

Standardized fluid testing protocol

for supplements / new products

1.0 Thickened fluids terminology, preparation and testing methods

Fluid consistency	Fluid preparation (per 200ml) – using Resource ThickenUp Clear thickener	Primary testing method*
Level 1 Slightly thick	1 scoop	Flow test
Level 2 Mildly thick	2 scoops	
Level 3 Moderately thick	4 scoops	
Level 4 Extremely thick	6 scoops	Fork drip test

**Testing methods are based on International Dysphagia Diet Standardization Initiative (IDDSI) recommendations*

2.0 Materials / Equipment

- 10mls BD syringes
- Timers
- Measuring cup
- Utensils (cups and spoons)
- Resource clear thickener

BD syringes are to be used in accordance with the IDDSI Flow Test protocol and timers are for the monitoring of time effects. Two timers are recommended. One to track standing time while the other as a stopwatch for the 10 second flow rate. Measuring cups should be used to aid accurate preparation thickened fluids. To closely replicate preparation conditions in the hospital and/or at home, the use of commonly accessible measuring cups and utensils used for the tests is recommended.

3.0 Methodology

The execution of testing and rationales are detailed in the table below. Liquids should be tested at room temperature.

	Steps	Rationale
<i>Baseline measurement</i>		
1	<p>Perform IDDSI Flow Test on unthickened fluids</p>	<p>The standardised IDDSI Flow Test is a testing method that is sensitive in categorizing a wide range of liquids reliably, in agreement with currently existing laboratory tests and expert judgement.</p> <p>Step 1 is used to determine the baseline consistency of supplements.</p>
<i>Testing of thickened fluids</i>		
2	<p>Prepare thickened fluid following manufacturer's recommendation</p> <p>The following example is for Nestle ThickUp Clear:</p> <ol style="list-style-type: none"> a. Measure 200ml of fluids using a measuring cup. b. Add the recommended dosage of thickener into a clean dry cup <i>e.g., slightly thick fluids – 1 scoop of Resource ThickenUp Clear thickener</i> c. Add liquid to the powder. d. Start stirring immediately for 30 seconds or until all the powder as dissolved. Concurrently start both timers. This will be T_0. e. Leave the mixture to stand for 30 seconds (30sec + 30 sec = T_1). 	<p>The preparation recommendations in step 2 are adapted from the proposed preparation guide as per Nestle Health Science for Resource ThickenUp Clear.</p> <p>Number in subscript indicates time (minutes) post initial contact. Starting the timer at 2(d) is for the purpose of keeping time when fluids come in contact with thickener – to minimize the time effect.</p>
3	<p>Commence IDDSI Flow Test at T_1.</p> <p>Depending on Flow Test results, commence other tests e.g. Fork drip test and spoon tilt test as appropriate. Refer to 5. for instructions for Fork Drip test and Spoon Tilt test. For instance:</p>	<p>Some supplements would settle on standing, i.e., visual inspection (obvious colour gradient). A quick stir of the mixture reduces the heterogeneity without over agitating the solution.</p>

	<p>- Fork drip test for flow test results which corresponds to Moderately Thick and above (i.e. flow test > 8)</p> <p>- Spoon tilt test for flow test results which corresponds to extremely-thick and above (i.e. flow test > 10)</p> <p><i>IDDSI Flow Test:</i></p> <ul style="list-style-type: none"> • Stir briskly for 10 seconds. • Use BD syringe₁ to draw thickened supplement from beaker. • Inject contents of syringe₁ to 10mls mark of syringe₂. • Perform IDDSI Flow Test. • Repeat these 2 more times for this timepoint (T₁). 	<p>Samples were drawn slowly into syringe₁ to minimize shearing effects and frothing (as per IDDSI recommendation). Use finger to occlude tip of syringe₂. Samples were injected slowly from syringe₁ to syringe₂ to minimize shearing effects and frothing. Different syringes will be used for testing of different supplements or thickened fluids to minimize contamination.</p>
4	<p>Repeat at T₁₅ and T₃₀ for slightly thick, mildly thick and moderately thick fluids following the IDDSI Flow Test.</p> <p>Fresh syringes should be used for each round of testing.</p>	<p>The following timings (T₁₅ and T₃₀) are selected for the test because fluids are not always served immediately after preparation. This information on the fluid stability of thickened oral nutritional supplements (ONS) will be used to inform caregivers when to best serve ONS after preparation.</p>
5	<p>Commence IDDSI Fork Drip Test and Spoon Tilt Test where appropriate at any above time points T₁, T₁₅ and T₃₀.</p> <p><i>IDDSI Fork Drip Test:</i></p> <ul style="list-style-type: none"> • Stir briskly for 10 seconds. • Perform IDDSI Fork drip test. Repeat thrice. <p><i>IDDSI Spoon Tilt Test:</i></p> <ul style="list-style-type: none"> • Stir briskly for 10 seconds • Perform IDDSI Spoon tilt test. Repeat thrice. 	<p>The IDDSI Fork Drip Test is used to check the correct thickness and cohesiveness in Levels 3-5 foods by assessing whether they flow through or how they hold together on the slots/prongs of a fork and comparing against the detailed descriptions of each level.</p> <p>The IDDSI Spoon Tilt Test is used to determine the stickiness of the sample (adhesiveness) and the ability of the sample to hold together (cohesiveness). It is used predominantly for measures of samples in level 4 and 5.</p>

4.0 Documentation of fluid testing

Proposed sample results report format.

4.1 Batch details and manufactured dates of the products(s) tested are shown in table 1.

Table 1: Details of tested products

Date of test:	
Supplement name:	
Batch number :	
Manufactured date :	
Temperature of supplement at time of test:	

4.2 Average results of IDDSI Flow Test and results of the IDDSI Fork Drip Test are shown in table 2.

Table 2: Example of IDDSI Flow Test and results of IDDSI Fork Drip Test

			IDDSI flow value (mls)	IDDSI level (droplist)	Fork drip test (droplist)	Spoon tilt test (droplist)	Notes
Baseline consistency			0.8	Thin (<1ml)			On average of 3 trials
Target testing consistency	No. of scoops of thickener (in proportion to 200ml)	Wait Time (min)					
Slightly Thick	1	1					
		15					
		30					
Mildly Thick	2	1					
		15					
		30					
Moderately Thick	4	1					
		15					
		30					
Extremely Thick	6	1					
		15					
		30					

FAQ

Q1: Will a different preparation method compromise the result of the thickened oral nutritional supplements (ONS)?

A: This protocol serves as a guide and is not prescriptive. Firstly, we suggest following the proposed preparation method suggested by Nestle Singapore as detailed in the protocol. Should there be difficulties dissolving the Resource ThickenUp Clear thickener, clinicians may consider other methods that are clinically practiced in Singapore. For example, (1) adding thickener to ONS before stirring or (2) slowly adding thickener to ONS while stirring. The workgroup acknowledges that these are existing fluid preparation methods used clinically. In addition, an ONS thickening trial (with Fresubin) done in April 2021 showed that fluid preparation methods (1) and (2) were both able to achieve lump-free ONS mixture for safe consumption. However, if clinicians are to use the alternative fluid preparation methods for fluid testing, it is imperative for them to ensure that the resulting mixture is lump-free, and all thickener added into the mixture is fully dissolved.

The bottom-line is that clinicians should only proceed with the Flow test/Fork drip test when all the thickener is well dissolved into the mixture with no lumps. If the thickener does not dissolve fully, do make special note of the deviation as well as the possible cause(s), and redo the preparation (Step 2) before proceeding with the Flow test/Fork drip test (Step 3/ Step 5).

Q2: What should I do if the thickener powder does not dissolve in 30 seconds with stirring?

A: Suggest to follow the instructions in the protocol first for standardization especially when the test is done to compare different ONS products. Do however note that the protocol is not a research protocol but a guideline for the fluid testing. If the thickener does not dissolve fully in 30 seconds with stirring, it is advised to document what step(s) were taken to ensure that the thickener fully dissolves into the ONS mixture. Additional steps can be spending extra time to stir the mixture etc.

Q3: What should I do if there are clumps after adding thickener to the milk feeds?

A: As mentioned in Q1, suggest to discard sample and redo the fluid preparation (Step 2) with a fresh sample of un-thickened ONS.

Q4: Why are the various time points for testing chosen? T1, T15, T30

A: The following timings (T₁₅ and T₃₀) are selected for the test because fluids are not always taken immediately after preparation for various reasons. For example, caregivers may not be able to serve the thickened ONS immediately after preparation due to other

responsibilities or patients may take a long time to finish the thickened ONS due to feeding difficulties. This information at spaced out time points of T₁₅ and T₃₀ gives information on the fluid stability of thickened ONS. The information will be used to inform caregivers/clinicians when to best serve ONS after preparation.

Q5: What should I do if the milk supplements come in various volume packets?

A: It is advised to measure the ONS samples using a measuring cup for accurate thickened fluid preparation. Refer to Step 2 for details. The protocol is a fluid testing guideline suggested for clinicians and not for caregivers.

Q6: Since we need to be syringing the thickened supplements slowly so as to prevent shearing effects, do we only start the syringing up process at the 1/15/30 minute marks or do we do so pre-emptively so that the actual flow test (i.e., letting the fluids flow through the syringe by gravity) happens exactly at the 1/15/30 minute mark?

A: It is advised to start the syringing process at the 1/15/30 minutes mark. As long as the 3 syringe tests are done immediately and consecutively at the said time point, any time lapse should be error carried forward. If the tester does truly test in a delayed manner and not consecutively then they should make additional comments such that this time factor is being considered in the interpretation of the results.

Q7: What if the thickness of the ONS is already at level 1 or level 2 at baseline. For example, to achieve level 3 for a supplement that is already at level 2, should we still go ahead and add 4 scoops of thickener to 200ml of the supplement?

A: In this case, please add 4 scoops to 200ml of supplement to achieve level 3. Given that this is mainly for testing purpose, the aim is to test if particular supplement can be thickened up to the desired consistency with Resource Clear thickener instructions. The results from this testing protocol are mainly to inform external vendors, Speech Therapists and Dietitians, caregivers etc. If the ONS cannot be thickened up as per Resource Clear thickener instructions, it is up to the relevant stakeholders to discuss further if there are strong indications to deviate from usual thickening protocol.

Q8: Should we water down of fluids that are already at level 2 at baseline for the testing at level 1?

A: If the baseline is at a thicker level (e.g., level 2) , the data points below the baseline (e.g., level 1) can be omitted. There is no need to dilute the ONS just for the testing of a specific ONS that has a baseline of a higher viscosity because this is generally not applied in clinical practice. From a Speech Therapist perspective, consuming a thicker fluid consistency generally does not lead to further

complications e.g., patient safety issue. Moreover, diluting ONS may have further implications on the nutrition aspects especially for patients on fluid restrictions etc. This issue should be further discussed with Dietitian colleagues if the tester sees a strong indication to proceed with the dilution of an ONS during testing.

Q9: What should I do if I want to test the thickened ONS at chilled and warmed up temperature?

A: This testing protocol is designed for testing supplements at ambient temperature. Should the individual/organization have indications for testing the ONS at specific temperatures, it is up to them to specify the temperature under which the test was conducted. They can still refer to this testing protocol as a guide.