncology* 2017;26(2):149–60.
- [13] Papadakos J, McQuestion M, Gokhale A, Damji A, Trang A, Abdelmutti N, et al. Informational needs of head and neck cancer patients. *J Cancer Educ* 2018;33(4):847–56.
- [14] van der Hout A, Holtmaat K, Jansen F, Lissenberg-Witte BI, van Uden-Kraan CF, Nieuwenhuijzen GAP, et al. The eHealth self-management application 'Oncokompas' that supports cancer survivors to improve health-related quality of life and reduce symptoms: which groups benefit most? *Acta Oncol* 2021;60(4):403–11.
- [15] van der Hout A, van Uden-Kraan CF, Holtmaat K, Jansen F, Lissenberg-Witte BI, Nieuwenhuijzen GAP, et al. Role of eHealth application Oncokompas in supporting self-management of symptoms and health-related quality of life in cancer survivors: a randomised, controlled trial. *Lancet Oncol* 2020;21(1):80–94.
- [16] Jansen F, Eerenstein SEJ, Nossen IC, Lissenberg-Witte BI, de Bree R, Doornaert P, et al. Effectiveness of a guided self-help exercise program tailored to patients treated with total laryngectomy: Results of a multi-center randomized controlled trial. *Oral Oncol* 2020;103:104586. <https://doi.org/10.1016/j.oraloncology.2020.104586>.
- [17] Coffey L, Mooney O, Dunne S, Sharp L, Timmons A, Desmond D, et al. Cancer survivors' perspectives on adjustment-focused self-management interventions: a qualitative meta-synthesis. *J Cancer Surviv* 2016;10(6):1012–34.
- [18] Cramer JD, Johnson JT, Nilsen ML. Pain in head and neck cancer survivors: prevalence, predictors, and quality-of-life impact. *Otolaryngol Head Neck Surg* 2018;159(5):853–8.
- [19] Baudalet M, Van den Steen L, Tomassen P, Bonte K, Deron P, Huvenne W, et al. Very late xerostomia, dysphagia, and neck fibrosis after head and neck radiotherapy. *Head Neck* 2019;41(10):3594–603.
- [20] Meyer TK, Pisegna JM, Krisciunas GP, Pauloski BR, Langmore SE. Residue influences quality of life independently of penetration and aspiration in head and neck cancer survivors. *Laryngoscope* 2017;127(7):1615–21.
- [21] Dawson C, Adams JO, Fenlon D. The experiences of people who receive swallow therapy after surgical treatment of head and neck cancer. *Oral Surg Oral Med Oral Pathol Oral Radiol* 2019;128(5):456–63.
- [22] Tyker A, Franco J, Massa ST, Desai SC, Walen SG. Treatment for lymphedema following head and neck cancer therapy: a systematic review. *Am J Otolaryngol* 2019;40(5):761–9.
- [23] Lynch PT, Horani S, Lee R, Sumer BD, Lee SC, Mayo HG, et al. Effectiveness of physical activity interventions in improving objective and patient-reported outcomes in head and neck cancer survivors: a systematic review. *Oral Oncol* 2021;117:105253. <https://doi.org/10.1016/j.oraloncology.2021.105253>.
- [24] Tyler MA, Mohamed ASR, Smith JB, Aymard JM, Fuller CD, Phan J, et al. Long-term quality of life after definitive treatment of sinonasal and nasopharyngeal malignancies. *Laryngoscope* 2020;130(1):86–93.
- [25] Spotten LE, Corish CA, Lorton CM, Ui Dhuibhir PM, O'Donoghue NC, O'Connor B, et al. Subjective and objective taste and smell changes in cancer. *Ann Oncol* 2017;28(5):969–84.
- [26] Haxel BR, Fuchs C, Fruth K, Mann WJ, Lippert BM. Evaluation of the efficacy of the 'nasal airflow-inducing manoeuvre' for smell rehabilitation in laryngectomees by means of the Sniffin' Sticks test. *Clin Otolaryngol* 2011;36:17–23.
- [27] Risberg-Berlin B, Ylitalo R, Finizia C. Screening and rehabilitation of olfaction after total laryngectomy in Swedish patients: results from an intervention study using the Nasal Airflow-Inducing Manoeuvre. *Arch Otolaryngol Head Neck Surg* 2006;132(3):301–6. <https://doi.org/10.1001/archotol.132.3.301>.
- [28] Hilgers FJM, Jansen HA, van As CJ, Polak MF, Muller MJ, van Dam FSAM. Long-term results of olfaction rehabilitation using the nasal airflow-inducing ("polite yawning") manoeuvre after total laryngectomy. *Arch Otolaryngol Head Neck Surg* 2002;128(6):648–54. <https://doi.org/10.1001/archotol.128.6.648>.
- [29] Wulf-Burchfield E, Dietrich MS, Ridner S, Murphy BA. Late systemic symptoms in head and neck cancer survivors. *Support Care Cancer* 2019;27(8):2893–902.
- [30] Li NA, Otomaru T, Taniguchi H. Sleep quality in long-term survivors of head and neck cancer: preliminary findings. *Support Care Cancer* 2017;25(12):3741–8.
- [31] Clarke P, Radford K, Coffey M, Stewart M. Speech and swallow rehabilitation in head and neck cancer: United Kingdom national multidisciplinary guidelines. *J Laryngol Otol* 2016;130(S2):S176–80.
- [32] Kraaijenga SAC, Oskam IM, van Son RJH, Hamming-Vrieze O, Hilgers FJM, van den Brekel MWM, et al. Assessment of voice, speech, and related quality of life in advanced head and neck cancer patients 10-years+ after chemoradiotherapy. *Oral Oncol* 2016;55:24–30.
- [33] Nayak SG, Pai MS, George LS. Quality of life of patients with head and neck cancer: a mixed method study. *J Cancer Res Ther* 2019;15(3):638–44. [https://doi.org/10.4103/jcrt.JCRT\\_1123\\_16](https://doi.org/10.4103/jcrt.JCRT_1123_16).
- [34] Fromm L, Gotfredsen K, Wessel I, Ozhayat EB. Oral health-related quality of life, oral aesthetics and oral function in head and neck cancer patients after oral rehabilitation. *J Oral Rehabil* 2019;46:738–46.
- [35] Mercadante V, Al Hamad A, Lodi G, Porter S, Fedele S. Interventions for the management of radiotherapy-induced xerostomia and hyposalivation: a systematic review and meta-analysis. *Oral Oncol* 2017;66:64–74.
- [36] Soldera EB, Ortigara GB, Bonzanini LLL, Schulz RE, Danesi CC, Antoniazzi RP, et al. Clinical and sociodemographic factors associated with oral health-related quality of life in survivors of head and neck cancer. *Head Neck* 2020;42(5):886–97.
- [37] Høxbroe Michaelsen S, Grønhoj C, Høxbroe Michaelsen J, Friborg J, von Buchwald C. Quality of life in survivors of oropharyngeal cancer: A systematic review and meta-analysis of 1366 patients. *Eur J Cancer* 2017;78:91–102.
- [38] Jacobs M, Macefield RC, Elbers RG, Sitnikova K, Korfage IJ, Smets EMA, et al. Meta-analysis shows clinically relevant and long-lasting deterioration in health-related quality of life after esophageal cancer surgery. *Qual Life Res* 2014;23(4):1097–115.
- [39] Hui D, Bohlke K, Bao T, Campbell TC, Coyne PJ, Currow DC, et al. Management of dyspnea in advanced cancer: ASCO guideline. *J Clin Oncol* 2021;39(12):1389–411.
- [40] Wilbers J, Kappelle AC, Versteeg L, Tuladhar AM, Steens SCA, Meijer FJA, et al. Cognitive function, depression, fatigue and quality of life among long-term survivors of head and neck cancer. *Neurooncol Pract* 2015;2:144–50.
- [41] Bolt S, Baylor C, Burns M, Eadie T. "I would have told you about being forgetful, but I forgot": the experience of cognitive changes and communicative participation after head and neck cancer. *Disabil Rehabil* 2020;42(7):931–9.
- [42] Zer A, Pond GR, Razak ARA, Tirona K, Gan HK, Chen EX, et al. Association of neurocognitive deficits with radiotherapy or chemoradiotherapy for patients with head and neck cancer. *JAMA Otolaryngol Head Neck Surg* 2018;144:71–9.
- [43] Rhoten BA, Davis AJ, Baraff BN, Holler KH, Dietrich MS. Priorities and preferences of patients with head and neck cancer for discussing and receiving information about sexuality and perception of self-report measures. *J Sex Med* 2020;17(8):1529–37.
- [44] Henry M, Alias A, Cherba M, Woronko C, Rosberger Z, Hier M, et al. Immediate post-treatment supportive care needs of patients newly diagnosed with head and neck cancer. *Support Care Cancer* 2020;28(11):5557–67.
- [45] Singer S, Danker H, Dietz A, Kienast U, Pabst F, Meister EF, et al. Sexual problems after total or partial laryngectomy. *Laryngoscope* 2008;118(12):2218–24.
- [46] Mishra SI, Scherer RW, Geigle PM, Berlanstein DR, Topaloglu O, Gotay CC, et al. Exercise interventions on health-related quality of life for cancer survivors. *Cochrane Database Syst Rev* 2012;2012:Cd007566.
- [47] Miller A. Returning to work after head and neck cancer. *Curr Opin Otolaryngol Head Neck Surg* 2020;28:155–60.
- [48] Verdonck-de Leeuw IM, van Bleek W-J, René Leemans C, de Bree R. Employment and return to work in head and neck cancer survivors. *Oral Oncol* 2010;46(1):56–60.
- [49] De Felice F, Locati LD, Ronchi S, Thariat J, Orlandi E. Quality of life and financial toxicity after (chemo)radiation therapy in head and neck cancer: are there any sex- or gender-related differences? *Tumori* 2022;3008916221078885.
- [50] Crowder SL, Najam N, Sarma KP, Fiese BH, Arthur AE. Quality of life, coping strategies, and supportive care needs in head and neck cancer survivors: a qualitative study. *Support Care Cancer* 2021;29(8):4349–56.
- [51] Baddour K, Fadel M, Zhao M, Corcoran M, Owoc MS, Thomas TH, et al. The cost of cure: Examining objective and subjective financial toxicity in head and neck cancer survivors. *Head Neck* 2021;43(10):3062–75.
- [52] Smith GL, Shih YF, Frank SJ. Financial toxicity in head and neck cancer patients treated with proton therapy. *Int J Part Ther* 2021;8:366–73.
- [53] Beeler WH, Bellile EL, Casper KA, Jaworski E, Burger NJ, Malloy KM, et al. Patient-reported financial toxicity and adverse medical consequences in head and neck cancer. *Oral Oncol* 2020;101:104521. <https://doi.org/10.1016/j.oraloncology.2019.104521>.
- [54] Taib BG, Rylands J, Povall S, Jones TM, Taylor-Robinson D. Protocol: systematic review of the association between socio-economic status and survival in adult head and neck cancer. *Syst Rev* 2017;6:151.
- [55] Morze J, Danielewicz A, Przybyłowicz K, Zeng H, Hoffmann G, Schwingshackl L. An updated systematic review and meta-analysis on adherence to mediterranean diet and risk of cancer. *Eur J Nutr* 2021;60:1561–86.
- [56] Schwingshackl L, Schwedhelm C, Galbete C, Hoffmann G. Adherence to mediterranean diet and risk of cancer: an updated systematic review and meta-analysis. *Nutrients* 2017;9:1063.
- [57] Kamal M, Barrow MP, Lewin JS, Estrella A, Gunn GB, Shi Q, et al. Modeling symptom drivers of oral intake in long-term head and neck cancer survivors. *Support Care Cancer* 2019;27:1405–15.
- [58] Crowder SL, Douglas KG, Yanina Pepino M, Sarma KP, Arthur AE. Nutrition impact symptoms and associated outcomes in post-chemoradiotherapy head and neck cancer survivors: a systematic review. *J Cancer Surviv* 2018;12:479–94.
- [59] Raj VS, Pugh TM, Yaguda SI, Mitchell CH, Mullan SS, Garces NS. The who, what, why, when, where, and how of team-based interdisciplinary cancer rehabilitation. *Semin Oncol Nurs* 2020;36:150974.
- [60] Hatton RA, Crane J, Patterson J, Rogers SN. A survey to ascertain peer support models available in Head and Neck cancer across the United Kingdom. *Br J Oral Maxillofac Surg* 2022;60(4):488–92.