Fiberoptic endoscopic evaluation of swallowing and videofluoroscopy swallowing assessment of adults in residential care facilities: a scoping review protocol

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ABSTRACT

Objective: This scoping review will identify and explore existing evidence on the use of instrumental swallowing assessment in the diagnosis and management of dysphagia in adults living in residential care facilities.

Introduction: Oropharyngeal dysphagia is prevalent among adults living in residential care facilities. Videofluoroscopy and fiberoptic endoscopic evaluation of swallowing are instrumental assessment procedures commonly utilized in the evaluation of oropharyngeal dysphagia in hospital and community settings. However, little is known about the use of these procedures in residential care facilities. To ensure evidence-based assessment of oropharyngeal dysphagia and to guide future research, exploration of the current use and clinical utility of videofluoroscopy and fiberoptic endoscopic evaluation of swallowing in residential care facilities is needed.

Inclusion criteria: Published and gray literature written in English between 2000 and 2019 that discusses instrumental swallowing assessment of adults in residential care facilities will be included in the review.

Methods: A three-step search strategy will be used to explore relevant literature. All citations and articles retrieved during the searches will be imported into a software application for systematic reviews. Once duplicates are removed, two reviewers will screen the titles and abstracts against predefined inclusion criteria. Information will be extracted from literature that meets the selection criteria using a purposefully developed charting form. The search strategy and results will be illustrated through a Preferred Reporting Items for Systematic Reviews and Meta-Analyses diagram. Key findings and their relationship to the research questions will be summarized in a chart and discussed in interpretive narrative form.

Keywords Dysphagia; Fiberoptic Endoscopic Evaluation of Swallowing and Videofluoroscopy; geriatric; nursing; residential


Introduction

Adults who are living in residential care facilities (RCFs) are likely to experience many health problems that increase their risk of developing oropharyngeal dysphagia (OD). Prevalence of OD among adults in RCFs has been reported to be between 40% and 68%. 1-3 Prevalence rates vary depending on the type of screening tool, care setting, medical diagnosis and country of investigation. 4-8 Furthermore, there is a lack of information on how OD is assessed in RCF cohorts, the frequency of instrumental swallowing assessment tool use, and barriers and facilitators associated with assessment procedures.

Oropharyngeal dysphagia

Oropharyngeal dysphagia is a real or perceived impairment in the safety and efficiency of formation and movement of food or liquids from the oral cavity to the esophagus. 9,10 Oropharyngeal dysphagia may occur due to one or a combination of different etiologies, including: neurological conditions (e.g.
stroke), structural anomalies (e.g. osteophytes), neurodegenerative diseases (e.g. dementia, Parkinson’s disease, motor neuron disease), head and neck cancer, and respiratory compromise (e.g. chronic obstructive pulmonary disease). These etiologies are become more prevalent with increasing age. Sarcopenia, described as age-related changes in head and neck anatomy, and neural and muscular physiology may also lead to reduced functional reserve in older age. One study found lifetime dysphagia prevalence of 38% in adults aged 65-94 years.11

Potential sequelae of OD include malnutrition, dehydration, aspiration (potentially resulting in aspiration pneumonia), increased hospital readmissions with pneumonia, institutionalization, choking and death.8,10 Mortality rates of up to 50% have been reported in adults in RCFs with known aspiration.12 Psychosocial consequences of OD include feelings of embarrassment,13 anxiety,14 fear of choking,13 reduced self-esteem,13 lowered mood or depression,14 reduced quality of life,14 social isolation15 and physical burden on caregivers.6 Oropharyngeal dysphagia also poses economic implications likely to increase with global aging. A US study identified that patients with dysphagia had, on average, a 40% increase in length of stay compared to patients without dysphagia, resulting in an additional USD $347 million per annum in associated healthcare costs.15,16

Assessment procedures for oropharyngeal dysphagia
It is generally accepted that accurate assessment is essential for appropriate dysphagia prognostication and management.17 However, current dysphagia management is heavily based on anecdotal evidence and expert opinion, with limited robust research evidence available that is applicable to the broad population of older people living in RCFs.10,18 To date, most studies of dysphagia screening, assessment and management have been focused on certain populations, such as people with neurogenic disorders19-22 (e.g. stroke) and head and neck cancer23,24 in acute, rehabilitation or outpatient settings.19-22 Little is known about the procedures in RCFs. One of the major ethical considerations for conducting a swallowing assessment is its potential to result in improved care. To be considered beneficial, swallowing assessments should be supported by access to appropriate dysphagia management. Historically, availability of dysphagia care in RCFs has been limited, in contrast to care in hospital settings.25 In some developed countries there is a trend towards consumer-directed dysphagia care25 and healthcare standard regulation in RCFs.26

Clinical swallowing examinations (CSEs) may be used to confirm suspected OD, provide data about the nature and severity of dysphagia,27 and determine when additional diagnostic information is required. Clinical swallowing examinations are utilized as the initial step in evaluation. The components of a CSE may include: i) medical and swallowing history, ii) oral hygiene evaluation, iii) structural oromotor and neurological assessment of cranial nerves (specifically five, seven, nine, 10 and 12), iv) cognitive-communication observations, and v) swallowing trials with selected food and fluid consistencies.10,27 Oral and pharyngeal stages of swallowing are observed, with special attention to behavioral signs and reported symptoms that suggest physiological impairments (e.g. multiple swallows per mouthful, reflexive cough, wet vocal quality, dyspnea or increased respiratory rate post-swallowing). Using clinical reasoning, the examiner evaluates and synthesizes relevant information from the CSE.28 In some cases, CSEs may provide a clear diagnostic picture. In other cases, CSEs reveal areas where further diagnostic information is required to guide dysphagia management.

Clinical swallowing examinations do not require specialized instrumentation and can be rapidly administered in a variety of settings. Problems associated with CSEs include limited specificity in determining swallowing physiology,29 variability in components evaluated by each examiner30-32 and expertise of individual examiners influencing the interpretation of the CSE.33 Given these issues, there has been increasing support and evidence for instrumental swallowing assessments to be utilized after CSEs, as a key feature of dysphagia management, especially when additional information is required about aspects of swallowing physiology.10 Instrumental assessment of swallowing has many benefits over CSE alone. It provides a means to identify the presence and degree of aspiration, the site and volume of pharyngeal residue, pharyngeal/laryngeal sensation, and the effectiveness of compensatory and rehabilitative strategies.10 These findings can be used to reduce aspiration risk and aspiration-related morbimortality.34 Instrumental assessment may also help to define the risks and advantages of
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oral intake, leading to more informed and patient-centered choices.

Videofluoroscopy swallowing study (VFSS) and fiberoptic endoscopic evaluation of swallowing (FEES) are the two most commonly used instrumental swallowing assessment techniques. While both tools rely on perceptual judgements by the assessing clinician, they are recognized as complementary best clinical standards with acceptable levels of inter- and intra-rater reliability. Both tools allow the clinician to triage different food textures, fluid viscosities, compensatory postures, swallowing maneuvers and methods of food/fluid presentation to investigate dysphagia presence, profile and the impact of intervention. They are useful in providing biofeedback and educating patients, their families and professionals.

Studies where VFSS and FEES were both utilized, suggest substantial agreement between the two techniques in the detection of laryngeal penetration (k = -0.68, p = .000), aspiration (k = -0.75, p = .000) and pharyngeal residue (k = -0.67, p = .000). However, authors report that swallows rated through FEES received more severe Penetration-Aspiration Scale scores and pharyngeal residue ratings, with pharyngeal residue identified in a greater number of locations compared to swallows rated using VFSS.

Videofluoroscopy is a radiological procedure during which passage of food and fluids coated with radio opaque barium is observed in lateral and anterior-posterior planes. It enables two-dimensional visualization of the oral, pharyngeal and upper esophageal phases of swallowing. Potential risks associated with VFSS relate to radiation exposure and the use of contrast material.

Fiberoptic endoscopic evaluation of swallowing involves passing a fiberoptic rhinolaryngoscope connected to a camera, light source and video-recording equipment transnasally, enabling direct visualization of bolus flow and the surface anatomy of structures involved in swallowing. Fiberoptic endoscopic evaluation of swallowing allows closer visualization of the laryngeal vestibule, vocal folds and the upper trachea than VFSS, so secretions and bolus residue in or around the upper airway can be examined, informing judgements on aspiration risk. During peak laryngeal excursion, there is a brief (0.5 second) period of “white out” during which the endoscope view is obstructed by soft tissue structures at the point of peak pharyngeal constriction. The presence of aspiration during “white out” is inferred by examining material expectorated from the airway and residue on the subglottic shelf or further inside the trachea after the swallow.

Fiberoptic endoscopic evaluation of swallowing has been used with a variety of clinical adult populations, including patients in intensive care, with neurological conditions, head and neck cancer, chronic obstructive pulmonary disease and muscular dystrophy.

Risks associated with FEES are minimal for adult hospital inpatients and outpatients from hospitals or otolaryngology clinics, but are affected by a variety of medical etiologies including progressive neurological conditions such as Alzheimer’s disease. Cumulative incidence of adverse events, including discomfort, epistaxis, gagging, vomiting and mucosal perforation is less than one percent according to the largest FEES risk study published, to the authors’ current knowledge. The risk of self-limiting epistaxis may increase to six percent in acute stroke patients receiving antithrombotic medications.

More than 50% of adults living in RCFs experience dementia, with approximately half of these adults exhibiting symptomatic agitation. Severe agitation and a lack of cooperation could prove potentially hazardous during FEES. These factors are recognized as contraindications that would form potential barriers to instrumental swallowing assessment in some adults with dementia.

Characteristics of FEES that may be valuable in the RCF setting include ease of usage; ability to assess secretion management without oral intake and before onset of severe OD; low cost compared to VFSS; the absence of radiation exposure, which permits multiple and longer assessments when tolerated by the patient; tool portability, creating potential to perform bedside examinations in patients who may not be able to be moved a different setting; and sensitivity in identifying bolus spillage, residue and secretions. These characteristics need to be explored in a RCF setting, to create an evidence-base that can guide clinical decision making in the assessment of OD.

What is not known in residential care facility populations?

With projections for accelerated growth in global aging and an increase in the acuity of adults in RCFs, OD may present significant health
concerns into the future. Within the field of geriatrics, there is a focus on minimizing avoidable hospital readmissions, providing quality care inhouse, reducing avoidable hospital transfers and optimizing quality of life.

Currently, there is a paucity of research that examines how swallowing is assessed in RCFs and inadequate data to guide clinical decision making relating to instrumental swallowing assessment use. Limited information is available throughout a variety of published and gray literature sources, including internet sites established by mobile FEES service providers in the US. In this context, a scoping review into the use of instrumental swallowing assessments, and specifically mobile FEES and VFS, in RCFs will reveal relevant sources of information, concepts, literature gaps, searching strategies and obstacles, while investigating the association between concepts, ideas and challenges in this field. A preliminary search of the JBI Database of Systematic Reviews and Implementation Reports, Cochrane Database of Systematic Reviews, CINAHL and PubMed databases on the September 5, 2018, did not reveal any existing scoping or systematic reviews on this topic.

The objective of this scoping review is to examine and map available evidence about the use of instrumental swallowing assessments, specifically FEES and VFS, in RCFs. The frequency of use, acceptability and tolerability associated with instruments, as well as barriers and facilitators associated with use will be explored. Gaps in the existing evidence-base will be identified. Conclusions will be derived about the overall state of research into the use of this instrumental swallowing assessment technique in residential care facilities. This information may help to guide facility managers and speech pathology service providers in developing evidence-based models of instrumental swallowing assessment for adults living in RCFs, and identifying adults who may benefit from these models. It may also provide a platform for future research into this field.

**Review questions**

The primary question of this scoping review is: How are FEES and VFS used to evaluate and manage swallowing for adults in RCFs?

Secondary questions that will also be used to further clarify this topic are:

- How are FEES and VFS currently utilized to support dysphagia management in adults in RCFs?
- What factors influence the provision of FEES and VFS in a RCF?
- What is the acceptability and tolerability of FEES and VFS in adults in RCFs?
- Are there differences between and within countries (e.g. across different states or facilities) in the way that FEES and VFS are accessed and utilized in RCFs?

**Inclusion criteria**

To maintain congruency between the title, objectives and questions, the following inclusion criteria for the scoping review will be applied.

**Participants**

Literature referring to adults who are aged 18 years and over will be considered. From 2016 to 2017, adults who are aged 85 years and over comprised 53% of people entering permanent RCFs in Australia and the majority of adults in RCFs in the US. Adults over the age of 80 years share an increased risk of specific comorbidities and geriatric syndromes that may impact their assessment and care provision. While less common, young adults with dysphagia may live in RCFs due to high care needs resulting from lifelong or acquired conditions (e.g. cerebral palsy, Huntington’s disease or a traumatic acquired brain injury) and the lack of more suitable accommodation. Therefore, this scoping review will consider all adults residing in RCFs.

**Concept**

In this review, the focus will be on FEES, one of the two most commonly utilized instrumental swallowing assessment tools. Fiberoptic endoscopic evaluation of swallowing is recognized as the best clinical standard, complementary to VFSS.

**Context**

A RCF is a place that offers 24-hour care, including nursing care, to adults who require assistance with medications, medical care or activities of daily living due to physical, cognitive or emotional challenges. Alternate names utilized in the literature and therefore included in this scoping review are: residential care, care facility, long term care, skilled nursing facility, nursing home, assisted living.
Types of sources
To capture the full breadth of published and unpublished evidence on instrumental swallowing assessment in RCFs, literature written in English from 2000 to present in textbooks, peer reviewed journals, gray literature, editorials and theses will be included. The period selected correlates with the publication of a comprehensive textbook about FEES, now widely referenced, the emergence and acceptance of FEES as an established instrumental swallowing assessment tool, and the gradual increase in the use of FEES in certain countries.

Methods
This scoping review will be performed and reported using JBI methodology for scoping reviews.

This protocol was developed to provide transparency on the review process and minimize reporting bias. The JBI methodology aligns itself with Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) and Enhancing the Quality and Transparency of Health Research (EQUATOR) principles to standardize the process for conducting and reporting scoping reviews.

Search strategy
A three-step, iterative search strategy will be employed, as advocated by the JBI scoping review methodology.

Step one will include an initial limited search of three online databases, specifically MEDLINE, CINAHL and Embase, using the search terms in Table 1. Search terms were derived from the concepts in the title of the scoping review and refined. The titles, abstracts and index terms of relevant, retrieved literature will be analyzed to create an inventory of search terms. A research librarian will be consulted during this process to ensure that the search terms have been refined appropriately.

Step two will involve a search across online databases, using the established inventory of search terms. An example search strategy for CINAHL is provided in Appendix I. This scoping review encompasses topics relevant to medicine (e.g. endoscopy, pneumonia), economics (e.g. cost of hospital readmissions) and allied health sciences (e.g. swallowing assessment). Therefore, a range of databases was selected to cover these fields.

Gray literature searching will also be conducted to avoid publication bias and because preliminary searches have suggested a paucity of published research data. Relevant material captured by the step two search will be identified.

Step three will include a search of reference lists of all papers included in the review for additional, relevant studies based on information contained in their titles and abstracts. The primary reviewer will contact the authors for further information, when necessary.

Information sources
The databases to be searched include: MEDLINE, CINAHL, Embase, Scopus and Cochrane Database of Systematic Reviews.
Gray literature sources will include: Google Scholar; Google (advanced search); position papers of national speech pathology professional bodies in countries where FEES is utilized; position papers of the European Society of Swallowing Disorders; book chapters in selected speech pathology textbooks (e.g. Endoscopic Evaluation and Treatment of Swallowing Disorders); websites of mobile FEES service providers; and dissertations published in English from Open Access Theses and Dissertations, DART – Europe e-Theses Portal, ProQuest Dissertations and Theses Global, and British Library Electronic Theses Online Service.

Study selection
All citations and articles retrieved during the searches will be imported into EndNote reference management software (Clarivate Analytics, PA, USA). The software will enable duplicate citations to be identified and removed. Relevant articles will then be imported into Rayyan (Qatar Computing Research Institute, Doha, Qatar), a web and mobile software application for systematic reviews, created to enhance data screening and collaboration between reviewers.

Two reviewers will screen the titles and abstracts of articles and other literature, retrieved in steps two and three of the search process against predefined inclusion criteria (Appendix II). Full texts will be retrieved and screened, when inclusion criteria are met or if there is ambiguity about the inclusion of a particular study in the review. If a discrepancy in judgment arises between the two reviewers and cannot be resolved through discussion, a third independent reviewer will examine the full text of the article and make the final decision.

Data extraction
A draft charting form has been developed to record key information extracted from the selected full text articles (Appendix III). This form will capture the following information: author(s); year of publication/completion for unpublished data; country of origin; source category; population/sample size; methodology; intervention type; outcomes; key findings and/or contentions about i) instrumental swallowing assessment in adults in RCFs, ii) VFSS in adults in RCFs, iii) FEES in adults in RCFs; current authors’ intention to contact the author(s) of the article.

Inter-rater reliability of the charting form will be optimized by randomly selecting 10% of articles for two independent researchers to review. Information extracted will be compared to ensure consistency and alignment with the objective/questions of this scoping review. As recommended in the JBI scoping review protocol, the charting table will then be modified to capture any additional information identified as relevant by the reviewers.71,72 The remaining articles will be reviewed and data will be extracted by the primary reviewer.

Data presentation
A PRISMA diagram will be used to graphically represent the flow of information through steps two and three of the search strategy, and through study selection.73 The diagram will depict records identified, included, excluded and the rationale for exclusion.

Key findings of data extracted and their relationship to the research questions will be summarized in a chart. A discussion and interpretation of these exploratory findings for advancing current understanding of instrumental swallowing assessment in adults in RCFs will be presented in narrative form.

Acknowledgments
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References


Appendix I: Example of tier two in the search strategy

**CINAHL database**  
Search conducted: September 9, 2018

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<th>Query</th>
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<tr>
<td>S1</td>
<td>TI dysphagia AND TI (residential care OR care facility OR skilled nursing facility OR long term care OR nursing home OR care home OR institution) AND SU deglutition disorders</td>
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<td>S2</td>
<td>TI (Videoendoscop OR instrument OR FEES OR FEESST OR fibreoptic endoscopic evaluation of swallowing OR fiberoptic endoscopic evaluation of swallowing OR videofluoro OR VFS OR VFSS) AND TI swallow AND AB (residential care OR care facility OR skilled nursing facility OR long term care OR nursing home OR care home OR institution)</td>
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<tr>
<td>S3</td>
<td>TI dysphagia AND TI practice pattern</td>
</tr>
<tr>
<td>S4</td>
<td>SI OR S2 OR S3</td>
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Limited to 2000-present; English language
## Appendix II: Inclusion criteria

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<th>Participants</th>
<th>Concept</th>
<th>Context</th>
<th>Sources</th>
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<td>Adults who are 18 years and over</td>
<td>Fiberoptic endoscopic evaluation of swallowing and Videofluoroscopy Swallowing Study</td>
<td>Residential care facility</td>
<td>Literature written in English from 2000 to present in: textbooks, peer reviewed journals, gray literature, editorials and theses.</td>
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### Appendix III: Data extraction tool

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<td>ii. VFSS swallowing assessment in adults in RCFs:</td>
<td></td>
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<tr>
<td>iii. FEES in adults in RCFs:</td>
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<tr>
<td>Author contact indicated (Y/N):</td>
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FEES: fiberoptic endoscopic evaluation of swallowing; RCF: residential care facility; VFSS: videofluoroscopy swallowing study.