A Retrospective Chart Review to Determine the Prevalence of Malnutrition in the Elderly and the Effects of Nutrition Interventions

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Introduction:

In countries all over the world, the numbers of the aging population continue to increase. The population of older adults is expected to grow exponentially over the next decade[1]. According to data from World Population Prospect from 2015 to 2030, the population of people aged 60 years and above is expected to increase by at least 56%, from 901 million to 1.4 billion.[1]

As people go through the ageing process it is a multidimensional process that involves several alterations that involve physical, social and physiological changes that occur over the span of their life time.[1] There are multiple social determinants of health that can factor into how a person ages over their lifetime for example socioeconomic status, food security, living environment, and access to health care. These factors can affect their health outcomes either negatively or positively. The elderly population, which is defined as a person that is 60 years of age or older; are at increased risk for developing type 2 diabetes, cardiovascular disease, dementia, stroke and cancer.[1,2]

Elderly people that have multiple comorbidities, often have a difficult time caring for themselves after a hospitalization due to sarcopenia: the degenerative loss of muscle that can decrease muscle strength and quality due to ageing or immobility[3]. Sarcopenia can result in ataxia, weakness and decreased ability to complete activities of daily living[3]. The elderly patients are then referred to acute care rehab settings, to increase strength for a safe discharge to a home setting or assisted living facility. Elderly patients that are not discharged from the acute care setting and are in need of long term nursing needs have an increased prevalence for weight loss and malnutrition[2]. It is reported the prevalence of malnutrition in nursing home patients is 50% higher as compared to elderly individuals that are still living at home or in an assisted living setting[3].

Research from 16 cross sectional studies found that elderly nursing home patients have a higher prevalence for weight loss and malnutrition due to the following determinants (without age and genetics being included): chewing and/or swallowing difficulty, dental status, physical function, psycho-social wellbeing, medication interaction, appetite, previous lifestyle habit's, ability to feed self, and co-morbidities[3]. Malnutrition can be defined as: a state of nutrition in which a deficiency of energy, protein and other nutrients causes measurable adverse effects on tissue and body form, function and clinical outcome[3]. Malnutrition can be costly increasing a person's risk for hospitalization and re-hospitalization with longer hospital stays, increased mortality, delayed wound and increase risk for developing pressure ulcers, decreased cognitive function, decreased bone mass resulting in increased frailty and falls, decreased muscle tone resulting in decreased functional status[4]. The Academy of Nutrition and Dietetics (AND) and American Society of Parental and Enteral Nutrition (ASPEN) have worked together to set criteria to determine if an individual presents with the clinical characteristics for malnutrition. The criteria analyzes seven different clinical characteristics; the individual must have 2 of the characteristics present to be diagnosed with malnutrition[5]. The clinical characteristics have different levels of severity that determine whether the individual has moderate or severe malnutrition. The clinical characteristics that are assessed are energy intake, BMI, fluid accumulation, weight loss, grip strength, body fat, and muscle mass[5].

This retrospective study examined current nutritional interventions in place to treat malnutrition. The current nutritional interventions included: diet liberalization, referral to another discipline (OT, PT, SLP), nutritional supplementation select menu programmed, use of appetite stimulant under medical supervision, and changing 2% milk to whole milk. The data collected revealed that despite nutritional interventions being placed in a timely manner the malnutrition was not corrected. The purpose of this study was to develop new nutritional interventions to determine if they would be effective in aiding to correct the malnutrition criteria in the elderly that live in a long term care nursing facility.

Methods:

Study Design

This retrospective study evaluated the prevalence of malnutrition diagnosis in older adults at the Presbyterian Home of CNY, an acute rehab and long term care nursing facility over a three month time period. The data collected was used to evaluate the effectiveness of standard nutritional interventions initiated by the Registered Dietitian Nutritionist (RDN); to treat malnutrition after the patient met the criteria set forth by AND/ASPEN. New nutritional interventions were developed and implemented to treat malnutrition, data was collected again during a three week time frame to assess the effectiveness of the new interventions. The new interventions that were developed by the RDN were to program the house diet with whole milk in place of 2% milk, implementing a higher calorie diet that provided the patient with an additional 500 calories, and also screening residents monthly with a BMI of 23 and reviewing their current nutritional interventions to determine if changes needed to be made. This was done to prevent their BMI from dropping below 23 which is one of the seven malnutrition criteria. The tool that was used to collect data was developed by the RDN and collected pre and post weights and pre and post BMI's. The study design and interventions were approved by the SUNY Oneonta Institutional Review Board.

Participants

The participants of this study were patients at Presbyterian Home for CNY, a skilled nursing facility for an acute rehab stay or for long term care. All participants were aged 60 years or older and considered an older adult based on their age. Upon admission all patients are screened for malnutrition by the RDN utilizing the AND/ASPEN criteria for malnutrition. A Nutrition Focused Physical Exam is completed to determine if the patient presents with the following physical findings: muscle wasting, loss of fat stores, or decreased hand grip strength. The malnutrition diagnosis criteria also includes reviewing clinical characteristics of decreased energy intake, weight loss, and Body Mass Index (BMI). In order for the patient to be diagnosed with malnutrition there must be two of the seven criteria listed above present.

During the three month look back there were 27 patients that met the criteria for malnutrition based on an average census of 130 patients, or 21% of the population. For the three week period that examined the effectiveness of new malnutrition interventions the sample size decreased to 20 patients as some of them had either passed away, were discharged home or no longer met the criteria for

malnutrition as their malnutrition had resolved prior to the newly developed interventions being implemented. At the time of the intervention phase of the study admissions at the facility were on hold due to the COVID-19 pandemic which resulted in a decline in the average census to 95 patients of which 20 patients met the criteria for malnutrition or 21% of the population. The demographics of the sample population were 70 years or older, 14 were female and 6 were male. Consent was waived for the participants as they were patients at the skilled nursing facility receiving medical nutrition therapy by the RDN that followed the policies and procedures of the Clinical Nutrition Department. All data collected on the patients was de-identified to protect health information.

Interventions

Data collected during the three month look back period revealed the most common interventions implemented at the skilled nursing facility by the RDN were changing 2% milk to whole milk, liberalizing the diet order, adding nutritional supplements like fortified commercial milkshakes or fortified hot cereal, referral to another discipline like speech or PT/OT, or recommendation to the medical provider for an appetite stimulant. However despite these interventions being implemented for the patients that were diagnosed with malnutrition, out of the 27 patients reviewed none of the patients were able to have their malnutrition diagnosis corrected. This indicated that the patient still triggered for at least two of the seven malnutrition diagnosis criteria despite nutritional interventions being implemented within 24 to 48 hours of their malnutrition diagnosis.

In an effort to help decrease the prevalence of malnutrition at the skilled nursing facility the RDN's developed three new interventions that would be implemented into the policy and procedures of the Clinical Nutrition Department. The first intervention was changing the standard house diet to provide whole milk in place of 2% milk, unless it was determined by the RDN to not be appropriate or the patient preference is for a different type of milk. When new patients are admitted they would automatically be provided with a whole milk instead of having to wait until their initial nutrition assessment was completed to determine their need for additional calories. The second intervention that was implemented was programming high calorie supplements or fortified foods into the patient's diet, this provided an additional 500kcals daily as compared to the regular diet. The third intervention that was developed is to run the BMI report monthly, any patient that triggers for a BMI of 23 will have

their current nutritional interventions reviewed to determine if changes need to be made to the patient's plan of care. This intervention was developed to prevent the BMI dropping to below 23; as a BMI of <22 is one of the seven criteria that can that could count towards meeting the criteria for malnutrition.

Tools

The tools that were utilized during this retrospective study were the AND/ASPEN Malnutrition and Morbid Obesity Diagnosis tool (Appendix One) that is a validated tool developed by AND/ASPEN. The other tools that were utilized during this study were data collection charts that were developed by the RDN (Appendix two and three). The data collected was obtained from the patient's electronic medical record utilizing the computer system Point Click Care. One of the tools that was used to gather data reviewed the criteria that diagnosed the patient for malnutrition, the date the patient was diagnosed and the date the intervention was put into place. The RDN also obtained data regarding the type of nutritional intervention(s) implemented, if the intervention implemented was working or if further follow-up was needed and evidence that the interventions were working. This was all data collected during the retrospective time frame of three months.

Once interventions were developed and implemented the data collected during the 3 week phase to monitor the effectiveness of the interventions looked at the initial weight, the post weight and amount of weight change, pre and post BMI, current interventions in place, the addition of the newly developed interventions and if the patients malnutrition criteria improved.

Data Analysis

The data was analyzed by utilizing the IBM SPSS version 26 statistics software program. The weight changes, pre and post BMI's were entered into the software program to determine the measures of central tendency. A test for normality was completed in the SPSS software to determine if the data was normally distributed. Once it was determined that the data had a normal distribution the SPSS software was again utilized to run a paired T-test and also a Pearson's correlation test. The p value was set at ($p=<0.05$), to determine statistical significance. The data collection charts were also utilized to look at the demographics of the population.

Results:

The sample size of the population initially started at 27 patients, however due to either being discharged home, discharged to the hospital or passing away the sample size declined to 20 patients(n=20). This resulted in a loss of approximately 26% of the sample population. The sample population was made up of 20 elderly patients with the average age of 85 years old of which 14 were female and 6 were male(Table 1). All 20 patients met at least 2 of the ASPEN/AND guidelines for malnutrition. 19 out of 20 patients had the fortified diet implemented as an intervention to improve their malnutrition criteria, which is 95% of the sample. One resident had very limited nutritional interventions that could be implemented due to Nothing By Mouth (NPO) status and nutritional needs being met with enteral feedings.

Approximately 40% of the sample (n=20), had no improvement in their BMI despite the high calorie diet being implemented. The mean pre-BMI was 19.28, and the mean post-BMI improved to 19.405 (Table 1). Once the data was determined to be normally distributed with a standard deviation of 0.35 with the Pre-BMI and standard deviation of 0.35 with the post BMI. A paired sample t-test was completed to assess the significance of the pre-and post BMI's. The paired t-test showed statistical significance with a result of 0.03(Table 2). There was also a positive correlation between the pre- and post BMI at 0.997, which can be expected with gradual weight gain. As it is known that as a person gains weight the higher their BMI is.

100% of the patients did have beneficial weight gain of at least 0.10#, with the greatest weight gain being 1.25#. Table 3 depicts the average weight gain, the most frequent weight gain and the range of weight gain. However due to there being 7 patients or 20% of the sample that had a 1# or greater weight gain this could have skewed the average weight gain, since the most frequent weight gain was only 0.25#.

Despite nutritional interventions being implemented none of the patients had an improvement in their malnutrition criteria during the three week study period. As mentioned above 100% of the patients did have a positive beneficial weight gain.

Discussion:

The results of this study showed that early interventions are key in addressing malnutrition in the elderly. These interventions can be screening older adults for malnutrition criteria before they meet the criteria for malnutrition, for example reviewing nutritional interventions when their BMI is at 23. Other have studies shown that despite nutritional interventions being implemented to treat malnutrition that is often difficult to correct; leading to increased mortality rates in the elderly, longer hospital stays, and increased frailty. Malnutrition in the elderly is difficult correct due to the complexity of the multiple different reasons that may cause it malnutrition like dysphagia, polypharmacy, genetics, multiple co-morbidities, isolation, food insecurity, loss of appetite, and loss of taste and smell.

Strengths

This study did show a positive impact with beneficial weight gain when the high calorie diet was implemented. Since the patients of this study are continuously evaluated by the RDN conducting the study even after the study was completed the RDN can continue to monitor their weight gain with the fortified diet in place. Another strength of this study was that it evaluated the nutritional interventions of the clinical nutrition department, and allowed for the RDN to assess where nutritional interventions could be improved or new interventions put into policy; thus having a positive outcome for the residents in the long term facility. It has also been beneficial to review patients with a BMI of 23 to prevent their BMI to dropping to 22. As other studies indicate earlier screening and implementation of nutritional interventions can help prevent malnutrition in the elderly.

Weakness and Limitations

Due to time constraints for monitoring the implementation of the interventions the quantitative data that was collected was limited. This study was limited to only a 3 week time frame. Also due to the current Corona Virus Pandemic and decrease in the facility census with restrictions on admissions the sample population was also limited, prior to the study interventions being implemented the sample size decreased by 26%.

Conclusion:

Malnutrition in the elderly population continues to be a contributing factor that leads to longer hospital stays, increased rate of mortality and decline in health outcomes. However if a patient is screened and assessed for malnutrition before they meet the criteria for it; perhaps it can prevent them from becoming malnourished. Nutritional interventions like a high calorie diet, nutritional supplements, liberalized diet restrictions and referrals to other disciplines are all interventions that are all useful in preventing malnutrition in the elderly population. Once a patient does meet the criteria for malnutrition it is difficult to correct the malnutrition due to the loss of muscle mass and fat stores.

Population Demographics
Sample: 20 Original Sample: 27 loss of 7 patients (26%)
Male: 6/30%
Female: 14/70%
Mean age: 85year olds
Mean Pre-BMI: 19.28
Mean Post-BMI: 19.41
Mean Wt Gain: 0.66#

Table1: The demographics of the sample population, that includes data on sex, age, pre and post BMI and weight gain

Pre-BMI Standard Deviation	+/- 0.35
Post BMI Standard Deviation	+/- 0.35
Correlation of Pre and Post BMI	0.997
Paired T-Test	0.02891

Table 2: P<0.05, table of significant values

Median Weight Gain: 0.63#
Mean Weight Gain: 0.66#
Range of weight gain: 0.10# to 1.25#

Table 3: The most common weight gain, the average weight gain and the range of weight gain after interventions were implemented

Malnutrition & Morbid Obesity Diagnosis Tool

RESIDENT NAME: _____
MEDICAL RECORD NUMBER: _____

*The Registered Dietitian has completed a nutrition assessment of your resident. Please see the complete nutrition assessme for dietitian recommendations to address **malnutrition OR morbid obesity**.*

1. **Malnutrition-** The following Clinical Characteristics were found to be present as an assessment.

CLINICAL CHARACTERISITIC	ACUTE (<3 MO.) Illness/Injury				CHRONIC (≥3 mo.) Illness			
A minimum of **2 characteristics** are recommended for diagnosis	☐ **MODERATE Malnutrition**		☐ **SEVERE Malnutrition**		☐ **MODERATE Malnutrition**		☐ **SEVERE Malnutrition**	
ENERGY INTAKE Recent intake compared to estimated requirements reported as a percentage over time	<75% of needs for > 7 days		<50% of needs for ≥5 days		<75% of needs for ≥ 1 mo.		<75% of needs for ≥ 1 mo.	
WEIGHT LOSS Interpretation of percentage of weight lost from baselines over time	%	Time	%	Time	%	Time	%	Time
	1-2	1 wk.	>2	1 wk.	5	1 mo.	>5	1 mo.
	5	1 mo.	>5	1 mo.	7.5	3 mos.	>7.5	3 mos.
	7.5	3 mos.	>7.5	3 mos.	10	6 mos.	>10	6 mos.
					20	1 yr.	>20	1 yr.
BMI	<20 if <70 yr. <22 if >70 yr.		<18.5 if <70 yr. <20 if >70 yr.		<20 if <70 yr. <22 if >70 yr.		<18.5 if <70 yr. <20 if >70 yr.	
PHYSCIAL FINIDNGS								
BODY FAT Loss of subcutaneous fat	Mild		Moderate		Mild		Severe	
MUSCLE MASS Muscle loss in the face, trunk, arms and legs	Mild		Moderate		Mild		Severe	
FLUID ACCUMULATION Presence of edema can mask weight loss	Mild		Severe		Mild		Severe	
GRIP STRENGTH (as measured by dynamometer)	N/A		Measurably reduced		N/A		Measurably reduced	

Adapted from the Academy of Nutrition and Dietetics & American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.)

Appendix One: The AND/ASPEN Malnutrition Screening Tool

Malnutrition Study Tool to Collect data for 3 month look back period

Patient ID #	Criteria for malnutrition	Date dx with malnutrition	Date of nutritional interventions	Type of nutritional intervention put in place	Are nutritional interventions working or does patient need further interventions	Evidence that interventions are working

Appendix Two: The Malnutrition Study Tool to Collect Data

Patient ID #	Initial Weight	Initial BMI	Weight Change after 3 weeks	Post BMI	Current interventions in place	Addition of new interventions	Malnutrition Criteria did it improve?

Appendix Three: The data collection used after the nutritional interventions were implemented

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