Institution: University College London

Unit of Assessment: 4 - Psychology, Psychiatry and Neuroscience

Title of case study: Improvements to quality of life and safety for people with swallowing difficulties following analysis of fluid thickeners

1. Summary of the impact (indicative maximum 100 words)

Swallowing disorders (dysphagia) result in prolonged hospital stays and can lead to death. An important method in the management of dysphagia is the use of fluid thickeners. Fluid thickeners both slow the flow of fluid through the oropharynx and increase the sensory input to mediate swallowing, thus increasing safety. Research at UCL's Language and Communication Research Department has led to improvements in the development and standardization of fluid thickeners, the training of healthcare workers who prepare them, and increased understanding for industry, healthcare and patients. The results are used in the development of new commercial thickeners, refinement of current commercial thickeners, training industry employees, development of international guidelines for dysphagia management, training NHS staff, and prescribing thickeners for people with dysphagia.

2. Underpinning research (indicative maximum 500 words)

Dysphagia is the term used to describe disorders that affect our ability to eat, drink and swallow. It is a global disability affecting approximately 14% of people over the age of 60 years, 40-78% of people post stroke, 20-40% of people with Parkinson's disease, and is found in 20% of the general elderly primary care population. It also affects children, most notably those with cerebral palsy and Down's syndrome. The potential problems of choking, chronic aspiration, malnutrition and dehydration can be fatal, and have a profound impact on quality of life. Persistent swallowing problems add significantly to delay in discharge from hospital (adding to NHS costs) with some nursing homes unwilling to accept patients who are fed through a nasogastric tube.

An important technique in the management of swallowing disorders is modifying a person's diet by changing the thickness/viscosity of foods and drinks through the addition of commercially available powders. Almost all individuals with dysphagia will be prescribed a thickening powder, with some people using thickeners over many years.

In the laboratory, Drs Christina Smith and Ben Hanson examined the flow behaviours of thickened drinks during their preparation by carers and over the time period when drinks may be left for a patient to consume them. This work corroborated carers' subjective impressions of continued thickening over time and was additionally able to quantify the degree of thickening at different times after preparation allowing carers and patients to know the thickness of their drinks at different times **[1]**.

Following on from this research, thickened drinks were prepared using instructions provided on the packaging of thickener products and these were compared with the terminology provided by the National Descriptors developed by professional bodies (Royal College of Speech and Language Therapists, British Dietetics Association and National Patient Safety Agency). This study clarified for professionals how to prepare drinks using thickeners and recommended following product guidelines for thickening water rather than using unreliable subjective judgements such as visualising the product **[2]**. As well as publication in academic journals, a summary of both papers was also produced for a professional magazine to maximise the information dissemination **[3]**.

Smith and Hanson further demonstrated how thickened drinks change during swallowing as a result of salivary amylase, with some thickeners returning to their unthickened state **[4]**. They then went on to propose a solution to preserve the thickened drink, thus maximizing patient safety. Examining behaviour of the two (starch-based and gum-based) primary groups of commercially available thickeners and how they change depending upon the base fluid, they demonstrated a 10-

fold difference in the thickness of a drink (white wine being the thinnest and lemon barley water the thickest) with the addition of the same quantity of thickening powder **[5]**.

The work described above has clear implications for the preparation of drinks for people with swallowing difficulties. The research has been used by industry in training (Fresenius Medical Care), product description (Nutilis and Fresenius Medical Care) and ongoing product development Nutilis and Fresenius Medical Care). It has attracted UK research council and industry funding. It has altered clinical practice by clarifying for industry and clinicians the critical issues in the use of thickeners as a therapeutic intervention.

3. References to the research (indicative maximum of six references)

[1] O'Leary M, Hanson B, Smith CH. Viscosity and non-Newtonian features of thickened fluids used for dysphagia therapy. Journal of Food Science. 2010 Aug 1;75(6):E330-8. http://dx.doi.org/10.1111/j.1750-3841.2010.01673.x

[2] O'Leary M, Hanson B, Smith CH. Variation of the apparent viscosity of thickened drinks. International Journal of Language and Communication Disorders. 2011 Jan-Feb;46(1):17-29. http://dx.doi.org/10.3109/13682822.2010.484846

[3] Smith CH, Hanson B (2011) Understanding thickeners, RCSLT Bulletin, May 2011. Available on request.

[4] Hanson, B, O'Leary M, Smith CH. The effect of saliva on the viscosity of thickened drinks. Dysphagia. 2012 Mar;27(1):10-9. http://dx.doi.org/10.1007/s00455-011-9330-8

[5] Hanson B, Cox B, Kaliviotis E, Smith CH. Effects of Saliva on Starch-Thickened Drinks with Acidic and Neutral pH. Dysphagia. 2012 Sep;27(3):427-35. http://dx.doi.org/10.1007/s00455-011-9386-5 (163 downloads in 30 days reported in letter from publisher)

Grants

Smith CH & Hanson B. 2012-2015. Prescribed diets: quantifying the effect of mechanical consistency on health, patient safety, and quality of life. UK Research Council - Crucible Centre for Lifelong Health and Wellbeing, £86,000.

Hanson B & Smith CH. 2012-2015. 'Understanding Flow Properties of Thickened Drinks'. Heath Engineering for an Ageing Population, and Fresenius Medical Care, £75,617.

Hanson, B. 2008-2010. 'A self-sensing instrument for investigation of rheology in dysphagia'. EPSRC, £207,000.

4. Details of the impact (indicative maximum 750 words)

Our programme of research into thickened drinks used in clinical practice has had an influence on commercial products for dysphagia, and on the practitioners using these products. Both of these factors have resulted in increased benefit for patients with dysphagia.

Impact on the manufacturers of drink thickeners.

Our research has been utilised by all three of the companies producing thickening products (Fresenius Kabi, Nutricia and Nestlé), both through direct use and citation of our research, and via our training of their product developers and representatives (for example at the European Society for Swallowing Disorders 2012, and BAPEN 2012). These companies have utilised our work in the development of new products, in the refinement of existing products, in the training of their employees and in the training of healthcare providers. In addition it has been used in their discussions with NHS staff who procure these products for use in individual health trusts. (Every

NHS Trust uses these products, and the total market value is around £12-15m per annum **[a]**.)

Fresenius Kabi cite our research throughout an 'advertorial' for their product, Thick and Easy **[b]**. This has been used in international journals such as Dysphagia, and also the professional magazine from the Royal College of Speech and Language Therapists. Fresenius also report that the research has been used in product development:

> "*The research has also helped us start some new product development projects by giving us the improved information around the products available in the market*" **[c]**.

Nutricia have also cited one of our papers in an advert for their Nutilis range **[d]**. They report that:

> "*The findings from [O'Leary et al 2010] helped Nutricia to develop an internal standard for viscosity, which has enabled Nutricia to objectively measure viscosity when determining the different stages of our dysphagia products (Nutilis Range)… Nutricia have used the research from Dr Christina Smith and colleagues to improve the standards of the Nutilis range, which is designed to benefit the care of patients living with dysphagia"* **[e]**.

The improvements to the thickening products, as described by the companies have resulted in a better product used in healthcare. In addition, the improvements are reflected in the clarity of their advertising.

Impact on clinical practice through training of healthcare providers.

As mentioned above, companies have used our work in the training of healthcare providers. Many of these companies provide extensive training and education to healthcare staff who make thickened drinks for patients. Fresenius Kabi, for example, report that:

> *"Research at UCL by Dr Christina Smith and colleagues has revealed that there are a number of misconceptions around thickening drinks that have led to products being misunderstood and potentially affecting practice carried out by Speech and Language Therapists. The findings have been incorporated into our training sessions to ensure correct usage of the products and increased understanding into how liquids and thickeners work together allowing health care professionals and patients to use our products with better knowledge around the way the product works which ultimately improves practice"* **[c]**.

The more carefully this training is provided with increased knowledge of the behaviours of the thickening products, the better provision for patients.

We have also directly trained healthcare workers through study days (such as the adult dysphagia special interest group in June 2011; the Scottish Speech and Language Therapists Special Interest Group in April 2013) and practical symposia at conferences (e.g. European Society for Swallowing Disorders, October 2012) **[f]**.

Resulting impacts on patients

Our research into the behaviours of thickening products providing clearer information on the use of these products has influenced the prescribing to individuals with swallowing difficulties. For example, a Speech and Language Therapist at University Hospital Lewisham reported that the hospital had changed their use of the products as a direct result of the research **[g]**.

The international reach of the research is demonstrated the International Dysphagia Diet Standardisation Initiative (IDDSI) which is utilising the results in setting forth their guidelines.

5. Sources to corroborate the impact (indicative maximum of 10 references)

[a] Details of market value and trusts using drinks thickeners provided by Senior Product Manager,

Fresenius Kabi. Copy of email available on request.

[b] Fresenius advertorial. References Hanson et al 2011 and O'Leary et al 2011 throughout. Copy available on request.

[c] Letter of endorsement from Fresenius Medical Care. Copy available on request.

[d] Advert for the Nutilis range. References O'Leary et al 2010. Copy available on request.

[e] Letter of endorsement from Nutricia. Copy available on request.

[f] Copies of conference programmes available on request.

[g] Email from SLT, University Hospital Lewisham. Copy available on request.