



Assessment of Nurses' Knowledge on the Impact of an International Dysphagia Diet Standardisation Initiative (IDDSI)-Based Training Program in Rehabilitation Hospital: A Pre- and Post-Study

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KEYWORDS

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ABSTRACT

Dysphagia, or difficulty swallowing, often requires modifying food textures and liquid consistencies to ensure patient safety and proper nutrition. The International Dysphagia Diet Standardisation Initiative (IDDSI) framework, introduced in 2013, provides standardized guidelines for these modifications. This study evaluates nurses' understanding of food texture and liquid consistency modifications before and after a training program based on the IDDSI framework, aiming to improve interdisciplinary communication, reduce discrepancies in dietary management, and enhance safety for patients with dysphagia. A quantitative pre- and post-test study using convenience sampling was conducted to evaluate nurses' knowledge of dysphagia and the IDDSI framework. Knowledge was assessed with ten validated questions. The training program, delivered by a multidisciplinary core team including dietitians, speech therapists, and medical specialists, featured interactive learning, hands-on activities, and demonstrations. Participants completed assessments before (pre-test) and after (post-test) the training to measure knowledge improvement. The training program significantly increased nurses' knowledge ($t = -8.43$, $df = 32$, $p < 0.001$), according to a paired samples t-test. This suggests that the training sessions effectively improved the nurses' understanding of the IDDSI framework. The study reveals that nurses' understanding of modifications in food texture and liquid consistency has been significantly improved by the IDDSI training program. According to the findings, implementing this knowledge into practice can improve the care provided to individuals experiencing dysphagia by ensuring safer and more reliable food preparation techniques.

Keywords: Dysphagia, IDDSI framework, Food texture modification, Liquid consistency, Nursing education.

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1. INTRODUCTION

Dysphagia is defined as difficulty in the swallowing process that impairs the passage of a food bolus through the swallowing tract. Dysphagia results from neuromuscular (central and/or peripheral) or mechanical disorders that impair the voluntary and involuntary phases of swallowing. The causes of oropharyngeal dysphagia (OD) vary according to the underlying pathophysiology. Safe swallowing without aspiration requires the bolus to have an appropriate size,

consistency, and lubrication, achieved through coordinated preparatory processes before effective swallowing occurs [1].

Based on the Korean National Health Insurance Service database from 2006-2016, data recorded a crude annual incidence of dysphagia that rose steadily from 7.14 in 2006 to 15.64 in 2016, while prevalence increased from 0.09% to 0.25% over the same period. Stroke, neurodegenerative disease, cancer, and chronic obstructive pulmonary disease were strongly associated with dysphagia, with odds ratios of 7.86, 6.20, 5.59, and 2.94, respectively. Mortality among

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patients with dysphagia was over three times higher than in those without dysphagia (HR 3.12). According to the stated hazard ratio, the probability of death was more than three times higher for patients with dysphagia than for those without. In order to prevent complications such as aspiration pneumonia, malnutrition, and dehydration, it is critical to identify dysphagia as a clinically relevant predictor of poor outcomes and to implement multidisciplinary intervention immediately as possible. Overall, dysphagia requiring medical care is increasing, particularly among older adults, and is closely linked to major chronic diseases [2]. A systematic review conducted by Rajati et al. (2022) found that the overall estimated global prevalence rate of OD was 43.8% (95% CI 33.3-54.9%). The highest prevalence rate by continent was estimated in Africa at 64.2% (95% CI 53.2-73.9%) whereas the highest prevalence rate related to study population was related to dementia was at 72.4% (95% CI 26.7-95.0%) followed by children (72.3%) and stroke patients (55.4%) [3]. Given the high global prevalence of oropharyngeal dysphagia (OD), its impact on healthcare systems is substantial, contributing to increased risks of aspiration pneumonia, malnutrition, prolonged hospital stays and higher healthcare costs. Therefore, it is recommended that healthcare providers and policy makers place greater emphasis on OD management to reduce overall clinical and economic burden.

A qualitative study was conducted among allied health professionals (AHPs) worked clinically in private and non-profit organization (NGO) sector, viewed that dysphagia negatively impacts a person's quality of life by limiting choice and control over food, reducing social engagement, and creating negative mealtime experiences with unappealing texture-modified food [4]. Some of the interventions by the healthcare professionals include delivering nutrition through offering food texture modification or enteral tube feeding based on safety. Patient should also be offered treatment by the multidisciplinary team through education for patients and caregivers to improve mealtime experiences [5].

The International Dysphagia Diet Standardisation Initiative (IDDSI) framework, introduced in 2013, aims to standardize food texture and liquid consistency modifications for individuals with dysphagia. It was developed in 2015 by a multidisciplinary team to facilitate healthcare workers in the management of patient with dysphagia requiring food texture and liquid consistency modification. It is the latest guideline to integrate testing methods using household utensils to confirm food texture and liquid consistency. It has 8 levels which differentiated by color, numbers, and label coded. Every level has its own distinct characteristics to help users understand the food and liquid properties [6].

A study conducted by Son et al. involved physicians, nurses, nutritionists, and swallowing therapists (occupational therapists) working in the Department of Rehabilitation Medicine, and Dietetics and Nutrition Services Team at a single center in Seoul, Korea, demonstrated that IDDSI framework had a strong correlation with the previously used guidelines and was reasonably applicable in East Asian countries. Additionally, swallowing therapists showed the highest coefficient level of understanding in IDDSI (0.991) [7].

A systematic review by Cha et al. revealed that when compared to patients following standard diets, those receiving modified diets showed a tendency toward compromised

nutritional status. Participants from the study were selected those requiring food modification texture in rehabilitation hospitals, nursing homes or long-term care facilities. In order to ensure swallowing safety, some meals lose some of their palatability, texture, and satiety, which results in reduced food intake [8]. Both food and liquids require adjusted viscosity and texture for individuals experienced with dysphagia. Nevertheless, the lack of conventional recipes restricts the variety of dysphagia meals and the use of commercial thickening agents frequently might diminishes food flavor. These problems may cause patients on modified diets to consume fewer solid foods over time, raising the risk of malnutrition.

Both IDDSI levels and nutritional status were shaped by a combination of individual and environmental factors. Severe personal conditions such as dementia, cognitive decline, poor oral health, and feeding difficulties were associated with poorer nutritional status and challenges in appropriately implementing modified diets. Subsequently, it was linked to more frequent prescriptions for nutritional supplements and a higher chance of finishing meal [9]. Implementation of food texture and liquid consistency modification may opposed challenging scenarios as there were several factors that influenced the practice. A review conducted by Smith et al. demonstrated that techniques of food preparation and formulation were necessary to improve the taste and visual appearance of food modification [4].

A qualitative study was done in two hospitals in the Netherlands found that among the job scope of the nurses were to provide mealtime assistance to the patient [10]. These situations could complicated for those who need extra cares which requires food texture modification. Nurses play an important role towards patient in the hospital especially in the early detection and prevention of aspiration in stroke patients. Notably, a study conducted in the general intensive care unit and stroke unit at Menoufia University Hospital, Egypt showed that knowledge about acute stroke dysphagia and early detection of patient aspiration among nurses (n = 40) was improved after education programme conducted [11].

2. OBJECTIVE

This study aims to observe the current knowledge of nurses on the management of dysphagia through food texture and liquid consistency modification and to compare nurses' understanding of food texture and liquid consistency modifications before and after a training program using the IDDSI framework.

3. METHODOLOGY

Convenience sampling was used in a quantitative pre- and post-test study design. This method was employed due to its practicality, time efficiency, and ease of recruiting participants who were readily available and directly involved in dysphagia care and IDDSI implementation. However, this approach may limit the generalisability of the findings, as the sample may not be fully representative of nurses in other settings, potentially introducing selection bias and restricting the applicability of the results to a wider population.

Nurses' knowledge was evaluated using a set of ten validated knowledge questions that focused on dysphagia and the IDDSI framework. The ten validated knowledge questions used in this study were adapted from a previously developed and validated questionnaire designed in a previous study evaluating effectiveness of a nutrition module for children with cerebral palsy requiring texture-modified based on the International Dysphagia Diet Standardisation Initiative (IDDSI). The original instrument contained 20 items, with 10 questions focusing on feeding problems in cerebral palsy and another 10 assessing knowledge of the IDDSI framework. For the current study, only the 10 IDDSI-related questions were extracted and used to specifically evaluate nurses' knowledge on dysphagia diet consistency, texture modification principles, and safe feeding practices, while maintaining the validity and reliability established in the original validation process [12]

The Core team members were formed from a variety of disciplines such as dietitians, speech therapists, medical specialists and inpatient nurses.

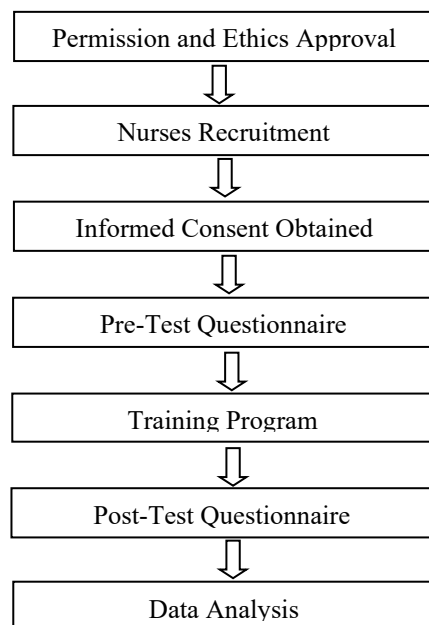


Fig. 1. Data collection process

Prior to data collection, the core team participated in the training program, which incorporated interactive learning, hands-on activities, and demonstrations. Data collection was done in 2 days, which core team did a road tour to each ward to conduct the same training as they were attended before. Permission from the head of nurses in each ward was obtained and nurses on duty were participated in the training program. Participants' knowledge was evaluated before (pre-test) and after (post-test) the training. Figure 1 shows the data collection process.

3.1 Knowledge Questionnaire

A structured knowledge questionnaire was used to assess nurses' understanding of dysphagia management and the International Dysphagia Diet Standardisation Initiative (IDDSI) framework. The questionnaire consisted of 10 questions, each with only one correct answer, scored as right or wrong. The items were designed to evaluate key aspects of the IDDSI guidelines, including diet texture levels, liquid

consistencies, and safe feeding practices. The questionnaire was administered before and after the training program to measure changes in knowledge resulting from the intervention.

3.2 Training Program

The training program was conducted as an interactive sharing session led by the core team. Rather than a formal lecture, the session emphasized collaborative discussion and practical understanding of dysphagia management and implementation of the International Dysphagia Diet Standardisation Initiative (IDDSI) framework. Educational tools, including an IDDSI flip chart, were used to facilitate explanation of diet levels, texture classifications, and testing methods. The core team provided structured guidance on identifying appropriate food textures and liquid consistencies while encouraging participants to share clinical experiences and raise practical questions. Demonstrations of texture verification methods were incorporated to enhance comprehension and support application in routine nursing practice. To reinforce learning and promote sustained implementation, the educational flip chart and laminated IDDSI reference posters were subsequently provided to the ward for ongoing reference and clinical use.

A key component of the training program was the practical demonstration, designed to reinforce hands-on skills in verifying food and liquid consistencies according to IDDSI standards. The hospital kitchen prepared samples of food textures ranging from Level 3 to Level 7, which were used during the session. Nurses observed the core team performing IDDSI testing methods, including the syringe flow test and fork pressure test, to assess texture and consistency. The syringe flow test involves filling a syringe with 10 millilitres of liquid, letting it flow for 10 seconds, and measuring the amount of liquid left, the more liquid left, the thicker the consistencies is whereas the fork pressure test involves by pressing food with a fork to determine how easily it breaks down, harder items are not ideal for dysphagia diets. Both tests assist in ensuring that food and liquid are prepared at the proper texture and consistency to lower the risk of aspiration and choking.

Following the demonstration, participants practiced these methods themselves under supervision, allowing them to gain confidence in evaluating modified diets accurately. This experiential learning approach emphasized observation, guided practice, and immediate feedback, ensuring that nurses could reliably apply IDDSI testing in their daily clinical practice.

3.3 Ethical Approval

This study was conducted in accordance with ethical standards and received approval from the Medical Research and Ethics Committee (MREC), Ministry of Health Malaysia (NMRR ID-25-00101-WWS [IIR]). All procedures involving human participants adhered to the principles outlined in the Declaration of Helsinki.

4. RESULTS

4.1 Participant Characteristics

A total of 33 nurses participated in the study. Participants were distributed across wards as follows: neurology and acquired brain injury ward, $n = 10$; pediatrics, $n = 7$; geriatric, $n = 4$; and other wards, $n = 12$. The range of clinical experience among participants was 1.25 to 13 years, reflecting diverse levels of nursing practice and exposure to patient care requiring modified diets or dysphagia management.

4.2 Pre- and Post-Knowledge Score

Nurses' knowledge of dysphagia management and IDDSI diet implementation improved significantly following the training program. Pre knowledge scores ranged from 7 to 10 ($M = 8.39$, $SD = 0.90$), while post knowledge scores ranged from 8 to 10 ($M = 9.76$, $SD = 0.50$). A paired-samples t-test indicated a significant increase in knowledge scores from pre- to post-intervention, $t(32.02) = -8.43$, $p < .001$. This suggests that the training sessions effectively improved the nurses' understanding of the IDDSI framework.

5. DISCUSSION

This study demonstrated that a brief, interactive training program significantly improved nurses' knowledge of IDDSI guidelines. Additionally, practical demonstrations and hands-on practice enhanced their competency in assessing food textures and liquid consistencies.

Previous study shown an educational program significantly upgraded nurses' knowledge and skills—87.5% and 92.5% reached good levels, respectively—and enabled 82.5% to effectively detect aspiration in acute stroke patient [11]. The study was driven by a need for enhanced communication between healthcare professionals, address discrepancies in food texture and liquid consistency modifications, and improve safety for individuals with dysphagia during mealtimes [13]. Similarly, other study had been done to observe difference between pre and post training session among multidisciplinary healthcare professionals ($n = 30$). Participants were from Food and Nutrition Services department (kitchen staff and dietitians) and collaborating departments (nursing and speech pathology). The training sessions included hands-on demonstration of IDDSI level and lecture-style. Results shown, knowledge confidence improved (characteristics and testing methods of different level of IDDSI) The results indicated that the IDDSI training improved participants' accuracy of knowledge and comprehension of the framework, especially in properly identifying food texture levels and the IDDSI's primary objective. Participants were able to better connect their past experiential knowledge with the standardised IDDSI system, leading to enhanced conceptual clarity, evidenced by an increase in correct responses following training [14]. The framework provides clear and standardised descriptions of texture and consistency.

The used of IDDSI terminologies not only facilitate efficient communication among healthcare professionals in healthcare institution, it also improved on staff knowledge and texture-modified diet (TMD) compliance in aged care facilities. The intervention led to a 46% increase in IDDSI compliance of TMD meals ($n = 79$) and significantly improved staff awareness of IDDSI guidelines from 25% to

75% ($p < 0.001$) [15]. The increase in IDDSI compliance demonstrates how effectively structured implementations help to enhance adherence to texture-modified recommendations. This is particularly crucial in rehabilitation settings, as patients often require regular dietary modifications due to dynamic changes in swallowing function. Therefore, increased compliance may promote safer dysphagia management, minimize practice variability, and improve consistency in diet management.

These results were in line with earlier studies that highlight the value of hands-on, demonstration-based training for medical personnel. Studies conducted in long-term care (LTC) settings, for instance, have revealed that residents who are more at risk for dysphagia are more likely to be given texture-modified foods; nonetheless, there were still gaps in screening and diet prescription procedures ($p < 0.001$). Crucially, diet changes by themselves were not linked to longer mealtimes, indicating that physical assistance during meals and other forms of individualized support are still essential for safe and sufficient nutritional intake [16]. By improving nurses' competence in evaluating and implementing modified diets, training interventions such as the one described in this study can directly contribute to safer feeding practices and potentially better nutritional outcomes for patients with dysphagia.

Higher levels of diet texture modification have been linked to a higher risk of dysphagia, which is correlated with lower IDDSI levels. According to Vucea et al. (2020), residents who consumed modified texture foods (MTF) were far more likely to experience dysphagia than those who followed a typical diet. Additionally, the MTF group showed poorer nutritional condition, as seen by considerably lower mean body weight, higher percentages of lower body mass index (BMI) and reduced calf circumference, and lower mean MNA-SF scores [17]. Nevertheless, Miles et al. (2021) reported that participants consuming pureed diets were more likely to complete their meals, highlighting significant differences in meal intake across diet types [18].

These results imply that following the IDDSI framework for texture modification and consistency adjustment can lead to clinically significant results, such as better nutritional intake and swallowing safety. Healthcare professionals can customize diet changes to meet the needs of each patient by using the IDDSI framework, which offers standardized, evidence-based guidelines that take into account factors including swallowing capacity, cognitive function, and general health. In addition to promoting patient safety, the careful and methodical implementation of these recommendations provides a scientific basis for creating customized dietary plans, which helps to maximize the standard of care and the nutritional health of dysphagia patients [19].

To ensure that IDDSI guidelines are applied consistently and to promote patient safety, multidisciplinary teams, continuous quality control, and structured staff training are crucial. The use of posters, printed materials, and free online resources from the official IDDSI website to support staff learning and adherence to standardized diet modification practices has been recommended by previous studies that highlight the significance of accessible educational programs within healthcare institutions [20]. In addition, fragmentation of critical records may lead to inconsistent documentation of IDDSI diet prescriptions, which can affect communication

between staff and compromise patient safety. This highlights the need for more integrated documentation systems to support accurate and safe implementation of IDDSI guidelines.

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6. CONCLUSION

The study reveals that nurses' understanding of modifications in food texture and liquid consistency has been significantly improved by the IDDSI training program. According to the findings, implementing this knowledge into practice can improve the care provided to individuals experiencing dysphagia by ensuring safer and more reliable food preparation techniques.

This study has several limitations that should be considered when interpreting the findings. First, the sample size was relatively small, with only 33 nurses participating, which may limit the generalization of the results. Second, the assessment of knowledge and practical skills was conducted immediately after the training program, and no long-term follow-up was performed to determine whether the improvements were sustained over time. Finally, the study was conducted at a single institution, which may restrict the applicability of the findings to other settings or healthcare contexts.

Future studies had been suggested by Spoladore et al. (2024) to develop a novel prototype ontology-based decision support system (DSS) aimed at supporting neuromuscular patients with dysphagia undergoing oral feeding and their caregivers in the preparation of safe and nutritionally adequate meals [21]. The system allows clinicians to create patient profiles and generate personalised lists of safe recipes based on dysphagia severity and swallowing safety scores through a decision support application. The patient application then displays clinician-approved recipes with key details and step-by-step instructions supported by images or videos, guided interface for safe meal preparation. Meanwhile, the clinician application enables updates to patient data and the underlying ontology based on clinical changes or feedback, allowing the system to regenerate updated recipe recommendations while ensuring the patient application remains aligned with the latest assessment.

Futher investigations should examine how well knowledge and practical skills acquired from training programs centered upon IDDSI are retained over time, as well as how they affect patient outcomes including aspiration rates and general nutritional status. The generalization of the results across various healthcare settings would also be ascertained by performing multi-center research. Such studies could offer important proof of the long-term viability and clinical efficacy of nurse training treatments, guaranteeing that gains in

competency and knowledge translate into safer and more reliable care for dysphagic patients.

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