



Factors that affect quality of life for older people with head and neck cancer: A systematic review

Semple, C. J., McKenna, G., Parahoo, R., Rogers, S. N., & Tiblom Ehrsson, Y. (2023). Factors that affect quality of life for older people with head and neck cancer: A systematic review. *European Journal of Oncology Nursing*, 63, [102280]. <https://doi.org/10.1016/j.ejon.2023.102280>

[Link to publication record in Ulster University Research Portal](#)

Published in:
European Journal of Oncology Nursing

Publication Status:
Published online: 30/04/2023

DOI:
[10.1016/j.ejon.2023.102280](https://doi.org/10.1016/j.ejon.2023.102280)

Document Version
Publisher's PDF, also known as Version of record

General rights
Copyright for the publications made accessible via Ulster University's Research Portal is retained by the author(s) and / or other copyright owners and it is a condition of accessing these publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy
The Research Portal is Ulster University's institutional repository that provides access to Ulster's research outputs. Every effort has been made to ensure that content in the Research Portal does not infringe any person's rights, or applicable UK laws. If you discover content in the Research Portal that you believe breaches copyright or violates any law, please contact pure-support@ulster.ac.uk.



Factors that affect quality of life for older people with head and neck cancer: A systematic review

Cherith J. Semple^a, Gerry McKenna^b, Roisin Parahoo^a, Simon N. Rogers^c,
Ylva Tiblom Ehrsson^{d,*}

^a Institute of Nursing & Health Research, Ulster University / Cancer Services, South Eastern Health & Social Care Trust, Belfast, Northern Ireland, UK

^b Centre for Public Health, Royal Victoria Hospital, Queens University Belfast, Belfast, Northern Ireland, UK

^c Wirral University Teaching Hospital, Wirral, England, UK

^d Department of Surgical Sciences, Section of Otorhinolaryngology and Head & Neck Surgery, Uppsala University, Sweden

ARTICLE INFO

Keywords:

Elderly
Head and neck cancer
Older
Quality of life
Systematic review

ABSTRACT

Purpose: Quality of life is a critical aspect in the management of older head and neck cancer patients. It needs to be considered alongside survival benefit, treatment burden, and longer-term outcomes. The purpose was to undertake a systematic review of empirical peer-reviewed studies with a primary focus on factors impacting quality of life for older head and neck cancer patients.

Methods: A systematic review, searching 5 electronic databases (PsychoINFO, MEDLINE, CINAHL, Embase, and Scopus) using PRISMA methodology was conducted. Data was appraised using the Newcastle-Ottawa scale and a narrative synthesis performed.

Results: Only 10 papers fulfilled the inclusion criteria. Two main themes emerged: 1) Impact of head and neck cancer on quality of life domains and 2) quality of life in treatment decision-making.

Conclusions: In an era of progressive personalised care, there is an evident need for more qualitative and quantitative studies focusing on quality of life for older head and neck cancer patients. However, older head and neck cancer patients experience notable differences, especially with poorer physical functioning and greater eating and drinking challenges. Quality of life impacts older patients decision-making, treatment planning and intensifies post-treatment support.

1. Introduction

In the world, the older population has steadily increased over past decades as a consequence of an improved average lifespan (World Health Organization, 2020). Furthermore, the long-term trend in the Western world is that life expectancy is increasing and people who are 65 years can often expect to live a further 20 years (The National Board of Health and Welfare Sweden, 2020). Globally in 2020, about 9.3% of the population were above 65 years and it is estimated to be about 16% in 2050 (United Nation Population Division, 2022).

A diagnosis of cancer involves challenges for individuals on a physical, psychological, social, and existential level (Cavers et al., 2012; Ehrsson et al., 2015). Pre-existing chronic diseases and other health problems associated with aging, frailty, and sarcopenia are additional considerations that can have a detrimental impact on older patients' quality of life (QOL) (Yancik et al., 2007). In addition, these factors

influence treatment choices, treatment intent, survival, and outcomes. As the complexity of older patients' increases, so do the therapeutic, ethical, and supportive care challenges for all concerned: the patient, their carer, and the healthcare team. This is particularly prescient in head and neck cancer (HNC) given the anatomical structures involved and the potential radicality of treatment necessary when curative intent is being considered. Side-effects of HNC may have a detrimental impact on many different functions such as problems with breathing (Deng et al., 2016), chewing, pain, swallowing, xerostomia (Crowder et al., 2018) and speech (Singer et al., 2013). Additionally, HNC patients may have trouble with physical appearance, low mood, social eating, loss of independence, fatigue, concern about carer burden and with intimate relationships, affecting QOL (Moore et al., 2014; Stenhammar et al., 2017; Van Beek et al., 2020).

Unsurprisingly, the management of older patients with HNC has become a source of much debate, heightened by the paucity of clinical

* Corresponding author. Department of Surgical Sciences, Uppsala University, SE-751 85, Uppsala, Sweden.

E-mail address: ylva.tiblom.ehrsson@surgsci.uu.se (Y. Tiblom Ehrsson).

<https://doi.org/10.1016/j.ejon.2023.102280>

Received 29 November 2022; Received in revised form 29 January 2023; Accepted 9 February 2023

Available online 15 February 2023

1462-3889/Crown Copyright © 2023 Published by Elsevier Ltd.

This is an open access article under the CC BY-NC-ND license

(<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

studies reporting specifically on their preference, experience, and perception of QOL outcomes. Earlier reports suggested that treatment did not affect HRQOL differently in older and younger patients (Derks et al., 2004b); however, there are subtle, yet important considerations from these earlier studies (Derks et al., 2005a; Derks et al., 2004a; Derks et al., 2004b; Derks et al., 2005b). Older patients seem to cope and adjust well to treatment and this is reflected in their HRQoL scores (Laraway et al., 2012). Even up to 6 years after treatment, van der Schroeffer et al. (2007) found no significant differences in survival or overall QOL between older and younger HNC patient. This might be an over simplification as in the older person there is the potential for several QOL domains to decreased following major HN surgery (Khaffif et al., 2007). More recently Bruijnen et al. (2021) recognized a functional decline after surgery in older HNC patients, indicating a higher level of dependency. This might impact on QOL but also burden of carer support. Furthermore, VanderWalde et al. (2013) in their review inferred that older HNC patients may require more supportive care throughout the treatment process.

Concerns raised in clinic consultations seems to be slightly different in the older HNC patient group; with fewer psychological, emotional and spiritual well-being items identified on concern checklist, and in particular the item about fear of recurrence (Rogers et al., 2015). In an evaluation of older age and frailty as factors associated with depression and postoperative decision regret in patients undergoing major HN surgery, Thomas et al. (2019) found that there was no difference based on age in the prevalence of moderate to severe depression or decision regret.

The purpose of this systematic review is to succinctly reflect and summarise the QOL issues in the older age group of patients with HNC as identified through studies that have specifically focused on this issue. By exploring difference in QOL outcomes in the older patient it will be possible to reflect on how this outcome parameter might impact on decision making, treatment planning, and post treatment support.

2. Materials and methods

2.1. Data sources and search strategy

This systematic review followed a priori protocol according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses protocols (PRISMA-P) 2015 guidelines (Moher et al., 2009).

Existing literature was systematically searched to identify articles specifically relating to factors that influence and impact QOL for older patients with HNC. For this review the three key search terms were operationally defined as follows, 'head and neck cancer'; to include malignant neoplasms of the oral and nasal cavity, pharynx, larynx, paranasal sinuses, and salivary glands; 'elderly', and 'quality of life'. As the medical literature doesn't give a clear definition of being 'aged' or 'older' or 'elderly, we will refer to elderly as 65 years and over. Although this age (65 years and over) is frequently used, some authors have selected older as 70 or 80 years and over. For this purposes of this systematic review QOL has been defined as a broad concept describing a person's overall feeling of wellbeing and includes a wide range of both physically, psychologically, socially, and emotionally concepts.

Five electronic databases, namely, PsychoINFO, MEDLINE, CINHAL, Embase, and Scopus were searched, using both Medical Subject Heading (MeSH) terms and text word searches, to increase the search sensitivity. Boolean operator 'OR' and 'AND' were used to combine search terms to broaden or limit the search results, as appropriate. The search terms (Table 1) were generated in consultation with an experienced subject librarians and the first author (CJS). The fully devised search strategy was peer-reviewed using the PRESS tool (Sampson et al., 2009) by two co-authors (CJS, RP). The search strategy was deployed by the first author (CJS).

Grey literature searches were conducted using Google Scholar to identify research not indexed in the electronic databases. A carefully

Table 1

Search terms.

'head and neck'
1)Head and neck cancer* 2) Head and neck neoplasm* 3) Head and neck tumour* 4) Head and neck tumor* 5) Oral cancer* 6) Oral neoplasm* 7) Oral tumour* 8) Oral tumor* 9) Mouth cancer* 10) Mouth neoplasm* 11) Mouth tumour* 12) Mouth tumor* 13) Larynx* cancer* 14) Larynx* neoplasm* 15) Larynx tumour* 16) Larynx tumor* 17) Pharynx* cancer* 18) Pharynx* neoplasm* 19) Pharynx* tumour* 20) Pharynx tumor* 21) 1-20
'elderly'
22)elderly* 23)aged* 24)Frail 25)senior citizen* 26) 22 - 25
'quality of life'
27)quality of life* 28)health related quality of life* 29)27-28
30)21 AND 26 AND 29

constructed list of inclusion and exclusion criteria was applied to ensure a focus to the review and the opportunity to critically assess and assimilate those papers only relevant to address the review aim were included. Age is often considered as a clinical characteristic in studies reporting on QOL outcomes, but not as a specific issue relating to QOL outcomes. To mitigate against the potential of numerous papers that add little to and detract from the salient issues, a decision was reached to complete a comprehensive but focused review on studies with a primary focus on QOL for older HNC patients. The initial search needed to be sufficiently broad and inclusive but then to be sufficiently precise to allow an appropriate number of studies to be included. Both qualitative and quantitative studies were eligible for inclusion and no restrictions were applied to the location of research, language or year of publication, whether the research was conducted prospectively, retrospectively or longitudinally, from the perspective of patients or healthcare professionals. For inclusion, participants had to be aged 65 and older, with a primary diagnosis of HNC. Studies were excluded if the main focus was not on QOL in older people with HNC, no validated measure to report on QOL for quantitative studies, primary focus of study on effectiveness of certain drugs or treatment in older people with HNC, and reviews, commentaries, case studies, literature or systematic reviews.

2.2. Data selection

The searches identified 3514 publications of which 193 duplicates were removed. The remaining 3321 publications were reviewed by title and abstract, by the first author (CJS). 3187 records were excluded during this step in the process, primarily due to the lack of focus on QOL as the primary endpoint for older patients with HNC. Full-text papers were retrieved for the remaining 134 articles deemed eligible on the basis of title and abstract. The first author (CJS) identified 10 quantitative articles relevant, when the full text papers were assessed against the inclusion and exclusion. These were confirmed by one co-author (RP). A PRISMA-P diagram illustrates these findings and explanations for excluded articles at the full-text stage (Fig. 1).

2.2.1. Data extraction

The first author (CJS) independently extracted data using an extraction sheet in Microsoft Excel. Data was extracted on the author(s), year, country, study aim, research design, sample size, age groups, treatment modality, tumour site, QOL outcomes, main study findings, and methodological criticisms. The data extracted from the 10 included papers were further reviewed by one co-researcher (RP). Any differences in opinion regarding extraction were resolved via discussion. The second and fifth authors (GMcK, YTE) independently applied the Newcastle-Ottawa Scale quality assessment scale for observational studies as the quality appraisal tool of choice for this review (Wells et al., 2000) (Table 2). When differences in scoring were noted, a third author (CJS) reviewed scoring and consensus reached.

2.2.2. Strategy for data synthesis

Due to the heterogeneity of QOL outcome measures and diversity of

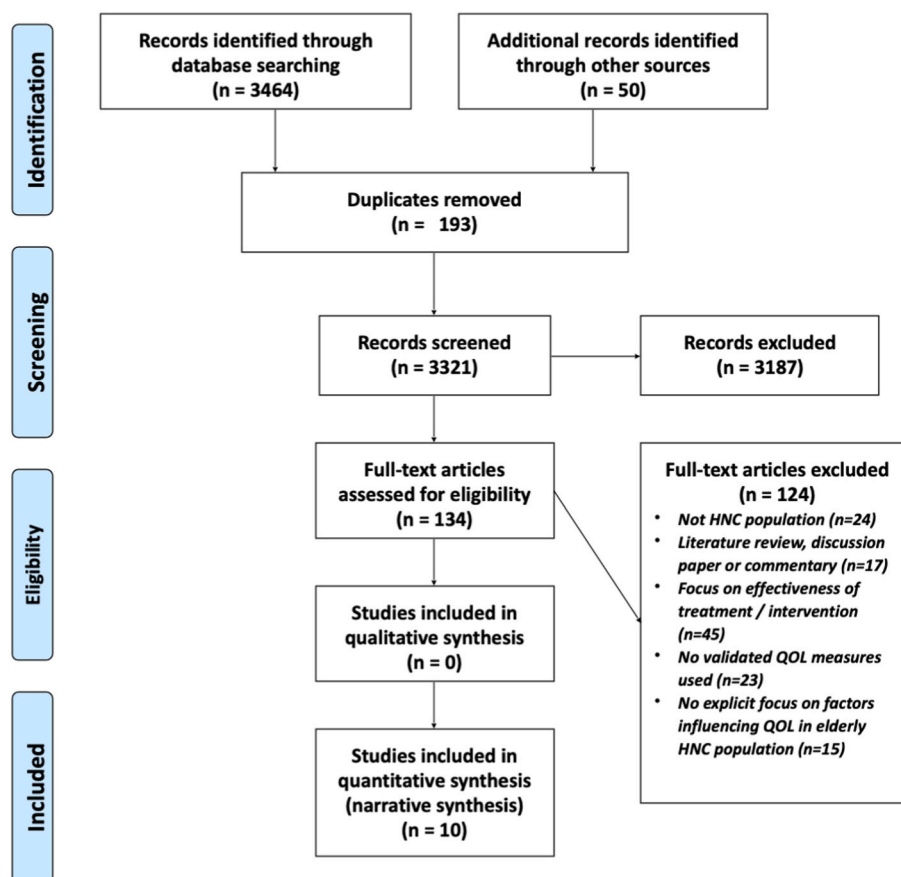


Fig. 1. PRISMA flowchart.

study designs a three stage narrative synthesis of the results was conducted. The synthesis comprised of: (1) developing a preliminary synthesis; (2) exploring relationships within and between studies; and (3) assessing the robustness of the synthesis. For stage 1, being the preliminary synthesis we used two approaches: a) from the original data extraction table the summary of main study findings was translated were necessary from numerical into text and b) using a line-by-line approach, relevant extracts of text from study findings were collated, grouped, and inductive themes developed and refined into two main themes. At stage 2 relationships in the data were explored, in order to consider differences within and between the data of included studies. Vote counting of reported QOL aspects was conducted to identify relationships within and between characteristics of each study (Table 3). Finally, stage 3 was assessing the robustness of the synthesis, in order to provide an assessment of the strength of the evidence for drawing conclusions and for generalising the findings of the synthesis. This was achieved through the use of critical appraisal and by placing the findings in the context of wider literature.

3. Results

3.1. Study characteristics

Within the 10 included studies, all were quantitative, with a heterogeneous HNC population of patients identified, including a range of tumour locations such as oral cavity, tonsil, larynx, and pharynx, of various stages and receiving different modalities of treatment. Sample sizes ranged from 57 (van der Schroeff et al., 2007) to 638 (Laraway et al., 2012), with a preponderance of studies being conducted by one study group in the Netherlands (Derks et al., 2005a; Derks et al., 2004a; Derks et al., 2004b; Derks et al., 2005b; van der Schroeff et al., 2007). One further study was conducted in United States (Baxi et al., 2018),

United Kingdom (Laraway et al., 2012) and Israel (Khaff et al., 2007), with two studies originating from Europe (Pottel et al., 2014; Silveira et al., 2011). None of the included studies reported on clinician-rated outcome, but instead standardised patient-reported outcome measures, with the results of the synthesis drawn from the raw scores used within these studies.

Results of the synthesis: Two themes were identified: 1) Impact of HNC on QOL domains for older patients and 2) QOL influences treatment decision-making for older patients with HNC. Theme one had a number of subthemes, namely: physical functioning, psychological issues, social functioning and social support, eating and drinking issues, and speech problems.

3.2. Theme 1: impact of HNC on QOL domains for older patients

Physical functioning: A number of studies in this review (Baxi et al., 2018; Derks et al., 2005a; Derks et al., 2004a; Khaff et al., 2007; Pottel et al., 2014; Silveira et al., 2011; van der Schroeff et al., 2007) specifically addressed physical functioning as a QOL domain. Several reported that physical functioning for older patients was poor before treatment (Derks et al., 2005a; Derks et al., 2004a; Pottel et al., 2014) and after treatment (Baxi et al., 2018; Derks et al., 2005a; Khaff et al., 2007; Pottel et al., 2014; Silveira et al., 2011; van der Schroeff et al., 2007). For studies that specifically drew comparisons on physical functioning between younger and older HNC patients, these studies demonstrated that physical functioning differed significantly between groups at baseline which maintained overtime (Derks et al., 2005a; van der Schroeff et al., 2007). In van der Schroeff et al.'s (2007) and Baxi et al.'s (2018) studies, physical functioning differed from other QOL domains, as the only domain that had a significant difference between younger and older patients at pre-treatment (Baxi et al., 2018; van der Schroeff et al., 2007) and remained relatively constant after treatment (Derks et al., 2004a).

Table 2
Summary of study characteristics.

Author	Study aim	Study design and setting	Sample size	Age	Treatment modality	Tumour site	QOL outcome measures	Summary of findings	Quality appraisal: Newcastle Ottawa score
Baxi et al., (2018) [27]	Determine if age affects QOL in patients with HPV-related oropharyngeal SCC	Cross-sectional survey New York, USA	N = 185	Younger <65 (n = 154) Older ≥65 (n = 31)	Post-radiotherapy (XRT) (1–5 years completed definitive chemoXRT or surgery followed chemoXRT or XRT)	Oropharynx	EQ-5D, EORTC-QLQ-H&N35	No significant difference in EQ-5D global QOL. Older patients reported more immobility, problems with social eating, coughing and more likely to be gastrostomy tube dependent.	4
Derks et al. 2004 [13]	Compare QOL of elderly HNC patients to younger patient up to 1-year after diagnosis	Prospective survey The Netherlands	N = 183	Younger 45–60 (n = 105) Older ≥70 (n = 78)	Surgery, XRT or chemoXRT	Oral cavity, oropharynx, hypopharynx and larynx with no distant disease	EORTC-QLQ-C30, EORTC-QLQ-HN35	Before and after treatment physical functioning for older patients was worse. At 6-months younger patients reported more pain. At 12-months no other relevant differences reported.	7
Derks et al. 2004 [16]	Compare differences in elderly versus younger HNC patients across physical, social and psychological domains 1-year treatment	Prospective survey The Netherlands	N = 121	Younger 45–60 (n = 70) Older ≥70 (n = 51)	Surgery, XRT or chemoXRT	Oral cavity, pharynx, and larynx with no distant disease	Instrument activities of daily living (IADL), Activity of Daily Living (ADL), KPS, CES-D, RSS12-I (social support), loneliness questionnaire plus semi-structured EORTC-QLQ-C30, EORTC-QLQ-HN35	Elderly patients didn't receive standard treatment as often. Before and at 1 year, no difference in physical functioning, or satisfaction with social support as perceived by patients in both groups over time. Before and 1 year later, no difference for loneliness for both groups. Both groups scored higher for depression, with lower performance status (KPS) 1-year later, but no difference between group differences.	7
Derks et al. 2005 [14]	Compare differences in coping between younger and older HNC patients	Prospective study The Netherlands	N = 183	Younger 45–60 (n = 105) Older ≥70 (n = 78)	Surgery, XRT or chemoXRT	Oral cavity, oropharynx, hypopharynx and larynx with no distant disease	EORTC-QLQ-C30, Utrecht Coping List, CES-D	Before treatment and at 12-months QOL and depressive symptoms did not differ between older and younger HNC patients. Before treatment and 6-months younger patients used more active coping strategies. Overall, older	7

(continued on next page)

Table 2 (continued)

Author	Study aim	Study design and setting	Sample size	Age	Treatment modality	Tumour site	QOL outcome measures	Summary of findings	Quality appraisal: Newcastle Ottawa score
Derks et al. 2005 [15]	Influence of age, disease status, comorbidity, social support, depression and QOL on treatment choice.	Prospective study The Netherlands	N = 183	Younger 45–60 (n = 105) Older ≥70 (n = 78)	Surgery, XRT* or chemoXRT	Oral cavity, oropharynx, hypopharynx and larynx with no distant disease	EORTC-QLQ-C30, RSS12-I (social support), CES-D	people used more religious coping and religious control. Having non-standard treatment for HNC was influenced by being widowed, advanced tumour status, more comorbidities, less pain and length of life was less important than QOL.	7
Khaffif et al., (2007) [19]	Compare QOL in patients older than 75 years following major HNC surgery, to those younger and with healthy controls	Cross-sectional survey Israel	N = 105	Younger 65–75 years (n = 30) Older over 75 (n = 35) Health controls over 75 (n = 40)	Major head and neck surgery	Range of tumour sites with the HN region	SF-12, UWQOL, sense of burden on caregiver	Older patients have lower QOL scores than younger for physical, social roles, emotional status and pain. Although across both patient groups report overall QOL to be relatively preserved, several QOL domains are decreased in elderly patients who have major HN surgery to include: activity, chewing, appearance and leisure.	6
Laraway et al., (2012) [17]	Compare HRQOL in older people versus younger who have been treated with curative intent for oral cancer	Prospective study United Kingdom	N = 638	Younger <65 years (n = 394) Older over 65 (244)	Surgery alone, surgery and chemoXRT, and Chemotherapy or XRT	Oral cavity	UWQOL	Older patients reported better physical and emotional function, notably in regard to appearance, speech, saliva than younger patients treated by an operation.	7
Pottel et al. (2014) [28]	Identify problems for elderly HNC patients during an intensive XRT/chemotherapy course and explored potential differences in HRQOL in fit versus vulnerable patients.	Multi-centred, prospective study Belgium	N = 100	Elderly cancer patients, aged ≥65 years (n = 100, range 65–86, median 72)	Curative primary or adjuvant radiotherapy, with or without concomitant systemic therapy	Multiple HN sites, with the exclusion of parotid gland or nasal cavity and paranasal sinuses	EORTC-QLQ-C30, EORTC-QLQ-HN35	Most vulnerable elderly HNC patients are those with lower functional status and higher symptoms.	5
Silveira et al., (2011) [29]	Comparing HRQOL outcomes for geriatric and younger HNC patients	Cross-sectional survey Portugal	N = 289	Younger 45–60 (n = 174) Geriatric ≥65 (n = 115)	Surgery, XRT or chemoXRT	Oral cavity, oropharynx and larynx	EORTC-QLQ-C30, EORTC-QLQ-HN – Portuguese version	Older patients scored worse compared to younger on physical and emotional functional scales. Younger patients report more	7

(continued on next page)

Table 2 (continued)

Author	Study aim	Study design and setting	Sample size	Age	Treatment modality	Tumour site	QOL outcome measures	Summary of findings	Quality appraisal: Newcastle Ottawa score
van der Schroeff et al., (2007) [18]	Determine the effect of age and survival on QOL in elderly HNC patients	Prospective study The Netherlands	N = 57	Younger 45–60 (n = 33) Older ≥70 (n = 24)	Surgery, XRT or chemoXRT	Oral cavity, oropharynx, hypopharynx and larynx with no distant disease	EORTC-QLQ-C30, EORTC-QLQ-HN, CES-D, 2 questions on treatment choice	problems with finances, appetite loss, nausea and vomiting. At 12-months after treatment, and long-term follow-up (3–6 years post-diagnosis) older patients worse physical functioning, swallowing and speech, with global QOL and depression comparable across both groups. At long-term follow-up 90% younger patients would choose same treatment again, compared to 65% of older patients.	7

Interestingly, [Khafif et al. \(2007\)](#) demonstrated no difference in physical functioning between older HNC patients than an older healthy population on the SF-12 physical functioning scale, but patients <75 had significantly better physical functioning in comparison to the other two cohorts. This variance is likely a consequence of natural deterioration associated with physical functioning and the aging process.

Psychological issues: From the majority of studies identified in this review, emotional wellbeing did not differ between younger and older patients at diagnosis ([Derks et al., 2005b](#); [Khafif et al., 2007](#)), within the first year of treatment ([Derks et al., 2004a](#); [Derks et al., 2004b](#); [Pottel et al., 2014](#)) or during long-term follow-up ([Baxi et al., 2018](#); [van der Schroeff et al., 2007](#)). It is important to note that although these studies didn't note a difference in emotional functioning scores on the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire-Core 30 (EORTC QLQ C30), [Derks et al. \(2004a\)](#) found concerning depression symptoms (CES-D score > or equal to 16 indicating depression) across both younger and older HNC patients respectively. Furthermore, for both groups their CES-D score was increased significantly post-treatment. Older patients showed no significant difference from their younger counterpart in terms of either mean scores or the proportion of patients with a score of > or equal to 16. Whereas, [Silveira et al. \(2011\)](#) reported emotional functioning as clinically

(difference >10 points on the EORTC QLQ C30) and statistically poorer 3–9 months post-treatment for older HNC patients, compared to younger. Of interest, [Laraway et al. \(2012\)](#) was the only study in this review who reported both older patients (aged 65 years or over) with better emotional function notably in regard to appearance using UWQOLv4, and those 75 years and over having better mood and anxiety compared to younger HNC patients treated by surgery. Improved emotional functioning relating to older patients may depict that they are less conscious of body image, but this finding was not supported by [Khafif et al. \(2007\)](#). Older patients having surgery for HNC in their study reported more appearance-related impairment than both younger HNC patients and healthy older controls on the UWQOL subscale. Overall, these studies would mostly indicate that older patients seem to cope and adjust well to treatment and not differ from younger patients, with an acknowledgement that depression rates are higher than the general population.

As coping was considered in detail by [Derks et al. \(2005b\)](#), they discovered that younger HNC patients more often used active problem-solving coping at diagnosis and for the next 6-months. In contrast, at all times (at diagnosis, 6 and 12 months), older patients used religious coping significantly more often than younger patients. With the exception of avoidance coping, which correlated significantly with

Table 3
QOL domains reported upon for studies included within systematic review.

Author and year	Physical functioning (mobility)	Social	Eating & drinking	Emotional	Appearance	Speech	Global QOL
Baxi et al. (2018) [27]	X		X	X		X	X
Derks et al. 2004 [13]	X	X	X	X		X	X
Derks et al. 2004 [16]	X	X		X			
Derks et al. 2005 [14]	X	X		X			X
Derks et al. 2005 [15]	X	X	X	X		X	X
Khafif et al., (2007) [19]	X	X	X	X	X	X	X
Laraway et al., (2012) [17]	X	X	X	X	X	X	X
Pottel et al., (2014) [28]	X	X	X	X		X	X
Silveira et al., (2011) [29]	X	X	X	X		X	X
van der Schroeff et al., (2007) [18]	X	X	X	X		X	X

poorer QOL and depressive symptoms, all other coping styles demonstrated no differences between older and younger patients across QOL domains.

Social functioning and social support: A synergistic finding is demonstrated between Derks et al.'s (2005a, 2004b; 2005b) prospective studies reporting no difference in social functioning on the EORTC-QLQ-C30 before treatment and for the first year between older and younger HNC patients and Silveira et al. (2011) study, who also spanned a similar post-treatment follow-up period. This trend was continued into longer-term follow-up of 3–6 years (van der Schroeff et al., 2007). In contrast, on the HNC disease-specific EORTC H&N35 survey instrument older patients reported more problems with social contacts (Derks et al., 2005a). Whereas, Baxi's et al. (2018) cross-sectional study of 185 patients, at least 12-months from radiotherapy and Silveira et al. (2011) with a similar sample size (n = 289) did not find any comparable differences between older and younger on the social contact item of the EORTC H&N35. Two studies in this review used the UWQOL tool, with Khafif et al.'s (2007) study inferring that social aspects of older HNC patients (over 75 year old) having major surgery were affected, with the "Leisure" and "Activity" subscales having decreased scores in comparison to younger patients. This finding was not supported in Laraway's study (2012) with oral cancer patients, treated in a maxillofacial surgical unit who also used the UWQOL tool.

When specific tools were used to examine social support, such as the short version of the Social Support List – Interactions (RSS12-1), results highlighted that before HNC treatment and 1 year later, comparable proportions (86–91%) of patients in both age groups were satisfied with the support they had received from their social networks (Derks et al., 2004a). Within this study both younger and older patients reported that the size of their intimate social network had decreased somewhat, but not significantly, 1 year after diagnosis. Furthermore, on a specific loneliness questionnaire, before and 1 year after treatment there was no difference in mean scores between younger and older patients (Derks et al., 2004a). Despite this, older patients with less appraisal support and those who had problems with social contacts received standard treatment less often (Derks et al., 2005a), therefore, a widowed person was less likely to be treated using standard treatment (Derks et al., 2005a). Nonetheless, most studies in this review indicate that older HNC patients, in comparison to their younger counterparts report no significant difference in social functioning and are satisfied with the support they receive from their available social network.

Eating and drinking issues: Overall, the studies in this review would indicate that older patients have a trend towards more issues with social eating and greater requirement for enteral feeding. Silveira et al. (2011) when comparing two patient groups, namely older HNC patients versus younger, demonstrated that more often all patients in their study were managing oral diet (younger n = 154 (88.5%), older n = 92 (92.8%)). However, when patients required enteral feeding, PEG feeding was the major choice over nasogastric feeding, especially for the older group. Similarly, Baxi et al. (2018) highlighted that after treatment, older patients were at an increased risk of requiring PEG feeding. In this cohort, 41% of patients (63/154) under 65 years and 52% of patients (16/31) 65 years or older required a feeding tube at some point during the course of treatment and subsequent follow-up (P = .24). Furthermore, in this study, younger HNC patients, compared with patients 65 years or older, the only item on the EORTC HN35 tool demonstrating significantly more problems was social eating, with a mean difference in scores of 11.1 (P < .0001) (Baxi et al., 2018).

However, Derks et al. (2005a) reported no significant difference on the EORTC H&N35 social eating score before treatment started. This trend continued at 3, 6 and 12 months after treatment (n = 183) (Derks et al., 2004b). Whereas, van der Schroeff et al. (2007) demonstrated in a long-term prospective study with a sampler cohort of 33 younger (45–60 years) and 24 older patients (70 years and older) at 12 months social eating was significantly worse for the older patients but not at 3–6 year follow-up. The indication is that after treatment, older HNC patients

have more notable changes to their eating and drinking, which was also supported by Khafif et al. (2007). They observed significant differences on the chewing subscale of the UWQOL between their three study groups. 'Chewing' scores obtained among older patients having major HN surgery (group I) reported increased impairment, in comparison to both younger patients following major HN surgery (group II) and healthy controls (group III). Using the same QOL measurement tool, Laraway et al. (2012) did not report any significant difference in chewing subscale across age ranges of under 55 years, 55–64 years, 65–74 years and 75 years and over for patients with oral cancer. Moreover, from the studies in this review it would appear that older HNC patients have more issues with eating, both physically and socially, with a greater requirement for enteral feeding during and after treatment.

Speech problems: was less often reported across the studies as affecting more older patients with HNC, in comparison to younger HNC patients. Both Derks et al. (2004b) using the EORTC H&N35 speech subscale and Laraway et al. (2021) using the UWQOL speech subscale report no difference across age ranges. Nonetheless, Khafif et al. (2007) and van der Schroeff et al. (2007) studies indicate that older patients having surgery and those in longer-term follow-up respectively had more speech problems.

3.3. Theme 2: QOL influences treatment decision-making for older patient with HNC

Baxi et al. (2018) reported no difference in the treatment choice between younger and older patient with HPV-related oropharyngeal cancer. Whereas, Derks et al. (2004b) highlighted that older HNC patients, to include those with cancers to the oral cavity, larynx and pharynx did not receive standard treatment as often as their younger counterparts. Of note, surgical treatment was performed in a similar proportion of patients in both age groups, but younger patients were given radiotherapy significantly more often. Reason for older patients receiving non-standard treatment according to Derks et al. (2005a) include their marital status and specifically being widowed, those with advanced tumour stage, more comorbidities, experiencing less pain and considering the length of life less important than QOL. Of note, 90% of younger patients if given the choice would choose the same treatment compare to 65% in the older group (van der Schroeff et al., 2007), hence one-third of older patients changed their thinking about pre-treatment decision-making.

4. Discussion

Older adults are the fastest-expanding subgroup of the cancer population and currently an area of much research and clinical interest. This is an exceptionally important area of research, as insights into older HNC patients QOL and related perspective is incumbent upon the health community to appropriately identify the right treatment and supportive care for the older patient. Despite this weighted importance, there is relatively poor understanding, with only 10 papers from a quantitative paradigm identified in this review to have a specific primary focus on QOL for elderly HNC patients, warranting a timely research focus response. This is nonetheless a challenging and complex area (Vander-Walde et al., 2013) and even more so, in the older elderly (≥80 years). In a systematic review by Drageset et al. (2021) of patients with various cancer diagnoses, a major gap in the literature was identified as they noted that inpatients, aged ≥80 years with cancer were seldom included in studies that involved the completion of QOL instruments. A holistic approach toward the older patients is of great importance, as a complex variety of factors influence the QOL of older people with cancer, with overall poorer physical function than younger patients and greater eating and drinking issues, higher requirement for enteral feeding plus more speech challenges.

Treatment choice in older patients with HNC should be based on

shared decision-making, centred on comprehensive medical assessment (Truglio-Londrigan et al., 2014), preferences of the patient (Derks et al., 2005b), anticipated impact on QOL, and not on chronological age. To facilitate decision-making this systematic review summarise what influences and impacts the QOL in older patients with HNC. Two themes were hence developed; *Impact of HNC on QOL domains for older patients* with sub-themes and *QOL influences treatment decision-making for older patient with HNC*.

4.1. Impact of HNC on QOL domains for older patients

4.1.1. Physical functioning

In the present review, physical activity in older patients with HNC was seen to be reduced before and after treatment compared to the younger patients. This is probably related to the normal aging process, as aging leads to loss of functions and muscle mass. In addition, older people are often more sedentary (Paterson and Warburton, 2010). Despite this, physical activity is instrumental to promote physical and emotional wellbeing for older patients, with WHO (World Health Organization, 2020) guidelines on physical activity and sedentary behaviour recommending people over 65 to undertake regular physical activity and to limit the total time spent being sedentary. The benefits of exercise for older people are clear, with Vogel et al.'s review article (2009) indicating that moderate and regular physical activity is associated with reduced morbidity and mortality, which is a key premise in promoting cancer prehabilitation (Moore et al., 2021). Furthermore, for older breast cancer patients, physical activity after surgery showed an improved recovery with enhanced body function and self-efficacy (Klein et al., 2021).

4.1.2. Psychological issues

Older people's QOL may be influenced by disease and other clinical factors such as depression and mood (Naumann and Byrne, 2004; Scocco et al., 2006). In the present review, there were no differences between younger and older patients with HNC regarding depression rates but it was higher than the older general population, which implies a risk for decreased QOL in patients with HNC. This is in line with Hammermüller et al. (2021), depicting patients with HNC suffer significantly more from psychological distress compared to the general population, indicating the need for routine psychological screening to promote timely and targeted emotionally wellbeing interventions.

In the present study, different coping strategies were used between younger and older patients, where the younger used active problem-solving strategies and the older relied more on religious coping strategies. Aligning with Aarts et al. (2015), older patients with prostate, lung, gastrointestinal, or breast cancer used active coping strategies to a lesser extent than middle-aged patients, and consequently reached out for social support less often which is known to decrease the risk for depression (Aarts et al., 2015). Ensuring that patients' receives the support needed, alongside promotion of active problem-solving strategies, is of importance for this older population.

Body image changes caused by disfigurements, scars, fibrosis and lymphoedema are not easy to hide and can result in body image related distress; presenting as a critical psychosocial issue for patients with HNC (Fingeret et al., 2015). Body image is about how you and others judge your physical appearance. Older people in general are more likely to be less conscious about body image. This is supported by Melissant et al. (2021), where younger patients with HNC were shown to have greater body image distress. However, the opposite is demonstrated in this current systematic review, where older patients often reported more appearance-related body image distress compared to younger patients. One could speculate that younger patients are more willing to 'pay the price' with a changed physical appearance as it is more important for them to have a long life, whereas older patients are more concerned about a worthy QOL than living longer. Effective psychosocial intervention to increase QOL in patients with HNC is therefore of importance

but more research is needed to determine the most effective, acceptable and feasible psychosocial interventions to embed into routine HNC care (Fingeret et al., 2015; Rogers et al., 2021; Semple et al., 2013).

4.1.3. Social functioning and support

This review highlights the importance of social support, with the social context of older patients influencing treatment choice, hence patients lacking social support or being widowed being less likely to embark on more radical treatment. Compared to younger cancer patients, older patients with lung and colorectal cancer are more likely, if they have family, to share the decision-making process (Hobbs et al., 2015). Categorising social support into emotional (someone to talk to, trust and love), informational (someone provides instructions and advice regarding e.g. decision-making), instrumental (giving resources in a difficult situation e.g. time or money), and appraisal (getting feedback on your performance) (House, 1981) proves important. Healthcare professionals should pay attention to what type of social support the older patient needs, being cognizant of their need for emotional and informational support to promote shared-decision making.

4.1.4. Eating and drinking issues

Nutritional intake often deteriorates at diagnosis due to the location of the tumour. Furthermore, acute and late treatment toxicities frequently includes nutritional problems for patients with HNC (Eades et al., 2009; Nguyen et al., 2006; Stone et al., 2003). This patient cohort needs additional help to promote coping mechanisms and guidelines with nutritional problems, as patients struggle with eating which may affect them psychologically, physiologically and socially (Dornan et al., 2022; Dornan et al., 2021; Einarsson et al., 2019; McQuestion et al., 2011). In the present review, older patient had greater tube dependency, more social eating difficulties, and more coughing compared to the younger patients. Enteral feeding in the older HNC population more often necessitates intervention from others; therefore older patients with home enteral nutrition denoting a heavy reliance on help from informal family caregivers (Silver et al., 2004). Irrespective of family-support, there are often unresolved issues resulting in skin problems, daily interruptions of feeding, dehydration and weight loss. To facilitate optimal nutritional support and an enhanced social eating experience a multi-disciplinary and person-centred approach is indicated (Dornan et al., 2021; Silver et al., 2004) with older HNC patients needing additional support especially on discharge the hospital and initially post-treatment.

4.1.5. Speech issues

Patients with HNC are at risk for speech problems due to the site of the tumour and the given treatment. Indication in this systematic review was that older patients had more speech problems. All patients with HNC should be offered a pre-treatment baseline assessment and intervention programme for speech and swallowing exercises and when needed, structured long-term follow up (Clarke et al., 2016).

4.2. QOL influences treatment decision-making for the older patient with HNC

As HNC is predominantly a disease of older patients, it is important that there is a paradigm shift in clinical care focusing on biological age as being more important than chronological age, in the treatment decision-making process (Porceddu and Haddad, 2017). Biological age refers to frail or not being frail, regardless of chronological age (Porceddu and Haddad, 2017). Aging is a highly individualised process, thus performance status and comorbidities could prove invaluable in deciding what the best treatment should be for individuals with HNC (VanderWalde et al., 2013). This could be performed through a geriatric assessment with an integrated HRQOL assessment done prior to treatment, including functional status, comorbid medical conditions, cognitive status, psychological state, social support, nutritional status, and a

review of the medication list (Soo et al., 2021). In a narrative review article on frailty before surgery, prehabilitation interventions with exercise, education, and nutritional support may improve surgical outcomes (Norris and Close, 2020), therefore multimodal prehabilitation should be promoted irrespective of age in advance of active treatment. de Vries et al. (2020) showed that frail older patients with HNC had worse outcomes at three months post treatment regarding physical, psychological, and social factors compared to non-frail older patients. Screening for frailty can give suggestions for what kind of treatment older patients may cope with (Hogan et al., 2017). Frailty is being increasingly recognized, measured, and taken into account with cancer patients considering surgical therapy. Nonetheless, much remains unknown and more clinical trials are needed for older HNC patients, especially those 75 years and over and those considered as frail.

It is imperative that patients make an informed choice with knowledge and understanding of adverse effects from potential treatment options available to them. This should include potential complications from the treatment and its effects on their quality and quantity of life which may be challenging given the limited data. Köksal et al. (2022), recently highlighted that decision- regret with treatment choice for those receiving adjuvant radiotherapy, was more evident in the older HNC patient group, where survival might be less of a priority than for younger patients (Windon et al., 2019). Regret about treatment on older HNC patients appears to be influenced by treatment burden, poor function anticipated and limited overall survival. Other factors such as physical, psychological, and social issues play a role in such decision-making.

4.3. Strengths and limitations

This systematic review was rigorously conducted, and no restrictions applied to the location of research, language, or year of publication, however a relatively small number of papers were eligible due to the focused inclusion and exclusion criteria. The strict inclusion criteria where QOL for older patients had to be the primary research question resulted in many articles that used QOL as a secondary research question being excluded, which could be seen as a limitation.

There are also other limitations that need to be considered, for instance QOL questionnaires are limited in their assessments by the topic covers, words used, and scoring. They tend to focus on QOL in the last week. The questionnaires identified in this search, though valid, tended to be the EORTC covering general cancer and H&N specific module. There are many other aspects to QOL as reflected in the number of different questionnaires reported on Handle on QOL. The review can only give a partial reflection on QOL and qualitative research methodology, specific to the experience of the older patient would be very insightful. Another factor is that generally the response rates to HNC questionnaires is lower in the older patient, so any data will be subject to a degree of responder bias. Also age tends to be a characteristic at diagnosis, but those patients living beyond their cancer for ten years or more, will have an ageing profile and this might not have been adequately addressed in the studies. One should also be aware of that the articles from Derks et al. (2005a, 2004a, 2004b; 2005b) have overlapping samples but with different research questions, reporting different data sets. Nonetheless, have overlapping samples across four studies reduces the overall sample population within this review.

5. Conclusion

There is a paucity of literature specific to the QOL in the older HNC patient. QOL patient reported outcomes tend to be a secondary part of an analysis and under reported, or the patient age is included as one of many patient characteristics. The QOL papers specific to the older patient show notable differences to other HNC age groups, especially with poorer physical functioning and greater eating and drinking challenges and these need to be considered when planning treatment and providing

post treatment support. There is a necessity to acquire more data on the older patients' perspective using both qualitative and quantitative methodology, in order to provide a more holistic context and individualised view in care provision.

Funding

This work was supported by The Swedish Cancer Society [grant numbers 2018/502 and 2021/0371]; The Kamprad Family Foundation for Entrepreneurship, Research & Charity [grant numbers 20150003]; The P.O. Zetterling Foundation; The Erik, Karin, Gösta Selander Foundation; and The Geriatric Foundation, Uppsala University.

Declaration of competing interest

None declared.

References

- Aarts, J.W., Deckx, L., van Abbema, D.L., Tjan-Heijnen, V.C., van den Akker, M., Buntinx, F., 2015. The relation between depression, coping and health locus of control: differences between older and younger patients, with and without cancer. *Psycho Oncol.* 24, 950–957. <https://doi.org/10.1002/pon.3748>.
- Baxi, S.S., Cullen, G., Xiao, H., Atoria, C.L., Sherman, E.J., Ho, A., Lee, N.Y., Elkin, E.B., Pfister, D.G., 2018. Long-term quality of life in older patients with HPV-related oropharyngeal cancer. *Head Neck* 40, 2321–2328. <https://doi.org/10.1002/hed.25159>.
- Bruijnen, C.P., de Groot, L.G.R., Vondeling, A.M., de Bree, R., van den Bos, F., Witteveen, P.O., Emmelot-Vonk, M.H., 2021. Functional decline after surgery in older patients with head and neck cancer. *Oral Oncol.* 123, 105584 <https://doi.org/10.1016/j.oraloncology.2021.105584>.
- Cavers, D., Hacking, B., Erridge, S.E., Kendall, M., Morris, P.G., Murray, S.A., 2012. Social, psychological and existential well-being in patients with glioma and their caregivers: a qualitative study. *CMAJ Can. Med. Assoc. J. = J. Assoc. Med. Canad.* 184, E373–E382. <https://doi.org/10.1503/cmaj.111622>.
- Clarke, P., Radford, K., Coffey, M., Stewart, M., 2016. Speech and swallow rehabilitation in head and neck cancer: United Kingdom National Multidisciplinary Guidelines. *J. Laryngol. Otol.* 130, S176–S180. <https://doi.org/10.1017/S0022215116000608>.
- Crowder, S.L., Douglas, K.G., Yanina Pepino, M., Sarma, K.P., Arthur, A.E., 2018. Nutrition impact symptoms and associated outcomes in post-chemoradiotherapy head and neck cancer survivors: a systematic review. *J. Canc. Surviv.* 12, 479–494. <https://doi.org/10.1007/s11764-018-0687-7>.
- de Vries, J., Bras, L., Sidorenkov, G., Festen, S., Steenbakkens, R.J., Langendijk, J.A., Witjes, M.J., van der Laan, B.F., de Bock, G.H., Halmos, G.B., 2020. Frailty is associated with decline in health-related quality of life of patients treated for head and neck cancer. *Oral Oncol.* 111, 105020 <https://doi.org/10.1016/j.oraloncology.2020.105020>.
- Deng, J., Murphy, B.A., Dietrich, M.S., Sinar, R.J., Mannion, K., Ridner, S.H., 2016. Differences of symptoms in head and neck cancer patients with and without lymphedema. *Support. Care Oncol. Off. J. Multinat. Assoc. Support. Care Canc.* 24, 1305–1316. <https://doi.org/10.1007/s00520-015-2893-4>.
- Derks, W., de Leeuw, J.R., Hordijk, G.J., Winnubst, J.A., 2005a. Reasons for non-standard treatment in elderly patients with advanced head and neck cancer. *Eur. Arch. Otorhinolaryngol.* 262, 21–26. <https://doi.org/10.1007/s00405-004-0744-x>.
- Derks, W., de Leeuw, R., Winnubst, J., Hordijk, G.J., 2004a. Elderly patients with head and neck cancer: physical, social and psychological aspects after 1 year. *Acta Otolaryngol.* 124, 509–514. <https://doi.org/10.1080/00016480310000656>.
- Derks, W., de Leeuw, R.J., Hordijk, G.J., Winnubst, J.A., 2004b. Quality of life in elderly patients with head and neck cancer one year after diagnosis. *Head Neck* 26, 1045–1052. <https://doi.org/10.1002/hed.20113>.
- Derks, W., Leeuw, J.R., Hordijk, G.J., Winnubst, J.A., 2005b. Differences in coping style and locus of control between older and younger patients with head and neck cancer. *Clin. Otolaryngol.* 30, 186–192. <https://doi.org/10.1111/j.1365-2273.2004.00938.x>.
- Dornan, M., Semple, C., Moorhead, A., 2022. Experiences and perceptions of social eating for patients living with and beyond head and neck cancer: a qualitative study. *Support Care Canc.* 30 (5), 4129–4137. <https://doi.org/10.1007/s00520-022-06853-6>.
- Dornan, M., Semple, C., Moorhead, A., McCaughan, E., 2021. A qualitative systematic review of the social eating and drinking experiences of patients following treatment for head and neck cancer. *Support. Care Oncol. Off. J. Multinat. Assoc. Support. Care Canc.* 29, 4899–4909. <https://doi.org/10.1007/s00520-021-06062-7>.
- Drageset, J., Sandvik, R.K., Eide, L.S.P., Austrheim, G., Fox, M., Beisland, E.G., 2021. Quality of life among cancer inpatients 80 years and older: a systematic review. *Health Qual. Life Outcome* 19, 1–16. <https://doi.org/10.1186/s12955-021-01685-0>.
- Eades, M., Chasen, M., Bhargava, R., 2009. Rehabilitation: long-term physical and functional changes following treatment. *Semin. Oncol. Nurs.* 25, 222–230. <https://doi.org/10.1016/j.soncn.2009.05.006>.
- Ehrsson, Y.T., Sundberg, K., Laurell, G., Langius-Eklöf, A., 2015. Head and neck cancer patients' perceptions of quality of life and how it is affected by the disease and

- enteral tube feeding during treatment. *Upsala J. Med. Sci.* 120, 280–289. <https://doi.org/10.3109/03009734.2015.1075630>.
- Einarsson, S., Laurrell, G., Tiblom Ehrsson, Y., 2019. Experiences and coping strategies related to food and eating up to two years after the termination of treatment in patients with head and neck cancer. *Eur. J. Canc. Care* 28, e12964. <https://doi.org/10.1111/ecc.12964>.
- Fingeret, M.C., Teo, I., Goetsch, K., 2015. Body image: a critical psychosocial issue for patients with head and neck cancer. *Curr. Oncol. Rep.* 17, 1–6. <https://doi.org/10.1007/s11912-014-0422-0>.
- Hammermüller, C., Hinz, A., Dietz, A., Wichmann, G., Pirllich, M., Berger, T., Zimmermann, K., Neumuth, T., Mehnert-Theuerkauf, A., Wiegand, S., 2021. Depression, anxiety, fatigue, and quality of life in a large sample of patients suffering from head and neck cancer in comparison with the general population. *BMC Canc.* 21, 1–11. <https://doi.org/10.1186/s12885-020-07773-6>.
- Hobbs, G.S., Landrum, M.B., Arora, N.K., Ganz, P.A., Van Ryn, M., Weeks, J.C., Mack, J.W., Keating, N.L., 2015. The role of families in decisions regarding cancer treatments. *Cancer* 121, 1079–1087. <https://doi.org/10.1002/cncr.29064>.
- Hogan, D.B., Maxwell, C.J., Afilalo, J., Arora, R.C., Bagshaw, S.M., Basran, J., Bergman, H., Bronskill, S.E., Carter, C.A., Dixon, E., Hemmelgarn, B., Madden, K., Mitnitski, A., Rolfs, D., Stelfox, H.T., Tam-Tham, H., Wunsch, H., 2017. A scoping review of frailty and acute care in middle-aged and older individuals with recommendations for future research. *Can. Geriatr. J.* 20, 22–37. <https://doi.org/10.5770/cgj.20.240>.
- House, J.S., 1981. *Work Stress and Social Support*. Addison-Wesley Publishing Company, MA.
- Khaff, A., Posen, J., Yagil, Y., Beiser, M., Gil, Z., Ben-Yosef, R., Landsberg, R., Fliss, D.M., 2007. Quality of life in patients older than 75 years following major head and neck surgery. *Head Neck* 29, 932–939. <https://doi.org/10.1002/hed.20635>.
- Klein, I., Kalichman, L., Chen, N., Susmallian, S., 2021. Effect of physical activity levels on oncological breast surgery recovery: a prospective cohort study. *Sci. Rep.* 11, 10432. <https://doi.org/10.1038/s41598-021-89908-8>.
- Köksal, M., Saur, L., Scafa, D., Sarria, G., Leitzen, C., Schmeel, C., Far, F., Strieth, S., Giordano, F.A., 2022. Late toxicity-related symptoms and fraction dose affect decision regret among patients receiving adjuvant radiotherapy for head and neck cancer. *Head Neck*. <https://doi.org/10.1002/hed.27103>.
- Laraway, D.C., Lakshmi, R., Lowe, D., Roe, B., Rogers, S.N., 2012. Quality of life in older people with oral cancer. *Br. J. Oral Maxillofac. Surg.* 50, 715–720. <https://doi.org/10.1016/j.bjoms.2012.01.010>.
- McQuestion, M., Fitch, M., Howell, D., 2011. The changed meaning of food: physical, social and emotional loss for patients having received radiation treatment for head and neck cancer. *Eur. J. Oncol. Nurs. Off. J. Eur. Oncol. Nurs. Soc.* 15, 145–151. <https://doi.org/10.1016/j.ejon.2010.07.006>.
- Melissant, H., Jansen, F., Eerenstein, S., Cuijpers, P., Laan, E., Lissenberg-Witte, B., Schuit, A., Sherman, K., Leemans, C., Verdonck-de Leeuw, I., 2021. Body image distress in head and neck cancer patients: what are we looking at? *Support. Care Canc.* 29, 2161–2169. <https://doi.org/10.1007/s00520-020-05725-1>.
- Moher, D., Liberati, A., Tetzlaff, J., Altman, D.G., Group, P., 2009. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *PLoS Med.* 6, e1000097. <https://doi.org/10.1371/journal.pmed.1000097>.
- Moore, J., Scoggins, C.R., Phillips, P., Egger, M., Tennant, P., Little, J., Martin, R.C.G., 2021. Implementation of prehabilitation for major abdominal surgery and head and neck surgery: a simplified seven-day protocol. *J. Gastrointest. Surg.* 25, 2076–2082. <https://doi.org/10.1007/s11605-020-04740-1>.
- Moore, K.A., Ford, P.J., Farah, C.S., 2014. Support needs and quality of life in oral cancer: a systematic review. *Int. J. Dent. Hyg.* 12, 36–47. <https://doi.org/10.1111/idh.12051>.
- Naumann, V.J., Byrne, G.J., 2004. WHOQOL-BREF as a measure of quality of life in older patients with depression. *Int. Psychogeriatr.* 16, 159–173. <https://doi.org/10.1017/s104161020400109>.
- Nguyen, N.P., Moltz, C.C., Frank, C., Vos, P., Smith, H.J., Karlsson, U., Nguyen, L.M., Rose, S., Dutta, S., Sallah, S., 2006. Evolution of chronic dysphagia following treatment for head and neck cancer. *Oral Oncol.* 42, 374–380. <https://doi.org/10.1016/j.oraloncology.2005.09.003>.
- Norris, C.M., Close, J.C.T., 2020. Prehabilitation for the frailty syndrome: improving outcomes for our most vulnerable patients. *Anesth. Analg.* 130, 1524–1533. <https://doi.org/10.1213/ANE.0000000000004785>.
- Paterson, D.H., Warburton, D.E., 2010. Physical activity and functional limitations in older adults: a systematic review related to Canada's Physical Activity Guidelines. *Int. J. Behav. Nutr. Phys. Act.* 7, 38. <https://doi.org/10.1186/1479-5868-7-38>.
- Porceddu, S.V., Haddad, R.I., 2017. Management of elderly patients with locoregionally confined head and neck cancer. *Lancet Oncol.* 18, e274–e283. [https://doi.org/10.1016/S1470-2045\(17\)30229-2](https://doi.org/10.1016/S1470-2045(17)30229-2).
- Pottel, L., Lycke, M., Boterberg, T., Pottel, H., Goethals, L., Duprez, F., Van Den Noortgate, N., De Neve, W., Rottey, S., Geldhof, K., Buyse, V., Kargar-Samani, K., Ghekiere, V., Debruyne, P.R., 2014. Serial comprehensive geriatric assessment in elderly head and neck cancer patients undergoing curative radiotherapy identifies evolution of multidimensional health problems and is indicative of quality of life. *Eur. J. Canc. Care* 23, 401–412. <https://doi.org/10.1111/ecc.12179>.
- Rogers, S.N., Allmark, C., Bekiroglu, F., Edwards, R.T., Fabbri, G., Flavel, R., Hight, V., Ho, M.W., Humphris, G.M., Jones, T.M., 2021. Improving quality of life through the routine use of the patient concerns inventory for head and neck cancer patients: main results of a cluster preference randomised controlled trial. *Eur. Arch. Oto-Rhino-Laryngol.* 278, 3435–3449. <https://doi.org/10.1007/s00405-020-06533-3>.
- Rogers, S.N., Audisio, R.A., Lowe, D., 2015. Do the elderly raise different issues when using the Patient Concerns Inventory in routine head and neck cancer follow-up clinics? *Eur. J. Canc. Care* 24, 189–197. <https://doi.org/10.1111/ecc.12289>.
- Sampson, M., McGowan, J., Cogo, E., Grimshaw, J., Moher, D., Lefebvre, C., 2009. An evidence-based practice guideline for the peer review of electronic search strategies. *J. Clin. Epidemiol.* 62, 944–952. <https://doi.org/10.1016/j.jclinepi.2008.10.012>.
- Scocco, P., Fantoni, G., Caon, F., 2006. Role of depressive and cognitive status in self-reported evaluation of quality of life in older people: comparing proxy and physician perspectives. *Age Ageing* 35, 166–171. <https://doi.org/10.1093/ageing/afj026>.
- Semple, C., Parahoo, K., Norman, A., McCaughan, E., Humphris, G., Mills, M., 2013. Psychosocial interventions for patients with head and neck cancer. *Cochrane Database Syst. Rev.* <https://doi.org/10.1002/14651858.CD009441.pub2>.
- Silveira, A.P., Goncalves, J., Sequeira, T., Ribeiro, C., Lopes, C., Monteiro, E., Pimentel, F.L., 2011. Geriatric oncology: comparing health related quality of life in head and neck cancer patients. *Head Neck Oncol.* 3, 3. <https://doi.org/10.1186/1758-3284-3-3>.
- Silver, H.J., Wellman, N.S., Arnold, D.J., Livingstone, A.S., Byers, P.M., 2004. Older adults receiving home enteral nutrition: enteral regimen, provider involvement, and health care outcomes. *JPEN J. Parenter. Enteral. Nutr.* 28, 92–98. <https://doi.org/10.1177/014860710402800292>.
- Singer, S., Wollbrück, D., Dietz, A., Schock, J., Pabst, F., Vogel, H.J., Oeken, J., Sandner, A., Koscielnny, S., Hormes, K., Breitenstein, K., Richter, H., Deckelmann, A., Cook, S., Fuchs, M., Meuret, S., 2013. Speech rehabilitation during the first year after total laryngectomy. *Head Neck* 35, 1583–1590. <https://doi.org/10.1002/hed.23183>.
- Soo, W.K., King, M., Pope, A., Steer, C., Devitt, B., Chua, S., Parente, P., Davis, I.D., Darzins, P., 2021. The Elderly Functional Index (ELFI), a patient-reported outcome measure of functional status in patients with cancer: a multicentre, prospective validation study. *Lancet Healthy Longev.* 2, e24–e33. [https://doi.org/10.1016/S2666-7568\(20\)30036-2](https://doi.org/10.1016/S2666-7568(20)30036-2).
- Stenhammar, C., Isaksson, J., Granström, B., Laurell, G., Ehrsson, Y.T., 2017. Changes in intimate relationships following treatment for head and neck cancer—a qualitative study. *J. Psychosoc. Oncol.* 35, 614–630. <https://doi.org/10.1080/07347332.2017.1339224>.
- Stone, H.B., Coleman, C.N., Anscher, M.S., McBride, W.H., 2003. Effects of radiation on normal tissue: consequences and mechanisms. *Lancet Oncol.* 4, 529–536. [https://doi.org/10.1016/S1470-2045\(03\)01191-4](https://doi.org/10.1016/S1470-2045(03)01191-4).
- The National Board of Health and Welfare Sweden. <https://www.socialstyrelsen.se/globalassets/sharepoint-dokument/artikelkatalog/ovrigt/2020-3-6603.pdf>. (Accessed 18 January 2022). Accessed.
- Thomas, C.M., Sklar, M.C., Su, J., Xu, W., de Almeida, J.R., Gullane, P., Gilbert, R., Brown, D., Irish, J., Alibhai, S.M.H., Goldstein, D.P., 2019. Evaluation of older age and frailty as factors associated with depression and postoperative decision regret in patients undergoing major head and neck surgery. *Jama Otolaryngol.* 145, 1170–1178. <https://doi.org/10.1001/jamaoto.2019.3020>.
- Truglio-Londrigan, M., Slyer, J.T., Singleton, J.K., Worrall, P.S., 2014. A qualitative systematic review of internal and external influences on shared decision-making in all health care settings. *JBI Evid. Synth.* 12, 121–194. <https://doi.org/10.11124/jbisrir-2012-432>.
- United Nation Population Division. <https://www.un.org/development/desa/pd/>. (Accessed 18 January 2022). Accessed.
- Van Beek, F., Jansen, F., Mak, L., Lissenberg-Witte, B., Buter, J., Vergeer, M., Voortman, J., Cuijpers, P., Leemans, C., Verdonck-de Leeuw, I., 2020. The course of symptoms of anxiety and depression from time of diagnosis up to 2 years follow-up in head and neck cancer patients treated with primary (chemo) radiation. *Oral Oncol.* 102, 104576. <https://doi.org/10.1016/j.oraloncology.2020.104576>.
- van der Schroeff, M.P., Derks, W., Hordijk, G.J., de Leeuw, R.J., 2007. The effect of age on survival and quality of life in elderly head and neck cancer patients: a long-term prospective study. *Eur. Arch. Otorhinolaryngol.* 264, 415–422. <https://doi.org/10.1007/s00405-006-0203-y>.
- VanderWalde, N.A., Fleming, M., Weiss, J., Chera, B.S., 2013. Treatment of older patients with head and neck cancer: a review. *Oncologist* 18, 568–578. <https://doi.org/10.1634/theoncologist.2012-0427>.
- Vogel, T., Brechat, P.H., Lepretre, P.M., Kaltenbach, G., Berthel, M., Lonsdorfer, J., 2009. Health benefits of physical activity in older patients: a review. *Int. J. Clin. Pract.* 63, 303–320. <https://doi.org/10.1111/j.1742-1241.2008.01957.x>.
- Wells, G.A., Shea, B., O'Connell, D., Peterson, J., Welch, V., Losos, M., Tugwell, P., 2000. The Newcastle-Ottawa Scale (NOS) for assessing the quality of nonrandomised studies in meta-analyses. https://www.ohri.ca/programs/clinical_epidemiology/oxford.asp. (Accessed 2 December 2021). Accessed.
- Windon, M.J., Fakhry, C., Faraji, F., Troy, T., Gourin, C.G., Kiess, A.P., Koch, W., Eisele, D.W., D'Souza, G., 2019. Priorities of human papillomavirus-associated oropharyngeal cancer patients at diagnosis and after treatment. *Oral Oncol.* 95, 11–15. <https://doi.org/10.1016/j.oraloncology.2019.05.016>.
- World Health Organization. International classification of functioning, disability and health (ICF). <https://www.who.int/standards/classifications/international-classification-of-functioning-disability-and-health>. (Accessed 18 September 2022). Accessed.
- World Health Organization. WHO guidelines on physical activity and sedentary behaviour. <https://www.who.int/publications/i/item/9789240015128>. (Accessed 18 January 2022). Accessed.
- Yancik, R., Ershler, W., Satariano, W., Hazzard, W., Cohen, H.J., Ferrucci, L., 2007. Report of the national institute on aging task force on comorbidity. *J. Gerontol. Ser. A Biol. Sci. Med. Sci.* 62, 275–280. <https://doi.org/10.1093/gerona/62.3.275>.