REVISTA DE ENFERMAGEM REFERÊNCIA
homepage: https://rr.esenfc.pt/rr/
ISSNe: 2182.2883

RESEARCH ARTICLE (ORIGINAL)

Rehabilitation nursing: Functional independence after surgery for head and neck cancer

Enfermagem de reabilitação: Independência funcional após cirurgia por cancro de cabeça e pescoço

Enfermería de rehabilitación: Independencia funcional tras la cirugía de cáncer de cabeza y cuello

José Moreira [1]
https://orcid.org/0000-0003-0059-768X

Inês Frade [2]
https://orcid.org/0000-0002-0590-4290

Sandra Gomes [3]
https://orcid.org/0000-0003-4220-2455

Susana Miguel [3]
https://orcid.org/0000-0001-8830-070X

[1] University of Évora, Nursing Department, Évora, Portugal

[2] Lisbon Nursing School, Lisbon, Portugal

[3] Portuguese Oncology Institute of Lisbon, Head and neck surgery, Lisbon, Portugal

Corresponding author
José Moreira
E-mail: jose.moreira@uevora.pt

Received: 03.02.23
Accepted: 26.09.23

Abstract
Background: Surgery for head and neck cancer (HNC) compromises patients' functional capacity and self-care, thus early rehabilitation is crucial. There is little scientific evidence in this area, particularly in demonstrating the positive impact of the intervention of rehabilitation nurses (RNs) on the functionality and level of dependence of patients undergoing HNC surgery.
Objective: To assess the level of dependence at clinical discharge in patients undergoing HNC surgery with the intervention of RNs.
Methodology: A quantitative, observational, and retrospective cohort study was conducted to compare these two groups of patients with and without intervention.
Results: In this sample (n = 133), the length of stay was reduced (5.02 days) in the intervention group. The differentiated intervention improved the functional capacity and independence of tracheostomized patients (RR:1.55; 95% CI [1.04;2.31]; p = 0.03), after adjusting for confounding factors in the High Discharge Barthel Index variable.
Conclusion: RNs' specialized care for patients undergoing HNC surgery, as part of a multidisciplinary intervention, is fundamental to reducing the level of dependence after surgery.

Keywords: rehabilitation nursing; field dependence-independence; head and neck cancer; maxillofacial surgery; tracheotomy

Resumo
Enquadramento: No cancro de cabeça e pescoço (CCP) o tratamento cirúrgico compromete a capacidade funcional e autocuidado dos doentes.
A reabilitação precoce é essencial, existindo escassa evidência científica nesta área, nomeadamente na demonstração do impacto positivo do Enfermeiro Especialista em Enfermagem de Reabilitação (EEER) na funcionalidade e nível de dependência dos utentes submetidos a cirurgia de CCP.
Objetivo: Avaliar o nível de dependência aquando da alta clínica dos utentes com CCP submetidos a cirurgia com intervenção do EEER.
Metodologia: Estudo quantitativo observacional, de coorte retrospetivo, comparando dois grupos de doentes: com e sem intervenção.
Resultados: Na amostra (n = 133), o tempo de internamento foi menor em 5,02 dias no grupo com intervenção. A intervenção diferenciada teve efeito positivo na melhoria da capacidade funcional e independência dos utentes traqueostomizados (RR:1.55; CI95% [1.04;2.31]; p = 0,03), tal como após ajuste das variáveis de confundimento na variável Índice Barthel Alta.
Conclusão: O cuidado especializado de Enfermagem de Reabilitação a estes doentes, inserido num contexto de intervenção multidisciplinar, é fundamental na mitigação da dependência após tratamento cirúrgico.

Palavras-chave: enfermagem em reabilitação; área de dependência-independência; neoplasias de cabeça e pescoço; cirurgia maxilofacial; traqueotomia

Resumen
Marco contextual: En el cáncer de cabeza y cuello (CCC), el tratamiento quirúrgico compromete la capacidad funcional y el autocuidado de los pacientes.
La rehabilitación temprana es esencial y existen pocas pruebas científicas en este ámbito, sobre todo que demuestren el impacto positivo del personal de enfermería especialista en rehabilitación (EEER) en la funcionalidad y el nivel de dependencia de los pacientes sometidos a cirugía de CCP.
Objetivo: Evaluar el nivel de dependencia en el momento del alta de los pacientes con CCP intervenidos quirúrgicamente con intervención de EEES.
Metodología: Estudio cuantitativo observacional, de cohorte retrospectivo que compara dos grupos de pacientes: con y sin intervención.
Resultados: En la muestra (n = 133), la duración de la hospitalización fue 5,02 días menor en el grupo con intervención. La intervención especializada tuvo un efecto positivo en la mejora de la capacidad funcional y la independencia de los usuarios con traqueotomía (RR:1.55; CI95% [1.04;2.31]; p = 0,03), así como después de ajustar las variables de confusión en la variable Índice de Barthel Alta.
Conclusión: Los cuidados especializados de enfermería de rehabilitación para estos pacientes, en el marco de una intervención multidisciplinar, son fundamentales para reducir la dependencia tras la cirugía.

Palabras clave: enfermería de rehabilitación; área de dependencia-independencia; neoplasias de cabeza y cuello; cirugía maxilofacial; traqueotomía

How to cite this article: Moreira, J., Frade, A., Gomes, S., & Miguel, S. (2023). Rehabilitation nursing: Functional independence after surgery for head and neck cancer. *Revista de Enfermagem Referência*, *6*(2), e29294. https://doi.org/10.12707/RVI23.15.29294

Introduction

Cancer is one of the world's top health priorities. Head and neck cancer (HNC) has high incidence (lips and oral cavity - 2.0%; salivary glands - 0.28%; oropharynx - 0.51%; hypopharynx - 0.44%; nasopharynx - 0.69%; and larynx - 0.96%) and mortality rates (lips and oral cavity - 1.8%; salivary glands - 0.23%; oropharynx - 0.48%; hypopharynx - 0.39%; nasopharynx - 0.80%; and larynx - 1.0%; Ferlay et al., 2020). It is the eighth leading cause of death from cancer (Grattan et al., 2018). In Portugal, according to 2015 data, around 3,000 new cases of HNC are diagnosed every year, with an incidence of 52 new cases in men and eight new cases in women per 100,000 population (Direção-Geral da Saúde, 2017). HNC can have many names depending on where the cancer starts. They can start in the nasal cavity and paranasal sinuses, nasopharynx, hypopharynx, larynx, oropharynx, oral cavity, lip, and malignant tumors of the salivary glands (Baijens et al., 2021).

Tobacco and alcohol intake are major risk factors for this type of cancer, and 72% of HNC are related to each of these factors alone or a combination of both (Baijens et al., 2021).

Treatment can be surgical or non-surgical (radiotherapy, chemotherapy, and immunotherapy). These approaches can be used alone or combined. These tumors can compromise the patient's functional capacity and self-care related to breathing, communication, and eating (Nayak & George, 2018). Surgeries such as total laryngectomy (TL), mandibulectomy, glossectomy, and floor-of-the--mouth resection imply physical and psychosocial changes and, often, greater dependence on third parties (Miguel et al., 2019). These changes can be exacerbated if there is a need for neck dissection or (temporary or permanent) tracheostomy, with an impact on the patient's self-care actions (Queirós et al., 2017).

Due to alterations in communication, these patients' ability to report symptoms, ask questions, request care, express feelings, fears, and desires, as well as make decisions related to their healthcare is compromised, which can increase their vulnerability (Frade et al., 2022).

The Barthel Index assesses the patient's level of independence for self-care. It has already been validated in Portugal (Araújo et al., 2007). From a perspective of holistic care, nurses should be aware of the changes that this type of tumors and treatments can cause (Miguel et al., 2019) and implement a care plan focused on altered human responses to facilitate this transition process (Nayak et al., 2018).

In view of this problem, this study aims to analyze the role of Rehabilitation Nurses (RNs) in the degree of dependence and self-care of patients hospitalized after HNC surgery, as part of generalized health care.

The general objective was to assess the level of dependence at discharge of patients with HNC who had undergone surgery (with temporary or permanent tracheostomy) with the intervention of RNs.

Background

Given the need for differentiated and specialized care, rehabilitation care should be provided to all patients undergoing HNC surgery, particularly tracheostomized patients. Intervention in patients with a breathing stoma should focus on educating about postoperative care and adaptation strategies to prevent complications and promote the health, well-being, and quality of life of patients and families (Queirós et al., 2017).

As an integral part of the multidisciplinary rehabilitation team, RNs play a fundamental role during the hospitalization of patients undergoing HNC surgery, since their competencies involve designing, implementing, and monitoring differentiated intervention plans (Ordem dos Enfermeiros, 2010). This differentiated intervention plan includes motor and respiratory rehabilitation interventions, associated with the Continuous Quality Improvement and Care Management domains. In the first domain associated with the use of knowledge and skills for continuous quality improvement, it is essential to collaborate with other health professionals in the management and support of the various activities of daily living (ADLs), preventing complications and promoting autonomy. In the second domain related to optimizing the care process in terms of decision-making, decision-making in this area of intervention is crucial for providing quality care that meets patients' needs (Ordem dos Enfermeiros, 2010).

Research question

Does the intervention of RNs improve the functional capacity and self-care of patients undergoing HNC surgery?

Methodology

This is a quantitative observational, retrospective cohort study, with an intervention carried out between July 2018 and October 2020. Inclusion criteria were all adult patients over the age of 18 with tongue, floor of the mouth, gum, retromolar, larynx cancer, and cervical metastasis who underwent the following surgeries: TL + Neck dissection and Mandibulectomy, glossectomy, and floor-of-the-mouth resection + Neck dissection + Pectoralis major flap + Tracheostomy. Exclusion criteria were death during hospitalization, patients undergoing surgeries other than those mentioned in the inclusion criteria, and the impossibility of accessing clinical data. The identifiable target population (n = 674) consisted of a non-probability convenience sample.

Two groups were formed from the sample. The Generalized Health Care Group consisted of all patients who underwent the surgeries mentioned above and received generalized health care without the intervention of RNs. Given that there is only one RN in the multidisciplinary team, patients undergoing RN intervention are selected

according to their personal background, namely chronic respiratory diseases, and the respiratory and sensorimotor functional changes resulting from the surgery. Thus, the first group included patients who did not receive RN intervention within the first 24 hours after surgery because the multidisciplinary team member was not at the unit on a daily basis. The Generalized Health Care group with RN intervention consisted of patients who, after the surgeries mentioned above, in addition to generalized care, had RN assessment and intervention in the immediate postoperative period (24 hours after surgery), which are part of RN practice and care. In this case, where the assessment and first intervention are carried out, the initial Barthel Index reflects the degree of dependence and is applied after surgery.

RNs specifically intervene in the respiratory and motor areas, which include the following nursing diagnoses: Impaired ventilation; Potential to improve ability to optimize ventilation; Impaired airway clearance; Potential to improve knowledge to promote airway clearance; Potential to improve ability to promote airway clearance; Impaired body balance; Potential to improve knowledge of body balance technique; Potential to improve ability to perform muscle and joint exercise techniques; Potential to improve knowledge of energy conservation; and Potential to improve knowledge of muscle and joint exercise techniques.

The data included: Demographic data (gender and age); Immediate postoperative status in the first 24 hours - surgery, initial Barthel Index; Intermediate/Late postoperative status after 24 hours until discharge - Infection, Discharge Barthel Index, Length of hospital stay (days), and Discharge Barthel Index > 91.

Data were collected from the inpatient department's RN database. Demographic data, length of hospital stay, main diagnosis, and referral for hospital discharge were collected from all inpatients diagnosed and submitted to surgery. For the other variables, the information was collected retrospectively from the Excel® RN database.

Measures of central tendency (mean and median) and dispersion (range with minimum and maximum, and standard deviation) were calculated for each of the variables in both groups. Frequency distribution tables were also presented for both groups. The Chi-square test was used to compare the categorical variables between the groups. For numerical variables, the assumptions for Student's *t*-test for independent samples were assessed. Because the criteria of homogeneity of variances and normality were not met, the non-parametric Mann-Whitney *U* test was used to compare the two groups. The significance level was set at 5%.

The numerical dependent variable was categorized as dichotomous (Discharge Barthel Index > 91), in which a Barthel Index score above 91 at discharge suggests mild dependence/independence, and a score below 91 suggests moderate and high dependence (Araújo et al., 2007).

Descriptive statistics were used to characterize the sample. IBM SPSS Statistics software, version 28.0, was used for data analysis. The Poisson distribution model was used to analyze the effect of the independent variables on the results, that is, the role of these variables on the impact of the RN intervention on the patients' independence. Using this generalized linear model with the log link function, a regression analysis with robust standard errors was conducted, assuming a Relative Risk (RR) with 95% confidence interval.

Ethical principles were respected and safeguarded throughout the study. The study was submitted and accepted by the Research Unit and the Ethics Committee of the health unit where the study was carried out in November 2021, under number UIC/1427. The study was also approved by the heads of service of both surgical specialties at this health institution. Given that this is a retrospective study, and since it was not possible to obtain any contact details or identifiers of the participants in the database mentioned above, all information used and collected in this study was coded and kept confidential for analysis, with a corresponding code (1, 2, 3, ...) for each hospitalization episode. Therefore, data confidentiality and anonymization were safeguarded, and only the researcher of this study had access to their identification using the code assigned. The study was registered on the clinical trials platform - ClinicalTrials.gov, under number NCT05246891.

Results

The sample (n = 133) consists of patients from the generalized health care group (n = 63) and the group that received RN intervention after the surgeries under analysis (n = 70). The sample consisted mainly of men (89.5%), with a mean age of 67.3 years, with half of the sample being at least 67 years old.

When comparing the two groups, no statistically significant differences were found in the demographic characteristics (age and gender), the type of surgery, and the Initial Barthel Index, suggesting their statistical homogeneity at a 5% significance level, as shown in Table 1.

Table 1

Demographic Characteristics, Immediate Postoperative Status, and Intermediate/Late Postoperative Status in both groups

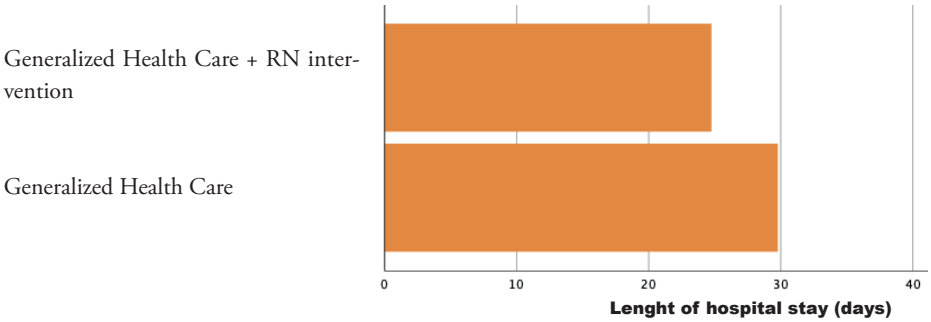
	RN Intervention Group (*n* = 70)			**Generalized Health Care Group (*n* = 63)**			
	Frequencies (*n*/%)	Mean (± ***SD***)	Min--Max	Frequencies (n/%)	Mean (± ***SD***)	Min--Max	*p*
Gender							
Male	62 (52.1%)			57 (47.9%)			0.72[b]
Female	8 (57.1%)			6 (42.9%)			
Age							
Years		67.3 (± 11.6)	42-92		67.3 (± 10.9)	45-87	0.60[a]
Type of surgery							
1	35 (57.4%)			37 (51.4%)			0.31[b]
2	35 (48.6%)			26 (42.6%)			
Initial Barthel Index		46.7 (± 17.7)		20-85	42.9 (± 9.5)	20-60	0.17[c]
Discharge Barthel Index		83.2 (± 18.9)		40-100	79.2 (± 13.3)	50-100	0.01[c]
Length of hospital stay (days)		24.7 (± 15.4)		5-76	29.7 (±1 8.3)	5-93	0.03[c]
Discharge Barthel Index>91							
Yes	38 (56.2%)			22 (36.7%)			0.02[b]
No	32 (63.3%)			41 (56.3%)			

Note. SD = Standard-deviation; RN = Rehabilitation Nurse; Max = Maximum; Min = Minimum; [a]Student's *t*-test.
[b]Chi-square test; [c]Mann-Whitney test; *p* = p-value; 1 = Total laryngectomy + Neck dissection; 2 = Mandibulectomy, glossectomy, and floor-of-the-mouth resection+Neck dissection+Pectoralis major flap+Tracheostomy.

Concerning the two groups, there was a lower average length of stay in the RN intervention group (24.7 days) compared to the generalized healthcare group (29.7 days), with an average reduction of 5.02 days in the RN intervention group ($p = 0.03$), as shown in Figure 1.

Figure 1

Length of hospital stay (days) and intervention of the rehabilitation nurse



With regard to the Barthel Index variable at discharge, more than half of the patients in the generalized healthcare group were discharged with a moderate degree of dependence, with an average of 79.9 points, as opposed to those of the RN intervention group, who were discharged as independent/mildly dependent, with an average of 83.2 points.

The regression model shows that the Initial Barthel Index and Age variables are associated with a Discharge Barthel Index > 91, as shown in Table 2.

It should be noted that the RR of the Discharge Barthel Index > 91, according to the RN intervention, is estimated at 1.55, varying between 1.04 and 2.31 (95% CI; p = 0.03).

As the CI does not include the unit value, it can be stated with 95% confidence that there is an improvement in the functional capacity and self-care of patients undergoing HNC surgery.

The same is true when adjusting for the Age variable in MOD 1 (RR: 1.52; 95%CI [1.06; 2.18]; p = 0.02), that is, younger patients with RN intervention will have mild dependence/independence at discharge.

Table 2

Estimate of the RR in the Barthel Index >91 after discharge in patients receiving RN intervention versus generalized health care

Model	Adjusted RR[1]	95% CI	*p*
RN Intervention	1.55	[1.04; 2.31]	.03
MOD 1: Age + RN Intervention	1.52	[1.06; 2.18]	.02
MOD 2: MOD 1 + Initial Barthel Index	1.35	[0.94; 1.94]	.09

Note. [1]Adjusted for confounding through regression; RN = Rehabilitation Nurse; CI = Confidence Interval; MOD = Model; RR = Relative Risk; p = p-value.

However, this is not the case when adjusting for the Initial Barthel Index in MOD 2 (RR: 1.35; 95%CI [0.94; 1.94]; p = 0.09). Although the effect of the RN intervention is positive for the Discharge Barthel Index > 91, the intervention is not effective for the independence of patients with a higher Initial Barthel Index.

Discussion

This study analyzed the role of RNs in patients with HNC after surgery, through individualized plans to optimize functional capacity and self-care. The RN's intervention reduced the length of hospital stay after surgery for these patients and significantly improved their functional capacity and self-care.

The main consequences of elective surgery for patients with HNC include dependence and impaired functional capacity at the respiratory and motor levels. Some studies have already shown that patients with HNC who have undergone treatments have impaired functional capacity and self-care (Burgos-Mansilla et al., 2021; Sheikh et al., 2014).

Both stiffness and pain in the neck and shoulder were associated with the postoperative period, even when the spinal accessory nerve was preserved on the neck dissection. For these diagnoses, according to the American Cancer Society, early rehabilitation through referral and follow-up by a RN prevents limitations in shoulder functionality, minimizing pain and optimizing functional capacity for self-care (Cohen et al., 2016). In this study, patients who only received generalized health care were discharged with a moderate/high degree of dependence, as opposed to those receiving RN intervention, who

were discharged with a mild degree of independence/dependence (p = 0.02). These findings align with those of Bannister and Ah-See (2015), who found that early mobilization strategies and specific rehabilitation programs in HNC surgery allow for faster functional recovery and a lower degree of dependence after surgery. The results of this study are also in line with Twomey et al. (2020), who reported that early postoperative mobilization in patients with HNC undergoing flap reconstruction improves surgical outcomes, prevents cardiorespiratory and muscular complications, promotes readaptation to walking and independence, and facilitates the transition process and recovery at home. Furthermore, according to Burgos-Mansilla et al. (2021), the implementation of physical exercise programs in patients with HNC who have undergone surgery enhances the recovery of functionality and improves quality of life.

The results of this study showed a reduction in hospitalization days associated with RN intervention after surgery (p = 0.03), which is in line with Bannister and Ah-See (2015), who reported that rehabilitation programs for patients undergoing HNC surgery optimize functional capacity, reduce complications, and lead to earlier hospital discharge. Another study also found a significant reduction in the length of hospital stay for patients who also completed an individualized rehabilitation exercise program on their own (Steegmann et al., 2020). The RN intervention improves patients' independence after surgery, which is maintained when adjusting for the Barthel Index and age in the immediate postoperative period. There is no evidence from other studies on this outcome in which there is RN intervention after HNC surgery; however, it is known that age and comorbidities lead to higher dependency levels with decreased functional capacity (Sheikh et al., 2014).

A tracheostomy can usually cause an increase in total airflow resistance due to the small diameter of the tube, leading to changes in breathing patterns, end-expiratory pressure, and secretion production (Mills et al., 2022). The magnitude of this effect depends on several factors, mainly the effectiveness of the ventilation process. The RN can optimize ventilation and airway clearance using their skills. Airway clearance can be ineffective in the first few days after surgery due to uncontrolled pain, adaptation to the new breathing process, and difficulty in clearing secretions, leading to stasis. As a result, there is often a decrease in tidal volume with changes in the ventilation/perfusion ratio, leading to hypoxemia. Breathing re-education exercises are fundamental in promoting airway patency, optimizing ventilation, and preventing atelectasis/pneumonia (Moreira et al., 2022). In this context, RN care focuses mainly on preventing respiratory complications, optimizing functionality, and improving the ventilation/perfusion ratio.

In addition to ineffective airway clearance, an inadequate breathing pattern was also diagnosed after HNC surgery. In the case of pectoralis major flap, the patient reports pain in the intervened thoracic region and breathing is predominantly abdominal. It is important to note that in the surgeries under analysis, in which "there is paralysis of the thoracic muscles due to trauma, there may be a higher respiratory rate and lower tidal volume" (Marques-Vieira & Sousa, 2016, p. 521). For this reason, the role of the RN involves training the inspiratory muscles, increasing functional capacity, inspiratory capacity, and relaxation of the thoracic cavity conditioned by pain (Marques-Vieira & Sousa, 2016). Autonomy should also be promoted when preparing for discharge, that is, the transition from inpatient to outpatient care, focusing on the possibility of the patient maintaining life, health, and well-being on a daily basis after treatment.

A limitation of this study is that the duration of the RN intervention was much shorter than generalized health care throughout the hospital stay. Another limitation is related to the assessment of the Initial Barthel Index, that is, when there is no RN intervention, the degree of dependence is assessed by the nurse who is providing direct care to that patient.

Conclusion

This study has shown the importance of early rehabilitation after surgery. Patients undergoing surgery for HNC should receive specialized nursing care, which can lead to shorter hospital stays and significant improvement in functional capacity and self-care after surgery. This type of specialized care as part of a multidisciplinary intervention in patients undergoing HNC surgery helps mitigate the impact of this treatment on individual functionality and promote a rapid recovery. The implementation and evaluation of RN care shows that this type of care contributes to health education, early mobilization, breathing exercises during the postoperative period, and adaptation to a new health status. There is a need to raise awareness of the physical and mental fragility in patients who are recovering from HNC surgery and promote their independence. Future studies should use larger samples and other instruments for assessing functional capacity and quality of life.

Author contributions

Conceptualization: Moreira, J.
Data curation: Moreira, J.
Formal analysis: Moreira, J.
Funding acquisition: Moreira, J.
Investigation: Moreira, J.
Methodology: Moreira, J.
Project administration: Moreira, J.
Resources: Moreira, J.
Software: Moreira, J.
Supervision: Frade, I., Gomes, S., Miguel, S.
Validation: Frade, I., Gomes, S., Miguel, S.
Visualization: Frade, I., Gomes, S., Miguel, S.
Writing – original draft: Frade, I.
Writing – review and editing: Miguel, S.

Acknowledgements

This study was awarded an Honorable Mention by the Ordem dos Enfermeiros (Portuguese Nursing Regulatory

Body) - Southern Section, as part of the Mariana Diniz de Sousa Nursing Research Award for 2022.

References

Araújo, F., Ribeiro, J., Oliveira, A., & Pinto, C. (2007). Validação do índice de Barthel numa amostra de idosos não institucionalizados. *Revista Portuguesa de Saúde Pública*, *25*(2), 59-66. http://hdl.handle.net/10362/95522

Baijens, L. W., Walshe, M., Aaltonen, L. M., Arens, C., Cordier, R., Cras, P., Crevier- Buchman, L., Curtis, C., Golusinski, W., Govender, R., Eriksen, J. G., Hansen, K., Heathcote, K., Hess, M. M., Hosal, S., Klussmann, J. P., Leemans, C. R., MacCarthy, D., Manduchi, B., … Clavé, P. (2021). European white paper: Oropharyngeal dysphagia in head and neck cancer. *European Archives of Oto-Rhino-Laryngology, 278*(2), 577–616. https://doi.org/10.1007/s00405-020-06507-5

Bannister, M., & Ah-See, K. (2015). Enhanced recovery programmes in head and neck surgery: Systematic review. *The Journal of Laryngology and Otology, 129*(5), 416–420. https://doi.org/10.1017/S0022215115000936

Burgos-Mansilla, B., Galiano-Castillo, N., Lozano-Lozano, M., Fernández-Lao, C., Lopez-Garzon, M., & Arroyo-Morales, M. (2021). Effect of physical therapy modalities on quality of life of head and neck cancer survivors: A systematic review with meta-analysis. *Journal of Clinical Medicine, 10*(20). https://doi.org/10.3390/jcm10204696

Cohen, E. E., LaMonte, S. J., Erb, N. L., Beckman, K. L., Sadeghi, N., Hutcheson, K. A., Stubblefield, M. D., Abbott, D. M., Fisher, P. S., Stein, K. D., Lyman, G. H., & Pratt-Chapman, M. L. (2016). American cancer society head and neck cancer survivorship care guideline. *CA: A Cancer Journal for Clinicians, 66*(3), 203-239. https://doi.org/10.3322/caac.21343

Direção-Geral de Saúde. (2017). *Programa nacional para as doenças oncológicas.* https://www.sns.gov.pt/institucional/programas-de-saude-prioritarios/programa-nacional-para-as-doencas-oncologicas/

Ferlay, J., Ervik, M., Lam, F., Colombet, M., Mery, L., Piñeros, M., Znaor, A., Soerjomataram, I., & Bray, F. (2020). *Global cancer observatory: Cancer today*. https://gco.iarc.fr/today/home

Frade, A. I., Espiney, L., & Pinto, V. M. (2022). Vulnerability, health information right and the contributions of augmentative and alternative communication for people with aphasia. *Clinical Ethics, 0*(0), 1-3. https://doi.org/10.1177/14777509221105397

Grattan, K., Kubrak, C., Caine, V., O'Connell, D. A., & Olson, K. (2018). Experiences of head and neck cancer patients in middle adulthood: Consequences and coping. *Global Qualitative Nursing Research, 5*. https://doi.org/10.1177/23333936187603

Marques-Vieira, C., & Sousa, L. (2016). *Cuidados de enfermagem de reabilitação à pessoa ao longo da vida*. Lusodidacta.

Miguel, S., Zamarioli, C., Carvalho, E., & Caldeira, S. (2019). The human responses and nursing diagnoses of head and neck cancer patients: Literature review and synthesis of evidence. *Cadernos de Saúde, 11*(1), 19-29. https://doi.org/10.34632/cadernosdesaude.2019.5274

Mills, C. S., Michou, E., King, N., Bellamy, M. C., Siddle, H. J., Brennan, C. A., & Bojke, C. (2022). Evidence for above cuff vocalization in patients with a tracheostomy: A systematic review. *The Laryngoscope, 132*(3), 600–611. https://doi.org/10.1002/lary.29591

Moreira, J., Fonseca, P., & Miguel S. (2022). A pilot study on a nurse rehabilitation program: Could it be applied to COVID-19 patients? *International Journal of Environmental Research and Public Health, 19*(21), 14365. https://doi.org/10.3390/ijerph192114365

Nayak, S., Pai, M. S., & George, L. (2018). Self-image and quality of life among head and neck cancer patients. *Journal of Clinical and Diagnostic Research, 12*(8), XC01–XC05. https://doi.org/10.7860/JCDR/2018/30770.11875

Ordem dos Enfermeiros. (2010). *Regulamento das competências especificas do enfermeiro especialista em enfermagem de reabilitação.* https://www.ordemenfermeiros.pt/arquivo/legislacao/Documents/LegislacaoOE/ RegulamentoCompetenciasReabilitacao_aprovadoAG20Nov2010.pdf

Queirós, S., Santos, C. B., Brito, M., & Pinto, I. (2017). Fatores condicionadores do desenvolvimento da competência de autocuidado na pessoa com ostomia de ventilação. *Revista de Enfermagem Referência, 4*(14), 57-67. https://doi.org/10.12707/RIV17010

Sheikh, A., Shallwani, H., & Ghaffar, S. (2014). Postoperative shoulder function after different types of neck dissection in head and neck cancer. *Ear, Nose, & Throat Journal, 93*(4-5), E21–E26. https://research.ebsco.com/c/t56eot/viewer/pdf/tk7oz7tkuz

Steegmann, J., Bartella, A., Kloss-Brandstätter, A., Kamal, M., Hölzle, F., & Lethaus, B. (2020). A randomized clinical trial on the efficacy of a patient-adapted autonomous exercise regime for patients with head and neck cancer. *Journal of Cranio-Maxillo-Facial Surgery, 48*(3), 187–192. https://doi.org/10.1016/j.jcms.2019.12.009

Twomey, R., Culos-Reed, S. N., Daun, J. T., Ferber, R., & Dort, J. C. (2020). Wearable activity trackers and mobilization after major head and neck cancer surgery: You can't improve what you don't measure. *International Journal of Surgery, 84*, 120–124. https://doi.org/10.1016/j.ijsu.2020.10.032