

Oral Hygiene Programs/Techniques used in Patients with Esophagectomy in the Acute Phase: Protocol for a Scoping Review

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Abstract

Background: Maintaining or improving oral hygiene is crucial for patients who have undergone esophagectomy due to esophageal cancer. Research shows that good oral hygiene is associated with fewer complications and shorter hospital stays after surgery. While there are many studies highlighting the importance of oral care in the preoperative phase, techniques and protocols for oral hygiene care in the postoperative phase remain unclear. The need for comprehensive guidance for healthcare professionals is urgent.

Objectives: The aim of the study is to identify the techniques and protocols used to maintain or improve oral hygiene in patients after esophagectomy and to describe the general benefits of these strategies. To achieve these goals, a scoping review will be conducted to gather all available information from existing studies.

Methods: The review will include the use of five electronic databases to search for literature. The search will be conducted using three main terms: "oral hygiene", "esophageal cancer" and "esophagectomy". Studies that meet the inclusion criteria will be assessed by two reviewers for selection, and their data will be extracted using specific tools (e.g. Covidence and EndNote).

Conclusions: The review will provide a comprehensive account of the techniques and protocols used for maintaining oral hygiene in patients who have undergone esophagectomy. The results of this review will provide valuable information for clinical practice and help healthcare professionals, especially Speech and Language Therapists, in better managing these

patients. Additionally, this review will serve as a foundation for future research on the topic.

Keywords: oral hygiene, oral health, esophageal cancer, esophagectomy, acute phase, scoping review

1 Introduction

Recent suggests that for patients with esophageal cancer, maintaining good oral hygiene is associated with reduced comorbidity and shorter hospital stays following esophagectomy surgery [1]. Among the various complications, postoperative pneumonia emerges as the most common comorbidity, significantly increasing both mortality rates and prolonged hospitalization [2-5]. Research findings highlight that preoperative oral and dental care can significantly reduce the risk of postoperative pneumonia [1, 2] and act as a predictor of long-term outcomes, such as life expectancy, in these patients [6]. Conversely, poor oral hygiene prior to surgery is recognized as an independent risk factor for the development of postoperative pneumonia [7].

Various techniques and protocols are used to maintain or enhance oral hygiene in patients scheduled for surgery. Nevertheless, there is a lack of research that systematically identifies, names, and explains these practices in detail. Thus, uncertainty arises for specialties, including Speech and Language Therapists, who aim to determine which of these strategies are most effective and beneficial for managing esophagectomy patients. Additionally, most studies focus on the preoperative phase, leaving a gap in understanding

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regarding specific techniques or protocols for postoperative phase.

Research Questions: The aim of this scoping review is to explore oral hygiene techniques and protocols used for patients with esophageal cancer, particularly those who have undergone esophagectomy. The specific research questions guiding this review are:

1. What techniques or protocols are currently available to enhance oral hygiene in patients undergoing esophagectomy due to esophageal cancer?
2. What are the documented benefits of implementing oral hygiene techniques / protocols in patients undergoing esophagectomy?

2. Methods

Research Design: Given the absence of a systematic review on this topic, and the need to take a broad approach to mapping the available evidence, a scoping review is deemed the most suitable method to address the research questions [8]. This approach allows for the inclusion of a wide range of study designs and outcomes, facilitates the identification of knowledge gaps, and is particularly appropriate for exploring a complex and heterogeneous area [9] such as oral hygiene interventions in patients with esophageal cancer and esophagectomy. Since a scoping review relies on secondary source analysis, it does not involve direct patient contact, thereby avoiding ethical risks and the need for consumables. The review will follow the PRISMA-ScR checklist [10] for its design and execution and the JBI methodological guidance for its reporting [11].

Search Strategy: The literature search will be conducted using the following databases: PubMed, Web of Science (Core Collection), CINAHL, Embase, and Cochrane Library. Collaboration with a librarian from Trinity College Dublin will ensure a comprehensive and accurate search. Three main search concepts, “oral hygiene”, “esophageal cancer” and “esophagectomy”, will be applied

across all databases with appropriate modifications. An example of the search strategy PubMed is provided in [Appendix 1](#). Additionally, reference lists from relevant papers will be checked to identify any overlooked studies. A search for grey literature will not be conducted, as it is not considered necessary for this scoping review.

Inclusion/Exclusion Criteria: This scoping review uses the Participant-Concept-Context (PCC) framework to guide the development of the research questions and define the key elements of the review. The PCC framework is structured as follows:

- a) **Participant:** Adults (18 years or older) with esophageal cancer who have undergone esophagectomy in the acute phase (up to one-month post-surgery).
- b) **Concept:** Any oral hygiene technique or protocol.
- c) **Context:** Any clinical setting.

Based on this framework, the following inclusion and exclusion criteria will be applied during the study selection:

- **Inclusion Criteria:**
 1. Studies including adults (18 or above) with esophageal cancer who have undergone esophagectomy and are still hospitalized post-surgery.
 2. Report of any technique or protocol related to oral hygiene.
 3. No restrictions will be applied regarding study design; studies of any design (i.e. case studies, cohort studies, and RCTs), will be considered.
 4. Only full text articles published in peer review journal will be included.
- **Exclusion Criteria:**
 1. Studies that do not align with the conceptual PCC framework.
 2. Studies where relevant data cannot be retrieved.
 3. Studies available only as abstracts without full text availability.

4. Editorials, expert opinions, and secondary data.

No restrictions will be applied regarding publication date, or language, as the goal is to collect all relevant information available in the literature. For papers without full-text access, an attempt will be made to contact the primary authors; otherwise, they will be excluded from consideration.

Outcomes of Interest: Data related to oral hygiene techniques and protocols, their frequency, materials used, personnel involved, and any training required for implementation will be collected. Additionally, information on pneumonia rates, feeding changes, and oral hygiene evaluation tools will be recorded.

Data Collection: The following steps will be followed:

1. **Covidence Software:** Duplicates will be removed.
2. **Search Selection:** Two reviewers (VE, MSM) will independently screen all the papers and determine their eligibility for inclusion based on the predefined criteria. Any disagreements will be resolved through discussion between the reviewers, with or without the presence of a supervisor.
3. **Data Extraction:** Study details (e.g., author and publication year, study country/setting/design, sample size, patient demographics, techniques used, and outcomes) will be extracted by the initial reviewer (VE).
4. **Data Charting:** An initial Microsoft Excel charting form ([Appendix 2](#)) will be used to develop the Covidence template for data extraction. Once the data have been extracted, and in line with practices reported in a previous scoping review [12], a pilot study will be conducted. During this phase, a second reviewer (MSM) will independently verify the extracted data to assess inter-rater agreement, thereby supporting the validity and reliability of the data extraction process.
5. **EndNote:** This tool will be used to export papers and generate citations and references.

Data Analysis Plan: Data will be mapped using a Microsoft Excel data charting sheet to address the research questions through descriptive analysis. Findings will be presented in tables and charts to effectively visualize the results. No statistical analysis will be performed.

3. Discussion

This scoping review will address a gap in the literature regarding oral hygiene techniques for patients post-esophagectomy due to esophageal cancer. While preoperative oral care is well-documented, there is limited information on protocols for the postoperative acute phase. Oral hygiene is crucial for preventing complications like pneumonia, which can extend hospital stays and worsen patient outcomes. However, a lack of clarity exists on which techniques are most effective. By synthesizing existing evidence, this review will provide Speech and Language Therapists and other healthcare professionals with valuable insights for improving clinical practice. It will also lay the groundwork for future systematic reviews to enhance patient care post-esophagectomy.

References

1. Papaconstantinou D., Fournaridi A.V., Tasioudi K., Lidoriki I., Michalinos A., Konstantoudakis G., and Schizas D., *Identifying the role of preoperative oral/dental health care in post-esophagectomy pulmonary complications: a systematic review and meta-analysis*. Dis Esophagus, 2023. **36**(3).
2. Sato Y., Motoyama S., Takano H., Nakata A., Liu J., Harimaya D., Todo N., Yoshino K., Sasaki T., Wakita A., Kawakita Y., Imai K., Saito H., Fukuda M., and Minamiya Y., *Esophageal Cancer Patients Have a High Incidence of Severe Periodontitis and Preoperative Dental Care Reduces the Likelihood of Severe Pneumonia after Esophagectomy*. Dig Surg, 2016. **33**(6): p. 495-502.

3. Soutome S., Yanamoto S., Funahara M., Hasegawa T., Komori T., Oho T., and Umeda M., *Preventive Effect on Post-Operative Pneumonia of Oral Health Care among Patients Who Undergo Esophageal Resection: A Multi-Center Retrospective Study*. Surg Infect (Larchmt), 2016. **17**(4): p. 479-84.
4. Yamada Y., Yurikusa T., Furukawa K., Tsubosa Y., Niihara M., Mori K., Asoda S., Kawana H., Kitagawa Y., and Nakagawa T., *The Effect of Improving Oral Hygiene through Professional Oral Care to Reduce the Incidence of Pneumonia Post-esophagectomy in Esophageal Cancer*. Keio J Med, 2019. **68**(1): p. 17-25.
5. Yoshida N., Harada K., Iwatsuki M., Baba Y., and Baba H., *Precautions for avoiding pulmonary morbidity after esophagectomy*. Ann Gastroenterol Surg, 2020. **4**(5): p. 480-484.
6. Watanabe T., Sohda M., Kim M., Saito H., Ubukata Y., Nakazawa N., Kuriyama K., Hara K., Sano A., Sakai M., Ogawa H., Yokobori T., Yokoo S., Shirabe K., and Saeki H., *Preoperative evaluation of oral hygiene may predict the overall survival of patients with esophageal cancer*. Esophagus, 2023. **20**(1): p. 99-108.
7. Kuriyama K., Sohda M., Watanabe T., Saito H., Yoshida T., Hara K., Sakai M., Kim M., Asami T., Yokoo S., Kuwano H., Shirabe K., and Saeki H., *Resistance to Preoperative Oral Care Is Associated With Postoperative Pneumonia After Oesophageal Cancer Surgery*. Anticancer Res, 2021. **41**(3): p. 1507-1514.
8. Munn Z., Peters M.D.J., Stern C., Tufanaru C., McArthur A., and Aromataris E., *Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach*. BMC Medical Research Methodology, 2018. **18**(1): p. 143.
9. Munn Z., Pollock D., Khalil H., Alexander L., McLnerney P., Godfrey C.M., Peters M., and Tricco A.C., *What are scoping reviews? Providing a formal definition of scoping reviews as a type of evidence synthesis*. JBI Evid Synth, 2022. **20**(4): p. 950-952.
10. Tricco A.C., Lillie E., Zarin W., O'Brien K.K., Colquhoun H., Levac D., Moher D., Peters M.D.J., Horsley T., Weeks L., Hempel S., Akl E.A., Chang C., McGowan J., Stewart L., Hartling L., Aldcroft A., Wilson M.G., Garritty C., Lewin S., Godfrey C.M., Macdonald M.T., Langlois E.V., Soares-Weiser K., Moriarty J., Clifford T., Tunçalp Ö., and Straus S.E., *PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation*. Annals of Internal Medicine, 2018. **169**(7): p. 467-473.
11. Aromataris E L.C., Porritt K, Pilla B, Jordan Z, *JBI Manual for Evidence Synthesis*. 2024. p. 480.
12. Hirschwald J., Finnegan L., Hofacker J., and Walshe M., *Underserved groups in dysphagia intervention trials in Parkinson's disease: A scoping review*. Ageing Res Rev, 2024. **93**: p. 102150.

Appendices

Appendix 1: Example of search strategy

PubMed #	Search strategy	Results
#12	((((oral hygiene[Title/Abstract] OR oral health*[Title/Abstract] OR oral care*[Title/Abstract] OR mouth care[Title/Abstract] OR dental care*[Title/Abstract] OR mouth hygiene[Title/Abstract] OR toothbrush*[Title/Abstract] OR oral condition*[Title/Abstract] OR oral manag*[Title/Abstract] OR dental brush*[Title/Abstract] OR dental support*[Title/Abstract]) OR ("Oral Hygiene"[Mesh])) OR ("Oral Health"[Mesh])) OR ("Dental Care"[Mesh])) AND ((oesophagectom*[Title/Abstract] OR esophagectom*[Title/Abstract] OR oesophagus surgery[Title/Abstract] OR esophagus surgery[Title/Abstract] OR oesophageal surgery[Title/Abstract] OR esophageal surgery[Title/Abstract] OR oesophageal cancer resection[Title/Abstract] OR esophageal cancer resection[Title/Abstract]) OR ("Esophagectomy"[Mesh])) AND ((oesophageal cancer*[Title/Abstract] OR esophageal cancer*[Title/Abstract] OR oesophageal carcinoma*[Title/Abstract] OR esophageal carcinoma*[Title/Abstract] OR oesophageal squamous cell carcinoma*[Title/Abstract] OR esophageal squamous cell carcinoma*[Title/Abstract] OR oesophageal tumour*[Title/Abstract] OR esophageal tumour*[Title/Abstract] OR oesophageal tumor*[Title/Abstract] OR esophageal tumor*[Title/Abstract] OR oesophageal neoplasm*[Title/Abstract] OR esophageal neoplasm*[Title/Abstract]) OR ("Esophageal Neoplasms"[Mesh]))	21
#11	(oesophageal cancer*[Title/Abstract] OR esophageal cancer*[Title/Abstract] OR oesophageal carcinoma*[Title/Abstract] OR esophageal carcinoma*[Title/Abstract] OR oesophageal squamous cell carcinoma*[Title/Abstract] OR esophageal squamous cell carcinoma*[Title/Abstract] OR oesophageal tumour*[Title/Abstract] OR esophageal tumour*[Title/Abstract] OR oesophageal tumor*[Title/Abstract] OR esophageal tumor*[Title/Abstract] OR oesophageal neoplasm*[Title/Abstract] OR esophageal neoplasm*[Title/Abstract]) OR ("Esophageal Neoplasms"[Mesh]))	76,860
#10	"Esophageal Neoplasms"[Mesh]	62,965
#9	oesophageal cancer*[Title/Abstract] OR esophageal cancer*[Title/Abstract] OR oesophageal carcinoma*[Title/Abstract] OR esophageal carcinoma*[Title/Abstract] OR oesophageal squamous cell carcinoma*[Title/Abstract] OR esophageal squamous cell carcinoma*[Title/Abstract] OR oesophageal tumour*[Title/Abstract] OR esophageal tumour*[Title/Abstract] OR oesophageal tumor*[Title/Abstract] OR esophageal tumor*[Title/Abstract] OR oesophageal neoplasm*[Title/Abstract] OR esophageal neoplasm*[Title/Abstract]	50,376
#8	(oesophagectom*[Title/Abstract] OR esophagectom*[Title/Abstract] OR oesophagus surgery[Title/Abstract] OR esophagus surgery[Title/Abstract] OR oesophageal surgery[Title/Abstract] OR esophageal surgery[Title/Abstract] OR oesophageal cancer resection[Title/Abstract] OR esophageal cancer resection[Title/Abstract]) OR ("Esophagectomy"[Mesh])	20,980
#7	"Esophagectomy"[Mesh]	13,564

#6	oesophagectom*[Title/Abstract] OR esophagectom*[Title/Abstract] OR oesophagus surgery[Title/Abstract] OR esophagus surgery[Title/Abstract] OR oesophageal surgery[Title/Abstract] OR esophageal surgery[Title/Abstract] OR oesophageal cancer resection[Title/Abstract] OR esophageal cancer resection[Title/Abstract]	17,155
#5	((oral hygiene[Title/Abstract] OR oral health*[Title/Abstract] OR oral care*[Title/Abstract] OR mouth care[Title/Abstract] OR dental care*[Title/Abstract] OR mouth hygiene[Title/Abstract] OR toothbrush*[Title/Abstract] OR oral condition*[Title/Abstract] OR oral manag*[Title/Abstract] OR dental brush*[Title/Abstract] OR dental support*[Title/Abstract]) OR ("Oral Hygiene"[Mesh])) OR ("Oral Health"[Mesh])) OR ("Dental Care"[Mesh]))	107,517
#4	"Dental Care"[Mesh]	35,881
#3	"Oral Health"[Mesh]	22,384
#2	"Oral Hygiene"[Mesh]	21,723
#1	oral hygiene[Title/Abstract] OR oral health*[Title/Abstract] OR oral care*[Title/Abstract] OR mouth care[Title/Abstract] OR dental care*[Title/Abstract] OR mouth hygiene[Title/Abstract] OR toothbrush*[Title/Abstract] OR oral condition*[Title/Abstract] OR oral manag*[Title/Abstract] OR dental brush*[Title/Abstract] OR dental support*[Title/Abstract]	72,852

Appendix 2: Data extraction sheet (Microsoft Excel)

#	First author's name, Year of publication	Country of study origin	Study setting	Study design	Sample size	Age	Gender	Techniques / protocols related to oral hygiene	Person(s) performing the techniques/ protocol	Outcome measures
1.	Soutome, 2016	Japan	University Hospital	Cohort study	280	N/S	Male 149 Female 24	Oral health instruction, Removal of dental calculus (scaling), Professional mechanical tooth cleaning, Removal of tongue coating with a toothbrush, Extraction of teeth with severe periodontitis, (after surgery) gargling with water during the daytime every 3-6 hours	Dentists, Dental hygienist	Presence of fever, Elevated white blood cell count, Pulmonary infiltrates requiring antibiotic therapy
2.										
3.										