

Supplementary Material

Prognostic models and factors identifying end-of-life in patients with non-cancer noncommunicable chronic diseases: systematic review

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Prognostic models and factors for patients with COPD

Table S1: Methodological characteristics of prognostic models for mortality prediction in patients with COPD.

Study	Country	Prognostic models	Data source	Study design	Number of participants included	Prevalence of outcome	Missing data described and handled	Modelling method	Model presentation
Bloom 2019	United Kingdom	BARC	Electronic Health Records	Retrospective cohort	54990	11775 (21.4%)	Yes	Multivariable Cox proportional hazards regression.	Risk prediction equation
Boeck 2016	Switzerland	B-AE-D, B-AE-D-C, ADO BODE, DOSE	Secondary data	Prospective cohort	460	54 (11.7%) at 2 years	No	Multivariable Cox proportional hazards regression.	Risk score
Law 2014	United Kingdom	ADO	Secondary data and medical records	Retrospective cohort	95	55 (58%) at 4 years	Yes	Kaplan–Meier Curves and log-rank tests.	Risk score
Marin 2013	Spain	ADO, BODE, e-BODE, BODEX, SAFE, DOSE	Secondary data	Prospective cohort	3633	243 (6.7%)	No	Multivariable Cox proportional hazards regression.	NR
Martinez 2008	USA	mBODE	Interview and Clinical examination	Randomised trial	1218	184 (15.1%) at 6 months, 279 (22.9%) at 12 months, and 399 (32.8%) at 24 months	Yes	Multivariable Cox proportional hazards regression.	NR
Owusuua 2022	Netherlands	ADO-SQ, ADO, BODEX, CODEX	Medical record and interview	Prospective cohort	358	63 (17%)	Yes	Univariate and multivariate logistic models were constructed to determine the effects of relevant variables, and ROC analysis was applied to test the final models.	Risk prediction equation, nomogram and web application
Tsai 2022	Taiwan	DO	Medical record, clinical examination and interviews	Prospective cohort	Development: 752, External validation: 342	Development: 60 (8%), External validation: 49 (14.3%)	No	Multivariable Cox proportional hazards regression models were constructed to determine the effects of relevant variables, and logistic regression and ROC analyses were applied to test the final models.	Risk prediction equation, and risk score
Zhang 2022	China	FFP, CFS, SPPB, FI-CD	Electronic Health Records and Interviews	Prospective cohort	302	28 (9.3%)	No	Poisson regression and Cox proportional hazard regression models were constructed to evaluate the effects of relevant variables. Additionally, a time-dependent receiver operator characteristic (ROC) analysis was applied to test the final models.	NR

ADO: Age, dyspnoea and airflow obstruction; ADO-SQ: age, dyspnoea level, airflow obstruction, and surprise question; B-AE-D: Body mass index, number of severe exacerbation in the previous year, dyspnoea; B-AE-D-C: Body mass index, number of severe exacerbation in the previous year, dyspnoea, copeptin; BARC: Body mass index, blood results, age, airflow obstruction, exacerbations, smoking and comorbidities; BODE: Body mass index, airflow obstruction, dyspnoea and exercise capacity; BODEX: BODEexercise capacity; CFS: Clinical frailty scale; CODEX: Comorbidity, airflow obstruction, dyspnoea, exacerbation DO: dyspnoea and hypoxemia; DOSE: dyspnoea, airflow obstruction, smoking, exacerbation; eBODE: exacerbations BODE; FFP: Fried frailty phenotype; FI-CD: Frail index of accumulative deficits; mBODE: modified BODE; NR: Not reported; SAFE: airflow obstruction, dyspnoea, quality of life and smoking; SPPB: Short physical performance battery

Table S2: Prognostic factors included in the final models for COPD and their corresponding predictive performance.

Study	Model name	Predictors	Predictive performance										
			Discrimination (AUC/C-statistics)						Calibration measure				
			Development		Internal validation		External validation		Development	Internal validation	External validation		
			1 year	Other	1 year	Other	1 year	Other					
Bloom 2019	BARC	Age, gender, BMI, creatinine, haemoglobin, platelets, airflow obstruction, Asthma, AF, stroke, No CKD, smoking, dementia, Low albumin, lung cancer, lung fibrosis, MRC dyspnoea score, hospitalisations	0.79 (0.78–0.81)					0.67 (0.65–0.70)			Slope= 0.95 (0.9–0.99)		Slope=0.54 (0.45–0.64)
Boeck 2016	B-AE-D	BMI, number of severe AECOPD the previous year, mMRC dyspnoea score	0.78 (0.68–0.87)	2year: 0.74 (0.67–0.81), 3year: 0.65 (0.57–0.72), 5year: 0.62 (0.57–0.67)	0.74 (0.63–0.86)	4-year:0.62 (0.54–0.69)					HosL Test 12 months (P=0.4), 2year (P=0.5), 3year (P=0.2), 5year (P=0.3)	HosL Test 12 months (P=0.7), 4-year (P=0.3)	
	B-AE-D-C	BMI, Number of severe AECOPD the previous year, mMRC dyspnoea score, and Copeptin	0.80 (0.71–0.90)	2year: 0.77 (0.70–0.85), 3year: 0.71 (0.64–0.79), 5year: 0.68 (0.62–0.74)	0.75 (0.62–0.88)	4-year:0.68 (0.61–0.76)					HosL Test 12 months (P=0.7), 2year (P=0.9), 3year (P=0.7), 5year (P=0.4)	HosL Test 12 months (P=0.2), 4-year (P=0.9)	
	ADO	Age, dyspnoea, and airflow obstruction					0.72 (0.62–0.82)	2-year: 0.72 (0.64–0.79), 3-year: 0.67 (0.59–0.75), 5-year:0.68 (0.61–0.74)					HosL Test 12 months (P=0.3), 2year (P=0.8), 3year (P=0.11), 5year (P=0.2)
	BODE	BMI, airflow obstruction, dyspnoea, and exercise capacity					0.76 (0.65–0.87)	2-year: 0.69 (0.61–0.78), 3-year: 0.59 (0.50–0.67), 5-year: 0.60 (0.54–0.67)					HosL Test 12 months (P=0.9), 2year (P=0.2), 3year (P=0.6), 5year (P=0.6)
	DOSE	Dyspnoea, airflow obstruction, smoking, and exacerbation					0.64 (0.54–0.73)	2-year: 0.63 (0.55–0.70), 3-year: 0.58 (0.50–0.65), 5-year: 0.58 (0.52–0.64)					HosL Test 12 months (P=0.9), 2year (P=0.8), 3year (P=0.7), 5year (P=0.2)

Law 2014	ADO	Age, dyspnoea and airflow obstruction					Log-rank, p=0.0027			
Marin 2013	ADO	Age, dyspnoea, and airflow obstruction					0.702	6-month (0.701), 5-year (0.695), 10-year (0.679)		
	BODE	BMI, airflow obstruction, dyspnoea, and exercise capacity					0.682	6-month (0.680), 5-year (0.673), 10-year (0.647)		
	e-BODE	BMI, airflow obstruction, dyspnoea, exercise capacity, and exacerbations					0.683	6-month (0.680), 5-year (0.681), 10-year (0.664)		
	BODEX	BMI, airflow obstruction, dyspnoea, and exacerbations					0.651	6-month (0.651), 5-year (0.652), 10-year (0.642)		
	SAFE	Airflow obstruction, dyspnoea, quality of life and smoking					0.642	6-month (0.641), 5-year (0.648), 10-year (0.671)		
	DOSE	Dyspnoea, airflow obstruction, smoking, and exacerbation					0.631	6-month (0.632), 5-year (0.628), 10-year (0.618)		
Martinez 2008	mBODE	Change in BMI, airflow obstruction, dyspnoea, and exercise capacity	0.68	6-month: 0.66, 24-month: 0.69						
Owusuaa 2022	ADO-SQ	Age, dyspnoea level, airflow obstruction, and surprise question.	0.79 (0.73–0.85)						Calibration plot: Moderate	
	ADO	Age, dyspnoea, and airflow obstruction					0.73 (0.67–0.80)			
	BODEX	BMI, airflow obstruction, dyspnoea, and exacerbations					0.71 (0.65–0.77)			
	CODEX	CCI, airflow obstruction, dyspnoea, and exacerbations					0.68 (0.61–0.75)			
Tsai 2022	DO	MRC=4 and hypoxemia (SpO2 < 90% in ambient air)	0.73				0.84			
Zhang 2022	FFP	Weakness, slowness, unintentional weight loss, exhaustion, and low physical activity	0.83 (0.76–0.89)							
	CFS	Preadmission functional performance, cognition, and comorbidities	0.82 (0.76–0.88)							
	SPPB	physical performance	0.82 (0.76–0.88)							
	FI-CD	Comorbidities, presence of recent weight loss, physical and functional performance	0.82 (0.77–0.88)							

ADO: age, dyspnoea and airflow obstruction; ADO-SQ: age, dyspnoea level, airflow obstruction, and surprise question; AECOPD: Acute exacerbation of COPD; B-AE-D: Body mass index (BMI), number of severe exacerbation in the previous year, dyspnoea; B-AE-D-C: Body mass index, number of severe exacerbation in the previous year, dyspnoea, copeptin; BARC: Body mass index, blood results, age, airflow obstruction,

exacerbations, smoking and comorbidities; BODE: Body mass index, airflow obstruction, dyspnoea and exercise capacity; BODEX: BODEexercise capacity; CFS: Clinical frailty scale; CODEX: Comorbidity, airflow obstruction, dyspnoea, exacerbation DO: dyspnoea and hypoxemia; DOSE: dyspnoea, airflow obstruction, smoking, exacerbation; eBODE: exacerbations BODE; FFP: Fried frailty phenotype; FI-CD: Frail index of accumulative deficits;MRC: Medical Research Council; mBODE: modified BODE; mMRC: modified Medical Research Council; SAFE: airflow obstruction, dyspnoea, quality of life and smoking; SPPB: Short physical performance battery

Prognostic models and factors for patients with dementia

Table S3: Methodological characteristics of prognostic models for mortality prediction in patients with dementia

Study	Country	Prognostic models	Data source	Study design	Number of participants included	Prevalence of outcome	Missing data described and handled	Modelling method	Model presentation
Hum 2021	Singapore	PalsDEM	Medical records, clinical examination, interviews	Prospective cohort	555	419 (75.5%)	Yes	Multivariable Cox proportional hazards regression models were constructed to determine the statistically significant effects of relevant variables, and multivariate logistic regression and ROC analyses were applied to test the final model.	Risk score
Lee 2018	Taiwan	Survival model from NHIRD	Secondary data	Retrospective cohort	37289	20,542 (55.1%)	No	Multivariable Cox proportional hazards regression.	Risk score
Mitchell 2010	USA	ADEPT	Secondary data	Retrospective cohort	222,405	90,324 (40.6%)	Yes	Multivariable Cox proportional hazards regression, and ROC analyses.	Risk score
Mitchell 2010	USA	ADEPT, Medicare hospice eligibility guideline	Secondary data and interviews	Prospective cohort	606	111 (18.3%)	Yes	Multivariable Cox proportional hazards regression, and ROC analyses.	Risk score
Van der Steen 2007	Netherlands and USA	MDS Risk Score	Secondary data, medical records and interviews	Retrospective cohort	Cohort 1: 288 Cohort 2: 269	Cohort 1: 70 (24.3%), Cohort 2 99 (36.8%)	Yes	Logistic regression and ROC analyses.	Risk score
Wang 2019	USA	Deep learning-based model	Secondary data	Retrospective cohort	26921	12,385 (46.0%)	No	Machine learning: Long short-term memory (LSTM) network.	NR

ADEPT: advanced dementia prognostic tool; MDS: Minimum Data Set; PalsDEM: palliative support dementia model; NR: Not reported; ROC: Receiver operating characteristics curve

Table S4: Prognostic factors included in the final models for dementia and their corresponding predictive performance.

Study	Model name	Predictors	Predictive performance										
			Discrimination (AUC/C-statistics)						Calibration measure				
			Development		Internal validation		External validation		Development	Internal validation	External validation		
			1 year	Other	1 year	Other	1 year	Other					
Hum 2021	PalsDEM	Age, dementia aetiology, Functional Assessment Staging Test stage, Charlson Comorbidity Index scores, Australian National Sub-Acute and Non-Acute Patient palliative care phase, and 30-day readmission frequency	0.66		0.65 (0.59-0.70)								
Lee 2018	Survival model from NHIRD	Age, sex, stroke, chronic renal failure, liver cirrhosis, cancer, pressure injury, nasogastric tube placement, supplemental oxygen supply, ≥2 hospitalization, receiving ≥1 emergency services, ≥2 occurrences of CPR, and receiving ≥2 endotracheal intubations	NR	NR	0.733	6-month: 0.72							
Mitchell 2010	ADEPT	Age, male gender, dyspnoea, pressure ulcer, functional dependence, length of stay, bedfast most of day, insufficient oral intake, bowel incontinence, BMI<18.5, weight loss, and having CHF	0.70	6-month: 0.73	0.68					Calibration plot: perfect calibration	Calibration plot: perfect calibration		
Mitchell 2010	ADEPT	Age, male gender, dyspnoea, pressure ulcer, functional dependence, length of stay, bedfast most of day, insufficient oral intake, bowel incontinence, BMI<18.5, weight loss, and having CHF						6-month: 0.67 (0.62-0.72)					HosL Test 6 months (P=0.69)
	Medicare hospice eligibility guideline	FAST stage, medical conditions in prior 12 months (aspiration pneumonia, pyelonephritis or another upper urinary tract infection, septicaemia, pressure ulcers recurrent fevers after antibiotic treatment, insufficient oral intake or tube feeding with impaired nutritional status)						6-month:0.55 (0.51-0.59)					
Van der Steen 2007	MDS Risk Score	Age, ADL score, gender, cancer, CHF, oxygen therapy in prior 14 days, SOB, <25% food eaten at most meals, unstable medical conditions, bowel incontinence, bedfast, and not awake most of the day.						6-month: Cohort 1: 0.65 (0.58-0.72) Cohort 2: 0.64(0.58-0.71)					Calibration table
Wang 2019	Deep learning-based model	Top ranked features: palliative and end-of-life care, cognitive function, delirium, testing of cholesterol levels, cancer, pain, use of health care services, arthritis, nutritional status, skin care, family meeting, shock, respiratory failure, and swallowing function.	NR	NR	0.956 (0.955-0.956)	6-month: 0.978(0.977-0.978) 2-year: 0.943 (0.942-0.944)							

ADEPT: advanced dementia prognostic tool; CHF: congestive heart failure; MDS: Minimum Data Set; PalsDEM: palliative support dementia model; NR: Not reported; SOB: shortness of breath

Prognostic models and factors for patients with heart failure

Table S5: Methodological characteristics of prognostic models for mortality prediction in patients with heart failure

Study	Country	Prognostic models	Data source	Study design	Number of participants included	Prevalence of outcome	Missing data described and handled	Modelling method	Model presentation
Avula 2020	USA	PRISM categorical score, Modified SHFM score, SHFM + PRISM (categorical) score	Secondary data	Retrospective cohort	689	195 (28.4%)	Yes	Machine learning.	Decision tree
Candeloro 2020	Italy	PNI	Medical record, interviews and observation	Prospective cohort	344	75 (21.8%)	No	Multivariable Cox proportional hazards regression.	NR
Huynh 2008	USA	Risk score for hospice care	Secondary data	Randomised trial	282	43 (15.2%)	No	Multivariate logistic regression was conducted to determine the effects of relevant variables, and multivariable Cox proportional hazards regression analyses were applied to test the final models.	Risk score
Martini 2017	Spain	Mortality risk score for very old	Medical records	Retrospective cohort	629	86 (13.7%)	No	Univariate and multivariate logistic models were constructed to determine the effects of relevant variables, and ROC analysis was applied to test the final models.	Risk score
Masterson 2019	USA	Performance Scale Version 2	Electronic Health Records	Retrospective cohort	1114	805 (72%)	Yes	Multivariable Cox proportional hazards regression and ROC analyses.	NR
Snow 2016	USA	Prognostic model from CMS	Secondary data	Retrospective cohort	7508	1825 (24.3%)	No	Logistic regression and ROC analyses.	NR

CMS: Centres for Medicare and Medicaid Services; PRISM: Placement Resource Indicator for Systems Management; PNI: Prognostic nutritional index; SHFM: Seattle Heart Failure Model; ROC: Receiver operating characteristics curve

Table S6: Prognostic factors included in the final models for heart failure and their corresponding predictive performance.

Study	Model name	Predictors	Predictive performance									
			Discrimination (AUC/C-statistics)						Calibration measure			
			Development		Internal validation		External validation		Development	Internal validation	External validation	
			1 year	Other	1 year	Other	1 year	Other				
Avula 2020	PRISM categorical score	Age, gender, cognitive defects or other neurological deficits, AF, cancer, presence of respiratory failure, CHF, sepsis or injury during the current admission, medical versus surgical admission, BUN, WBC, platelet, lactate, haemoglobin, albumin, arterial pH, arterial PaO ₂ , troponin, history of hospitalization within the past year, and discharge to an extended care facility within past year.						0.701				
	Modified SHFM score	Age, gender, LVEF, NYHA class, SBP, diuretic dose, lymphocyte count, haemoglobin, serum sodium, total cholesterol, uric acid, ischemic cardiomyopathy, QRS > 0.15 sec, use of beta-blocker, ACEIs, ARBs, potassium-sparing diuretic, statins and allopurinol, and ICD, or CRT status	0.686									
	SHFM + PRISM (categorical) score	Predictors in the PRISM categorical score, and modified SHFM score	0.740		0.631							
Candeloro 2020	PNI*	Serum albumin and lymphocyte count										
Huynh 2008	Risk score for hospice care	Serum urea nitrogen ≥30 mg/dL, SBP < 120mmHg, peripheral arterial disease and serum sodium <135 mEq/L		6-month 0.80								
Marttini 2017	Mortality risk score for very old	NYHA class III–IV, severe functional dependence, infection as the cause of exacerbation of CHF, medication ≥8, serum albumin <3 mg/dL, GFR <60mL/min, serum potassium >5.5 mEq/L and RDW >17%.		Within 1-2 weeks: 0.78 (0.72–0.84)		Within 1-2: 0.77 (0.70–0.83)				HosL Test (P=0.185)		
Masterson 2019	Performance Scale Version 2	Ambulation, activity and evidence of disease, independence in self-care, oral intake, and level of consciousness.						7 days: 0.802, 14 days: 0.774, 30 days: 0.736, 90 days: 0.705 180days: 0.689				
Snow 2016	Prognostic model from CMS	Age, gender, cancer, brain damage, liver disease, presence of chronic skin ulcers, and hospitalization from a nursing home		6-month: 0.71						HosL Test (P=0.98)		

ACEIs: Angiotensin-converting enzyme inhibitors; AF: Atrial fibrillation; ARBs: Angiotensin receptor blockers; AUC: Area under the curve; BUN: Blood Urea Nitrogen; CRT: Cardiac Resynchronization Therapy; CMS: Centres for Medicare and Medicaid Services; CHF: Congestive heart failure; GFR: Glomerular filtration rate; Hos L: Hosmer-Lemeshow Test; ICD: Implantable Cardioverter Defibrillator; LVEF: Left

Ventricular Ejection Fraction; NYHA: New York Heart Association; PaO₂: Partial Pressure of Oxygen; PRISM: Placement Resource Indicator for Systems Management; PNI: Prognostic nutritional index; RDW: Red Cell Distribution Width; SHFM: Seattle Heart Failure Model; SBP: Systolic blood pressure; WBC: White blood cells. * The model performance not reported.

Prognostic models and factors for patients with mixed chronic diseases

Table S7: Methodological characteristics of prognostic models for mortality prediction in patients with mixed chronic diseases.

Study	Country	Prognostic models	Data source	Study design	Diseases included	Number of participants included	Prevalence of outcome	Missing data described and handled	Modelling method	Model presentation
Bernabeu-Wittel 2014	Spain	PALIAR score	Interview and clinical examination	Prospective cohort	Heart failure, respiratory failure, chronic renal failure, chronic liver disease, and/or chronic neurological diseases	Derivation cohort: 884 Validation cohort: 894	Derivation cohort: 332 (37.6%) Validation cohort: 337(37.7%)	No	Univariate and multivariate logistic models were constructed to determine the statistically significant effects of relevant variables, and ROC analysis was applied to test the final models.	Risk score
Bretos-Azcona 2022	Spain	Multisystem chronic illness model	Secondary data	Retrospective cohort	Heart failure, dementia, ischaemic heart disease, cerebrovascular disease, diabetes, COPD, asthma, chronic renal failure and cirrhosis	591	201(34%)	Yes	Univariate and multivariate logistic models were constructed to determine the statistically significant effects of relevant variables, and ROC analysis was applied to test the final models.	Nomogram
Harrold 2005	USA	PPS	Medical records	Prospective cohort	Cardiac disease, dementia, debility (failure to thrive), pulmonary disease, stroke, renal failure or disease, other neurological diseases (excludes dementia)	466	422(90.6%)	No	Kaplan–Meier survival curve, Cox proportional hazards regression and ROC analyses.	NR
Promptakorn 2021	Thailand	PPS	Electronic Health Records	Retrospective cohort	Neurological disorders (stroke and other neurological disorders), heart disease, and renal failure and other diagnoses [#]	100	NR	No	Kaplan–Meier survival curve, Log-rank test, Cox proportional hazards regression analyses.	NR
Samsudin 2022	Malaysia	PPI	Questionnaire	Prospective cohort	Heart failure, respiratory disease, renal failure, chronic liver disease, and neurological disease (stroke).	108	NR	Yes	Multivariable Cox proportional hazards regression and ROC analyses.	NR
Turrillas 2021	Spain	NECPAL prognostic mode	Secondary data	Retrospective cohort	Advanced frailty, organ diseases*, dementia, and cancer	Derivation: 631 Validation: 158	Derivation: 274 (43.4%) Validation: NR	Yes	Multivariable Cox proportional hazards regression and ROC analyses.	NR

* Chronic lung disease, chronic heart disease, chronic liver disease, chronic renal disease, stroke, chronic neurological diseases (motor neuron, multiple Sclerosis, amyotrophic lateral sclerosis, and Parkinson)

[#] Pneumonia, COPD (chronic obstructive pulmonary disease), HIV/AIDS (Human Immunodeficiency Virus/ Acquired immunodeficiency syndrome), and intertrochanteric fracture.

Table S8: Prognostic factors included in the final models for mixed chronic diseases and their corresponding predictive performance.

Study	Model name	Predictors	Predictive performance									
			Discrimination (AUC/C-statistics)						Calibration measure			
			Development		Internal validation		External validation		Development	Internal validation	External validation	
			1 year	Other	1 year	Other	1 year	Other				
Bernabeu-Wittel 2014	PALIAR score	Age ≥85years, Functional class IV on NYHA and/or MRC, anorexia, presence of skin pressure ulcer, ECOG performance status ≥, and albumin <2.5 g/dL		6-month: 0.71(0.69-0.75)					6-month: 0.7 (0.67 - 0.72)	Hos L Test: (P=0.387)		Hos L Test: (P=0.39)
Bretos-Azcona 2022	Multisystem chronic illness model	Functional status (Barthel scale), serum creatinine, existence of pressure ulcers and patient global status	0.751		0.744 (0.701-0.788) and 0.751 (0.711-0.791)					Hos L Test: (P=0.761) and Calibration plot		
Harrold 2005	PPS	Ambulation, activity and evidence of disease, independence in self-care, oral intake, and level of consciousness.							1 day: 0.8 3 days: 0.85 7 days: 0.8 30 days: 0.74 90 days: 0.68			
Promptakom 2021	PPS	Ambulation, activity and evidence of disease, independence in self-care, oral intake, and level of consciousness.										
Samsud in 2022	PPI	PPS score, oral intake, presence of oedema, dyspnoea at rest and delirium							6 months 0.945(0.904-0.985)			
Turrillas 2021	NECPAL prognostic mode	Age, nutritional decline, disease-specific indicator (severity and progression), use of resources (admissions and interventions), comorbidity, functional decline, palliative care need identified by HCPs	0.741 (0.699-0.782)	3-month: 0.822(0.769-0.875) 6-month: 0.786(0.742-0.83) 24-month: 0.722(0.684-0.759)	0.693(0.598-0.787)	3-month: 0.805(0.69-0.919) 6-month: 0.764(0.657-0.872) 24-month: 0.672(0.589-0.755)				Brier score 3 months: 0.031 6 months: 0.072 12 months: 0.05 24 months: 0.139 E/O at: 3-month:0.755(0.591-0.966) 6-Month:0.947(0.806-1.112) 12-month:0.567(0.502-0.641) 24-month:0.735(0.673-0.802)	Brier score 3 months: 0.016 6 months: 0.044 12 months: 0.04 24 months: 0.132 E/O ratio: 3-month:0.539(0.311-0.936) 6-month:0.935(0.646-1.354) 12-month:0.549(0.427-0.706) 24-month:0.703(0.591-0.836)	

NECPAL: NECesidades PALiativas; PPI: Palliative prognostic index; PPS: Palliative Performance Scale

ECOG: Eastern Cooperative Oncology Group; HosL: Hosmer-Lemeshow Test; NECPAL: NECesidades PALiativas; NR: Not reported; NYHA: New York Heart Association; HCPs: Healthcare professionals; PPI: Palliative prognostic index; PPS: Palliative Performance Scale; E/O: Expected to observed

Risk of bias assessment

Table S9: Risk of bias (ROB) assessment result for prognostic model studies

Study	Risk of bias						Overall ROB
	Study Participation	Study Attrition	Prognostic Factor Measurement	Outcome Measurement	Study Confounding	Statistical Analysis and Reporting	
Bretos-Azcona 2022	+	+	+	+	+	+	+
Samsudin 2022	?	+	+	?	?	-	-
Tsai 2022	+	+	+	+	+	?	?
Zhang 2022	+	?	+	+	?	-	-
Owusuuaa 2022	+	+	+	+	+	+	+
Hum 2021	+	?	+	+	+	-	-
Promptantakorn 2021	?	?	+	?	?	-	-
Turrillas 2021	+	+	?	?	+	+	?
Avula 2020	+	+	?	+	?	?	?
Candeloro 2020	+	+	?	+	+	?	?
Bloom 2019	+	+	?	+	+	+	?
Masterson 2019	+	+	?	+	+	?	?
Wang 2019	+	-	?	+	+	-	-
Lee 2018	+	+	?	+	+	?	?
Martini 2017	+	?	?	+	+	-	-
Boeck 2016	+	+	+	+	+	-	-
Snow 2016	+	?	?	+	+	-	-
Bernabeu-Wittel 2014	+	?	+	+	+	-	-
Law 2014	+	+	?	+	?	-	-
Marin 2013	?	?	?	+	+	-	-
Mitchell 2010	+	+	?	+	+	+	?
Mitchell 2010	+	+	+	+	+	+	+
Huynh 2008	+	?	?	+	+	-	-
Martinez 2008	+	+	+	+	+	-	-
Van der Steen 2007	+	+	?	+	+	+	?
Harrold 2005	?	?	+	+	?	-	-

ROB: Risk of Bias; + indicates low ROB; - indicates high ROB; and? indicates unclear ROB

Table S10: Risk of bias (ROB) assessment result for prognostic factor studies

Study	Risk of bias						Overall ROB
	Study Participation	Study Attrition	Prognostic Factor Measurement	Outcome Measurement	Study Confounding	Statistical Analysis and Reporting	
Just 2021	?	+	+	+	+	+	
Tasar 2020	?	+	?	+	?	+	
Pasina 2018	+	+	+	+	?	+	
Neo 2017	+	?	+	+	?	+	
Yohannes 2016	+	+	+	+	+	+	

Benzo 2013	+	-	+	+	+	+	
Polkey 2013	+	+	+	+	?	?	
Austin 2012	+	?	?	+	?	?	
Mannino 2011	?	?	?	+	?	?	
Zvi 2007	+	+	+	+	+	+	
Aminoff 2006	?	+	+	+	?	+	
Man 2006	?	+	+	+	+	+	
Schonwetter 2003	?	?	+	+	?	+	
Meyer 2002	+	+	?	+	+	+	
Luchins 1997	+	+	+	+	?	?	

ROB: Risk of Bias; + indicates low ROB; - indicates high ROB; and? indicates unclear ROB

Search strategy

Table S11: Search strategy

An extremely similar search strategy was followed on Medline (Ovid), Embase (Ovid) and PsycINFO (Ovid) databases.	
Search	
ID	Search Terms
1	Non?cancer.mp.
2.	Non?malignant\$.mp.
3.	cardiomegaly/ or cardiomyopathies/ or heart failure/ or dyspnea, paroxysmal/ or edema, cardiac/ or heart failure, diastolic/ or heart failure, systolic/ or ventricular dysfunction/
4.	Heart failure.mp.
5.	Congestive heart failure.mp.
6.	3 or 4 or 5
7.	lung diseases, obstructive/ or pulmonary disease, chronic obstructive/
8.	Chronic obstructive pulmonary disease\$.mp.
9.	7 or 8
10.	diabetes mellitus, type 2/
11.	Diabet\$.mp.
12.	Diabetes mellitus.mp.
13.	Diabetes Complications/
14.	10 or 11 or 12 or 13
15.	liver diseases/ or hepatic insufficiency/ or liver cirrhosis/ or liver diseases, alcoholic/
16.	Chronic liver disease\$.mp.
17.	15 or 16
18.	End stage renal disease\$.mp.
19.	renal insufficiency/ or renal insufficiency, chronic/ or kidney failure, chronic/
20.	End stage kidney disease\$.mp.
21.	18 or 19 or 20
22.	dementia/ or alzheimer disease/ or dementia, vascular/

23. Dementia.mp.
24. 22 or 23
25. 1 or 2 or 6 or 9 or 14 or 17 or 21 or 24
26. "activities of daily living"/ or functional status/
27. Performance status.mp.
28. Functional status.mp.
29. Physical dependence\$.mp.
30. body weight changes/ or body-weight trajectory/ or weight loss/
31. weight loss\$.mp.
32. Weight reduction\$.mp.
33. comorbidity/ or multimorbidity/
34. Comorbidity\$.mp.
35. hospitalization/ or "length of stay"/ or patient readmission/
36. Hospitalization\$.mp.
37. Length of hospital stay\$.mp.
38. Hospital admission\$.mp.
39. eating/ or elder nutritional physiological phenomena/ or feeding behavior/ or nutritional status/
40. Nutrition status.mp.
41. body mass index/
42. symptom assessment/ or visual analog scale/
43. vital signs/ or blood pressure/ or body temperature/ or heart rate/ or respiratory rate/
44. "signs and symptoms"/ or body temperature changes/ or chills/ or cyanosis/ or edema/ or eye manifestations/ or fatigue/ or hot flashes/ or mobility limitation/ or neurologic manifestations/ or oral manifestations/ or "signs and symptoms, digestive"/ or "signs and symptoms, respiratory"/ or skin manifestations/ or urological manifestations/
45. pain/
46. Pain.mp.
47. cognitive dysfunction/ or delirium/
48. laboratories, clinical/ or laboratories, hospital/
49. serum albumin, human/
50. C-Reactive Protein/
51. clinical chemistry tests/ or blood gas analysis/ or blood urea nitrogen/ or clinical enzyme tests/ or urinalysis/ or hematologic tests/
52. natriuretic peptide, brain/
53. "Quality of Life"/
54. Health related quality of life.mp.
55. 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53 or 54
56. prognosis/ or treatment outcome/
57. Prognosis.mp.

58. Prognostication\$.mp.
 59. survival analysis/
 60. Survival/
 61. Survival prediction\$.mp.
 62. mortality/ or "cause of death"/ or fatal outcome/ or hospital mortality/ or maternal mortality/ or mortality, premature/ or survival rate/
 63. Mortality.mp.
 64. death/
 65. Death\$.mp.
 66. Prognosis model\$.mp.
 67. Prognosis tool\$.mp.
 68. Risk Assessment/ or Prognosis risk stratification\$.mp.
 69. 56 or 57 or 58 or 59 or 60 or 61 or 62 or 63 or 64 or 65 or 66 or 67 or 68
 70. life support care/ or nursing care/ or palliative care/ or terminal care/
 71. Palliative care\$.mp.
 72. Terminal care\$.mp.
 73. hospice care/
 74. Hospice care\$.mp.
 75. "Hospice and Palliative Care Nursing"/
 76. Special\$ palliative care\$.mp.
 77. End of life care\$.mp.
 78. Terminal phase of life.mp.
 79. Last life.mp.
 80. 70 or 71 or 72 or 73 or 74 or 75 or 76 or 77 or 78 or 79
 81. 25 and 55 and 69 and 80
 82. limit 81 to (english language and humans)

CINAHL Complete (EBSCO)

Search ID# Search Terms

- S1 ""Non-cancer""
 S2 ""non-malignant""
 S3 (MH "Heart Failure")
 S4 (MH "Ventricular Dysfunction, Right") OR (MH "Ventricular Dysfunction, Left")
 S5 ""Congestive heart failure""
 S6 (MH "Pulmonary Disease, Chronic Obstructive") OR (MH "Lung Diseases, Obstructive")
 S7 "Chronic obstructive pulmonary disease"
 S8 (MH "Diabetes Mellitus, Type 2") OR (MH "Diabetes Mellitus")
 S9 "Diabetes mellitus"
 S10 "Diabetes"

S11	(MH "Liver Cirrhosis") OR (MH "Liver Cirrhosis, Alcoholic") OR (MH "Liver Failure") OR (MH "Liver Diseases, Alcoholic") OR (MH "Liver Diseases")
S12	"chronic liver disease"
S13	"End stage renal disease"
S14	(MH "Renal Insufficiency, Chronic") OR (MH "Renal Insufficiency") OR (MH "Kidney Failure, Chronic")
S15	"End stage kidney disease"
S16	(MH "Dementia") OR (MH "Delirium, Dementia, Amnestic, Cognitive Disorders") OR (MH "Dementia Patients")
S17	"dementia"
S18	(MH "Terminally Ill Patients")
S19	(MH "Aged") OR (MH "Aged, 80 and Over")
S20	(MH "Activities of Daily Living") OR (MH "Functional Status") OR (MH "Activities of Daily Living (Saba CCC)")
S21	"Performance status"
S22	"Functional status"
S23	"Physical dependenc*"
S24	(MH "Body Weight Changes") OR (MH "Weight Loss")
S25	"weight loss"
S26	"weight reduction*"
S27	(MH "Comorbidity")
S28	"comorbidit*"
S29	"Multimorbidity"
S30	(MH "Length of Stay") OR (MH "Readmission") OR (MH "Hospitalization") OR (MH "Patient Admission")
S31	"Length of hospital stay*"
S32	"Hospitali?ation*"
S33	(MH "Geriatric Nutrition") OR (MH "Nutritional Status")
S34	(MH "Eating Behavior") OR (MH "Food Habits")
S35	"Nutrition status"
S36	(MH "Body Mass Index")
S37	(MH "Visual Analog Scaling") OR (MH "Symptom Distress Scale") OR (MH "Clinical Assessment Tools")
S38	(MH "Vital Signs") OR (MH "Blood Pressure Determination") OR (MH "Body Temperature Determination") OR (MH "Pulse") OR (MH "Respiratory Rate") OR (MH "Severity of Illness")
S39	(MH "Signs and Symptoms") OR (MH "Body Temperature Changes") OR (MH "Edema") OR (MH "Eye Manifestations") OR (MH "Fatigue") OR (MH "Neurologic Manifestations") OR (MH "Signs and Symptoms, Respiratory") OR (MH "Signs and Symptoms, Digestive")
S40	(MH "Pain")
S41	"cognitive dysfunction"
S42	(MH "Clinical Laboratories, Hospital") OR (MH "Clinical Laboratories")
S43	(MH "Serum Albumin")
S44	(MH "C-Reactive Protein")

S45 (MH "Hematologic Tests") OR (MH "Chemistry, Clinical") OR (MH "Diagnosis, Laboratory") OR (MH "Immunologic Tests") OR (MH "Urinalysis") OR (MH "Blood Cell Count") OR (MH "Platelet Function Tests") OR (MH "Hematocrit")

S46 (MH "Blood Urea Nitrogen")

S47 (MH "Natriuretic Peptide, Brain")

S48 (MH "Quality of Life") OR (MH "Health and Life Quality (Iowa NOC)")

S49 "Health related quality of life"

S50 (MH "Prognosis")

S51 "Prognosis"

S52 "Prognostication*"

S53 (MH "Survival Analysis")

S54 (MH "Survival")

S55 (MH "Predictive Validity") OR (MH "Predictive Value of Tests") OR (MH "Prediction Models") OR ""Survival prediction*""

S56 (MH "Hospital Mortality") OR (MH "Mortality")

S57 ""survival rate""

S58 "Mortality prediction*"

S59 (MH "Death")

S60 "Prognosis model"

S61 "Prognosis tool"

S62 "Prognosis risk stratification*"

S63 (MH "Hospice and Palliative Nursing") OR (MH "Life Support Care") OR (MH "Terminal Care (Saba CCC)")

S64 (MH "Palliative Care")

S65 "palliative care"

S66 "Terminal care"

S67 (MH "Hospice Care")

S68 "Hospice care"

S69 "End of life care"

S70 "Terminal phase of life"

S71 "Last life"

S72 S63 OR S64 OR S65 OR S66 OR S67 OR S68 OR S69 OR S70 OR S71

S73 S50 OR S51 OR S52 OR S53 OR S54 OR S55 OR S56 OR S57 OR S58 OR S59 OR S60 OR S61 OR S62

S74 S19 OR S20 OR S21 OR S22 OR S23 OR S24 OR S25 OR S26 OR S27 OR S28 OR S29 OR S30 OR S31 OR S32 OR S33 OR S34 OR S35 OR S36 OR S37 OR S38 OR S39 OR S40 OR S41 OR S42 OR S43 OR S44 OR S45 OR S46 OR S47 OR S48 OR S49

S75 S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10 OR S11 OR S12 OR S13 OR S14 OR S15 OR S16 OR S17 OR S18

S76 S72 AND S73 AND S74 AND S75

Cochrane Library

Search ID#	Search Terms:
#1	(Non-cancer):ti,ab,kw
#2	(Non-malignant):ti,ab,kw
#3	MeSH descriptor: [Heart Failure]
#4	MeSH descriptor: [Heart Failure, Diastolic]
#5	MeSH descriptor: [Heart Failure, Systolic]
#6	(congestive heart failure):ti,ab,kw
#7	MeSH descriptor: [Pulmonary Disease, Chronic Obstructive]
#8	MeSH descriptor: [Lung Diseases, Obstructive]
#9	("chronic obstructive airway disease"):ti,ab,kw
#10	MeSH descriptor: [Diabetes Mellitus, Type 2]
#11	MeSH descriptor: [Diabetes Mellitus]
#12	("chronic liver disease"):ti,ab,kw
#13	("End stage liver disease"):ti,ab,kw
#14	("End stage renal disease"):ti,ab,kw
#15	MeSH descriptor: [Renal Insufficiency]
#16	MeSH descriptor: [Renal Insufficiency, Chronic]
#17	("End stage kidney disease"):ti,ab,kw
#18	MeSH descriptor: [Dementia]
#19	#1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15 OR #16 OR #17 OR #18
#20	(Age):ti,ab,kw
#21	MeSH descriptor: [Activities of Daily Living]
#22	MeSH descriptor: [Functional Status]
#23	("performance status"):ti,ab,kw
#24	MeSH descriptor: [Weight Loss]
#25	MeSH descriptor: [Body-Weight Trajectory]
#26	MeSH descriptor: [Body Weight Changes]
#27	MeSH descriptor: [Comorbidity]
#28	MeSH descriptor: [Multimorbidity]
#29	("Hospitalization"):ti,ab,kw
#30	("Length of hospital stay"):ti,ab,kw
#31	("Nutritional status"):ti,ab,kw
#32	MeSH descriptor: [Eating]
#33	MeSH descriptor: [Signs and Symptoms]
#34	MeSH descriptor: [Mobility Limitation]
#35	MeSH descriptor: [Pain]
#36	MeSH descriptor: [Vital Signs]
#37	MeSH descriptor: [Laboratories]
#38	MeSH descriptor: [C-Reactive Protein]

- #39 MeSH descriptor: [Quality of Life]
- #40 #20 OR #21 OR #22 OR #23 OR #24 OR #25 OR #26 OR #27 OR #28 OR #29 OR #30 OR #31 OR #32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38 #39
- #41 MeSH descriptor: [Prognosis]
- #42 ("Prognostication"):ti,ab,kw
- #43 MeSH descriptor: [Survival Analysis]
- #44 MeSH descriptor: [Survival]
- #45 ("survival prediction"):ti,ab,kw
- #46 ("Mortality prediction"):ti,ab,kw
- #47 MeSH descriptor: [Mortality]
- #48 MeSH descriptor: [Death]
- #49 #41 OR #42 OR #43 OR #44 OR #45 OR #46 OR #47 OR #48
- #50 MeSH descriptor: [Life Support Care]
- #51 MeSH descriptor: [Nursing Care]
- #52 MeSH descriptor: [Palliative Care]
- #53 MeSH descriptor: [Hospice Care]
- #54 ("End of life care"):ti,ab,kw
- #55 ("Terminal phase of life"):ti,ab,kw
- #56 ("Specialist palliative care"):ti,ab,kw
- #57 #50 OR #51 OR #52 OR #53 OR #54 OR #55 OR #56
- #58 #19 AND #40 AND #49 AND #57