Supplementary Material

Comparing the clinical frailty scale and an International Coding of Disease-10 modified frailty index in predicting long-term survival in critically ill patients

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Supplementary Table 1: A complete list of ICD-10 variables extracted from the VAED database.

Data Field Description	Definition
Month and Year of Admission	Month and Year on which a patient commences an episode of care.
Care type	The nature of clinical service (type of care) provided to an admitted patient during an episode of care. There must be one and only one care type code per episode. A change in care type results in a statistical separation and a new episode with a statis
	1 NHT/Non-Acute
	P Designated Pediatric Rehabilitation Program/Unit
	2 Designated Rehabilitation Program/Unit: Level 1
	6 Designated Rehabilitation Program/Unit: Level 2
	8 Palliative Care Program
	5 Mental Health
	9 Geriatric Evaluation and Management Program
	R1 Restorative Care: On-site
	R2 Restorative Care: Off-site
	0 Alcohol and Drug Program
	4 Other care (Acute) including Qualified newborn
	U Unqualified newborn
	N Qualified Newborn
	U Unqualified Newborn
	X Not Applicable
Admission type	The type of admission relating to this episode of care:
	K Posthumous Organ Procurement
	S Statistical admission (change in Care Type within this hospital)
	Y Birth episode
	M Maternity
	C Emergency admission through Emergency Department at this hospital (VEMD reporting hospitals only)
	L Admission – from the Waiting List (ESIS reporting hospitals only)
	O Other emergency admissions
	X Other admissions
Admission type indicator	Admission type indicator derived from Admission Type
	E Emergency
	L Elective
	M Maternity
	N Newborn (<= 9 days old)
	S Statistical
Criterion for Admission	This field indicates the criterion for admission for the episode of care.
	K Posthumous Organ Procurement
	N Qualified newborn
	U Unqualified newborn
	R Restorative Care: Off-site
	O Patient is expected to require hospitalization for a minimum of one night
	B Day-only Automatically Admitted Procedures
	E Day-only Extended Medical Treatment

	C Day-only Not Automatically Qualified Procedures
	S Secondary family member
Admission/readmission to rehabilitation	For Care Types P, 2 and 6, this field indicates whether this is the first or subsequent rehabilitation episode for a particular injury/condition.
	0 First rehabilitation admission
	1 Readmission for rehabilitation
RUG ADL on admission	RUG ADL (Resource Utilization Groups Activities of Daily Living) score as assessed on admission. Cumulative score out of 18.
Source of referral to palliative care	Source of referral to the DH Palliative Care Program (Care Type 8).
	01 Community sector – GP
	02 Community sector – Specialist
	03 Community sector - Self, Carer, Other (family member, neighbor)
	04 Community sector- Community-based agency
	05 Hospital - Public - Admitted patient
	06 Hospital - Private - Admitted patient
	07 Hospital - Outpatient - Non-admitted
	08 Residential care - Nursing home/hostel
	09 Other

Data Field Description	Definition
5-year age groups	Five-year age groups
	00-04 05-09 10-14 15-19 20-24
	25-29 30-34 35-39 40-44 45-49
	50-54 55-59 60-64 65-69 70-74
	75-79 80-84 85+
Sex of patient	The sex of the patient:
	1 Male
	2 Female
	3 Indeterminate (only for infants < 90 days old)
	4 Intersex
Statistical local area (5 digits)	The patient's Statistical Local Area of residence. Based on Australian Standard Geographical Classification (ASGC) 2011 boundaries and derived from the locality and postcode.
Local government area	The patient's Local Government Area of residence. Based on Australian Standard Geographical Classification (ASGC) 2004 boundaries for Victoria, and 1999 boundaries for the rest of Australia.
Region of residence	The code for the Department of Health/Human Services Region in which the patient resides; is derived from the field 'SLA'.
	1 Barwon South Western
	2 Grampians
	3 Loddon Mallee
	4 Hume
	5 Gippsland
	8 Eastern
	9 Southern
	A North-Western
	I Interstate
	M Missing
State of residence	State of patient residence derived from SLA:
	0 Unknown/Itinerate/Overseas
	1 New South Wales

	2 Victoria
	3 Queensland
	4 South Australia
	5 Western Australia
	6 Tasmania
	7 Northern Territory
	8 Australian Capital Territory
	9 Other Territories
Carer availability	A record of whether a person, such as a family member, friend or neighbor has been identified as providing regular ongoing care or assistance, which is not linked to a formal service.
	1 Carer not needed/ not applicable
	2 Lives alone, has a carer
	3 Lives alone, has no carer
	4 Lives with another, has no carer
	5 Lives with another, has a resident carer
	6 Lives with another, has a non-resident carer
	7 Lives in a mutually dependent situation
	8 Missing or not recorded
Hospital Region	Metropolitan/Rural flag of hospitals.

Data Field Description	Definition
Month and Year of separation	Month and Year of separation, eg. Jul, Aug
Length of stay	The length of stay is calculated during the PRS/2 processing, summing the total patient days in each of the status segments minus leave with and without permission days.
Hospital in the home length of stay	Hospital in the Home Length of Stay.
Hospital in the Home separation	Flag to indicate that the episode includes a "Hospital In The Home" component.
Patient type	Patient type derived from Separation Account:
	H Public
	P Private
	S Compensable
	V DVA
	X Ineligible
Duration of unit stay	Identifies the duration of stay within a specific campus unit.
	E Entire admission was at the specified campus unit
	P Part of the admission was at the specified campus unit.
Barthel index on separation	The Barthel Index on separation is assessed on the day on which the decision is taken to cease rehabilitation (for Care Types F, E, 2, 6, 7, 9 or K).
RUG ADL on separation	RUGADL (Resource Utilization Groups Activities of Daily Living) score as assessed on separation (for Care Type 8). Cumulative score out of 18.

Data Field Description	Definition
Victorian Adjusted AR-DRGv6	Victorian Adjusted Australian Revised Diagnosis Related Group v6 is the same as AR-DRG v6 except where adjustments are made utilising the VIC-DRG6 field, for case-mix payments.
Victorian adjusted AR-MDCv6	The Australian Revised Major Diagnostic Category (AR-MDC) Version 6.0 is derived through the same grouping process as the AR-DRG v6.
Clinical specialty	Clinical specialty mapped from VIC. DRG v6.0x (665 DRGs mapped into 27 Clinical Specialties):
	01 Neurosurgery

	03 Vascular
	04 Orthopedics
	05 Neurology
	06 Ophthalmology
	07 ENT
	08 Cardiothoracic
	09 Cardiology
	10 Rehabilitation
	11 Dental
	12 Rheumatology
	13 Plastics
	14 General Medicine
	15 Psychiatry
	16 General Surgery
	17 Nephrology
	18 Renal Dialysis
	19 Urology
	20 Gynecology
	21 Obstetrics & Ante-natal
	22 Neonatology
	23 Haematology
	24 Respiratory
	25 Oncology/Radiology
	26 Endocrinology
	27 Gastroenterology
	28 Other/Ungroupable
DRG Type	DRG type:
	M Medical
	S Surgical
	O Other
DRG Coding status	Coding status of separation records:
	C Coded
	P Problem DRG (AR-DRG 6.0: 801A, 801B, 801C)
	<Blank> Not Coded
First external-cause activity	The first diagnosis code is in the range U50 – U73.
First external-cause place of occurrence	The first diagnosis code commencing with Y92.
Principal external-cause	If the first diagnosis is an injury or poisoning, i.e., in the range S00 to T98, then the principal external cause is the first code in the range of V01 to Y91 or Y95 to Y98.
Principal external-cause activity	If the first diagnosis is an injury or poisoning i.e., in the range S00 to T98, and the principal external cause in the range V01-Y34, then the activity is the first diagnosis code in the range U50 – U73.
Principal external-cause place of occurrence	If the first diagnosis is an injury or poisoning, i.e., in the range S00 to T98, and the principal external cause in range V01 – Y89, then "place of occurrence" is the first diagnosis code commencing with Y92.
Duration of stay (hours) in the intensive care unit	The total duration of stay (hours) in an approved Intensive Care Unit (ICU) or Neonatal Intensive Care Unit (NICU), during this episode of care.
	Duration is reported in hours and rounded up to the nearest hour.
Duration of Mechanical Ventilation in ICU	The total duration of Mechanical Ventilation (MV) in hours provided in an approved Intensive Care Unit (ICU) or Neonatal Intensive Care (NICU) during this episode of care.

Duration of Non-Invasive Ventilation	The total number of hours of non-invasive ventilatory assistance given via any route other than intubation or tracheostomy, provided to patients in an approved Neonatal Intensive Care Unit (NICU) or Special Care Nursery (SCN) or Intensive Care Unit (ICU).
Clinical Sub-program	The diagnosis is based on the body system manifesting the reason for rehabilitation. Reported for Care Types 2, 6, 7, K and P. Clinical Sub-Program is assigned by the treating clinician.
Impairment	A code is assigned, based on the body system manifesting the reason for rehabilitation. Only reported for Sub-acute records. Reported for Care Type 2,6, P, R1 and R2. Introduction of Version 1 Australian Impairment code-set for Sub-Acute episodes as an optional field.

Data Field Description	**Definition**
Mental Health legal status	A funding-source indicator for involuntary patients:
	1 Involuntary for all or part of this episode
	2 Not involuntary at any time during this episode
	9 Not Applicable
Admission Source	Describes where the patient was residing or living before the commencement of an episode of care.
	A Transfer from mental health residential facility
	B Transfer from Transition Care bed-based program
	H Admission from private residence/ accommodation
	N Transfer from aged care residential facility
	S Statistical Admission (change in Care Type within this hospital)
	T* Transfer from acute/ extended care/ rehabilitation/ geriatric center
	* Requires an admission transfer code
	Y Birth Episode

Data Field Description	**Definition**
Encrypted Campus code	Indicates the hospital campus where the episode of care was provided. The patient activity must be reported under the campus code at which it occurred.
Interpreter Required	The patient's need for an interpreter, as perceived by the patient or person consenting for the patient.
	1 Yes
	2 No
	9 Not Stated/Inadequately described
Marital status	The current marital or living status of the patient at the time of admission:
	1 Never married
	2 Widowed
	3 Divorced
	4 Separated
	5 Married
	6 De Facto
	9 Not stated/inadequately described
Preferred Language	Language (including sign language) is most preferred by the patient for communication. This may be a language other than English even where the person can speak fluent English.
Indigenous status	The indigenous status of the patient as determined by patient self-identification.

Data Field Description	**Definition**
Encrypted Transfer Source (FROM)	Identification of the hospital campus the person has been transferred from, following separation from that hospital.
Account class on separation	The patient account classification on separation.

Encrypted Transfer destination (TO)	Identification of the hospital campus to which the patient is transferred after separation from this hospital.
	Y Yes
	N No
	U Uncoded (but eligible for WIES funding when coded)
Separation Mode	Type of separation:
	A Separation and transfer to mental health residential facility
	B Separation and transfer to Transition Care bed-based program
	D Death
	H Separation to private residence/accommodation
	S Statistical Separation
	N Separation and transfer to aged care residential facility
	T* Separation and transfer to another acute hospital/extended care/rehabilitation/geriatric center
	R Separation and transfer to Restorative Care bed-based program
	* Requires separation transfer code
	Z Left against medical advice
Separation referral	Clinical care and support services are arranged by the hospital to meet the person's recuperative needs when discharged to private accommodation or home. Up to four referrals can be transmitted in one field.
	A Referral to Aged Care Assessment Service (ACAS), arranged before discharge
	B Community palliative care support arranged before discharge
	C Mental health community services arranged before discharge
	D Psychiatric disability support services arranged before discharge
	F Domiciliary postnatal care arranged before discharge
	G Referral to general practitioner arranged before discharge
	K Referral to Aboriginal and Torres Strait Islander (ATSI) service, arranged before discharge
	L Alcohol and drug treatment service arranged before discharge
	M Referral to a community rehabilitation center arranged before discharge
	P Post-Acute Care Program services arranged before discharge
	R Other clinical care &/or support services arranged before discharge
	S Referral to private psychiatrist arranged before discharge
	T Referral to Transition Care home-based program, arranged before discharge
	U Home nursing support arranged before discharge
	X No referral or support services were arranged before discharge.

Supplementary Table 2: A complete list of ICD-10 variables extracted from the VDI database.

Data Field Description	Justification
Cause of Death	
Deceased Date of Death (Month/year)	Estimation of long-term survival after ICU admission
Deceased Age at Death (Month/year)	Estimation of long-term survival after ICU admission

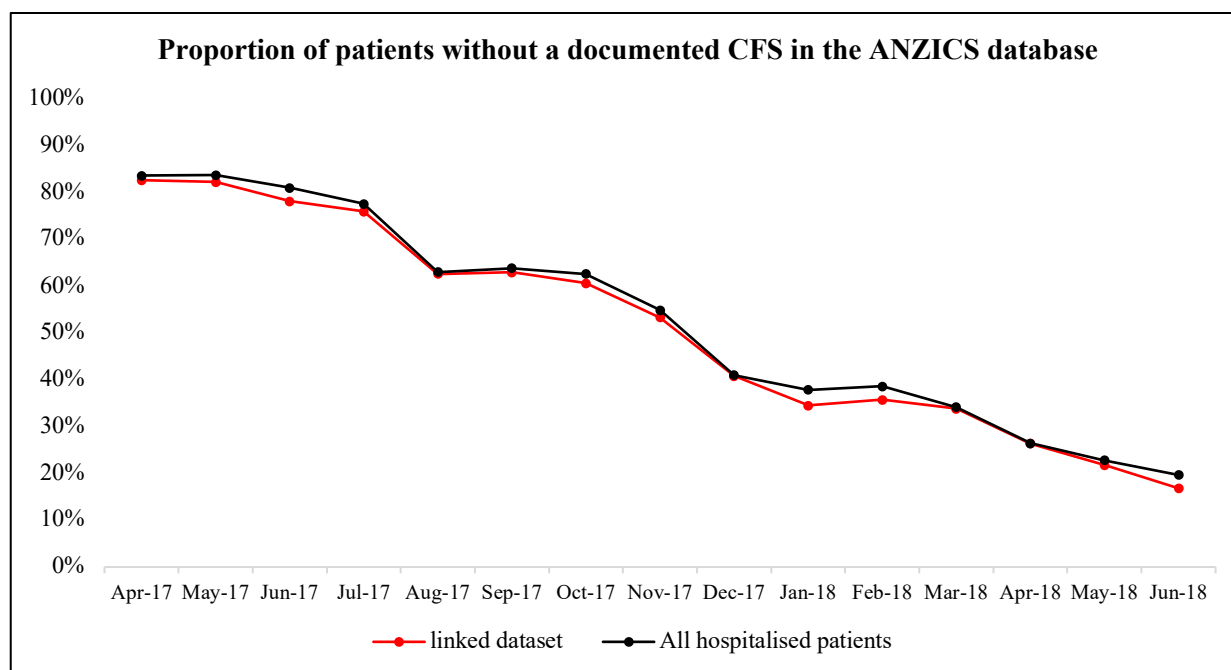**Supplementary Table 3:** ICD-10 codes used to estimate the ICD-10mFI.

Variable 1: "Functional status (not independent)"	1. H54 – Blindness and low vision 2. R26.0- R26.9 – Gait problems 3. R27.0 -R27.9 – Lack of coordination 4. R41 – Sarcopenia 5. R41.81 – age-related cognitive decline 6. R54 – age-related physical disability 7. S72 – fracture of the femur 8. Z73 – Life management difficulty 9. Z74.1 – Need for assistance 10. Z73.6 – Activities of daily living dysfunction 11. Z74 – Care-provider dependency
Variable 2: "History of hypertension requiring medication"	12. I10 – Essential hypertension 13. I11 – Hypertensive heart disease 14. I12 – Hypertensive kidney disease 15. I13 – Hypertensive heart and kidney disease 16. I15 – Secondary hypertension
Variable 3: "History of chronic obstructive pulmonary disease or pneumonia"	17. J12 – viral pneumonia 18. J13 – pneumonia due to streptococcal pneumonia 19. J14 – pneumonia due to Hemophilus influenzae 20. J15 – Bacterial pneumonia, not elsewhere classified 21. J16 – Pneumonia due to other infectious organisms 22. J17 – Pneumonia in diseases classified elsewhere 23. J18 – Pneumonia, organism unspecified 24. J43 – Emphysema 25. J44 – Chronic obstructive pulmonary disease
Variable 4: "History of impaired sensorium"	26. A81.0 – Creuksfeld Jacob Disease 27. F00-F03 – Delirium superimposed with dementia 28. F01 – Vascular Dementia 29. F04 – Organic Amnesia Syndrome 30. F05 – Delirium 31. F06 – Memory disturbance 32. F10 – Amnesia related to Alcohol 33. F11-F19 – Amnesia related to psychoactive agents 34. G20 - Parkinson's disease 35. G30 – Alzheimer's Dementia 36. H35 – Macular degeneration
Variable 5: "History of diabetes mellitus"	37. E10 - Type 1 diabetes mellitus 38. E11 - Type 2 diabetes mellitus 39. E13 – Other specified diabetes mellitus 40. E14 - Unspecified diabetes mellitus
Variable 6: "History of myocardial infarction"	41. I21 – Acute myocardial infarction 42. I22 – Subsequent myocardial infarction 43. I25 – Chronic ischemic heart disease
Variable 7: "History of congestive heart failure"	44. I50 – Heart failure 45. U80.2 – Chronic heart failure
Variable 8: "History of stroke with neurologic deficit"	46. I61 – Intracerebral hemorrhage 47. I63 – Cerebral infarction 48. I69 – Sequelae of cerebrovascular disease
Variable 9: "History of TIA or stroke without neurological deficit"	49. G45 – Transient cerebral ischemic attacks and related syndromes
Variable 10: "History of PCI, angina or stenting"	50. I20 – Angina pectoris
Variable 11: "History of Peripheral vascular disease or ischemic rest pain"	51. I70.2 - Atherosclerosis of arteries of extremities 52. I73 - Peripheral vascular disease 53. I77.9 - Peripheral arterial insufficiency 54. I77.1 - Obliterative peripheral arteries

Supplementary Table 4: Comparison between included (n=7,001) vs excluded (n=13,457).

	Overall	Excluded Patients	Included Patients	p-value
Number of patients, % (n)	20458	13457	7001	-
Age (years), mean (SD)	61.8 (17.6)	62.5 (17.5)	60.5 (17.6)	**<0.001**
Male, % (n)	57.0 (11689)	55.9 (7523)	59.5 (4166)	**<0.001**
Clinical Frailty Scale score, mean (SD)	3.4 (1.5)	3.5 (1.9) (2439)	3.3 (1.5)	**<0.001**
ICU Admission Type, % (n)				
- Elective Surgery	23.8 (4877)	23.3 (3137)	24.9 (1740)	**0.014**
Comorbidities, % (n)				
- Chronic respiratory disorder	8.5 (1741)	8.9 (1202)	7.7 (539)	**0.003**
- Cardiovascular disorder	8.6 (1757)	9.6 (1287)	6.7 (470)	**<0.001**
- Chronic renal failure	4.3 (874)	4.6 (614)	3.7 (260)	**0.004**
- Hepatic failure	2.6 (536)	2.6 (355)	2.6 (181)	0.82
- Cirrhosis	2.6 (539)	2.7 (358)	2.6 (181)	0.75
- Immune disorders	1.7 (351)	1.5 (200)	2.2 (151)	**<0.001**
- Immunodeficiency	5 (1020)	4.6 (625)	5.6 (395)	**0.002**
- Metastatic cancer	3 (623)	3.3 (440)	2.6 (183)	**0.001**
- Lymphoma	1.1 (218)	1.2 (166)	0.7 (52)	**0.001**
- Leukaemia	1.4 (279)	1.2 (168)	1.6 (111)	**0.049**
Charlson Comorbidity Index	0 (0-2)	0 (0-2)	0 (0-2)	0.85
Pre-ICU (Hours), median (IQR)	8 (4-22.2)	8.3 (4.1-22.8)	7.5 (3.8-20.1)	**<0.001**
Scoring and Risk of Death scores				
- APACHE-2 score, mean (SD)	15.6 (7.8)	15.7 (8.0)	15.4 (7.5)	**0.034**
- APACHE-3 score, mean (SD)	52.4 (26.2)	52.6 (26.9)	51.9 (24.7)	0.06
- ANZROD Score, (%) median (IQR)	2.7 (0.8-10)	2.9 (0.8-10)	2.3 (0.7-9.1)	**<0.001**
Organ failure and supports, % (n)				
- Invasive ventilation	38.4 (7858)	34.1 (4592)	46.7 (3266)	**<0.001**
- Renal replacement therapy	3.3 (671)	2.3 (314)	5.1 (357)	**<0.001**
Mortality, % (n)				
- ICU Mortality	6.5 (1328)	6.4 (856)	6.7 (472)	0.30
- Hospital Mortality	9.4 (1924)	9.5 (1282)	9.2 (642)	0.39
- 12-month Mortality	14.6 (2995)	14.8 (1989)	14.4 (1006)	0.43
Length of Stay, median (IQR)				
- ICU length of stay (hours)	46 (24-89)	44 (23-84)	47 (24-93)	**<0.001**
- Hospital length of stay (days)	7 (4-14)	7 (4-13)	8 (4-15)	**<0.001**
ICU >10 days	5.2 (1057)	4.6 (617)	6.3 (440)	**<0.001**
Readmission	4.0 (823)	4.1 (547)	3.9 (276)	0.67
Discharge Destination, % (n)				
- Usual residence	62.3 (12745)	56.9 (7657)	64.2 (4496)	**<0.001**

SD = standard deviation; n = number; IQR = interquartile range; ICU = intensive care unit; ICU – intensive care unit; APACHE - Acute Physiology and Chronic Health Evaluation; ANZROD – ANZ Risk of death

Supplementary Table 5: Reduction over time in the proportion of patients without a documented CFS in the ANZICS database.

Month/year	20,457 hospitalizations during the study period			14,943 patients that were linked		
	CFS recorded	CFS missing	Missing (%)	CFS recorded	CFS missing	Missing (%)
April 2017	229	1169	83.6%	189	899	82.6%
May 2017	244	1256	83.7%	202	934	82.2%
June 2017	280	1193	80.9%	236	844	78.1%
July 2017	325	1125	77.6%	256	807	75.9%
August 2017	588	1002	63.0%	441	739	62.6%
September 2017	510	900	63.8%	378	642	62.9%
October 2017	522	874	62.6%	407	626	60.6%
November 2017	556	676	54.9%	434	496	53.3%
December 2017	729	507	41.0%	563	388	40.8%
January 2018	761	464	37.9%	593	312	34.5%
February 2018	755	474	38.6%	611	340	35.8%
March 2018	936	486	34.2%	679	347	33.8%
April 2018	892	321	26.5%	654	234	26.4%
May 2018	1066	315	22.8%	798	222	21.8%
June 2018	1046	256	19.7%	560	113	16.8%

Proportion of patients without a documented CFS in the ANZICS database

Legend: linked dataset — All hospitalised patients

Supplementary Table 6: Variations observed in the proportion of each of the 11 comorbidity measures of ICD-10 modified Frailty Index (ICD-10mFI) between the CFS and the ICD-10mFI.

modified frailty index (mFI) variables	Total No. of patients (N=7001)	Clinical Frailty Score		ICD-10 Modified Frailty Index	
		non-frail patients (N=5678)	frail patients (N=1323)	non-frail patients (N=5910)	frail patients (N=1091)
	n/N (%)	n/N (%)	% (n//N)	n/N (%)	% (n//N)
Functional status (not independent)	2.4 (170/7001)	2.1 (119)	3.9 (51)	2.2 (138)	5.2 (32)
History of hypertension requiring medication	44.9 (850/7001)	12.1 (686)	12.4 (164)	9.2 (586)	42.9 (264)
History of chronic obstructive pulmonary disease or pneumonia	12.9 (903/7001)	10.3 (586)	24.0 (317)	9.9 (631)	44.2 (272)
History of impaired sensorium	16.5 (1152/7001)	16.0 (910)	18.3 (242)	14.0 (893)	42.0 (259)
History of diabetes mellitus	24.8 (1735/7001)	23.1 (1314)	31.8 (421)	20.6 (1317)	67.9 (418)
History of myocardial infarction	16.8 (1174/7001)	18.1 (1030)	10.9 (144)	12.9 (824)	56.8 (350)
History of congestive heart failure	8.0 (560/7001)	6.4 (362)	15.0 (198)	4.9 (314)	39.9 (246)
History of stroke with neurologic deficit	3.0 (207/7001)	3.0 (169)	2.9 (38)	2.3 (145)	10.1 (62)
History of percutaneous angiographic intervention, angina or stenting	2.2 (151/7001)	2.5 (140)	0.8 (11)	1.1 (73)	12.7 (78)
History of Peripheral vascular disease or ischemic rest pain	1.2 (81/7001)	1.1 (63)	1.4 (18)	0.9 (58)	3.7 (58)
History of Transient ischemic attack or stroke	0.2 (13/7001)	0.2 (12)	0.1 (1)	0.1 (9)	0.6 (4)

^ Except for history of hypertension requiring medication (p=0.75), stroke with a neurological deficit (p=0.84), history of peripheral vascular deficit or Ischaemic rest pain (p=0.44) and history of transient ischemic attack (0.30), all other comparisons between frail and not-frail for CFS were statistically significant. History of impaired sensorium had a p=0.045, while the rest had a p<0.001.
^^ All comparisons between frail and not-frail for mFI scores were statistically significant and had a p<0.001, except for Transient ischemic attack (p=0.005).

Supplementary Table 7: Unadjusted outcomes.

	Overall % (n)	Clinical Frailty Scale^		ICD-10 Modified Frailty Index^^	
		Non-frail	Frail	Non-frail	Frail
Mortalities					
- ICU Mortality	6.7 (472)	5.8 (328)	10.9 (144)	6.5 (413)	9.6 (59)
- Hospital Mortality	9.2 (642)	7.6 (433)	15.8 (209)	8.7 (554)	14.3 (88)
- 28-Day Mortality	9.0 (630)	7.4 (420)	15.9 (210)	8.5 (542)	14.3 (88)
- 90-day Mortality	11.8 (828)	9.4 (533)	22.3 (295)	11.2 (716)	18.2 (112)
- 6-month Mortality	13.5 (944)	10.6 (600)	26.0 (344)	12.7 (814)	21.1 (130)
- 1-year Mortality	14.4 (1005)	11.3 (642)	27.4 (363)	13.6 (866)	22.6 (139)
- ICU LOS (days)	1.9 (1.0-3.7)	1.8 (0.9-3.5)	2.3 (1.2-4.2)	1.8 (1.0-3.5)	2.8 (1.3-5.1)
- Hospital LOS (days)	8 (4-15)	7 (4-14)	9 (5-8)	7 (4-14)	12 (7-20)
Discharge Destination					
- Hospital Mortality	9.2 (642)	68.3 (3877)	46.8 (619)	8.7 (554)	14.3 (88)
- Usual residence	64.2 (4496)	68.3 (3877)	46.8 (619)	65.1 (4154)	55.5 (342)
- Nursing home discharge	1.6 (110)	0.8 (43)	5.1 (67)	1.5 (93)	2.8 (17)
- Transfer to rehabilitation	13.3 (932)	11.8 (671)	19.7 (261)	13.0 (827)	17.0 (105)
- Other acute hospital*	8.3 (581)	7.9 (449)	10.0 (132)	9.9 (630)	9.7 (60)
- Other**	3.4 (240)	3.7 (212)	2.1 (28)	6.4 (448)	0.6 (4)

ICU - intensive care unit, IQR - interquartile range; *n - number;* SD - standard deviation
* *Includes both transfer to ICU and acute hospital bed*
** Includes discharge to hospital in the home (n=19, 0.3%), mental residential care facility (n=73, 1%), other (n=38, 0.5%), discharge against medical advice (n=110, 1.6%)
^ All comparisons between frail and not-frail for CFS scores were statistically significant and had a p<0.001.
^^ All comparisons between frail and not-frail for ICD-10mFI scores were statistically significant. Discharge destination had a p=0.015, while the rest had a p<0.001.

Supplementary Table 8: Logistic Regression analysis for short-term and long-term mortalities for all patients and those stratified based on age. Unadjusted and adjusted for ANZROD and sex. The odds ratio (OR) in bold represents statistically significant results. Graphically presented in Figure 2.

Frail - outcome	CFS				ICD-10mFI			
	Unadjusted		Adjusted*		Unadjusted		Adjusted*	
	OR	95%-CI	OR	95%-CI	OR	95%-CI	OR	95%-CI
All patients (n=7001)								
ICU mortality	1.29	1.21-1.37	**1.10**	1.02-1.18	1.15	1.05-1.25	0.91	0.81-1.02
Hospital mortality	1.36	1.29-1.44	**1.21**	1.13-1.29	1.22	1.14-1.32	1.01	0.91-1.12
28-day mortality	1.38	1.31-1.45	**1.23**	1.15-1.31	1.27	1.14-1.32	1.01	0.92-1.12
90-day mortality	1.45	1.38-1.52	**1.33**	1.25-1.41	1.26	1.18-1.35	1.07	0.99-1.16
6-month mortality	1.49	1.42-1.56	**1.38**	1.31-1.46	1.29	1.21-1.38	**1.12**	1.04-1.21
1-year mortality	1.49	1.43-1.56	**1.38**	1.31-1.46	1.30	1.22-1.38	**1.13**	1.05-1.22
Patients <65 years (n=3637)								
ICU mortality	1.25	1.14-1.37	**1.20**	1.07-1.35	1.31	1.14-1.51	1.05	0.87-1.26
Hospital mortality	1.28	1.18-1.40	**1.25**	1.13-1.39	1.33	1.17-1.51	1.08	0.91-1.27
28-day mortality	1.30	1.20-1.42	**1.19**	1.09-1.29	1.35	1.18-1.53	1.09	0.92-1.30
90-day mortality	1.36	1.26-1.47	**1.35**	1.24-1.48	1.31	1.17-1.47	1.08	0.93-1.25
6-month mortality	1.42	1.32-1.52	**1.43**	1.31-1.55	1.34	1.20-1.50	1.13	0.98-1.29
1-year mortality	1.42	1.33-1.53	**1.43**	1.31-1.55	1.40	1.26-1.56	**1.21**	1.06-1.38
Patients 65-75 years (n=1735)								
ICU mortality	1.42	1.26-1.59	**1.25**	1.08-1.44	1.15	0.98-1.34	1.05	0.86-1.27
Hospital mortality	1.44	1.30-1.59	**1.28**	1.13-1.45	1.15	1.01-1.31	1.04	0.88-1.23
28-day mortality	1.48	1.34-1.64	**1.34**	1.18-1.52	1.14	1.00-1.31	1.04	0.88-1.23
90-day mortality	1.51	1.37-1.66	**1.38**	1.23-1.54	1.13	1.00-1.28	1.03	0.89-1.20
6-month mortality	1.53	1.40-1.68	**1.41**	1.27-1.57	1.16	1.03-1.30	1.07	0.94-1.24
1-year mortality	1.53	1.40-1.67	**1.40**	1.26-1.56	1.14	1.02-1.27	1.05	0.92-1.21
Patients >75 years (n=1624)								
ICU mortality	1.12	0.99-1.26	0.94	0.81-1.08	0.85	0.71-1.01	**0.65**	0.53-0.82
Hospital mortality	1.25	1.13-1.39	1.10	0.97-1.24	1.03	0.90-1.18	0.87	0.74-1.03
28-day mortality	1.23	1.11-1.36	1.06	0.94-1.20	1.03	0.90-1.18	0.87	0.73-1.03
90-day mortality	1.34	1.22-1.46	**1.20**	1.08-1.34	1.16	1.04-1.30	1.04	0.90-1.20
6-month mortality	1.34	1.23-1.47	**1.22**	1.10-1.35	1.19	1.07-1.33	1.07	0.94-1.22
1-year mortality	1.36	1.25-1.48	**1.24**	1.12-1.37	1.18	1.06-1.31	1.05	0.92-1.20

*Adjusted for male sex and ANZROD
CFS - Clinical frailty score, ICD-10mFI - ICD-10 code derived modified frailty index

Supplementary Table 9: Demographic table describing the dichotomized comparison between frail and non-frail between the modified frailty index (mFI) with and without the ICD-10 code for Hypertension (82.3).

	Modified Frailty Index (excluding the ICD-10 code 82.3 for Hypertension)			ICD-10 Modified Frailty Index (including the ICD-10 code 82.3 for Hypertension)		
	Non-frail	Frail	p-value	Non-frail	Frail	p-value
Number of patients, % (n)	91.2 (6385)	8.8 (616)	-	53.6 (5910)	15.6 (1091)	-
Age (years), mean (SD)	59.9 (18.0)	67.3 (11.4)	**<0.001**	59.1 (18.2)	68.3 (11.7)	**<0.001**
Male, % (n)	58.3 (3722)	72.1 (444)	**<0.001**	57.5 (3397)	70.5 (769)	**<0.001**
Hospital Admission source, % (n)						
- Private Residence	78.4 (5004)	63.8 (393)	**<0.001**	79.2 (4683)	65.4 (714)	**<0.001**
- Transfer from nursing home	0.3 (17)	0.8 (5)		0.2 (14)	0.7 (8)	
- Transfer from rehabilitation	20.8 (1330)	34.9 (215)		20.0 (1183)	33.2 (362)	
- From Transitional care program	0.0 (1)	0.1 (1)		0.0 (1)	0.1 (1)	
- No information	0.5 (33)	0.3 (2)		0.5 (29)	0.5 (6)	
Hospital Classification, % (n)						
- Tertiary	60.9 (3886)	71.4 (440)	**<0.001**	60.3 (3562)	70.0 (764)	**<0.001**
- Metropolitan	11.3 (723)	14.4 (89)		11.3 (666)	13.4 (146)	
- Rural/Regional	27.8 (1776)	14.1 (87)		28.5 (1682)	16.6 (181)	
ICU Admission Type, % (n)						
- Elective Surgery	24.3 (1554)	30.2 (186)	**<0.001**	23.3 (1377)	33.3 (363)	**<0.001**
- Emergency Surgery	20.8 (1326)	14.4 (89)		21.1 (1247)	15.4 (168)	
- Medical	54.9 (3505)	55.4 (341)		55.6 (3286)	51.3 (560)	
Comorbidities, % (n)						
- Chronic respiratory disorder	7.2 (462)	12.5 (77)	**<0.001**	7.1 (420)	10.9 (119)	**<0.001**
- Cardiovascular disorder	6.2 (399)	11.5 (71)	**<0.001**	5.9 (350)	11.0 (120)	**<0.001**
- Chronic renal failure	3.5 (225)	5.7 (35)	**0.007**	3.3 (193)	6.1 (67)	**<0.001**
- Chronic liver failure /Cirrhosis	2.6 (169)	1.9 (12)	0.30	2.7 (160)	1.9 (21)	0.14
- Immunodeficiency	5.8 (373)	3.6 (22)	**0.020**	6.0 (352)	3.9 (43)	**0.008**
- Metastatic cancer	2.8 (176)	1.1 (7)	**0.016**	2.9 (170)	1.2 (13)	**0.001**
- Lymphoma	0.8 (48)	0.6 (4)	0.78	0.8 (46)	0.5 (6)	0.42
- Leukaemia	1.6 (104)	1.1 (7)	0.35	1.7 (100)	1.0 (11)	0.10
Charlson Comorbidity Index	0 (0-1)	2 (1-3)	**<0.001**	0 (0-1)	1 (1-2)	**<0.001**
Pre-ICU (Hours), median (IQR)	7.3 (3.8-17.4)	10.5 (4.4-80.3)	**<0.001**	7.1 (3.7-15.9)	10.3 (4.8-73.4)	**<0.001**
ICU admission post MET call	12.2 (780)	17.0 (105)	**<0.001**	12.4 (730)	14.2 (885)	0.09
Treatment limitations	8.3 (526)	13.1 (13.1)	**<0.001**	7.8 (460)	13.5 (147)	**<0.001**
Scoring and Risk of Death scores, mean (SD)						
- APACHE-2 score	15.1 (7.4)	18.6 (7.5)	**<0.001**	14.9 (7.5)	18.0 (7.3)	**<0.001**
- APACHE-3 score	50.9 (24.6)	62.1 (23.7)	**<0.001**	50.4 (24.8)	60.0 (22.8)	**<0.001**
- ANZROD (%)	9.0 (16.6)	14.1 (19.0)	**<0.001**	9.0 (17.0))	13.0 (19.0)	**<0.001**
Organ failure and support, % (n)						
- Invasive ventilation	45.1 (2877)	63.1 (389)	**<0.001**	44.0 (2600)	61.0 (666)	**<0.001**
- Renal replacement therapy	6.0 (386)	14.3 (88)	**<0.001**	5.9 (347)	11.6 (127)	**<0.001**
Mortality, % (n)						
- ICU Mortality	6.5 (413)	9.6 (59)	**0.003**	6.5 (382)	8.2 (90)	**<0.001**
- Hospital Mortality	8.7 (554)	14.3 (88)	**<0.001**	8.5 (505)	12.6 (137)	**<0.001**
- 1-year Mortality	13.6 (866)	22.6 (139)	**<0.001**	13.3 (788)	19.9 (217)	**<0.001**
Length of Stay, median (IQR)						
- ICU length of stay (days)	1.8 (1.0-3.5)	2.8 (1.3-5.1)	**<0.001**	1.9 (1.0-3.4)	2.4 (1.3-4.3)	**<0.001**

- Hospital length of stay (days)	7 (4-14)	12 (7-20)	**<0.001**	7 (4-15)	11 (6-17)	**<0.001**
Discharge Destination, % (n)						
- Usual residence	65.1 (4154)	55.5 (342)	**<0.001**	65.2 (3852)	59.0 (644)	**0.015**
- Nursing home discharge	1.5 (93)	2.8 (17)		1.4 (82)	2.6 (28)	

SD = standard deviation; *n = number; ICU = intensive care unit;* APACHE = Acute Physiology and Chronic Health Evaluation; ANZROD = Australia New Zealand risk-of-death

Respiratory disorders: Chronic restrictive, obstructive disease resulting in severe exercise restriction (unable to climb stairs or perform household duties); or documented chronic hypoxia, hypercapnia, secondary polycythemia, severe pulmonary hypertension (mean > 40 mmHg); or ventilator dependency.

Cardiovascular: New York Heart Association Class IV: angina or symptoms at rest or on minimal exertion

Liver: ***Biopsy proven*** cirrhosis and documented portal hypertension, or episodes of past upper GI bleeding attributed to portal hypertension.

Renal: Must be receiving chronic hemodialysis or peritoneal dialysis.

Immune Suppressive Disease (Immune disease): Condition that is sufficiently advanced to suppress resistance to infection: Leukaemia, AIDS, lymphoma, severe autoimmune disease or documented diffuse metastatic cancer.

Immunosuppressive Therapy (Immunosuppressed): The patient has received therapy that has suppressed resistance to infection: e.g., immunosuppression, chemotherapy within 4 weeks of admission, radiation, high-dose steroid treatment (e.g., >1.5mg/kg methylprednisolone or equivalent for ≥5 days), long term treatment with >20 mg/day steroid.

Supplementary Table 10: Association between the Clinical Frailty Scale (CFS) and the ICD-10 modified frailty index (mFI) including the ICD-10 code 82.3 for Hypertension.

mFI	CFS score		Spearman's Correlation[1]	Agreement[2]
	non-frail (CFS <5)	Frail (CFS≥5)	Correlation coefficient (95%-CI; p-value)	Kappa (95%-CI*; p-value)
All patients (n=7001)	**5678**	**1323**		
ICD-10 mFI (non-frail; n=5910 [73.8%])	4860	1050	0.25 (0.23-0.28; p<0.001)	0.07 (0.04-0.09; p<0.001)
ICD-10mFI (frail; n=1091 [26.2%])	818	273		
ICD-10mFI with CCI			0.29 (0.27-0.31; p<0.001)	0.07 (0.02-0.11; p<0.001)
CFS with CCI			0.25 (0.23-0.27; p<0.001)	0.06 (0.02-0.09; p<0.001)
CFS – Clinical Frailty Scale; ICD-10mFI – ICD-10 code derived modified frailty index; CCI – Charlson comorbidity index [1] Spearman correlation based on continuous variables [2] Kappa agreement based on dichotomous variables				

Supplementary Table 11: Cox Proportional Hazards Regression Analysis, for 6-month survival, adjusted for sex, and ANZROD with and without 82.3 ICD-10 code for hypertension.

	Unadjusted	Adjusted
	HR (95%-CI)	HR (95%-CI)
CFS	1.44 (1.38-1.49)	**1.26** (1.21-1.31)
ICD-10mFI (excluding the ICD-10 code 82.3 for Hypertension)	1.25 (1.18-1.32)	1.04 (0.98-1.10)
ICD-10mFI (including the ICD-10 code 82.3 for Hypertension)	1.22 (1.16-1.28)	1.03 (0.98-1.09)
HR - Hazard ratio; CFS - Clinical frailty scale; mFI - modified frailty index; ANZROD – ANZ Risk of death		

Supplementary Table 12: Comparison of ICD-10 modified Frailty Index (ICD-10mFI) with and without 82.3 ICD-10 code for hypertension.

	Outcome	Discrimination, C-statistic (95%-CI)[*]	
		ICD-10mFI (excluding the ICD-10 code 82.3 for Hypertension)	ICD-10mFI (including the ICD-10 code 82.3 for Hypertension)
- ICU mortality	472/6994	0.54 (0.52-0.57)	0.54 (0.52-0.57)
- Hospital mortality	642/7000	0.56 (0.54-0.58)	0.56 (0.53-0.58)
- 28-day mortality	630/7001	0.56 (0.54-0.59)	0.56 (0.54-0.58)
- 90-day mortality	828/7001	0.57 (0.55-0.59)	0.57 (0.55-0.59)
- 6-month mortality	944/7001	0.58 (0.56-0.60)	0.58 (0.56-0.60)
- 1-year mortality	1005/7001	0.58 (0.56-0.60)	0.58 (0.56-0.60)
[*] Unadjusted ICU – intensive care unit, ICD-10mFI – ICD-10 code derived modified			

Supplementary Table 13: Association between the CFS and the ICD-10-mFI for all patients and subgroups stratified by age.

ICD-10mFI	Spearman's Correlation[1]	Agreement[2]
	Correlation coefficient (95%-CI)	Kappa (95%-CI*)
Age-stratified Subgroup Analysis		
Patients <65 years (n=3642)		
- ICD-10mFI with CFS	0.13 (0.09, 0.16)	-0.11 (-0.12, -0.10)
- ICD-10mFI with CCI	0.14 (0.11, 0.17)	0.12 (0.11, 0.13)
- CFS with CCI	0.27 (0.23, 0.30)	-0.15 (-0.16, -0.14)
Patients 65-75 years (n=1735)		
- ICD-10mFI with CFS	0.23 (0.20, 0.25)	-0.11 (-0.12, -0.10)
- ICD-10mFI with CCI	0.31 (0.25, 0.34)	0.12 (0.11, 0.13)
- CFS with CCI	0.27 (0.25, 0.30)	-0.15 (-0.16, -0.14)
Patients >75 years (n=1624)		
- ICD-10 mFI with CFS	0.11 (0.06, 0.16)	-0.11 (-0.12, -0.10)
- ICD-10mFI with CCI	0.27 (0.22, 0.31)	0.12 (0.11, 0.13)
- CFS with CCI	0.12 (0.07, 0.17)	-0.15 (-0.16, -0.14)
CFS – Clinical Frailty Scale; ICD-10mFI – ICD-10 derived modified frailty index; CCI - Charlson comorbidity index [1] Spearman correlation based on continuous variables [2] Kappa agreement based on dichotomous variables		

Supplementary Table 14: Cox Proportional Hazards Regression Analysis, for 6-month survival, adjusted for ANZROD and sex, for subgroups stratified by age.

Covariates	Unadjusted HR (95%-CI)	Adjusted HR (95%-CI)
Patients <65 years (n=3642)		
CFS	1.38 (1.30-1.48)	**1.26** (1.18-1.35)
Male sex	-	0.76 (0.61-0.96)
ANZROD	-	1.05 (1.05-1.06)
ICD-10mFI	1.30 (1.18-1.44)	1.03 (0.93-1.15)
Male sex	-	0.82 (0.65-1.03)
ANZROD	-	1.05 (1.05-1.06)
Patients 65-75 years (n=1735)		
CFS	1.46 (1.36-1.58)	**1.25** (1.19-1.31)
Male sex	-	0.83 (0.71-0.97)
ANZROD	-	1.05 (1.05-1.05)
ICD-10mFI	1.13 (1.02-1.16)	1.05 (0.95-1.17)
Male sex	-	1.16 (0.90-1.49)
ANZROD	-	1.05 (1.04-1.05)
Patients >75 years (n=1624)		
CFS	1.30 (1.21-1.40)	**1.17** (1.08-1.26)
Male sex	-	0.92 (0.74-1.14)
ANZROD	-	1.04 (1.04-1.05)
ICD-10mFI	1.15 (1.05-1.26)	0.96 (0.87-1.06)
Male sex	-	0.97 (0.78-1.20)
ANZROD	-	1.04 (1.04-1.05)
HR - Hazard ratio; CFS - Clinical frailty scale; mFI - modified frailty index; ANZROD – ANZ Risk of death		

Supplemental Table 15: Comparison of Clinical Frailty Scale (CFS) and ICD-10-modified Frailty Index (mFI) for predicting clinical outcomes, for subgroups stratified by age.

Outcomes	Raw mortality (n/N)[#]	Discrimination, C-statistic (95%-CI) [*]			Adjusted Discrimination, C-statistic (95%-CI) [**]		
		CFS	ICD-10mFI	p-value	CFS	ICD-10mFI	p-value
Patients <65 years (n=3642)							
ICU mortality	195/3638	0.59 (0.55-0.63)	0.57 (0.53-0.61)	0.59	0.94 (0.92-0.95)	0.93 (0.92-0.95)	0.53
Hospital mortality	238/3642	0.60 (0.56-0.64)	0.58 (0.54-0.62)	0.33	0.92 (0.90-0.94)	0.92 (0.90-0.94)	0.19
28-day mortality	227/3642	0.61 (0.57-0.65)	0.58 (0.55-0.62)	0.33	0.92 (0.91-0.94)	0.92 (0.90-0.94)	0.43
90-day mortality	293/3642	0.63 (0.60-0.66)	0.58 (0.54-0.61)	**0.011**	0.90 (0.88-0.92)	0.89 (0.87-0.91)	0.13
6-month mortality	327/3642	0.65 (0.62-0.68)	0.58 (0.55-0.61)	**0.001**	0.89 (0.87-0.91)	0.88 (0.86-0.90)	0.15
1-year mortality	351/3642	0.65 (0.62-0.68)	0.59 (0.56-0.62)	**0.002**	0.89 (0.87-0.90)	0.88 (0.86-0.90)	0.08
Patients 65-75 years (n=1735)							
ICU mortality	138/1734	0.63 (0.58-0.68)	0.55 (0.50-0.60)	**0.012**	0.91 (0.88-0.94)	0.91 (0.89-0.93)	0.21
Hospital mortality	189/1735	0.64 (0.59-0.68)	0.54 (0.50-0.59)	**0.002**	0.89 (0.86-0.92)	0.89 (0.86-0.92)	0.58
28-day mortality	187/1735	0.65 (0.60-0.69)	0.54 (0.50-0.59)	**<0.001**	0.88 (0.85-0.91)	0.89 (0.86-0.92)	0.41
90-day mortality	232/1735	0.65 (0.61-0.69)	0.54 (0.50-0.58)	**<0.001**	0.87 (0.84-0.89)	0.88 (0.85-0.90)	0.19
6-month mortality	271/1735	0.66 (0.62-0.69)	0.54 (0.51-0.58)	**<0.001**	0.86 (0.84-0.89)	0.86 (0.84-0.89)	0.87
1-year mortality	287/1735	0.67 (0.64-0.69)	0.59 (0.57-0.61)	**<0.001**	0.86 (0.83-0.88)	0.86 (0.83-0.88)	0.90
Patients >75 years (n=1624)							
ICU mortality	139/1622	0.54 (0.48-0.59)	0.46 (0.41-0.51)	**0.023**	0.90 (0.87-0.92)	0.90 (0.85-0.92)	0.49
Hospital mortality	215/1623	0.58 (0.53-0.62)	0.52 (0.47-0.56)	**0.028**	0.88 (0.86-0.90)	0.87 (0.85-0.90)	0.31
28-day mortality	216/1624	0.57 (0.53-0.61)	0.51 (0.47-0.56)	**0.041**	0.88 (0.86-0.90)	0.88 (0.85-0.90)	0.61
90-day mortality	302/1624	0.60 (0.57-0.64)	0.55 (0.51-0.58)	**0.016**	0.86 (0.84-0.88)	0.86 (0.84-0.88)	0.48
6-month mortality	345/1624	0.61 (0.57-0.64)	0.56 (0.52-0.59)	**0.021**	0.85 (0.83-0.87)	0.85 (0.83-0.88)	0.44
1-year mortality	366/1624	0.61 (0.58-0.64)	0.55 (0.52-0.59)	**0.008**	0.84 (0.82-0.86)	0.84 (0.82-0.87)	0.82

[#] Outcome based on CFS
[*] Unadjusted
[**] Adjusted for ANZROD and male sex using logistic regression models
CFS - Clinical frailty scale; mFI - modified frailty index; ANZROD – ANZ Risk of death

Supplementary Table 16: Differences between CFS vs. HFRS and CFS vs. ICD-10-mFI studies to demonstrate how this current paper enhances knowledge and provides insight on how the clinicians should do when it comes to estimating frailty using administrative data.
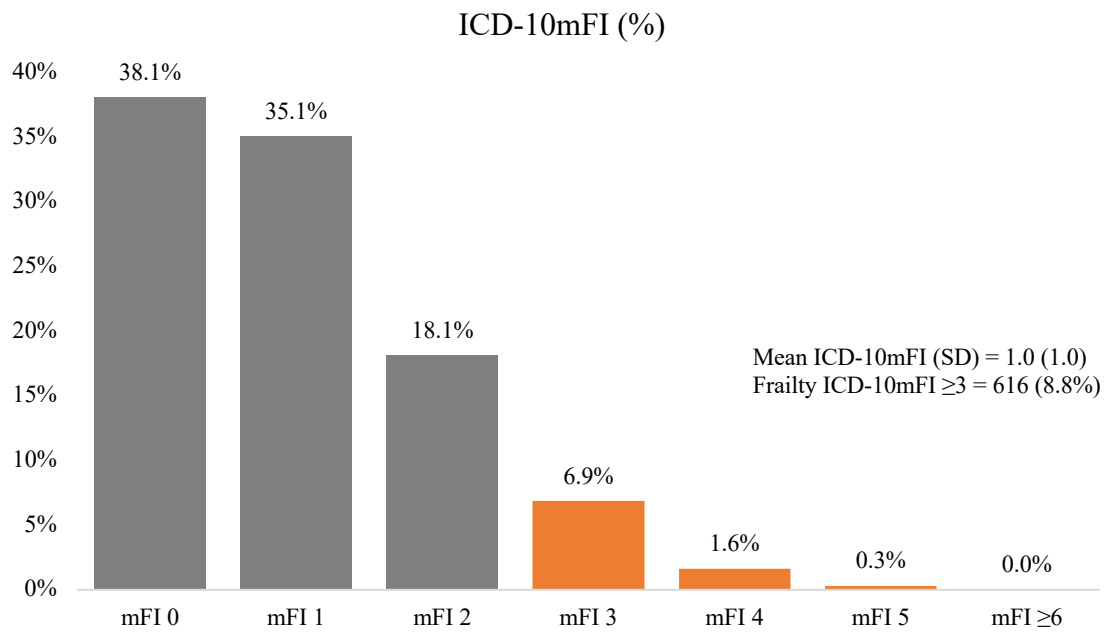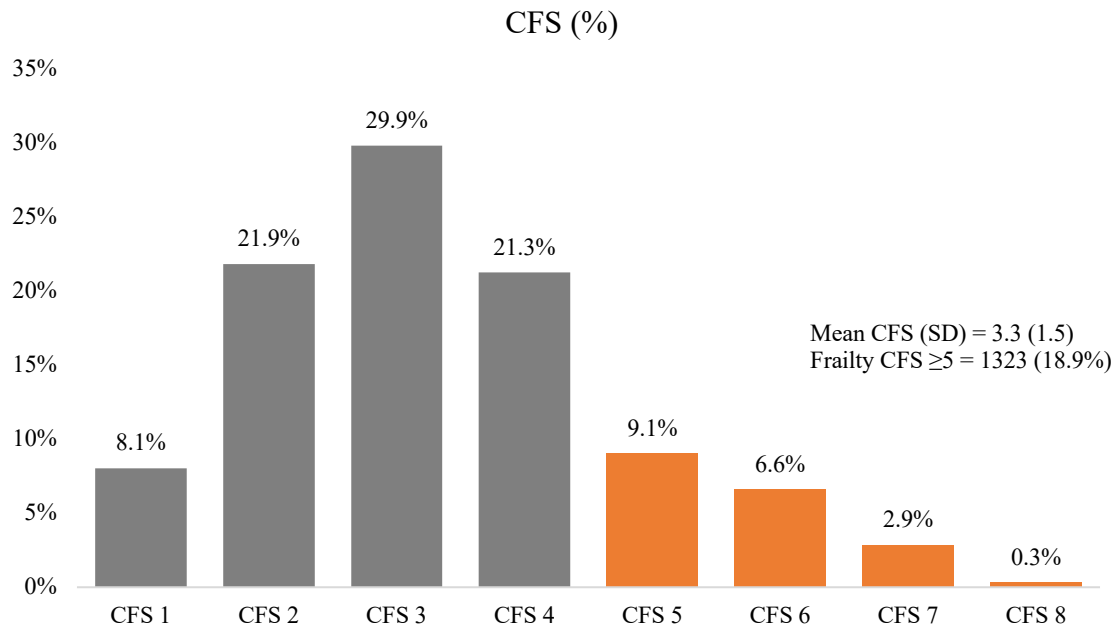
Key elements	CFS vs. HFRS paper[*]	CFS vs. ICD-10mFI paper	Inference/Implication
1. Dataset	Both studies used the same dataset of patients admitted to 16 Australian ICUs in the state of Victoria between 1st April 2017 to 30th June 2018.		-
2. Frailty measurement	Although the original HFRS used a combination of pre-existing conditions and those that developed during the hospitalisation, for the purposes of the study, we only used the ICD-10 codes that represented pre-existing conditions at the time of index hospital admission.	The ICD-10mFI was calculated as an approximation using all the pertinent ICD-10 codes, from prior and the new conditions accrued from indexed hospitalization, required to identify the eleven variables using the Delphi consensus investigation[**]	There is a difference in how the ICD-10-mFI is estimated.
3. Correlation with CFS (Spearman's rho)	rho=**0.13** (95%CI: 0.10-0.15)	rho=**0.22** (95%-CI: 0.19-0.24).	Although both are weak, ICD-10-mFI correlation with CFS is marginally better than HFRS with CFS.
4. Agreement (Kappa)	κ=0.12 (95%CI: 0.10-0.15)	κ=0.06 (95%CI: 0.04-0.08)	Both had weak agreements with CFS.
5. Cox Proportional Hazards Regression analysis	1-year (5-unit increment) HR=**1.08** (95%CI: 1.02-1.15)	6-months (1-unit increment HR=1.03 (95%CI: 0.93-1.15)	ICD-10-mFI did not predict long-term survival, whereas HFRS did.
6. C-static discrimination of long-term mortality (1-year)	CFS had a better discrimination than HFRS (AUROC 0.66 vs 0.63 p<0.0001).	CFS had a better discrimination than HFRS (AUROC 0.66 vs 0.58 p<0.0001).	However, after multivariable adjustment, none of the 3 frailty measures were able to improve the discrimination provided by patient illness severity assessed by ANZROD.
7. Multivariable logistic regression (odds ratio)			The multivariable logistic regression, adjusted for ANZROD and sex, demonstrated that the HFRS was independently predictive of only 90-day 6-month and 1-year mortalities. In contrast, ICD-10-mFI were only independently predictive of only long-term (6-month and 1-year) mortalities. With both administrative measures, the magnitude of predictions was considerably lower than the CFS prediction.

| 8. **Subgroup analysis based on age** | Only patients **≥75 years** were performed. There were 1,683 patients 75 years and over. The HFRS weakly correlated with the CFS (Spearman's rho=0.22 [95%CI: 0.18-0.27]; p<0.0001) and had a poor agreement (Kappa=0.05; 95%CI: 0.01-0.08; p=0.004). Although the AUROC curves had moderate discrimination the scores were similar for both CFS and HFRS. The HFRS (5-unit increment; HR=1.05, 95%CI: 0.95-1.16), adjusted for ANZROD and sex, was **not independently associated** with 1-year survival for HFRS when compared with CFS (1-unit increment; HR=1.18, 95%CI: 1.10-1.27). Although the HFRS was independently predictive of only 90-day, 6-month and 1-year mortalities, the magnitude of prediction was weaker than the CFS prediction. | Categorized as **<65, 65-75, >75 years**. For patients >75 years of age, the ICD-10mFI weakly correlated with the CFS for with had weak agreements. Cox proportion hazards regression, after adjusted for ANZROD and sex, demonstrated that while CFS was independently predictive of six-month survival, ICD-10-mFI was not. The AUROC predicted both short- and long-term (6-month and 12-month) mortalities, with the CFS consistently a better predictor than the ICD-10mFI. In the multivariable logistic regression, adjusted for ANZROD and sex, the CFS was independently predicted only 90-day, 6-month and 1-year mortalities, whereas the ICD-10mFI only predicted ICU mortality. Kaplan-Meier survival curves for the two frailty measures demonstrated greater survival separation between non-frail and frail patients for the CFS when compared to the ICD-10mFI for all age groups. | The HFRS independently predicted 90-day, 6-month and 1-year mortalities, whereas the ICD-10-mFI only predicted ICU mortality in the very old patients. |

[*]Subramaniam A, Ueno R, Tiruvoipati R, Srikanth V, et al: Comparison of the predictive ability of clinical frailty scale and hospital frailty risk score to determine long-term survival in critically ill patients: a multicentre retrospective cohort study. *Crit Care* 2022; 26(1):121.

[**]Subramaniam A, Ueno R, Tiruvoipati R, Darvall J, Srikanth V, Bailey M, Pilcher D, Bellomo R: Defining ICD-10 surrogate variables to estimate the modified frailty index: a Delphi-based approach. *BMC Geriatr* 2022.

CFS – clinical frailty scale; ICD-10-mFI – ICD-10 code derived modified frailty index; HFRS – hospital frailty risk score; HR – hazard ratio; OR – odds ratio; AUROC – area under the receiver operating characteristic; ANZROD – ANZ Risk of death

Supplementary Figure 1: Flow diagram describing the patients included in the study.

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┌──────────────────────────────────────────────────────────┐
│  20,457 ICU patients in ANZICS APD during the study period │
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        │ ┄┄┄┄▶ ┌╌╌╌╌╌╌╌╌╌╌╌╌╌╌╌╌╌╌╌╌╌╌╌╌╌╌╌┐
        │       ╎   5,513 patients were unlinked ╎
        ▼       └╌╌╌╌╌╌╌╌╌╌╌╌╌╌╌╌╌╌╌╌╌╌╌╌╌╌╌┘
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│  14,943 patients data linked                               │
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        │ ┄┄┄┄▶ ┌╌╌╌╌╌╌╌╌╌╌╌╌╌╌╌╌╌╌╌╌┐
        │       ╎   5,053 patients no CFS  ╎
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│  9,890 patients had CFS                                    │
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        │       ╎  2,439 patients did not have ICD-10 codes ╎
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│  7,451 patients had CFS                                    │
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        │       ╎ 450 readmitted to ICU in index hospital admission ╎
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┌──────────────────────────────────────────────────────────┐
│  7,001 patients included                                   │
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Supplementary Figure 2: Distributions of Clinical Frailty Scale (CFS) and ICD-10 modified Frailty Index (ICD-10mFI) scores.

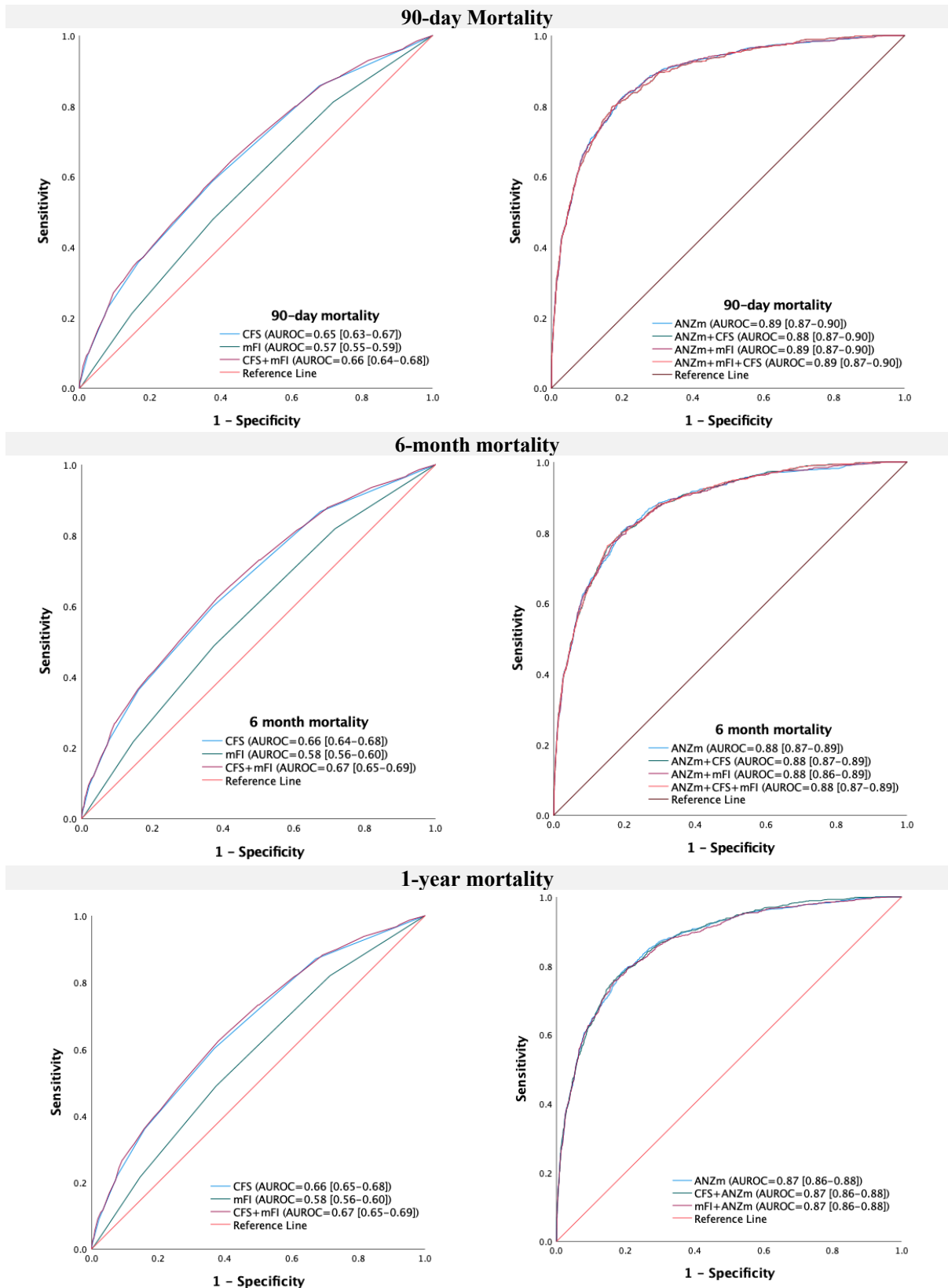
CFS (%)

Mean CFS (SD) = 3.3 (1.5)
Frailty CFS ≥5 = 1323 (18.9%)

CFS 1: 8.1%
CFS 2: 21.9%
CFS 3: 29.9%
CFS 4: 21.3%
CFS 5: 9.1%
CFS 6: 6.6%
CFS 7: 2.9%
CFS 8: 0.3%

ICD-10mFI (%)

Mean ICD-10mFI (SD) = 1.0 (1.0)
Frailty ICD-10mFI ≥3 = 616 (8.8%)

mFI 0: 38.1%
mFI 1: 35.1%
mFI 2: 18.1%
mFI 3: 6.9%
mFI 4: 1.6%
mFI 5: 0.3%
mFI ≥6: 0.0%

Supplementary Figure 3: Area under the receiver operator curve for short- and long-term mortalities. The CFS was significantly better than the ICD-10mFI. The right panels showed that neither provided any worthwhile improvement on top of ANZROD.

90-day Mortality

90-day mortality
CFS (AUROC=0.65 [0.63-0.67])
mFI (AUROC=0.57 [0.55-0.59])
CFS+mFI (AUROC=0.66 [0.64-0.68])
Reference Line

90-day mortality
ANZm (AUROC=0.89 [0.87-0.90])
ANZm+CFS (AUROC=0.88 [0.87-0.90])
ANZm+mFI (AUROC=0.89 [0.87-0.90])
ANZm+mFI+CFS (AUROC=0.89 [0.87-0.90])
Reference Line

6-month mortality

6 month mortality
CFS (AUROC=0.66 [0.64-0.68])
mFI (AUROC=0.58 [0.56-0.60])
CFS+mFI (AUROC=0.67 [0.65-0.69])
Reference Line

6 month mortality
ANZm (AUROC=0.88 [0.87-0.89])
ANZm+CFS (AUROC=0.88 [0.87-0.89])
ANZm+mFI (AUROC=0.88 [0.86-0.89])
ANZm+CFS+mFI (AUROC=0.88 [0.87-0.89])
Reference Line

1-year mortality

CFS (AUROC=0.66 [0.65-0.68])
mFI (AUROC=0.58 [0.56-0.60])
CFS+mFI (AUROC=0.67 [0.65-0.69])
Reference Line

ANZm (AUROC=0.87 [0.86-0.88])
CFS+ANZm (AUROC=0.87 [0.86-0.88])
mFI+ANZm (AUROC=0.87 [0.86-0.88])
Reference Line

*mFI – in figure legends represent ICD-10mFI.
AUROC - area under the receiver operating characteristic, ANZm - ANZROD+male, ANZROD - Australia New Zealand risk-of-death CFS – clinical frailty scale

Supplementary Figure 4: Kaplan Meier curves between frail and non-frail patients for CFS, ICD-10mFI with and without ICD-10 82.3 for Hypertension included for all patients.
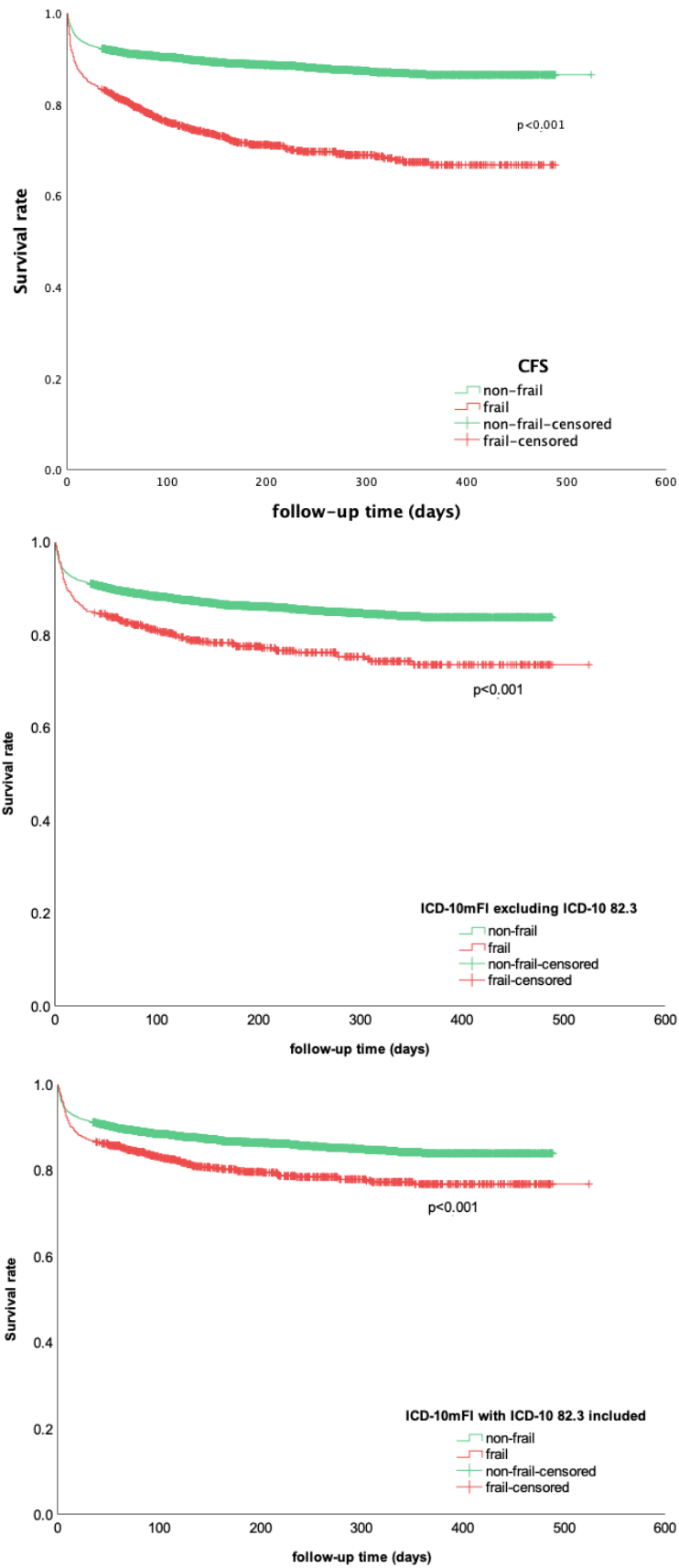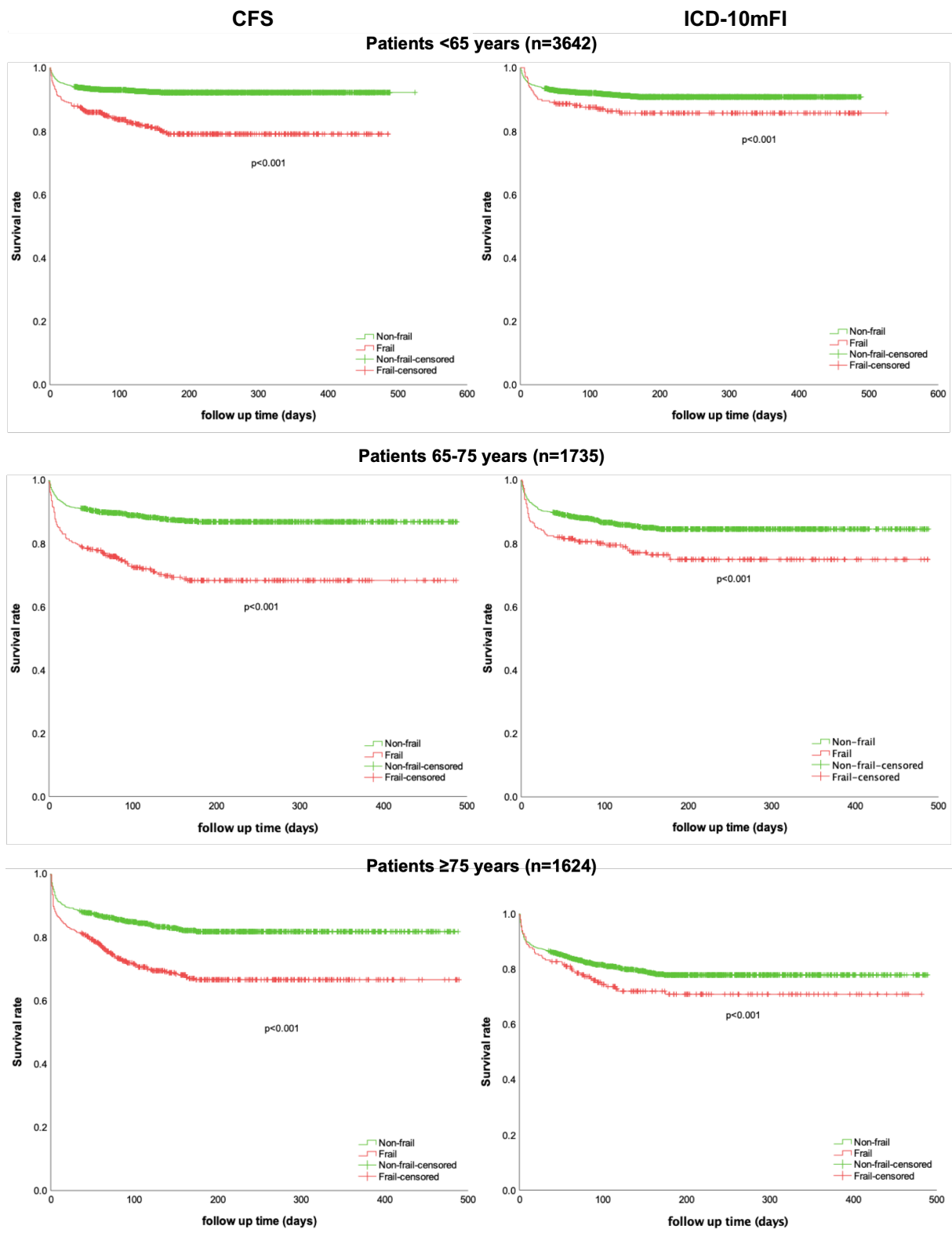
Supplementary Figure 5: Multivariable logistic regression, adjusted for ANZROD and sex, for short- and long-term mortality between CFS and ICD-10mFI treated as a continuous variable for those stratified based on age.
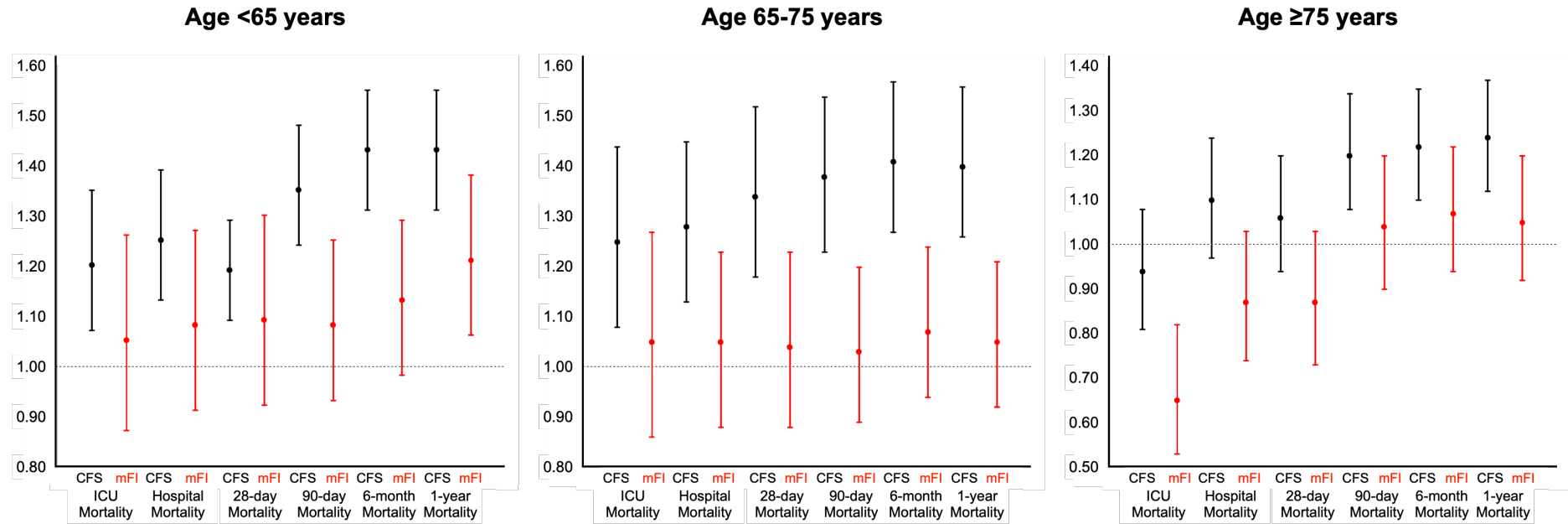
CFS - Clinical frailty scale; mFI - ICD-10 code derived modified frailty index

Supplementary Figure 6: Kaplan Meier curves between frail and non-frail patients (treated as a dichotomous variable) for CFS and ICD-10mFI for those stratified based on age.

CFS - Clinical frailty scale; ICD-10mFI - ICD-10 code derived modified frailty index