

The Relationship between Texture-Modified Diets, Mealtime Duration, and Dysphagia Risk in Long-Term Care

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ABSTRACT

Many long-term care (LTC) residents have an increased risk for dysphagia and receive texture-modified diets. Dysphagia has been shown to be associated with longer mealtime duration, and the use of texture-modified diets has been associated with reduced nutritional intake. The current study aimed to determine if the degree of diet modification affected mealtime duration and to examine the correlation between texture-modified diets and dysphagia risk. Data were collected from 639 LTC residents, aged 62–102 years. Nine meal observations per resident provided measures of meal duration, consistencies consumed, coughing and choking, and assistance provided. Dysphagia risk was determined by identifying residents who coughed/choked at meals, were prescribed thickened fluids, and/or failed a formal screening protocol. Degree of texture modification was derived using the International Dysphagia Diet Standardization Initiative Functional Diet Scale. There was a significant association between degree of diet modification and dysphagia risk ($P < 0.001$). However, there was no association between diet modifications and mealtime duration, even when the provision of physical assistance was considered. Some residents who presented with signs of swallowing difficulties were not prescribed a texture-modified diet. Swallowing screening should be performed routinely in LTC to monitor swallowing status and appropriateness of diet prescription. Physical assistance during meals should be increased.

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RÉSUMÉ

De nombreux résidents d'établissements de soins de longue durée (SLD) présentent un risque accru de dysphagie et suivent une diète à texture modifiée. Il est démontré que la dysphagie est associée à une période de repas plus longue, et le recours à une diète à texture modifiée est associé à un apport nutritionnel plus faible. La présente étude visait à déterminer si le degré de modification de la diète influence la durée de la période de repas et à examiner la corrélation entre les diètes à texture modifiée et le risque de dysphagie. Des données ont été recueillies auprès de 639 résidents d'établissements de SLD âgés de 62 à 102 ans. Neuf observations de repas par résident ont permis de mesurer la durée des repas, les consistances consommées, la toux et les étouffements, et l'aide fournie. Le risque de dysphagie a été déterminé en identifiant les résidents qui toussaient ou s'étouffaient durant les repas, qui se faisaient prescrire des boissons épaissies ou qui ont échoué le protocole de dépistage officiel. Le degré de modification de la texture a été obtenu au moyen de l'échelle d'alimentation fonctionnelle [Functional Diet Scale] de l'International Dysphagia Diet Standardisation Initiative. Une association importante a été observée entre le degré de modification de la diète et le risque de dysphagie ($P < 0,001$). Cependant, aucune association n'a été observée entre les modifications à la diète et la durée de la période de repas, même en tenant compte de l'aide physique apportée. Certains résidents présentant des signes de difficultés de déglutition ne recevaient pas de diète à texture modifiée. L'évaluation de la déglutition devrait être effectuée régulièrement dans les établissements de SLD afin de surveiller la capacité de déglutition et la justesse de la diète prescrite. L'aide physique durant les repas devrait être accrue.

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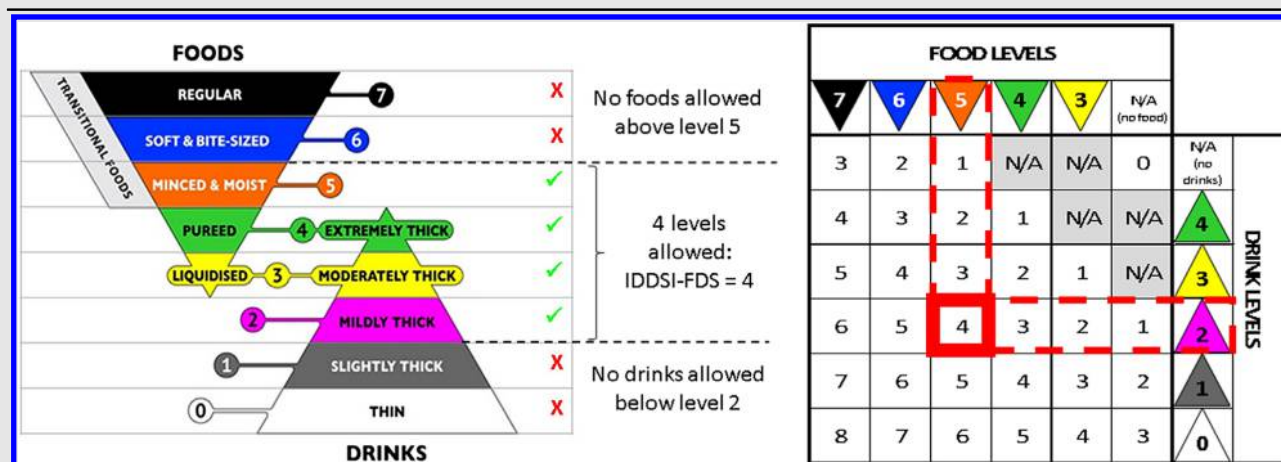
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INTRODUCTION

Texture-modified diets are used by clinicians to manage swallowing impairments (dysphagia) [1, 2]. The main concern for people with dysphagia is swallowing safety, involving aspiration, which can lead to pneumonia [3]. Thickened liquids reduce the risk of aspiration because they move slower through the oropharynx, giving the patient more time to protect the airway [4]. Texture-modified foods are often recommended when there is difficulty chewing and insufficient preparation of a bolus [5]. Foods that are puréed, minced, or soft are thought to be easier for oral processing and swallowing. However, these textures may also be used for other reasons, such as poor oral condition, pain, or to decrease energy and time for eating [5].

The lack of common standards for dysphagia management, despite global use of texture modification, led to the creation of the International Dysphagia Diet Standardization Initiative (IDDSI) [6]. This is a framework of standardized terminology for texture-modified foods and liquids. It consists of a continuum of 8 levels, with thin to extremely thick beverages spanning levels 0–4 and puréed to regular foods spanning levels 3–7. To accompany this framework, the IDDSI Functional Diet Scale (IDDSI-FDS) (Figure 1) was created to capture the degree of diet texture restriction [7]. An IDDSI-FDS score of 8 indicates that the patient is on an unmodified diet, and scores close to 8 indicate that the patient is on a relatively unrestricted diet. As scores approach 0, diets become more

Figure 1. International Dysphagia Diet Standardisation Initiative (IDDSI) – Functional Diet Scale scoring chart, with the IDDSI framework on the left [6]. Adapted from Steele et al. [7].



restricted, and a score of 0 indicates that the patient cannot take anything by mouth.

In long-term care (LTC) settings it is often difficult to obtain dysphagia assessments because of limited resources. Consequently, we rely on dysphagia screening and other observations to determine the presence of impairments [8, 9]. For example, overt signs of dysphagia risk have been associated with longer mealtime durations [9]. In addition, previous research indicates that pureed diets and longer mealtime durations are associated with reduced protein/energy intake [10, 11].

The current study aimed to determine: (i) if texture-modified diets affect mealtime duration, taking into consideration the provision of physical assistance, and (ii) the association between degree of diet texture modification and dysphagia risk.

METHODS

This study is part of the Making the Most of Mealtimes study, a cross-sectional, multi-site project. Human subject ethics clearance was obtained from the Research Ethics Boards of the Universities of Alberta, Manitoba, Moncton, and Waterloo, and Toronto Rehabilitation Institute. The complete protocol is described elsewhere in detail [12]. In brief, 32 LTC homes participated across 4 Canadian provinces. Eligible residents were: ≥ 60 years of age, medically stable, and eating an oral diet. In each home, 20 participants were recruited from the eligible residents. Written consent was provided by the resident or their alternate decision maker. Trained research personnel used consistent methods across all homes to collect data. Diet textures were documented based on 9 mealtime observations per resident. The food and liquid textures consumed across these meals were used to calculate IDDSI-FDS scores. Dysphagia risk was a composite variable, determined on the basis of: (i) receiving thickened liquids, (ii) failing the Screening Tool for Acute Neurological Dysphagia [13],

and/or (iii) any observation of coughing or choking across meal observations. The provision of physical assistance (never, sometimes or often receiving assistance) and mealtime duration (the length of time a resident was seated in the dining room with food/drink in front of them) were also determined at meals. “Sometimes” receiving assistance referred to instances when the resident was able to perform most tasks, but needed help with tasks such as opening packages, help as fatigue set in, occasional prompts, or physical assistance to eat. Residents who required assistance with the majority of their meal were coded as “often” needing assistance. The average score across meals was used and the mean duration of mealtimes was calculated.

Data analysis

Descriptive statistics for dysphagia risk, provision of physical assistance, and mealtime duration were calculated by IDDSI-FDS score. Chi-square statistics were used to determine the correlation between IDDSI-FDS score and dysphagia risk. Based on the frequency distributions for which only 54 participants had IDDSI-FDS scores of 1 through 4, scores were simplified to combine participants with scores ≤ 4 into 1 group, representing residents with very restricted diets. This simplified IDDSI-FDS parameter was then combined with physical assistance to create a new variable (IDDSI-FDS \pm physical assistance), where each of the 5 possible IDDSI-FDS scores (≤ 4 , 5, 6, 7, and 8) were further subdivided based on residents who often, sometimes, or never received assistance. Differences in mealtime duration were explored between the different categories of the IDDSI-FDS \pm physical assistance variable, using univariate analysis of variance (ANOVA).

RESULTS

Data were collected from 639 LTC residents (199 male, 440 female), aged 62–102 years (mean \pm SD: 87 ± 7.4 years);

Table 1. Summary of frequency statistics for all study variables (n = 637).

IDDSI-FDS score	n	Dysphagia risk (%)	Received physical assistance often (%)	Received physical assistance sometimes (%)	Never received physical assistance (%)	Mealtime duration (min)
0	0	N/A	N/A	N/A	N/A	N/A
1	4	100	75	35	0	30.42 (95% CI: 15.18–45.66)
2	13	100	77	8	15	38.00 (95% CI: 28.42–47.60)
3	20	100	60	30	10	39.20 (95% CI: 31.15–47.25)
4	17	100	35	24	41	40.84 (95% CI: 34.05–47.33)
5	45	58	47	13	40	38.98 (95% CI: 34.89–43.08)
6	127	58	10	16	74	40.76 (95% CI: 38.10–43.43)
7	83	70	5	8	87	42.21 (95% CI: 39.46–44.95)
8	328	50	2	8	90	39.83 (95% CI: 38.55–41.11)

Note: IDDSI-FDS, International Dysphagia Diet Standardisation Initiative – Functional Diet Scale.

1 participant withdrew consent prior to starting data collection. Complete data were available for 637 participants. There were no IDDSI-FDS scores of 0, and just over half of residents (n = 328) had a score of 8 (see Table 1). Approximately 8% of residents had scores ≤ 4 , and 33% had scores of 6 or 7. There was a significant association between IDDSI-FDS score and presence of dysphagia risk ($\chi^2(7) = 52.015$, $P < 0.001$). Dysphagia risk was present in 100% of residents with IDDSI-FDS scores of ≤ 4 ; the majority also received physical assistance. Despite risk being identified in 50%–70% of residents with IDDSI-FDS scores between 5 and 8, assistance was rarely provided to this group. A small proportion (8%) of residents received assistance in the absence of identified dysphagia risk. As seen in Figure 2, there were no significant differences in mealtime duration across the composite IDDSI-FDS \pm physical assistance categories ($F(14, 610) = 1.491$, $P = 0.109$). However, those with an IDDSI-FDS score of 7 who sometimes received assistance (n = 7), tended to have much longer mealtime durations, and those with a score of 1 had the lowest mealtime durations but the greatest variability.

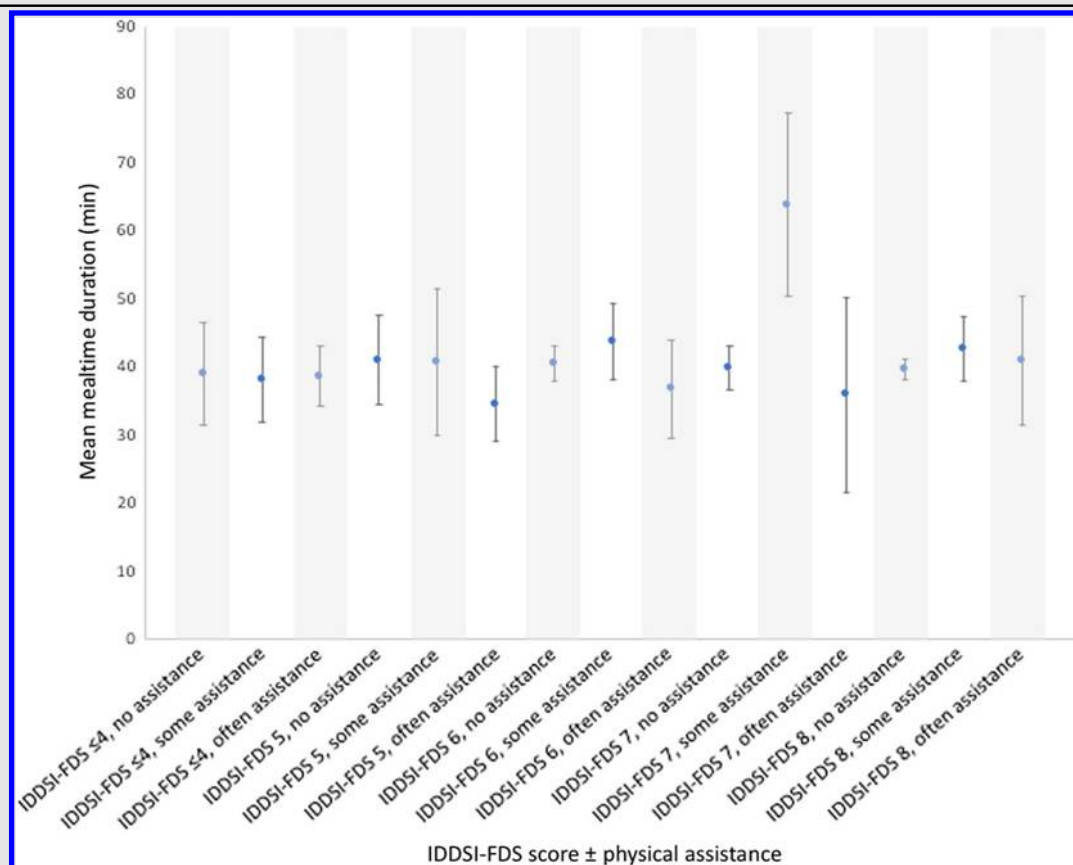
DISCUSSION

The current study found no association between texture modification and mealtime duration. This finding remained unchanged when physical assistance was factored into the analysis. It is possible that other factors better explain mealtime duration, such as cognitive impairment, social interaction, distractions, appetite, palatability of food, and

availability of assistance. The current study considered the provision of physical assistance, but it is unknown whether residents received assistance when needed and the length of time they waited. The greatest variability in mealtime duration was found in residents with an IDDSI-FDS score of 1, due to a diet of purées with extremely thick liquids. All residents in this group received physical assistance resulting in the lowest mealtime durations. The variability in mealtime duration may be caused by differing levels and timing of assistance, in addition to other factors, like meal palatability. Interestingly, residents with a score of 7 had the longest mealtime durations. This score indicates that they were only consuming a slightly modified diet. Only 13% received physical assistance, despite 70% presenting with signs of dysphagia. These residents may have been overlooked in terms of requiring assistance because of their relatively unrestricted diets, causing them to take longer to eat given their swallowing difficulties. As LTC homes move towards person-centred care [14] and meals focused on relationship building, mealtime duration may not be a useful outcome for demonstrating challenges with eating due to diet prescription. These findings also highlight the importance of physical assistance, as it allows all residents to consume meals over a similar length of time, regardless of texture modifications and other confounding factors.

Interestingly, physical assistance was rarely provided for residents with less restricted diets despite a fair number of them presenting with dysphagia risk. When considering the reasons for differing amounts of assistance, it is important to consider that the presence of dysphagia does not necessitate

Figure 2. Scatter plot displaying mean mealtime duration in minutes for residents with International Dysphagia Diet Standardisation Initiative – Functional Diet Scale scores ≤4 and 5 through 8, who did and did not receive physical assistance (n = 637).



physical assistance and vice versa. Further, diet modifications, dysphagia risk and assistance may all have a basis in cognitive deterioration, as does loss of motor control. Previous research has indicated that residents with more severe forms of cognitive impairment tend to be on more restricted diets [15]. As seen in Table 1, residents with IDDSI-FDS scores of 1 through 3 (i.e., the most restricted diets) appear to have received the most physical assistance.

The findings of this also study confirm that dysphagia risk is associated with greater restrictions in diet in LTC. This is unsurprising given that texture-modified diets are commonly used to manage swallowing difficulties [1, 2]. However, dysphagia risk was also identified in 50% of residents receiving a completely unrestricted diet. This may be due to the criteria used to determine risk or the maintenance of a regular diet despite known swallowing issues, but could also indicate potential swallowing challenges or improperly managed dysphagia. Prescription of an inappropriate diet texture in the presence of swallowing difficulties increases the risk of aspiration and airway obstruction, potentially resulting in pneumonia and death [16]. Other significant risk factors for

dysphagia and aspiration pneumonia are also prevalent among LTC residents, especially dependence for feeding and oral care, multiple medical diagnoses, and use of multiple medications [17]. This underscores the importance for ensuring residents are consuming an appropriate diet texture. Texture modifications may sometimes be liberalized for the purposes of improving quality of life, and decisions to eat-at-risk may be supported in person-centred care models [18]. However, such decisions are likely to be documented as exceptions, noting consideration of all risk factors.

The results of this study demonstrate that texture-modified diets are associated with dysphagia risk. However, dysphagia risk and physical assistance do not necessarily co-occur and modifying diets does not mitigate the impact of dysphagia risk on mealtime duration. In fact, those with the most restricted diets had the shortest mealtime duration, regardless of the amount of assistance provided. There are clearly several factors at play within the dining room that influence diet prescription, provision of physical assistance, and mealtime duration. Unfortunately, many are difficult to control. However, dysphagia risk is a clear contributor to

the prescription of modified diet textures, while not always being associated with physical assistance. The factors leading to the provision of physical assistance needs to be explored in future studies.

This study has some limitations. Firstly, residents were only screened for dysphagia; therefore, we cannot confirm a dysphagia diagnosis. In addition, many factors, such as speed of eating and time spent socializing, were not considered during mealtime observations. The only distraction accounted for was whether the resident left the dining room. Lastly, we only noted the provision of physical assistance and did not capture the details of whether residents always received assistance when needed or the type of physical assistance provided.

RELEVANCE TO PRACTICE

There are several clinical implications based on these findings. Given the large proportion of residents presenting with risk of dysphagia who consume a completely unrestricted diet, it is critical that we screen for dysphagia and refer residents who fail these screenings for more comprehensive evaluations. This will ensure that residents and their alternate decision-makers are given the most appropriate diet recommendations. Members of the dysphagia team who provide these recommendations need to take into consideration and educate on quality of life, risk of malnutrition, and factors contributing to aspiration pneumonia so that an informed decision can be made. Since many LTC residents have progressive conditions, screening should be integrated into quarterly health check-ups alongside the Resident Assessment Instrument to monitor changes in status. If residents fail a swallowing screening, subsequent check-ups should involve swallowing assessments to diagnose dysphagia and develop management plans.

The use of texture-modified diets in LTC may stem from concerns regarding swallowing difficulty, but ultimately swallowing difficulties may not always result in diet modifications. Texture-modified diets have little impact on mealtime duration, even when the provision of physical assistance at meals is considered. Clinicians in LTC should use these findings to advocate for more careful prescriptions of diet modifications, considering both swallowing safety and quality of life. Moreover, LTC homes should consider increasing the availability of staff to provide physical assistance during mealtimes given the number of residents presenting with signs of swallowing difficulties and how assistance allows residents in LTC eat at a similar pace as others who do not require it. These changes will help to ensure residents are eating and drinking safely.

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Conflict of interest: Heather Keller is a part of the Speaker's Bureau for Nestle Health Science, Abbott Nutrition, and Fresenius Kabi, and receives salary support from the Schlegel-University of Waterloo Research Institute for Aging. The remaining authors declare that they have no conflicts of interest.

References

- Robbins J, Nicosia M, Hind JA, Gill GD, Blanco R, Logemann J. Defining physical properties of fluids for dysphagia evaluation and treatment. Perspectives on Swallowing and Swallowing Disorders (Dysphagia). 2002;11:16–9. doi: [10.1044/sasdl11.2.16](https://doi.org/10.1044/sasdl11.2.16).
- Garcia JM, Chambers E, Matta Z, Clark M. Viscosity measurements of nectar- and honey-thick liquids: product, liquid, and time comparisons. Dysphagia. 2005;20(4):325–35. PMID: [16633878](https://pubmed.ncbi.nlm.nih.gov/16633878/). doi: [10.1007/s00455-005-0034-9](https://doi.org/10.1007/s00455-005-0034-9).
- van der Maarel-Wierink CD, Vanobbergen JNO, Bronkhorst EM, Schols JMGA, de Baat C. Meta-analysis of dysphagia and aspiration pneumonia in frail elders. J Dent Res. 2011;90(12):1398–404. PMID: [21940518](https://pubmed.ncbi.nlm.nih.gov/21940518/). doi: [10.1177/0022034511422909](https://doi.org/10.1177/0022034511422909).
- Logemann JA. Treatment of oral and pharyngeal dysphagia. Phys Med Rehabil Clin N Am. 2008;19(4):803–16. PMID: [18940642](https://pubmed.ncbi.nlm.nih.gov/18940642/). doi: [10.1016/j.pmr.2008.06.003](https://doi.org/10.1016/j.pmr.2008.06.003).
- Keller H, Chambers L, Niezgoda H, Duizer L. Issues associated with the use of modified texture foods. J Nutr Health Aging. 2012;16(3):195–200. PMID: [22456772](https://pubmed.ncbi.nlm.nih.gov/22456772/). doi: [10.1007/s12603-011-0160-z](https://doi.org/10.1007/s12603-011-0160-z).
- Cichero JA, Lam P, Steele CM, Hanson B, Chen J, Dantas RO, et al. Development of international terminology and definitions for texture-modified foods and thickened fluids used in dysphagia management: the IDDSI framework. Dysphagia. 2017;32(2):293–314. PMID: [27913916](https://pubmed.ncbi.nlm.nih.gov/27913916/). doi: [10.1007/s00455-016-9758-y](https://doi.org/10.1007/s00455-016-9758-y).
- Steele CM, Namasivayam-MacDonald AM, Guida BT, Cichero JA, Duivestijn J, Hanson B, et al. Creation and initial validation of the international dysphagia diet standardisation initiative functional diet scale. Arch Phys Med Rehabil. 2018;99(5):934–44. PMID: [29428348](https://pubmed.ncbi.nlm.nih.gov/29428348/). doi: [10.1016/j.apmr.2018.01.012](https://doi.org/10.1016/j.apmr.2018.01.012).
- Namasivayam AM, Steele CM, Keller H. The effect of tongue strength on meal consumption in long term care. Clin Nutr. 2016;35(5):1078–83. PMID: [26321499](https://pubmed.ncbi.nlm.nih.gov/26321499/). doi: [10.1016/j.clnu.2015.08.001](https://doi.org/10.1016/j.clnu.2015.08.001).
- Namasivayam-MacDonald AM, Morrison JM, Steele CM, Keller H. How swallow pressures and dysphagia affect malnutrition and mealtime outcomes in long-term care. Dysphagia. 2017;32(6):785–96. PMID: [28733775](https://pubmed.ncbi.nlm.nih.gov/28733775/). doi: [10.1007/s00455-017-9825-z](https://doi.org/10.1007/s00455-017-9825-z).
- Vucea V, Keller HH, Morrison JM, Duncan AM, Duzier LM, Carrier N, et al. Nutritional quality of regular and pureed menus in Canadian long term care homes: an analysis of the Making the Most of Mealtimes (M3) project. BMC Nutr. 2017;3(1):80. doi: [10.1186/s40795-017-0198-3](https://doi.org/10.1186/s40795-017-0198-3).
- Vucea V, Keller HH, Morrison JM, Duizer LM, Duncan AM, Carrier N, et al. Modified texture food use is associated with malnutrition in long term care: an analysis of Making the Most of Mealtimes (M3) project. J Nutr Health Aging. 2018;22(8):916–22. PMID: [30272093](https://pubmed.ncbi.nlm.nih.gov/30272093/). doi: [10.1007/s12603-018-1016-6](https://doi.org/10.1007/s12603-018-1016-6).
- Keller HH, Carrier N, Slaughter S, Lengyel C, Steele CM, Duizer L, et al. Making the Most of Mealtimes (M3): protocol of a multi-centre cross-sectional study of food intake and its determinants in older adults living in long term care homes. BMC Geriatr. 2017;17(1):15. PMID: [28086754](https://pubmed.ncbi.nlm.nih.gov/28086754/). doi: [10.1186/s12877-016-0401-4](https://doi.org/10.1186/s12877-016-0401-4).
- Shepherd TJ. Dysphagia update: evidence, tools, and practice. Presentation to International Stroke Conference, San Francisco, CA, February 2007.
- Reimer HD, Keller HH. Mealtimes in nursing homes: striving for person-centered care. J Nutr Elder. 2009;28(4):327–47. PMID: [21184376](https://pubmed.ncbi.nlm.nih.gov/21184376/). doi: [10.1080/01639360903417066](https://doi.org/10.1080/01639360903417066).
- Alagiakrishnan K, Bhanji RA, Kurian M. Evaluation and management of oropharyngeal dysphagia in different types of dementia: a systematic review. Arch Gerontol Geriatr. 2013;56(1):1–9. PMID: [22608838](https://pubmed.ncbi.nlm.nih.gov/22608838/). doi: [10.1016/j.archger.2012.04.011](https://doi.org/10.1016/j.archger.2012.04.011).
- Cichero JA, Steele C, Duivestijn J, Clave P, Kayashita J, Dantas R, et al. The need for international terminology and definitions for texture-modified foods and thickened liquids used in dysphagia management: foundations of a global initiative. Curr Phys Med Rehabil Rep. 2013;1(4):280–91. PMID: [24392282](https://pubmed.ncbi.nlm.nih.gov/24392282/). doi: [10.1007/s40141-013-0024-z](https://doi.org/10.1007/s40141-013-0024-z).
- Langmore SE, Terpenning MS, Schork A, Chen Y, Murray JT, Lopatin D, et al. Predictors of aspiration pneumonia: how important is dysphagia? Dysphagia. 1998;13(2):69–81. PMID: [9513300](https://pubmed.ncbi.nlm.nih.gov/9513300/). doi: [10.1007/PL00009559](https://doi.org/10.1007/PL00009559).
- Niedert KC. American Dietetic Association. Position of the American Dietetic Association: liberalization of the diet prescription improves quality of life for older adults in long-term care. J Am Diet Assoc. 2005;105(12):1955–65. PMID: [16402447](https://pubmed.ncbi.nlm.nih.gov/16402447/). doi: [10.1016/j.jada.2005.10.004](https://doi.org/10.1016/j.jada.2005.10.004).