Critical Review:
Does ingesting water increase the risk for adverse health effects in adults with oropharyngeal dysphagia who have been determined to aspirate thin fluids?*

Alexandra Butti
M.Cl.Sc (SLP) Candidate
Western University: School of Communication Sciences and Disorders

This critical review examines whether allowing oral intake of water for adult patients with oropharyngeal dysphagia who have been determined to aspirate thin fluids increases the risk for adverse effects on their health. The literature search yielded five studies, including three randomized clinical trial designs, one case control study, and one single subject design. Overall, the literature provides suggestive evidence that as long as adult patients meet certain criteria and specific rules and guidelines are followed, allowing these patients to ingest water does not increase the risk for any adverse health effects, however, further research needs to be conducted in order to draw any definite conclusions.

Introduction

Oropharyngeal dysphagia, which refers to difficulties swallowing due to problems in the mouth and/or throat, is a common problem that is associated with varying pathologies (Karagiannis, Chivers, & Karagiannis, 2011). As a result of oropharyngeal dysphagia, patients can experience aspiration events, in which substances such as food or drink, enter the lungs. Whether or not complications arise from this aspiration is dependent on the makeup of the substance being aspirated, as well as the patient's medical status or functional ability (Frey & Ramsberger, 2011). Although not every aspiration event leads to complications, it remains possible that a patient will suffer from aspiration pneumonia as a result (Frey & Ramsberger, 2011). Aspiration pneumonia is when substances, which contain pathogenic bacteria, enter the lungs and cause an infection that could be life-threatening (Carlaw et al., 2012).

In order to prevent aspiration pneumonia, a number of recommendations can be made, with the most common being the recommendation of thickened fluids (Garon, Engle, & Ormiston, 1997). Thickened fluids slow down the speed of the ingested material and extend the swallowing transit times (Carlaw et al., 2012). However, many patients dislike thickened fluids, resulting in patients potentially being at risk for dehydration, which can lead to further adverse complications and poorer quality of life (Frey and Ramsberger, 2011). Patients could also reject the recommendation altogether (Frey & Ramsberger, 2011).

In order to address this issue, water protocols have been developed in which carefully selected patients who do aspirate thin fluids are allowed to drink water while following a number of rules and guidelines (Carlaw et al., 2012). Even though water is a thin fluid, some argue that aspirating water does not cause harm, since it has a neutral pH balance and will be absorbed, unlike other thin fluids like coffee or pop (Frey & Ramsberger, 2011).

Objectives

The primary objective of this paper is to consolidate as well as critically evaluate existing literature that focuses on examining the effects of allowing oral intake of water to adult patients who have oropharyngeal dysphagia and who have been determined to aspirate thin fluids. Clinical implications of the results from the literature will also be discussed.

Methods

Search Strategy

Online databases, such as Scopus, PubMed, Scholars Portal, ScienceDirect, and Google Scholar were searched using the following terms:

> (water protocol) OR (intake of water) AND (dysphagia) OR (aspiration)

Furthermore, the reference lists from each identified paper were reviewed manually in order to find any paper that may have been missed by the aforementioned search criteria.

Selection Criteria

Selected studies must have been written in English with no limitations on publication date. Participants of the included studies were required to be adults with oropharyngeal dysphagia who have been determined to aspirate thin fluids.

No limitations were set on how aspiration was determined or the medical diagnoses of participants.

** This paper was created as a required assignment for the CSD9639 Evidence Based Practice for Clinicians course at Western. While it has been evaluated by course instructors for elements of accuracy and style, it has not undergone formal peer-review.*

Participants must also have been allowed some form of oral water intake by the researchers.

Data Collection

The search and selection criteria described above resulted in five studies applicable to this critical review. These included three randomized clinical trial designs, one case control study, and one single subject design.

Results

Garon, Engle, and Ormiston (1997) used a randomized clinical trial design in order to examine the effects of oral ingestion of water on 20 adult patients who had suffered a recent cerebrovascular accident but had adequate cognition, and who have been determined to aspirate thin fluids via videofluroscopy. The researchers randomly assigned the participants to either a control group (n = 10), in which they had access to thickened fluids only, or to a study group (n = 10), in which they had access to thickened fluids, as well as water between meals. The adverse effects measured were dehydration, occurrence of aspiration pneumonia, and intravenous fluid being needed. They also measured patient satisfaction, how long it took until the patient no longer aspirated, and the amount of thickened fluid and/or water that was ingested.

By the end of the study, including a 30 day follow-up period, no participant developed any adverse health effects. Of all the variables that were measured, the researchers reported that the only significant difference was that the control group ingested more thickened fluids than the study group. They also reported that the patients in the study group were much more satisfied than those in the control group.

Strengths of the study include a detailed outline of the characteristics of each participant and inclusion/exclusion criteria. How the study was carried out was also described at length, and the researchers made a point to educate each staff and family member involved about the procedures of the study. Limitations of the study include the small sample size (n = 20). The researchers never described which statistical tests were used, so it is impossible to determine whether they were appropriate. They also failed to describe the multiple response questionnaire that they used to measure patient satisfaction. Due to the two points above, replicating this study is not possible. Furthermore, researchers did not blind those individuals completing the outcome measures, which could lead to biases in data collection.

Overall, the research provides suggestive evidence that patients who are cognitively intact do not suffer any adverse health effects from the ingestion of water and seem to be more satisfied with their diet. However, as concluded by the authors, research on a larger scale must be carried out before any definite conclusions are drawn.

Karagiannis, Chivers, and Karagiannis (2011) used a randomized clinical trial design to study 76 adult patients from a subacute unit with a variety of medical issues. Each patient had dysphagia and was confirmed to aspirate thin fluids. The patients were randomly assigned to either the control group, in which they received thickened fluids only for eight days (n = 34), or to the intervention group, in which they received thickened fluids for three days and thickened fluids with access to water for five days (n = 42). Before the implementation of the above diet, staff was provided education, strict guidelines for oral care for every patient, as well as instructions as to when water could be provided. Once the diet was implemented, researchers tracked daily fluid intake, chest status and core body temperature. Quality of life surveys were also administered at the beginning and end of the study to 18 participants (5 from the control group, 13 from the intervention group).

Researchers found that six patients from the intervention group developed complications related to the lungs and an increase in their core body temperature when these complications arose. It is worthwhile to note that these six patients were either immobile or had low mobility, and all suffered from neurological dysfunction or an intellectual disability. In regards to fluid intake, when the patients in the intervention group were allowed to drink water, intake of fluids increased and these participants also consumed more fluids than their counterparts in the control group according to appropriate statistical tests (i.e., paired t-tests). In fact, two participants in the control group required intravenous fluid. Of the patients who completed the quality of life survey, those in the intervention group were more satisfied with what they were drinking, their mouths felt cleaner, and they were not as thirsty as compared to those in the control group according to appropriate statistical tests (i.e., paired t-tests).

A strength of this paper is the extremely thorough discussion about the participant selection process, as well as the detailed description of participant characteristics. The authors also outlined the design step-by-step, including how they collected data, making it easy to replicate. Some limitations of the study include the fact that the duration of the study was short (8 days total, with only 5 of those days implementing participants' access to water) and there was no monitoring for adverse effects once the study was

completed. Also, biases could have been present in terms of completion of outcome measures, as researchers did not specify whether those completing the measures were blinded. The quality of life measure is also a limitation as only 5 participants from the control group and 13 participants from the intervention group completed it, as the majority could not complete it due to cognitive inability.

Overall, these results provide suggestive evidence that patients with low mobility and severe neurological dysfunction are at a higher risk to experience adverse health effects from ingesting water. Therefore, patients with this profile should follow their recommended modified diet.

Carlaw et al. (2012) conducted a randomized clinical trial in which 15 adult participants with oropharyngeal dysphagia who have been determined to aspirate thin fluids were either given regular care with no oral water intake (n = 7), or participated in the GF Strong Water Protocol (GFSWP), where oral intake of water was permitted following the guidelines of the protocol (n = 8). The researchers wanted to determine whether the participants in the latter group (a) were adversely affected when allowed to drink water as compared to the former (i.e., development of aspiration pneumonia, initiation of tube-feeding or intravenous fluids, or acute-care hospitalization), and (b) had better quality of life, as measured by the Swallowing Quality of Life (SWAL-QOL) questionnaire. Fluid intake was also measured using the nurses' 24-h fluid intake charts. These outcomes were measured for 14 days with adverse events continuing to be monitored until patient discharge.

The researchers determined that neither group experienced any adverse effects during the initial 14-day monitoring period or until discharge. They also determined that participants in the GFSWP group had greater fluid intake, using an appropriate nonparametric analysis, and overall improvements on SWAL-QOL scores, using an appropriate univariate ANOVA, as compared to those in the control group.

Strengths of this study included an easily reproducible design and method to test the question. The characteristics of the eligible participants were clearly outlined and each participant was randomly assigned to his/her respective group. A standardized measure (SWAL-QOL) was also administered to evaluate quality of life. However, some limitations of this study included the small sample size (n = 15), the short amount of time the researchers monitored fluid intake (14 days), as well as the fact that the researchers did not blind those individuals completing the outcome measures, which could lead to biases. It is also worthwhile to note that the researchers did not examine the impact that the safe swallowing strategies and techniques the participants were implementing had on their aspiration status. These techniques were part of regular standard care and only a select number of participants from either group were recommended these strategies. Furthermore, the researchers mentioned the incidence of pneumonia in the test facility was relatively low to begin with, and that the lack of adverse effects may have been due to not only the GFSWP exclusion criteria (i.e., the participants were not seriously ill) but also to the strict oral care guidelines in the protocol. The researchers also cautioned that their results may not generalize to facilities where interdisciplinary collaboration and support is not available.

Overall, the research provides suggestive evidence that no adverse health effects arise from the ingestion of water in patients as long as they meet the eligibility criteria of the GFSWP and the rules and guidelines of the protocol are adhered to.

Frey and Ramsberger (2011) conducted a retrospective case control study to determine what impact oral ingestion of water had on aspiration pneumonia in 58 adult patients who had confirmed dysphagia after a Cerebrovascular Accident. Medical records were reviewed, and the researchers statistically matched a group of patients who had been involved in the water protocol administered in the hospital (water group; n = 30) to a group of patients who were given a thickened fluids only diet (no water group; n = 28) based on a number of characteristics. Patient charts were examined further to look for a code indicating the patient had aspiration pneumonia during his/her stay in the hospital.

Using appropriate statistical tests (i.e., t-tests) the researchers found that there was no significant difference between the two groups in how long the patients stayed in the hospital or in their Functional Independent Measure scores at the time of admission or discharge. Furthermore, out of the 58 patients reviewed, only two from the no water group had aspiration pneumonia.

The researchers provided an informative explanation of the water protocol implemented in the hospital. They also provided descriptive statistics of the participants and explained how they matched participants from either group. However, since this is a retrospective study, relevant information may not have been included in the medical records of the patients that could have potentially made them inadequate matches. Another

limitation is the fact that in those patients who developed aspiration pneumonia, co-morbidities could have been present that were not in the medical records that may have put them at greater risk to develop aspiration pneumonia. Furthermore, of the participants included in the study, only 22 had been determined to aspirate thin fluids. It is also worthwhile to note that the nature of the water protocol itself, with its rules and guidelines regarding important areas like exclusion criteria (e.g., patients with impaired cognition or who were impulsive were not eligible to be included in the protocol), oral care, and feeding positioning, could have in itself reduced the risk for aspiration pneumonia, as these same rules were not placed on the no water group. Finally, although the researchers acknowledged the fact that patient satisfaction and hydration would have been ideal to measure, due to nature of the study, this information was not available.

Overall, this research provides suggestive evidence that as long as the water protocol is followed including exclusion criteria, oral care, and feeding positioning, there does not seem to be any adverse health effects associated with giving water to those eligible patients who aspirate thin fluids.

Karagiannis and Karagiannis (2014) used a single subject design in which they carefully selected 16 mobile patients who had relatively good cognitive ability and confirmed oropharyngeal dysphagia. In the first part of the study, all staff who worked with patients who had dysphagia were educated, and an oral hygiene protocol was enacted. In the second part, participants were monitored for five days while ingesting their modified diet of thickened fluids. They were then allowed to drink water in addition to their modified diet (intervention period), followed by another five day monitoring period. Chest examinations were performed daily, as well as full blood examinations and nasal swabs on the first and last day of the intervention period, in order to check for any infections. The amount of water and thickened fluids was measured daily, and quality of life surveys were given to 11 participants pre- and post-intervention.

The chest and blood examinations as well as the nasal swabs were negative for all participants. Using appropriate statistical tests (i.e., paired t-tests), the researchers reported that quality of life increased in regards to quality of drinks, hydration, and oral mouth care from the pre- to post-intervention period, also fluid intake increased significantly during the intervention period. It should be noted that four participants required intravenous fluid for the full period of the study, and three required it at some point during the study (ranging from one to three days).

Strengths of the paper include the researchers' detailed description of participant characteristics. They also provided informative graphs for their measurements of hydration by participant, as well as a graph showing the responses to the quality of life questionnaire. These were helpful to see how each individual patient fared in comparison to one another. Some limitations include the fact that the length of the intervention period was not explicitly stated, which limits reproducibility. Reproducibility is further limited due to the fact that although the researchers stated that each participant was on a modified diet of thickened fluids, they do not provide any evidence as to how this was decided (i.e., clinical bedside swallowing assessment?, Modified Barium Swallow study?, Videofluoroscopic Swallowing study?). Also, the researchers did not discuss the impact of the intravenous fluid on the study. Finally, not all participants completed the quality of life surveys, and there was not an explanation as to why. Since there were no reasons given, it is impossible to understand why this quality of life survey may not have been appropriate for certain patient profiles. The *n* for the surveys was also very low, therefore, this makes it unrepresentative for all patients in the study.

Overall, this research provides suggestive evidence that patients who have low to no mobility and who have poor cognitive function, should adhere to a modified diet. However, if the patients meet the Frazier Rehabilitation Centre free water protocol criteria and the guidelines are followed, there should be no reason to deviate from this protocol.

Discussion

The studies reviewed in this paper provide suggestive evidence that as long as dysphagic adult patients meet certain criteria (i.e., are not seriously ill and have relatively good cognitive ability and mobility) and specific rules and guidelines are followed (i.e., in areas such as oral care and feeding positioning), allowing these patients to ingest water does not increase the risk for any adverse health effects. Fluid intake was also measured in three papers, which showed an increase in volume for the patients ingesting water. Although the four papers that measured quality of life showed an increase for those patients receiving water, weaknesses with the measures do not allow any conclusions to be drawn about quality of life.

The above results are suggestive due to a number of limitations identified throughout the papers reviewed. Although each paper had unique limitations of its own, recurring weaknesses were evident, with the first being the number of participants in the studies, as only two out of the five studies had adequate sample sizes.

Another common limitation throughout the papers was the duration of the intervention period, as multiple studies either had short intervention periods (5-14 days) or failed to state the length of the intervention period altogether, the latter of which is a reproducibility issue. Some studies also failed to study the impact of certain key factors that may have made a difference in their overall conclusions (i.e., safe swallowing strategies in the Carlaw et al. (2012) paper and intravenous fluid in the Karagiannis and Karagiannis (2014) paper). It is worthwhile to note that none of the studies blinded the individuals who were completing the outcome measures as to which group the patients were in, which could lead to biases. Furthermore, since most studies carefully selected patients and followed guidelines and rules in regards to areas like oral hygiene and feeding positioning, generalizability of the results to all patients with oropharyngeal dysphagia who aspirate thin fluids is not possible.

Although this review was not specifically targeting quality of life, it is worthwhile to mention the limitations in its measurement. When quality of life was measured, only one study used a standardized questionnaire (SWAL-QOL), while the remaining studies either used a limited number of questions or failed to describe the questionnaire altogether. Furthermore, some studies had a limited number of participants completing the measure due to poor cognitive ability.

Conclusion

The current literature examining the effects of oral ingestion of water by adult patients with oropharyngeal dysphagia who aspirate thin fluids is suggestive due to the limitations outlined above. Additional research must be conducted in order to draw any definite conclusions. Some suggestions for future research that address the aforementioned limitations include increasing the sample size, increasing the length of intervention, and blinding those individuals completing the outcome measures. Future research may also benefit from designing and implementing more effective quality of life measures, as well as including other baseline measures (e.g., standardized measures of mobility, cognition, etc.) related to the patients in order to determine patient differences and determine ideal candidates for the protocol.

Clinical Implications

Although this literature review did not result in any definite conclusions, the evidence does seem to suggest that allowing water to carefully selected patients, while following specific rules and guidelines, does not seem to result in any adverse health effects and may even increase fluid intake. Having said that, due to the limitations in the research, Speech-Language Pathologists must be cautious when considering this as a treatment option and must carefully select patients and adhere to rules and guidelines if it is chosen. If studies with more conclusive evidence are published, adhering to these water protocols may be a way to combat the issues many Speech-Language Pathologists face when recommending thickened fluids, such as patient compliance and quality of life issues, as well as dehydration and additional adverse health effect concerns (Frey & Ramsberger, 2011).

References

Carlaw, C., Finlayson, H., Beggs, K., Visser, T., Marcoux, C., Coney, D., & Steele, C. M. (2012). Outcomes of a pilot water protocol project in a rehabilitation setting. *Dysphagia, 27,* 297-306.

Frey, K. L., & Ramsberger, G. (2011). Comparison of outcomes before and after implementation of a water protocol for patients with cerebrovascular accident and dysphagia. *American Association of Neuroscience Nurses, 43*(3), 165-171.

Garon, B. R., Engle, M., & Ormiston, C. (1997). A randomized control study to determine the effects of unlimited oral intake of water in patients with identified aspiration. *Journal of Neurologic Rehabilitation, 11,* 139-148.

Karagiannis, M., Chivers, L., & Karagiannis, T. C. (2011). Effects of oral intake of water in patients with oropharyngeal dysphagia. *BMC Geriatrics, 11*(2), 9.

Karagiannis, M. & Karagiannis, T. C. (2014). Oropharyngeal dysphagia, free water protocol and quality of life: an update from a prospective clinical trial. *Hellenic Journal of Nuclear Medicine, 17*(1), 26-29.