

Critical Review:

Does implementation of a water protocol improve quality of life for individuals with thin liquid restrictions?

Ayesha Johnson

M.Cl.Sc SLP Candidate

University of Western Ontario: School of Communication Sciences and Disorders

This critical review examined the effects of a water protocol on quality of life in patients with dysphagia restricted to thickened liquid. A literature search yielded a mix of randomized control trials, a single group intervention study, and conference abstracts which employed an array of statistical analyses. Overall, there are mixed findings regarding the implementation of a water protocol and quality of life. Evidence for the use of a water protocol ranged from equivocal to somewhat suggestive. Experimental limitations, clinical recommendations, and suggestions for future research are discussed.

Introduction

Difficulty swallowing or dysphagia is a common clinical issue that is associated with a range of pathologies such as stroke, head and neck cancer, acquired brain injury, and Alzheimer's disease (Carlaw, Finlayson, Beggs, Visser, Marcoux, & Coney, 2012; Chouinard, 2000; Marik & Kaplan, 2003; Murray, Doeltgen, Miller, & Scholten, 2016). Dysphagia is characterized by aspiration (i.e. foreign material going below the level of the vocal folds) and difficulty moving food through the system (Altman, Yu, & Schaefer, 2010). A number of negative outcomes are associated with aspiration including restricted fluid intake, malnutrition, dehydration, and aspiration pneumonia. The latter complication, aspiration pneumonia, is particularly serious and can lead to death (Murphy & Gilbert, 2009). It should be noted that risk of aspiration differs based on the consistency of the materials being ingested. Generally speaking, thin liquids pose considerable risk due to the requisite musculature control to contain and transfer a liquid bolus.

One of the most common approaches to dysphagia management is modification of diet consistency. For reasons outlined above, liquids are often modified to a more thickened consistency to improve bolus management and reduce the risk of aspiration. It must be acknowledged, however, that thickened liquids may not provide the same experience for quenching thirst, comfort with swallowing, sensation of oral cleanliness and satisfaction with drinking. Indeed, patients have been reported to dislike thickened liquid, and there is poor patient compliance with this diet modification (Garcia, Chambers, & Molander, 2005; Murray, Doeltgen, Miller, & Scholten, 2014). As a result, patients may either go without proper hydration or persist in drinking thin liquids placing themselves at risk of aspiration.

In order to improve patient compliance with a thickened liquid diet, one suggestion has been to allow thin water intake at designated times. Water is a potentially innocuous substance that is readily absorbed by the body, and as such, poses little risk for the development of pneumonia even if it is aspirated. As well, water intake is a normalizing experience that has the potential to make people feel less thirsty thereby increasing intake, providing comfort, and positively impacting health related quality of life (Gillman, Winkler, & Taylor, 2017; Panther, 2005). These ideas have led to the development of a water protocol, a protocol to allow oral water intake when a patient is otherwise on a thickened liquid diet. Typically a water protocol allows access to thin pure water at designated safe points (i.e. between meals and at least 30 minutes after eating). Thorough oral cleaning must take place prior to consumption of the thin water. Water protocols often include a staff education component. Patient supervision is sometimes required if the patients are impulsive or cannot follow the recommended strategies (Gillman et al., 2017).

Evidence suggests that with careful patient selection, the occurrence of aspiration pneumonia is not increased during the implementation of a water protocol (Gillman et al., 2017). Nevertheless, the potential positive impact of water protocols is not well understood. A water protocol may have the potential to increase health-related quality of life without increasing the incidence of aspiration pneumonia.

Objectives

The purpose of this critical review was to evaluate the existing literature to determine the impact of a water protocol on quality of life in patients with dysphagia restricted to thickened liquid.

Methods

Search Strategy

Online databases (PubMed, Web of Science and Scopus) were searched using the following search terms: (free water protocol) OR (oral intake of water) AND (dysphagia) OR (thin liquid aspiration) AND (quality of life)

Selection Criteria

Studies selected for inclusion were required to contain the implementation of a water protocol in patients with thin liquid aspiration and evaluate the impact on health-related quality of life.

Studies were limited to adult patients (over the age of 16) with thin liquid aspiration identified via a bedside swallowing examination (BSE) videofluoroscopic Swallowing Study (VFSS) and/or fiberoptic endoscopic evaluation of swallowing (FEES).

Data Collection

The results of the literature search yielded eight studies that met the selection criteria: five randomized control trials, one single group study, and two conference abstracts.

Results

Carlaw et al. (2012) conducted a small prospective randomized control trial to compare the occurrence of adverse events, fluid intake, and quality of life in adults with dysphagia randomized to either a water protocol implementation group (n=9) or a delayed implementation group (n=7). Participant inclusion criteria were well described, and a gold standard dysphagia assessment approach was used to confirm thin liquid aspiration. Swallowing quality of life was assessed using an appropriate standardized questionnaire, which is the variable of interest in this critical review. Fluid intake was monitored over the span of 14 days and quality of life was assessed at the start and end of the two weeks.

Results were compared using appropriate parametric statistics, although the immediate and delayed implementation groups were collapsed for the intervention data and compared to the delayed implementation group as the control data. An appropriate questionnaire subscale composite score was calculated (comprising of symptom, burden, mental health, fear and fatigue subscales) to detect subtle differences in quality of life. Results revealed a significant difference with a strong effect size in the subscale composite score from baseline to post-intervention. There was also a mean improvement in the subscales related to the impact of symptoms and fear

associated with swallowing. This study provides somewhat suggestive evidence that quality of life improved following two weeks on a water protocol.

Karagiannis, Chivers, & Karagiannis (2011) conducted a prospective quasi-randomized control trial with two age- and sex- matched groups of adults with dysphagia who either did (n=42) or did not (n=34) receive a water protocol intervention. The authors compared lung related complications, hydration levels, and quality of life between groups, for which only the latter is relevant to the present review. The participant inclusion criteria were appropriate, although only data from subacute participants were included, and limited information was provided regarding the omitted data of 15 acute patients. Swallowing was assessed behaviourally and/or using VFSS. A non-standardized 4-question survey was employed to assess quality of life pre- and post- intervention, although no explanation was provided regarding the question selection. An appropriate pictorial based rating scale was used to collect patient responses. Fluid intake was monitored over the span of 5 days and patient satisfaction was assessed at the start and end. The short duration of the implementation puts into question the validity of the study results.

Appropriate statistical analysis revealed that the intervention group had significantly higher levels of satisfaction with drinks, level of thirst, and mouth cleanliness. There were no differences found in overall positive feeling, albeit the inappropriate choice of a nonspecific question (“How are you feeling?”) may have influenced this finding. These results may be biased as only 24% of the patients (5 control group patients and 13 intervention group patients) completed the quality of life surveys. This study provides somewhat suggestive evidence that a water protocol could improve quality of life related measures.

Karagiannis & Karagiannis (2014) followed up their 2011 research by conducting a single group pre- and post- intervention study with 16 adults with dysphagia to investigate the effects of a water protocol on quality of life, and other variables not of interest to the present review. Participant inclusion and exclusion criteria were only broadly described. Dysphagia was identified through a bedside swallowing study, but no instrumental assessments were conducted to confirm thin liquid aspiration. Fluid intake was monitored over the span of 5 days and patient satisfaction was assessed at the start and end. Eleven participants, only 69% of participants, completed a non-standardized 4-question survey to assess quality of life pre and post intervention. Survey scores were calculated based on an appropriate pictorial based rating scale. The use of parametric statistics may

have been liberal, given the small sample size. The lack of a control group and the short duration of monitored implementation are also weaknesses of this study.

Results revealed a significant difference in the survey questions related to quality of drinks, hydration and oral mouth care. However, no significant difference was found in general well-being between pre- and post-survey results. Overall, this study provides somewhat suggestive evidence that implementation of a water protocol positively impacts quality of life related measures.

In another prospective randomized control study **Pooyania, Vandurme, Daun, & Buchel (2015)** sought to compare the effects on lung health, fluid intake, swallowing related care, and quality of life between adults with dysphagia who either were (n=10) or were not (n=6) on a pilot water protocol for on average 4.3 weeks. The participant criteria were thorough and well described, and thin liquid aspiration was confirmed using gold standard objective approaches. An appropriate and validated questionnaire of swallowing quality of life was included, which is the variable of interest in this critical review. However, this data was omitted from the report due to insufficient data collection. Given the lack of results in the main variable of interest, this study provides equivocal evidence for this critical review.

Garon, Engle, & Ormiston (1997) conducted a prospective randomized control trial to investigate the effects of a water protocol on lung health, fluid intake and patient satisfaction, for which only the latter is relevant to the present review. Patient inclusion and exclusion criteria were well described, and a small sample of 20 patients were randomly assigned the control (n = 10) or intervention (n = 10) group. VFSS, a gold standard assessment approach, was used to confirm thin liquid aspiration. The water protocol implementation lasted for on average 19 days and fluid intake was monitored throughout. Very limited information was provided regarding the patient satisfaction questionnaire development and questions, and only follow-up survey information was collected; both of which put into question the validity of the survey results.

Limited details were provided regarding the survey result analysis, although results were described anecdotally. These factors may have confounded the authors' results regarding participant satisfaction. The authors indicated that all the intervention group participants reported high satisfaction with access to water, participant comments were related to thin water assisting with quenching thirst and oral dryness. In

addition, 90% of control group participants reported displeasure with thickened liquids. Overall, this study provides somewhat suggestive evidence that a water protocol may positively impact patient satisfaction.

Murray et al. (2016) conducted a two-armed parallel randomized control trial to evaluate the effects of a water protocol on hydration status, health outcomes of dehydration, and patient satisfaction which is the variable of interest in this critical review. The inclusion and exclusion criteria were well defined and described. A small sample size of sixteen participants were randomly assigned the control (n=6) or intervention (n=8) group, no significant demographic differences were found between the two groups. Thin liquid aspiration was assessed through bedside swallow examinations and VFSS, however a gold standard instrumental assessment was not completed for all patients. Fluid intake was monitored over the span of 14 days and patient satisfaction was assessed on day 0, 7 and 14. A non-standardized 5 question survey was used to collect data on patient satisfaction, specifically regarding coughing, distress, taste, thirst quenching, feel in mouth, and fluid preference. An appropriate Likert scale of five pictorial responses was used to make the questionnaire accessible to participants with cognitive and communication impairments. Appropriate statistics were used to analyze patient satisfaction scores between the two groups.

Results revealed no significant differences in patient satisfaction ratings between water and thickened liquids. No significant differences between groups were found in questions relating to coughing, distress, taste and thirst. These findings provide somewhat suggestive evidence that there is no significant difference in satisfaction levels between groups given access to thin water and thickened liquid, and groups with access to solely thickened liquid.

Kenedi et al. (2013) investigated the effects of a water protocol and the rates of adverse health events, changes in diet, length of stay in hospital, and participant satisfaction which is the variable of interest in this critical review. Forty-three participants were randomly assigned to either the control group (n = 21) or the intervention group (n = 22). As this is a conference abstract the participant inclusion criteria, methods, and statistical analysis were not well described. The authors' findings reveal that 100% of the intervention group indicated improvements in dry mouth and 87% of the intervention group indicated the thin water quenched thirst. Approximately 50% of all participants indicated satisfaction with thickened liquids. However, it should be noted that only 37% of patients completed the satisfaction survey, which may have biased these

results. This conference abstract provides equivocal evidence to this critical review as not enough information is provided to properly evaluate the study.

In a conference abstract, **Schwarz et al. (2017)** describe a study that will investigate the barriers and facilitators of implementing a water protocol in a rehabilitation unit. This study hopes to collect information on incidence of compliance with oral care regime, oral hygiene ratings, adverse events, fluid intake, and staff and patient satisfaction surveys. The conference abstract provides minimal details about the study, and therefore it is not possible to judge the appropriateness of their methods. As this study has not been completed, it currently provides equivocal evidence to this critical review.

Discussion

Diet modifications including thickened liquids are a common management option for adults with dysphagia. Water protocols have been introduced to allow patients on thickened liquid diets access to water. In 2017, a systematic review examining health outcomes indicated that the implementation of a water protocol did not result in higher levels of lung complications or dehydration, at least for patients without degenerative neurological conditions and relatively intact mobility and cognition (Gillman et al.). The present review examined the impact of water protocols on quality of life.

A total of eight studies addressing quality of life outcomes in patients on a water protocol were identified. Overall, four of these provided somewhat suggestive evidence that a water protocol positively impacts quality of life (Carlaw et al., 2012; Garon et al., 1997; Karagiannis et al., 2011; Karagiannis et al., 2014). In contrast, one study provided somewhat suggestive evidence that a water protocol did not impact quality of life (Murray et al., 2016). Three studies provided equivocal evidence (Kenedi et al., 2013; Pooyania et al., 2015; Schwarz et al., 2017).

Most of the studies examined in the present critical review measured quality of life in different ways. Some studies (Carlaw et al., 2012; Pooyania et al., 2015) chose a dysphagia specific quality of life measure, the Swallowing Quality of Life questionnaire, which is a validated and reliable tool (McHorney, Robbins, Lomax, Rosenbek, Chignell, Kramer & Bricker, 2002). However, most of the studies in the present review utilized unstandardized patient satisfaction questionnaires (Garon et al., 1997; Karagiannis et al., 2011; Karagiannis et al., 2014; Murray et al., 2016). The authors in these studies did not rationalize the question

selection process, and often included only five or fewer questions. Use of these limited questionnaires likely fails to fully sample the construct of quality of life, thereby raising questions regarding the validity of the findings.

Although a number of the studies employed a RCT design (Carlaw et al., 2012; Garon et al., 1997; Karagiannis et al., 2011; Kenedi et al., 2013; Murray et al., 2016; Pooyania et al., 2015), the lack of consistency in findings across studies could be influenced by several notable weaknesses. These weaknesses included as short implementation time, small sample size, lack of robust statistical analysis, and only post-intervention questionnaire data. These factors must be taken into account when drawing conclusions from these studies.

It is recommended that future research seeks to determine the most appropriate way to measure quality of life during the implementation of a water protocol. In addition, it would be interesting to examine what effect, if any, the type of hospital setting has on quality of life during the implementation of a water protocol.

Clinical Implications

Although only modest evidence exists that a water protocol improves quality of life, it is possible that access to thin water could still be important for individuals suffering complex medical condition. A growing body of evidence indicates that the implementation of a water protocol in carefully selected patients does not result in higher levels of lung complications (Gillman et al., 2017). Given this information, clinicians can consider implementation of a water protocol on a case by case basis with appropriate outcome monitoring as it could potentially have a positive impact on certain aspects of quality of life.

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