

Making Dysphagia Easier to Swallow

The National Dysphagia Diet is 10 years old this year.

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No doubt, as long as man has walked the earth, someone—somewhere—has experienced difficulty in swallowing.

As a condition, swallowing difficulty—or dysphagia—has been studied for decades. But as a condition requiring a specialized oral diet, dysphagia is just a “kid.” Prior to the 1970s, people unable to swallow were most often nutritionally managed by using enteral tube feedings. Returning the individual to oral feeding was typically the goal, but healthcare professionals lacked a unified plan to get them there. Fortunately for patients, healthcare professionals discovered that an active interdisciplinary approach to diagnosis, management, and rehabilitation techniques can help normalize the swallowing process. Improved swallowing often results in a return to normal eating, and that serves to speed recovery and improve quality of life. It was the recognition of a lack of dysphagia diet standards and the value of teamwork that ignited the creation of the *National Dysphagia Diet: Standardization for Optimal Care*.

The concept of a National Dysphagia Diet (NDD) was conceived in the early 1990s as a way to decrease the confusion in communications between healthcare professionals, patients, and caregivers. At the time, a survey with clinicians showed that more than 40 different terms were used to label solid food textures, and at least 18 different names were used to describe liquid consistencies. This was the motivation behind forming a NDD Task Force of speech-language pathologists, dietitians, food scientists, and manufacturers that would collectively begin to untangle cluttered dysphagia diet practices. The goal of the NDD was to standardize terminology and procedures based on best practices of the time.

One step in developing the NDD was to seek a more scientific foundation for the dysphagia diet that would be based on key rheological properties of foods and fluids. This foundation would help to create consistency across the food industry both in manufacturing and foodservice operations. To be scientific; the food properties needed to be objective, measurable, and include all foods within the diet continuum. In the end, the diet needed to address both solid textures and liquid viscosities. And most importantly, the diet needed to be something that could be transferred from facility services to at-home care. But what is food and fluid rheology and how does that relate to

eating? Food rheology is the science of identifying and measuring food textures. With an understanding of these textures it becomes possible to measure and relate any given food to the ability (or inability) to chew, manipulate and swallow that item. To summarize, this means that a diet for dysphagia is not as simple as puree, mince or chop - that is only one part of the matrix.

Basic Forces of Chewing and Swallowing

To understand the NDD, it's important to understand the physical forces of the chewing and swallowing process that most people take for granted. Five basic effects result from the forces that occur during chewing and swallowing. See Figure 1

The type of food will dictate which, and how much, of these forces are needed to manipulate the item enough to enable swallowing it. For example, applesauce is much easier to eat as compared to apple slices as compared to a whole apple.

Food Textures

Any food can be defined by its textural characteristics. More than two dozen food textures have been identified, however, only eight of these textures are considered most significant in treating dysphagia. Food textures share descriptions that are similar to those of chewing and swallowing.

- Adhesiveness
- Cohesiveness
- Firmness
- Biteability
- Hardness
- Springiness
- Viscosity (applies only to liquids)
- Shear

Figure 1: Forces of Chewing and Swallowing

Food is **compressed**. This means the food item is deformed by force, such as when the tongue pushes a food up against the roof of the mouth and basically squishes it.

Food can be **adhesive**. Some foods are attracted to another surface. Peanut butter is very adhesive. Oil is not at all sticky.

Food becomes **tensile**. Food can be extended (stretched) due to force. Think of dough being extruded from a cookie press. Food extrusion occurs in the process of swallowing when the food bolus moves through the esophagus by way of peristaltic waves. These waves stretch and pull the food bolus along until it reaches the stomach.

Food is **sheared** (cut) by the grinding force of molar teeth.

Food can be **fractured** (broken) by biting it into pieces.

Lab instruments and software programs are used in food development and manufacturing to measure the texture dimensions of individual foods. The NDD Task Force measured and analyzed more than 120 different foods to arrive at the NDD Diet Levels and where foods are assigned within each level. Figure 2 shows how foods can be plotted by a descriptive texture across a force continuum. To illustrate how to interpret the continuum, consider the example for 'biteability'. It is very easy to bite a piece of a corn muffin. It takes such little effort that front teeth can accommodate the bite. A graham cracker is only a little more difficult to bite. A ginger snap, however, is a firm crunchy cookie that requires even more biting force than the cracker. As a food is more "biteable" we begin to shift it around from the front teeth, which are designed for biting harder foods. Peanut brittle is "tooth breaking tough" and very difficult to bite to the degree that a person would rarely use front teeth for the bite, but rather shift to the stronger incisor teeth. Again, a person spends little time thoughtfully determining how to "attack" a food; the actions come naturally from years of experience in eating.

Figure 2: Semisolid/Solid Food Texture Measurement Scale

The numbers on this scale do not reflect actual measurements, they describe a continuum of texture ranges.

	0	25	50	75	100
Cohesiveness	gel dessert		vanilla pudding	tapioca pudding	dough
Adhesiveness	vegetable oil	marshmallow fluff	oatmeal	canned peas	peanut butter
Firmness		whipped cream	cheese spread	orange section	cream cheese
Springiness	cream cheese	hot dog	marshmallow		Knox® blocks
Biteability	corn muffin	graham cracker	ginger snap		peanut brittle
Hardness		egg white	hot dog	carrot	hard candy
Yield Stress	water	ketchup	Miracle Whip®	carrot baby food	tomato paste
	0		50		100

Figure 3a: National Dysphagia Diet Levels Summarized—Foods

<p>Level 1: Dysphagia Pureed</p> <p>For moderate to severe dysphagia. The diet consists of pureed, homogenous, and cohesive foods. Foods should be "pudding like." Any food that requires bolus formation, controlled manipulation, or chewing should be excluded.</p>
<p>Level 2: Dysphagia Mechanically Altered</p> <p>For mild to moderate oral and/or pharyngeal dysphagia. This level consists of all foods from Level 1, plus foods that are moist, soft-textured, and easily formed into a bolus. Pieces can be no larger than one-quarter inch. This is a transition level from pureed texture to more solid foods and some ability to chew is required. The ability to tolerate mixed textures at this level will be individualized.</p>
<p>Level 3: Dysphagia Advanced</p> <p>For mild dysphagia. This level consists of most textures except very hard, sticky, or crunchy foods. Foods should still be moist and in "bite-size" pieces at the oral phase of the swallow, more chewing ability is required.</p>
<p>Level 4: Regular Diet</p> <p>All foods allowed, as tolerated.</p>

Figure 3b: National Dysphagia Diet Levels Summarized—Liquids

Thin	No alteration
Nectar-like	Slightly thicker than water; the consistency of un-set gelatin
Honey-like	A liquid with the consistency of honey
Spoon-thick	A liquid with the consistency of pudding

Translating Science to Diet Prescription

People may have assumed that a group simply sat around a table and arbitrarily decided the NDD diet levels and which foods should be assigned to each of those levels. The science and analysis described here actually took much subjective choice out of the NDD development. The analysis clearly showed textural break points between each of the NDD diet levels. While it was not possible to scientifically analyze all the foods and food combinations that exist on menus, the data collected from the tested foods served as bench marks for categorizing similar type foods into diet levels as described in Figure 3a. A similar approach of measuring and analyzing viscosity and shear was used to define thickened liquids by assigning viscosity ranges as shown in Figure 3b. This compilation of several years of work from the NDD task force represents today's National Dysphagia Diet standards.

Putting the NDD into Practice

Speech- language pathologists (SLP) use a variety of tools to assess an individual's ability to chew and swallow safely and assign a diet level. Several evaluation methods [Figure 4] are available for a speech- language pathologist to use in assigning dysphagia severity. None of the methods are a perfect match to the NDD; however, the severity scale most closely correlated to the NDD is the Dysphagia Outcome and Severity Scale (DOSS). The DOSS uses a scale of 7 (normal in all situations) to 1 (severe; unable to tolerate any oral intake safely). In lieu of other evaluation tools, using the DOSS offers a fairly systematic way to match NDD diet level to the patient as shown in Figure 5. A key take-away from this chart should be that the dysphagia diet is a continuum, often times an individual is starting the next level while still in the prior one.

Rehabilitation Institute of Chicago Functional Swallowing Scale (RIC-FSS)

Dysphagia Severity Rating Scale for Parkinson's Disease

Amyotrophic Lateral Sclerosis (ALS) Severity Scale

The Dysphagia Outcome and Severity Scale (DOSS)

Implementing the National Dysphagia Diet

The dysphagia diet is more than simply adjusting food texture. The diet is a critical tool within someone's total therapy plan to improve their quality of life. A small informal survey (done by this author) from the fall of 2011 indicated that a little over 60% of health care facilities use the NDD for guidance for their dysphagia diet menu. This opens the question of what the other 40% of

health care facilities are providing for a dysphagia diet in their respective operation. Implementing the NDD does not have to be a daunting task, especially when it is approached with small goals. Most facilities have a "Wound Care Team"; consider creating the "Dysphagia Care Team". Use a Dysphagia Care Team to review the ideas shown in the checklist, take inventory of current facility practice and make a simple plan to move forward.

Checklist for Best Practice

- **Regularly meet** as an interdisciplinary dysphagia team (medical director, speech, nursing, dietary and others).
- **Review current menu**, recipes and special dysphagia products with the facility SLP to align diet objectives.
- **Challenge kitchen staff** to do more with dysphagia diet plate presentations.
- **Train new facility hires** about facility dysphagia diet standards.
- **Annually retrain** facility staff on the importance of the dysphagia diet standards.
- **Discuss implementing dysphagia-specific protocols** (oral hygiene, hydration, satisfaction survey, etc.).
- **Provide discharge education** for patients/caregivers (where applicable).

Figure 4: Dysphagia Severity Scales

Dysphagia Outcome and Severity Scale (DOSS)
Functional Severity Levels for Dysphagia
Rehabilitation Institute of Chicago Functional Swallowing Scale (RIC-FSS)
Dysphagia Severity Rating Scale for Parkinson's Disease
Amyotrophic Lateral Sclerosis (ALS) Severity Scale

Figure 5: Correlation of DOSS and NDD Texture Levels

Dysphagia Outcome and Severity Scale (DOSS)	1	2	3	4	5	6	7
Recommended NDD Diet Levels	1	1 and 2	2 and 3	3 and 4	4	4	4

Source: National Dysphagia Diet Task Force. National Dysphagia Diet: Standardization for Optimal Care. Chicago: American Dietetic Association, 2002.

What Next?

Science and practice are rarely in sync and health care is often left to watching and waiting for the next new medicine, therapy, super food or best practice. Few would argue that a time has come for the NDD to be refreshed. For today, however, the *National Dysphagia Diet: Standardization for Optimal Care* represents the best information available to guide the dysphagia diet. Standards and best practices are useful professional tools because they offer guidance where all the answers may not yet be available. Not only does a good standard guide the practitioner, it also is informative for the patient, caregivers, regulators and the greater public audience. Any facility that is not using the NDD as the standard for their dysphagia diets may create an opening to ethical and legal liability. Of most importance, individuals living with dysphagia deserve to receive the most current standards of care, including those of the NDD. If your facility is still waiting to implement the National Dysphagia Diet, wait no longer – your clients are depending on you.

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