

In the Thick of It! Lessons from a Collaborative Effort to Evaluate the Effects of Non-Commercial Thickening Agents on Liquid Consistencies for Use in the Pediatric Population

Background Information

Why Thicken (Chicero et al., 2017; Krummrich, Kline, Krival, & Rubin, 2017, Stuart & Motz, 2019)

- Dysphagia can have significant consequences
- Leading to respiratory illness, feeding avoidance, poor weight gain & growth, developmental impairment & stressful parent-child interactions
- *Viscosity*: An important consideration in evaluation & feeding therapy
- *Bolus viscosity*: Shown to affect oral & pharyngeal transit times, timing and duration of UES opening and duration and magnitude of hyoid and laryngeal movement.
- Unable to eliminate risk of aspiration with therapeutic techniques (pacing, nipple change, positional changes, etc.) & increased viscosity improves swallow function
- Trial in GER management

What about the caregiver? (Krummrich, Kline, Krival, & Rubin, 2017)

- Do caregivers see a change in signs of dysphagia when thickened liquids are used as part of their feeding program?
- Do caregivers report a change in the volume of intake for children with dysphagia when thickened liquids are used?

Not just little adults (Stuart, Waldron, & Tanner, 2005)

- Lack of options for thickeners in pediatrics
- Many commercial thickeners not safe for pediatrics
- No published standard thickening recipes for infant formula or other liquids using non-commercial thickeners

Line Spread Test (Lund, Masters, Garcia, & Chambers, 2013)

Concerns with Commercial Thickeners in Pediatric Population

- 2001-2012: Great solution for pediatric thickening
- Premature infants using Simplythick® developed NEC
- FDA advisory: Not for use in infants <37 weeks GA
- HDVCH: would not use on infants under 1 year of age

Another Change in Practice (Hojsak et al., 2015, Salvatore et al., 2018, Shibata et al., 2016)

- High levels of inorganic arsenic
- Intake during childhood is likely to affect long term health
- Recommended inorganic arsenic intake in infancy & childhood be as low as possible
- AAP: Using oatmeal cereal vs rice cereal as a thickening agent in infants and children

New Thickening Recipes

- Revised thickening recipes using the following thickening agents
 - For children >1 year of age
 - Simplythick® (if cleared by medical team)
 - Baby food (stage 1)
 - Yogurt
 - Pudding
- Revised our thickening recipes using the following thickening agents
 - For children > 3 years of age: Commercial thickeners
 - Breastmilk: Gel Mix (if cleared by medical team)

Clinical Differences

- Type of formula (premixed vs powder)
- Calorie of the formula (standard 20 cal vs higher calorie)
- Temperature
- Time
- Preparation (shaken/stirred, powder formula or cereal added first)
- Breastmilk
- Barium

IDDSI Protocol: The International Dysphagia Diet Standardisation Initiative 2016, <https://iddsi.org/framework/ext>

Aims of the Project

- To check compatibility of HDVCH protocol (thickening with noncommercial thickeners) with the IDDSI protocol in each liquid consistency category
- To modify the HDVCH protocol to ensure consistency with IDDSI protocol
- To determine the effects of time, method of preparation, & temperature on modified protocol

Methods

Consistencies: ½ nectar, Nectar, Honey

IDDSI Flow Test: Materials (Chicero et al., 2017; The International Dysphagia Diet Standardisation Initiative 2016, @<https://iddsi.org/framework/e>)

- 10 mL Leur slip tip syringe
- BD™ syringe, Manufacturer code 301604
- Length of the 10 ml scale: 61.5 mm
- Stopwatch

Base materials

- Similac® for Supplementation Non-GMO
- Similac® Advance Infant Formula with Iron
- Country Fresh DairyPure® Whole Milk
- PediaSure® Grow & Gain readymade

Thickening agents

- Earth's Best Organic® Whole Grain Oatmeal
- Gerber® Single Grain Baby Cereal
- Low fat vanilla yogurt
- Simplythick®

Preparation materials: Bottle, Whisk, Spoons

Effects of Time: Baseline, 10 minutes, & 20 minutes

Effects of Preparation: Shaken and stirred

Effects of Temperature: Room temperature and cold

Results

Modified Protocol: Oommen & Newberg (2019). Manuscript in Preparation.

Effects of Time: Baseline, 10 minutes, & 20 minutes

- Modified recipes
- No significant difference in consistency at baseline, 10 minutes, & 20 minutes, $p = 0.1$

Effects of Preparation: Shaken and stirred

- Original recipes, ready-made & prepared
- No significant difference in consistency when mixing vs. shaking the formula with thickening agent, $p = 0.23$

Effects of Temperature: Room temperature and cold

- Original recipes, prepared formula
- No significant difference in consistency when preparing with room temp. vs. cold water, $p = 0.48$

Discussion

- Modified protocol: Feedback from the clinical team
 - Application (patients, setting) with powder-based formula
 - No modification necessary for mode of presentation
 - Awaiting more clinical trials
 - Development of standardized protocol
- Modified protocol
 - Effects of time
 - Effects of temperature
 - Effects of mode of preparation
 - No change in consistency: Positive findings when considering variability in preparation of formula in different settings & by different people

Future Direction

Select References

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Learning Outcomes

1. Are you able to describe terminology for varying consistencies of thickened liquids in the pediatric population (e.g. IDDSI framework)?
2. Are you able to identify testing methods to evaluate the consistency of thickened liquids when using non-commercial thickeners?
3. Are you able to identify possible implications for practice by reviewing examples of the modified protocol for thickened liquids that is compatible with the IDDSI framework for application in the pediatric population?

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