

# Dysphagia

## Understanding thickeners, thickened fluids, texture-modified foods and how to support patients



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Dysphagia comes from the Greek 'dys' meaning disorder and 'phagia' to eat. It is used to describe difficulties swallowing resulting from neurological or physical impairment of the oral, pharyngeal or oesophageal mechanisms.<sup>1</sup>

### Who is affected and why is it a problem?

Dysphagia affects 99 million people worldwide.<sup>2</sup> Dysphagia can occur at all ages but infants and the elderly are most affected.<sup>2</sup> Ten to 30 per cent of over 65-year-olds,<sup>3</sup> 50-75% of nursing home residents,<sup>4</sup> and 10% of acute hospitalised elderly patients<sup>5</sup> may have dysphagia. One study reported that one month after stroke 15% of patients had dysphagia.<sup>6</sup> For neurological conditions, such as Parkinson's, motor neurone disease (MND) or multiple sclerosis (MS), dysphagia may be an initial symptom in a minority of patients, but as disease progresses swallow function will deteriorate in the majority, with 90% of MND patients developing dysphagia.<sup>1</sup> Of adults in care homes for dementia, 68% were found to have dysphagia.<sup>7</sup> Swallowing difficulties may be present in 5.3% of adults with learning disabilities.<sup>1</sup> Dysphagia may occur in 27% of patients with chronic obstructive pulmonary disease (COPD)<sup>8</sup> and in those with head and neck cancer<sup>9</sup> or brain injury.<sup>1</sup>

Dysphagia is associated with increased morbidity and mortality, and decreased quality of life.<sup>1</sup> This is due to the increased risk of aspiration, chest infections, pneumonia, choking, asphyxia, dehydration and malnutrition.<sup>2</sup>

### Swallowing mechanism

There are four stages to swallowing.<sup>10</sup> The **oral preparatory stage** is where the oral cavity is sealed, preventing leakage

into the oropharynx prior to the swallow. This is a voluntary stage when food or drink is taken into the mouth, chewed if necessary and formed into a bolus. During the **oral propulsive stage** the bolus is moved by the tongue toward the oropharynx. The soft palate moves up closing access to the nasal passages. The **pharyngeal stage** occurs when the bolus stimulates receptors in the palatal arches and uvula causing the pharyngeal muscles to contract in response to signals from the medulla oblongata. These contractions cause the larynx to elevate and the epiglottis to fold, closing off the entrance to the trachea and the soft palate and uvula to block off the nasopharynx. The bolus is forced into the oesophagus, which is moved, during the **oesophageal phase** by peristaltic waves towards the stomach, through the lower oesophageal sphincter.

For food, the swallowing process may take approximately nine seconds but for liquids, the effect of gravity may speed this process up considerably. Slowing the movement of liquids down by means of altering the viscosity of the bolus is the basis for using thickened fluids in patients with dysphagia.<sup>10</sup> The idea is that more viscose liquids may help patients control the movement of a bolus better, thus allowing more time for the closing off the entrance to trachea and reducing the risk of aspiration.<sup>11</sup> Using texture-modified food is another strategy that may help avoid choking and aspiration.<sup>2</sup>

### Timeline for the development of commercially available thickeners, thickened fluids and texture-modified foods

**1987** first commercial instant starch-based food thickener was developed for the institutional market in the USA. This replaced rice, tapioca, instant mashed potato flakes and gelatine as an easier way for healthcare institutions to thicken liquids to nectar, honey and pudding consistencies, without lumping or over-thickening, enabling better tasting thickened drinks.

**Late 1980s to early 1990s** saw the introduction and use of drinks and pureed food with early starch-based thickeners in the UK, in addition to the use of a gum-based thickener that was primarily used for the thickening of infant milks to manage reflux.

**1989** 'The Purée Gourmet – A Cookbook for Pureed Foods that Look and Taste Delicious' (by J William Richman) was published in the USA. This publication showed healthcare facilities how to make dense and cohesive foods to promote a safer swallow while creating eye appealing plate presentations to promote food consumption.

**1990s** 'Slurry Techniques' were developed using a starch-based thickener in the USA. This technique used the starch-based thickener to thicken apple juice or water, which was then poured over breads, cakes and biscuits to soften them to a puree consistency. Slurry techniques meant that swallowing impaired patients could enjoy these standard menu items without having them pureed.

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**1991** saw the launch in the USA of pre-pureed, pre-formed meat portions that looked like 'the real thing'. For the first time, healthcare facilities could offer ham, roast beef, chicken, fish and even hot dogs that looked recognisable on the plate while still offering the consistency they needed for safe swallowing.

**1993** the leading starch brand in the USA launches in the UK, bringing over the concept of creating eye appealing pureed foods using the aforementioned techniques and starting the transformation of mealtimes for thousands of patients with dysphagia.

**1994** food moulds and catering pack sizes from the manufacturer of a starch-based thickener were introduced in the UK, allowing healthcare facilities to prepare pureed meals for multiple patients alongside food prepared for those without dysphagia.

**1995** onwards saw a host of commercially available 'ready-made' foods and liquid products launched in the USA and the UK, including the first thickened drinks and fruit purees.

**Late 1990s** UK healthcare facilities began producing ready-made pureed meals for use regionally as well as in-house. This followed the launch of commercially manufactured pureed meals that could be distributed nationally.

**2010** saw the first powdered 'clear' gum-based thickeners introduced in the USA, and shortly afterwards in the UK, enabling clear liquids to retain their intended appearance. Commercially available ready-prepared meals for patients with dysphagia for national home-delivery were also launched in UK.

**2010 to present** has seen an increase in the use of gum-based thickeners to thicken clear liquids, whilst effective starch-based products continue to be the thickener of choice for non-clear liquids, foods and catering.

## Comparing starch-based and gum-based thickeners

In the UK, powdered starch-based thickeners – made from modified-maize starch – and gum-based thickeners – containing xanthium gum and/or xanthium gum and guar gum – are available.<sup>12,13</sup>

In a review by Sura *et al.*,<sup>14</sup> looking at the management of dysphagia in the elderly, they stated that although thickened fluids were a frequently used method there is very little evidence that it results in good clinical outcomes, such as reduced incidence of aspiration pneumonia. However, a randomised double-blind study by Leonard *et al.*,<sup>15</sup> using fluoroscopy in 100 patients, found clinically significant reductions in the incidence of penetration and aspiration for gum-thickened barium liquid compared to thin barium liquid. In this study, rates of aspiration of starch-thickened barium liquid was not statistically significantly different from thin barium liquid.<sup>15</sup>

There are concerns that patients who are recommended thickened fluids are at risk of dehydration. Leibovitz *et al.*<sup>16</sup> found that up to 75% of long-term care residents were dehydrated when relying on thickened-fluids for oral hydration. There are a number of possible reasons for this increased risk of dehydration. However, Cichero<sup>11</sup> states that neither starch-based nor gum-based thickeners affect the bioavailability of water. It would appear that alterations in taste and feelings of increase satiety are the most likely causes of poor fluid consumption.<sup>11</sup> Mattas *et al.*<sup>17</sup> reported that commercial thickeners could suppress the flavour of a liquid and add off-flavours (bitter, astringent, sour or metallic), with starch-based thickeners creating a grainy texture, whilst gum-based thickeners add 'slickness' to drinks.

Gum-based thickeners form meshes of entanglements with water molecules, whereas, starch-based thickeners work by expanding in the liquid capturing fluid molecules.<sup>11</sup> This process continues so that starch-thickened drinks left for any length of time may become thicker than the consistency intended.<sup>11</sup> Also, starch-based thickeners were found to be less stable over time and temperature ranges (4° vs. 70° C), than gum-based thickeners.<sup>18</sup> An additional disadvantage of starch-based thickeners is that if the product becomes contaminated with saliva, the amylase present can break carbohydrate bonds resulting in a thinning of the fluid and increasing the risk of aspiration.<sup>19</sup> Following manufacturers instructions closely when thickening different beverages is important to avoid the above risks. A study by Hadde *et al.*<sup>20</sup> found that milk required a much longer time to thicken than water using a gum-based thickeners, due to the effect on polymer formation of calcium in the milk.

Other factors to consider when using thickeners are their effect on medication bioavailability, which is a topic of ongoing research, and the advice of a pharmacist should be sought.<sup>11</sup> Starch-based thickeners will make a small contribution to the carbohydrate content of a beverage, whilst some gum-based thickeners may contain glucose, thus the effect on blood sugar levels for patients with diabetes may need to be taken into account. In addition, Magalhães de Almeida *et al.*<sup>21</sup> point out that different thickeners have varying sodium content, which may need to be taken into consideration for patients requiring sodium-restriction.

The factors identified above emphasise that it is important to choose the type of thickener needed depending on what is being thickened, along with taking into account the patient's underlying conditions.

## Pre-thickened drinks and supplements

Pre-thickened drinks are available in the UK<sup>13</sup> and may have benefits over using powdered thickeners as a method of providing thickening drinks. A small crossover study by McCormick *et al.*,<sup>22</sup> with eleven patients at a Dublin hospital, found that when patients received pre-thickened drinks they tended to increase their fluid intake in comparison to fluids thickened with a powdered starch-based thickener. However, their use is likely to have significant cost implications. In addition, there is a limited range of pre-thickened oral nutritional supplements on the market.<sup>23</sup>

## Texture-modified foods

A recent survey commissioned by a leading manufacturer of texture-modified foods, carried out with 213 healthcare professionals (HCPs), found that over half felt out-of-date on the current nutritional treatment approach for dysphagia.<sup>24</sup> Up to 70% of respondents said there was not enough help and education about the condition, and nearly half reported that they had not been trained on dysphagia in over two years, with 10% not receiving any training whatsoever.<sup>24</sup> Most concerning of all, around 50% of the HCPs surveyed had seen cases in the last 12 months where giving the incorrect food to dysphagia patients had directly contributed to aspiration or malnutrition.<sup>24</sup>

Malnutrition in patients with dysphagia is a significant concern.<sup>2</sup> Crawley<sup>25</sup> reported that patients with dysphagia may only meet 45% of their energy requirements and need more frequent energy dense meals to obtain sufficient energy. The texture, appearance and mouthfeel of modified textured foods are known to be contribute to their poor oral intake.<sup>26</sup> In addition,

patients being unable to identify food items and feelings of loss of control has been found to negatively influence mealtime experience of patients with dysphagia.<sup>27</sup> In addition, the nutritional content of texture-modified foods, especially puree may be lower than standard foods.<sup>28</sup>

Techniques such as providing moulded puree meals may improve intake. A pilot study by Farrer *et al.*,<sup>26</sup> in 66 adults requiring pureed meals in an Australian acute care institution, found that providing moulded puree vs. non-moulded increased consumption from 25% to 75% of the meal and reduced wastage. Blaise<sup>27</sup> highlighted that the social context a meal was eaten in was another area that could affect food intake. Thus, HCPs looking after patients with dysphagia need to address these issues.

## Resources for healthcare professionals

For a description of dysphagia, its assessment and treatment, the literature synthesis published by the Royal College of Speech and Language Therapists (RCSLT) is a useful resource: [www.rcslt.org/speech\\_and\\_language\\_therapy/commissioning/dysphagia\\_manual\\_072014](http://www.rcslt.org/speech_and_language_therapy/commissioning/dysphagia_manual_072014)

The National Patient Safety Agency (NPSA), in conjunction with the RCSLT, British Dietetics Association (BDA), Hospital Caterers Association (HCA) and National Nurses Nutrition Group (NNNG), published 'Dysphagia Diet Food Descriptors' in 2011, which contains definitions of the four modified food texture terms used in the UK and a checklist for caterers:

- B (thin puree) • C (thick puree)
- D (pre-mashed) • E (fork-mashable)

Available from: [www.hospitalcaterers.org/publications/downloads/dysphagia-descriptors.pdf](http://www.hospitalcaterers.org/publications/downloads/dysphagia-descriptors.pdf)

Training on recognising and managing dysphagia is essential for hospital and care home staff. In March 2014, during Nutrition and Hydration Week, a game designed to help

frontline staff identify and manage dysphagia was launched. NHS England, with Focus Active Learning, BDA, Nutricia and RCSLT, developed The Dysphagia Game - [www.dysphagiagame.com](http://www.dysphagiagame.com). Originally produced as a board game for up to 10 players, it is now available online and as an app for mobile and tablet devices.

The 2011, the Caroline Walker Trust published 'Eating Well: Supporting Older People and Older People with Dementia: Practical Guide', which contains chapters of soft and pureed meals, including recipes and menu planning suggestions - [www.cwt.org.uk/wp-content/uploads/2014/07/EW-Old-Dementia-Practical-Resource.pdf](http://www.cwt.org.uk/wp-content/uploads/2014/07/EW-Old-Dementia-Practical-Resource.pdf).

Additional online resources are available from Fresenius Kabi: [www.dysphagia.org.uk](http://www.dysphagia.org.uk); Wiltshire Farm Foods: [www.softerfoods.co.uk](http://www.softerfoods.co.uk); and Dysphagia Recipes: <http://dysphagia.recipes.com>. In addition, the HCA has a number of useful resources on their website: [www.hospitalcaterers.org/publications](http://www.hospitalcaterers.org/publications). A copy of a booklet by Premier Foods entitled 'Healthcare Solutions: Dysphagia and Dementia' can be obtained from the National Association of Care Catering (NACC) website: [www.thenacc.co.uk/news/MembersNews/news/Premier+Foods+Healthcare+Solutions+Dysphagia+and+Dementia](http://www.thenacc.co.uk/news/MembersNews/news/Premier+Foods+Healthcare+Solutions+Dysphagia+and+Dementia).

## Support for patients and carers

NHS Choices has a brief explanation of what dysphagia is, how it is treated and possible complications: [www.nhs.uk/conditions/Dysphagia/Pages/definition.aspx](http://www.nhs.uk/conditions/Dysphagia/Pages/definition.aspx).

All the major charities for conditions where dysphagia is a common problem provide more specific advice online and have publications to support patients and their carers.

- The Stroke Association - 'A complete guide to swallowing problems after stroke': [www.stroke.org.uk/resources/complete-guide-swallowing-problems-after-stroke](http://www.stroke.org.uk/resources/complete-guide-swallowing-problems-after-stroke)
- Parkinson's UK - 'Eating, swallowing and saliva control in Parkinson's':

[www.parkinsons.org.uk/content/eating-swallowing-and-saliva-control-parkinsons-information-sheet](http://www.parkinsons.org.uk/content/eating-swallowing-and-saliva-control-parkinsons-information-sheet)

- Alzheimer's Society - 'Eating and drinking' includes information on swallowing: [www.alzheimers.org.uk/site/scripts/documents\\_info.php?documentID=149](http://www.alzheimers.org.uk/site/scripts/documents_info.php?documentID=149)
- Multiple Sclerosis Society - 'Managing swallowing problems': [www.mssociety.org.uk/what-is-ms/signs-and-symptoms/swallowing/managing-swallowing-problems](http://www.mssociety.org.uk/what-is-ms/signs-and-symptoms/swallowing/managing-swallowing-problems)
- Motor Neurone Disease Association - 'Eating and drinking' (including links to a leaflet on swallowing difficulties): [www.mndassociation.org/life-with-mnd/everyday-living/eating-and-drinking](http://www.mndassociation.org/life-with-mnd/everyday-living/eating-and-drinking)
- Headway: Brain Injury Association - 'Dysphagia after brain injury': [www.headway.org.uk/Factsheets.aspx](http://www.headway.org.uk/Factsheets.aspx)
- Macmillan Cancer Support - 'Eating problems and cancer': <http://be.macmillan.org.uk/be/p-20051-eating-problems-and-cancer.aspx> and more specifically 'Changes to eating after treatment for head and neck cancer': [www.macmillan.org.uk/Cancerinformation/Cancertypes/Headneck/Livingwithheadneckcancer/Changestoeating.aspx](http://www.macmillan.org.uk/Cancerinformation/Cancertypes/Headneck/Livingwithheadneckcancer/Changestoeating.aspx)

In addition, there are two books, written by dietitians, which deal with this topic and include recipes: 'How to eat well when you have cancer' by Jane Freeman (Sheldon Press); and 'Every Mouthful Counts' by Mhairi Donald and Catriona Brooks available from Sussex Cancer Fund: [www.sussexcancerfund.co.uk/Fundraising/emc.html](http://www.sussexcancerfund.co.uk/Fundraising/emc.html)

## Conclusion

Meeting the hydration and nutritional needs of patients with dysphagia remains challenging, despite recent improvements in products aimed at this patient group. It is important that these products are chosen carefully to match the patients swallowing capacity and aid their concordance with recommended fluid consistencies and food textures. HCPs need to be well trained in recognising and managing this condition.

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