

Read & Watch: Lecture Summary



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Scientific evidence of the impact of thickened liquids on penetration and aspiration

Speaker biography

Catriona M Steele is a clinician-scientist working in the area of swallowing and swallowing disorders. She has a background as a medical speech-language pathologist and is Director of the Swallowing Rehabilitation Research Laboratory (www.steeleswallowinglab.ca) at the KITE Research Institute, the research arm of the Toronto Rehabilitation Institute – University Health Network. Dr Steele holds a Canada Research Chair in Swallowing and Food Oral Processing and is a Professor in the Department of Speech-Language Pathology, Rehabilitation Sciences Institute, Temerty Faculty of Medicine at the University of Toronto. She also teaches in the Master of Deglutology programme at the Katholiek University of Leuven in Belgium.

Professor Steele holds research funding from the National Institutes of Health (USA), as well as several active industry partnerships. A full list of her publications can be accessed at <https://www.orcid.org/0000-0002-4294-6561>. She is an associate editor for the Dysphagia journal and a member of the editorial board for the Journal of Texture Studies. She is also a founding and current member of the Board of Directors for the International Dysphagia Diet Standardisation Initiative (www.iddsi.org). Catriona is a current board member of the Dysphagia Research Society, and will serve as President for 2024-2025.

Abstract

Oropharyngeal dysphagia (OD) is prevalent in several at-risk populations. In the United States, OD affects 6.7% of hospitalized patients¹. In post-acute care patients, compared to those without OD, is associated with: longer length of stay (8.8 days vs 5.0 days), more in-hospital mortality (1.7 times) and a higher likelihood of discharge to a post-acute care facility (33%)^{1,2}. Similar results have been reported for Europe³.

Individuals with dysphagia are often advised to use thickened liquids as a therapeutic strategy to limit the risk of penetration and aspiration⁴. However, questions persist regarding the impact of bolus consistency on swallowing safety, and whether thickened liquids effectively reduce either the frequency or severity of aspiration and silent aspiration. The standard method for grading the severity of penetration and aspiration is using the 8-point Penetration-Aspiration Scale (Table 1)⁵. Scores of 1 and 2 are seen in healthy swallowing involve either no airway invasion, or transient entry of material into the laryngeal vestibule leaving no residue behind. Scores of 3-5 are assigned for penetration of material into the laryngeal vestibule, while scores of 6-8 involve aspiration of material below the true vocal folds^{5,6}.

In both clinical practice and research, it is common to summarize swallowing safety based on the worst PAS score seen for each consistency, and to summarize scores across repeated bolus trials. These summarization practices represent bias in prior analyses. In this talk, Professor Steele will share the results of a recent analysis, using a Bayesian multilevel ordinal regression model approach^{7,8} to evaluate the impact of liquid consistency on PAS scores, considering all 8 levels of the scale across repeated bolus trials.

This analysis combined data from two prior studies funded by Nestle Health Science, involving a total of 678 adults with suspected dysphagia (289 female; mean age 68 years, range 20-100). All participants underwent videofluoroscopy involving ≥3 boluses of 20% w/v barium prepared using a xanthan-gum thickener (ThickenUp® Clear, Nestlé Health Science) to the following consistencies as defined by the International Dysphagia Diet Standardisation Initiative (IDDSI) Framework⁸:

- thin liquid barium without thickener (IDDSI Level 0);
- mildly thick barium (IDDSI Level 2);
- moderately thick barium and (IDDSI Level 3); and
- extremely thick barium (IDDSI Level 4).

Duplicate blinded rating yielded PAS scores for 8,135 boluses, with discrepancies resolved by consensus. A Bayesian multilevel ordinal regression model approach examined PAS patterns across consistencies. At least one score of concern (i.e., PAS > 2) was seen on thin liquids in 299 participants (44.1%). Across repeated trials, the first score of concern was most likely to be seen on the first thin liquid bolus (n = 155, 51.84%) with slightly lower frequencies on subsequent thin bolus presentations. Among participants with at least one trial of airway invasion, multiple scores of concern across repeated trials were more common for thin liquids (62.22%) compared to mildly (49.47%), moderately (35.20%), and extremely thick (9%) consistencies. Across all consistencies, the probability of a PAS score of concern (>2) was highest for thin liquids and decreased significantly with mildly thick liquids. Further non-significant decreases were seen with thickening to moderately and extremely thick consistencies. Silent aspiration (i.e., PAS = 8) was seen on 9.7% of thin and 9.5% of mildly thick boluses, but was extremely rare on moderately (3.8%) and extremely thick (0.9%) liquids. A similar pattern was seen for the frequency of silent aspiration by consistency among participants with at least one PAS score of concern.

These results confirm that the probabilities of penetration, aspiration and silent aspiration are greatest on thin liquids. Significant reductions in PAS frequency and severity were seen with mildly thick liquids (IDDSI level 2). Silent aspiration was exceptionally rare on moderately thick (IDDSI level 3) and extremely thick liquids (IDDSI level 4).

These findings demonstrated the therapeutic benefits of a unique xanthan gum based thickening agent (ThickenUp® Clear) reported previously in patients with dysphagia¹⁰⁻¹⁴.

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Watch the 18 minute conference talk with Dra. Catriona M. Steele and hear about SCIENTIFIC EVIDENCE OF THE IMPACT OF THICKENED LIQUIDS ON PENETRATION AND ASPIRATION



<https://www.youtube.com/watch?v=nVmiMpEm9QQ>

