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AHS Water Protocol: Knowledge Translation of a Paradigm Shift in Dysphagia Management

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Water Protocol

### **ABSTRACT**

Dysphagia is a common symptom of a variety of medical conditions. The traditional treatment employed to avoid aspiration pneumonia for individuals with thin liquid dysphagia has been the use of thickened liquids (Karagiannis, Chivers, & Karagiannis, 2011). However, recent research indicates that allowing individuals with thin liquid dysphagia access to water in addition to thickened liquids results in better hydration without increasing incidences of pneumonia (Carlaw et al., 2012; Garon, Engle, & Ormiston, 1997; Murray, Doeltgen, Miller, & Scholten, 2016; Pooyania, Vandurme, Daun, & Buchel, 2015). The purpose of this project was to collaborate with the Alberta Health Services (AHS) Provincial Speech-Language Pathology (SLP) Practice Council to assist in the development and implementation of a provincial clinical protocol for identifying individuals with dysphagia who may benefit from drinking thin water. This project focused on knowledge translation to current health care professionals across Canada to communicate current evidence and shifting practice patterns in the use of thickened liquids and water protocols in institutional settings. These goals were attained by conducting an evidence-based review of the literature and disseminating the findings to help enhance the quality of care of individuals coping with swallowing disorders. This paper includes an evaluation of the team's end-of-grant knowledge translation efforts.

### **INTRODUCTION**

Dysphagia is a symptom of a variety of diseases that is characterized by increased effort or time during swallowing (Bernard, Loeslie, & Rabatin, 2015). Thin liquid dysphagia refers specifically to difficulty swallowing thin liquids. In individuals suffering from thin liquid

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dysphagia, thin liquids are more difficult to control during a swallow, tend to leak out of the mouth and into the throat before a swallow begins. As a result, these individuals have an increased risk of aspirating. Aspiration is when food, liquids, or other stomach contents enter the lungs (Bernard et al., 2015). Aspiration is a health concern because it is associated with an increased risk of aspiration pneumonia (Bernard et al., 2015). Aspiration pneumonia occurs when pathogenic bacteria enter the lower respiratory tract during aspiration, and the patient is unable to clear the material from their lungs (Bernard et al., 2015).

The traditional intervention for thin liquid dysphagia is to provide thickened liquids; however, recent research indicates ‘free water’ protocols (allowing access to unthickened water under specific conditions) may be best practice (Carlaw et al., 2012; Garon, Engle, & Ormiston, 1997; Karagiannis, & Karagiannis, 2014; Murray, Doeltgen, Miller, & Scholten, 2016; Pooyania, Vandurme, Daun, & Buchel, 2015). Whereas free water protocols are not a new concept, institutions are now implementing water protocols for specific patients with thin liquid dysphagia. However, the free water protocol is still not widely accepted by all healthcare professionals. There appears to be a gap between translating research into practice and policy. Consequently, patients are not benefiting from this shift in dysphagia management.

Knowledge translation (KT) is essential to close the gap between knowledge and practice. The Canadian Institutes of Health Research (CIHR, 2016) defines KT as “a dynamic and iterative process that includes synthesis, dissemination, exchange and ethically sound application of knowledge to improve the health of Canadians, provide more effective health services and products, and strengthen the health care system.” KT encourages the use of evidence-based practice (EBP) to make informed decisions in healthcare. EBP involves making

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practice decisions based on the integration of research evidence, clinical expertise and patient values (Sackett, Rosenberg, Gray, Haynes, & Richardson, 1996).

The overall aim of this research project was to close the gap between knowledge and practice by focusing on KT to current health care professionals across Alberta to communicate current evidence and shifting practice patterns in the use of thickened liquids and water protocols in institutional settings. In this paper we describe the process and the evaluation of the KT efforts.

## METHODS

### *Collaboration*

The Alberta Health Services (AHS) Provincial Speech-Language Pathology (SLP) Practice Council listed the water protocol as a high priority project. There was a need to promote the implementation of research findings and clinical practice guidelines among healthcare practitioners. As a result, a working group from AHS Calgary Zone collaborated with Dr. Stuart Cleary and two SLP students from the University of Alberta to assist with the project.

### *Evidence-Based Review*

A systematic search of electronic databases, including Medline (EBSCO interface), CINAHL Plus with (EBSCO interface), Abstracts in Social Gerontology (EBSCO interface), ComDisDome (ProQuest interface), Web of Science, SCOPUS, and Google Scholar was conducted using the following criteria: aspirat\* AND water AND ((thick\* n5 (liquid OR fluid or water)) OR free water or frazier water). In addition, the references of articles were examined to identify additional studies.

### ***Study Selection***

Studies were selected for inclusion in the review if they met the following criteria: they were published in English between 1995 to the end of February 2016, were peer-reviewed, and were randomized clinical trials that examined the use of a water protocol. These studies' primary objective was to examine the use of free water protocols and thickened liquids in preventing aspiration pneumonia; the secondary objectives were to evaluate outcomes (i.e., hydration and patient satisfaction with diet texture). Participants in the included studies were adults with thin liquid dysphagia who aspirate thin liquids. No limitations were set regarding the medical diagnosis of patients or how aspiration was diagnosed.

### ***Dissemination of Findings***

The results of the research were summarized and prepared into a knowledge translation manuscript for Canadian Nursing Home Journal (see Appendix A). A PowerPoint presentation (see Appendix B) was also created to raise awareness of the shift in managing thin liquid dysphagia, and the pilot project, which will be expanded into a provincial wide initiative. The PowerPoint presentation presented included comprehension questions reviewing key points for the viewer to complete which are not included within the appendix. The presentation was created to share with AHS employees via AHS Practice Wise and future SLP students in the Communication Sciences and Disorders (CSD) 521 Dysphagia class at the University of Alberta. AHS Practice Wise is where clinicians, leaders, regulators, researchers, and educators are invited to discuss their experiences, learn, and share clinically relevant information.

## **FINDINGS**

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SLPs commonly prescribe thickened liquids to individuals with thin liquid dysphagia as a management technique used to decrease instances of aspiration pneumonia (Carlaw et al., 2011; Pooyania et al., 2015). The premise is that thickened liquids are easier to control in the oral cavity and are swallowed more slowly as a result (Bisch, Logemann, Rademaker, Kahrilas, & Lazarus, 1994; Carlaw et al., 2011; Garcia, Chambers, & Molander, 2005). A survey of 145 SLPs found that 84.4% of the respondents believed thickening water to be an effective management strategy for patients with dysphagia (Garcia et al., 2005). In a review of 25,470 long-term care residents, 8% were on thickened liquids, where the amount of patients on thickened liquids differed across facilities ranging from 0-28% (Castellanos, Butler, Gluch, & Burke, 2004).

Although thickening liquids does change the consistency of the bolus and its transit time in the oral cavity, their use may not always result in decreased risk of aspiration (Pooyania et al., 2015). Studies investigating the efficiency of thickened liquids have found that they do not prevent aspiration in all patients (Carlaw et al., 2011). In addition, some studies have found aspiration of thickened water to be worse than the aspiration of unthickened water (Carlaw et al., 2011). There is evidence that it may be harder to clear thickened liquids from the lungs than unthickened water, and this may increase the risk of aspiration pneumonia (Carlaw et al., 2011). Prescribing thickened water is also shown to have other negative health effects. A study found patients restricted to thickened liquids groups had higher incidence of dehydration (6% vs 2%), urinary tract infections (6% vs 3%) and fever (4% vs 2%) (Robbins et al., 2008). Restriction to thickened liquids may also have a negative impact on quality of life as many

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patients do not like thickened water (Garcia et al., 2005). This dislike can lead to noncompliance which further increases the risk of dehydration (Robbins et. al., 2008).

### ***Free Water Protocols***

The Free Water Protocol was first implemented in 1984 at the Frazier Rehabilitation Institute in Louisville, Kentucky. Panther (2005) explains the protocol was implemented as a response to patients who were secretly consuming thin liquids or patients who were non-compliant with recommendations to drink thickened liquids. It appeared the individuals who chose to take thin liquids against recommendations were not developing aspiration pneumonia despite evidence of aspiration on videofluoroscopy. As a result, the team altered their approach to strict dysphagia intervention and developed the Frazier Water Protocol. Free water is recommended based on thorough assessment to prioritize patient health and safety. The clinicians at this facility report that quality of life has been improved for these patients and patients report strong satisfaction with being allowed to drink water (Panther, 2005).

The Free Water Protocol is a set of guidelines that allows access to water for specific individuals with thin liquid dysphagia. Access to unthickened water is used to supplement thickened liquids in an attempt to improve hydration and enhance quality of life. Water is used because it has a neutral pH and can be safely absorbed by the lungs as long as no pathogens are present; aspiration of water is a benign event (Panther, 2005).

Oral hygiene is mandatory in free water protocols. Pathogenic bacteria in the oral cavity can be carried by water into the lungs and increase the risk of aspiration pneumonia (Ashford, 2005). Routine oral hygiene reduces aspiration pneumonia risk by removing pathogenic bacteria from the oral cavity and therefore preventing travel to the lungs.

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Carlaw et al. (2011) created a six-step decision process to help determine eligibility for the Free Water Protocol. See Appendix C for an adapted Decision Matrix created by the student researchers.

### ***Evidence for Free Water Protocols***

The literature search and the selection criteria described above resulted in five randomized clinical trials (Carlaw et al., 2012; Garon et al., 1997; Karagiannis et al., 2011; Murray et al., 2016; Pooyania et al., 2015). See Appendix D: Water Protocol Evidence Table for more information. In four studies, no participants who drank thin water as part of a free water protocol developed aspiration pneumonia (Carlaw et al., 2012; Garon et al., 1997; Murray et al., 2016; Pooyania et al., 2015). With regard to hydration, no patients developed dehydration in four studies (Carlaw et al., 2012; Garon et al., 1997; Karagiannis et al., 2011; Pooyania et al., 2015), and total liquid intake increased significantly in two of those studies (Carlaw et al., 2012; Karagiannis et al., 2011). Finally, increased satisfaction and quality of life was reported in three of these studies (Carlaw, et al., 2012; Garon et al., 1997; Karagiannis et al., 2011).

Implementing the Free Water Protocol has the potential to reduce dehydration and increase quality of life. Garon et al. (1997) found patients reported greater satisfaction related to thirst and oral dryness. Similarly, Karagiannis et al. (2011) found patients reported greater satisfaction related to thirst and mouth cleanliness.

Karagiannis et al. (2011) study found a significant increase in the development of lung complications in a subset of patients given access to water. Karagiannis & Karagiannis (2014) elaborate the population at greatest risk of developing aspiration pneumonia following intake of water are those who are immobile or have low mobility and severe degenerative



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neurological dysfunction. Consequently, when this subset of the sample was excluded, the Karagiannis & Karagiannis (2014) study found free water did not result in aspiration pneumonia, improved measures of hydration, and increased quality of life.

## DISCUSSION

### *End-of-Grant Knowledge Translation*

CIHR outlines two approaches to knowledge translation: end-of-grant knowledge translation, and integrated knowledge translation (iKT). In end-of-grant knowledge translation, researchers develop and implement a plan for disseminating knowledge to those who use it after the research is completed (CIHR, 2016). In iKT, those who use the knowledge are a part of the entire research process through collaboration with the researchers in the selection of research goals, determining the methods used, and being involved in data collection, interpreting the results, and disseminating the findings (CIHR, 2016). The working group from AHS Calgary Zone focused on iKT. They implemented a water protocol pilot project and are addressing operational components of the project. This pilot project will then be expanding to a province-wide initiative implementing the water protocol. Since iKT programs require a dissemination plan (end-of-grant KT) the collaborators at the University of Alberta focused on end-of-grant KT, which is the focus of this project. The CIHR outlines five factors that should be addressed in end-of-grant KT plans: goals, knowledge-user audience, strategies, expertise, and resources.

**Goals.** The first factor, goals, typically consists of raising awareness and promoting action (CIHR, 2015). The goals for this project were to increase knowledge and inform practice

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for frontline workers in institutional settings. The randomized control trials examined in this study were completed in institutional settings. As a result, the findings were most relevant in these settings. The goal is to inform the practice of frontline workers in addition to SLPs because the successful implementation of water protocols is completed in multidisciplinary teams.

**Knowledge-User Audience.** The second factor, knowledge-user audience, consists of identifying individuals or groups who should know about the research findings (CIHR, 2015). As stated above, the target audience for our KT project is frontline service providers who work in institutional settings with individuals who have thin liquid dysphagia. The authors in the literature emphasize the importance of multidisciplinary teams for the success of water protocols. Multidisciplinary teams involved in the implementation of water protocols often include SLPs, occupational therapists, physicians, nurses, and clinical nutritionists. Therefore, it is important to target all these professions in the dissemination of knowledge regarding free water protocols.

**Strategies.** The third factor, strategies, broadly falls into three categories for reaching target audiences and delivering the goals: diffusion, dissemination, and application (CIHR, 2015). Diffusion (i.e., let it happen) involves a generalized approach to sharing research findings with a broad audience (CIHR, 2015). Some examples of diffusion include academic journals and conferences. Dissemination (i.e., help it happen) refers to a more targeted and tailored approach to sharing research evidence with knowledge users (CIHR, 2015). Educational sessions for knowledge user and creating tools are two examples of dissemination. Application (i.e., make it happen) moves beyond awareness and actively attempts to engage knowledge users to

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adapt and adopt the research evidence (CIHR, 2015). Some examples of application include identifying the barriers to the uptake of research findings and adapting the knowledge for users.

The student researchers and their supervisor used both the diffusion and dissemination method to reach their target audience and deliver the goals. They targeted diffusion by publishing in the *Canadian Nursing Home* journal. This journal is targeted to health professionals involved in the care of residents in long-term care facilities and nursing home facilities. It has been estimated dysphagia may be as high as 68% for residents in long-term care settings (Steele, Greenwood, Ens, Robertson, & Seidman-Carlson, 1997). Therefore, it was important to target healthcare providers in this setting.

The student researchers and their supervisor targeted dissemination by creating a PowerPoint and presenting it to Alberta Health Services clinicians via AHS Practice Wise on March 25, 2017. This presentation was available to all AHS employees, including our target audience, in various institutional settings (e.g., hospitals, clinics, continuing care facilities, mental health facilities and community health sites). Furthermore, a decision flowchart was created to guide clinicians in their recommendations for patients regarding free water protocols. This decision matrix was included in both the published manuscript and in the presentation.

**Expertise.** The fourth factor, expertise, refers to specific expertise that may be required to deliver on the identified strategies (e.g., specialized products like DVDs and films) (CIHR, 2015). Human resources with expertise in research experience, publication experience, and presentation experience were involved in the team. The team consisted of clinicians and

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experienced academics collaborating in addition to the graduate students involved in the project.

**Resources.** The fifth factor, resources, refers to demonstrating that the proposed KT activities can be delivered (e.g., financial resources, human resources) (CIHR, 2015). The pilot project carried out by the Calgary group assessed a number of feasibility objectives and identified barriers prior to conducting a larger trial. Our project does not provide financial support to individuals interested in implementing a free water protocol; however, decreasing cases of aspiration pneumonia and illnesses associated with dehydration will reduce the length of hospital stays and prevent health care costs associated with treatment of these conditions.

### **Limitations**

Our project is limited in the size of the audience it is able to reach. Although our manuscript was published in a journal for staff in long-term care facilities, this does not guarantee that all staff will have access to our article or read it. Our PowerPoint presentation helps to increase accessibility of our findings; however, it was only available to AHS employees on the previous date mentioned. In addition, our project only utilized two strategies of KT: diffusion and dissemination. Application is another strategy that would increase the size of the audience reached. Additional experts could have also been utilized to create more specialized products. Furthermore, the team could have applied for a grant to assist in the delivery of information.

### **Future Directions**

In the future this project can be improved by making a few adjustments. Firstly, rather than just summarizing the evidence available on water protocols, findings could be further analysed.

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Specifically, the quality of each study could have been assessed for components such as allocation concealment, blinding, reporting of participants by allocation group, and follow-up. Specific information could have been extracted and these data could have been subjected to a meta-analysis if appropriate. Furthermore, evidence found in these studies may not be generalizable from one setting to another; for example, in the community, or acute care.

In terms of the five factors that should be addressed in end-of-grant KT plans, there are a few adjustments that would have made this project stronger, such as greater inclusion of expertise and resources. Future projects can include an expert such as a graphic designer to create decision aids for clinicians to use for patients, and to design a website with central access to information regarding water protocols.

The target population for this project is adults; however, thin liquid dysphagia also occurs in pediatric age groups. A similar study could be performed examining the use of water protocols in the pediatric population.

## CONCLUSION

The traditional intervention for thin liquid dysphagia is thickening liquids, but recent research indicates free water protocols may be best practice because they have the potential to reduce dehydration and increase quality of life. The key message identified from the literature is that the research evidence supports the use of free water protocols for a subset of patients with thin liquid dysphagia, and the data indicate minimal risk for aspiration pneumonia when proper oral hygiene is provided. A variety of factors must be taken into account when deciding which individuals are eligible for free water protocols. It is important for care providers to be

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aware both the possible benefits of free water protocols and the criteria to consider when recommending patients.

The focus of this project was to collaborate with the AHS Provincial SLP Practice Council and assist in the development and implementation of a provincial clinical protocol for identifying individuals with dysphagia who may benefit from receiving thin water. This project focused on knowledge translation to current health care professionals across Canada to communicate current evidence and shifting practice patterns in the use of thickened liquids and water protocols in institutional settings. These goals were attained by conducting an evidence-based review of the literature and communicating the findings via diffusion and dissemination in order to help enhance the quality of care of individuals coping with swallowing disorders. This was accomplished through publishing a manuscript in *Canadian Nursing Home Journal*, presenting a PowerPoint presentation to AHS employees, and creating a decision flow chart to increase the ease of making clinical decisions regarding individual patient's eligibility for free water protocol inclusion.

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## APPENDICES

**Appendix A: Manuscript for Canadian Nursing Home Journal****Dysphagia/Diet Texture Modifications/Free Water Protocols**

*A common technique to improve safe swallowing and decrease the risk of aspiration is to thicken liquids, including water, to make them easier to control in the mouth and throat. The research evidence for the use of thickened water is uncertain, as most people with dysphagia dislike thickened water, and the negative health outcomes associated with thickened water may outweigh potential safety benefits. Even so, free water protocols are frequently implemented in health care settings, including long-term care, to address these concerns.*

*In this submission, the authors provide a review of the state of the science behind free water protocols for dysphagia and how to implement these protocols with individuals who experience swallowing difficulties.*

By Stuart Cleary, Jill Yanke, Bhavna Masuta and Kristy Wilson

# Free water protocols

## What works, for whom and why?

### *Dysphagia and diet texture modifications*

**D**ysphagia refers to increased time and/or effort swallowing a bolus moving from the mouth to the stomach (Bernard, et al., 2015), and can be caused by a number of disorders and diseases. Individuals with dysphagia may have difficulty with one or more food textures - e.g., liquids, solids, mixed textures (Carlaw, et al., 2012); this difficulty can place them at risk for negative health outcomes such as dehydration, under-nutrition, choking and aspiration.

#### Aspiration

Aspiration occurs when food, liquid or other stomach contents, enter the lungs during swallowing, thereby increasing the risk of aspiration pneumonia, which is the infiltration of pathogenic organisms into the lower respiratory tract (i.e., larynx, trachea, bronchi, and lungs) (Bernard, et al., 2015).

Dysphagia, or difficulty swallowing, is generally managed through the use of multiple interventions, including body positioning, safe-swallowing techniques, oral-motor exercises, education, and diet texture modifications.

A common diet texture modification is to thicken thin liquids to make them easier to control during swallowing (Carlaw, et al., 2012; Bisch, et al., 1994; Pooyania, 2015).

Thin liquids are notoriously hard to control during swallowing as they tend to spill out of the back of the mouth before swallowing is triggered. Thus, many people have dysphagia that is characterized by pronounced difficulty swallowing thin liquids (i.e., 'thin liquid dysphagia').

#### Texture modifications

Speech-language pathologists (SLPs) often recommend thickened liquids for individuals with thin-liquid dysphagia in an effort to slow the transit of the bolus, improve oral control of liquids and reduce the risk of aspiration (Garcia, et al., 2005). In fact, a survey of 145 SLPs found that 84.4% of the respondents believed thickening water to be an effective management strategy for those with dysphagia (Garcia, et al., 2005).

In a review of 25,470 long-term care residents, 8% were on thickened liquids, the range for facilities varied between 0-28% and 60% of those on thickened liquids received nectar-thick, 33% received honey-thick and 6% received a pudding-thick consistency (Castellanos, et al., 2004).

#### Conflicting research

Unfortunately, thickened liquids may not be the best choice for all people with dys-

phagia. Despite widely held perceptions of the effectiveness of thickened liquids in preventing aspiration, the research evidence is conflicting.

A seminal study by Robbins, et al., (2008), showed that thickened liquids may be harmful for some older adults with swallowing problems. These authors followed 515 medically fragile, dependent adults with Parkinson disease and/or dementia. Two out of three subjects aspirated all textures of liquids as evaluated by a video fluoroscopic swallowing exam, and all continued to eat and drink three meals per day. Those consuming thickened liquids did not have a lower incidence of pneumonia:

- pudding thick = 19% incidence;
- nectar-thick = 11%; and,
- thin liquids = 10% incidence with and without the chin tuck maneuver.

In this study patients drinking thickened liquids also had higher incidence rates of dehydration (6% vs. 2%), urinary tract infections (6% vs 3%) and fever (4% vs 2%).

In several studies, patients receiving thickened liquids failed to meet adequate requirements for daily fluid intake (Finestone, et al., 2001; Whelan, 2001).

Many patients dislike thickened fluids and, as a result, refuse to drink such liq-

uids, or will have a significant reduction in the amount they drink (Garcia, et al., 2005; Panther, 2005).

**Dehydration and cognitive impairment**

Because dehydration is associated with cognitive impairment (Gopinathan, et al., 1988), increased risk of falls, (Nazarko, 2015) and other conditions such as chronic kidney disease and gallstones (Armstrong, 2012), it is important for health professionals to take special care to prevent dehydration in long-term care residents.

Allowing thin water for patients with dysphagia may increase hydration and life satisfaction. For example, Garon, et al., (1997) found that patients who were allowed unthickened water reported high satisfaction related to thirst and oral dryness. Similarly, Karagiannis, Chivers and Karagiannis, (2011) reported patient satisfaction with thin water in terms of level of thirst and mouth cleanliness.

The key to providing non-thickened (thin) water to individuals with dysphagia is to ensure safety through a detailed swallowing evaluation and determination of eligibility, along with careful monitoring of the protocol once implemented.

**Free Water Protocols**

The Frazier Rehabilitation Institute in Louisville, Kentucky implemented the Frazier Free Water Protocol in 1984 as a means of managing risk of aspiration pneumonia for patients who were either secretly consuming thin-liquids or explicitly refusing to drink the recommended thickened liquids.

The conventional view at the time was that all individuals who aspirated liquids were at risk of developing aspiration pneumonia and should be placed on thickened

liquids, inclusive of water. The Frazier Free Water Protocol was thus controversial at the time. However, as researchers and clinicians understand more about the relationship between aspiration and aspiration pneumonia, as well as the the benefits of free water, the protocol is gaining acceptance in various settings.

A Free Water Protocol is a set of guidelines that allows access to water for specific individuals with thin-liquid dysphagia in order to supplement thickened liquids in an attempt to improve hydration and increase quality of life (Carlaw, et al., 2012). In Free Water Protocols, patients only consume water between meals, without food or medications, and after oral hygiene is provided.

Oral hygiene is mandatory in free water protocols. Some researchers argue that, in the absence of pathogens, aspirated water neutral in pH can be safely absorbed by the lungs and is a benign event (Panther, 2005). However, if the oral cavity contains pathogenic bacteria because of decaying dentition and generally poor oral hygiene, these bacteria can be carried by plain water into the lungs and cause pneumonia (Langmore et al., 1998; Yoneyama et al., 2002). Thus, implementing a dedicated oral care regime can reduce the possibility of the presence of pathogenic bacteria in the oral cavity, which in turn reduces risk for aspiration pneumonia (Yoneyama, et al., 2002).

**Who benefits from a Free Water Protocol?**

To determine if someone is a suitable candidate for a free water protocol, SLPs and the care team must recognize that people participating in a free water protocol are still likely to aspirate; however, the risk of developing aspiration pneumonia is reduced by adherence to protocol guidelines.

**Why do some people who aspirate develop pneumonia and others not?**

Most people will occasionally aspirate some food or liquid. Further, it is estimated that 45% of healthy people aspirate secretions in their sleep - between 0.1 and 2 ml., without ever developing pneumonia (Gleeson, et al., 1997).

**Risk factors - Aspiration Pneumonia**

Aspiration tolerance is a complex issue. Research evidence on risk factors for aspiration pneumonia helps clinicians make decisions about who can tolerate aspiration of small amounts of water, thereby reaping the benefits of using a free water protocol.

A seminal study by Langmore and colleagues (1998) involved assessment of multiple risk factors for developing pneumonia among 189 elderly subjects over four years. The highest risk factors for aspiration pneumonia were as follows (ranked strongest to weakest risk):

- dependency for feeding
- dependency for oral care
- number of decayed teeth
- tube feeding
- number of medications
- smoking, and
- an altered level of consciousness

Other researchers have also reported similar predictors post-stroke (Finlayson, et al., 2011; Masiero, et al., 2008). Based on the research evidence, people who have several of these risk factors should be excluded (or only cautiously considered) for a free water protocol. For example, if the patient is immuno-compromised, has advanced pulmonary disease, xerostomia, smokes tobacco, has poor dentition, and takes multiple medications, then that person may not be a viable candidate for a free water protocol (Carlaw, et al., 2012).

**Research evidence for Free Water Protocols**

A search was conducted of several databases, using key words and terms related to the use of a free water protocol and dysphagia management. Only peer-reviewed, randomized controlled trials between 1995 and 2015 were included in the review.

The search yielded five randomized studies that included examination of the use of

**Oral Hygiene Evaluations and the Free Water Protocol**

Refer to a dental hygienist for an evaluation if there is a concern about a patient's oral and dental hygiene. Oral care is part of a free water protocol and should consist of the following steps:

- Thorough brushing of teeth or cleaning of dentures.
- Ensure no food buildup or residue on or between teeth.
- Swab mouth, or 'rinse-and-spit,' prior to any water intake.
- Use chlorhexidine (antibacterial) mouthwash when necessary.
- Perform oral care in the morning, prior to all oral intake, and again at bedtime.

(Karagiannis and Karagiannis, 2011; Panther, 2005)

<b>Appendix A: Water Protocol Evidence Table</b>			
<b>Reference</b>	<b>Population Studied (n)</b>	<b>Primary Outcome</b>	<b>Major Findings</b>
Garon, B. R., Engle, M., & Ormiston, C. (1997).	Stroke rehabilitation patients with previously identified thin-liquid aspiration (20 = 10 control, 10 interventions).	- No patient developed pneumonia, dehydration or complications in either group during the study or 30-day follow up.	- Fluid intake was reported to increase in intervention group when compared to control group; ( <b>NOT</b> statistically significant). - All intervention group patients reported high satisfaction with access to water specifically related to thirst and oral dryness.
Karagiannis, M. J. P., Chivers, L., & Karagiannis, T. C. (2011).	Subacute patients in a tertiary community hospital who aspirate thin-liquids (6 = 34 control, 42 interventions).	- 14.3% rate of lung complications among intervention group while 0% among control group.	- All the patients that developed lung complications had neuro-degenerative disease and/or poor mobility. - Total daily oral liquid intake was significantly higher in the intervention group when compared to the control group. - Intervention group patients reported remarkably higher levels of satisfaction with drinks, level of thirst, and mouth cleanliness when compared to control group.
Carlaw, C., Finlayson, H., Beggs, K., Visser, T., Marcoux, C., Coney, D., et al., (2012).	Rehabilitation patients with confirmed thin-liquid aspiration (15 = 9 immediate implementation, 7 delayed implementation).	- No adverse events	- Fluid intake increased at least 10% of the calculated fluid requirements in 11/15 participants. - Participants reported high QOL outcomes.
Pooyania, S., Vandurme, L., Daun, R., & Buchel, C. (2015).	Stroke or acquired brain injury neuro-rehabilitation patients with thin-liquid dysphagia (16 = 6 control, 10 intervention).	No participants in either group developed aspiration pneumonia.	- No statistically significant difference in the weekly total liquid intake between the groups. - No statistically significant difference between the groups for perceived swallowing related quality of care.
Murray, J., Doeltgen, S., Miller, M., & Scholten, I. (2016).	Stroke patients with thin-liquid dysphagia from inpatient rehabilitation facilities (16 = 7 control, 9 intervention)	- No participant in either group was diagnosed with pneumonia  - No adverse events  No participants in either group developed aspiration pneumonia  No participant in either group was diagnosed with pneumonia.	- No difference in the total amount of fluid consumed between the groups. - 21% of the total sample was diagnosed with dehydration. - There was significantly more diagnoses of urinary tract infection in the control group compared to the intervention group. - No difference in satisfaction ratings between water and thickened-liquids for those in the intervention group.

**Appendix B:**

**Water Protocol Algorithm**

*(Adapted from Carlaw, et al., 2011)*

**Step 1**

*Does patient have thin liquid dysphagia as determined from a clinical swallowing assessment by a SLP?*

If **YES**, continue to Step 2

If **NO**, stop - individual does not require the water protocol

**Step 2**

*Does the patient meet any of the following exclusion material?*

- a) Acute or unstable medical condition?
- b) Risk that coughing may rip stitches, cause pain or discomfort?
- c) Oral infection that cannot be controlled
- d) Poor oral hygiene despite routine care?
- e) Excessive coughing with oral intake of thin liquids?
- f) Active pneumonia?
- g) Advanced degenerative neurological condition
- h) Immobile or low mobility

If **YES**, stop - individual is not eligible for water protocol

If **NO**, continue to Step 3

**Step 3**

*Does the patient require supervision for water intake?*

- a) Dependency for feeding?
- b) Poor safety awareness?
- c) Difficulty following protocol rules?
- d) Needs assistance with oral care?
- e) Fluid intake concerns (restrictions, excessive thirst)
- f) Cognitive-communication or behavioural factors that limit ability to obtain water?
- g) Medical or other reasons why client must be offered water?

If **YES**, patient will require supervision for water intake, continue to step 4.

If **NO**, patient is suitable for independent participation in water protocol, continue to step 4

**Step 4**

*Does the patient require suction for oral care?*

- a) Difficulty swishing or spitting during oral care?
- b) Difficulty managing oral secretions during oral care?

If **YES**, patient will need plan of oral care with suction, continue to step 5

If **NO**, patient will need plan of oral care without suction, continue to step 5

**STEP 5**

*Are there oral health concerns?*

- a) Nurse to ask regarding need for oral care, presence of oral pain, bleeding gums, or oral ulcers
- b) Complete Oral Health Assessment Tool

If **YES**, refer to dentistry and adapt oral care plan by adding appropriate interventions; continue to step 6

If **NO**, follow standard oral care plan, continue to step 6

**Step 6**

*Implement plans for care for water protocol and oral hygiene*

a water protocol (Garon, et al., 1997; Karagiannis, Chivers and Karagiannis, 2011; Carlaw, et al., 2012; Pooyania, et al., 2015; Murray, et al., 2016).

A total of 127 subjects participated in these studies in which the primary objective was to examine the use of free water protocols and thickened liquids in preventing aspiration pneumonia; the secondary objectives were to evaluate outcomes, i.e., hydration and patient satisfaction with diet texture.

In four studies, no participants who drank thin water as part of a free water protocol developed aspiration pneumonia (Garon, et al., 1997; Carlaw, et al., 2012; Pooyania, et al., 2015; Murray, et al., 2016).

With regard to hydration, no patients developed dehydration in four studies (Garon, et al., 1997; Karagiannis and Karagiannis, 2011; Carlaw, et al., 2012; Pooyania, et al., 2015), and total fluid intake increased significantly in two of those studies (Karagiannis, Chivers and Karagiannis, 2011; Carlaw, et al., 2012). Finally, increased satisfaction and quality of life was reported in three of these studies (Garon, et al., 1997; Karagiannis, Chivers, et al., 2011; Carlaw, et al., 2012).

The research evidence supports the use of free water protocols for a subset of patients with thin-liquid dysphagia, minimal risk factors for aspiration pneumonia - and then only with proper oral hygiene. See: **Appendix A: Water Protocol Evidence Table.**

### Conclusions

Although the free water protocols are not new in concept, many institutions are now allowing them to be implemented for specific patients with thin-liquid dysphagia. This shift is a result of evidence-based practice by SLPs and other members of the healthcare team.

Balancing research findings, clinical expertise, and patient preference provide a solid foundation for the use of free water protocols for people with thin-liquid dysphagia. As the practice gains acceptance and becomes more widespread, more research will be needed to answer questions related to long-term outcomes as well as shorter-term health and quality of life benefits. Patient and family perspectives will be important to consider in research and are, of course, at the core of resident-centered care in all settings.

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Jill Yanke, Bhavna Masuta and Kristy Wilson, the other authors, are graduate students in Speech Language Pathology under the tutelage of Stuart Cleary.

All the authors are part of a working group, in conjunction with Alberta Health Services, assisting in the establishment of a province-wide strategy on Free Water Protocols for those with swallowing disorders.

## Water Protocol for Individuals with Dysphagia

Bhavna Masuta & Jill Yanke | Supervisor: Dr. Stuart Cleary

### Learning Objectives:

- Important Concepts:
  - What is Dysphagia?
  - The 4 Phases of a Normal Swallow
  - Aspiration & Aspiration Pneumonia
- The Traditional Approach: Texture modification
- Dehydration and Cognitive Impairment
- A New Approach: Free Water Protocols
- Guidelines for Eligibility
- Importance of Oral Hygiene
- Rules of Water Protocol
- What does the evidence say?

### Purpose

- To communicate shifting practice patterns regarding thickened liquids and water protocols
- To review current evidence regarding water protocols which were listed as a high-priority project by the AHS Provincial SLP Practice Counsel
- To collaborate and raise awareness of a **pilot project** by AHS (Calgary Zone) in the Fall, 2016
  - The pilot project is a working group focusing on the inpatient neurological unit aiming to find and fix operational bugs
- To translate knowledge of water protocols to staff in institutional settings

### Dysphagia

- Dysphagia is a *symptom*
  - It can be caused by a variety of disorders and diseases
- Dysphagia is characterized by increased time and/or effort in swallowing a bolus at any of the 4 phases of a swallow
  - Bolus: refers to chewed food or liquid that is being swallowed

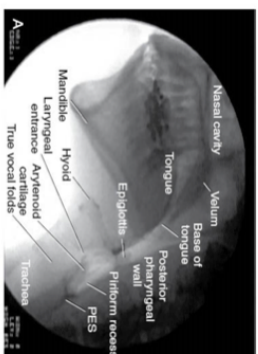


FIGURE 10-1A. Lateral (A) and anterior (B) radiographic views of a normal swallowing mechanism. FES, Pharyngoesophageal segment. Copyright © 2010 by Mosby, Inc., an affiliate of Elsevier Inc. <http://www.student.com/9782801200194/82912/>

## 4 Phases of a Swallow

- Difficulty at any of these stages is dysphagia

Phase	Oral	Oral	Pharyngeal	Esophageal
Relevant Anatomy	<ul style="list-style-type: none"> <li>-Lips</li> <li>-Teeth</li> <li>-Hard/Soft Palate</li> <li>-Cheeks</li> <li>-Floor of mouth</li> <li>-Mandible</li> <li>-Tongue</li> </ul>	<ul style="list-style-type: none"> <li>-Tongue</li> <li>-Hard/Soft Palate</li> <li>-Cheeks</li> <li>-Palatal Arches</li> </ul>	<ul style="list-style-type: none"> <li>-Pharyngeal Muscles</li> <li>-Soft Palate</li> <li>-Epiglottis</li> <li>-Vallicles</li> <li>-Pyramidal Sinus</li> <li>-Hyoid Bone</li> <li>-Larynx</li> <li>• Tongue Base</li> </ul>	<ul style="list-style-type: none"> <li>-Cricopharyngeal Muscle</li> <li>-Esophagus</li> <li>-Upper Esophageal Sphincter</li> </ul>
Actions	<ul style="list-style-type: none"> <li>-Accepting and holding bolus in mouth</li> <li>-Chewing of food</li> <li>-Mixing/grinding bolus with saliva</li> <li>-Centering bolus into position on tongue in preparation for swallow</li> </ul>	<ul style="list-style-type: none"> <li>-Tongue moves bolus to back of mouth by pushing up against hard palate</li> <li>-Triggering the pharyngeal swallow when the bolus passes the palatal arches</li> </ul>	<ul style="list-style-type: none"> <li>-Soft palate elevates</li> <li>-Pharyngeal constrictor muscles push food through the pharynx</li> <li>-Larynx moves forward, elevates and closes to protect the airway</li> </ul>	<ul style="list-style-type: none"> <li>-Larynx lowers</li> <li>-Esophageal peristalsis moves food from the esophagus to lower esophageal sphincter</li> <li>-Cricopharyngeal muscle contracts to prevent reflux</li> <li>-Diaphragm contracts to move bolus to stomach</li> </ul>

(Terrado, Russell & Bowman, 2001)

<http://idolibrary.com/18647268381/>

## Risk without Management: Aspiration

- **Aspiration** is when small particles of food or liquid pass the level of the vocal folds
- Persons with dysphagia are more likely to aspirate than those without dysphagia
- Aspiration can lead to **Aspiration Pneumonia**
- Aspiration pneumonia is when pathogenic bacteria are introduced into the lower respiratory tract including the larynx, trachea, bronchi, and lungs
- Aspiration pneumonia negatively impacts health and may lead to death

## Signs/Symptoms of Dysphagia

Oral Preparatory/Oral	Pharyngeal	Esophageal
<ul style="list-style-type: none"> <li>• Drooping</li> <li>• Spitting food out of the mouth</li> <li>• Takes too long to chew</li> <li>• Difficulty chewing</li> <li>• Dry mouth</li> <li>• Meal times are prolonged</li> <li>• Changes in taste</li> <li>• Excessive oral secretions</li> <li>• Excessive or uncontrolled tongue movements</li> <li>• Difficulty managing foods of specific tastes or textures</li> <li>• Avoids foods that require chewing</li> <li>• Cannot suck through a straw</li> </ul>	<ul style="list-style-type: none"> <li>• Food sticking in the throat</li> <li>• Voice sounds hoarse or different</li> <li>• Nasal sounding voice</li> <li>• Nasal burning or dripping, sniffling during a meal</li> <li>• Nasal regurgitation</li> <li>• Wet or gurgly voice after swallow</li> <li>• Coughing or choking before, during, or after a swallow</li> <li>• Stridor</li> <li>• Excessive saliva or mucus</li> <li>• Saliva is difficult to swallow</li> <li>• Fluids difficult to swallow</li> </ul>	<ul style="list-style-type: none"> <li>• Unpleasant taste to mouth when waking up</li> <li>• Acidic smelling breathe</li> <li>• Excessive burping</li> <li>• Regurgitation of gastric contents or wet burps</li> <li>• Food sticking in the throat</li> <li>• Heartburn or epigastric pain</li> <li>• Repetitive swallowing</li> </ul>

<http://idolibrary.com/18647268381/>

(Terrado, et al, 2001)

## Normal Swallow

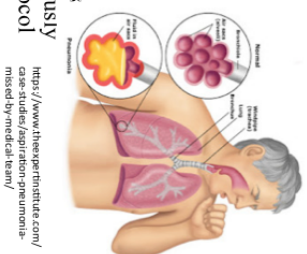
Video of a Normal Swallow



## Aspiration

Video of Aspiration

- Langmore and colleagues (1998) found the highest risk factors for aspiration pneumonia are:
  - dependency for feeding
  - dependency for oral care
  - number of decayed teeth
  - tube feeding
  - number of medications
  - smoking
  - an altered level of consciousness
- People who have several of these risk factors should be excluded (or cautiously considered) from the free water protocol



## Traditional Approach: Texture Modification

- Thick liquids are easier to control in the mouth and throat than thin liquids which are more likely to be aspirated
  - e.g., tea is easier to aspirate than pudding
- **Thin-liquid dysphagia** is characterized by pronounced difficulty swallowing thin liquids
- Thickening liquids (including water) is common practice to manage thin-liquid dysphagia



Picture modified from the dieticians association of australia, 2007

- It is currently under debate if thickening water is *best* practice

## Risk Factors - Aspiration Pneumonia

- A survey of 145 SLPs found that 84.4% of the respondents believed thickening water to be an effective strategy for those with dysphagia (Garcia et al., 2005)
- In a review of 25,470 long-term care residents, 89% were on thickened liquids (Castellanos et al., 2004)

## Common Practice: Thickening Liquids

## Dehydration and Cognitive Impairment

- **Dehydration** is an excessive loss of water from the body
- **Cognition** includes (and is not limited to) problem solving, making decisions, and processing, interpreting and understanding information
- Dehydration is associated with cognitive impairment, increased risk of falls, chronic kidney disease, and gallstones (Gopinathan et al., 1988; Nazarko, 2015; Armstrong, 2012)
- Patients limited to thickened liquids are dehydrated compared to those who are not (Garcia et al., 2005; Robbins et al., 2008; Whelan, 2001)

## Thickened liquids: Health Risks

Table 2. Adverse Experiences, Hospitalizations, or Death, by Intervention

Conditions	Intervention, n (%)		
	Clear-Dense Purine (n = 239)	Thin, Type of Liquid (n = 256)	Thickened Liquid (n = 133)
<b>Participants with at least one experience*</b>	51 (20)	67 (27)	30 (23)
Dehydration	6 (2)	15 (6)	7 (5)
Urinary tract infection	8 (3)	14 (6)	5 (4)
Weight loss	4 (2)	6 (2)	3 (2)
Fatigue or weakness	4 (2)	6 (2)	3 (2)
Constipation	1 (0.1)	5 (2)	0 (0)
Increased breathing difficulty	4 (2)	9 (4)	0 (0)
Aspiration pneumonia, or fever event	7 (3)	8 (3)	4 (3)
Participant hospitalized at least once	52 (20)	51 (20)	23 (19)
Participant hospitalized at least once at an adverse experience	4 (2)	10 (4)	5 (4)
Death (adverse event)	32 (12)	29 (11)	14 (11)
Spontaneous adverse event†	71 (29)	66 (26)	34 (26)

\* Adverse events occurring in at 10 participants or clinically meaningful events are listed.

† Life-threatening adverse experiences, hospitalizations, or death.

## A New Approach: Free Water Protocols

- The Free Water Protocol was first implemented in 1984 at The Frazier Rehabilitation Institute in Louisville, Kentucky
- Why was it developed?
  - Patients were secretly drinking thin liquids
  - Patients were refusing to drink thickened liquids
- The Free Water Protocol was implemented to help manage the risk of aspiration pneumonia for these patients and improve their quality of life
- The Free Water Protocol allowed the healthcare team to prioritize a patient's health and improve quality of life and satisfaction.

## What is the Free Water Protocol?

- A set of guidelines that:
  - allows access to water for *specific individuals* with thin-liquid dysphagia
  - *Supplement* thickened liquids with access to unthickened water in an attempt to improve hydration and enhance quality of life
  - Reduce the risk of aspiration pneumonia
- Why Water?
  - Water has a neutral pH and can be safely absorbed by the lungs *as long as no pathogens are present* (Panther, 2005)
  - Recall that aspiration pneumonia requires pathogenic bacteria to be introduced into the lower respiratory tract

## What are the Benefits of the Free Water Protocol?

- Reduced dehydration
- Increased quality of life:
- Satisfaction related to thirst and oral dryness (Garon et al., 1997)
- Satisfaction related to thirst and mouth cleanliness (Karagiannis, Chivers, & Karagiannis, 2011)

## Who Benefits from a Free Water Protocol?

- Individuals who are still likely to aspirate thin liquids
- Risk of aspiration pneumonia is reduced by adherence to protocol guidelines
- Individuals who can tolerate aspiration of small amounts of water
- There is a 6 step decision process to determine who is eligible for the Free Water Protocol (adapted from Carlaw et al., 2011)

## Free Water Protocol Guidelines (Cont.)

<p><b>Step 4:</b> Determining if the patient require suction for oral care:</p> <ul style="list-style-type: none"> <li>• Difficulty swishing or spitting during oral care</li> <li>• Difficulty managing oral secretions during oral care</li> </ul> <p>Yes → patient will need oral care plan with suction; Step 5</p> <p>No → Patient will need oral care plan without suction; Step 5</p>	<p><b>Step 5:</b> Determining if there are oral health concerns:</p> <ul style="list-style-type: none"> <li>• Ask questions regarding need of oral care assistance, presence of oral pain, bleeding gums, or oral ulcers</li> <li>• Complete the Oral Health Assessment Tool</li> </ul> <p>Yes or poor score → Refer to dentistry &amp; adapt oral care plan by adding appropriate intervention; Step 6</p> <p>No → Follow standard care plan; Step 6</p>
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Step 6: Implement plans for care for water protocol and oral hygiene

## Free Water Protocol Guidelines

Step 1: Did SLP clinical swallowing assessment indicate thin liquid dysphagia?  
 - Yes → Step 2  
 - No → Water Protocol N/A

<p><b>Step 2:</b> Are any exclusion criteria met?</p> <ul style="list-style-type: none"> <li>• Acute/unstable medical condition</li> <li>• Risk of cough ripping stitches or causing pain</li> <li>• Uncontrolled oral infection</li> <li>• Poor oral hygiene</li> <li>• Excessive coughing with oral intake of thin liquids</li> <li>• Active pneumonia or fever</li> <li>• Advanced degenerative neurological condition</li> <li>• Immobile or low mobility</li> </ul> <p>Yes → Water Protocol N/A                  No → Patient is eligible; Step 3</p>	<p><b>Step 3:</b> Determining if supervision during water intake is required:</p> <ul style="list-style-type: none"> <li>• Dependency for feeding?</li> <li>• Poor safety awareness?</li> <li>• Difficulty following protocol 'rules'?</li> <li>• Needs assistance with oral care?</li> <li>• Fluid intake concerns (e.g., restriction, excessive thirst)</li> <li>• Limited ability to obtain water (e.g., cognitive-communication or behavioural factors)?</li> <li>• Medical reasons for offering water?</li> </ul> <p>Yes → supervision required; Step 4                  No → supervision not required; Step 4</p>
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## The Importance of Oral Care



- Oral hygiene is *mandatory* in free water protocols
- Pathogenic bacteria in the oral cavity can be carried by plain water into the lungs and increase the risk of pneumonia (Langemore et al, 1998)
- Routine oral hygiene reduces aspiration pneumonia risk by removing pathogenic bacteria from the oral cavity and therefore preventing travel to the lungs

• <http://www.sajcd.org.za/index.php/sajcd/article/view/102/html/1469>

## Rules of Water Protocol

- Oral care is completed first thing in the morning, prior to oral intake
- Water is then permitted up until the client has any meal
- Swallowing strategies and precautions are used when swallowing water (e.g., chin tuck, head turn, etc.)
- The prescribed thickened liquid (i.e. nectar or honey thick) is used during meals
- Water is not allowed during the meal or for 30 minutes after the meal
- Oral care must be completed after each meal or snack
- All pills are taken with prescribed thickened liquid

## Research Evidence for Free Water Protocols

- Five randomized studies (Garon et al., 1997; Karagiannis, Chivers and Karagiannis, 2011; Carlaw et al., 2012; Pooyania et al., 2015; Murray et al., 2016) examining the use of a water protocol between 1995 and 2016 with a total of 127 subjects.
- **Aspiration pneumonia:** 4% studies no participant who drank thin water as part of the free water protocol developed aspiration pneumonia
- **Hydration:** 4% studies no patients developed dehydration
- **Total fluid intake:** 2% studies total fluid intake increased significantly
- **Satisfaction and quality of life:** 3% studies reported increased satisfaction and quality of life

## Summary Chart of Evidence

Study	Population Studied (n)	Primary Outcome	Major Findings
Garon, R., Fiegel, M., O'Brien, C. (1997)	Stroke rehabilitation patients who developed aspiration pneumonia during interventions (20) - 10 control, 10 intervention	No patient developed aspiration pneumonia during interventions during follow up	- Fluid intake increased in the intervention group compared to the control group and statistically significantly - All patients reported high satisfaction with access to water specifically related to their oral and dietary
Karagiannis, M. J. R., Karagiannis, T. C. (2011)	Stroke patients who developed aspiration pneumonia during interventions (76) - 34 control, 42 intervention	14.1% rate of aspiration pneumonia in the intervention group (9% in control group)	- All patients who developed lung complications had lower-degenerative disease and/or poor mobility - All patients who developed aspiration pneumonia were significantly higher in the intervention group compared to the control group - Intervention group patients reported (overall) higher levels of satisfaction with their oral and dietary - All control patients who developed aspiration pneumonia were significantly higher in the control group - Fluid intake increased in at least 19% in 11/17 participants - There were no reported high quality of life outcomes
Carlaw, C., Halderson, R., O'Brien, C., Mackinnon, C., Valler, J., D. Ford. (2012)	Rehabilitation patients who developed aspiration pneumonia during interventions (11) - 9 intervention, 2 control	No adverse events	- Fluid intake increased in at least 19% in 11/17 participants - There were no reported high quality of life outcomes
Pooyania, S., Pooyania, L., Dan, R., & Brackel, C. (2015)	Stroke or acquired brain injury patients with thin-liquid dysphagia (n=19)	No patient was hospitalized or died during the intervention period	- No statistically significant difference in the weekly total liquid intake between the groups - No statistically significant difference between the groups for perceived swallowing quality of life - There was significantly more diagnosis of further throat infections in the control group compared to the intervention group - No difference in satisfaction ratings between water and thickened liquids in the intervention group
Murray, J., Davidson, P., & Siskin, L. (2016)	Stroke patients with thin-liquid dysphagia (n=9 intervention)	No participant was hospitalized or died during the intervention period	- No difference in the total amount of fluid consumed between the groups - There was significantly more diagnosis of further throat infections in the control group compared to the intervention group - No difference in satisfaction ratings between water and thickened liquids in the intervention group

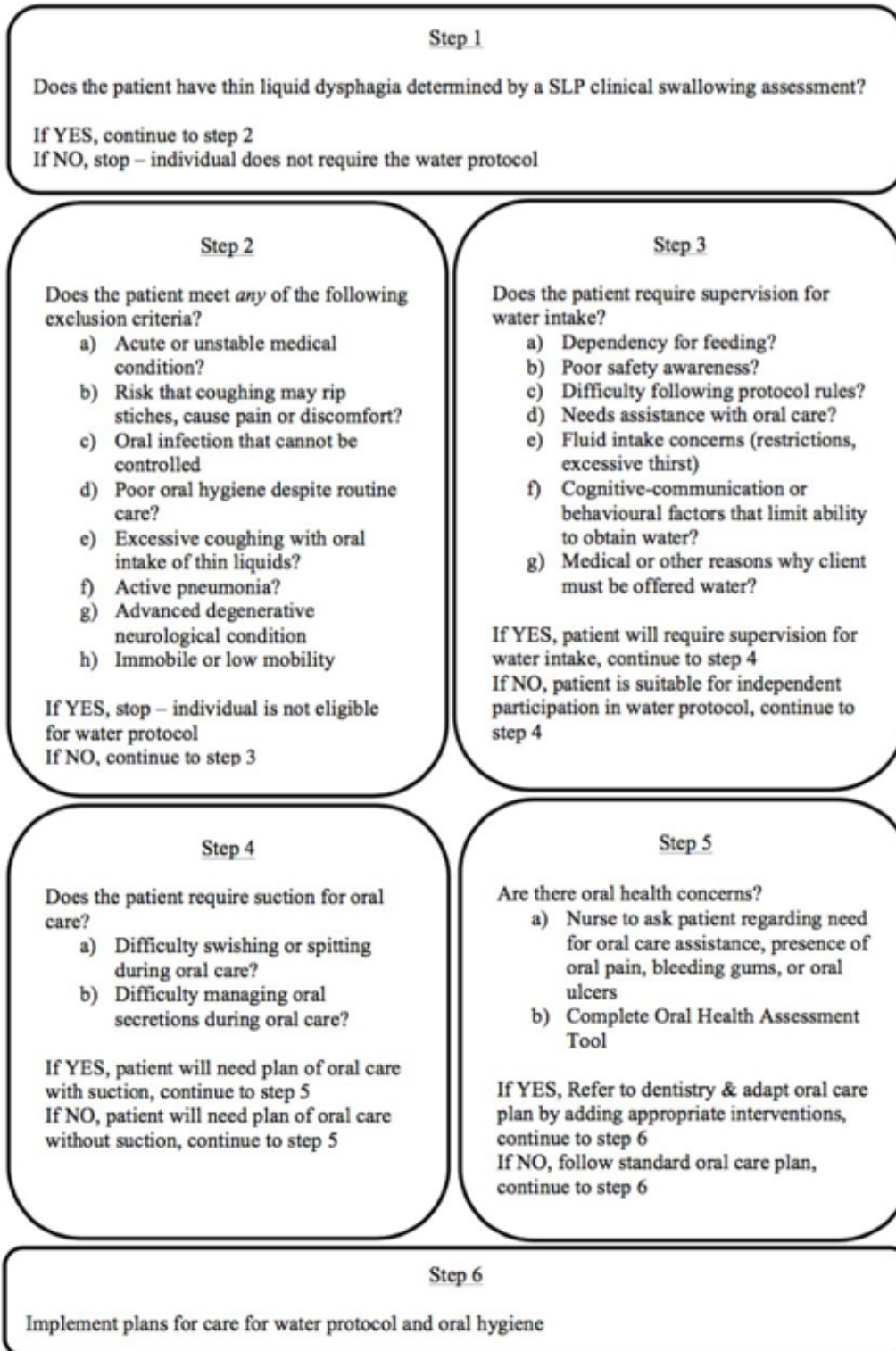
## Conclusion

- There has been a shift in practice and many institutions are now allowing the implementation of free water protocols for specific patients with thin-liquid dysphagia
- Importance of multidisciplinary teams
- Need more research

## Take-Home Message

- The research evidence supports the use of free water protocols for a subset of patients with thin-liquid dysphagia, minimal risk factors for aspiration pneumonia - and then only with proper oral hygiene.

**Appendix C: Adapted Decision Matrix Adapted from Carlaw et al., (2011)**



**Appendix D: Summary of the Evidence**

Reference	Population Studied (n)	Primary Outcome	Major Findings
Garon, B. R., Engle, M., & Ormiston, C. (1997).	Stroke rehabilitation patients with previously identified thin-liquid aspiration (20 = 10 control, 10 interventions).	- No patient developed pneumonia, dehydration or complications in either group during the study or 30-day follow up.	- Fluid intake was reported to increase in intervention group when compared to control group; ( <b>NOT</b> statistically significant). - All intervention group patients reported high satisfaction with access to water specifically related to thirst and oral dryness.
Karagiannis, M. J. P., Chivers, L., & Karagiannis, T. C. (2011).	Subacute patients in a tertiary community hospital who aspirate thin-liquids (6 = 34 control, 42 interventions).	- 14.3% rate of lung complications among intervention group while 0% among control group.	- All the patients that developed lung complications had neuro-degenerative disease and/or poor mobility. - Total daily oral liquid intake was significantly higher in the intervention group when compared to the control group. - Intervention group patients reported remarkably higher levels of satisfaction with drinks, level of thirst, and mouth cleanliness when compared to control group.
Carlaw, C., Finlayson, H., Beggs, K., Visser, T., Marcoux, C., Coney, D., et al., (2012).	Rehabilitation patients with confirmed thin-liquid aspiration (15 = 9 immediate implementation, 7 delayed implementation).	- No adverse events	- Fluid intake increased at least 10% of the calculated fluid requirements in 11/15 participants. - Participants reported high QOL outcomes.
Pooyania, S., Vandurme, L., Daun, R., & Buchel, C. (2015).	Stroke or acquired brain injury neuro-rehabilitation patients with thin-liquid dysphagia (16 = 6 control, 10 intervention).	No participants in either group developed aspiration pneumonia.	- No statistically significant difference in the weekly total liquid intake between the groups. - No statistically significant difference between the groups for perceived swallowing related quality of care.
Murray, J., Doeltgen, S., Miller, M., & Scholten, I. (2016).	Stroke patients with thin-liquid dysphagia from inpatient rehabilitation facilities (16 = 7 control, 9 intervention)	- No participant in either group was diagnosed with pneumonia  - No adverse events  No participants in either group developed aspiration pneumonia  No participant in either group was diagnosed with pneumonia.	- No difference in the total amount of fluid consumed between the groups. - 21% of the total sample was diagnosed with dehydration. - There was significantly more diagnoses of urinary tract infection in the control group compared to the intervention group. - No difference in satisfaction ratings between water and thickened-liquids for those in the intervention group.