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Tackling malnutrition with a new compact oral nutrient supplement among residents in aged care: a pilot study

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ABSTRACT

Introduction. There is a high prevalence of malnutrition among older adults entering residential aged care (RAC). **Aim.** To determine whether 60 mL of a compact oral nutrition supplement (ONS; daily total: 576 kcal, 35 g protein) consumed four times daily with medication rounds improves malnutrition status, body weight, and body composition measures among older adults in RAC. **Methods.** Residents ($n = 20$; mean age: 86.7 ± 6.8 years; 50% female) screened for malnutrition (20% malnourished, 80% at risk of malnutrition) using the Mini Nutritional Assessment-short form were recruited during April–June 2021. Participants received 60 mL of an ONS four times daily using the Medication Pass Nutrition Supplement Programme (Med Pass). The ONS intake and participant compliance were recorded. Body mass index, fat, and muscle mass (bioelectrical impedance), malnutrition risk, depressive symptoms, and quality of life were assessed at baseline and following the 18-week intervention. **Results.** Median overall compliance was 98.6%. An ONS intake did not significantly increase mean ± s.d. any body composition measures or improve health and wellbeing outcomes; however, it resulted in increased body weight and body mass index (BMI; 13/20 (65%) participants), body fat mass and percentage (10/16 (63%) participants) and muscle mass (9/16 (56%) participants). Malnutrition risk scores improved in 65% (13/20) of participants, resulting in 10% being assessed as malnourished, 65% at risk of malnutrition, and 25% with normal nutrition status. **Discussion.** Delivery of a compact oral nutrition supplement with the medication round was accepted by residents. Its efficacy in improving malnutrition risk and body composition among residents warrants further investigation.

Keywords: aged care, BMI, malnutrition, Med Pass, MNA-SF, muscle mass, New Zealand, oral nutrition supplement.

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Introduction

Sarcopenia, including muscle wasting and low BMI, is associated with an increased risk of falls and fractures,[1] chronic respiratory disease,[2] and all-cause mortality.[3] Sarcopenia is also exacerbated by inadequate nutrient, especially protein, intake.[4,5] Previously, 47% of older adults entering residential aged care (RAC) were reportedly malnourished and 43% were at risk of malnutrition,[6] highlighting the need for effective dietary interventions to improve nutrition status. Although a 'food first approach' is the preferred first step, the use of an oral nutrition supplement (ONS) is recommended when the food first approach does not meet nutritional needs.[7] The Medication Pass Nutrition Supplement Programme (Med Pass) protocol is associated with high levels of compliance and involves dispensing small doses (~60 mL) of energy-dense ONS (≥ 2 kcal mL^{-1}) three or four times daily between meals during the medication round.[8] In Australia, a randomised controlled trial using the Med Pass protocol among older hospitalised adults found a significant improvement in appetite, increased meal consumption, protein intake, body weight, and decreased length of stay.[9] The addition of an ONS to the usual medication round was no more time-consuming for staff and resulted in reduced ONS wastage. This pilot study aimed to determine whether use of a compact ONS using the Med Pass protocol could reduce malnutrition risk and improve body composition and health and wellbeing measures among RAC residents in New Zealand.

WHAT GAP THIS FILLS

What is already known: Malnutrition at entry into RAC is high (47%) and is associated with increased risk of sarcopenia and other adverse health outcomes. The Medication Pass Nutrition Supplement Programme (Med Pass) protocol is associated with high compliance and has led to increased appetite, meal consumption, protein intake, body weight, and decreased length of stay in RAC.[9]

What this study adds: Compliance to intake of an ONS may be enhanced using the Med Pass protocol. The use of an ONS in addition to usual dietary intake may assist residents to meet their energy and protein requirements and maintain or regain body weight.

Methods

A single arm intervention pilot study was conducted among residents at an Auckland RAC facility.[10] Although the original design was a two-armed study, restrictions due to coronavirus disease 2019 (COVID-19) lockdown prevented the researchers from taking follow-up measures in the control group. Inclusion criteria were: Mini Nutritional Assessment-Short Form (MNA-SF) score 0–11 (malnourished or at risk of malnutrition), aged ≥65 years, BMI $<30\ kg\ m^{-2}$, and deemed eligible by the RAC clinical manager. Participants not eligible to participate were those with an acute decline in cognition or function, or those in need of acute palliative care. Residents were recruited between April and June 2021, and they or their enduring power of attorney were guided through a Participant Information Sheet and provided written informed consent before data were collected. The study was approved by the New Zealand Health and Disability Ethics Committee (No. 20/NTB/120/AM01).

Sociodemographic and health data, height, body weight and composition, nutrition risk status, depressive symptoms, and quality of life were assessed at baseline and following the 18-week intervention. Sociodemographic and health data were obtained, with permission during the consent process, from the residents' clinical notes. Muscle and fat mass were assessed using portable bioelectrical impedance (InBodyS10, Inbody Co. Ltd., Seoul, Korea) validated against dual-energy X-ray absorptiometry (DEXA).[11] Nutrition risk was assessed using the MNA-SF; malnourished (score 0–7), at risk of malnutrition (score 8–11), or normal nutrition status (score 12–14).[12] Depressive symptoms were assessed using the validated 15-item Geriatric Depression Scale (GDS): normal to no depressive symptoms (score 0–4), mild depression (score 5–9), and moderate to severe depression (score 10–15).[13] Quality of life was assessed using the Medical Outcomes Study 12-item Short Form Survey (SF-12) tool to describe physical and mental functioning, which indicates disability as being: absent (score >50), mild (score 40–50), moderate (score 30–40), or severe (score <40).[14]

Participants received neutral-flavoured Fortisip™ Compact Protein (Danone Nutricia, Australia) four times daily for 18 weeks, which provided 576 kcal energy and 35 g protein daily in addition to usual dietary intake. The ONS (60 mL) was dispensed in small glasses by registered nurses during the medication rounds at 8 am, 12 pm, 5 pm, and 7 pm. Participant compliance was monitored by nurses who also noted any reason for not consuming the full serving.

Statistical analysis was carried out using SPSS statistical software (Version 27; SPPS Inc., Chicago, IL, USA). Normality of data was assessed using Shapiro–Wilk and Kolmogorov–Smirnov tests. Parametric data are presented as mean and standard deviation and non-parametric data as median with 25th and 75th percentiles. Pre- and post-intervention measurements were compared using dependent sample *t*-tests for parametric data and Wilcoxon signed-rank test for non-parametric data. Significance was set at $P = 0.05$.

Results

Of 50 residents who met the eligibility criteria, 32 provided consent and 20 completed the study (12 dropouts: 2 participant burden, 3 removed by clinical management, 2 unacceptable weight gain, 1 appetite suppressed, 4 died).

Participants' characteristics and health status are presented in Table 1. Participants were 50% women and had a mean (±s.d.) age of 86.7 ± 6.8 years. The MNA-SF score median [25th, 75th percentile] was 9.0 [7.3, 10.0], with 20% of participants assessed as malnourished and 80% as at risk of malnutrition. Participants had 6.0 ± 2.7 co-morbidities and took 7.5 ± 3.3 medications.

Overall, 98.6% of the prescribed ONS was consumed over the 18-week intervention. The most common reasons for not consuming the whole dose were disliking the taste, being unwell or asleep.

Although the ONS did not significantly improve most body composition or any health and wellbeing measures (Table 2), it resulted in an increase in body weight and BMI in 65% (13/20) of participants. Total body fat mass and percentage increased in 63% (10/16) and muscle mass increased in 56% (9/16) of participants. An increase in total body fat mass and percentage was observed in a higher proportion of participants aged ≥90 (83%) than <90 (50%) years. Seventy-seven percent of residents whose nutrition risk status improved also had an increase in body weight and BMI compared to only 43% whose nutritional status did not improve ($P = 128$ for both weight and BMI).

The MNA-SF score increased in 65% (13/20) of participants in response to the intervention, resulting in nutrition risk status of: malnourished 10%, at risk of malnutrition 65%, and normal nutrition 25%. Non-significant changes

Table 1. Participant characteristics.

Characteristics	
Age (years), mean ± s.d. (range)	86.7 ± 6.8 (75–103)
Age, years, *n* (%)	
<85	11 (55.0)
≥85	9 (45.0)
Sex, *n* (%)	
Men	10 (50.0)
Women	10 (50.0)
Level of care, *n* (%)	
Rest home	8 (40.0)
Hospital	12 (60.0)
Previous living setting, *n* (%)	
Home	12 (66.7)
Hospital	6 (33.3)
Ethnicity, *n* (%)	
New Zealand European	18 (90.0)
Other[A]	2 (10.0)
Relationship status, *n* (%)	
Married/partnered	8 (42.1)
Never married/widowed	11 (57.9)
Level of education	
Primary and secondary	9 (53.0)
Tertiary	8 (47.0)
Health status, mean ± s.d. (range)	
Number of comorbidities	6.0 ± 2.7 (1–12)
Number of medications	7.5 ± 3.3 (3–15)
Nutrition status	
MNA-SF score, median [25th, 75th percentile]	9.0 [7.3, 10.0]
Malnourished, MNA-SF Score, *n* (%)	5 (20.0)
At risk of malnutrition, MNA-SF Score, *n* (%)	15 (80.0)

[A]Ethnicity, Other: Māori *n* = 1, Fijian *n* = 1.
MNA-SF, Mini Nutritional Assessment – Short Form.

in the GDS (−1 [−3.5, 1.0]), SF-12 mental component (+2.8 ± 12.0), and SF-12 physical component (+5.9 ± 11.1) scores were observed.

Discussion

This pilot study is the first to report outcomes of, and compliance to (98.6%), a compact, energy-dense ONS using the Med Pass protocol among RAC residents in New Zealand. The high compliance to the 18-week intervention demonstrates its acceptability among RAC residents. A similar intervention in Germany among RAC residents who were malnourished or at risk of malnutrition reported 73% compliance to a 12-week intervention.[15] Although the total volume of ONS in that study matched the current study, it was served as 2 × 125 mL bottles of ONS (Fortimel Compact, Nutricia) rather than 4 × 60 mL of ONS served in glasses as in the current study. The study also reported that high compliance (≥80%) led to significantly greater weight gains than low compliance (≤30%), highlighting the importance of compliance to promote body weight maintenance and reduce risk of sarcopenia.

BMI is a significant predictor of sarcopenia risk among RAC residents,[16] hence the importance of identifying and treating malnutrition in RAC. Despite non-significant findings ($P > 0.05$), the current study resulted in improved physical measures over the 18-week intervention. Over half the participants showed improvements in body weight, BMI, fat-free mass, muscle mass, and nutrition risk status. Significant increases in muscle mass following similar ONS interventions have been reported in Taiwan and USA.[17–19] An increase in muscle mass from baseline to post-intervention was the measure nearest to reaching significance and showed a small–medium effect size. This finding suggests, with a larger sample of residents, significance may have been reached and body composition changes could be improved. Nutrition risk (MNA-SF) scores improved by 10%, resulting in fewer participants assessed as malnourished (10%) or at risk of malnutrition (65%), and a resultant one-quarter (25%) of participants returning to normal nutrition risk status.

This pilot study had several limitations. First, during the final 30 days of the intervention, New Zealand was under COVID-19 lockdown restrictions. As a result, residents were prevented from undertaking usual levels of physical activity and from having visitors. These factors may have adversely affected residents' appetite, usual dietary intake, and psychological wellbeing. Also, due to COVID-19 restrictions within the RAC facility, we were unable to engage non-intervention residents as a control group. Although small–medium effect sizes were observed, the small sample size did not allow the findings to reach significance. Although the inclusion of cognitively impaired residents reduced the overall response rate to the SF-12 and GDS questionnaires, their inclusion helped to improve the generalisability of the findings.

Conclusion

Overall, we observed an improvement in participant nutrition risk status, body weight, and muscle mass. Providing a nutrient and energy-dense ONS using the Med Pass protocol may be an effective method to improve nutrition risk status in RAC residents and warrants further investigation among a larger sample.

Table 2. Impact of ONS intervention on body composition and physical and mental components.

	Pre-intervention	Post-intervention	Change	*P*-value
Body composition				
Body weight (kg)	61.2 ± 13.2	62.7 ± 15.7	1.5 ± 5.9	0.259
BMI (kg m^{-2})	22.9 ± 3.6	23.4 ± 4.1	0.5 ± 2.1	0.335
Fat-free mass (kg)	41.1 ± 8.1	42.3 ± 9.6	1.2 ± 3.7	0.207
Muscle mass (kg)	21.3 ± 4.7	22.1 ± 5.4	0.8 ± 2.2	0.137
Total body fat (kg)	20.1 ± 10.3	21.5 ± 9.4	1.4 ± 6.6	0.679
Body fat percentage (%)	31.8 ± 11.3	33.1 ± 9.3	1.3 ± 7.5	0.506
Physical and mental health				
Geriatric depression score	5.0 [2.0, 7.0]	3.0 [0.5, 5.5]	−1 [−3.5, 1.0]	0.225
SF-12 mental score	53.3 [44.7, 58.9]	56.0 [49.9, 61.4]	2. 8 ± 12.0	0.953
SF-12 physical score	38.40 [33.3, 41.8]	47.6 [34.9, 52.1]	5.9 ± 11.1	0.264

Body composition data are presented as mean ± s.d.; physical and mental health data are presented as median [25th, 75th percentiles].
BMI, body mass index; SF-12, 12-item short form survey.

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Data availability. The data that support this study will be shared upon reasonable request to the corresponding author.

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