

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

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Learner Objectives

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

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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 PEDIRG international pediatric committee

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Review Article
The Adverse Effects and Events of Thickened Liquid Use in Adults: A Systematic Review
Sophie Worster Adams^{1,2}, Philipp Gander^{3,4} and Andrew Nemojny-MacDonald⁵

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
Marie Beck^{1,2,3}, Annette Kjaergaard⁴, Tina Hansen⁵, Ingrid Poulsen^{6,7}

Efficacy of Thickened Liquids for Eliminating Aspiration in Head and Neck Cancer: A Systematic Review
Carly E. A. Barbon, MA^{1,2}, and Catriona M. Steele, PhD^{1,2,3,4}

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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

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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

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Commercial thickeners- age considerations

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

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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

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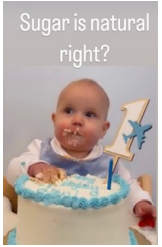
Infants: thickening formula challenges

- *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, \$\$

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Ingredient considerations: infants and children

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

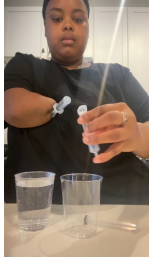
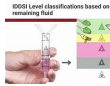
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Thickened liquids: problem solving

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

Solution: IDDSI flow test!



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Thickened liquids: problem solving

Problem: Flaky cereal clog syringe or bottle nipple

Solution: Grind with coke can Y cut nipple

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Thickened liquids: Breast milk breaks down all starches???

- *Fruit purees (banana! peach, & pear)*
- gelmix/purathick thickened BM (over time)
- Oatmeal thinned for cold breast milk (40° F), but thickened for the 70° F and 98.6° F
- Vegetable purees (carrots, sweet potato, green beans) minimally effective, squash effective at cold temps
- Yogurt- slightly thick level for 40° F, thinned over time
- Pudding- level 2 for 40° F, but thinned to level 0 in 5 min


Brooks, 2024

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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



Brooks et al 2022

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

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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

Altman et al., 2010; Schmidt, et al., 1994; Teasell, et al., 1996

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Risk of infection multifactorial...

Aspiration secondary to dysphagia

Immunosuppression

Reduced mobility

Oral health ...

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Why do we thicken? Aspiration Pediatrics

- **Thin liquids flow quickly**, thicker more cohesive, minimizes aspiration (Cichero 2013)
- **Aspiration**- instability, stridor, wheezing, PNA/respiratory compromise, scarring (Tutor+Gosa 2012)
- **Silent aspiration**- cough response to aspiration diminished in infancy (Kuhlemeier 2001, Arvedson 1994, Clave 2008, Garon 2009)
- Smaller, compliant airways at **higher risk of obstruction with aspiration** (Simon 2013)
- **Parent report** ↓ apnea, coughing, congestion, aversion, emesis, and wheezing with thickened liquids (Krummich 2017)
- Infants with silent aspiration taking thickened liquids ↓ **risk of acute respiratory illness** (Coon 2016)

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Why do we thicken? Aspiration Pediatrics

- Brower et al 2014
 - determine the relative prevalence and specific etiologies of non-CF bronchiectasis in childhood
 - 12 studies encompassing 989 children
 - Sixty-three percent of the subjects had an underlying disorder. Infectious (17%), primary immunodeficiency (16%), **aspiration (10%)**, ciliary dyskinesia (9%), congenital malformation (3%), and secondary immunodeficiency (3%)
 - **Severe pneumonia of bacterial** or viral **etiology** and B cell defects were the most common disorders identified

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Why do we thicken? Pediatrics

- Thickened liquids can allow infants and children to **continue an oral diet** if aspirating thin liquids
- **Avoid alternate sources of nutrition** such as nasogastric tube or gastrostomy tube
- **NG G tubes can be associated with increased hospitalizations** (McSweeney 2016)

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Facts about thick fluids

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

= control

= safety

	Level 0	Level 2
5ml	39%	23%
50ml	34%	17%

Miles et al., 2018; Newman, 2016; Steele, 2015

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Case study- slower flow - pediatric

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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

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Mcgrattan 2020

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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 ($4 < \text{pH} < 7$) in the first hour after a meal and acid GERD ($\text{pH} > 4$) occurs later in post prandial period (van Wijk 2007)
- The esophageal mucosa can neutralizing gastric acid (Li et al 2021)

Pediatric Gastroesophageal Reflux Clinical Practice Guidelines: Joint Recommendations of the North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition and the European Society for Pediatric Gastroenterology, Hepatology, and Nutrition

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EVIDENCE- DOES THICKENING ACTUALLY IMPROVE PULMONARY HEALTH?

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Facts about thick fluids

- ↓ aspiration
- But ? ↑ likelihood of silent aspiration

= ? ↓ safety

	Level 0	Level 2
5m		
50r	60%	74%
50ml	59%	69%

Miles et al., 2018

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Facts about thick fluids

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- But ? ↑ likelihood of silent aspiration

= ? ↓ safety

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Lung health

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

= ? ↓ safety



Nativ-Zeltzer et al., 2017

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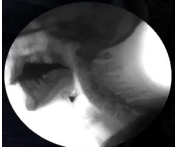
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Facts about thick fluids

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

= ? ↓ safety



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

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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).

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Other systematic reviews

- Bardon & Steele., 2015 - head and neck cancer
- Cichero et al., 2013 - narrative review, mixed etiology
- Loeb et al., 2003 - SR, mixed etiology
- Painter et al., 2017 - narrative review, dementia

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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 liquids 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
- Wallace, Clayton, Freeman-Sanderson & Miles (JSLP in press)
 - Provide **some critique of these reviews**
 - 2013 - 16 papers 'Level A: High level of evidence for chin tuck and thin fluids as first choice'
 - 2018 - 2 RCTs only (new criteria 2010-2016) excluding high quality papers from previous review, both RCTs were 2008, statistical approach not reported, no distinction between acute/chronic, "weak evidence against thick fluids.
 - 2023 - 3 RCTs only, missing key high quality non-RCTs, randomization to texture allocation regardless of dysphagia, statistics queries

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Other systematic reviews



Letter to the Editor: Thickened Fluids and Risk of Dehydration O'Keefe, Lazenby-Paterson et al., 2023

- 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.
- Criticized the group for:
 - industry supported
 - based on 2 systematic reviews: 22 patients after total maxillectomy (n=12 on TF) & 712 patients in stroke rehab (n=37 on TF)
 - statistical approach and power
 - mis-interpretation of the findings

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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**.

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EVIDENCE- ADVERSE EFFECTS OF THICKENING

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Review Article

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

Sophia Warden Abrams, Pooja Gandhi, and Ashwini Namasivayan-MacDonald

- 33 papers (4990 patients)
- ↓ 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

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SLOWED TRANSIT TIME = INCREASING RESIDUE

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Thickened liquids → greater residue

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

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Facts about thick fluids

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

= sticking around & efficiency


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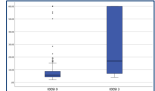
Oesophagus and thick fluids

Oesophagus

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



= sticking around & efficiency



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

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Oesophagus and Medicines

Medicines

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

= ? ↓ safety & efficiency



Cichero., 2013; Miles et al., 2019

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COMPLIANCE & QUALITY OF LIFE

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The Cons of Thickening- Pediatrics

- Poor compliance associated with taste and texture
- Accessibility and cost
- Variability in thickness (Garcia 2005)
- Impact of these substances on a child's immature digestive tract (Bridget 2014, Dewar 2006, Shim 2013, Tutor & Gosa 2012, Weir 2005)
- Difficulty extracting fluid- need faster flow nipple, wider straw

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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

= ↓ QOL

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

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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.

= ↓ QOL

Lim et al., 2016

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BALANCING RISK & INFORMED CONSENT

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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

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Informed consent / Balancing risks

Informed or misinformed consent and use of modified texture diets in dysphagia

Rowe J, O'Keefe M, Evans Leslie, Tracy Lazebny-Paterson, Anne McCurt, Lindsay Collins, Ayle Moran, Alison Smith. *Supports in context of IDDSI: Overview, Perspectives, Research and Research Collection*

BMC Medical Ethics 24, Article number: 7 (2023) | [Cite this article](#)

"I can't guarantee thickening will help"

"There are other ways...."

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

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RCSLT

Our statement on thickened fluids

21 March 2023

The long-standing practice of using commercially and naturally thick fluids is among the most common treatment tools in the management of eating, drinking and swallowing problems. The RCSLT acknowledges that this practice is undergoing increasing scrutiny.

The commonly accepted view is that by flowing more slowly, thickened fluids improve bolus containment and reduce risk of aspiration and cough-related distress, thereby improving safety and comfort. The literature reports that thickened fluids can alter swallow physiology and reduce aspiration. However, there is an absence of evidence that thickened fluids can reduce dysphagia-related complications such as respiratory tract infections, or that they improve health or quality of life outcomes for patients.

The RCSLT advises that decisions about thickened fluids, as for any intervention, should be made through a process of informed consent following a holistic assessment that includes consideration of the potential impact on health and quality of life. Patients or their proxies must understand what thickened fluid treatment entails, and its potential adverse side effects as well as its potential benefits.

The RCSLT also plans to publish a position paper on the evidence surrounding thickened fluids in clinical practice by the end of 2023.

Clinical practitioners have a responsibility to familiarise themselves with the current literature and explore within their workplaces how their use of thickened fluids aligns with the evidence base.

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RCSLT

Position statement on the use of thickened fluids in the management of people with swallowing difficulties

March 2023

Clinical practitioners have a responsibility to familiarise themselves with the current literature and explore within their workplaces how their use of thickened fluids aligns with the evidence base. The RCSLT advises that decisions about thickened fluids, as for any intervention, should be made through a process of informed consent following a holistic assessment that includes consideration of the potential impact on health and quality of life. Patients or their proxies must understand what thickened fluid treatment entails, and its potential adverse side effects as well as its potential benefits.

The commonly accepted view is that by flowing more slowly, thickened fluids improve bolus containment and reduce risk of aspiration and cough-related distress, thereby improving safety and comfort. The literature reports that thickened fluids can alter swallow physiology and reduce aspiration. However, there is an absence of evidence that thickened fluids can reduce dysphagia-related complications such as respiratory tract infections, or that they improve health or quality of life outcomes for patients.

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Research Article

Alterations and Preservations: Practices and Perspectives of Speech-Language Pathologists Regarding the Intervention of Thickened Liquids for Swallowing Problems

Aimee McCurt,^{1,2,3,4} Hannah Byrne,⁵ Lindsey Collins,^{6,7} Michelle McInerney,^{8,9} and Alison Smith¹⁰

¹Faculty of Allied Health, University of Lincoln, Lincoln; ²Health Research Institute, Health Implementation Science and Technology Research Centre, University of Lincoln, Lincoln; ³Health, Behavior, and Society Program, Harvard Medical School, Boston; ⁴Department of Speech and Hearing Sciences, University of Lincoln, Lincoln; ⁵Faculty of Health Sciences, University of Bath, Bath; ⁶Lincoln English; ⁷Lincoln English; ⁸Lincoln English; ⁹Lincoln English; ¹⁰Department of Speech and Hearing Sciences, University of Lincoln, Lincoln

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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. PROMS, hydration, survival

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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

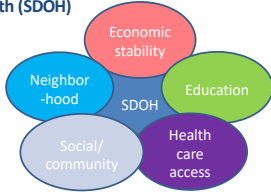


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Principles of Social Determinants Of Health (SDOH)

- *cost of thickener
- *transportation to pharmacy
- *rural neighborhood-access
- *electricity for warming Gelmix
- *reading level- instructions
- *language barriers





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WEANING & ALTERNATIVES



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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

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Strategies before thickening

INFANTS	TODDLERS
Slow flow nipple Elevated Sidelying Pacing/regulation	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	

Ahn 2012; Cary 2016; Goulding & Bakheit 2000; Karagannis 2011; Karagannis & Karagannis 2014; Gosa 2011

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Thank you

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