Adverse Health Effects of Frailty in CKD Patients

	Effect (descriptions)	Risk Difference	CKD severity	Frailty Assessment	Sample Size	Reference
Lifestyle	Smoking	RR 1.18 (1.04-1.34)	CKD stage 5D (hemodialysis)	Fried Phenotypes	205	1
Ethnicity	Hispanic	Frailty scores +0.6 points per year	CKD stage 5D (hemodialysis)	Fried Phenotypes	762	2
Biological						
Cardiovascular	Hypertension	RR 1.6 (1.26-2.04)	CKD stage 5D (hemodialysis)	Fried Phenotypes	205	1
	Peripheral vascular disease	RR 1.58 (1.34-1.8)	CKD stage 5D (hemodialysis)	Fried Phenotypes	205	1
	Left ventricular dysfunction	RR 1.18 (1.03-1.36)	CKD stage 5D (hemodialysis)	Fried Phenotypes	205	1
	Endothelial dysfunction	r = -0.367 (p= 0.004) OR 3.86 (1.00-14.88)	CKD stages 3-5	Fried Phenotypes	61	3
Vascular access	Use of a permanent vascular access (fistula or graft)	HR 0.71 (0.51-0.98)	CKD stage 5D (hemodialysis)	Fried Phenotypes	2275	4
Cerebrovascular	Cerebrovascular Accident	RR 1.34 (1.19-1.5)	CKD stage 5D (hemodialysis)	Fried Phenotypes	205	1
Pulmonary	COPD	OR 1.68 (1.16-2.45)	CKD stages 1-5	Fried Phenotypes	10256	5
Inflammatory	IL-6	Worse frailty	CKD stage 5D	Fried	762	2

已註解 [W使1]: 要寫一下是相對於什麼(ex. fistula/graft vs. catheter)

			(hemodialysis)	Phenotypes		
	CRP	After adjustment, OR	Chronic kidney	Fried	5888	[6]
	Fibrinogen	1.76 (1.28-2.41) to	insufficiency, serum	Phenotypes		
		1.50 (1.07-2.09)	creatinine ≥ 1.3 mg/dL			
Endocrinologic/ Metabolic	Diabetes	Frailty scores +0.7 points per year	CKD stage 5D (hemodialysis)	Fried Phenotypes	762	[2]
		OR 1.68 (1.16-2.45)	CKD stages 1-5	Fried Phenotypes	10256	[5]
	Obesity (IMC ≥ 30 kg/m^2)	OR 6.63 (1.16-36.77)	CKD stages 3-5	Fried Phenotypes	61	[3]
	Higher parathyroid hormones (PTH)	r= 0.30 (p= 0.01)	CKD stages 3-5	Fried Phenotypes	61	[3]
Body Composition	Higher fat mass	r= 0.25 (p= 0.04)	CKD stages 3-5	Fried Phenotypes	61	[3]
Cancer	Cancer	OR 1.89 (1.19-2.99)	CKD stages 1-5	Fried Phenotypes	10256	[5]
Arthritis	Arthritis	OR 3.34 (2.08-5.38)	CKD stages 1-5	Fried Phenotypes	10256	[5]
Laboratory Data	eGFR (mL/min/1.72m^2) reference: > 60					
	eGFRcys < 30	Frailty prevalence 2.8	CKD stages 1-4	Fried Phenotypes	336	[7]
	eGFRcys 30-44	Frailty prevalence 2.1				

Serum Albumin Concentrations (g/dL)	Frailty scores -1.1 points per g/dL	CKD stage 5D (hemodialysis)	Fried Phenotypes	762	[2]
Serum Creatinine <4 mg/dL*	RR 1.46 (1.22-1.71)	CKD stage 5D (hemodialysis)	Fried Phenotypes	205	[1]
Testosterone, every 50% lower free form		CKD stage 5D (hemodialysis), men	Fried Phenotypes	440	[8]
being frail	OR 1.40 (1.05-1.53)				
becoming frail over 12 months	OR 1.40 (1.07-1.73)				
Hemoglobin	Adjusted, OR 1.76 (1.28-2.41) to 1.50 (1.07-2.09)	Chronic kidney insufficiency, serum creatinine ≥1.3mg/dL	Fried Phenotypes	5888	[6]
LDL, HDL					

Non-adjusted differences in comorbidity and system-based influences

	Effect (descriptions)	Prevalence	CKD Severity	Frailty Assessment	Sample Size	Reference
Biological						
Cardiovascular	Heart Failure (%)	30% vs 12%	CKD stages 1-4	Fried Phenotypes	336	[7]
	Angina (%)	34% vs. 22%	CKD stages 1-4	Fried Phenotypes	336	[7]
Cerebrovascular	Cerebrovascular Disease (%)	26.4 vs. 12.0	CKD stage 5D (hemodialysis)	Fried Phenotypes	324	[9]
Vascular Access	Catheter vs. Native/Prosthetic FAVI (%)	61.6% vs. 27.78/11.11%	CKD stage 5D (hemodialysis)	Fried Phenotypes	320	[10]
Endocrinologic/ Metabolic	Diabetes (%)	F vs. NF				
		64% vs. 49%	CKD stages 1-4	Fried Phenotypes	336	[7]
	Obesity (%)	F vs. NF				
		64% vs. 50%	CKD stages 1-4	Fried Phenotypes	336	[7]
		51.8% vs. 23.9%	CKD stage 5D (hemodialysis)	Fried Phenotypes	324	[9]
	BMI based on dry weight	31.5 vs. 27.6	CKD stage 5D (hemodialysis)	Fried Phenotypes	324	[9]
	BMI	22.53 vs. 26.16	CKD stage 5D	Fried	320	[10]

已註解 [W使2]: prevalent diseases

已註解 [W使3]: prevalent disease

已註解 [W使4]: characteristics of hemodialysis initiates
!! 當在沒有 cerebrovascular disease 的患者當中，frailty 跟 cognitive function 沒有什麼關係。

已註解 [W使5]: Characteristics
!! 好像比較少人提到

已註解 [W使6]: prevalent diseases

已註解 [W使7]: prevalent diseases

已註解 [W使8]: characteristics of dialysis initiates

已註解 [W使9]: characteristics of dialysis initiates

已註解 [W使10]: characteristics

			(hemodialysis)	Phenotypes		
Cognitive	Executive Function	F vs. NF				
	Trail Making Tests A (TMTA) scores	+12.08	CKD stage 5D (hemodialysis)	Fried Phenotypes	324	[9]
	Trail Making Tests B (TMTB) scores	+33.15	CKD stage 5D (hemodialysis)	Fried Phenotypes	324	[9]
Immunological	Inflammatory					
	CRP (ln CRP) (mg/dL)	1.12 vs 0.28	CKD stage 5D (peritoneal dialysis)	Clinical Frailty Scale (CFS)	119	[11]
	IL6 (ln IL6) (mg/dL)	2.45 vs. 1.58				
	Mycophenolate mofetil (MMF) dose reduction (MDR)	F vs. NF	CKD stage 5T	Fried Phenotypes	525	[12]
	1 year since KT (%)	44 vs 40				
	2 years since KT (%)	54 vs. 45				
	3 years since KT (%)	67 vs. 51				
	Viral infection	F vs. NF				
	HCV (n=37) (capitals)	36 vs. 1	CKD stage 5D (hemodialysis)	Fried Phenotypes	205	[1]
Body Composition	Lower lean mass					
	Lean body mass (in frail vs. nonfrail) (%)	57.1% vs .14.7%	CKD stage 1-5	Edmonton Frail Scale (EFS)	41	[13]
Laboratory Data	Prealbumin (PRAB) (mg/dL)	28.9 vs. 38.3	CKD stage 1-5	Edmonton Frail Scale	41	[11]

已註解 [W使11]: at hemodialysis initiation

已註解 [W使12]: 跟 laboratory data 中的 PRAB (prealbumin), albumin 一樣都是以 frailty status 看不同

已註解 [W使13]: 在 complications 有 adjusted 的 data 了

已註解 [W使14]: 是 univariate 的，而且是分析 risk factor for frailty ，我覺得要刪掉

已註解 [W使15]: 根據 frailty status 分的不同

			(EFS)		
Serum albumin (mg/L)		Pearson correlation coefficient r = -0.263 (p = 0.025)	CKD stage 5D (hemodialysis)	Fried Phenotypes	74	15
		38 vs. 41	CKD stage 1-5	Edmonton Frail Scale (EFS)	41	13
		29.2 vs. 34.8	CKD stage 5D (peritoneal dialysis)	Clinical Frailty Scale (CFS)	119	11
		36.1 vs. 38.5	CKD stage 5D (hemodialysis)	Fried Phenotypes	320	10
	Frail with depression vs. Frail without depression vs. Nonfrail	32.9 vs. 34.9 vs. 35.8 (p=0.025)	CKD stage 5D (peritoneal dialysis)	In-house Chinese questionnaire	178	16
Calcium (mmol/L)		2.24 vs. 2.36	CKD stage 1-5	Edmonton Frail Scale (EFS)	41	13
Hemoglobin (g/dL)		Pearson correlation coefficient r = -	CKD stage 5D (hemodialysis)	Fried Phenotypes	74	15

已註解 [W使16]: 單位不同，請統整。兩位數的話應是 mg/L

已註解 [W使17]: 根據 frailty status 的不同

已註解 [W使18]: Creatinine (umol/L)．299 vs. 115

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		0.336 (p = 0.004)			
		6.49 vs. 8.07 (p = 0.037)			
		10.35 vs. 10.97	CKD stage 5D (hemodialysis)	Fried Phenotypes	320 [10]
	25-hydroxy vitamin D (ng/mL)	Pearson correlation coefficient r = -0.363 (p = 0.002)	CKD stage 5D (hemodialysis)	Fried Phenotypes	74 [15]
		11.58 vs. 17.09 (p = 0.005)			
Miscellaneous	Dialysis clearance rate (Kt/V and urea reduction ratio)	↑	CKD stage 5D (chronic dialysis)	FRAIL scale	46 [17]
Composite	Number of complications (complications identified at data collection: High Pressure Cramping, Anemia, Weight loss Pain, Weakness, Weight gain Constipation, Heart Arrhythmia, Headache, Itch, Recurrent infections, Arterial hypertension)	Spearman's correlation 0.666 (p = 0.000 in table) (p < 0.05 in text)	Elderly (≥ 60 yo), with diagnosis of CKD	Edmonton Frail Scale (EFS)	35 [18]
	Higher number of comorbid conditions	6 vs. 4 (p = 0.03)	CKD stage 1-5	Edmonton Frail Scale	41 [13]

已註解 [W使19]: Clearance rate 哪一種？

				(EFS)		
	Charlson's comorbidity score		Spearman's rank correlation coefficient r = 0.40 (p < 0.0001)	CKD stage 5D (peritoneal dialysis)	Chinese questionnaire	193	[19]
Functional Status	Disability		F vs. NF			
		≥1 disability in activities of daily Living (ADLs)	15% vs. 5%	CKD stages 1-4	Fried Phenotypes	336	[7]
		≥1 disability in instrumental activities of daily living (IADLs)	60% vs. 28%			
		≥1 disability in mobility tasks	40% vs. 18%			
		Less ADL-independent	55% vs. 91%	≥ 65 yo, predialysis, eGFR < 20 mL/min	Groningen frailty indicator (GFI)	65	[20]
	Ability to perform basic activities of daily living		33.33% vs 76.4%	CKD stage 5D (hemodialysis)	Fried Phenotypes	320	[10]
	Ability to perform transfers		38.8% vs. 84.7%			
Microbiota						

已註解 [W使20]:

已註解 [W使21]: Mentioned in other articles as complications, can omit

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Gut microbiota	Malnutrition-Inflammation-Score (MIS)		7.6 vs. 3.9	Stage 3b-4, eGFR 15-45ml/min	Fried Phenotype score	64 (and 15 control subjects)	21
		Abundance of unclassified Mogibacteriaceae and Oscillospira	Directly proportional to MIS			
		Abundance of Akkermansia, Ruminococcus, and Eubacterium	Inversely proportional to MIS			
	Bacterial Abundance of some genera (Mogibacteriacee, Coriobacteriacee, Eggerthella, Erwinia, Coprobacillus, Anaerotruncus, etc)		↑			

Neurological

EEG	Brain Wave		F vs. NF	ESRD, under chronic dialysis	FRAIL scale	46	17
		Global DAR	283 ± 679 vs. 2971 ± 4859			
		DARs (left frontal)	135 ± 250 vs. 3073 ± 4702			
		DAR (left TO)	197 ± 318 vs. 3708 ± 6398			
		DAR (central)	55 ± 96 vs. 1773 ± 3262			
		DAR (right TO)	187 ± 261 vs.			

		4400 ± 7763				
	Global DTABR	191 ± 469 vs. 1781 ± 2793				
	DTABR (left frontal)	86 ± 158 vs. 1680 ± 2388				
	DTABR (left TO)	130 ± 210 vs. 1884 ± 2828				
	DTABR (central)	39 ± 65 vs. 1132 ± 1957				
	DTABR (right TO)	126 ± 178 vs. 2960 ± 5271				
Psychological						
Mood	Mood Change	Negative change	CKD stage 5D (hemodialysis)	Edmonton Frail Scale (EFS)	N/A	[22]
Mental Health						
Anxiety	Hospital Anxiety and Depression Scale (HADS)	Women:↑in global, psychological, social frailty Men:↑in Physical frailty	ESRD, under online-haemodiafiltration (OL-HDF)	N/A	97	[23]
Depression	Hospital Anxiety and Depression Scale (HADS)	Men↑in global,	ESRD, under online-	N/A	97	[23]

		psychological, physical frailty	haemodiafiltration (OL-HDF)			
	Incidence (%) (Self-reported Major Depression Inventory)	83 vs. 6	CKD stage 1-5	Edmonton Frail Scale (EFS)	41	[13]
Mental Function	Post-KT delirium	9.0% vs. 3.9%	CKD stage 5T	Fried Phenotypes	893	[24]
Sociological						
Interaction	Interaction with family	Good				[25]
Physical activity	Minnesota Leisure Time Activity (LTA)	95 vs. 735 (p<0.001)	CKD stage 5D (hemodialysis)	Fried Phenotypes	68	[26]
	Low Physical Activity Questionnaire (LoPAQ)	280 vs. 798 (p=0.003)				
	Sitting (hours/day)	6.5 vs. 5 (p=0.04)				
Nutritional Status	Overall subjective global assessment (SGA) (weight loss, anorexia, subcutaneous fat, muscle mass) (Frail with depression vs. Frail without depression vs. Nonfrail)	5.04 vs. 5.41 vs. 5.75 (p < 0.0001)	CKD stage 5D (peritoneal dialysis)	In-house Chinese questionnaire	178	[16]
		Spearman's rank correlation coefficient r = -0.44, p < 0.0001	CKD stage 5D (peritoneal dialysis)	Chinese questionnaire	193	[19]

	Malnutrition inflammation score (MIS) (frail with depression vs. frail without depression vs. nonfrail)	9.48 vs. 7.13 vs. 5.12 (p < 0.0001)	CKD stage 5D (peritoneal dialysis)	In-house Chinese questionnaire	178	[16]
		Spearman's rank correlation coefficient r = 0.40, p < 0.0001	CKD stage 5D (peritoneal dialysis)	Chinese questionnaire	193	[19]
Quality of Life	HRQoL					
	SF-36					
	Scores in physical functioning, blood pressure, role physical, and physical component summary domains	↓	CKD stage 1-5	Edmonton Frail Scale (EFS)	41	[13]
	Kidney Disease Quality of Life (KDQoL)	F vs. NF				
	Physical health	33.7 vs. 40.7	ESRD CKD stage 5D (conventional hemodialysis)	Fried Phenotypes	151	[27]
	Kidney disease effects	51.6 vs. 66.8				
Independence	Functional Independence Measure (FIM)		Elderly, ≥65y/o	Edmonton Frail Scale (EFS)	137	[28]
	Spearman's correlation	Frailty diagnosis with global FIM	-0.703 (p<0.001)			

	coefficient	Frailty diagnosis with motor FIM	-0.714 (p<0.001)				
		Frailty diagnosis with cognitive FIM	-0.575 (p<0.001)				
		EFS scores with gross FIM	-0.53 (p<0.01)				
Health-care utilization	Hospitalization		90% vs. 53% (p = 0.04)	≥ 65 yo, predialysis, eGFR < 20 mL/min	Groningen frailty indicator (GFI)	65	[20]
		Cumulative number of inpatient health-care visits	↑	CKD stage 1-5	Edmonton Frail Scale (EFS)	41	[13]
		Cumulative number of emergency health-care visits					
		Cumulative number of total health-care visits					
		Admissions/year	0.77727 vs. 0.2838	CKD stage 5D (hemodialysis)	Fried Phenotypes	320	[10]

Complications

	Effect (descriptions)	Risk Difference	CKD Severity	Frailty Assessment	Sample Size	Reference
Biological						
Cardiovascular	Cerebrovascular Accident	OR 1.55 (1.05-2.99)	CKD stage 5D (hemodialysis)	Fried Phenotypes	2275	[4]
	QRS duration	β coefficient = −0.29, t = −2.03 (p = 0.048)	CKD stage 5D (chronic hemodialysis)	Edmonton frailty scale (EFS)	41	[29]
		β coefficient = −0.27, t = −1.84 (p = 0.05)		FRAIL scale		
	Vascular Access failure	HR 2.63 (1.03-6.71)	ESRD (CKD stage 5D)	Self-reported FRAIL scale	51	[30]
Renal Function Decline	Risk for death or dialysis therapy	2.5 (1.4-4.4)-fold greater	CKD stages 1-4	Fried Phenotypes	336	[7]
Immunological	Mycophenolate mofetil (MMF) dose reduction (MDR)	HR 1.29 (1.01-1.66)	CKD stage 5T	Fried Phenotypes	525	[12]
Cognitive	Modified Mini-Mental State (3MS)	-2.37 to -2.80 (1 year) (p=0.03)	ESRD	Fried Phenotypes	324	[9]
	Declined, 1-4 years post-KT (points/week)	Slope = -0.04 vs. 0.005	CKD stage 5T	Fried physical frailty phenotypes (PFP)	665	[31]
	At 4 year post-KT (points)	-5.5 (87.4 vs.				

已註解 [W使22]: simple

已註解 [W使23]: simple

		92.9)			
Functional status	Disability	F vs. Prefrail vs. NF			
	Need for activities of daily livings (ADL) assistance	OR 11.32 (5.49-23.32) vs. 1.93 (1.01-3.68) vs. 1.00	CKD stage 5D (hemodialysis)	Fried Phenotypes	742	[32]
Diabetes	Diabetes	OR 1.35 (1.10-1.65)	CKD stage 5D	Fried Phenotypes	2275	[4]
Body composition	Lower lean mass	F/PF vs. NF			
	Whole body (kg)	34.7 vs. 43.1	CKD stage 5D (hemodialysis)	Self- report instrument evaluating five dimensions of frailty (fatigue, resistance, ambulation, illnesses, and weight loss)	44	[14]
	Cephalic/trunk (g)	3059 vs. 3288 (cephalic); 17.4 vs. 22.1 (trunk)			
	Right/Left upper limb (g)	1831 vs. 2493 (right); 1869 vs. 2515 (left)			
	Right/Left lower limb (g)	4920 vs. 6114 (right); 4650 vs. 6349 (left)			
	Bones				

Bone Mineral Density (BMD)	One year follow-up, with frailty	ESRD CKD stage 5D (chronic hemodialysis)	FRAIL Scale	43	[33]
L1	ß = −0.4, t =−2.18, p=0.04				
L4	ß =−0.39, t =−2.1, p=0.046				
Femur Neck (FN)	ß =−0.5, t= −2.96, p<0.01				
	β = −4, t = −3.17, p = 0.004				
Total	ß = −0.53, t = −3.27, p < 0.01	ESRD CKD stage 5D (chronic hemodialysis)	FRAIL Scale	43	[33]
Areas	One year follow-up, with frailty	ESRD CKD stage 5D (chronic hemodialysis)	FRAIL Scale	43	[33]
Average L-spine areas	ß = −0.48, t =−2.84, p < 0.01				
Changes of average L-spine areas	ß = −0.5, t =−3.02, p<0.01				
Z-score	One year follow-up, with frailty				

Percentage change of L1 Z-score	ß = −0.45, t =−2.11, p=0.049				
Vertebral Compression Fracture (VCF)	OR 1.8 (p = 0.01)	ESRD CKD stage 5D (chronic hemodialysis)	FRAIL Scale	43	[34]
Quantitative ultrasound (QUS) parameters of calcaneus					
Speed of sound (SOS)	Standardized β (range, p value)	CKD stage 5D (maintenance hemodialysis)	Fried Phenotypes	214	[35]
Female (Five frailty criteria)	Negative (-0.253 to -0.439, p ≤ 0.034)				
Male (All criteria significant except weight loss)	Negative (-0.277 to -0.402, p ≤ 0.003)				
Broadband ultrasound attenuation (BUA)	Standardized β (range, p value)				
Female (All criteria significant except weakness and weight loss)	Negative (-0.209 to -0.354, p ≤ 0.045)				

Male (All criteria significant except weight loss)	Negative (-0.171 to -0.371, p ≤ 0.045)				
Stiffness index	Standardized β (range, p value)				
Female (All criteria significant except weight loss)	Negative (-0.271 to -0.461, p ≤ 0.018)				
Male (Five frailty criteria)	Negative (-0.183 to -0.461, p ≤ 0.048)				
Muscles					
Quadriceps muscle area (magnitude of association with PbF vs. 10 years of age)	Multivariable coefficient -30.3 cm^2 (p = 0.02) vs. -6.6 cm^2 (p = 0.0001)	CKD stage 5D (hemodialysis)	Performance-based frailty (PbF)	80	[36]
Appendicular skeletal muscle mass index (ASMI)	Unadjusted 6.8 vs. 7.7; adjusted p < 0.05	CKD stage 1-5	Edmonton Frail Scale (EFS)	41	[13]
Fat					

	Appendicular fat percentage	FRAIL scale			
	Left/Right lower extremity	t = 2.32; p = 0.03 (left); t = 2.05; p = 0.048 (right)	CKD stage 5D (hemodialysis)	FRAIL scale	44	[14]
	Left/Right upper extremity	t = 2.66; p = 0.01 (left); t = 3.09; p = <0.01 (right)				
	Appendicular fat percentage	Frail/Prefrail vs. Nonfrail				
	Left/Right lower extremity	t = 2.31; p = 0.03 (left); t = 2.28; p = 0.03 (right)	CKD stage 5D (hemodialysis)	Self- report instrument evaluating five dimensions of frailty (fatigue, resistance, ambulation, illnesses, and weight loss)	44	[14]
	Right upper extremity	t = 2.35; p = 0.03				
	Sarcopenia	aOR 12.2 (2.27-65.5)	CKD stage 5D (peritoneal dialysis)	Clinical Frailty Scale (CFS)	11912	[11]
Laboratory data	Serum Albumin Concentrations (g/dL)					
	<3.2 vs. ≥3.9	OR 1.89 (1.30-2.59)	CKD stage 5D	Fried Phenotypes	2275	[4]
	Hypoalbuminemia	Negative association (p =	CKD stage 5D (maintenance	Frail Scale	46	[37]

已註解 [W使24]: 是 multivariate linear regression

已註解 [W使25]: adjusted for blah, blah, blah, risk factor for sarcopenia

		0.01)	hemodialysis) (ESRD)			
Psychological						
Delirium	Post-KT delirium	OR 2.05 (1.02-4.13)	CKD stage 5T	Fried Phenotypes	893	[24]
Distress	Distress Thermometer	β = 0.35, t = 3.0 (95% CL = 0.12-0.58) (p = 0.003)	CKD stage 5D (hemodialysis)	Canadian frailty score	382	[38]
Quality of Life	HRQoL					
	Fair/Poor HRQOL at follow-up (median 9.4 mo)	aOR 2.79 (1.32-5.90)	ESRD CKD stage 5T	Fried Phenotypes	233	[39]
	Worsening HRQOL at follow-up (median 9.4 mo)	aRR 2.91 (1.08-7.80)				
	SF-36					
	Hierarchical regression R^2 change (effects of frailty on HRQoL) in Physical Component Summary (PCS)	29% (p<0.001)	CKD stage 2-4	Fried Phenotypes	168	[40]
	Hierarchical regression R^2 change (effects of frailty on HRQoL) in Mental Component Summary (MCS)	21.3% (p<0.001)				

Physical components	Simple linear regression coefficient = -1.12 (-1.47 to -0.76) (p < 0.001)	CKD stages 3-5 (predialysis treatment)	Fried Phenotypes	61	[41]
Mental components	Simple linear regression coefficient = -0.75 (-1.40 to -.016)				
SF-12					
MCS	Effect estimate 0.94 (0.91-0.97) (p<0.01)	CKD stage 5D (peritoneal dialysis, n=129; hemodialysis, n=122)	The Canadian Study of Health and Aging Clinical Frailty Scale (CFS)	251	[42]
PCS	Effect estimate 0.88 (0.84-0.91) (p<0.01)				
KDQOL-SF scores within 3 months post-KT	F vs. NF				
At KT	↓	CKD stage 5T	Fried Phenotypes	443	[43]
Physical HRQoL	−6.31 points (95% CI -8.16 to -4.46)				
Kidney disease-	−6.53 points				

specific HRQoL	(95% CI -9.17 to -3.89)
Post-KT	Greater improvement
Physical HRQoL	1.35 points/month (0.65 to 2.05) vs. 0.34 points/month (-0.17 to 0.85)
Kidney disease-specific HRQoL	3.75 points/month (2.89 to 4.60) vs. 2.41 points/month (1.78 to 3.04)
Constituent domains	Greater improvement
General health	4.93 points/month (3.51 to 6.35) vs. 2.87 points/month (1.82 to 3.92)

Effects of ESRD on daily living	7.10 points/month (5.68 to 8.51) vs. 4.01 points/month (2.99 to 5.03)				
Cognitive function	2.88 points/month (1.80 to 3.96) vs. 1.28 points/month (0.50 to 2.07)				
Social interaction	1.18 points/month (-0.06 to 2.43) vs. -0.57 points/month (-1.47 to 0.33)				
Illness Intrusiveness Rating Scale	Effect estimate 1.14 (1.09-1.20)	CKD stage 5D (peritoneal dialysis, n=129; hemodialysis, n=122)	The Canadian Study of Health and Aging Clinical Frailty Scale (CFS)	251	[42]
Barthel Index	Effect estimate 0.89 (0.86-.093)				
Symptom score	Effect estimate 1.23 (1.13-1.34)				

	Hospital Anxiety and Depression Scale	Effect estimate 1.21 (1.11-1.31)			
	Falls	HR 2.1 (1.21-3.92)	CKD stage 5D (hemodialysis)	Fried Phenotypes	205 [1]
		OR 2.39 (1.22-4.71)	CKD stage 5D (maintenance hemodialysis)	Fried frailty index	762 [44]
	Higher numbers of falls	HR 3.09 (1.38-6.90)	CKD stage 5D (hemodialysis)		95 [45]
	Time to first fall or fracture requiring medical attention	HR 1.60 (1.16-2.20)	CKD stage 5D (maintenance hemodialysis)	Modified Fried Phenotypes by Bao Y [46].	1646 [47]
Graft Loss	Death-censored graft loss				
	F vs. NF (in patients with depressive symptoms)	aHR 6.20 (1.67, 22.95) vs. 3.16 (0.90, 11.04)	CKD stage 5T	Fried Phenotypes	773 [48]
Health-care utilization	Hospitalization/Death	HR 1.56 (1.36-1.79)	CKD stage 5D	Fried Phenotypes	2275 [4]
	Hospitalization	HR 2.06 (1.18-3.58)	CKD stage 5D (hemodialysis)	Fried Phenotypes	205 [1]
		aHR 1.80 (1.4-2.3)	CKD stage 5D (maintenance hemodialysis &	Adopted	1658 [49]

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		peritoneal dialysis)			
	Relative risk = 1.43 (1.00-2.03)	CKD stage 5D (hemodialysis)	Fried Phenotypes	146	[50]
Number of hospitalizations for all causes	beta = 0.29 (p < 0.0001)	CKD stage 5D (peritoneal dialysis)	Chinese questionnaire	193	[19]
Number of hospitalizations related to cardiovascular events	beta = 0.37 (p < 0.0001)				
Non-vascular access-related hospitalizations	aHR 1.98 (1.41-1.87) (內文應該寫錯，無勘誤)	CKD stage 5D	Fried Phenotypes	2275	[4]
Time to first hospitalization	HR 1.26 (1.09-1.45)	CKD stage 5D (maintenance dialysis)	Earlier modification of Fried Phenotypes by Johansen et al [4], but without weight loss.	1576	[46]
Early Hospital Readmission (EHR)	aRR 1.61 (1.81-2.19) (p=0.002)	CKD stage 5T	Fried Phenotypes	383	[51]
Duration of hospitalization					
Hospital stay (days per year of follow up) (frail with depression vs. frail without depression vs. nonfrail)	26.62 (IQR 10.65-61.18) vs. 14.05 (IQR 3.57-37.27) vs. 8.04 (IQR 0.91-19.42) (p<0.0001)	CKD stage 5D (peritoneal dialysis)	In-house Chinese questionnaire	178	[16]

	Total length of hospital stay	beta = 0.34 (p < 0.0001)	CKD stage 5D (peritoneal dialysis)	Chinese questionnaire	193	[19]
	Longer Length of Stay (LOS)					
	with delayed graft function (DGF), LOS	Relative Risk 1.15 (1.03-1.29)	CKD stage 5T	Fried Phenotypes	589	[52]
	With DGF, LOS ≥2 weeks	OR 1.57 (1.06-2.33)				
	≥2 weeks		CKD stage 5 to 5T	Fried Phenotypes	569	[53]
	Change in 3 categories (more frail)	OR 2.02 (1.20-3.40)				
	Change in frailty scores (more frail)	OR 1.92 (1.13-3.25)				
	With depressive symptoms (aRR difference between F and NF)	aRR 1.88 (1.70-2.08) vs. 1.38 (1.27-1.52)	CKD stage 5T	Fried Phenotypes	773	[48]
	CES-D score (10-point increase) (aRR increase between F and NF)	aRR 1.23 (1.16-1.31) vs. 1.17 (1.08-1.27)				
Mortality	Mortality	2.17 fold	CKD stage 5T	Fried Phenotypes	537	[54]
		HR 1.57 (1.25-1.97)	CKD stage 5D (maintenance dialysis)	Earlier modification of Fried Phenotypes by Johansen et al [4], but without weight loss.	1576	[46]
		HR 2.24 (1.60-	CKD stage 5D	Fried Phenotypes	2275	[4]

	3.15)				
	HR 1.22 (1.04-1.43)	CKD stage 5D (incident chronic dialysis)	CFS	390	[55]
	HR 4.28 (1.22-14.98)	Predialysis (eGFR ≤ 25 mL)	PRISMA questionnaire & Timed up and Go test	104	[56]
	aHR 9.83 (1.80-53.7)	CKD stage 5D (peritoneal dialysis)	CFS	119	[11]
	HR 2.60 (1.04-6.49)	CKD stage 5D (hemodialysis)	Fried Phenotypes	146	[50]
	HR 2.37 (1.11-5.02)	CKD stage 5D (maintenance hemodialysis & peritoneal dialysis)	Adopted	1658	[49]
	20.45% vs. 12.36% (p<0.005)	CKD stage 5D (hemodialysis)	Fried Phenotypes	320	[10]
Performance-based frailty	HR 2.16 (1.41-3.29)	CKD stage 5D (hemodialysis)	Fried Phenotypes & a definition that substitutes self-reported measures available on the Medical Outcomes Study 36-Item Short Form (SF-36) for the physical performance and	771	[57]
Self-reported function-based frailty	HR 1.93 (1.24-3.00)				
Patients who met both performance- and self-reported function-based	HR 2.46 (1.51-4.01)				

frailty			exhaustion criteria.		
F vs. NF (in patients with depressive symptoms)	aHR 2.62 (1.03, 6.70) vs. 1.92 (0.68, 5.38)	CKD stage 5T	Fried Phenotypes	773	[48]
At 24-month follow up, frail with depression vs. frail without depression vs. nonfrail	62.5% vs. 71.4% vs 86.6% (p=0.001)	CKD stage 5D (peritoneal dialysis)	In-house Chinese questionnaire	178	[16]
Prediction ability of comorbidities in F vs. NF	HR 0.75 (0.44-1.29) vs. 1.66 (1.17-2.35)	CKD stage 5T (KT candidates, on waitlist)	Fried Phenotypes	2086	[58]
Out of 10 deceased within 1 year of initiation (percentage of F vs. NF)	30% vs. 9%	≥ 65 yo, predialysis, eGFR < 20 mL/min	Groningen frailty indicator (GFI)	65	[20]
Risk for death or dialysis therapy	2.5 (1.4-4.4)-fold greater	CKD stages 1-4	Fried Phenotypes	336	[7]
All-cause mortality					
Adjusted	HR 1.66 (1.03-2.67)	CKD stage 5D (incident chronic dialysis)	Fried Phenotypes	370	[59]
Among BMI ≥30 kg/m^2	HR 3.77 (1.10-12.92)				
Above median Waist-Hip Ratio (WHR)	HR 2.38 (1.17-4.82)				
Anti-neutrophil cytoplasmic	HR 2.43 (1.48-	CKD stage 5D to 5T	Inability to walk without	425	[60]

	antibody (ANCA)-associated vasculitides (AAV) patients' mortality	3.99)	(RRT [hemodialysis, peritoneal dialysis, transplantation])	help		
	Mortality of patients with monoclonal gammopathy and ESRD caused by myeloma cast nephropathy (MCN), immunoglobulin light chain amyloidosis (ALA), or light-chain deposition disease (LCDD)	HR, 1.93 (1.58-2.36)	CKD stage 5D to 5T (RRT [hemodialysis, peritoneal dialysis, transplantation])	Inability to walk without help	1462	[61]
	Post-KT mortality					
	Change in 3 categories (more frail)	HR 2.27 (1.11-4.65)	CKD stage 5 to 5T	Fried Phenotypes	569	[53]
	Change in frailty scores (more frail)	HR 2.36 (1.12-4.99)				
Composite	Composite outcomes of all-cause death or cardiovascular hospitalization	HR 23.58 (1.61-346.03)	CKD stage 5D (hemodialysis)	Multidimensional frailty score based on comprehensive geriatric assessment (CGA) protocol	46	[62]
	30-day postoperative (KT) complications according to Comprehensive Complication	β=13.31, 95% CI 5.72-20.89 (p = 0.0007)	CKD stage 5T	Groningen Frailty Indicator	150	[63]

Bibliography

1. YadlaM, JohnJ, MummadiM. A study of clinical assessment of frailty in patients on maintenance hemodialysis supported by cashless government scheme. *Saudi J Kidney Dis Transplant*. 2017. doi:10.4103/1319-2442.198102

2. JohansenKL, DalrympleLS, DelgadoC, et al. Factors Associated with Frailty and Its Trajectory among Patients on Hemodialysis. *Clin J Am Soc Nephrol*. 2017;12(7):1100-1108. doi:10.2215/CJN.12131116

3. MansurHN. Fragilidade na doença renal crônica: prevalência e fatores associados. 2012.

4. JohansenKL, ChertowGM, JinC, KutnerNG. Significance of frailty among dialysis patients. *J Am Soc Nephrol*. 2007;18(11):2960-2967.

5. Wilhelm-LeenER, HallYN, MKT, ChertowGM. Frailty and chronic kidney disease: the Third National Health and Nutrition Evaluation Survey. *Am J Med*. 2009;122(7):664-71 e2. doi:10.1016/j.amjmed.2009.01.026

6. ShlipakMG, Stehman-BreenC, FriedLF, et al. The Presence of Frailty in Elderly Persons with Chronic Renal Insufficiency. *Am J Kidney Dis*. 2004;43(5):861-867. doi:10.1053/j.ajkd.2003.12.049

7. RoshanravanB, KhatriM, Robinson-CohenC, et al. A prospective study of frailty in nephrology-referred patients with CKD. *Am J Kidney Dis*. 2012;60(6):912-921. doi:10.1053/j.ajkd.2012.05.017

8. ChiangJM, KaysenGA, SegalM, ChertowGM, DelgadoC, JohansenKL. Low testosterone is associated with frailty, muscle wasting and physical dysfunction among men receiving hemodialysis: a longitudinal analysis. *Nephrol Dial Transplant*. 2018. doi:10.1093/ndt/gfy252

9. McAdams-DemarcoMA, TanJ, SalterML, et al. Frailty and cognitive function in incident hemodialysis patients. *Clin J Am Soc Nephrol*. 2015;10(12):2181-2189. doi:10.2215/CJN.01960215

10. BancuI, GraterolF, BonalJ, et al. Frail Patient in Hemodialysis: A New Challenge in Nephrology-Incidence in Our Area, Barcelones Nord and Maresme. *J Aging Res*. 2017;2017:7624139. doi:10.1155/2017/7624139

11. KamijoY, KandaE, IshibashiY, YoshidaM. Sarcopenia and Frailty in PD: Impact on Mortality, Malnutrition, and Inflammation. *Perit Dial Int*. 2018;38(6):447-454. doi:10.3747/pdi.2017.00271

12. McAdams-DemarcoMA, LawA, TanJ, et al. Frailty, mycophenolate reduction, and graft loss in kidney transplant recipients.

Transplantation. 2015;99(4):805-810. doi:10.1097/TP.0000000000000444

13. Adame PerezSI, SeniorPA, FieldCJ, JindalK, MagerDR. Frailty, Health-Related Quality of Life, Cognition, Depression, Vitamin D and Health-Care Utilization in an Ambulatory Adult Population with Type 1 or Type 2 Diabetes Mellitus and Chronic Kidney Disease: A Cross-Sectional Analysis. *Can J Diabetes*. June2018. doi:10.1016/j.jcjd.2018.06.001

14. ChaoC-T, ChanD-C, HuangJ-W. Frail Phenotype Might Be Associated With Higher Appendicular but Not Truncal Fat Among End-Stage Renal Disease Patients. *J Pain Symptom Manage*. 2017;53(4):e1-e4. doi:10.1016/j.jpainsymman.2017.01.004

15. DemirciogluD. The Association of Vitamin D Levels and the Frailty Phenotype Among Non-geriatric Dialysis Patients: A Cross-sectional Study. *Clinics*. 2018. doi:10.6061/clinics/2018/e116

16. SzetoC-C, ChanGC-K, NgJK-C, et al. Depression and Physical Frailty Have Additive Effect on the Nutritional Status and Clinical Outcome of Chinese Peritoneal Dialysis. *Kidney Blood Press Res*. 2018;43(3):914-923. doi:10.1159/000490470

17. ChaoC-T, LaiH-J, TsaiH-B, YangS-Y, HuangJ-W. Frail phenotype is associated with distinct quantitative electroencephalographic findings among end-stage renal disease patients: an observational study. *BMC Geriatr*. 2017;17(1):277. doi:10.1186/s12877-017-0673-3

18. deSousa MeiraA, Aparecido BatistaM, dePina PereiraRM, Partezani RodriguesRA, Silva FhonJR, KusumotaL. Frailty in elderly patients with chronic kidney disease under conservative treatment. *Rev da Rede Enferm do Nord*. 2016;17(3):386-392. doi:10.15253/2175-6783.2016000300012

19. NgJK-C, KwanBC-H, ChowK-M, et al. Frailty in Chinese Peritoneal Dialysis Patients: Prevalence and Prognostic Significance. *Kidney Blood Press Res*. 2016;41(6):736-745. doi:10.1159/000450563

20. MeulendijksFG, HamakerME, BoereboomFTJ, KalfA, VögtlanderNPJ, vanMunsterBC. Groningen frailty indicator in older patients with end-stage renal disease. *Ren Fail*. 2015;37(9):1419-1424.

21. MargiottaE, CaldiroliL, VettorettiS, et al. SuO004GUT MICROBIOTA COMPOSITION AND FRAILTY IN ELDERLY PATIENTS WITH CHRONIC KIDNEY DISEASE. *Nephrol Dial Transplant*. 2018;33(suppl_1):i618-i618. doi:10.1093/ndt/gfy104.SuO004

22. DeSouza OrlandiF, GesualdoGD. Assessment of the frailty level of elderly people with chronic kidney disease undergoing hemodialysis. *ACTA Paul Enferm*. 2014;27(1):29-34. doi:10.1590/1982-0194201400007

23. SalesC, TavaresR, AmadoL, et al. SP651ANXIETY AND DEPRESSION IN END STAGE RENAL DISEASE PATIENTS AND ITS

ASSOCIATION WITH CLINICAL AND LABORATORIAL DATA. *Nephrol Dial Transplant*. 2017;32(suppl_3):iii355-iii355. doi:10.1093/ndt/gfx154.SP651

24. HaugenCE, MountfordA, WarsameF, et al. Incidence, Risk Factors, and Sequelae of Post-kidney Transplant Delirium. *J Am Soc Nephrol*. 2018;29(6):1752-1759. doi:10.1681/ASN.2018010064

25. MoffattH, MoorhouseP, MalleryL, LandryD, TennankoreK. Using the Frailty Assessment for Care Planning Tool (FACT) to screen elderly chronic kidney disease patients for frailty: the nurse experience. *Clin Interv Aging*. 2018;13:843.

26. JohansenKL, PainterP, DelgadoC, DoyleJ. Characterization of physical activity and sitting time among patients on hemodialysis using a new physical activity instrument. *J Ren Nutr*. 2015;25(1):25-30. doi:10.1053/j.jrn.2014.06.012

27. NooriN, Sharma ParpiaA, LakhaniR, JanesS, GoldsteinMB. Frailty and the Quality of Life in Hemodialysis Patients: The Importance of Waist Circumference. *J Ren Nutr*. 2018;28(2):101-109. doi:10.1053/j.jrn.2017.07.007

28. Fabrício-WehbeSCC, SchiavetoFV, VendrusculoTRP, HaasVJ, DantasRAS, RodriguesRAP. Cross-cultural adaptation and validity of the "Edmonton Frail Scale - EFS" in a Brazilian elderly sample. *Rev Lat Am Enfermagem*. 2009;17(6):1043-1049. doi:10.1590/S0104-11692009000600018

29. ChaoC-T, HuangJ-W. Frailty severity is significantly associated with electrocardiographic QRS duration in chronic dialysis patients. *PeerJ*. 2015;3:e1354. doi:10.7717/peerj.1354

30. ChaoC-T, ChiangC-K, HuangJ-W, HungK-Y. Self-reported frailty among end-stage renal disease patients: A potential predictor of dialysis access outcomes. *Nephrology (Carlton)*. 2017;22(4):333-334. doi:10.1111/nep.12961

31. ChuNM, GrossAL, ShafferAA, et al. Frailty and Changes in Cognitive Function after Kidney Transplantation. *J Am Soc Nephrol*. 2019;30(2):336-345. doi:10.1681/ASN.2018070726

32. KutnerNG, ZhangR, AllmanRM, BowlingCB. Correlates of ADL difficulty in a large hemodialysis cohort. *Hemodial Int*. 2014;18(1):70-77. doi:10.1111/hdi.12098

33. ChaoC-T, HuangJ-W, ChanD-C. Frail phenotype might herald bone health worsening among end-stage renal disease patients. *PeerJ*. 2017;5:e3542. doi:10.7717/peerj.3542

34. ChaoC-T, ChiangC-K, HuangJ-W, ChanD-C. Effect of Frail Phenotype on Bone Mass and Vertebral Compression Fracture in Individuals Undergoing Dialysis. *J Am Geriatr Soc*. 2016;64(9):e19-21. doi:10.1111/jgs.14296

35. YonekiK, KitagawaJ, HoshiK, et al. Association between frailty and bone loss in patients undergoing maintenance hemodialysis. *J Bone Miner Metab*. January2018. doi:10.1007/s00774-017-0898-4

36. DelgadoC, DoyleJW, JohansenKL. Association of frailty with body composition among patients on hemodialysis. *J Ren Nutr*. 2013;23(5):356-362. doi:10.1053/j.jrn.2013.02.010

37. ChaoC-T, HsuY-H, ChangP-Y, et al. Simple self-report FRAIL scale might be more closely associated with dialysis complications than other frailty screening instruments in rural chronic dialysis patients. *Nephrology (Carlton)*. 2015;20(5):321-328. doi:10.1111/nep.12401

38. CamilleriS, ChongS, TangvoraphonkchaiK, YoowannakulS, DavenportA. Effect of Self-Reported Distress Thermometer Score on the Maximal Handgrip and Pinch Strength Measurements in Hemodialysis Patients. *Nutr Clin Pract*. 2017;32(5):682-686. doi:10.1177/0884533617697936

39. McAdams-DeMarcoMA, YingH, OlorundareI, et al. Frailty and Health-Related Quality of Life in End Stage Renal Disease Patients of All Ages. *J frailty aging*. 2016;5(3):174-179.

40. LeeSJ, SonH, ShinSK. Influence of frailty on health-related quality of life in pre-dialysis patients with chronic kidney disease in Korea: a cross-sectional study. *Health Qual Life Outcomes*. 2015;13(1):70.

41. MansurHN, ColugnatiFA, GrincenkovFR, BastosMG. Frailty and quality of life: a cross-sectional study of Brazilian patients with pre-dialysis chronic kidney disease. *Heal Qual Life Outcomes*. 2014;12:27. doi:10.1186/1477-7525-12-27

42. IyasereOU, BrownEA, JohanssonL, et al. Quality of Life and Physical Function in Older Patients on Dialysis: A Comparison of Assisted Peritoneal Dialysis with Hemodialysis. *Clin J Am Soc Nephrol*. 2016;11(3):423-430. doi:10.2215/CJN.01050115

43. McAdams-DeMarcoMA, OlorundareIO, YingH, et al. Frailty and Postkidney Transplant Health-Related Quality of Life. *Transplantation*. 2018;102(2):291-299. doi:10.1097/TP.0000000000001943

44. KutnerNG, ZhangR, HuangY, WasseH. Falls among hemodialysis patients: potential opportunities for prevention? 2014. doi:10.1093/ckj/sfu034

45. McAdams-DeMarcoMA, SureshS, LawA, et al. Frailty and falls among adult patients undergoing chronic hemodialysis: a prospective cohort study. *BMC Nephrol*. 2013;14:224. doi:10.1186/1471-2369-14-224

46. BaoY, DalrympleL, ChertowGM, KaysenGA, JohansenKL. Frailty, dialysis initiation, and mortality in end-stage renal disease. *Arch*

Intern Med. 2012;172(14):1071-1077. doi:10.1001/archinternmed.2012.3020

47.   DelgadoC, ShiehS, GrimesB, et al. Association of Self-Reported Frailty with Falls and Fractures among Patients New to Dialysis. *Am J Nephrol*. 2015;42(2):134-140. doi:10.1159/000439000

48.   KonelJM, WarsameF, YingH, et al. Depressive symptoms, frailty, and adverse outcomes among kidney transplant recipients. *Clin Transplant*. 2018;32(10):e13391. doi:10.1111/ctr.13391

49.   LeeS-Y, YangDH, HwangE, et al. The prevalence, association, and clinical outcomes of frailty in maintenance dialysis patients. *J Ren Nutr*. 2017;27(2):106-112.

50.   McAdams-DeMarcoMA, LawA, SalterML, et al. Frailty as a novel predictor of mortality and hospitalization in individuals of all ages undergoing hemodialysis. *J Am Geriatr Soc*. 2013;61(6):896-901. doi:10.1111/jgs.12266

51.   McAdams-DeMarcoMA, LawA, SalterML, et al. Frailty and Early Hospital Readmission After Kidney Transplantation. *Am J Transplant*. 2013;13(8):2091-2095. doi:10.1111/ajt.12300

52.   McAdams-DeMarcoMA, KingEA, LuoX, et al. Frailty, Length of Stay, and Mortality in Kidney Transplant Recipients: A National Registry and Prospective Cohort Study. *Ann Surg*. 2017;266(6):1084-1090. doi:10.1097/SLA.0000000000002025

53.   ChuNM, DengA, YingH, et al. Dynamic Frailty Before Kidney Transplantation-Time of Measurement Matters. *Transplantation*. February2019. doi:10.1097/TP.0000000000002563

54.   McAdams-DeMarcoMA, LawA, KingE, et al. Frailty and mortality in kidney transplant recipients. *Am J Transplant*. 2015;15(1):149-154. doi:10.1111/ajt.12992

55.   AlfaadhelTA, SorokaSD, KiberdBA, LandryD, MoorhouseP, TennankoreKK. Frailty and mortality in dialysis: evaluation of a clinical frailty scale. *Clin J Am Soc Nephrol*. 2015;10(5):832-840. doi:10.2215/CJN.07760814

56.   AliH, AbdelazizT, AbdelaalF, BaharaniJ. Assessment of prevalence and clinical outcome of frailty in an elderly predialysis cohort using simple tools. *Saudi J Kidney Dis Transpl*. 2018;29(1):63-70. doi:10.4103/1319-2442.225175

57.   JohansenKL, DalrympleLS, GliddenD, et al. Association of Performance-Based and Self-Reported Function-Based Definitions of Frailty with Mortality among Patients Receiving Hemodialysis. *Clin J Am Soc Nephrol*. 2016;11(4):626-632. doi:10.2215/CJN.03710415

58.   Pérez FernándezM, Martínez MiguelP, YingH, et al. Comorbidity, Frailty, and Waitlist Mortality among Kidney Transplant

Candidates of All Ages. *Am J Nephrol*. 2019;49(2):103-110. doi:10.1159/000496061

59. FitzpatrickJ, SozioSM, JaarBG, et al. Frailty, body composition and the risk of mortality in incident hemodialysis patients: the Predictors of Arrhythmic and Cardiovascular Risk in End Stage Renal Disease study. *Nephrol Dial Transplant*. 2019;34(2):346-354. doi:10.1093/ndt/gfy124

60. RomeuM, CouchoudC, DelaroziereJ-C, et al. Survival of patients with ANCA-associated vasculitis on chronic dialysis: data from the French REIN registry from 2002 to 2011. *QJM*. 2014;107(7):545-555. doi:10.1093/qjmed/hcu043

61. DecourtA, GondouinB, DelaroziereJC, et al. Trends in Survival and Renal Recovery in Patients with Multiple Myeloma or Light-Chain Amyloidosis on Chronic Dialysis. *Clin J Am Soc Nephrol*. 2016;11(3):431-441. doi:10.2215/CJN.06290615

62. LeeSW, LeeA, YuMY, et al. Is Frailty a Modifiable Risk Factor of Future Adverse Outcomes in Elderly Patients with Incident End-Stage Renal Disease? *J Korean Med Sci*. 2017;32(11):1800-1806. doi:10.3346/jkms.2017.32.11.1800

63. SchopmeyerL, ElMoumniM, Nieuwenhuijs-MoekeGJ, BergerSP, BakkerSJL, PolRA. Frailty has a significant influence on postoperative complications after kidney transplantation-a prospective study on short-term outcomes. *Transpl Int*. 2019;32(1):66-74. doi:10.1111/tri.13330