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FRAIL-NH PREDICTS OUTCOMES IN LONG TERM CARE

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Abstract: *Background/Objectives:* To investigate the predictive validity of the short, simple FRAIL-NH frailty screening tool in the long term care population and to then compare the predictive validity with the frailty index (FI) for 6-month adverse health outcomes. *Design:* Retrospective study using the Minimum Data Set (MDS) 3.0 and chart review from June-December 2014. *Setting:* Two Long Term Care Facilities in Saint Louis, MO. *Participants:* 270 patients ages ≥ 65 years old residing in long term care. *Measurements:* Frailty was measured using the FRAIL-NH and Frailty Index (FI) criteria. Adverse outcomes measured at 6-month follow-up included falls, hospitalizations, and hospice enrollment/mortality. *Results:* Based on screening tool used frailty prevalence was 48.7% for FRAIL-NH and 30.3% for FI. The FRAIL-NH pre-frail (Adjusted Odds Ratio [AOR]=2.62; 95% Confidence Interval [CI]=1.25-5.54; p=0.11) classification was associated with 6 month risk of falling and mortality/hospice enrollment was associated with the frail classification, AOR=3.96 (1.44-10.87, p=0.007). Combining the pre-frail and frail categories both measures predicted 6 month mortality with the FRAIL-NH being the strongest predictor (AOR=3.36; 95%CI=1.26-8.98; p=0.016) and the FI was a more modest predictor with an AOR of 2.28; 95%CI=1.01-5.15; p=0.047. When directly comparing the FRAIL-NH to the FI, the FRAIL-NH pre-frail were at increased risk of falling, AOR=2.42 (1.11–5.92, p=0.027) and the FRAIL-NH frail were at increased risk of hospice enrollment/death, OR=3.25 (1.04- 10.86) p=0.044. *Conclusion:* In comparison to the FI, the FRAIL-NH preformed just as well at screening for frailty and was a slightly better predictor of adverse outcomes. The FRAIL-NH is a brief, easy-to-administer frailty screening tool appropriate for long term care patients and predicts increased risk of falls in the pre-frail and mortality/hospice enrollment in the frail.

Key words: Frailty, long term care, mortality, FRAIL-NH.

Introduction

Frailty is highly prevalent amongst community-dwellers and the institutionalized population (1-4). Fundamental to the definition of frailty is the clinically apparent syndrome resulting from age-associated decline of physiologic reserve creating increased vulnerability to stressors (5). Frailty manifests itself when there is a cyclical instability in the following: loss of muscle mass, weakness, weight loss, low exercise tolerance, and low activity (5). More specifically the Fried frailty phenotype has been employed to identify the physically frail elderly. Three of the five following criteria must be met to be categorized as frail: unintentional weight loss of >10 pounds in one year, self-report of exhaustion, slow walking speed, low activity level, and weakness measured by grip strength (6).

Alternatively, frailty has been looked at as an accumulation of deficits (7). Rockwood and colleagues have created a mathematical model of deficit accumulation to create a Frailty Index (FI) to quantify the interacting problems resulting in frailty (7). The more deficits present, the higher likelihood that the patient will be frail putting them at a greater risk of adverse outcomes (7).

The International Academy of Nutrition, Health, and Aging adapted the Fried and Rockwood criteria to create a brief and easy-to-administer frailty (FRAIL) scale (8). The FRAIL scale has been validated in several studies across different populations and countries (9-14). The FRAIL scale is a five-item scale and includes fatigue, resistance, ambulation, illnesses, and loss of weight (8, 12).

Recently we adapted the FRAIL to develop a simple and easy-to-use frailty measure, FRAIL-NH, for use in long term care settings (15). The FRAIL-NH includes core characteristics of the frailty phenotype and FI classification systems (6-8). The seven potentially reversible variables involved in the FRAIL-NH include fatigue, resistance, ambulation, incontinence, weight loss, nutritional approach and help with dressing. A recent study in Hong Kong investigated the FRAIL-MDS, which uses very similar variables to the FRAIL-NH, to screen for frailty and poor outcomes in long term care. This longitudinal follow-up study included N= 2,380 long term care residents over 8 years. Those categorized as frail were more likely to fall, have ADL decline, require hospitalization, or die (16).

The purpose of this study is to add to the current literature in validating the FRAIL-NH in the long term care population and to compare the FRAIL-NH to the FI for strength in prediction of adverse health outcomes. We hypothesized that those who are pre-frail or frail on the FRAIL-NH or FI are at greater risk for poor outcomes including falls, hospitalizations, and hospice enrollment or mortality.

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Methods

Study Sample

Patients were selected from two skilled nursing and long term care facilities. Center One is a 215 bed facility and Center Two is a 200 bed facility. In order to qualify for the study patients had to meet the following inclusion criteria: age ≥ 65, admittance to the facility two months prior to data collection, and two or more complete Minimum Data Sets version 3.0 (MDSs) available within the study period. The goal of the inclusion criteria was to isolate long-term care patients. Patients on hospice at the time of data collection were excluded from the study. The study sample included N=270 patients, n=165 residents from Center One and n=105 residents from Center Two.

The MDS 3.0 was used to collect data points for this retrospective analysis. The MDS served as a resource to collect demographic and baseline information on the N=270 study patients as well as FRAIL-NH data points. The same data collection process was used to complete the FI. The MDS 3.0 was used to collect 25 FI variables and MAR review was completed to obtain the FI polypharmacy variable.

Data was collected over 6 months from June 2014 to December 2014. The first data points were collected as close to June 2014 as possible and were used to calculate the FRAIL-NH score and frailty index. The last MDS assessment prior to or during December 2014 was used to assess for adverse health outcomes of fall, hospitalization, and death/hospice enrollment. All data was collected in compliance with the Saint Louis Institutional Review Board rules and regulations.

FRAIL-NH

The FRAIL-NH scale draws on the strengths of the FRAIL, but was adapted to better fit the long term care population. Resistance is gauged by ability to self-transfer in the FRAIL-NH instead of the ability to climb stairs as in the FRAIL. Ambulation has a distance requirement in the FRAIL but is graded on use of assistive device(s) (cane, walker, wheelchair) vs no assistive device in the FRAIL-NH. Nutrition is evaluated by loss of weight and nutritional approach (regular diet, altered diet, or tube feedings) in the FRAIL-NH. Ability to dress one's self and incontinence were evaluated to assess for functional decline. FRAIL-NH scores range from 0-13 (best to worst) and are categorized as non-frail (0-5), pre-frail (6-7), and frail (≥8). A complete description of the FRAIL-NH items is provided in Appendix 1.

The Frailty Index

Frailty was also measured in relation to accumulation of deficits using a frailty index developed from 26 existing variables in the MDS 3.0. The specific variables were chosen in order to access deficits across multiple domains including co-morbidity, function, physical performance, and cognition (17). A complete list of the variables included in the Frailty Index can be found in appendix 2. The FI scores range from 0-1 (best to worst) and are categorized as non-frail (0-0.2), pre-frail (> 0.2-<0.3), and frail (≥ 0.3).

Outcome Measures

The primary outcomes of this study included falls, hospitalizations, and death or hospice enrollment. Falls were defined as a dichotomous outcome with 0= no falls during the follow-up period and 1= one or more falls in the follow-up period. This same system was used for hospitalization, death and hospice enrollment, 0= the event did not occur during the study period, 1= the event occurred in the 6 month study period. Every MDS in the 6-month study period was screened for these outcomes. A list of hospice-enrolled patients for each month of the study period was also obtained to capture all hospice enrollments.

Other Measures

Baseline characteristics were collected and categorized by frailty status for each frailty measure. Demographic and clinical characteristic variables were categorized as follows: age (65-74, 75-84, 85+), sex (female, male), ethnicity (African American, Caucasian, other) , marital status (married, divorces/separated, widowed, never married), number of medications (0-5, 6-9, 10+), PHQ-9 score to test for depression (score 0-27) and total comorbidities (0-16). The 16 comorbidities tracked included: cancer, atrial fibrillation, congestive heart failure, renal disease, pneumonia, urinary tract infection, wound infection, diabetes mellitus, arthritis, hip fracture, alzheimer's dementia, cerebrovascular accident, dementia of non-alzheimer's type, malnutrition, psychotic disorder and respiratory failure.

Statistical Analysis

Data was analyzed using IBM SPSS Statistics version 23.0 (IBM Corp., Somers, NY). Descriptive statistics are reported as means ± standard deviations (SD) or percentages. ANOVA for continuous variables and chi-square for categorical variables were used to compare participant characteristics of non-frail, pre-frail, and frail groups. Logistic regressions were computed to examine the associations between frailty categories (non-frail, pre-frail, frail) and study outcomes for the FRAIL-NH1 and FI. The FRAIL-NH scale was then comparted to the FI for predicting adverse outcomes using multivariate logistic regression. Odds ratios adjusted for age and sex (AORs), and 95% confidence intervals (CIs) are reported for logistic regressions.

Results

Of the 270 patients involved, 45.2% were age 85 and above, 75.5% were women, 80.4% were Caucasian, 50.4% were widowed, 56.1% had a PHQ-9 score of 0, and the most common number of comorbidities per patient was 3 (30.7%). The most common comorbidities categorized as present in

Table 1a
Participant Characteristics & FRAIL-NH Scale Classification FRAIL-NH (N=269)

	N	Non-Frail	Pre-Frail	Frail	P-Value*
Age					
65-74	50	30.0%	28.0%	42.0%	.857
75-84	97	23.7%	24.7%	51.5%	
85+	122	24.6%	26.2%	49.2%	
Sex					
Female	202	23.3%	26.2%	50.5%	.490
Male	66	30.3%	25.8%	43.9%	
Ethnicity					
African American	44	18.2%	20.5%	61.4%	.056
Caucasian	217	25.3%	27.2%	47.5%	
Other	8	62.5%	25.0%	12.5%	
Marital Status					
Married	69	21.7%	23.2%	55.1%	.109
Divorced/Separated	35	42.9%	25.7%	31.4%	
Widowed	135	21.5%	29.6%	48.9%	
Never Married	30	30.0%	16.7%	53.3%	
Medications					
0-5	50	22.0%	28.0%	50.0%	.794
6-9	127	24.4%	26.0%	49.6%	
10+	84	31.0%	23.8%	45.2%	
PHQ-9	269	1.26±1.8	1.33±1.9	1.24±1.9	.956
Comorbidities (0-16)	269	2.13±1.4	2.19±1.1	2.41±1.25	.257

* Chi-square test for categorical variables and ANOVA for continuous variables.

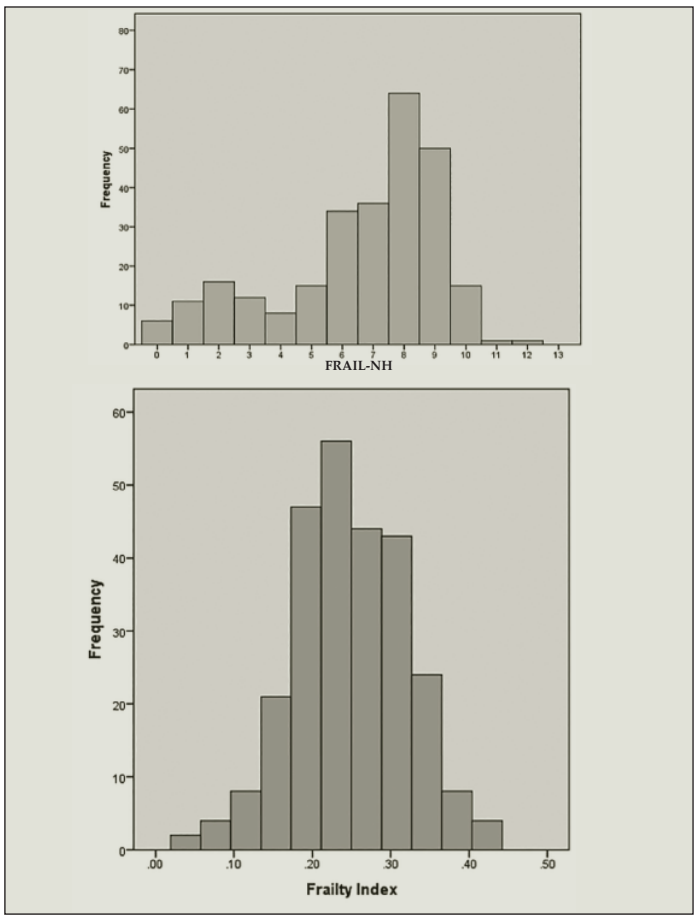
Table 1b
Participant Characteristics & Frailty Index Scale Classification (N=261; n=9 missing)

	N	Non-Frail	Pre-Frail	Frail	P-Value*
Age					
65-74	49	24.5%	51.0%	24.5%	.295
75-84	94	36.2%	34.0%	29.8%	
85+	118	30.5%	36.4%	33.1%	
Sex					
Female	197	26.9%	41.1%	32.0%	.032
Male	63	44.4%	30.2%	25.4%	
Ethnicity					
African American	41	24.4%	43.9%	31.7%	483
Caucasian	212	32.1%	38.2%	29.7%	
Other	8	50.0%	12.5%	37.5%	
Marital Status					
Married	65	38.5%	40.0%	21.5%	.328
Divorced/Separated	34	35.3%	41.2%	23.5%	
Widowed	133	26.3%	39.1%	34.6%	
Never Married	29	34.5%	27.6%	37.9%	
Medications					
0-5		56.0%	36.0%	8.0%	<.001
6-9		29.1%	44.1%	26.8%	
10+		20.2%	31.0%	48.8%	

* Chi-square test for categorical variables and ANOVA for continuous variables.

≥ 20% of patients include: dementia of any type (74.4%), dementia of Alzheimer's type (31.1%), diabetes mellitus (24.1%), psychotic disorder (23%), and congestive heart failure (20.4%).

Figure 1
Distribution of Scores on the FRAIL-NH & Frailty Index



Descriptive characteristics of the study sample according to frailty category per screening measure are presented in Table 1a- 1b. In the FRAIL-NH, it appears a larger percentage of those categorized as frail are African American, although this is not quite statistically significant (p=0.056). According to the FI, more women than men were categorized as frail (p=0.032).

The distribution of FRAIL-NH1and the FI scores can be found in Figure 1. In the FRAIL-NH the majority of patients scored between a 7-9, straddling between the pre-frail and frail category. This is also true of the FI distribution, most of the patients scored between a 0.2-0.3, falling in the pre-frail category. The FRAIL-NH showed a positive correlation with the FI with Pearson coefficient of 0.623. The frailty prevalence for each screening tool was as follows, 48.7% in the FRAIL-NH and 30.3% using the FI.

Table 2a-b shows the relationship of frailty category with longitudinal health outcomes for falls, hospitalizations, and death or hospice enrollment for each frailty measure. FRAIL-NH pre-frail status was associated with an increased risk of falls (AOR=2.63; 95%CI=1.25-5.54; p=0.011) whereas frail status did not show this association (AOR=1.22; 95%CI=0.61-2.42; p=.570). FI classifications of pre-frail or frail were not associated with falls. FRAIL-NH frail status was associated with mortality/hospice enrollment (AOR=3.96; 95%CI=1.44-10.87), but the association was smaller, and not statistically significant, for pre-frail status (AOR=2.37; 95%CI=0.77-7.30; p=.135). The FI index associations for pre-frail (AOR=2.28; 95%CI=0.94-5.53) and frail (AOR=2.28; 95%CI=0.92-5.68) status with mortality/hospice placement were similar to the FRAIL-NH, but modestly less overall. When the pre-frail and frail categories were combined both frailty measures predicted 6 month mortality with the FRAIL-NH being the strongest predictor (AOR=3.36; 95%CI=1.26-8.98; p=0.016) and the FI was again a more modest predictor with an AOR of 2.28; 95%CI=1.01-5.15; p=0.047. Frailty status was not associated with hospitalization on any of the measures.

Table 2a
FRAIL-NH and Longitudinal Health Outcomes FRAIL-NH

	Odds Ratio (95% CI)	P-Value*
Falls ≥ 1		
Pre-Frail	2.63 (1.25-5.54)	.011
Frail	1.22 (0.61-2.42)	.570
Pre-Frail or Frail	1.55 (0.81-2.96)	.185
Hospitalizations ≥ 1		
Pre-Frail	0.78 (0.35-1.76)	.551
Frail	0.72 (0.35-1.50)	.384
Pre-Frail or Frail	0.74 (0.33-1.45)	.387
Deceased or Hospice		
Pre-Frail	2.37 (0.77-7.30)	.135
Frail	3.96 (1.44-10.87)	.007
Pre-Frail or Frail	3.36 (1.26-8.98)	.016

* Logistic regression adjusted for age and sex.

Table 2b
Frailty Index and Longitudinal Health Outcomes

	Frailty Index	
Falls ≥ 1		
Pre-Frail	1.16 (0.60-2.25)	.664
Frail	1.13 (0.55-2.31)	.745
Pre-Frail or Frail	1.15 (0.63-2.09)	.659
Hospitalizations ≥ 1		
Pre-Frail	0.76 (0.42-1.90)	.763
Frail	0.93 (0.41-2.07)	.852
Pre-Frail or Frail	0.91 (0.46-1.78)	.773
Deceased or Hospice		
Pre-Frail	2.28 (0.94-5.53)	.068
Frail	2.28 (0.92-5.68)	.076
Pre-Frail or Frail	2.28 (1.01-5.15)	.047

* Logistic regression adjusted for age and sex.

Table 3
Comparing the FRAIL-NH and Frailty Index (FI) for the Prediction of Adverse Health Outcomes

	Odds Ratio (95% CI)	P-Value*
LR #1: Falls ≥ 1		
FRAIL-NH Pre-Frail	2.42 (1.11-5.92)	.027
FRAIL-NH Frail	1.00 (0.44-2.28)	.999
FI Pre-Frail	1.18 (0.57-2.48)	.654
FI Frail	1.38 (0.59-3.22)	.453
LR #2: Hospitalizations ≥ 1		
FRAIL-NH Pre-Frail	0.70 (0.29-1.68)	.424
FRAIL-NH Frail	0.61 (0.24-1.53)	.294
FI Pre-Frail	1.11 (0.47-2.62)	.819
FI Frail	1.23 (0.46-3.27)	.684
LR #3: Deceased or Hospice		
FRAIL-NH Pre-Frail	2.00 (0.60-6.62)	.259
FRAIL-NH Frail	3.35 (1.04-10.86)	.044
FI Pre-Frail	1.41 (0.52-3.80)	.498
FI Frail	1.20 (0.41-3.50)	.744

* Multivariate Logistic Regressions

Table 4
FRAIL-NH Items and Longitudinal Health Outcomes

	Odds Ratio (95% CI)	P-Value*
Falls ≥ 1		
Fatigue	1.61 (0.73-3.55)	.234
Resistance	1.17 (0.82-1.67)	.397
Ambulation	0.86 (0.63-1.19)	.371
Incontinence	1.10 (0.81-1.49)	.559
Illness / Number of Medications	1.24 (0.84-1.82)	.190
Loss of Weight	1.06 (0.38-2.98)	.907
Nutritional Approach	0.81 (0.49-1.33)	.394
Help with Dressing	1.58 (0.99-2.52)	.058
Hospitalizations ≥ 1		
Fatigue	0.89 (0.33-2.41)	.822
Resistance	0.80 (0.55-1.15)	.229
Ambulation	1.19 (0.80-1.76)	.385
Incontinence	0.77 (0.54-1.10)	.147
Illness / Number of Medications	0.96 (0.61-1.53)	.876
Loss of Weight	1.66 (0.54-5.08)	.374
Nutritional Approach	1.19 (0.68-2.11)	.545
Help with Dressing	0.76 (0.50-1.15)	.194
Deceased or Hospice		
Fatigue	1.84 (0.75-4.53)	.186
Resistance	1.92 (1.06-3.48)	.032
Ambulation	1.31 (0.85-2.01)	.222
Incontinence	1.53 (1.02-2.28)	.039
Illness / Number of Medications	0.58 (0.36-0.93)	.023
Loss of Weight	1.04 (0.28-3.83)	.949
Nutritional Approach	2.44 (1.47-4.04)	<.001
Help with Dressing	2.44 (1.06-5.61)	.036

* Logistic regression adjusted for age and sex.

Tables 3 compares the FRAIL-NH with the FI to investigate predictive validity of adverse outcomes. Similar to the previous results in table 2a, those categorized as pre-frail via the FRAIL-NH1 were at an increased risk for falls OR =2.42 (1.11–5.92, p=0.027), and those categorized as frail via the FRAIL-NH were at increased risk for death or hospice enrollment with an OR=3.25 (1.04- 10.86, p=0.044). In this comparative analysis the FI was a less significant predictors of adverse outcomes.

Table 4 shows the association of each FRAIL-NH variable with adverse health outcomes. Variables significantly associated with mortality/hospice placement include: incontinence of bowel or bladder (AOR =1.53; 95%CI=1.02-2.28; p = 0.039), inability to self-transfer (resistance variable) (AOR=1.92; 95%CI=1.06-3.48; p=0.032); inability to dress self (AOR=2.44, 95%CI=1.06-5.61; p = 0.036), and diet other than regular (AOR=2.44;,95%CI=1.47-4.04; p = <0.001).

Discussion

This study shows that the FRAIL-NH is a proficient, simple and easy to use screening tool applicable to long term care patients in categorizing frailty and predicting 6 month mortality/hospice enrollment.

The study population in FI did show a significant increase in frailty in institutionalized women versus men. This is consistent a previous study in Spain involving 281 elderly nursing home patients. Using the Fried criteria, frailty was more prevalent in women compared to men (18).

This article showed a positive correlation between the FRAIL-NH and the Frailty Index. This is expected as many of the FRAIL-NH variables were included in the Frailty Index. The prevalence of frailty based on screening tool ranged from 30.3% using the Frailty Index to 48.7% using the FRAIL-NH. This is slightly lower than the prevalence of other studies in long term care, using the Fried criteria 53.7% of patients in Spanish nursing homes were categorized as frail and using the Frailty Index theoretically 64.8% of French nursing home residents are considered frail (18,19). Of course, prevalence rates will vary based on definition and cut-off points. The Frailty Index is meant to be used as a continuous variable to quantify increased risk of decompensation when presented with stressors. We agree with the authors of a recent study who investigated the Frailty Index and mortality in French nursing home residents, the traditional cut point of 0.25 used for community dwellers is not optimal in the long term care setting but a suitable cut point is unknown (19). Including those pre-frail and frail as categorized by the FI (FI ≥ 0.21)our study did show a modest increase in mortality.

Interestingly, when investigating the FRAIL-NH there is a significant increased risk for falls in the pre-frail category OR=2.63, (1.25-5.54, p =0.01). The frail group did not demonstrate the same significance. A possible explanation for this finding includes the following; the pre-frail group

is more mobile and more likely to fall while ambulating. In comparison, the FI did not demonstrate an increased risk of fall. A proposed use of the FRAIL-NH is to identify the pre-frail at risk for falls that may benefit from structured exercise in the treatment of frailty (20).

When the FRAIL-NH was compared to the FI for predictive validity, the FRAIL-NH was superior to the FI at predicting falls in the pre-frail OR =2.42, (1.11–5.92 p=0.027), and death or hospice enrollment in the frail OR=3.25 (1.04- 10.86), p=0.044). The FRAIL-NH is less cumbersome to collect than the FI and predicts adverse outcomes as well or better than the FI.

When looking at the individual variables of the FRAIL-NH scale and how they are related to adverse outcomes, incontinence demonstrated a significant increased risk in mortality, OR 1.53 (1.02-2.28, p=0.39). Incontinence serves as a marker for mobility and cognitive impairment and has been associated with adverse outcomes in the elderly population (21,22). Other variables within the FRAIL-NH significant for increased risk of mortality included: diet other than regular (OR=2.44, 1.47-4.04, p=<0.001), and the ADL impairments of help with dressing (OR=2.44, 1.0.6-5.61, p=0.036) and inability to self-transfer (OR=1.92, 1.06-3.48, p=0.32). This highlights the fundamental deficits of sarcopenia and inadequate nutritional intake that allows frailty to manifest (23, 24). This also provides a starting point to investigate reversing frailty in the nursing home. A recent randomized control trial done in Singapore demonstrated how physical, nutritional ,and cognitive interventions are effective in reversing frailty in the community-living elder (25). To our knowledge, this has not been tested in the long term care setting, but would be highly valuable to do so.

Neither version of the FRAIL-NH or FI predicted hospitalization. Based on the definition of frailty there is increased risk for rapid deterioration and therefore increased hospitalization risk (6). Recently in the United States, there has been a focus on reducing hospitalizations in the post-acute care setting. A positive outcome of this movement was the development of quality improvement programs in facilities such as, Intervention to Reduce Acute Care Transfers (INTERACT) whose goal is to reduce inappropriate hospitalizations (26). Identifying and enrolling appropriate patients to hospice has also been beneficial in decreasing hospitalization (27). These two interventions are utilized at both involved facilities and may explain why those categorized as frail in this study did not see a significant increase in risk of hospitalization. Also, this study was designed to capture long term care residents vs skilled patients status post a recent hospitalization with a new functional deficit. Long term care patients have many health and functional deficits, but are more stable than those with recent, acute decompensation. Code status in the study population would be another interesting variable to investigate. In Missouri there is a code status that includes no hospitalization. This is yet another explanation as why there was no predicative value for hospitalizations.

The major strength of the FRAIL-NH is its ease of use. The data is easy and inexpensive to collect. Unlike many of the other proposed scales, it does not require face-to-face examination or self-report (6, 8). The only self-report data point included is fatigue; the other variables are measured objectively by staff and documented accurately at each MDS assessment. Another strength of the study is the inclusion of those with cognitive impairment and functional disability, unlike previous studies (6, 8). The major weakness of this study is the retrospective approach.

In conclusion, the FRAIL-NH proposes a standardized screening tool for the long term care population that is highly predictive of mortality. In this study it was a better predictor of 6 month mortality than the Frailty Index and is less time consuming to collect.

Some may argue that those in long term care suffer from end-stage frailty, but essential to the definition of frailty is the reversibility of impairment and the FRAIL-NH variables were chosen for their potential to improve (6, 8). Long term care patients who are further along the frailty syndrome spectrum still benefit from multidisciplinary intervention to prevent additional disability and death. Now there is a simple validated screening tool for the long term care population that is highly predictive for mortality further research is needed to identify intervention strategies and their effects on patient outcomes.

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Ethical Standards: This research complies with the ethical standards of the Saint Louis University Institutional Review Board.

Conflict of interest: There are no conflict of interest.

Appendix 1
FRAIL NH Scale

F= Fatigue, based on MDS response to PHQ-9, No (never or 1 day=0), Yes (several days or everyday=1), Depressed (PHQ-9 of ≥10=2)

R=Resistance, Can patient transfer, Independent ± Supervision=0, Set Up Only=1, or Physical Assistance=2

A= Ambulation, Independent=0, Walker/Cane=1, Not Able/Wheel-chair=2

I= Incontinence, None=0, Urinary Incontinence=1, Bowel Incontinence=2

L= Loss of Weight, defined by MDS as ≥ 5% in 30 days or ≥10% in 180 days No=0, Yes=1

N= Nutritional Approach, Regular Diet=0, Altered Diet=1, Feeding Tube=2

H=Help with dressing, Independent ± Supervision=0, Set Up only=1, Physical Assistance=2

	0	1	2
Fatigue	No	Yes	PHQ-9 ≥10
Resistance	Independent	Set Up	Physical Help
Ambulation	Independent	Walker/Cane	Not Able/WC
Incontinence	None	Bladder	Bowel
Loss of Weight	None	yes	xxxx
Nutritional Approach	Regular Diet	Altered	Feeding Tube
Help with Dressing	Independent	Set Up	Physical Help
Total/Version 1			0-13
Total/Version 2			0-13

If the patient meets both criteria, they will be assigned 2 points. For example if a patient is incontinent of bladder and bowel they will be assigned 2 points for that category. This applies to the category of fatigue as well.

Appendix 2

Frailty Index Variables

1. Congestive Heart Failure
2. Cerebrovascular Accident
3. Dementia, not specified type
4. Atrial Fibrillation
5. Depression defined as a PHQ-9 score greater ≥5
6. Arthritis
7. Hip Fracture
8. Pressure Sores
9. Urinary Incontinence
10. Polypharmacy, on ≥ 6 medications
11. Physical help with dressing
12. Fatigue, per self-report or staff observation, included in PHQ-9
13. No spouse
14. Weight Loss
15. Mobility Impairment
16. Anything other than a regular diet
17. Bowel Incontinence
18. Cancer
19. Renal Disease
20. Pneumonia
21. Urinary Tract Infection
22. Wound Infection
23. Diabetes Mellitus
24. Malnutrition
25. Psychotic Disorder
26. Respiratory Failure

Frailty Index scoring
Non-frail- 0.0-0.2
Pre-frail 0.21-0.29
Frail ≥ 0.3

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