

FIGURE LEGENDS

Figure 1. Additive effect of pre-ICU frailty on hospital mortality for elderly Medicare beneficiaries stratified by age for **A)** Frailty only versus Robust, **B)** pre-ICU Cancer & Frailty versus pre-ICU Cancer only, **C)** pre-ICU Chronic Organ Failure & Frailty versus pre-ICU Chronic Organ Failure only **D)** pre-ICU Cancer, Chronic Organ Failure & Frailty versus pre-ICU Cancer & Chronic Organ Failure

Figure 2. Kaplan-Meier curves of 3-year mortality for elderly Medicare beneficiaries who survived the index hospitalization with critical illness, comparing patients with and without pre-ICU Frailty: **A)** Robust versus Frailty only **B)** Robust versus pre-ICU Cancer & Frailty versus pre-ICU Cancer only, **C)** Robust versus pre-ICU Chronic Organ Failure and Frailty versus pre-ICU Chronic Organ Failure only, **D)** Robust versus pre-ICU Cancer, Chronic Organ Failure & Frailty versus pre-ICU Cancer & Chronic Organ Failure

Figure S1. Flowchart of exclusions and final study cohort of elderly Medicare beneficiaries admitted to an ICU in 2005

Figure S2. Venn Diagram of the categorization of elderly Medicare beneficiaries admitted to ICUs in 2005 using four pre-ICU health categories

Table S 1. Comparisons of pre-ICU health categories with published classifications of health categories prior to death

Health Categories	2002 Definitions ^a	2003 Definitions ^b	Pre-ICU Categories Definition
Cancer	A plurality of physician claims in the last year of life noting a cancer diagnosis (excluding skin cancer)	Decedents with a diagnosis of cancer ICD 140.0 – 239.9 noted as immediate or underlying cause of death on their death certificate	≥ 1 claim with a cancer diagnosis (140-239) not including benign carcinoma (ICD 210-229) and carcinoma in situ (ICD 230-234) and malignancy labeled as “unspecified nature” (ICD 239)
Chronic organ failure	Those with an inpatient claim or an ER visit in the last year of life with discharge diagnosis of CHF or COPD	Decedents with CHF (ICD-9 428.0 – 428.9) or chronic lung disease (490.0 -496.9) in any diagnosis field on the death certificate	≥ 1 claim with a diagnosis of CHF (ICD 428), ischemic heart disease (ICD 410-414), chronic liver disease (ICD 571, ICD 572.3 or ICD 456.2), chronic obstructive pulmonary disease and allied health conditions (ICD 490 – 496, excluding patients with a diagnosis of acute bronchitis
Frailty	Those remaining Medicare decedents who had at least one claim associated with diagnosis of stroke, alzheimer’s disease, dementia, acute delirium, Parkinson’s disease, hip fracture, incontinence, pneumonia, dehydration, syncope, or leg cellulitis	Decedents who had reported a nursing home stay during any of the follow-up interview	≥ 1 claim associated with Alzheimer’s disease or Dementia or senility (ICD 290, 331.0, 332, 797); Delirium (ICD 293.0, 293.1); Parkinson’s disease (ICD 332); Pathologic fracture (ICD 733.1; Urinary incontinence (ICD 788.91); Dehydration (ICD 276.51); Debility (799.3); protein-calorie malnutrition or kwashiorkor or nutritional marasmus (ICD 260, 261 262, 263); accidental falls (E880-E888) with gait abnormality or lack of coordination (ICD 781.3, 781.2; pressure ulcers (ICD 707.0, 707.2); abnormal loss of weight or underweight or failure to thrive (ICD 783.2, 783.7)
			OR
Robust	Younger decedents (< 80yrs) with little evidence of health care usage (< \$2000) in medicare reimbursements in the year before death	-No diagnosis of cancer or chronic organ failure on the death certificate - No nursing home stay	≥ 1 claim from a skilled nursing facility at any time during the year prior to the ICU -None of the chronic organ failure, frailty or cancer diagnoses
			AND

AND

-No claims from a Skilled Nursing Facility in the year prior to the ICU

-No history of cancer, heart disease, diabetes, hip fracture, or stroke

^aUsed in Lunney JR et al. J. Am Geriatr Soc 2002, see reference #5

^bUsed in Lunney JR et al. JAMA 2003, see reference #6

Table S2. Characteristics of the Study Population by mutually exclusive pre-ICU health categories

Characteristics	Robust (N= 8,901)	Chronic Organ Failure only (N=13,578)	Cancer only (N=2,902)	Cancer & Chronic Organ Failure (N=5,899)	Frailty only (N=2,449)	Chronic Organ Failure & Frailty (N=8,928)	Cancer & Frailty (N=888)	Cancer, Chronic Organ Failure & Frailty (N=3,882)
Male, n (%)	3,950 (44.4)	6,543 (48.2)	1,598 (55.1)	3,760 (63.7)	799 (32.6)	3,576 (40.1)	405 (45.6)	2,103 (54.2)
Age, mean ± SD	76.4±7.2	76.5±6.9	76.6±6.9	76.7±6.6	80.0±7.5	79.3±7.4	79.4±7.3	79.2±7.0
Race/Ethnicity, n (%)								
White	7,702 (86.5)	11,902 (87.7)	2,636 (90.8)	5,395 (91.5)	2,011 (82.1)	7,481 (83.8)	7,66 (87.4)	3,408 (87.8)
Black	822 (9.2)	1,028 (7.6)	180 (6.2)	333 (5.7)	302 (12.3)	1,027 (11.5)	82 (9.2)	352 (9.1)
Other	377 (4.2)	648 (4.8)	86 (3.0)	171 (2.9)	136 (5.6)	420 (4.7)	30 (3.4)	122 (3.1)
Hospitalized in year prior, n (%)	632 (7.1)	4,305 (31.7)	444 (15.3)	2,251 (38.2)	844 (34.5)	6,134 (68.7)	400 (45.1)	2,770 (71.4)
SNF in year prior, n (%)	N/A	N/A	N/A	N/A	416 (17.0)	3,141 (35.2)	162 (18.5)	1,295 (33.3)
ICU length of stay, median days (IQR)	2 (1-5)	2 (1-5)	2(1-5)	3(1-5)	2 (1-5)	3 (1-6)	2 (1-5)	3 (2-6)
Hospital Length of Stay, median days (IQR)	5(3-9)	6 (3-10)	6 (3-10)	7 (4-11)	6 (3-11)	7(4-12)	7(4-12)	8(4-14)
Surgical patient ^a	4,568 (51.3)	6,405 (47.2)	1,708 (58.9)	3,167 (53.7)	926 (37.8)	3,001 (33.6)	423 (47.6)	1,548 (39.9)
Clinical Diagnoses during Index Hospitalization, n (%)								
Pneumonia	242 (2.7)	767 (5.7)	69 (2.4)	303 (5.1)	93 (3.8)	699 (7.8)	31 (3.5)	275 (7.1)
Infection	2,364 (26.6)	3,829 (28.2)	793 (27.3)	1,736 (29.4)	1,074 (43.9)	4,140 (46.4)	321 (36.2)	1,699 (43.8)
Acute Renal Failure	84.1 (9.5)	1,602 (11.8)	287 (9.9)	675 (11.4)	341 (13.9)	1,474 (16.5)	117 (13.2)	653 (16.8)
Severe Sepsis ^b	978 (11.0)	1,847 (13.6)	319 (11.0)	831 (14.1)	466 (19.0)	2,089 (23.4)	146 (16.4)	903 (23.3)
Mechanical Ventilation	808 (9.1)	1,407 (10.4)	247 (8.5)	604 (10.2)	284 (11.6)	1,147 (12.9)	83 (9.4)	571 (14.7)
Discharge Destination, n (%)								
Died in hospital	867 (9.7)	1,396 (10.3)	274 (9.4)	668 (11.3)	389 (15.9)	1,496 (16.8)	139 (15.7)	762 (19.6)
Home with Health Services	1,137 (12.8)	1,921 (21.2)	460 (15.9)	968 (16.4)	264 (10.8)	1,044 (11.7)	102 (11.5)	511 (13.2)
Skilled Care Facility/Rehab	2,007 (22.6)	2,878 (21.2)	586 (20.2)	1,157 (19.6)	1,023 (41.8)	3,660 (41.0)	315 (35.5)	1,432 (36.9)
Other ^c	1,580 (17.8)	2,398 (17.7)	486 (16.8)	1,102 (18.7)	601 (24.5)	2,214 (24.8)	214 (24.1)	1,052 (27.1)

Notes

Abbreviations: ICU – Intensive Care Unit; SD – Standard Deviation; SNF- Skilled Nursing Facility; IQR – Interquartile Range; N/A – not applicable

^aDiagnoses-related groups were used to classify the index hospitalization as primarily medical or surgical

^bSevere Sepsis included those patients with infection and an acute organ dysfunction (see text for details)

^cIncludes those who left against medical advice or were discharged to other inpatient facility, federal health care facility, hospice or psychiatric hospital

Table S3. The median number of Medicare claims for each patient used to classify them into a given health category.^a

Pre-ICU Health Category	Cancer Claims, median (IQR)	Chronic Organ Failure Claims, median (IQR)	Frailty Claims, median (IQR)
Cancer Only (N=2,902)	4 (2-12)	N/A	N/A
Chronic Organ Failure Only (N=13,578)	N/A	8 (3-20)	N/A
Cancer & Chronic Organ Failure (N=5,899)	5 (2-13)	8 (3-19)	N/A
Frailty Only (N=2,449)	N/A	N/A	3 (1-8)
Cancer & Frailty (N=888)	5 (2-16)	N/A	2 (1-6)
Chronic Organ Failure & Frailty (N=8,928)	N/A	13 (5-33)	3 (1-8)
Cancer, Chronic Organ Failure & Frailty (N=3,882)	5 (2-15)	13 (5-32)	3 (1-7)

Notes

Abbreviations: IQR – Interquartile Range; N/A – not applicable

^a Robust patients are not included here since, by definition, they did not qualify for pre-ICU Cancer, Chronic Organ Failure or Frailty

Table S4. Mortality of patients with pre-ICU frailty (N= 16,147) stratified by specific frailty markers

Frailty Markers	Hospital mortality (%)	3-year mortality in hospital survivors (%)
Dementia diagnoses only ^a (N=2,790)	15.2	54.0
SNF in the year prior to the ICU ^b (N=936)	14.9	58.5
Other Frailty Diagnoses only ^c (N=6,276)	15.4	52.6
Dementia diagnoses & SNF in the year prior (N=477)	21.6	71.1
Dementia & Other Frailty Diagnoses (N=2,065)	17.7	63.9
SNF in the year prior & Other Frailty Diagnoses (no dementia diagnoses) (N=1,989)	20.4	66.2
Dementia diagnoses & Other Frailty Diagnoses & SNF in the year prior (N=1,614)	23.7	74.7

Abbreviations: ICU – Intensive Care Unit; SNF – Skilled Nursing Facility

^a Patients who were categorized as having pre-ICU frailty by having ≥ 1 claim associated with Alzheimer’s disease or dementia, senility

^b Patients who were categorized as having pre-ICU frailty only because they had ≥ 1 claim associated with SNF in the year prior to ICU

^c Patients who were categorized as having pre-ICU frailty only because they had ≥ 1 claim associated with a non-dementia diagnosis (see text for detail)

Figure S1

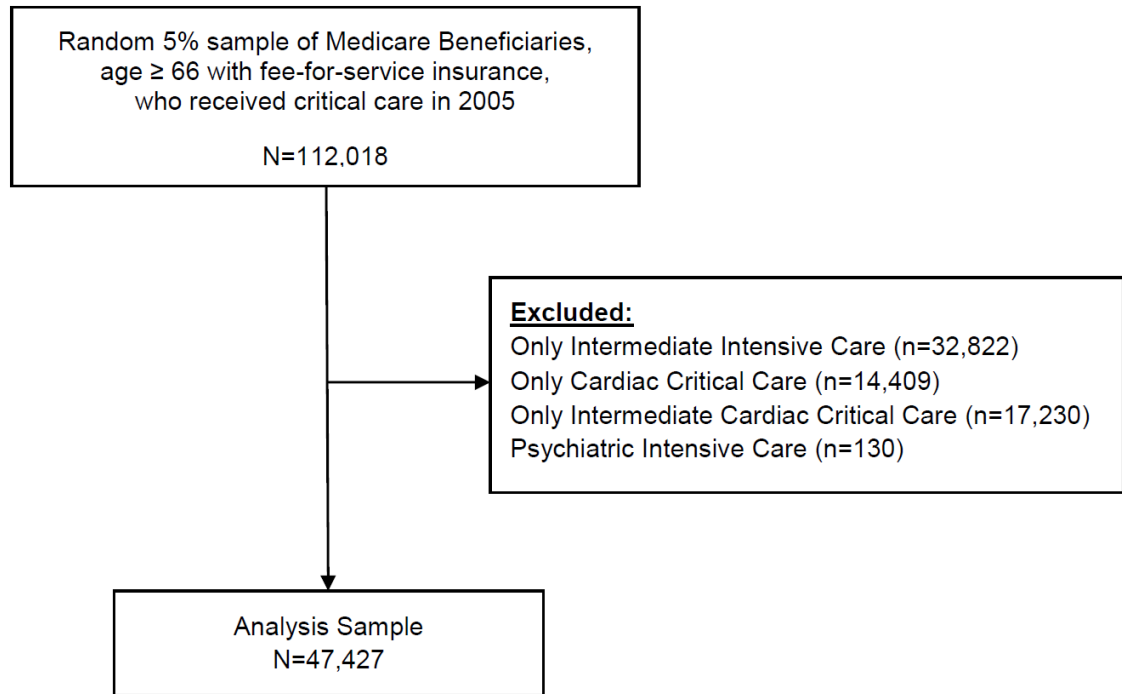


Figure S2

