

Using the Consolidated Framework for Implementation Research (CFIR) to Evaluate the Implementation of the International Dysphagia Diet Standardisation Initiative (IDDSI) and Provision of Texture Modified Diets (TMDs) in age-care Facilities: Barriers and Enablers to Implementation

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Research

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Abstract

Background

Texture modified diets (TMDs) are a common intervention for older adults with swallowing difficulties as they improve swallowing safety. The International Dysphagia Diet Standardization Initiative (IDDSI) provides a framework for terminology, definitions and testing of TMDs. This observational mixed methods study used the Consolidated Framework for Implementation Research (CFIR) to evaluate the effectiveness of IDDSI adoption in aged-care facilities (ACFs) and identify barriers and enablers to facilitate future implementation.

Methods

Five New Zealand ACFs who had adopted IDDSI >12 months previously were recruited. Evaluation tools were developed based on CFIR constructs, integrating data from i) mealtime observations; ii) manager interviews and iii) staff (nursing, carers and kitchen) self-administrated surveys.

Results

All facility and kitchen managers were IDDSI-aware and had access to online resources. Three sites had changed to commercially compliant products post-IDDSI adoption, which had cost implications. Awareness of IDDSI amongst staff ranged from 5-79% and <50% of staff surveyed felt sufficiently trained. Awareness was greater in large sites and where IDDSI was mandated by head office. Managers had not mandated auditing and they felt this had led to reduced perceived importance. Managers felt staff required more training and staff wanted more training, believing it would improve food safety and quality of care. Lack of a dedicated project lead and no speech pathologist onsite were perceived barriers. Collaboration between healthcare assistants, kitchen staff and allied health assisted implementation.

Conclusion

ACF staff were aware of IDDSI but staff knowledge was low. Using the CFIR, site-specific and generic barriers and enablers were identified to improve future implementation effectiveness. Managers and staff want access to regular training. Multidisciplinary collaboration and improving communication are essential. ACFs should consider TMD auditing regularly. Successful implementation of IDDSI allows improvement of quality of care and patient safety but requires a systematic, site-specific implementation plan.

Contributions To The Literature

- IDDSI has been adopted in many countries as the first international framework for dysphagia patients. This is the first study to evaluate IDDSI implementation using a consolidated implementation framework.
- The findings from this study will assist health professionals with future implementation strategies development and encourage organizations to incorporate implementation science when delivering a new guideline.
- The assessment tools used in this study can be adapted for future large-scale research.

Background

Texture modified diets (TMDs) are a common dietary intervention for older adults with swallowing difficulties (dysphagia) or poor dentition as they can improve swallowing safety, efficiency and/ or enjoyment [1,2]. The prevalence of TMD use in aged-care facilities (ACFs) in New Zealand aligns with international reporting prevalence of 15-30% [3,4]. Texture modification refers to the alteration of food particle size, texture and consistency and may involve cutting up, mincing or pureeing food, or the adding of thickening agents or additional liquids. Providing standardized and consistent TMDs remains challenging in practice [5–7]. Lack of standardized terminology and descriptions for the varying degrees of TMDs contribute to improper provision and therefore, increase the risk of adverse events such as choking or aspiration pneumonia [8]. To overcome the inconsistency in clinical practice and potential communication breakdowns, a global multidisciplinary team developed the International Dysphagia Diet Standardisation Initiative (IDDSI) framework. The IDDSI framework standardizes terminology and provides definitions and testing procedures of TMDs to guide individuals with dysphagia, their carers, health professionals and anyone involved in food provision or mealtime support for those with dysphagia [9].

The IDDSI framework consists of a progression of eight colour-coded levels, numbered and labelled to describe the textures of drinks and food [10]. The framework provides validated testing methods that can be conducted without specialist equipment or training for each food and drink level. The goal of a standardized common language for TMDs across all countries, ages, care settings and cultures is to advance patient safety, improve communication between health professionals and enhance collaboration of research [11].

IDDSI is rapidly being adopted by many countries worldwide but there are limited publications supporting ways to successfully adopt IDDSI. Both Lam et al.(2018) and Estrella et al. [12,13] demonstrated successful implementation of the IDDSI framework in pilot hospital sites as evidenced by improved interdisciplinary collaboration and staff practices. IDDSI was adopted in New Zealand in May 2018 and implementation has been encouraged across all healthcare settings including ACFs. ACFs support >35,000 residents across New Zealand with one-third of residents on TMDs [4]. Our earlier work found the majority of ACF pureed diets met IDDSI standards, yet none of the soft and bite-sized diets met standard. Foodservice providers contracted to ACFs were struggling to adjust menus and to supply financially viable meals that adhered to the IDDSI standards. Similar themes were reported in the New York pilot implementation study where food particle size compliance and, education and collaboration with foodservice management, were identified barriers [13]. Lam et al. and Rule both emphasise the need for multidisciplinary support for successful IDDSI implementation [12,14].

The formative evaluation of the implementation of a new healthcare practice helps to gain a better understanding of the complex factors influencing the process, which provide useful strategies for successful implementation. This in turn improves the effectiveness and sustainability of the implementation process. To our knowledge, this is the first study to evaluate IDDSI implementation in aged care using an established implementation science framework. We used the Consolidated Framework for Implementation Research (CFIR) to guide structured data collection, analysis and evaluation of the barriers and enablers associated with the implementation of IDDSI into TMD provision.

Consolidated Framework for Implementation Science

The CFIR has established use in evaluating health service interventions. It is a multi-dimensional framework, including five domains with 39 dynamic constructs which systematically evaluate both contextual and intervention factors that may influence an implementation process [15]. Our study used CFIR as a systematic assessment guide to evaluate the initial stages of IDDSI implementation and summarised the findings which could assist future implementation in ACFs and enhance the effectiveness of implementation.

Methods

This observational study received ethics approval from the University of Auckland Human Participants Ethics Committee (023048).

Study sample

Sample sites were selected through convenience sampling by emailing flyers to a list of central Auckland ACF managers retrieved from an internet search. According to the report from the Ministry of Health NZ, the average size of a certified ACF is 60 beds, with a median of 51 beds. Therefore, we stratified the facilities by size (small – less than 50; medium – 50 to 99; large – 100 to 200). Our study aimed to select a range of facilities covering various levels of service care (rest homes, dementia units, long-stay hospitals, psychogeriatric units) and size to ensure the representativeness of sampling. ACFs were invited one by one based on locality convenience and size until the maximum sample size of five ACFs was achieved. The authors had no prior relationship with the sites.

Data collection

Data collection aimed to gather diagnostic systematic information of current IDDSI adaption and use of TMDs in ACFs. A parallel mixed method approach was chosen for data collection and analysis to establish barriers and enablers of IDDSI implementation. Both quantitative and qualitative data were interpreted to appreciate the reasons and self-perceptions of implementation success and failure.

One researcher (a registered dietitian) visited each site and conducted i) mealtime observations; ii) manager interviews and iii) staff self-administrated surveys. Interviews were conducted on a one-day visit, while mealtime observations were conducted across 1-2 days at each site depending on dining room numbers. Surveys were handed to staff on the first visit and collected a week after. Healthcare assistants, nursing staff and kitchen staff were all invited to complete the survey. All data collection was completed between July 2019- April 2020. Observations, interviews and surveys were developed incorporating each of CFIR construct to identify the contributors affecting the implementation [Additional file 1].

Mealtime observations

One researcher was present in the dining room at lunch and dinner time to observe the residents consuming TMDs. To minimize the ACF staff performance bias, staff were not aware of the research aims, and there were no interactions with the residents or staff. Staff were told the research was to observe the plate wastage.

Feeding assistance, meal presentation, dining environment and staff communication with residents were recorded on the sheet.

Manager interviews

To understand the implementation process at sites, one researcher initiated a 30-50 minutes semi-structured interview with the facility manager, kitchen manager and clinical manager from each ACF. Questions were guided by the CFIR Interview Guide tool [Additional file 1]. Participants were prompted to outline their involvement in TMDs in their facility, any changes they have made during the implementation of IDDSI and perceived challenges and successes. Profession-specific probes were formulated according to their daily responsibilities (e.g. training schedules and use of external food service questions for facility managers; incidence of choking and clinical system for clinical managers; food preparation and testing for kitchen managers). Managers were asked to rate the implementation difficulty, self-perceived success and how confident they were regarding staff performance improvement after implementation on a scale of 0-10 (0 = lowest and 10 = highest). The interviews were audio-recorded and transcribed verbatim using F4Transkript software and reviewed by the interviewees for accuracy checking.

Staff surveys

Self-administrated anonymous surveys were distributed in paper form to healthcare assistants, nursing staff and kitchen staff and collected in a dropbox. The survey was designed based on a review of the relevant literature and was used to investigate staff knowledge and attitudes towards IDDSI implementation and use of TMDs. The survey consisted of five sections and 46 questions: i) background and experience with using TMDs; ii) knowledge of malnutrition; iii) knowledge of dysphagia; iv) knowledge of TMDs and IDDSI framework; v) attitudes towards IDDSI implementation and nutrition education [Additional file 2]. All questions related to knowledge level were multiple choices. Staff were asked to rate their perception of the facility TMDs on a Likert scale. The survey was developed by a dietitian researcher and evaluated and reviewed by an expert dietitian and speech pathologist to ensure the questions were relevant to the topic and plain language was used. Questions related to malnutrition and dysphagia aimed to measure staffs' general dysphagia knowledge. IDDSI questions were designed based on the information provided by the official website documents, which covered classification, labelling, testing methods and implication. Questions regarding attitude queried the staffs' insight of IDDSI implementation and their interests in future education.

Data analysis

Mealtimes observations and survey results were tallied by site and coded by prepopulated CFIR construct codes. A content analysis approach was used to systematically code interview transcripts and surveys, again, using prepopulated CFIR construct codes. Coding categories reflected each domain and construct of CFIR [Additional file 1]. Identified constructs from each interview, survey and mealtimes observations were then rated for strength for each of the facilities using CFIR Rating Rules recommended by Damschroder & Lowery (2013) (2=strong, 1=weak, 0=neutral). Positive (+) influence was considered as enablers, and negative (-) influence was considered as barrier to the implementation. Coding was checked by all authors for consensus agreement.

Results

Five ACFs participated in the study. All sites adopted the IDDSI in 2018-2019. A total of 15 managers were interviewed and 85 surveys were completed by the staff across the five sites. Sites ranged from 54-153 beds and all had access to a dietitian. Between 23-37% of residents were receiving TMDs including puree, minced and moist and soft and bite sized meals. Thickened drinks were much less frequent (range 5-12%). Details of sites and their meal services are displayed in Additional file 3.

Intervention Characteristics

Table 1 displays the overall contract ratings across sites.

1.1 Intervention source

The IDDSI is an externally developed initiative by an international committee and considered a global standard for texture modification. It was endorsed by New Zealand healthcare organizations in 2018. Positive perceptions of the source were found across all sites and was rated as a strong positive influencer of implementation.

1.2 Evidence strength and quality

IDDSI framework was developed by a multidisciplinary expert panel based on a systematic review that examined the impact of fluid viscosity and food texture on swallowing. The identification of IDDSI levels and descriptions were derived from both clinical evidence and expert opinions. Two facility managers expressed that they wanted to know more about the background of IDDSI suggesting a lack of awareness of the development process, which weakened their perception of the implementation needs: *'I don't think it's been publicized enough maybe.... They all know what soft, minced and moist and puree is. But, actually, the background behind that change'* Site 5 manager.

1.3 Relative advantages

With the exception of Site 1 which had a negative perception towards implementation, this construct showed a positive influence on the implementation. Compared to the previous terminologies, participants perceived advantages of having clearly defined levels and instructed testing methods for improving resident safety.

1.4 Adaptability

Managers confirmed TMDs have always been provided in ACFs and were aware of the various levels of TMDs. All sites were able to provide all levels of TMDs except for Site 4 where neither the chef nor kitchen manager had knowledge and experience of a minced and moist diet. Pureed diet was offered to residents who were prescribed on minced and moist diets. Other site managers found the changes were easily adaptable, though some sites made more changes than the others. Three sites started using IDDSI-complied commercial TMD after the implementation as it was more consistent and better compliant and presentation.

1.4 Trialability

Kitchen managers considered desserts as the hardest TMD to produce. Three sites conducted IDDSI-compliant commercial TMD trials with staff and residents during their implementation. Positive feedback was received from residents and staff before they moved on to a larger scale of commercial TMD. The other two sites indicated they did not make specific changes to the meals, so trialability did not apply to them.

1.5 Complexity

Though all managers were interviewed, three managers from three sites were either not aware of or involved in the implementation. Therefore, they were unable to give opinions on the rating of implementation difficulty and success. Mean range of implementation difficulty was 4.4 out of 10 (range 3-5). Four sites indicated the previous terminologies used to describe TMDs in New Zealand were very similar to IDDSI, but *'it was hard getting the staff to adopt the new terminology and to understand what the new changes were and why we're changing all these terminologies.'* Site 2 manager. Site 4 manager considered the process as relatively complex considering it as an ongoing process: *'I would say that we're probably still going through the process. It's not like we're done with it. There're still some things that we need to regather.'*

1.6 Design quality and packaging

Comprehensive IDDSI resources are readily accessed from the website, including written materials, posters, audit sheets, webinar and video links. The IDDSI framework has detailed descriptions of definition, test methods and food examples. Accordingly, the design quality of the IDDSI framework was rated as a strong enabler: *'the information is easier to access. It wasn't online before. We would be lost, and we will assume.'* Site 2 kitchen manager.

1.7 Cost

Participants reported cost was not a major concern as the implementation was delivered by their full-time clinicians. Site 3 clinical manager pointed out extra funding dedicated to the IDDSI implementation would be beneficial: *'I think we need extra (funding) ... at the moment, our suppliers would do it (education) or students would do it (education).'* Although the implementation project was not funded, two managers indicated their budget was able to cover the education delivered by contracted dietitians and they were willing to pay for more sessions in the future.

Twenty-three percent (n=7/30) of staff who completed the survey question 'the hardest changes for you using IDDSI' found the cost was higher to produce or purchase IDDSI-compliant meals. The budget of food purchasing was mentioned by three kitchen managers who started purchasing commercial IDDSI-compliant meals. Though higher priced, the commercial meals offer guaranteed texture and consistency, while also saving staff cooking time. Such benefits were deemed to outweigh the cost difference between freshly made and commercial meals. Managers from Site 2 and 5 reflected on the consumption of commercial fortified TMD and clinical improvements in nutrition and wound healing, reductions in hospital admissions, and saving the cost for purchasing additional supplements: *'yes, providing [commercial packaged TMD] has been an issue, because when we started, we were always over budget by \$4-5,000 a month. And I had to work with my kitchen manager to understand how to reduce other products to allow for these 12 people being catered for..it's a slightly higher cost overall. Although the price per resident per day is ok, it's about \$1.80 I think, for the*

modified meals.' Site 2 manager. *'Cost-effective versus the time it takes us to do it otherwise. So, it is cost-effective. Also, it's already pre-fortified, so comes with all the additional supplements that we need too.'* Site 5 manager.

Outer Setting

2.1 Patient needs and resources

Most of the staff were aware of the level of TMD their residents were prescribed but had limited knowledge regarding the appropriate food for each level. Seventy-eight percent (n=28/36) of the staff surveyed agreed the TMD should be tested daily. Managers acknowledged that IDDSI aims to enhance patient safety, which led to the motivation of the IDDSI implementation. Choking incidents were mentioned by clinical managers in all sites except Site 1 which only had rest-home level of residents: *'when I first started, we had a resident who choked, eventually was sent to the hospital and died in hospital...the resident was on a soft diet and .. supervision from the staff was poor.'* Clinical manager. *'After the main choking incident that we had, we also did an investigation, one of the findings was that not all of our staff was aware of the choking guideline ..So, we implemented.'* Clinical manager.

Managers indicated the inconsistency they observed of freshly made TMD and powder-mixed thickened fluids before IDDSI was implemented. Sites purchased commercial IDDSI-compliant meals found they were able to accommodate resident needs better with more suitable food options: *'so, the reason that we went with [commercial packaged TMD] was about my kitchen... minced and moist, it might be good one day and the next day it might be slightly runny or might be too thick... it was very hard for them to get the consistency correct every day.'* Site 2 manager.

Upgrading resident dining experience was another incentive for ACFs to implement IDDSI: *'we want to make sure that everyone ... engaging dining experience.'*; *'we just started a new quality goal for this year. And one of them is foodservice, including texture modification and flavours and things like that.'* Site 3 manager and Site 5 clinical manager. On the other hand, managers in the smallest site were not enthused about the changes. They only had a few residents on pureed diets and the residents on soft diets were mostly due to the poor dentition, so they did not perceive the needs to improve their current practice.

2.2 Cosmopolitanism

All sites indicated they had communicated with others during initial implementation: *'I met [the speech-language therapist] from Greenlane clinic, the head SLT. Because there was a lot of confusion about the information that we got into the practice that we were doing.'* Site 4 clinical manager.

2.3 Peer Pressure

Peer pressure had a positive impact on sites. IDDSI implementation was considered a recommended project in healthcare. Hospitals and commercial companies had moved to the IDDSI framework.

2.4 External Policy and Incentives

Despite IDDSI being endorsed by the New Zealand Speech-language Therapists' Association and the Dietitians Association, there was a lack of mandatory performance measurement or evaluation. While it was incorporated into the New Zealand Dietitian Menu Audit Tool, this was not mandated.

Inner Setting

3.1 Structural characteristics

Two types of foodservice systems were observed. Minced and moist and pureed diets were moulded by three sites using commercial TMD (Site 2, 3 and 5) while the other two sites served freshly made TMD with ice cream scoops. Suitable snacks and desserts were provided to TMD residents in all sites except Site 1 who did not modify dessert. All sites reported a well-established foodservice and nutrition policy, including menu review by dietitians and individualizing ethnic food by preferences [Additional file 3]. IDDSI labels were only used at Site 2. The kitchen manager and chefs with advanced experience working in ACFs and producing TMD demonstrated a better understanding of the needs to improve TMD and comply with IDDSI. Surveys indicated that half of the staff had 1-5yrs of work experience and a third had <1yr of experience [Additional file 4].

3.2 Networks and Communications

There were distinguishing differences between sites. One site reported a close working relationship between dietitians, kitchen and clinical staff: *'they come straight to me when we have a new resident, they hand me a nutritional profile. The clinical manager is fully on to it, she does her part, and basically, the RNs communicate on the daily basis. If there's any issue, we have meetings ... and resolve it as quickly as possible.'* [me and the dietitian] work by .. *If there's anything that needs to be implemented, she comes on-site, has a meeting with the village manager and myself'* Site 2 kitchen manager.

Two sites implied the need to improve communication between staff and dietitians: *'it's a good relationship between clinical staff and kitchen, but there's a lot of work in progress'; 'Sometimes I hear from the kitchen manager that the staff are not telling her everything... The communication should be better.'* Site 4 and 5 clinical managers.

None of the sites formed an interdisciplinary project team which was considered as a barrier. The staff received a one-time training and did not have a further meeting to discuss the challenges or problems they experienced. Meanwhile, the majority of the sites depended on the off-site dietitian acting as the coordinator for the implementation rather than having a team coordinator on site. All sites used online systems or electronic documents regarding dietary requirements. Clinical and kitchen managers were in charge of documenting. However, limited staff had access to up-to-date information. Foodservice preferred using paper format displaying the updated dietary requirements, and verbally delivered to healthcare assistants at the mealtime.

The private funding system means that facilities have access to 'free' community speech pathologists for one-off resident referrals only, but they are obligated to pay for education or training needs. A lack of input from speech-language therapy was indicated at all sites: *'because if the resident is not high in the priority with the healthcare service, then it is a matter of between 6 weeks to 3 months, or even longer, the waiting period.'* Site 4 clinical manager.

3.3 Culture

This construct was evaluated from interviews, surveys and direct observations. All sites had a friendly but intense working environment. Most of the managers indicated they have adequate staff producing meals and assisting residents. The kitchen manager from Site 4 indicated short staffing to prepare TMDs was one of the reasons they did not serve minced and moist diets. Routine staff were familiar with resident dietary preferences and were able to accommodate cultural requirements. Site 3 had a high ratio of residents who required feeding assistance against the number of staff available (n=7:3) while staff had limited interactions with residents at mealtime. Managers were satisfied with staff performance and valued good quality of nutritional care and safety for the residents. A mix of positive and negative comments about TMD was received: *'the thickener that we use in here tastes awful. We use the guar gum. With pureed, I would say that it put me off just because of how it looked. I really didn't think of the taste. I wouldn't be able to rate it properly. I didn't taste all of it. And the texture in my mouth also weirded me out.'* Site 1 and 4 clinical managers.

Staff were asked to rate their satisfaction with TMD provided in the facility (Figure 1). Site 2 and 4 had lower satisfaction rating compared to other sites (average below 4 out of 5).

3.4 Implementation Climate

3.4.1 Tension for change

Concerns for resident safety empowered tension for change: *'I doubt (the current thickener gives the right consistency) because in the previous facility we used liquid water, the pump. And that was such a quality improvement. It was consistent and the taste was good, there are no lumps. I would really like us to start using that here as well.'* Site 5 clinical manager. The need for change was not felt to be urgent at a low implementation site: *'we are not there yet, maybe we need it more when we move to a bigger site and having more patients [on TMDs].'* Site 1 clinical manager. The Tension for Change construct was not applied to Site 2 and 3 where the implementation was brought by their head office. They did not have the chance to consider whether it was needed at the time. However, choking incidents were brought up by two sites.

3.4.2 Compatibility

IDDSI was compatible with all sites goal of quality improvement and resident safety. IDDSI terms were not compatible with medical software some sites were using from an Australian company, which still used the Australian terms for TMDs. Staff could only choose the options listed on the software, and it confused them from adapting the IDDSI levels. Compatibility was rated as a strong influencer for Site 4 and 5 because they both had quality IDDSI improvement projects in progress.

3.4.3 Relative priority

The relative priority construct was only rated for Site 4, which was a self-directed implementation project. Other sites were led by the head office as a required project, where the priority was not applied.

3.4.4 Organisational incentives and rewards

All sites were rated as neutral with regards to incentives and rewards. Though one site held monthly meetings to reward dedicated staff nominated by their colleagues, residents or family members for outstanding performance. None of the sites offered any incentives or rewards for this particular implementation.

3.4.5 Goals and feedback

Managers did not receive any feedback from staff after IDDSI implementation. Site 2 and 3 monitored the terminologies used. Managers would correct staff: *'a lot of staff still refer to the old terminology, and if I hear and I just say, oh what's that?'* Site 2 manager. Both Site 4 and 5 started ongoing TMD auditing using IDDSI audit sheets. Site 4 had monthly TMD testing sessions and collected staff feedback on the texture and taste of the food, staff would also point out and send back the inappropriate TMD to the kitchen when noticed.

3.4.6 Learning climate

There were no potential risks related to the learning climate. All sites had a positive rating as a result of the collaborative working climate. Managers indicated chefs and kitchen managers as key players. Clinical staff reported they were able to communicate efficiently with the kitchen managers with the exception of Site 2, where 18-25% of the clinical staff (nurses and healthcare assistants) surveyed had limited involvement with TMDs, which could lead to a negative perception of them being less motivated and involved in the changes.

3.5 Readiness for implementation

3.5.1 Leadership engagement

Managers at some sites were highly engaged in monitoring performance, delivering training and actively seeking necessary input, whereas some leaders had conflicting opinions regarding the priority of the project: *'as a clinical manager, obviously I need to make sure firstly my staff does understand what it means. And then they need to understand what the different levels are, especially for the thickened fluids, and for the diets as well. And then make sure they are serving the right type of food to the right person'* Site 2 clinical manager. Site 5 delivered by cascaded approach, where leaders played a critical role: *'...cascade it to the other leaders, so the unit coordinators. Because we're large, for each floor, the structure of this home, each community has its leader, but we have to start at the top.'* Site 5 manager.

3.5.2 Available resources

IDDSI provided sufficient resources online for individual access. Other resources such as extra staff, space or funding were not provided to any sites for the implementation. Using packaged TMD saved space for cooking and time. Because IDDSI has more strict standards, Site 4 mentioned the lack of kitchen staff and equipment limited their ability to provide all levels of TMDs.

3.5.3 Access to knowledge and information

All sites received IDDSI training from dietitians and commercial company support staff: *'...(dietitian) would also bring [commercial TMD products] for the staff to taste. So that they would know what the food tastes like. We have done 3 training in the past about texture modification, IDDSI.'* Site 3 clinical manager. Managers mentioned staff need more training to reinforce the knowledge, in particular, for new staff. IDDSI framework

posters were displayed in Site 2 and 4. Chefs felt it was challenging to achieve the IDDSI standards due to the limited training on cooking TMD: *'I know that nutrition is important to me in the aged-care area. And I personally have no training in nutrition or dietary thing.'* Site 4 kitchen manager.

Of 84 staff surveyed, 25% (n=21) were aware of IDDSI. A limited knowledge level of IDDSI was found in all sites, with only 12% (n=10) able to match the terminologies with the correct number and color coding. Of the staff who reported being aware of IDDSI implementation, Site 2 and 4 had 75% of staff (n=3/4) and 45% (n=5/11) respectively felt they received sufficient information to understand IDDSI [Additional file 3].

Characteristics of Individuals

Results from this domain were interpreted indirectly from staff self-reported survey as we did not directly assess individual attitude at the time of implementation.

4.1 Knowledge and beliefs about the intervention

Managers had mixed beliefs and understanding of the importance and implication of IDDSI mainly due to their background and job responsibility. Fifty-three percent (n=8) of managers considered meals had improved since IDDSI roll-out, 27% (n=4) expressed few changes were seen, and the other 20% (n=3) indicated that TMDs still required improvements at their site. Despite the agreement on improving clinical safety, some managers pointed out the confusion staff had regarding the reasons for implementing IDDSI: *'make sure that everybody understands the differences between the different textures and the reasons why someone might be on them and the risks of what could happen if they don't deliver alright'* Site 5 clinical manager. Site 1 manager indicated the relevance of IDDSI was insignificant to their site considering their limited use of TMD.

Staff demonstrated positive attitudes towards learning IDDSI, 94% (n=79) wished to receive more information. Workshops (n=43), training courses (n=38) online resources (n=33), seminars (n=30) and hard copy handouts (n=25) were the most popular choices of learning. Site 1 showed a poor response rate as evidenced by only 29% of staff (n=2/7) completing all sections of the survey. Most staff showed positive beliefs of IDDSI with 18% pointing out IDDSI was hard to understand and comply with (Table 2).

4.2 Self-efficacy & 4.3 Individual stage of change

We were unable to assess individual staff belief in their ability to succeed in practising under IDDSI nor staff readiness for the changes. All managers expressed a high confidence level in staff performance and knowledge development in a future training (rated from 8-10 out of 10) and were satisfied with staff performance: *'I think everybody is ok. I often .. wander through in the mealtimes and everybody seems fine. No concerns'* Site 1 manager.

4.4 Individual identification with organisation

Four sites reported they felt supported by having a dietitian who could help them understand and solve problems on regular basis: *'the dietitian comes in every month, we're in touch almost every 2 weeks .. she came to train us for the moulding part twice, which was going on pretty smoothly'* Site 2 kitchen manager.

Managers demonstrated strong existing relationships: *'the dietitian comes here often and makes sure things are working well'* Site 3 manager.

Process

5.1 Planning

Though four sites received the plan from their head office, it was not individualized for each of the sites. None of the sites had a comprehensive plan covering pre-implementation assessments or gap analysis. Internal training was given for all sites at the time of implementation but without follow-up. Three sites received the education and materials from their national organizational dietitian. One site received the implementation material through head office online resources and received the education from their contracted dietitian. The implementation was generalized based on the organization rather than individual sites. The other site rolled out the implementation by an allied health coordinator. Missing an organized structural plan was a barrier. Site 5 indicated that the roll out could have been better developed.

5.2 Engaging

5.2.1 Opinion leaders, 5.2.2 Formally appointed internal implementation leaders and 5.2.3 Champions

The absence of influential leaders and appointed champions in this project was considered as a major barrier for all sites. None of the leaders had a working team engaging in the implementation. Only site 4 had an allied health coordinator who acted as a formally appointed internal leader to lead the implementation: *'she has a project called 'Dining with dignity'. She came into IDDSI and we worked alongside the kitchen, then we've invited a dietitian. Then she reviewed our meals that we serve and what should the texture be. She did some education training'* Site 4 clinical manager. The leaderships and coordinator roles were vacant in other sites.

5.2.4 External change agents

This construct significantly influenced the implementation effectiveness. Some sites received better support from commercial companies who provided resources and training to staff. Introducing the IDDSI-compliant products (thickener and TMD) led to a perceived improved quality of service.

5.2.5 Key stakeholders

One of the significant changes of IDDSI was the detailed instructions on TMD preparation and testing. Food particle size, consistency and texture should be tested for each level of TMDs. Only kitchen managers received information on TMD preparation and testing. Other kitchen staff and clinical staff had minimal involvement and were lacking awareness of IDDSI evidenced by the unsatisfactory IDDSI knowledge level from the surveys [Additional file 3], inconsistent use of IDDSI terminologies from observations and inaccurate terminologies used by managers in interviews.

5.2.6 Intervention participants

Residents were not participants in the implementation, therefore, it was not applicable.

5.3 Executing

Executing was not coded due to the lack of detailed planning and few procedures were developed by the sites.

5.4 Reflecting and evaluating

All sites had regular team meetings, but none of them tabled IDDSI on the agenda. Evaluation was missing in all sites. Participation in this study was voluntarily and sites were willing to receive formal feedback and reinforce implementation. A positive attitude was shown towards evaluation and improvement.

Discussion

This study evaluated the implementation effectiveness of IDDSI in New Zealand ACFs and identified barriers and enablers using CFIR. All five ACFs (54 to 153 beds) had adopted IDDSI, yet only one site delivered the information efficiently to staff. Similarly to previous New Zealand research, 27% of residents were prescribed TMDs [4]. IDDSI terminologies and testing methods were not widely used by staff. Both managers and staff showed a willingness for further assistance to succeed in IDDSI implementation. Our study categorized the significant influencers to success under four main CFIR domains of barriers and enablers, then provided sites with a tailored intervention to facilitate the IDDSI implementation.

Barriers to implementation

Tailored material, delivery and planning

Although IDDSI is being adopted globally, it is still a recent change. Not all ACF staff were aware of the IDDSI online resources which may have limited their perception of strength of evidence and motivate to comply. Jukes et al. assessed the use of Australian TMD standards and found a lack of knowledge about the implementing standards by ACFs and reported staff as a common barrier and therefore, an introduction of the standards is necessary to help staff to understand [11]. More than half the staff recognized IDDSI but indicated receiving unsatisfactory learning resources. For sustainable implementation and the best uptake of guidelines, structural strategies focusing on the improvement of knowledge and attitudes should be used [18,19]. None of the facilities conducted a local needs assessment nor had a formal implementation plan in place. Powell et al.'s review highlighted a planning process has been successfully used in implementing clinical innovations [20]. Given the heterogeneities among facility settings and culture, such as operational structure and staff experience, tailored implementation strategies are warranted corresponding to individual ACFs' context.

Strategies to attract and involve staff

Staff motivation for change was a significant influencer in moving forward with new guidelines. A previous study investigating 50 New Zealand ACFs identified insufficient foodservice staff training as a significant issue leading to compromised nutrition [21]. Our study corroborates this finding with TMD training non-compulsory for staff, therefore, limiting IDDSI awareness. Cabana et al.'s review found lack of awareness and familiarities were significant barriers for physician adherence to clinical guidelines [22]. It is important to engage the key personnel who play an important role in food and feeding. Translation of the guidelines into

practical demonstration is crucial to actively engage staff learning interests, in particular healthcare assistants and foodservice staff. Educational posters and pocket guidelines are ideal reminders, which would increase staff familiarity and awareness.

Interactive engagement showed success in IDDSI implementation in the Kempen Pilot [12]. Rule's study confirmed both self-learning alone and with hands-on practice of IDDSI testing methods improved the effectiveness of individual's learning outcomes [14]. Practical evidence-based training is recommended for foodservice and clinical staff. A successful education program is a key contributor to enhance the awareness of safety and nutrition risks [23]. Aligning with the training, rewards and incentives could motivate staff enthusiasm and behavior change [24]. Non-financial incentive from the facilities can be used as recognition and modelling, such as staff performance reviews and champion nomination.

Opinion leaders and professional input

Dietitians and speech pathologists play important roles in IDDSI knowledge translation. Lacking opinion leaders during the implementation was considered a significant barrier. Dietitians or speech pathologists may act as educational initiative opinion leaders to promote active learning [25]. An expert review confirmed the needs for multidisciplinary collaboration in dysphagia management [26]. While ACFs had access to dietitians and speech pathologists, this was often a private service or referral-based rather than having staff on-site full-time. Previous research suggests that SLT-prescribed TMD guidelines in ACFs was more likely to be adhered to by healthcare assistants compared to providing 1:1 support for individual residents [18]. In Kempen Pilot, both foodservice and clinical staff improved awareness of their role in TMDs provision through multidisciplinary collaboration and speech pathology initiated training series [12].

Reflections and evaluations

Reflections and evaluation were limited in our study. Yet previous work has demonstrated that where reflections and evaluations are more structured through regular meetings, implementation is more successful [16]. Audit and feedback are effective quality management strategies that have been used in implementing clinical innovations [19,20]. Team meetings should include goal-sharing, feedback of training and any changes arisen during implementation. Our early work similarly found texture and consistency of TMDs were insufficiently audited [28]. Assessment of the adherence to IDDSI guidelines is suggested as a measurement for the effectiveness of education [14]. Menu audit including IDDSI compliance, as well as staff performance and knowledge level assessments are recommended on regular basis.

Enablers of implementation

Established evidence and accessibility of the resources

IDDSI is well-recognized globally and has received endorsement from the New Zealand Health Quality and Safety Commission, Dietitian New Zealand and the New Zealand Speech-language Therapists' Association. With this national-level endorsement, our study mirrors findings overseas, with management all valuing IDDSI and a willingness to implement and educate their staff [11,22]. Positive understanding and agreement of the guideline act as an enabler in implementation. Though there are adequate online resources on the IDDSI website that can be accessed, implementation using electronic resources remains challenging due to the lack

of technological infrastructure and motivation [29]. Having dedicated resources available for implementation is positively associated with effectiveness, such as training, kitchen space, recipes and commercial TMD [15,29]. Evidence supports that the provision of accessible resources facilitates the implementation of guidelines, in particular printed, portable and centrally located resources [29,30]. Tailored resources will assist the staff to understand the guideline recommendations within a local context [29,31].

Team leader engagement and self-efficacy

Managers were committed to enhanced patient care. This finding is supported by Jukes et al. with supportive management and senior staff promoting the implementation of a TMD guideline [11]. Managers were confident in staff performance and learning abilities. Matwiejczyk et al. found foodservice staff with confidence and a positive belief in their ability showed improvements after an education program [32]. ACFs with a supportive culture reassure staff confidence and motivation in learning and acceptance of new guidelines. Active leadership engagement and a positive view of self-efficacy both contribute to implementation success [15,33].

Network and communications

Regardless of the structural heterogeneities among the facilities, staff agreed on the importance of communication between the clinical team and kitchen. Although Austbø Holteng et al. argued healthcare assistants expressed a lack of communication with foodservice staff, our study observed consistent communication and mealtime coordination [34]. Foodservice staff and nurses were more confident with the presence of in-house dietitians, which allowed them to communicate resident dietary changes efficiently. Casual staff without information of IDDSI have shown poor consistency in terminologies, and therefore weakened communication among facilities [35]. Interviews high staff turnover rates in ACFs. Having a stable team and appropriate communication channel across the organization is important to effective implementation.

External support

Supportive external change agents (commercial companies) had a significant impact on facilitating the implementation. Staff received the opportunity of interactive learning and were fond of the TMD tasting and moulding demonstrations. Companies used up-to-date IDDSI terminologies and labels on their products, which stimulated the learning process of new guidelines. Although external change agents may act as catalysts when introducing additional resources to facilitate the implementation, they have less understanding of the organization culture and commercial goals may match organizational needs [15]. It is important to balance the involvement of external change agents and maintain a long-term supportive relationship to boost implementation sustainability.

In 2020, the IDDSI working group received New Zealand Qualification Authority (NZQA) approval for a micro-credential in IDDSI for chefs. The micro-credential involves an e-learning interactive training package followed by a hands-on competency certification assessment. This will launch in early 2021 and further adds to the external resources available to food service.

Limitations

Voluntarily participated ACFs and staff may be more motivated in quality improvement and have more interest in nutritional care. This study only included urban ACFs that had implemented IDDSI, therefore the findings may not be generalized to all organizations. We aimed to capture responses from both clinical and foodservice staff, however, response rate varied across facilities. Staff numbers were uneven between departments due to the staffing arrangements and profession requirements. Although the transcriptions were pre-structured according to CFIR constructs and double-coded to minimize bias, interview answers still rely on participant subjective answers and memory. Future study should consider incorporating CFIR with objective measurement.

Conclusions

This is the first study to evaluate implementation of IDDSI in ACFs using a consolidated framework. Staff awareness and compliance with IDDSI is not optimal after the initial implementation. Barriers and enablers identified from this study should be used to improve future implementation effectiveness and sustainability. Practical training incorporated with printed resources should be recommended as part of the implementation. Clinical experts, such as speech pathologists and dietitians should be involved in planning, delivery, monitoring and reflection. Though IDDSI learning resources are easy to access, team leaders should encourage staff to participate in continuing education in dysphagia and TMD production. Successful implementation of IDDSI and appropriate use of TMDs require multidisciplinary effort. Tailored structural implementation strategies are required to achieve successful implementation of IDDSI and allow improvement of quality of care and patient safety.

Abbreviations

ACF: Aged-care facility; CFIR: Consolidated Framework for Implementation Research; IDDSI: International Dysphagia Diet Standardisation Initiative; TMD: Texture modified diet

Declarations

Ethics approval and consent to participate

Ethics approval was received from the University of Auckland Ethics Committee. All study participants and facilities provided written consent agreeing to participate in interviews and verbal consent prior to the audio recording of interviews.

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interest

None of the authors have relationship with aged-care facilities or commercial companies.

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Author's contributions

This research idea was conceptualized by all authors. Study methodology was finalized by XW with input from AM and AB. XW conducted the interviews, coded transcriptions and the constructs. AB double-coded a sample of transcripts and a sample of coded constructs. XW analysed the results with input from AM and AB. All authors read, contributed to and approved the final manuscript.

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Tables

Table 1. Consolidated Framework for Implementation Research (CFIR) construct rating of participating aged-care facilities

	<u>Intervention characteristics</u>	Site 1	Site 2	Site 3	Site 4	Site 5
1.1	Intervention Source	+2	+2	+2	+2	+2
1.2	Evidence Strength & Quality	-2	-2	-2	-2	-2
1.3	Relative advantage	-2	+2	+1	+2	+2
1.4	Adaptability	+1	+1	+1	-2	+1
1.5	Trialability	NA	+2	+2	NA	+2
1.6	Complexity	+1	-1	-1	-1	0
1.7	Design Quality and Packaging	+2	+2	+2	+2	+2
1.8	Cost	0	-1	-2	-2	0
	<u>Outer setting</u>					
2.1	Patient Needs & Resources	-1	+2	+2	+2	+2
2.2	Cosmopolitanism	+1	+1	+1	+1	+1
2.3	Peer Pressure	+1	+1	+1	+2	+1
2.4	External Policy & Incentives	-1	-1	-1	-1	-1
	<u>Inner setting</u>					
3.1	Structural Characteristics	-1	+2	+2	-2	+1
3.2	Networks & Communications	-1	+1	+1	-2	-1
3.3	Culture	-1	+1	+2	-1	+1
3.4	Implementation Climate					
3.4.1	Tension for Change	-2	NA	NA	+2	+2
3.4.2	Compatibility	-1	-1	-1	+2	+2
3.4.3	Relative Priority	NA	NA	NA	+2	NA
3.4.4	Organizational Incentives & Rewards	0	0	0	0	0
3.4.5	Goals and Feedback	-1	+1	+1	+2	+1
3.4.6	Learning Climate	+1	+2	+1	+1	+1
3.5	Readiness for Implementation					
3.5.1	Leadership Engagement	-1	+2	+2	+1	+2
3.5.2	Available Resources	0	+1	+1	-2	+1
3.5.3	Access to knowledge and information	+1	+2	+1	+1	+1
	<u>Characteristics of individuals</u>					
4.1	Knowledge & Beliefs about the	-1	+2	+2	+1	+1

Intervention						
4.2	Self-efficacy	+2	+2	+2	+2	+2
4.3	Individual Stage of Change	NA	NA	NA	NA	NA
4.4	Individual Identification with Organization	+1	+1	+1	0	+1
Process						
5.1	Planning	0	0	0	-1	-1
5.2	Opinion Leaders	missing	missing	missing	missing	missing
5.2.1	Formally appointed internal implementation leaders	missing	missing	missing	1	missing
5.2.2	Champions	missing	missing	missing	missing	missing
5.2.3	External Change Agents	missing	+2	+2	missing	+2
5.2.4	Key Stakeholders	-1	-1	-1	-2	-1
5.2.5	Patients/Customers	NA	NA	NA	NA	NA
5.3	Executing	NA	NA	NA	NA	NA
5.4	Reflecting & Evaluating	-1	-1	-1	-1	-1

Identified constructs from each interview were then rated for strength for each of the facilities using CFIR rating rules recommended by Damschroder & Lowery (2013) (2=strong, 1=weak, 0=neutral). positive (+) influence was considered as enablers, and negative (-) influence was considered as barrier of the implementation; NA= not applicable

Table 2. Staff attitude towards IDDSI framework (n=33, staff survey)

Staff attitude	Percentage of participants (n)
Improve food safety	91% (30)
Improve the quality of care	76% (25)
Enhance staff practice	45% (15)
Easy to put into practice	30% (10)
Enhance team communication	24% (8)
Hard to understand and comply with	18% (6)

Figures

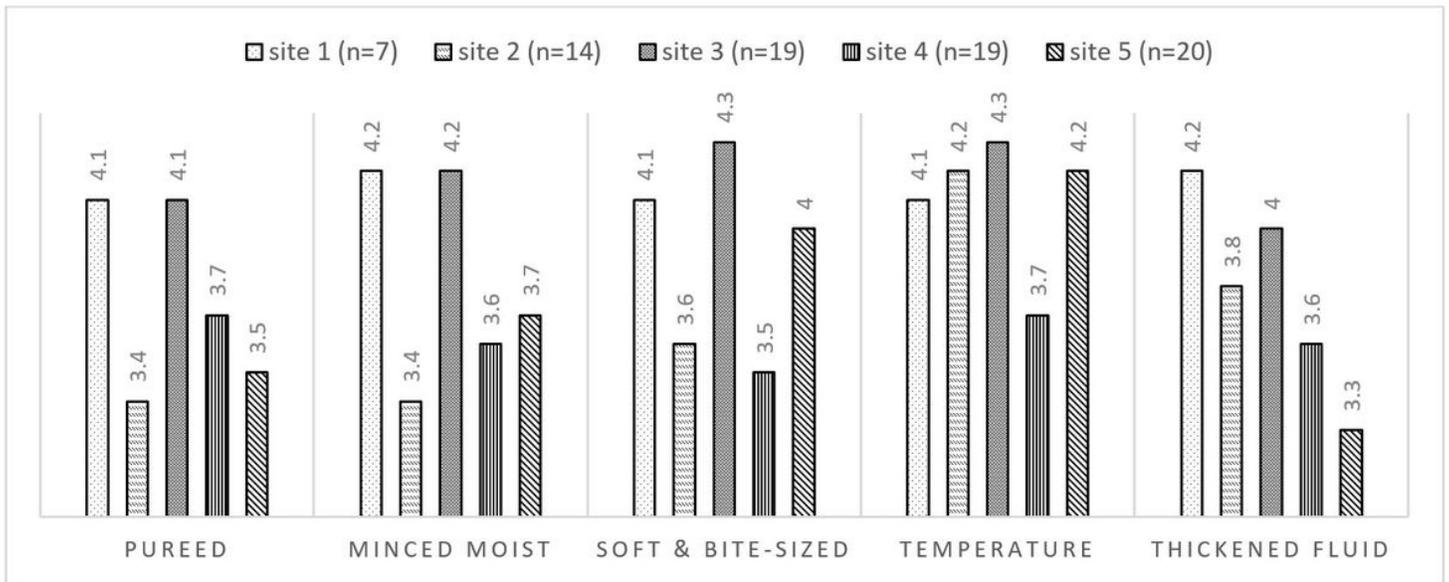


Figure 1

Average satisfaction rating of texture-modified food and thickened fluid by aged-care staff from 5 sites (1= not satisfied; 5 = highly satisfied)

Supplementary Files

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