Thickened Liquids: The Good, the Bad, and the Evidence

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Learner Objectives
Identify 3 pros of thickening liquids for adult and pediatric patients with dysphagia
Identify 3 cons of thickening liquids for adult and pediatric patients with dysphagia
Develop a balanced view of the role of thickening in dysphagia management

Disclosures
Financial
Anna Miles: The University of Auckland; ASHA registration waiver
Laura Brooks: Children’s Healthcare of Atlanta; ASHA registration waiver

Non-Financial
Anna Miles: NZSTA, ASHA, LSA, DRS, ESSD
Laura Brooks: Co-lead IDDSI USIRG Communications/Advocacy, Co-lead pediatric IDDSI USIRG Committee, Co-lead IDDSI PL8280 international pediatric committee

Systematic review and evidence based recommendations on texture modified foods and thickened liquids for adults (above 17 years) with oropharyngeal dysphagia – An updated clinical guideline

Efficacy of Thickened Liquids for Eliminating Aspiration in Head and Neck Cancer: A Systematic Review

The Adverse Effects and Events of Thickened Liquid Use in Adults: A Systematic Review

Treatment burden associated with the intake of thickened fluids
To thicken or not to thicken?

The Pros and Cons of Thickened Liquids
Things We Do for No Reason: The Use of Thickened Liquids in Treating Hospitalized Adult Patients with Dysphagia
THICKENING DRINKS ACROSS THE LIFESPAN

Thickening drinks
- Powders/ Gel to add to your favorite drink
  - Cold / hot/ carbonated
  - Water / fruit-based / dairy
- *Viscosity differs with mixer choice and time
- Pre-thickened drinks

Commercial thickeners- age considerations
- <1 year: gelmix
- 1 year+: purathick
- 3 years+: Thick & Easy, Thick & Easy (reg or clear)
- 12 years+: Simply Thick, Thick-It

Infants: thickening human milk challenges
- Amylase in human milk breaks down starches- 25x more amylase in HM than formula
- Cereals- believed to break down in HM
- *gelmix
  *Needs heat and agitation
  *Impact to GI system concerns
  *Side effects (gas, loose stool)
  *Accessibility concerns
  *Cost concerns

Infants: thickening formula challenges
- Rice cereal- arsenic risk
- Oatmeal cereal
  Clog syringe or bottle nipple
  Change in thickness over time
- Enfamil AR
- Commercial thickener
  gelmix- 42-week PMA
  Needs heat and agitation
  Impact to GI system concerns
  Accessibility concerns, $$
**Ingredient considerations: infants and children**

- Maltodextrine (tapioca)
- Xanthan gum
- Carob bean gum
- Tara gum
- Guar gum
- Erythritol
- Carrageenan

**Thickened liquids: problem solving**

**Problem:**
- Different fluids thicken differently depending on base liquid, thickener type, thickener brand, temperature, time

**Solution:**

- **Flaky cereal**
  - Grind with coke can
  - Y cut nipple

- **Vegetable purees**
  - Carrots, sweet potato, green beans
  - Minimally effective, squash effective at cold temps

- **Yogurt**
  - Slightly thick level for 40°F, thinned over time
  - Level 0 in 5 min

**Thickened liquids: problem solving children over months: cost, access, and ingredient concerns**

- Fruit purees added to water
- Yogurt added to milk
- Comparable to starch and gum commercial thickeners
- IDDSI flow test
- Rheology: shear rate and temperature

**EVIDENCE - WHY WE THICKEN LIQUIDA FOR ADULTS & PEDIATRICS - ASPIRATION**

Brooks, 2024
Why do we thicken?

**Pneumonia**
- 20-fold increase risk of pneumonia for those who aspirate

**Mortality**
- Odds ratio for death of 9.2 for those who aspirate

**Length of Stay**
- 10.55 days if dysphagic, 4.74 days if not

Why do we thicken? Aspiration Pediatrics

- Thin liquids flow quickly, thicker more cohesive, minimizes aspiration (Cichero 2013)

Why do we thicken? Aspiration Pediatrics

- Aspiration: instability, stridor, wheezing, PNA/respiratory compromise, scarring (Tutor+Gosa 2012)


- Smaller, compliant airways at higher risk of obstruction with aspiration (Simon 2013)

- Parent report: ↓anorexia, coughing, congestion, aversion, emesis, and wheezing with thickened liquids (Krummich 2017)

- Infants with silent aspiration taking thickened liquids ↓risk of acute respiratory illness (Cion 2016)

Facts about thick fluids

- ↓speed of transit time
- ↑cohesion
- ↓aspiration

<table>
<thead>
<tr>
<th>Level 0</th>
<th>Level 2</th>
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<tbody>
<tr>
<td>5ml</td>
<td>99%</td>
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<tr>
<td>50ml</td>
<td>34%</td>
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Case study – Pediatric strategies

Upright position:
Thin liquids: no penetration (pen) or aspiration (asp)
Thin liquids fatigue: 7 pen
Slightly thick liquids: no pen or asp
Slightly thick fatigue: 1 pen 1 asp
Mildly thick: 1 large aspiration

Mod thick: No pen or asp

Sidelying:
Thin liquids: 2 pen, no asp
Mildly thick liquids: no pen or asp

Case study - slower flow - pediatric

GI recs: thickening for reflux in infants?

• Thicken before PPI (Rosen et al. 2018)
• Gastric contents are buffered by milk in the post prandial period, consequently GERD is likely to be weakly acidic (4 < pH < 7) in the first hour after a meal and acid GERD (pH > 4) occurs later in post prandial period (Van Wijk 2007)
• The esophageal mucosa can neutralizing gastric acid (Li et al. 2021)

EVIDENCE - DOES THICKENING ACTUALLY IMPROVE PULMONARY HEALTH?

Facts about thick fluids
• ↓ aspiration
• But ↑ likelihood of silent aspiration

= ? ↓ safety
Lung health

• 24 rabbits
• water vs. xanthan gum vs. cornstarch
• ↑ death with cornstarch
• ↑ pulmonary inflammation, congestion & alveolar oedema with xanthan gum

Anna Gelzer et al., 2017

Facts about thick fluids

• multifactorial nature of pneumonia development
• ↑ Reduction of secondary complications
  • No sig. difference in pneumonia rates thick vs. thin
  • No sig. difference in pneumonia rates compared to safety strategies such as chin tuck

Nativ Zeltzer et al., 2017

A systematic review and meta-analysis of pneumonia associated with thin liquid vs. thickened liquid intake in patients who aspirate

Kaneoka et al., 2016

• 7 papers (650 patients)
• Six studies compared thin water protocols to thickened liquids for pneumonia prevention.
• A meta-analysis was done on the six studies, showing no significant difference for pneumonia risk (OR = 0.82; 95% CI = 0.05–13.42; p = 0.89).

Anderson et al., 2013; Beck et al 2018; Kaneoka et al., 2017; Langmore et al., 1998; Robbins et al 2005

Other systematic reviews

• Hansen et al., 2023
  • Second update of a systematic review and evidence-based recommendations
  • Top 5% of all research outputs, and was re-tweeted over 100 times across 10 different countries within six months of publication
  • "there is no convincing evidence that thickened fluids or texture modified diets prevent death or pneumonia nor improves quality of life, nutritional status, or oral intake in individuals with oropharyngeal dysphagia"
  • Beck et al., 2018
  • Beck et al., 2013

Other systematic reviews

• Wallace, Clayton, Freeman-Sanderson & Miles (IJSLP in press)
  • Provide some critique of these reviews
  • 2013 - 16 papers, "weak evidence for chin tuck and thin fluids as first choice"
  • 2018 - 2 RCTs only, statistical approach not reported, no distinction between acute/chronic, "weak evidence against thick fluids.
  • 2023 - 3 RCTs only, missing key non-RCTs, randomization to texture allocation regardless of dysphagia, statistics queries

There is scientific evidence on the positive effect of TF therapy on the hydration status of patients with OD. However, strict monitoring of fluid volume intake is essential due to the low consumption of TF in these patients.

Hansen et al., 2023

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Hansen et al., 2023
Other systematic reviews

• McCurtin et al., 2019
• to evaluate the evidence base of recommendations made by stroke clinical practice guidelines regarding the thickened liquids intervention.
• 13 clinical guidelines
• Despite the limited evidence base for the thickened liquid intervention, there was consensus among stroke guidelines in recommending it. This is despite limited empirical support. Furthermore, much of the evidence used to support recommendations was not appropriate, suggesting less than satisfactory evidence-based practices in formulating recommendations. In this case, clinical guidelines may not be reliable decision-support tools for facilitating clinical decision making.

EVIDENCE- ADVERSE EFFECTS OF THICKENING

• ↓ Quality of life n=18
• Aspiration n=12
• ↓ Intake n=8
• ↑ Dehydration n=5
• Pneumonia n=4

• ↑ Residue n=4
• Death n=2
• ↑ Medicine bioavailability n=2
• UTI n=1
• Hospitalization n=1

SLOWED TRANSIT TIME = INCREASING RESIDUE

Thickened liquids ➔ greater residue

• ↑ effort to transfer
• > Level 3 than Level 1
• Dependent on teat/ bottle
• ↑ residue in mouth, pharynx and oesophagus

Facts about thick fluids

• ↑ effort to transfer
• > Level 3 than Level 1
• Dependent on teat/ bottle
• ↑ residue in mouth, pharynx and oesophagus
Oesophagus and thick fluids

Oesophagus

- ↓ speed of transit through oesophagus
- ↑ effort to transfer
- ↑ residue in oesophagus
- Unknown impact in paediatrics/reflux treatment

Miles et al., 2015; Miles et al., 2019

Compliance & Quality of Life

The Cons of Thickening - Pediatrics

- Poor compliance associated with taste and texture
- Accessibility and cost
- Variability in thickness (varies 2005)
- Impact of these substances on a child's immature digestive tract
- Difficulty extracting fluid - need faster flow nipple, wider straw

Facts about thick fluids

- Many patients don't like them
  - Taste bad / ↓ flavour / not thirst quenching
  - ↓ fluid intake / hydration - though this can be the case with thin fluid too if they are challenging!
  - Issues with satiety
  - Carers have high burden - nurses and family
  - ↓ offers of drinks

Abrams., 2023 (1); Abrams., 2023 (2); McCurtin, 2018; Namasivayam-MacDonald., 2017; Wu., 2020

Facts about thick fluids

- RCT (n=76 patients; n=75 clinicians)
  - Explained risk of aspiration with thin fluids compared to thick then provided with thick fluids to consume (IDDSI 1 or 2)
  - Asked to trade QOL for years of life
  - 1/3 consumed <1/3 of their sample
  - on average respondents would be willing to sacrifice 4 years of a 10-year lifespan not to be restricted to modified fluids.

Lim et al., 2016

Oesophagus and Medicines

Medicines

- Impedes timely transit to stomach
- ↓ bioavailability
- Class I & II e.g., penicillin, prednisone and digoxin
- Impedes drug dissolution & disintegration

Cichero., 2013; Miles et al., 2019

Facts about thick fluids

- ↓ QOL

Lim et al., 2016
Informed consent / Balancing risks

- Accurate, balanced information
- Free to choose
- Shared decision-making
- Capacity

"I can’t guarantee thickening will help"
"There are other ways...."

Summary

- Benefits for some - especially in short-term
- No evidence of benefit for many
- Over-recommended (without adequate assessment)
- Under-utilized / mis-used
- Often prescribed but not reviewed regularly
- Thickening wean programmes needed
- Other safety options available

The authors argue:

- Given the unintended consequences of TL that it is timely for SLPs to explore alternative treatment options
- Commitment to person-centeredness is critical
- Instrumental assessment is important to guide treatment
- Decisions should be based on more than penetration/aspiration alone e.g. PROMIS, hydration, survival
Principles of medical ethics

- **Beneficence (doing good)**- improving swallowing and QOL
- **Non-maleficence (to do no harm)**- malabsorption (diarrhea)
- **Autonomy (pt is free to choose where able)**- thickener options, simplifying instructions
- **Justice (ensuring fairness)**- access for those with resource limitations, insurance coverage

Principles of Social Determinants Of Health (SDOH)

- Cost of thickener
- Transportation to pharmacy
- Rural neighborhood access
- Electricity for warming Gelmix
- Reading level- instructions
- Language barriers

WEANING & ALTERNATIVES

**Thickened liquids problem solving**— weaning to a thin liquid

- Clinicians should recommend the LEAST thickened liquids for safer swallowing and ACTIVELY work towards returning to THIN LIQUIDS (Cichero 2013)
- Slow systematic thickening wean
- Don’t jump from level 3 mod thick to thin
- Weaning toward consistency the patient is having trouble with (Wolter 2018)
- Retraining swallowing
- Must confirm wean success via instrumental examination
- Patient specific- needs good physician follow up

Strategies before thickening

**INFANTS**
- Slow flow nipple
- Elevated Sidelining
- Pacing/regulation

**TODDLERS**
- Positioning-straws- neutral head position
- Bolus modification-small, single sips
- Temperature
- Feeding tools- cups options

**ADULTS**
- Watch & wait with IV fluids. Free water protocols
- Positioning- chin down, head turn or tilt
- Bolus modifications: volume
- Sensory techniques: temperature, 3-second prep
- Maneuvers: supraglottic swallow, mendelsohn

Thank you

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References


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