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Rady College of Medicine

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Student Name: Frederick Eng **Date:** 08/05/16

Project Title: Frailty affects treatment decisions and outcomes for patients with chronic kidney disease

Primary Supervisor Name: Dr. Navdeep Tangri

Department: Nephrology

Co-Supervisor Name: Dr. Paul Komenda and Dr. Claudio Rigatto

Department: Nephrology

Summary (250 words max single spaced):

Chronic kidney disease (CKD) is a major and common health condition that encompasses medical, social, and economic burdens. The objective of this ongoing prospective longitudinal study was to evaluate the prevalence of frailty and its associated factors among patients with CKD Stages 4 - 5 (defined by eGFR < 30 mL/min/1.73 m^2) using different subjective and objective measures of frailty assessment tools [modified Fried criteria, short physical performance battery (SPPB), physician and nurse impression rating], and determine how these frailty assessment tools compare to one another in their frailty measurements and their associations to treatment decisions and clinical outcomes.

Findings of the study showed variation for the prevalence of frailty in our CKD Stage 4-5 study cohort of 508 patients, as determined by the different frailty assessment tools (Cohen's kappa: k ranged from 0.24 to 0.47). Important results of the study showed that the modified Fried criteria as an objective frailty measure was associated with mortality (odds ratio: 2.9 [95% CI: 1.393, 5.936]). Physician impression rating as a subjective frailty measure was associated with treatment dialysis modality decisions and patients who were considered frail by physicians were more likely to have in-center hemodialysis as their renal replacement therapy option (odds ratio: 3.1 [95% CI: 0.819, 11.913]).

Frailty is associated with treatment decisions and adverse outcomes in patients with advanced CKD. Further research to understand the longitudinal trajectory of frailty and its impact on mortality, morbidity, and quality of life after initiation of dialysis is needed.

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Frailty affects treatment decisions and outcomes for patients with chronic kidney disease

Introduction and Background

Chronic kidney disease (CKD) is a major and common health condition that encompasses medical, social, and economic burdens (López-Soto Jesús et al., 2015). Approximately three million Canadians have CKD placing them at an increased risk for premature death and end-stage renal failure (Zhang & Rothenbacher, 2008). Chronic kidney disease disproportionately affects the elderly and may represent a surrogate of unsuccessful aging (Cook, 2009; Coresh, Selvin, & Stevens, 2007). While the overall prevalence of CKD is approximately 13%, it rises to 25% in those over 65 years of age, and approaches 50% in individuals over 75 years (Coresh et al., 2007). Elderly patients with an advanced CKD often carry a higher burden of comorbid conditions, and suffer from increasing morbidity, early disability and mortality (Pugh et al., 2016; Walker et al., 2015).

Frailty is a multidimensional concept that affects physiological systems causing increased vulnerability for adverse health outcomes including disability, dependency, falls, and mortality (Fried, Ferrucci, Darer, Williamson, & Anderson, 2004). There remains a lack of consensus regarding the methods and tools used to measure of frailty, with some models arguing for a frailty phenotype, whereas others apply a more subjective or a deficit based approach. In the general population, most measures of frailty have demonstrated an association with poor clinical outcomes. While there have been several studies in patients with earlier stages of CKD, and those on dialysis, very few studies have investigated patients with advanced CKD Stages 4 and 5 (eGFR < 30 ml/min/1.73m^2) to assess the impact of prevalence of frailty on the outcomes of patients' modality treatment choice.

The objective of this study was to evaluate the prevalence of frailty and its associated factors among patients with CKD Stages 4-5 using different measures of frailty, and determine how these frailty measurement tools compare to one another and their associations to treatment decisions and clinical outcomes.

Materials and Methods

Study design

The CANFIT study is an ongoing multicenter, prospective observational cohort study examining the burden and longitudinal trajectory of frailty and its association with morbidity, mortality, and patient reported outcomes. Details of the CANFIT enrollment criteria and study measurements have been previously described (Walker et al., 2015). Briefly, enrollment of patients began in September 2012. After obtaining consent, each patient underwent a physical assessment at their next clinic visit (3–6 months after Date of Consent). Patients were followed up by repeating the assessment annually (every 9–15 months, depending on clinic appointment dates) until they reached a study endpoint; Death, Opting Out, or Loss to Follow Up. Ethics approval was obtained and is renewed annually until the end of study.

Inclusion/Exclusion criteria

The study recruited eligible patients who attended an inter-professional non-dialysis CKD clinic at one of three sites in Western Canada. The study consisted of patients with Stage 4 or 5 CKD (defined by eGFR <30 mL/min/1.73 m^2), gave informed consent, and had not been

treated with a dialysis modality prior to the first frailty assessment. Individuals were excluded if they were unable to speak English. Additionally, individuals who were blind were excluded from participating. However, visually impaired individuals were included if they retained enough visual ability to be able to complete the frailty assessments.

Data collection

Data collection consisted of initial compilation of demographic information (date of birth, gender, and race), comorbidities, case report form questions, questionnaires, physical function tests, physician and nurse impression ratings of frailty, and chart review information (consisting of laboratory results, adverse events, and additional comorbidities).

Comorbidities

Comorbidities were recorded in two groups: Self-reported and Case Summary reported. Self-reported comorbidities were assessed by recording the subject's response to a predetermined question (e.g., 'have you ever been diagnosed with asthma by a doctor?'). Case Summary Reported comorbidities were collected by searching for terms or synonyms on the patient's case summary (found in their clinic chart, adjudicated by their nephrologist, and reviewed by the inter-professional team on an annual basis). If the Case Summary lists the comorbidity or a synonym, the comorbidity was marked as present.

The comorbidities used in the study were based upon the Charlson Comorbidity index (Deyo et al., 1992) and/or the Elixhauser Comorbidity Index (Quan et al., 2005). Our study comorbidity index consisted of: myocardial infarction, diabetes, peripheral vascular disease, cerebrovascular disease, cirrhosis, gastrointestinal disease, chronic obstructive pulmonary disease, congestive heart failure, arthritis, malignancy, hypertension, pulmonary hypertension, other neurologic disease, weight loss, and depression.

Case report form questions

Subjects were asked for responses to several questions: weight loss within 3 and 12 months, number of falls within 1, 3, and 12 months, use of mobility aids within the last year (defined as any objects used to assist the subject with self-transportation, such as a walking cane, walker, wheelchair, etc.), new living arrangements within the last year, and hospital admission and reason within the last year (defined as 24 hours or greater stay in the hospital).

Questionnaires

The questionnaires administered included: Centre for Epidemiological Studies Depression Scale (CES-D, 2 Item version, adapted from Cardiovascular Health Study), Geriatric Depression Scale (GDS, 5 item version), Montreal Cognitive Assessment (MoCA version 1.0), EQ5D and Visual Analogue Scale (VAS) (Version 1.0, 2007), Physical Activity Scale for the Elderly Survey (PASE) (Fried et al., 2001; Hoyl et al., 1999; Rabin & Charro, 2001; Rinaldi et al., 2003; Washburn & Smith, 1993). Each questionnaire was scored according to the official instructions included with the questionnaire. A subject was scored as 'Exhausted' if they answered 'Occasionally' or 'Most or all of the time' to either question on the CES-D. A subject was scored as 'Depressed' if they answered positively for 2 or more of the 5 questions for the GDS. The MoCA was scored according to MoCA Version 1 instructions. EQ5D was reported as a string of the responses grouped together (e.g., 32121) and EQ-VAS was reported as a whole number, from 1 to 100. The PASE was scored using its own scoring system and results were reported as both PASE score and Paffenbarger Physical Activity Index score (kcal/week).

Description of Frailty Assessment Tools

The measurement tools used in this study were the Fried Phenotype Frailty Scale/Modified Fried Criteria (Fried et al., 2001), the Short Physical Performance Battery (SPPB) (Guralnik et al., 1994), and physician and nurse impression ratings (Likert scale 1 -5). The most evaluated and frequently used measure for frailty is the Fried Phenotype Frailty Scale/Modified Fried Criteria (Bouillon et al., 2013).

Modified Fried criteria: The five criteria evaluated for identifying the frail patient are weight loss, exhaustion, low physical activity, slowness, and weakness (Figure 2). Weight loss was measured using the question: "Have you lost weight in the last 12 months unintentionally? If yes, how much weight have you lost in the last 12 months (kilograms)?" Exhaustion was measured using two questions from the Center for Epidemiologic Studies Depression (CES-D) scale: "How often in the last week did you feel that everything was an effort?" and "How often in the last week did you feel that you could not "get going"?" Low physical activity was not measured by using the Minnesota Leisure Time Activity Questionnaire, as proposed by Fried and colleagues. Instead, the Physical Activity Scale for the Elderly (PASE) and Paffenbarger Physical Activity Index was adapted (Washburn & Smith, 1993). Subjects had to answer questions about how many times a week they spent time walking, minutes doing light sport/recreation, and minutes doing moderate/heavy sport. Kilocalories per week were calculated. The results were stratified by gender and compared with the cut-off values as described by Fried and colleagues (men 383 kcal/ week, women 270 kcal/week). If a person used fewer kcals per week the frailty criteria was met. Slowness was calculated based upon a four meter gait speed test. If the subject did not attempt the test, a score of zero was given and an automatic frail score. The Fried criteria used was less than 0.8 meters/second as frail. Weakness was measured by hand-grip strength using a Jamar Hydraulic Dynamometer (Model J00105, LaFayette Instrument Company Inc.). Each hand was measured 2 times with the dynamometer and all values were recorded in kilograms. As per published recommendations, patients were considered frail if ≥ 3 criteria were abnormal overall. The modified Fried has been extensively validated as a robust predictor of morbidity and mortality in older patients and in those with chronic diseases (Fried et al., 2001; Walker et al., 2015).

Short Physical Performance Battery (SPPB): Subjects were asked to perform the SPPB at each assessment (see Figure 1). The SPPB is entirely based on three physical function tests: chair stand test, 4 meter gait speed test, and 3 balance tests (side by side, semi-tandem and tandem (Guralnik et al., 1994). The SPPB is a standardized test that is easily administered; the SPPB uses a scoring range system of 0-12 by summing the three individual categorical scores and defines normal physical function at a specific score. The subjects were considered frail at a ≤ 10 score.

Physician and Nurse Impression Ratings (1 – 5 Likert Scale): Independent physician and nurse impression ratings were used to measure the level of frailty for subjects at initiation of their first frailty assessment by the patient's physician and nurse. Scoring of scale is based on clinical judgment and available clinical information. The initial subjective question completed by the physician and nurse was "Do you think the subject is frail?" The question was followed by another question asking the physician and nurse to rate the patient on a Likert scale ranging from 1 to 5 (very fit: 1, very frail: 5). Patients were considered frail by this frail assessment tool if they were rated 3 and higher on the scale.

Statistical Analysis

When calculating descriptive statistics, the study cohort was stratified by CKD Stage 4 and 5 as well as by whether patients had a treatment plan or not. Continuous variables were reported as median and interquartile range. The Mann Whitney U Test and the Chi Square Test were applied for comparison of the descriptive stats. We reported the prevalence of frailty of our cohort defined by the different frailty assessment tools (Modified Fried, SPPB, physician and nurse impression ratings). Agreement between the frailty assessment tools was calculated with Cohen's Kappa.

Outcomes of treatment decision and mortality were evaluated with logistic regression. Unadjusted and adjusted (age, sex, and comorbidity index) odds ratios of the outcomes of interest were reported for each frailty assessment tool.

Results

Study Population

We studied 508 patients with advanced CKD (Stages 4-5). The median age of the cohort in the CKD Stage 4 was four years older than the CKD Stage 5 cohort. Both cohorts had a predominance of males and reported similar percentages of comorbidities and laboratory values other than creatinine based variables (such as eGFR, creatinine, and UACR) (Table 1).

Comparison of Frailty Assessment Tools

The prevalence of frailty varied depending on the frailty assessment tool used. The modified Fried criteria identified 29.9% patients as frail, whereas 49.9% were deemed frail based on the SPPB, 33.4% on physician impression ratings, and 28.7% on nurse impression ratings (Table 2). The modified Fried and SPPB criteria are considered objective measures while the physician and nurse impression ratings are subjective measurements of a patient's frailty.

Interestingly, the objective frailty assessments (modified Fried and SPPB) varied the most in frailty estimates and showed poor agreement (Cohen's Kappa: κ of 0.2650). In contrast, the subjective measures (physician and nurse impressions) yielded similar estimates of frailty prevalence and exhibited moderate agreement between each other (κ of 0.4652). There was generally poor agreement between the objective and subjective frailty assessment tools (Table 2).

Dialysis Treatment Decision and Mortality Associations with Frailty Assessment Tools

Of 508 patients included in the study, 96 patients went on to dialysis and 40 patients died over the course of study.

Of the patients who moved on to dialysis, 64 went to in-center hemodialysis (HD) and 32 went to peritoneal dialysis (PD). Adjusted for covariates, the objective measures (modified Fried and SPPB) had weak association with dialysis modality decision making (Modified Fried: Odds ratio (OR) 1.686 [95% CI: 0.603, 4.712]). In contrast, the subjective physician impression ratings had nearly three times the association with treatment decisions (OR 3.1 [95% CI: 0.819, 11.913]) for in-center hemodialysis preference, and nearly reached borderline statistical significance ($p < 0.1$) after being adjusted for age, sex, and comorbidities. When examining laboratory variables, none were associated with outcomes (treatment decisions or death) in univariate analysis and were therefore excluded from multivariate analysis.

Of the 40 patients who died, only the objective frailty measure of the modified Fried criteria being adjusted for age, sex, and comorbidities associated strongly with patient mortality (OR 2.9 [95% CI: 1.393, 5.936]). All the other frailty assessment tools had no association with mortality. (Table 4).

Discussion

In this study of patients with CKD Stage 4-5, we found that the prevalence of frailty varied widely depending on the frailty assessment tools. Furthermore, the different frailty assessment tools did not identify the same patient subjects as frail, as demonstrated by their poor agreement. The subjective measures of frailty (physician impression ratings) were associated with treatment decisions (hemodialysis vs peritoneal dialysis) while the objective frailty measure (the modified Fried criteria) was associated with mortality.

Frailty is a term that is used to characterize a more vulnerable population. Earlier studies have examined the association of frailty and adverse outcomes in patients with CKD and have concluded the coexistence of frailty leads to poorer outcomes that include death or dialysis treatment (Roshanravan et al., 2012; Wilhelm-Leen, Hall, Tamura, & Chertow, 2009). These previous studies, using the modified Fried criteria to assess frailty, found that patients with earlier CKD stages 1-4 had a high prevalence of frailty which was twice that of a reference non-CKD population that was in fact an average of 15 years older than the CKD study cohort. As such, this further suggests that frailty has strong associations with chronic kidney disease and these factors may not be attributed to normal aging processes alone. Frailty appears to be prevalent throughout the different stages of CKD.

Our study suggests that patients who were perceived as frail by physicians and nurses in their impression ratings (independent of age and comorbidity) were more likely have treatment decisions towards in-centre hemodialysis as opposed to home dialysis modalities such as PD. From a financial and societal perspective, home dialysis modalities such as PD have significantly lower costs and more efficient health care utilization (Klarenbach et al., 2014; Komenda et al., 2010). The decision regarding when and what type of dialysis modality to initiate in a patient with progression CKD is a complex decision which incorporates both physician and patient factors. Incorrect classification of the patient into frail or not frail category may lead to inappropriate treatment modality irrespective of age from aggressive medical therapy including dialysis (HD or PD), transplantation, palliative, or no treatment.

There is currently no evidence that frail patients cannot undergo and be successful on PD. As such, given that health care providers may use frailty as an influential factor in their decision making and appear to have a bias to direct frail patients to in-center HD from this study, it would be important to examine if subjective frailty assessments are reliable to use in clinical practice and achieve better long term clinical outcomes. Our study compared the agreement between different types of subjective and objective frailty measures but did not examine patient relevant long term outcomes such as success rates on dialysis and/or technique failure. Future frailty studies can address these questions in the home dialysis population. Further research could also identify if subjective frailtly assessments are validated against more objective frailty measures in regards to these long term outcomes.

To our knowledge, this is the first study to examine subjective and objective frailty measurements in late CKD stage patients. As an ongoing study, more data is still being

collected and with time more treatment decisions and outcomes will be recorded to further examine associations between frailty and chronic kidney disease. The extensive depth of multiple comorbidies, case report questions, and various questionnaires together with the range of frailty assessment tools used are some of the main strengths of this prospective longitudinal study at multiple sites.

This study has several limitations as well. These include the current relatively small sample studied and the fact it was a cross sectional analysis of an ongoing longitudinal study. Furthermore, the sample studied was predominantly Caucasian, and hence the results may not be applicable to populations containing a more diverse ethnic sample. Additionally, results may not be generalizable to patients with earlier stages of CKD, un-referred patients, and those on dialysis as the study subjects were limited to inclusion of only CKD Stage 4 and Stage 5 attending inter-professional clinics.

In summary, the study evaluated the prevalence of frailty and its associated factors among patients with CKD Stage 4 and Stage 5 using objective and subjective measures of frailty. Since this was the first study to examine the prevalence of frailty and its association with treatment modality decisions among CKD Stage 4-5 patients, we were faced with the challenge of translating and validating criteria from the different frailty assessment tools of modified Fried, SPPB, physician, and nurse impression ratings. Prevalence of frailty was varied among the frailty assessment tools used. As well, the tools were noted to not measure frailty in the same manner from one another.

Based upon the results of this study, the objective frailty assessment of the modified Fried was associated with mortality while physician impression rating was associated with modality treatment decisions. Patients who were considered frail by physicians were more likely to have HD modality as their renal replacement therapy option. This study showed frailty is association with treatment decisions and adverse outcomes in patients with advanced CKD. Further research to understand the longitudinal trajectory of frailty and its impact on morbidity, mortality, and quality of life after initiation of dialysis is needed.

Figure 1: Short Physical Performance Battery scoring

Test		Scoring		Total
Chair stand test	The time taken for the participant to rise from sitting in a chair 5 times is measured. The test is completed without using hands on the chair or other tools to help the participant stand	0 1 2 3 4	Unable or >60s ≥16.70s 13.70-16.69s 11.20-13.69 s ≤11.19 s	4 points
Balance tests	Side by side: the participant is asked to stand with both feet side by side and the time is measured. Semi-tandem: the participant is asked to stand with one foot slightly more in front of the other and the time is measured. Tandem: the participant is asked to stand with one foot in front of the other and the time is measured.	0 1 0 1 0 1 2	Unable or <10 s ≥10s Unable or <10 s ≥10s Unable or <3s 3.00-9.99s ≥10s	4 points
4 m gait speed test	The time taken for the participant to walk 4 m is measured twice. The average time of the two trials is used to calculate score; Use of a mobility aid in the test was recorded.	0 1 2 3 4	Unable to complete >8.70s 6.21-8.70s 4.82-6.20s <4,82s	4 points
The SPPB is scored from 0 to 4 in 3 sections for a maximum score of 12 and a minimum score of 0. Scores were grouped by normal physical function and frail: score >10(normal physical function) and score ≤10 (reduced physical function as measure of frailty) (Guralnik et al., 1994).				

Figure 2: Operational Frailty Assessment Tools

Frailty Assessment Tool	Description	Measures
Modified Fried scale	5-item scale	(1) Slowness (2) Weakness (3) Weight loss (4) Low physical activity (5) Exhaustion
Short Physical Performance Battery	3-item scale:	(1) Gait speed (2) Balance (3) Repeated chair stands
Physician and Nurse Impression Rating Scale	5-category scale:	Likert Scale: 1 – 5 (1: Very Fit, 5: Very Frail)

Table 1: Baseline characteristics of the study cohort by CKD Stage 4 and CKD Stage 5

Variable	CKD Stage CKD Stage 4	CKD Stage 5	P-Value
N	333	175	
Demographics			
Age	69 (60, 78)	65 (53, 74)	0.0012
Race (Caucasian)	231 (74%)	105 (71.4%)	0.5558
Sex (% Female)	43.0%	42.8%	0.9561
Sys BP (mmHg)	134 (122, 148)	142 (130, 156)	<0.0001
Dia BP (mmHg)	73 (64, 81)	77.5 (67, 86)	0.0034
Weight (kg)	84.0 (72.2, 97.7)	81.1 (70.0, 95.9)	0.1066
Labs			
Hemoglobin (g/L)	116.5 (108.5, 127)	109 (100, 116)	<0.0001
Urine ACR (mg/g)	27.5 (4.7, 123.9)	148.5 (56.0, 363.8)	<0.0001
HbA1c (%)	6.2 (5.7, 7.5)	6.3 (5.5, 7.5)	0.7092
eGFR (mL/min/1.73 m2)	21 (18, 25)	11 (9, 13)	
Creatinine (umol/L)	233 (197, 285)	442 (364, 512)	
Serum Albumin (mmol/L)	37 (34, 39)	35 (31, 37)	<0.0001
Comorbidities (%)			
Previous MI	20.2%	21.6%	0.7256
Diabetes (Type I or II)	55.4%	55.6%	0.9776
Hypertension	86.5%	86.4%	0.9937
Dyslipidemia	63.0%	57.8%	0.2675
Congestive Heart Failure	9.4%	9.9%	0.8560
Visual/Hearing Impairment	53.2%	53.7%	0.9253
Neurologic Disease	13.0%	16.7%	0.2664
Median Kidney Failure Risk			
2-year risk	5.2%	35.7%	<0.0001
5-year risk	15.3%	74.8%	<0.0001

Table 2: Agreement (Kappa) between frailty assessment tools

Frailty Scale	Prevalence Total Measured	N Frail	%	Agreement (Kappa) Modified Fried	SPPB	Physician Impression	Nurse Impression
Modified Fried	482	144	29.9%		0.2650	0.2867	0.2353
SPPB	503	251	49.9%	0.2650		0.2628	0.2454
Physician Impression	446	149	33.4%	0.2867	0.2628		0.4652
Nurse Impression	428	123	28.7%	0.2353	0.2454	0.4652	

Table 3: Baseline characteristics of the study population by treatment plan

Variable	Treatment Plan		P-Value
	Yes Plan	No Plan	
N	255	304	
Demographics			
Age	66 (56, 75)	69 (60, 79)	0.0075
Race (Caucasian)	168 (70.6%)	209 (77.7%)	0.0674
Sex (% Female)	48.1%	51.9%	0.3338
Sys BP (mmHg)	138 (127, 150)	134 (122, 149)	0.0280
Dia BP (mmHg)	74 (67, 82)	74 (64, 83)	0.8082
Weight (kg)	83.6 (71.7, 97.6)	83.5 (71.1, 97.7)	0.8967
Labs			
Hemoglobin (g/L)	111 (104, 121)	118 (109, 129)	<0.0001
Urine ACR (mg/g)	86.5 (19.7, 252.0)	22.9 (4.6, 102.7)	<0.0001
HbA1c (%)	6.3 (5.6, 7.8)	6.2 (5.7, 7.2)	0.2242
eGFR (mL/min/1.73 m2)	16 (12, 21)	22 (17, 27)	<0.0001
Creatinine (umol/L)	310 (220, 412)	231 (182, 303)	<0.0001
Serum Albumin (mmol/L)	36 (33, 38)	37 (33, 39)	0.0041
Comorbidities (%)			
Previous MI	19.8%	20.3%	0.8817
Diabetes (Type I or II)	59.7%	53.4%	0.1418
Hypertension	86.6%	86.0%	0.8387
Dyslipidemia	63.9%	59.3%	0.2674
Congestive Heart Failure	13.9%	6.9%	0.0066
Visual/Hearing Impairment	52.8%	55.9%	0.4721
Neurologic Disease	17.4%	13.0%	0.1540
Median Kidney Failure Risk			
2-year risk	12.6%	3.4%	<0.0001
5-year risk	34.3%	10.3%	<0.0001

Table 4: Logistic Regression Models for outcomes of mortality and treatment decision

Logistic Regression Models: Odds Ratio + 95% Confidence Intervals												
	Mortality vs. No Mortality											
	Modified Fried			SPPB			Physician Impression			Nurse Impression		
Variable	Model 1 (n = 482, 37 events)	Model 2 (n = 477, 37 events)	Model 3 (n = 477, 37 events)	Model 4 (n = 503, 35 events)	Model 5 (n = 501, 35 events)	Model 6 (n = 501, 35 events)	Model 7 (n = 446, 35 events)	Model 8 (n = 443, 35 events)	Model 9 (n = 443, 35 events)	Model 10 (n = 428, 36 events)	Model 11 (n = 425, 36 events)	Model 12 (n = 425, 36 events)
Frail vs. Not Frail	3.436 (1.736, 6.802)	3.477 (1.726, 7.004)	2.876 (1.393, 5.936)	2.316 (1.109, 4.837)	2.298 (1.038, 5.086)	1.843 (0.823, 4.130)	1.760 (0.877, 3.532)	1.512 (0.716, 3.191)	1.217 (0.564, 2.627)	1.652 (0.816, 3.346)	1.490 (0.706, 3.143)	1.208 (0.559, 2.612)
Age		1.014 (0.988, 1.041)	1.009 (0.981, 1.037)		1.013 (0.984, 1.043)	1.009 (0.979, 1.040)		1.015 (0.986, 1.045)	1.011 (0.981, 1.042)		1.016 (0.987, 1.045)	1.011 (0.982, 1.041)
Sex (M vs. F)		1.666 (0.809, 3.432)	1.788 (0.859, 3.719)		1.918 (0.901, 4.080)	1.994 (0.932, 4.268)		1.134 (0.553, 2.325)	1.189 (0.576, 2.453)		1.427 (0.689, 2.957)	1.533 (0.735, 3.200)
Comorbidity Index			1.298 (1.044, 1.612)			1.419 (1.134, 1.777)			1.322 (1.057, 1.652)			1.323 (1.064, 1.646)
Logistic Regression Models: Odds Ratio + 95% Confidence Intervals												
	Treatment Decision of HD vs. PD											
	Modified Fried			SPPB			Physician Impression			Nurse Impression		
Variable	Model 1 (n = 91, 61 HD)	Model 2 (n = 90, 61 HD)	Model 3 (n = 90, 61 HD)	Model 4 (n = 87, 58 HD)	Model 5 (n = 86, 58 HD)	Model 6 (n = 86, 58 HD)	Model 7 (n = 84, 59 HD)	Model 8 (n = 83, 59 HD)	Model 9 (n = 83, 59 HD)	Model 10 (n = 87, 58 HD)	Model 11 (n = 86, 58 HD)	Model 12 (n = 86, 58 HD)
Frail vs. Not Frail	2.043 (0.786, 5.309)	1.559 (0.579, 4.413)	1.686 (0.603, 4.712)	1.330 (0.534, 3.307)	1.080 (0.377, 3.094)	1.115 (0.388, 3.209)	3.600 (1.097, 11.818)	2.918 (0.778, 10.943)	3.125 (0.819, 11.913)	2.343 (0.825, 6.650)	1.699 (0.557, 5.179)	1.804 (0.566, 5.753)
Age		1.030 (0.993, 1.070)	1.036 (0.995, 1.079)		1.048 (1.008, 1.090)	1.054 (1.009, 1.100)		1.012 (0.969, 1.057)	1.017 (0.971, 1.066)		1.036 (0.997, 1.077)	1.039 (0.997, 1.082)
Sex (M vs. F)		1.216 (0.468, 3.158)	1.109 (0.416, 2.954)		1.421 (0.505, 3.999)	1.317 (0.458, 3.785)		1.035 (0.375, 2.857)	0.951 (0.333, 2.713)		1.199 (0.449, 3.201)	1.147 (0.419, 3.140)
Comorbidity Index			0.877 (0.653, 1.178)			0.897 (0.654, 1.229)			0.897 (0.647, 1.245)			0.939 (0.684, 1.289)

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