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Clinical and Instrumental Swallowing Assessments for Dysphagia

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Rapid Review

Key Messages

What Is the Issue?

- Dysphagia, or swallowing impairment, is a common complication of many health conditions. To assess patients for dysphagia, speech-language pathologists may use instrumental swallowing assessments or clinical assessments.
- Instrumental swallowing assessments are more accurate and comprehensive, but they also require more time and resources.
- To help inform decisions about whether it is appropriate to increase use of clinical assessments and limit the use of instrumental swallowing assessments, it is important to understand current best practices as well as the comparative clinical utility and diagnostic accuracy.

What Did We Do?

- We searched for literature evaluating the clinical utility and diagnostic accuracy of instrumental swallowing assessments versus clinical assessments for patients with suspected dysphagia. We also searched for evidence-based guidelines that provide recommendations about the use of instrumental and clinical assessments for suspected dysphagia.
- An information specialist searched for peer-reviewed and grey literature sources published between January 1, 2019, and November 30, 2023.

What Did We Find?

- Four diagnostic test accuracy studies compared various clinical evaluations to instrumental swallowing exams. The tests ranged in their sensitivity, specificity, positive predictive values, and negative predictive values. Three of the 4 studies concluded that the clinical assessments they examined could be used to identify dysphagia. One of these 3 studies examined multiple clinical evaluations and noted the varying degrees of accuracy among the tests and indicated which of these is most accurate. The fourth study found that further evidence is needed to determine if a clinical feeding evaluation can predict aspiration. We did not find any studies directly evaluating the clinical utility of instrumental swallowing assessments versus clinical evaluation for patients with suspected dysphagia that met the inclusion criteria for this review.
- Six evidence-based guidelines made recommendations related to instrumental and clinical swallowing assessments for dysphagia. These recommendations generally indicated that instrumental assessments should be used when resources allow, or that they should take place in addition to clinical swallowing assessments.

Key Messages

What Does This Mean?

- Health care practitioners may wish to conduct an instrumental swallowing assessment, such as a fibreoptic endoscopic evaluation of swallowing or a videofluoroscopic swallowing study for patients for whom there are sufficient resources to do so.
- Clinical assessments for dysphagia have the potential to help clinicians diagnose patients with dysphagia without the use of instrumental swallowing assessments, particularly in settings with limited resources. However, this is not the case for all clinical assessments and needs to be determined on a case-by-case basis.

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Abbreviations

BWST	bedside water swallow test
CFE	clinical feeding evaluation
DTA	diagnostic test accuracy
FEES	fiberoptic endoscopic evaluation of swallowing
MBSS	modified barium swallow study
mMASA	modified Mann Assessment of Swallowing Ability
NFAS	neonatal feeding assessment scale
SCAS-PD	Swallowing Clinical Assessment Score in Parkinson's Disease
SLP	speech-language pathologist
VFSS	videofluoroscopic swallowing study

Context and Policy Issues

What Is Dysphagia?

Dysphagia, or difficulty swallowing, is a common complication of many conditions.[1] People who experience dysphagia have difficulty moving food or liquid, including saliva, from their mouth into their throat and esophagus.[1,2] Swallowing is a process that takes place in 3 phases: the oral preparatory phase, the pharyngeal phase, and the esophageal phase.[1,2] Dysphagia occurs when there is an issue with neural control or structural problems in any part of this swallowing process.[1,2] There are numerous factors that may cause this to happen, including, but not limited to, prolonged intubation, dementia, stroke, Parkinson disease, congenital conditions, head and neck cancer, and others.[1]

What Are Swallowing Assessments?

There are 2 primary methods that health care practitioners, particularly speech-language pathologists (SLPs), use to assess and help diagnose dysphagia: a clinical and/or bedside assessment or an instrumental assessment.[3]

Instrumental Swallowing Assessments

The most widely used instrumental assessment is a videofluoroscopic swallowing study (VFSS).[3] This may also be referred to as videofluoroscopy, or a modified barium swallow study (MBSS). A VFSS is a recorded X-ray exam of the swallowing process where the patient consumes foods or liquids in addition to barium to improve visibility.[2] The images from the recording can then help identify if and where in the swallowing process issues occur.[2] Another commonly used instrumental assessment for dysphagia is fibreoptic endoscopic evaluation of swallowing (FEES).[2] During a FEES procedure, the SLP inserts a lighted, flexible endoscope through the nose and into the mouth and throat.[2] This allows the SLP to examine the physical structures involved in swallowing as well as how a person's swallowing mechanism responds to different stimuli (e.g., food, liquids).[2]

Clinical Swallowing Assessments

A clinical or bedside swallowing assessment can be performed without any special equipment. To check for signs of dysphagia or aspiration during the assessment, the SLP will typically ask questions about the patient's symptoms and medical history and evaluate the structures involved in swallowing (e.g., teeth, lips, jaw, tongue, cheeks, and soft palate).[2,4] The SLP may also ask the patient to cough or clear their throat, and check reflexes such as gagging. Finally, the SLP may ask patients to swallow liquids and foods that vary in thickness and consistency, and note any issues around chewing, swallowing, and breathing, as well as listen to vocal quality for signs of aspiration.[2,4]

Why Is It Important to Do This Review?

Instrumental swallowing assessments for dysphagia such as VFSS and FEES are more accurate and comprehensive; however, they also require more financial, time, physical, and human resources. This is especially true for VFSS, which requires medical imaging staff, whereas FEES does not. VFSS also exposes individuals to radiation. As such, conducting clinical swallowing assessments instead of instrumental

swallowing assessments might be an option to help reduce a strain on resources. By conducting this review, we can explore the available evidence to determine how instrumental and clinical swallowing assessments compare to each other.

Objective

The purpose of this report is to summarize and critically appraise the evidence from medical databases and grey literature about the diagnostic accuracy and clinical utility of instrumental swallowing assessments versus clinical evaluation for people with suspected dysphagia. Comparing different types of instrumental assessments to each other was not in scope for this review. We also aimed to identify evidence-based guidelines about the use of instrumental and clinical assessments for suspected dysphagia.

Research Questions

1. What is the diagnostic accuracy of clinical evaluation versus instrumental swallowing assessments for patients with suspected dysphagia?
2. What is the clinical utility of clinical evaluation versus instrumental swallowing assessments for patients with suspected dysphagia?
3. What are the evidence-based guidelines regarding the use of clinical and instrumental assessments for suspected dysphagia?

Methods

Literature Search Methods

An information specialist conducted a literature search on key resources, including MEDLINE, Embase, the Cochrane Database of Systematic Reviews, the International HTA Database, and the websites of Canadian and major international health technology agencies, as well as a focused internet search. The search approach was customized to retrieve a limited set of results, balancing comprehensiveness with relevancy. The search strategy comprised both controlled vocabulary, such as the National Library of Medicine's MeSH (Medical Subject Headings), and keywords. Search concepts were developed based on the elements of the research questions and selection criteria. The main search concepts were instrumental swallowing assessments and dysphagia. CADTH-developed search filters were applied to limit retrieval to health technology assessments, systematic reviews, meta-analyses, indirect treatment comparisons, any types of clinical trials or observational studies, and guidelines. The search was completed on November 30, 2023, and limited to English-language documents published since January 1, 2019.

Selection Criteria and Methods

One reviewer screened citations and selected studies. In the first level of screening, titles and abstracts were reviewed and potentially relevant articles were retrieved and assessed for inclusion. The final selection of full-text articles was based on the inclusion criteria presented in Table 1.

Table 1: Selection Criteria

Criteria	Description
Population	Individuals with suspected dysphagia
Index test	Q1: Clinical or bedside evaluation
Reference standard	Q1: Instrumental swallowing assessment: VFSE, VFSS, or FEES
Intervention	Q2 and Q3: Instrumental swallowing assessment: VFSE, VFSS, or FEES
Comparator	Q2 and Q3: Clinical or bedside evaluation
Outcomes	Q1: Diagnostic test accuracy (e.g., sensitivity, specificity, positive predictive value, negative predictive value, false positives, false negatives) Q2: Clinical utility (e.g., time to "normal" or desired diet texture level, nutrition level, malnutrition rates, hospital length of stay, quality of life, safety [e.g., risk of aspiration pneumonia or choking, morbidity]) Q3: Recommendations regarding the use of assessments for swallowing (e.g., instrumental vs. clinical)
Study designs	Health technology assessments, systematic reviews, randomized controlled trials, nonrandomized studies, evidence-based guidelines

FEES = fibreoptic endoscopic evaluation of swallowing; VFSE = videofluoroscopic swallowing exam; vs. = versus; videofluoroscopic swallowing study.

Exclusion Criteria

We excluded articles if they did not meet the selection criteria outlined in Table 1, if they were duplicate publications, or if they were published before 2019. We also excluded guidelines with unclear methodologies.

Critical Appraisal of Individual Studies

One reviewer critically appraised the included publications using the following tools as a guide: the Quality Assessment of Diagnostic Accuracy Studies 2 (QUADAS-2) checklist[5] for diagnostic test accuracy (DTA) studies and the Appraisal of Guidelines for Research and Evaluation (AGREE) II instrument[6] for guidelines. We did not calculate summary scores for the included studies; rather, we described the strengths and limitations of each included publication narratively.

Summary of Evidence

Quantity of Research Available

This report includes 4 nonrandomized studies and 6 evidence-based guidelines. The study selection details are presented in Appendix 1. Additional references of potential interest are provided in Appendix 5.

Summary of Study Characteristics

The detailed characteristics of the included publications are provided in Appendix 2.

Included Studies for Question 1: DTA

We included 4 cross-sectional studies that examined the DTA of various clinical or bedside screening evaluations compared to instrumental assessments for dysphagia.[7-10] These studies were conducted in Turkey,[7] the US,[10] Brazil,[9] and South Africa.[8] The studies included a total of 233 individuals. Two of these studies included adults, 40 of whom had previously had an ischemic stroke[7] and 31 of whom had a diagnosis of Parkinson disease.[9] The other 2 studies[8,10] included neonates or infants, 1 of which was a retrospective chart review.

All of these studies used instrumental assessments as reference standards and did not include any instrumental assessments as index tests. One study examined multiple index tests,[7] including the bedside water swallow test (BWST), the modified Mann Assessment of Swallowing Ability (mMASA), saturation, and the National Institutes of Health Stroke Scale (NIHSS), all of which are clinical assessments. This study used FEES as the reference standard.[7] The index test for another study was the Swallowing Clinical Assessment Score in Parkinson Disease (SCAS-PD) and the reference standard used was the videofluoroscopic swallowing study (VFSS).[9] Both studies that examined dysphagia in neonates or infants used the MBSS as the reference standard.[8,10] One of these studies[10] used clinical feeding evaluation (CFE) as an index test and the other[8] used the neonatal feeding assessment scale (NFAS).

The outcomes relevant to this research question included sensitivity and specificity (4 studies)[7-10] and positive predictive value and negative predictive value (3 studies).[7,8,10]

Included Studies for Question 2: Clinical Utility

We did not identify any evidence about the clinical utility (e.g., reported health benefits, quality of life, or safety) of instrumental swallowing assessments versus clinical evaluation that met the inclusion criteria for this report.

Included Studies for Question 3: Evidence-Based Guidelines

We included 6 evidence-based guidelines with recommendations that were developed from systematic searches for relevant evidence. These guidelines were developed by groups in Korea,[11] the US,[12] Japan,[4] and Portugal.[13] Additionally, 2 guidelines were developed by multinational groups.[14,15] The target populations include individuals who have had a stroke and have suspected dysphagia (2 guidelines),[13,15] individuals with Parkinson disease (1 guideline),[14] individuals living with swallowing dysfunction (1 guideline),[12] and individuals who have a symptom or diagnosis of oropharyngeal dysphagia (1 guideline).[11] One guideline does not explicitly state the target population but we can infer based on the contents that it intends to target individuals with oropharyngeal dysphagia.[4] The intended users of these guidelines include various health care professionals (e.g., nurses, SLPs, physicians) involved in the treatment of patients with dysphagia.[4,11,13,15] Two guidelines do not specifically describe the intended users, though we can infer that the recommendations would be useful for health professionals who work with individuals who are suspected to have dysphagia.[12,14] All of the guidelines provide recommendations about the use of clinical evaluation and

instrumental assessments (including VFSS and FEES) for dysphagia.[4,11-15] All of the guidelines consider the effectiveness of assessment tools (clinical and instrumental) in diagnosing individuals with dysphagia when formulating recommendations relevant to this report.[4,11-15]

Summary of Critical Appraisal

Additional details regarding the strengths and limitations of the included publications are provided in Appendix 3.

DTA Studies

The population in all 4 DTA studies[7-10] on instrumental assessment versus clinical evaluation of dysphagia matched the population of interest in this report (i.e., individuals suspected of having dysphagia). Three studies[8-10] used appropriate methods for patient selection, while 1 study[7] did not clearly report a detailed account of patient sampling methods. In all 4 studies,[7-10] the choice of index tests and reference standards for dysphagia matched those targeted by this review. Additionally, all patients received the reference standard and all studies used reference standards likely to correctly classify dysphagia. The index test results were interpreted without the knowledge of the results of the reference standard in 2 studies,[7,9] which reduced the potential for bias due to prior knowledge when interpreting the index test results. It was unclear if this was the case in 2 other studies.[8,10] The reference standard results were interpreted without knowledge of the results of the index test in 2 studies.[7,8] It was unclear if this was the case in the other 2 studies.[9,10] In 3 studies, the index tests and reference standards were conducted within an appropriate time frame (i.e., within days of each other). One study conducted the index test and reference standard at the same time,[9] and 2 others conducted the index tests and reference standards within 7 days of each other.[8,10] The timing of these tests reduced the likelihood of misclassification due to the timing of the tests.[8-10] The fourth study did not report the timing of test administration.[7] There were missing results for both instrumental assessment and clinical evaluation for 3 individuals from the recruited population in 1 of the studies.[9] The reasons for this missing data were not presented and so it is unclear whether this could have introduced bias into the study. The authors of all 4 studies declared that they had no conflicts of interest;[7-10] however, the funding source was not clearly reported in 2 of the studies.[8,10] One of the studies appears to use the terms *screening* and *diagnosis* to refer to the same thing. This may lead to confusion around the intent of the assessments. However, based on the overall context of the rest of the study, it appears to be relevant to this review.

Evidence-Based Guidelines

All guidelines[4,11-15] state their scope and objective, and all guidelines except for Dhar et al.(2023)[12] specifically describe the health questions covered.[4,11,13-15] All guidelines except for Sugama et al.(2022)[4] describe the population to whom the guidelines are meant to apply;[11-15] however, based on the content of the guideline, we inferred that the target population is individuals with suspected or confirmed oropharyngeal dysphagia.

All guidelines included individuals from relevant professional groups during the guideline development process.[4,11-15] These professional groups included SLPs, nurses, specialist physicians (e.g., gastroenterologists, neurologists, geriatricians), and allied health professionals (e.g., occupational therapists). Three guidelines note that they do not include the views and preferences of the target

population.[13-15] Three other guidelines do not report whether they obtained this information.[4,11,12] As a result, it is unclear if the recommendations and information provided in the guidelines align with the experiences of individuals with lived experience. Four[4,11,13,15] of the guidelines clearly define their target users. Cosentino et al.(2021)[14] do not explicitly state their target users but refer to "individuals in the neurological health care practice" as a relevant population. Dhar et al. do not clearly define their target users.[12]

All guidelines used systematic methods to search for evidence, clearly describe the criteria for selecting evidence, and clearly describe the methods for formulating their recommendations.[4,11-15] This rigorous development helps improve the reproducibility of the guidelines. All the guidelines also considered the health benefits, side effects, and risks in formulation recommendations, and describe the strength and limitations of the body of evidence, often using existing critical appraisal tools such as Grading of Recommendations, Assessment, Development, and Evaluations (GRADE), Appraisal of Guidelines for Research and Evaluation II (AGREE II), A MeaSurement Tool to Assess systematic Reviews (AMSTAR 2), and Critical Appraisal Skills Programme (CASP) to evaluate the included literature.[4,11-15] Five of the guidelines[4,11,13-15] provide an explicit link between the recommendations and the supporting evidence. The guideline by Dhar et al. provides supporting evidence within the guideline; however, its presentation does not clearly connect the evidence to its corresponding recommendation.[12]

The guidelines published by Sugama et al. and Dziewas et al.(2021) were externally reviewed by experts before their publication.[4,15] The other 4 guidelines do not report whether their guidelines were externally reviewed.[11-14] Yang et al.(2023), Dziewas et al. and Oliveira et al.(2021) provide a time frame for which their guidelines will be updated (e.g., every 5 years, in the year 2024).[11,13,15] Cosentino et al., Sugama et al., and Dhar et al. do not provide a procedure for updating their guidelines.[4,12,14] The key recommendations in all guidelines are easily identifiable and include different options for assessing, diagnosing, managing, and treating dysphagia.[4,11-15]

Yang et al. note that they considered obstacles and facilitating factors when developing and grading their recommendations but do not elaborate on these considerations.[11] Sugama et al. include facilitating factors among their recommendations but do not discuss barriers.[4] Conversely, Dziewas et al. discuss potential barriers to application but not facilitators.[15] Oliveira et al. note that the specific context in which the guidelines are implemented will determine the facilitators and barriers to their implementation but do not provide examples or describe what the nature of the barriers and facilitators might be.[13] Cosentino et al. and Dhar et al. do not describe facilitators or barriers to guideline application.[12,14] Yang et al. note that they considered resources and costs when developing and grading their recommendations but do not provide further details on resource and cost considerations.[11] Sugama et al. include cost considerations in some, but not all, of their recommendations.[4] The other 4 guidelines do not discuss the potential resource implications of applying the guidelines.[12-15] None of the guidelines provide tools or advice on how to implement the recommendations, nor do they present monitoring or auditing criteria.[4,11-15]

Five guidelines declare potential conflicts of interest of the guideline development group members, none of which are relevant to the development of the guidelines.[4,11,13-15] Yang et al. explicitly state that the development of their guideline was not influenced by any funding group.[11] Both Oliveira et al. and Dziewas

et al. state that the authors did not receive financial support for the preparation of their guidelines.[13,15] Cosentino et al. and Sugama et al. both provide information about their respective funding sources but do not report whether these influenced the guideline development.[4,14] Dhar et al. do not provide information on conflicts of interest or funding sources.[12]

Summary of Findings

Appendix 4 presents the main study findings, detailed recommendations, and supporting evidence relevant to this report.

Diagnostic Accuracy of Instrumental Swallowing Assessments Versus Clinical Evaluation

We identified 4 cross-sectional studies[7-10] about the DTA of instrumental swallowing assessments versus clinical evaluation in individuals with suspected dysphagia. Three studies used VFSS or MBSS,[8-10] 2 terms used to refer to the same study, as a reference standard and 1 study used FEES,[7] all of which are relevant to this report.

BWST Versus FEES

In individuals who have previously had a stroke, when compared to FEES, BWST had:[7]

- moderate sensitivity to detect dysphagia (76.4%)
- moderate specificity to detect patients who do not have dysphagia (69.5%)
- moderate positive predictive value (65%)
- high negative predictive value (80%).

mMASA Versus FEES

In individuals who have previously had a stroke, when compared to FEES, mMASA had:[7]

- high sensitivity to detect dysphagia (88.2%)
- low specificity to detect patients who do not have dysphagia (43.5%)
- low positive predictive value (53.5%)
- high negative predictive value (83.3%).

Saturation Versus FEES

In individuals who have previously had a stroke, when compared to FEES, saturation had:[7]

- low sensitivity to detect dysphagia (41.1%)
- high specificity to detect patients who do not have dysphagia (86.9%)
- moderate positive predictive value (70%)
- moderate negative predictive value (66.6%).

BWST Plus mMASA Versus FEES

In individuals who have previously had a stroke, when compared to FEES, BWST plus mMASA had:[7]

- moderate sensitivity to detect dysphagia (76.4%)

- moderate specificity to detect patients who do not have dysphagia (73.9%)
- moderate positive predictive value (68.4%)
- high negative predictive value (80.9%).

Saturation Plus mMASA Versus FEES

In individuals who have previously had a stroke, when compared to FEES, saturation plus mMASA had:[7]

- low sensitivity to detect dysphagia (41.1%)
- high specificity to detect patients who do not have dysphagia (86.9%)
- moderate positive predictive value (70%)
- moderate negative predictive value (66.6%).

CFE Versus MBSS for Silent Aspiration

In infants, when compared to MBSS, CFE had:[10]

- high to very high sensitivity to detect silent aspiration (97.8%; 95% confidence interval [CI], 88.5% to 99.9%)
- very low specificity to detect patients who do not have silent aspiration (15.3%; 95% CI, 7.2% to 27.0%)
- low positive predictive value for silent aspiration (47.4%; 95% CI, 44.5% to 50.3%)
- moderate to high negative predictive value for silent aspiration (90.0%; 95% CI, 54.2% to 98.6%).

CFE Versus MBSS for Overt Aspiration

In infants, when compared to MBSS, CFE had:[10]

- moderate to high sensitivity to detect overt aspiration (100%; 95% CI, 66.4% to 100%)
- very low specificity to detect patients who do not have overt aspiration (15.3%; 95% CI, 7.2% to 27.0%)
- very low positive predictive value for overt aspiration (15.3%; 95% CI, 13.9% to 16.7%)
- very high negative predictive value for overt aspiration (100%).

SCAS-PD Versus VFSS

In individuals with Parkinson disease, when compared to VFSS, SCAS-PD[9] had:

- very high sensitivity to detect dysphagia (100%)
- high specificity to detect patients who do not have dysphagia (87.5%).

NFAS Versus MBSS

In neonates, when compared to MBSs, NFAS[8] had:

- moderate sensitivity to detect dysphagia (78.6%)
- high specificity to detect patients who do not have dysphagia (88.2%)
- moderate positive predictive value (78.6%)
- high negative predictive value (88.2%).

Guidelines Regarding the Use of Instrumental Swallowing Assessments and Clinical Evaluation

- When addressing whether VFSS is more effective than clinical evaluation in diagnosing oropharyngeal dysphagia, Yang et al.[11] recommend VFSS for the diagnosis of dysphagia.
- Dhar et al.[12] recommend that the type of instrumental assessment used be determined by the clinical scenario and that VFSS is appropriate to use in patients who have an inconclusive or incongruent swallow exam.
- Cosentino et al.[14] recommend that patients with Parkinson disease undergo a clinical swallowing assessment, which should be followed by an instrumental assessment when the clinical evaluation suggests the presence of dysphagia. They also recommend FEES or VFSS as a first-line diagnostic tool when available.
- Sugama et al.[4] recommend that patients 18 and older undergo a clinical swallowing assessment using physical techniques, but note that based on this assessment, subsequent diagnostic tests, including instrumental assessments such as VFSS and FEES, are necessary for the implementation of appropriate care.
- Dziewas et al.[15] recommend that all patients who have had a stroke undergo a dysphagia assessment as soon as possible. They note that VFSS or FEES should also be available in addition to the clinical swallow examination, and give preference to FEES.
- Oliviera et al.[13] recommend that patients undergo a clinical assessment for dysphagia, but that preference be given to instrumental assessments if resources allow.

Limitations

We did not find any evidence on the clinical utility of instrumental swallowing assessments versus clinical evaluation for patients with suspected dysphagia; therefore, we cannot form conclusions on this research question.

All the DTA studies[7-10] examined a different type of clinical swallowing assessment. They also used different reference standards.[7-10] As such, we are unable to examine how test accuracy compares across different studies and if there is consistency between studies. Additionally, the DTA studies were conducted in a range of populations. Two of these studies[7,9] focused on patients with specific conditions associated with dysphagia (i.e., Parkinson disease and stroke). Consequently, the results of each of these studies are only applicable to people who also have these respective conditions and cannot necessarily apply to other populations (e.g., older adults who have not had a stroke). As well, because only 1 of the DTA studies[10] reported 95% CIs, we cannot determine the precision of the reported sensitivities, specificities, negative predictive values, or positive predictive values.

In terms of the evidence-based guidelines, only 1 recommendation[11] specifically recommends the use of instrumental assessments over clinical evaluations. While some of the guidelines do indicate that preference should be given to instrumental assessments when resources are available, most of the other

recommendations discuss using the tests in combination or in sequence. Additional details or guidance about which contexts and populations would best benefit from the use of instrumental assessments or clinical evaluations would be useful. Similar to the DTA studies, the target population of the included guidelines varies, with some specifically intended for people with Parkinson disease, others intended for people who have had a stroke, and others for a more general population. As a result, the recommendations in some of the guidelines may not necessarily apply to all patient groups. Furthermore, several of the included recommendations are based on low-quality to moderate-quality evidence, which may limit their applicability. Four of the included guidelines also do not report on whether they underwent external review before publication, which may affect the suitability of the guidelines for their intended purpose.

Finally, none of the included DTA studies or evidence-based guidelines were conducted or developed in Canada, which may limit the generalizability of the findings of this report to the Canadian health care context.

Conclusions and Implications for Decision- or Policy-Making

This report includes 4 cross-sectional studies[7-10] about the DTA of instrumental swallowing assessments versus clinical evaluation for individuals with suspected dysphagia. It also includes 6 evidence-based guidelines[4,11-15] about instrumental and clinical evaluation for suspected dysphagia. Based on the literature search conducted for this review, we did not identify any evidence about clinical utility that met our inclusion criteria. As such, we cannot make conclusions about health benefits, quality of life, or safety outcomes related to instrumental or clinical assessments for dysphagia.

The DTA studies examined a range of index tests that varied considerably in their sensitivities and specificities.[7-10] Across all the index tests studied, sensitivities ranged from low to very high (41.1% to 100%) and specificities ranged from very low to high (15.3% to 88.2%). The authors of 3 of the DTA studies[7-9] concluded that the clinical evaluations they examined could feasibly be used to diagnose dysphagia when resources are limited. One of these studies investigated multiple index tests and while they stated that, generally, the tests they examined may be useful, they did note that 1 of tests (BWST plus mMASA) yielded the best results. The fourth DTA study[10] determined that more research was required for the index tests they examined (i.e., CFE). However, these findings may not be generalizable to all individuals with dysphagia because the studies used relatively small sample sizes and specific populations, including neonates and infants, people with Parkinson disease, and people who had experienced stroke.

Overall, the evidence-based guidelines were rigorous and clear in their methodologies and reporting. The relevant recommendations were based on evidence that ranged from low to high quality; however, most fell into the low and moderate categories. Based on the recommendations, instrumental swallowing assessments such as VFSS and FEES appear to be the first choice for dysphagia assessment. While clinical evaluation was recommended, it was often done so in association with instrumental swallowing assessments (e.g., clinical evaluation should be followed by instrumental assessment).

Based on the findings of both the DTA studies and evidence-based guidelines, it appears that while clinical evaluation may not be a perfect replacement for instrumental swallowing assessments, they may be

effective standalone tools for diagnosing dysphagia in settings where resources are limited. However, this is dependent on the population involved and the type of clinical evaluation used. Additional high-quality DTA studies that examine the same types of clinical feeding evaluations would help strengthen the evidence about whether they can be used as standalone assessments when the resources for instrumental swallowing assessments are not available. Furthermore, high-quality studies about the clinical utility of instrumental swallowing assessments versus clinical evaluation are needed to inform us about if and how these 2 approaches may differentially affect the health benefits, safety, and quality of life in individuals with suspected dysphagia. Finally, because some of the included guidelines recommend following clinical assessments with instrumental assessments, future research examining the potential benefits, harms, and costs of a sequential approach to dysphagia assessment may be useful.

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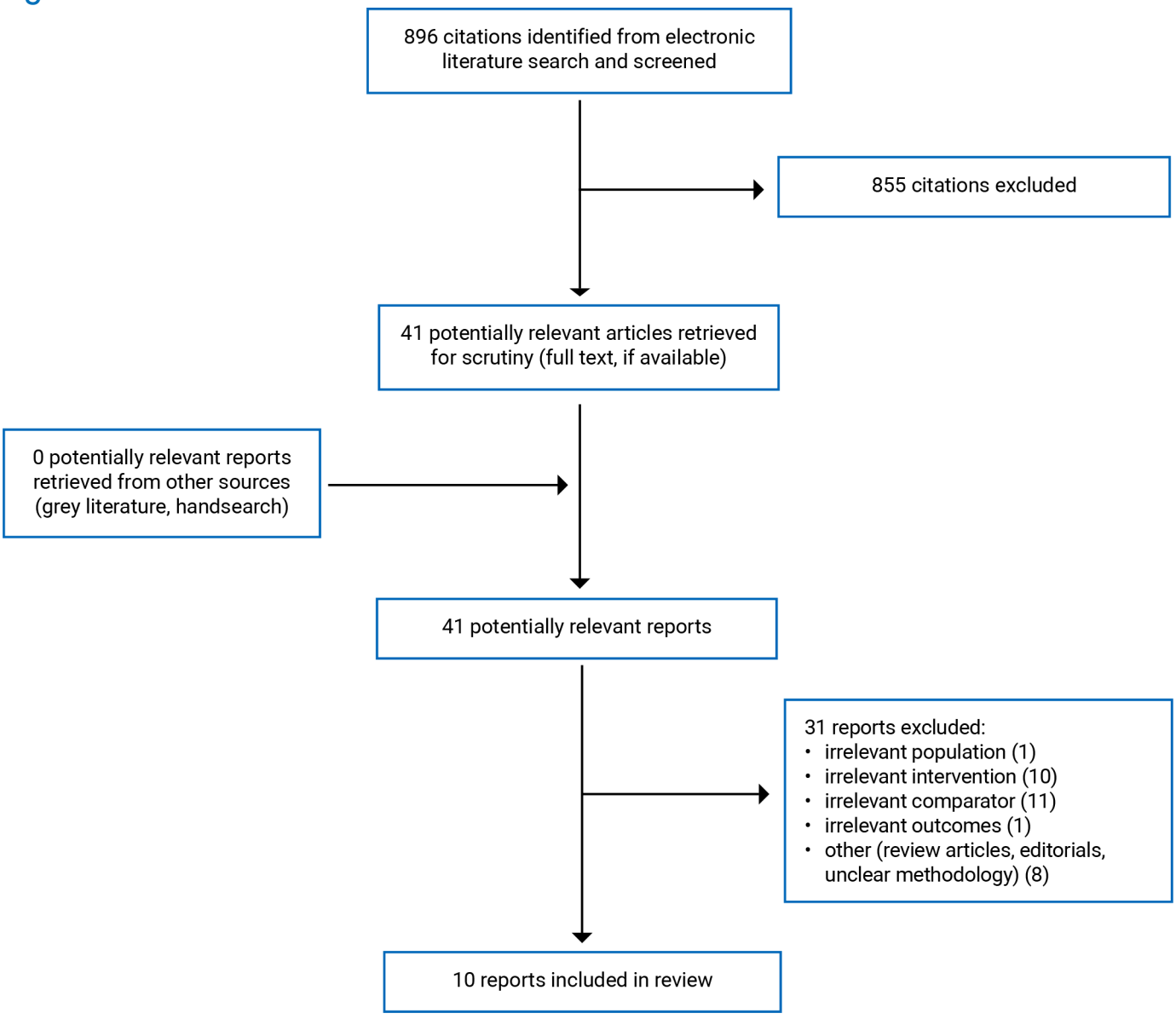
14. Cosentino G, Todisco M, Giudice C, Tassorelli C, Alfonsi E. Assessment and treatment of neurogenic dysphagia in stroke and Parkinson's disease. *Curr Opin Neurol.* 2022;35(6):741-752. PubMed
15. Dziewas R, Michou E, Trapl-Grundschober M, et al. European Stroke Organisation and European Society for Swallowing Disorders guideline for the diagnosis and treatment of post-stroke dysphagia. *Eur Stroke J.* 2021;6(3):LXXXIX-CXV. PubMed
16. Hashimoto R. [Minds guide for developing clinical practice guidelines ver. 2.0 by Japan Council for Quality Health Care -Practice of EBM-]. *Seishin Shinkeigaku Zasshi.* 2017;119(3):158-165. PubMed

Appendix 1: Selection of Included Studies

Figure 1: Selection of Included Studies



Appendix 2: Characteristics of Included Publications

Table 2: Characteristics of Included Primary Clinical Studies

Study citation, country, funding source	Study design, target condition(s)	Population characteristics	Intervention and comparator(s)	Outcomes of Interest
Yucel et al. (2022)[7] Turkey **Funding source:** no funding received from agencies in the public, commercial, or not-for-profit sectors.	Participants admitted to a tertiary hospital from July to October 2021 for first-time acute ischemic stroke were recruited.	40 people who previously had a stroke and complained of dysphagia within 3 days following hospital stay. Sex: • Male: 67.5% • Female: 32.5% Mean age: 68.72 years Stroke severity: • Minor: 42.5% • Moderate: 55% • Moderate to severe: 2.5%	**Index test(s):** BWST, mMASA, Saturation, NIHSS **Reference Standard:** FEES	Sensitivity, specificity, positive predictive value, negative predictive value
Balest et al. (2021)[10] US **Funding source:** NR	Retrospective study The charts of patients who had a CFE and MBS testing between January 1, 2012 and December 31, 2014 were included The CFE was conduced no more than 7 days before the MBS.	114 infants < 51 weeks post-menstrual age who have not yet fully developed a laryngeal cough reflex	**Index test(s):** CFE **Reference Standard:** MBSS	Sensitivity, specificity, positive predictive value, negative predictive value
Branco et al. (2019)[9] Brazil **Funding source:** Coordenação de Aperfeiçoamento de Pessoal de Nıvel Superior(CAPES) provided financial support to one graduate student and post-doc student involved in the work.	Cross-sectional study Participants who had a Parkinson Disease diagnosis and were treated at a neurology clinic in one hospital in Brazil were included. SCAS-PD was applied at the same time as VFSS.	31 people with a Parkinson Disease diagnosis Sex: • Male: 45.2% • Female: 54.8% Mean age: 68.8 years	**Index test(s):** SCAS-PD **Reference Standard:** VFSS	Sensitivity, specificity

Study citation, country, funding source	Study design, target condition(s)	Population characteristics	Intervention and comparator(s)	Outcomes of Interest
Viviers et al. (2019)[8] South Africa **Funding source:** NR	Cross-sectional study Participants were purposively sampled from a NICU at a tertiary academic hospital. A parental interview was completed, followed by the NFAS. The MBSS was completed within 7 days (mean: 2.25 days) of the NFAS.	48 neonates who had feeding difficulties. Gestational age (weeks), mean: 35.58. Birth weight (grams), mean: 2118 g.	**Index test(s):** NFAS **Reference Standard:** MBSS	Sensitivity, specificity, positive predictive value, negative predictive value

BWST = bedside water swallow test; CFE = clinical feeding evaluation; FEES = fibreoptic endoscopic evaluation of swallowing; MBSS = modified barium swallow study; mMASA = modified Mann Assessment of Swallowing Ability; NFAS = neonatal feeding assessment scale; NIHSS = National Institutes of Health stroke scale; NR = not reported; SCAS-PD = swallowing clinical assessment score in Parkinson disease; VFSS = videofluoroscopic swallowing study.

Note: This appendix has not been copy-edited.

Table 3: Characteristics of Included Guidelines

Intended users, target population	Intervention and practice considered	Major outcomes considered	Evidence collection, selection, and synthesis	Evidence quality assessment	Recommendations development and evaluation	Guideline validation
Yang (2023)[11]						
Intended users: Physicians and other health care professionals who diagnose and treat patients with symptoms of dysphagia. **Target population:** Adult patients with symptoms or diagnosis of oropharyngeal dysphagia	A range of interventions related to the assessment, treatment, and nutritional management for oropharyngeal dysphagia. **Relevant interventions:** VFSS and clinical evaluation for the diagnosis of oropharyngeal dysphagia	Effectiveness of diagnosing oropharyngeal dysphagia using VFSS compared to clinical evaluation	Authors carried out a systematic search of the literature and included SRs, RCTs, NRS.	Authors assessed the evidence quality using the GRADE approach where the quality of evidence was classified as high, moderate, low, or very low. The strength of recommendation was based on a modified GRADE methodology and classified recommendations as strong, conditional, against, inconclusive, or expert consensus	Members of the guideline development committee and advisory committee drafted the recommendations, which they discussed and revised through email and meetings with content experts. Members voted on each statement, grading their consensus from 1 to 9. Statements were accepted if at least 75% of the committee members agreed to the final version of recommendations.	NR.
Dhar (2023)[12]						
Intended users: NR. **Target population:** Patients living with swallowing dysfunction	A range of interventions related patient selection, study choice, radiation safety, team members and training, VFSS technique and interpretation, and esophagram technique and interpretation. **Relevant interventions:**	Appropriateness of study selection (VFSS, clinical swallow exam)	A search strategist carried out a systematic search of the literature and included all study designs except for case reports. Authors also reviewed the reference lists of included studies to	Authors assessed the evidence using a modified GRADE and Oxford Centre for Evidence-Based Medicine Levels of Evidence approach. They categorized the quality of evidence as follows:	Members of the guideline development group used a modified Delphi protocol to create consensus statements. The statements underwent 2 rounds of feedback and were ranked on a 9-point Likert scale. Consensus was	NR.

Intended users, target population	Intervention and practice considered	Major outcomes considered	Evidence collection, selection, and synthesis	Evidence quality assessment	Recommendations development and evaluation	Guideline validation
	VFSS and clinical swallow exam		find additional relevant articles.	• A – High • B – Moderate • C – Low • D – Very Low	defined as a mean score of 7.0 or higher and no more than 1 outlier.	
Cosentino (2022)[14]						
Intended users: Individuals in the neurologic health care practice **Target population:** Patients with Parkinson disease	A range of interventions related to screening, diagnosis, prognosis, and treatment of dysphagia. **Relevant interventions:** Clinical swallowing examination, VFSS, FEES	Effectiveness of clinical swallowing examination, VFSS, and FEES in accurately diagnosing oropharyngeal dysphagia	The technical committee conducted a systematic review of the literature and included studies of any design. They included studies that reported original data about screening, diagnosis, prognosis and quality of life.	Authors graded the evidence according to its risk of bias, ranging from Class I (highest quality) to Class IV (lowest quality) and were defined as follows: • Class I: low risk of bias • Class II: moderate risk of bias • Class III: moderately high risk of bias • Class IV: very high risk of bias Risk of bias was judged by assessing study design, patient spectrum, data collection, and masking for each clinical topic (screening, diagnosis, prognosis, treatment)	Members of the guideline development group used a modified Delphi method to develop the recommendations. The process consisted of 4 rounds in which the experts analyzed and provided feedback to consensus statements. Each round, a minimum of 80% agreement for each statement was required for inclusion in the final consensus statement.	NR.

Intended users, target population	Intervention and practice considered	Major outcomes considered	Evidence collection, selection, and synthesis	Evidence quality assessment	Recommendations development and evaluation	Guideline validation
Sugama (2022)[4]						
Intended users: Nurses and other health care professional who provide management of oropharyngeal dysphagia. **Target population:** NR – inferred from contents that it applies to individuals who have or are suspected of having oropharyngeal dysphagia.	A range of interventions related to screening, diagnosis, prognosis, and treatment of oropharyngeal dysphagia. **Relevant interventions:** Systematic assessment using physical assessment techniques (interview, visual examination, auscultation, palpation)	Effectiveness of assessment in detecting aspiration.	Team members were appointed to conduct a systematic review for each clinical question. Eligible study designs included RCTs, NRSs, SRs, and existing guidelines. The team members conducted qualitative synthesis for all clinical questions and meta-analysis for 3 of the clinical questions.	Guideline development members graded the certainty of evidence as strong (A), moderate (B), weak (C), or very weak (D). They categorized the strength of recommendation as: "1": Strongly recommend "2": Weakly recommend (suggested) "None": no clear recommendation can be made	The guideline development was based on the Minds Manual for Guideline Development 2017.[16] The recommendation panel, which consisted of experts from relevant fields, met over the course of 6 months to formulate decision. Decisions on the draft recommendations were made by a two-thirds majority vote of the panel members. The meeting members decided on the recommendations based on factors including the strength of evidence, the balance of benefits and harms, patient values and preferences, burden, and costs and resources.	The first draft of the clinical practice guideline received public feedback and external evaluation by experts in academic organizations, geriatrics, rehabilitation, home health care, and clinical practice guideline development. The guideline development group revised the content based on the feedback received before finalizing the paper.
Dziewas (2021)[15]						
Intended users: Physicians, speech-language therapists, stroke nurses, and other members of a	A range of interventions related to screening, diagnosis, prognosis, and treatment of post-stroke dysphagia. **Relevant intervention:**	Effectiveness of dysphagia assessment	The group collected evidence using a systematic search. Eligible study designs included SRs, RCTs, and NRSs. They also	Authors assessed evidence quality using the GRADE approach where the quality of evidence was classified as high, moderate, low,	The guidelines were developed based on the European Stroke Organization's standard operating procedure. The guideline was reviewed	Five external reviewers, the European Stroke Organization's Guidelines board, and the European Stroke Organization's

Intended users, target population	Intervention and practice considered	Major outcomes considered	Evidence collection, selection, and synthesis	Evidence quality assessment	Recommendations development and evaluation	Guideline validation
multidisciplinary team **Target population:** patients with post-stroke dysphagia	clinical swallow examination, VFSS, FEES		searched reference lists of review articles and clinical trials to identify additional literature. The group conducted a meta-analysis on eligible studies.	or very low. Authors defined 4 categories for the strength of recommendation, including: • Strong for an intervention • Weak for an intervention • Weak against and intervention • Strong for an intervention	numerous times by the development group and modified until they reached a consensus.	Executive Committee reviewed and approved the guideline document.
Oliviera (2021)[13]						
Intended Users: Health professionals **Target Population:** Patients who have had a stroke and dysphagia	A range of interventions related to screening, diagnosis, prognosis, and treatment of post-stroke dysphagia. **Relevant intervention:** clinical evaluation for dysphagia, instrumental assessment	Appropriateness of clinical evaluation and instrumental assessment is assessing dysphagia.	Authors conducted a systematic review or the literature. They included clinical guidelines, SRs, MAs, and experimental, quasi-experimental, and observational studies. They also conducted a manual search of relevant professional and scientific societies that issue clinical guidelines.	Authors assessed evidence quality using AGREE II for clinical guidelines, AMSTAR 2 for SRs, and CASP for primary studies. Authors defined 5 categories for the level of evidence, including: • **Level A:** high quality evidence from more than 1 RCT, MA of high-quality RCTs, or one or more RCTs corroborated by high-quality registry studies.	The guideline development group used a Delphi method consisting of 3 rounds to develop recommendations. The recommendation draft was appraised by a panel of experts (nutritionists, physiatrists, SLPs, and rehabilitation nurses.) A minimum of 80% consensus was established for the final 21 recommendations.	NR.

Intended users, target population	Intervention and practice considered	Major outcomes considered	Evidence collection, selection, and synthesis	Evidence quality assessment	Recommendations development and evaluation	Guideline validation
				• **Level B-R:** moderate quality evidence from 1 or more RCTs or MA of moderate quality RCTs • **Level B-NR:** moderate quality evidence from 1 or more NRS or MA of NRSs • **Level C-LD:** randomized or nonrandomized observational studies with limitations of design • **Level C-EO:** consensus of expert opinion based on clinical experience Authors also categorized the class of recommendation into: • I: strong • IIa: moderate • IIb: weak • III: not recommended		

AGREE II = Appraisal of Guidelines for Research and Evaluation II; AMSTAR 2 = A MeaSurement Tool to Assess systematic Reviews; CASP = Critical Appraisal Skills Programme; FEES = fibreoptic endoscopic evaluation of swallowing; GRADE = Grading of Recommendations, Assessment, Development, and Evaluations; MA = meta-analysis; NR = not reported; NRS = nonrandomized study; RCT = randomized controlled trial; SLP = speech-language pathologist; SR = systematic review; VFSS = videofluoroscopic swallowing study.

Note: This appendix has not been copy-edited.

Appendix 3: Critical Appraisal of Included Publications

Note that this appendix has not been copy-edited.

Table 4: Strengths and Limitations of Diagnostic Test Accuracy Studies Using the QUADAS-2 Checklist[5]

Strengths	Limitations
Yucel (2022)[7]	
The study population, index test, and reference standard match those targeted by the review. The index test results were interpreted without the knowledge of the results of the reference standard. The reference standard results were interpreted without knowledge of the results of the index test. The index test and reference standard were conducted at the same time. The authors used a reference standard (FEES) likely to correctly classify dysphagia. All patients received the same reference standard. All patients were included in the analysis. Authors declared that they had no potential conflicts of interest.	Limited description of sampling strategy. Did not present detailed patient characteristics. The timing of administration of the index and reference tests was not clearly reported. Authors include limited description of saturation as an index test. Authors seem to use screening and diagnosis interchangeably in this study. However, based on the context, it appears to meet the criteria for this review.
Balest (2021)[10]	
Patient charts were enrolled consecutively. The study population, index test, and reference standard match those targeted by the review. Authors provided a comprehensive list of patient comorbidities. The authors used a reference standard (MBSS) likely to correctly classify dysphagia. All patients received the same reference standard. The index test and reference standard were conducted within an appropriate time frame (< 7 days). Authors declared that they had no conflicts of interest and no financial relationships relevant to the study.	Because this study used retrospective data from patient charts, it is not clear whether the index test results were interpreted without knowledge of the results of the reference standard, or whether the results of the reference standard were interpreted without the knowledge of the results of the index test. The funding source for this study was not clearly reported.
Branco (2019)[9]	
Followed the Standards for Reporting of Diagnostic Accuracy Studies (STARD), which provides guidance on population and sampling. The study population, index test, and reference standard match those targeted by the review. The index test results were interpreted without the knowledge of the results of the reference standard. The index test scoring system was developed before conducting the assessment. The methods for administering the index test were well described.	It is unclear if the reference standard results were interpreted without knowledge of the results of the index test. Results of dysphagia assessment are not reported for 3 patients and reasons are not provided.

Strengths	Limitations
The reference standard used is considered the gold standard (VFSS) All patients received the same reference standard. The index test and reference standard were conducted at the same time. Authors declared that they had not conflicts of interest.	
Viviers (2019)[8]	
Low risk that the selection of patients would have introduced bias. The study population, index test, and reference standard match those targeted by the review. A guideline for the administration and scoring of the index test before any tests taking place. The reference standard results were interpreted without knowledge of the results of the index test. The authors used a reference standard (MBSS) likely to correctly classify dysphagia. All patients received the same reference standard. The index test and reference standard were conducted within an appropriate time frame (< 7 days, with an average of 2.25 days). Authors declared that they had no conflicts of interest.	Patient exclusion criteria were not stated. Patient characteristics were limited age, weight, and days in the NICU. It was not clear if the index test results were interpreted without knowledge of the results of the reference standard. The funding source for this study was not clearly reported.

FEES = fibreoptic endoscopic evaluation of swallowing; MBSS = modified barium swallow study; NICU = neonatal intensive care unit; QUADAS-2 = Quality Assessment of Diagnostic Accuracy Studies 2; VFSS = videofluoroscopic swallowing study.

Table 5: Strengths and Limitations of Guidelines Using AGREE II[6]

Item	Yang (2023)[11]	Dhar (2023)[12]	Cosentino (2022)[14]	Sugama (2022)[4]	Dziewas (2021)[15]	Oliviera (2021)[13]
Domain 1: scope and purpose						
1. The overall objective(s) of the guideline is (are) specifically described.	Yes	Yes	Yes	Yes	Yes	Yes
2. The health question(s) covered by the guideline is (are) specifically described.	Yes	No	Yes	Yes	Yes	Yes
3. The population (patients, public, etc.) to whom the guideline is meant to apply is specifically described.	Yes	Yes	Yes	Inferred based on contents of guideline	Yes	Yes
Domain 2: stakeholder involvement						
4. The guideline development group includes individuals from all relevant professional groups.	Yes	Yes	Yes	Yes	Yes	Yes
5. The views and preferences of the target population (patients, public, etc.) have been sought.	NR	NR	No	NR	No	No
6. The target users of the guideline are clearly defined.	Yes	No	Inferred based on contents of guideline	Yes	Yes	Yes
Domain 3: rigour of development						
7. Systematic methods were used to search for evidence.	Yes	Yes	Yes	Yes	Yes	Yes
8. The criteria for selecting the evidence are clearly described.	Yes	Yes	Yes	Yes	Yes	Yes

Item	Yang (2023)[11]	Dhar (2023)[12]	Cosentino (2022)[14]	Sugama (2022)[4]	Dziewas (2021)[15]	Oliviera (2021)[13]
9. The strengths and limitations of the body of evidence are clearly described.	Yes	Yes	Yes	Yes	Yes	Yes
10. The methods for formulating the recommendations are clearly described.	Yes	Yes	Yes	Yes	Yes	Yes
11. The health benefits, side effects, and risks have been considered in formulating the recommendations.	Yes	Yes	Yes	Yes	Yes	Yes
12. There is an explicit link between the recommendations and the supporting evidence.	Yes	Partially (general evidence is provided but its link to recommendations is not clearly stated)	Yes	Yes	Yes	Yes
13. The guideline has been externally reviewed by experts before its publication.	Unclear	NR	NR	Yes	Yes	Unclear
14. A procedure for updating the guideline is provided.	Yes	No	No	No	Yes	Yes
Domain 4: clarity of presentation						
15. The recommendations are specific and unambiguous.	Yes	Yes	Yes	Yes	Yes	Yes
16. The different options for management of the condition or health issue are clearly presented.	Yes	Yes	Yes	Yes	Yes	Yes
17. Key recommendations are easily identifiable.	Yes	Yes	Yes	Yes	Yes	Yes

Item	Yang (2023)[11]	Dhar (2023)[12]	Cosentino (2022)[14]	Sugama (2022)[4]	Dziewas (2021)[15]	Oliviera (2021)[13]
Domain 5: applicability						
18. The guideline describes facilitators and barriers to its application.	Partially (mentions that it was considered but does not elaborate)	No	No	Partially (describes facilitators but not barriers)	Partially (describes barriers but not facilitators)	Partially (notes that context will influence application but does not elaborate)
19. The guideline provides advice and/or tools on how the recommendations can be put into practice.	No	No	No	No	No	No
20. The potential resource implications of applying the recommendations have been considered.	Partially (mentions that it was considered but does not elaborate)	No	No	Partially (discussed in some recommendations but not all)	No	No
21. The guideline presents monitoring and/or auditing criteria.	No	No	No	No	No	No
Domain 6: editorial independence						
22. The views of the funding body have not influenced the content of the guideline.	Yes	NR	Unclear	Unclear	Yes	Yes
23. Competing interests of guideline development group members have been recorded and addressed.	Yes	NR	Yes	Yes	Yes	Yes

AGREE II = Appraisal of Guidelines for Research and Evaluation II; NR = not reported.

Appendix 4: Main Study Findings

Note that this appendix has not been copy-edited.

Table 6: Summary of Findings by Outcome — DTA of Clinical or Bedside Swallow Examination

Study Citation	Index test	Reference Standard	Number of patients	Number with Dysphagia (%)	Sensitivity, %	Specificity, %	PPV, %	NPV, %
Yucel et al. (2022)[7]	BWST	FEES	40	17 (42.5%)	76.4	69.5	65	80
	mMASA				88.2	43.5	53.5	83.3
	Saturation				41.1	86.9	70	66.6
	BWST + mMASA				76.4	73.9	68.4	80.9
	Saturation + mMASA				41.1	86.9	70	66.6
Balest et al. (2021)[10]	CFE	MBSS	114	55 (48%)	**Silent:** 97.8 (95% CI, 88.5 to 99.9) **Overt:** 100 (95% CI, 66.4 to 100)	**Silent:** 15.3 (95% CI, 7.2 to 27.0) **Overt:** 15.3 (95% CI, 7.2 to 27.0)	**Silent:** 47.4 (95% CI, 44.5 to 50.3) **Overt:** 15.3 (95% CI, 13.9 to 16.7)	**Silent:** 90.0 (95% CI, 54.2 to 98.6) **Overt:** 100
Branco et al. (2019)[9]	SCAS-PD	VFSS	31 (28 for whom results were reported)	14 (50%)	100	87.5	NR	NR
Viviers et al. (2019)[8]	NFAS	MBSS	48	14 (29.2%)	78.6	88.2	78.6	88.2

BWST = bedside water swallow test; CFE = clinical feeding evaluation; FEES = fibreoptic endoscopic evaluation of swallowing; MBSS = modified barium swallow study; mMASA = modified Mann Assessment of Swallowing Ability; NFAS = neonatal feeding assessment scale; NR = not reported; SCAS-PD: swallowing clinical assessment score in Parkinson disease; VFSS = videofluoroscopic swallowing study

Note: "Silent" refers to silent aspiration and "overt" refers to over aspirationGeneral note to table (e.g., how to interpret the data).

Table 7: Summary of Recommendations in Included Guidelines

Recommendations and supporting evidence	Quality of evidence and strength of recommendations
Yang (2023)[11]	
Regarding whether VFSS or clinical evaluation should be used: "VFSS is strongly recommended for diagnosis of dysphagia with moderate levels of evidence." (p.S5) Supporting evidence: 2 SRs, 3 NRSs, 1 economic evaluation	**Quality of evidence:** moderate **Strength of recommendation:** strong

Recommendations and supporting evidence	Quality of evidence and strength of recommendations
Dhar (2023)[12]	
"Choice of swallowing fluoroscopic study, VFSS or esophagram, should be guided by the clinical scenario. VFSS is appropriate to assess patients with suspected swallowing impairment from the oral to the pharyngoesophageal phases of deglutition. **VFSS is also appropriate for patients with an inconclusive or incongruent swallow exam."**(p.258) Supporting evidence: NRSs	**Quality of evidence:** C (low) **Strength of recommendation:** NR
Cosentino (2022)[14]	
"PD patients with a positive screening for dysphagia should undergo an in-depth clinical swallowing examination by a speech-language pathologist with special training in swallowing disorders. If a speech-language therapist with an expertise in the evaluation of neurogenic dysphagia is not available on site, a referral pathway should be put in place." (p.10) Supporting evidence: 15 NRSs	**Level of evidence:** Class II, III, and IV studies and expert opinion
"When the clinical evaluation suggests the presence of dysphagia, patients should undergo an instrumental investigation for the assessment of swallowing." (p.10) Supporting evidence: 35 NRSs	**Level of evidence:** Class I, II, III, and IV studies and expert opinion
"Depending on local availability and on specific advantages of each method, either FEES or VFSS are recommended as first-line diagnostic tools." (p.10) Supporting evidence: 35 NRSs	**Level of evidence:** Class I, II, III, and IV studies and expert opinion
Sugama (2022)[4]	
"We propose to conduct and assessment of aspiration through a systematic assessment using physical assessment techniques (i.e., interview, visual examination, auscultation, and palpation) for individuals aged 18 years and older who are suspected of having dysphagia" (p.10) Supporting evidence: 23 primary studies	Certainty of evidence: weak Strength of recommendation: weak
"Providing management for oropharyngeal dysphagia based on a systematic assessment has been proposed using physical assessment techniques (interview, visual examination, auscultation, and palpation) for individuals aged 18 and older. **Caution: Subsequent screening and diagnostic tests, including RSST, MWST, FT, cervical auscultation, VFSS, and FEES based on assessment techniques (i.e., interview, visual examination, auscultation, and palpation), are necessary for the implementation of appropriate care after physical assessment."** (p.12) Supporting evidence: 1 RCT	Certainty of evidence: weak Strength of recommendation: weak
Dziewas (2021)[15]	
"We suggest a dysphagia assessment in all stroke patients failing a dysphagia screen and/or showing other clinical	Quality of evidence: low Strength of recommendation: weak for intervention

Recommendations and supporting evidence	Quality of evidence and strength of recommendations
predictors of post-stroke dysphagia, in particular a severe facial palsy, severe dysarthria, severe aphasia or an overall severe neurological deficit (NIH-SS ≥ 10 points). Dysphagia assessment should be done as soon as possible. **In addition to the clinical swallow examination, VFSS or, preferentially, FEES should be available."** (p. XCVI) Supporting evidence: 1 RCT, 2 NRSs	
Oliviera (2021)[13]	
"It is recommended that all patients with positive screening for dysphagia, or present other risk factors, undergo clinical evaluation by properly trained professionals. **It is reasonable, whenever possible to give preference to instrumental assessment, considering the availability of technical and human resources".** (p.148) Supporting evidence: 5 clinical practice guidelines	Class of recommendation: IIa (moderate) Level of evidence: C-EO consensus of expert opinion based on clinical experience)

FEES = fibreoptic endoscopic evaluation of swallowing; FT = food test; MWST = modified water swallowing test; NIH-SS = National Institutes of Health stroke scale; NR = not reported; RSST = repetitive saliva swallowing test; VFSS = videofluoroscopic swallowing study.

Appendix 5: References of Potential Interest

Previous CADTH Reports

Fibreoptic endoscope evaluation versus video fluoroscopic swallowing exams for patients with dysphagia: A review of diagnostic accuracy and cost-effectiveness. (CADTH Rapid response report: summary with critical appraisal). Ottawa (ON): CADTH; 2019: https://www.cadth.ca/fibreoptic-endoscope-evaluation-versus-video-fluoroscopic-swallowing-exams-patients-dysphagia

Nonrandomized Studies

Single-Arm Studies

Stafler P, Akel K, Eshel Y, et al. Videofluoroscopy compared with clinical feeding evaluation in children with suspected aspiration. *Acta Paediatr*. 2022;111(7):1441-1449. PubMed

Guidelines and Recommendations

Unclear Methodology

Umay E, Eyigor S, Bahat G, et al. Best practice recommendations for geriatric dysphagia management with 5 Ws and 1H. *Ann Geriatr Med Res*. 2022;26(2):94-124. PubMed

Heart & Stroke Foundation. Rehabilitation and recovery following stroke: 7. Assessment and management of dysphagia and malnutrition following stroke. 6th edition - 2019 updated. 2019; https://www.strokebestpractices.ca/recommendations/stroke-rehabilitation/assessment-and-management-of-dysphagia-and-malnutrition-following-stroke

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Questions or requests for information about this report can be directed to **Requests@CADTH.ca**.