Caring For Older Patients in ICU

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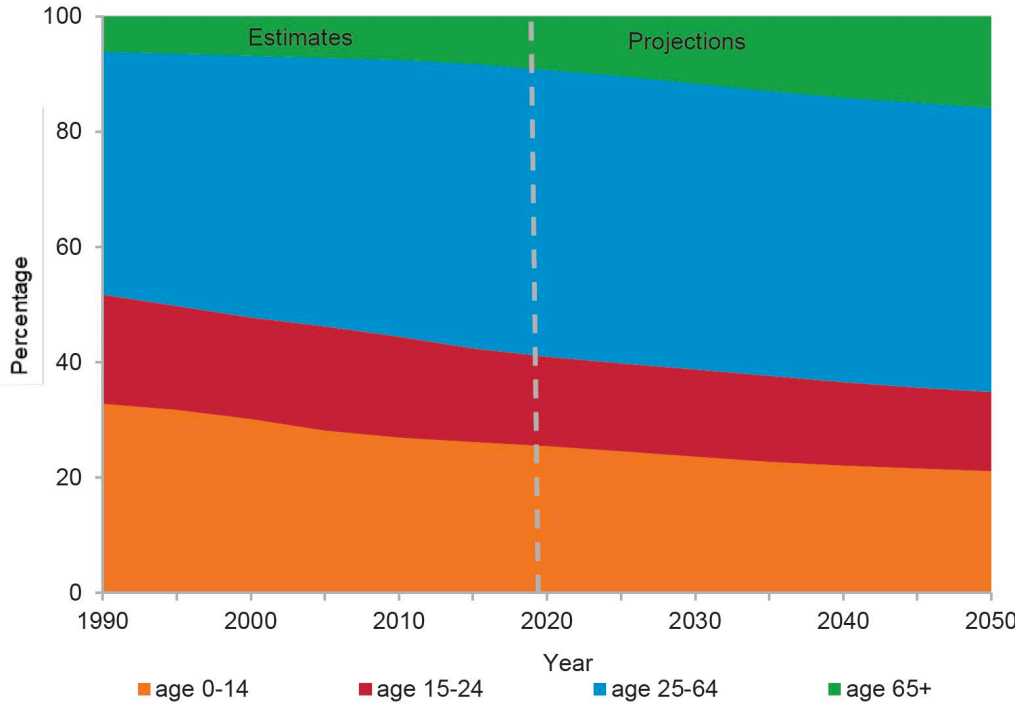
Older adults and older patients

Older adults in the world

- **Age ≥65** years-old (WHO)
- Older population in **increasing globally**

Global population by broad age groups, 1990-2050 (percentage)



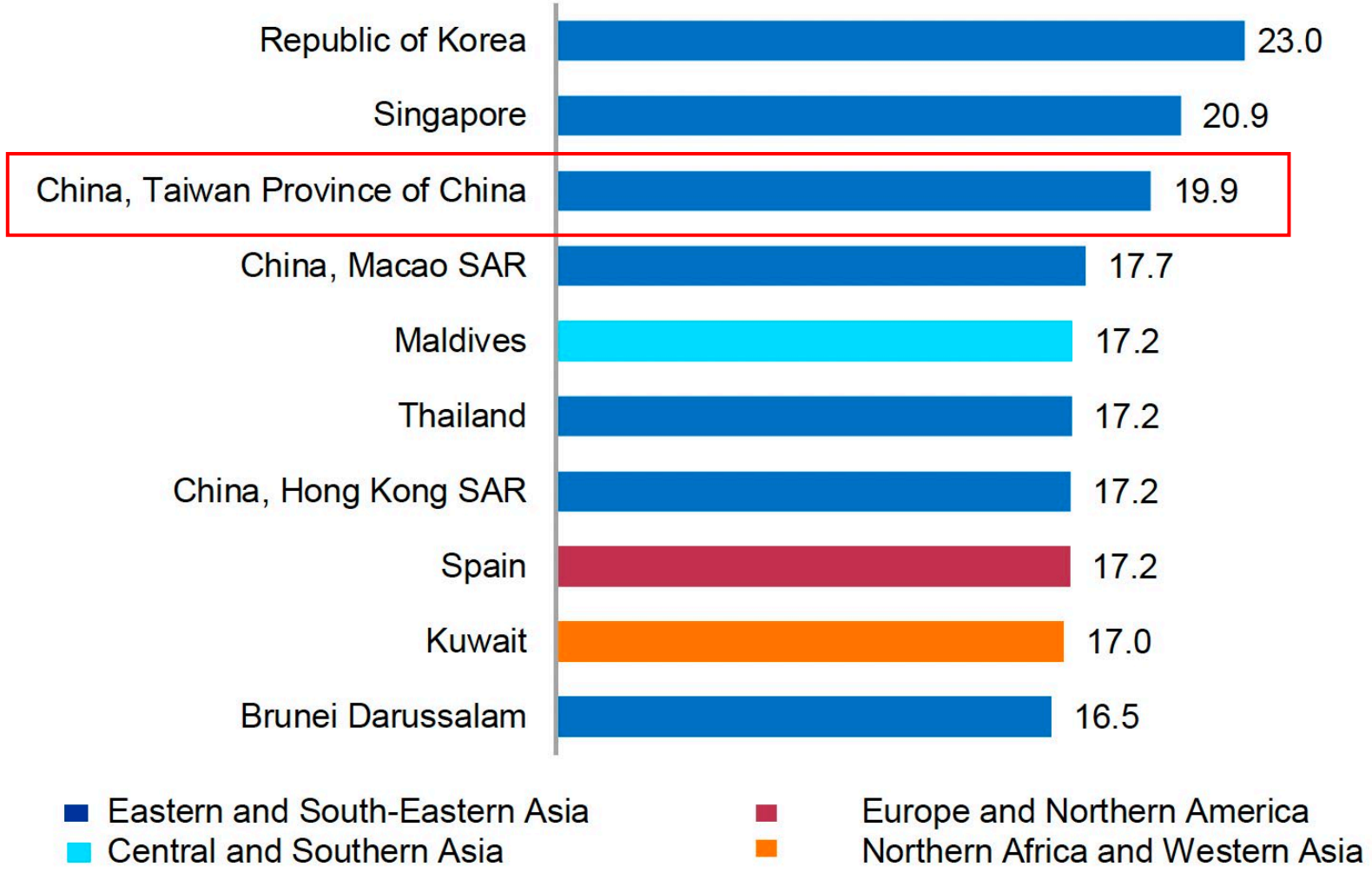
Number of persons aged 65 years or over by geographic region, 2019 and 2050

Region	*Number of persons aged 65 or over in 2019 (millions)*	*Number of persons aged 65 or over in 2050 (millions)*	*Percentage change between 2019 and 2050*
World	**702.9**	**1548.9**	**120**
Sub-Saharan Africa	31.9	101.4	218
Northern Africa and Western Asia	29.4	95.8	226
Central and Southern Asia	119.0	328.1	176
Eastern and South-Eastern Asia	260.6	572.5	120
Latin America and the Caribbean	56.4	144.6	156
Australia and New Zealand	4.8	8.8	84
Oceania, excluding Australia and New Zealand	0.5	1.5	190
Europe and Northern America	200.4	296.2	48

World Population Ageing 2019: Highlights

Older adults in the world

Countries or areas with the largest percentage point increase in the share of older persons aged 65 years or over between 2019 and 2050

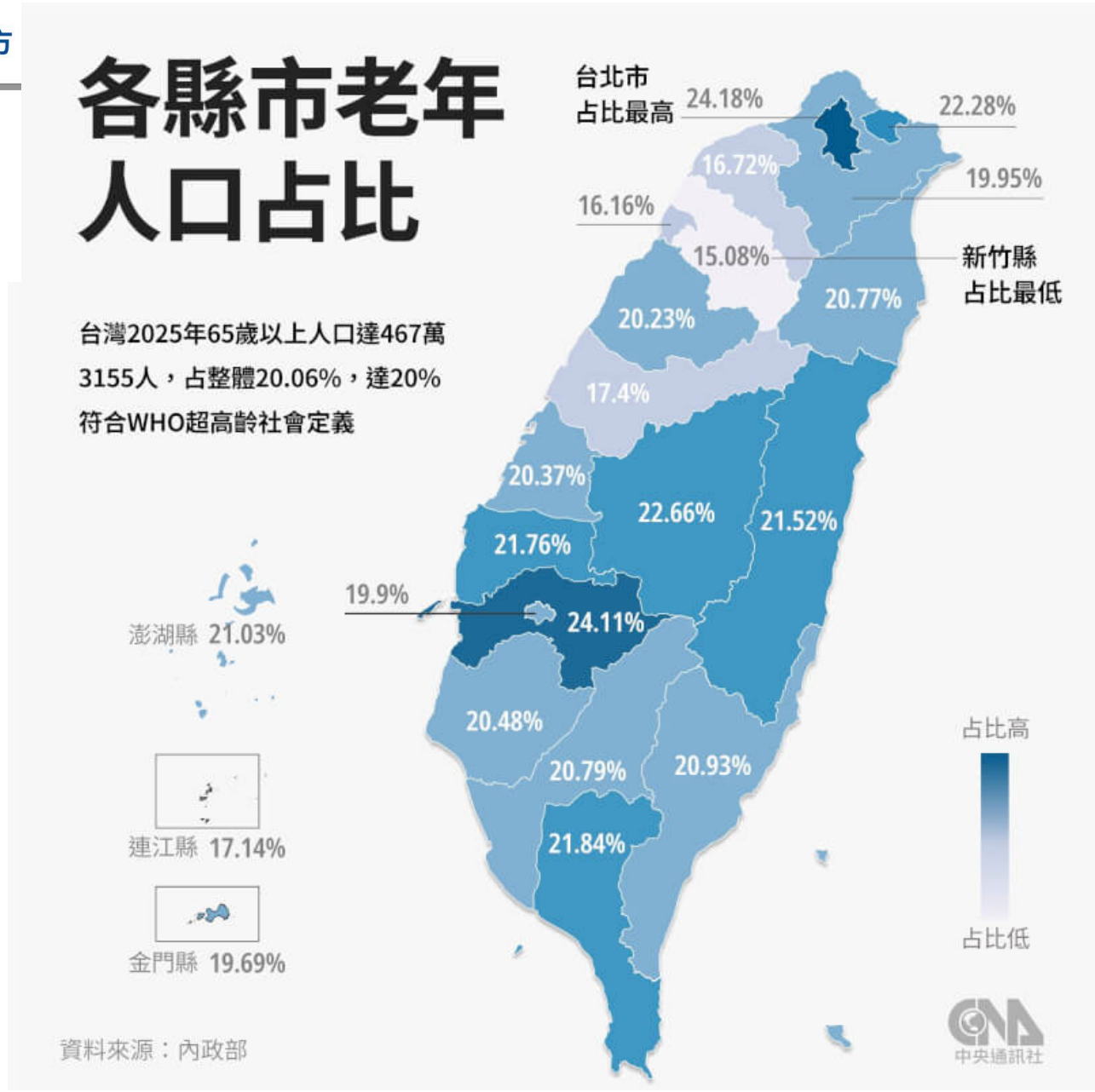


World Population Ageing 2019: Highlights

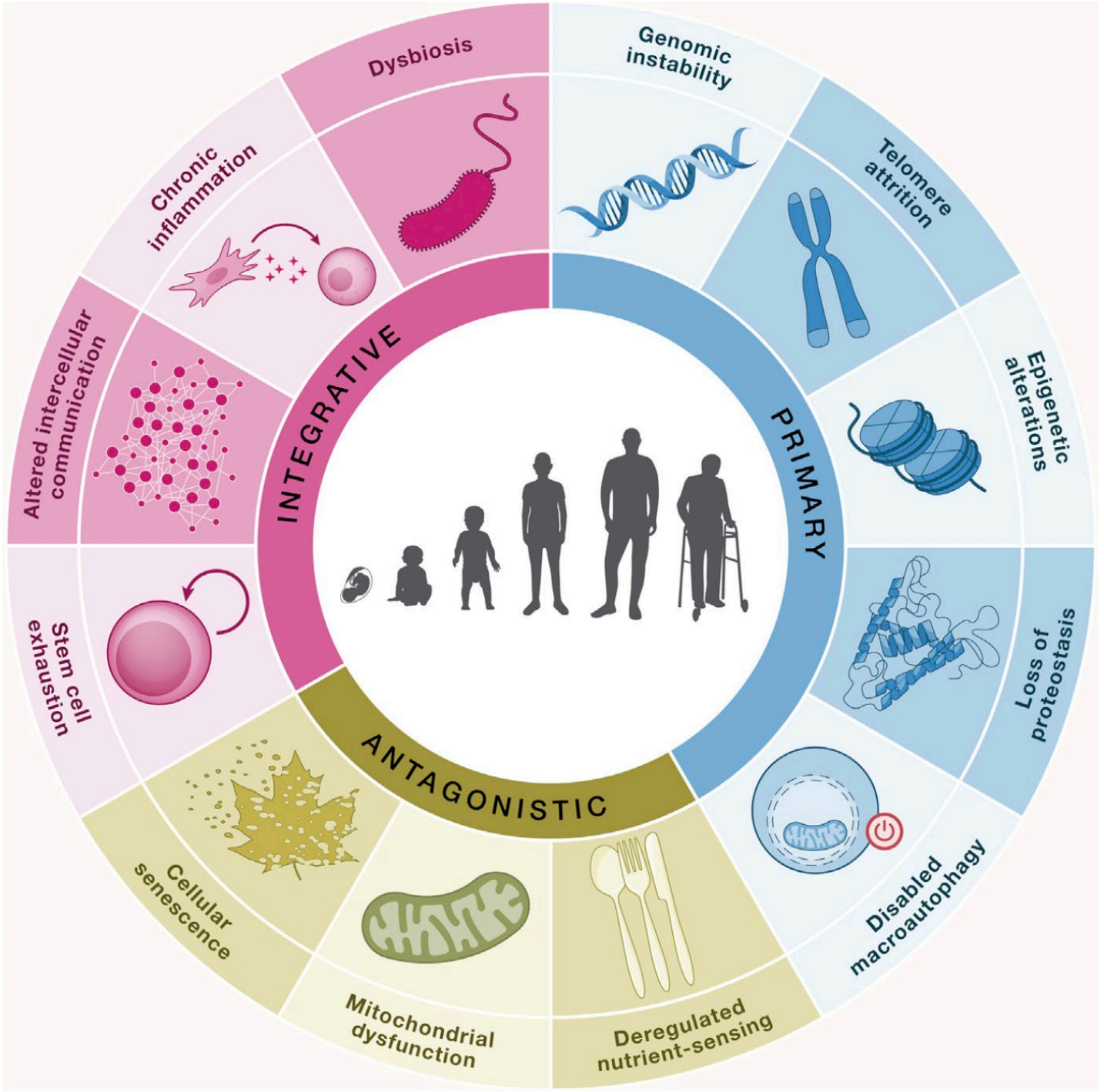
台灣成超高齡社會　65歲以上人口占比台北24.18%最高

2026/1/9 12:18（1/9 16:45 更新）

- 台灣2025年65歲以上人口數達到467萬3155人，占20.06%。
- 台北市65歲以上人口比率最高，占24.18
- 其次為嘉義縣24.11%%、南投縣22.66%、基隆市22.28%、屏東縣21.84%。

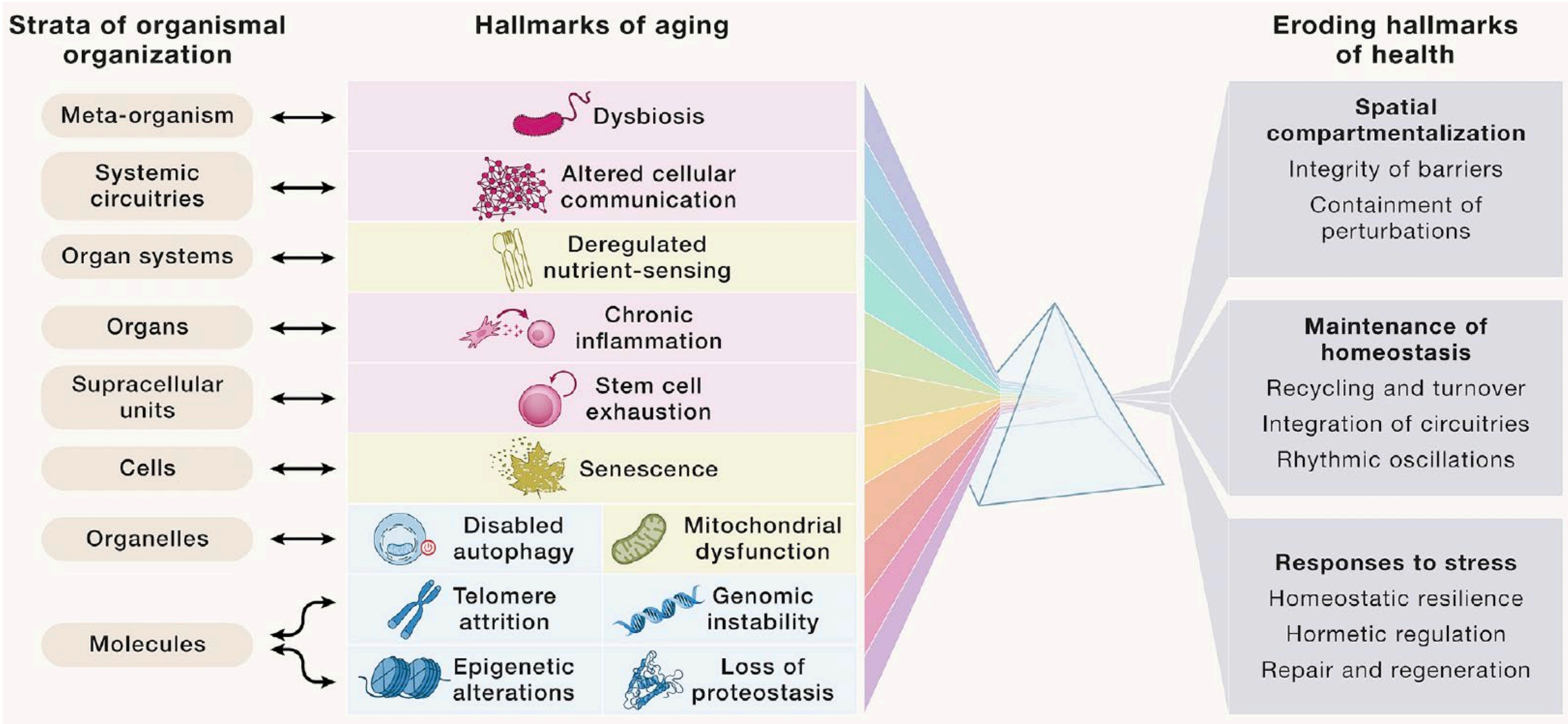


Hallmark of aging



López-Otín C et al., Cell. 2023 Jan 19;186(2):243-278.

Hallmark of aging

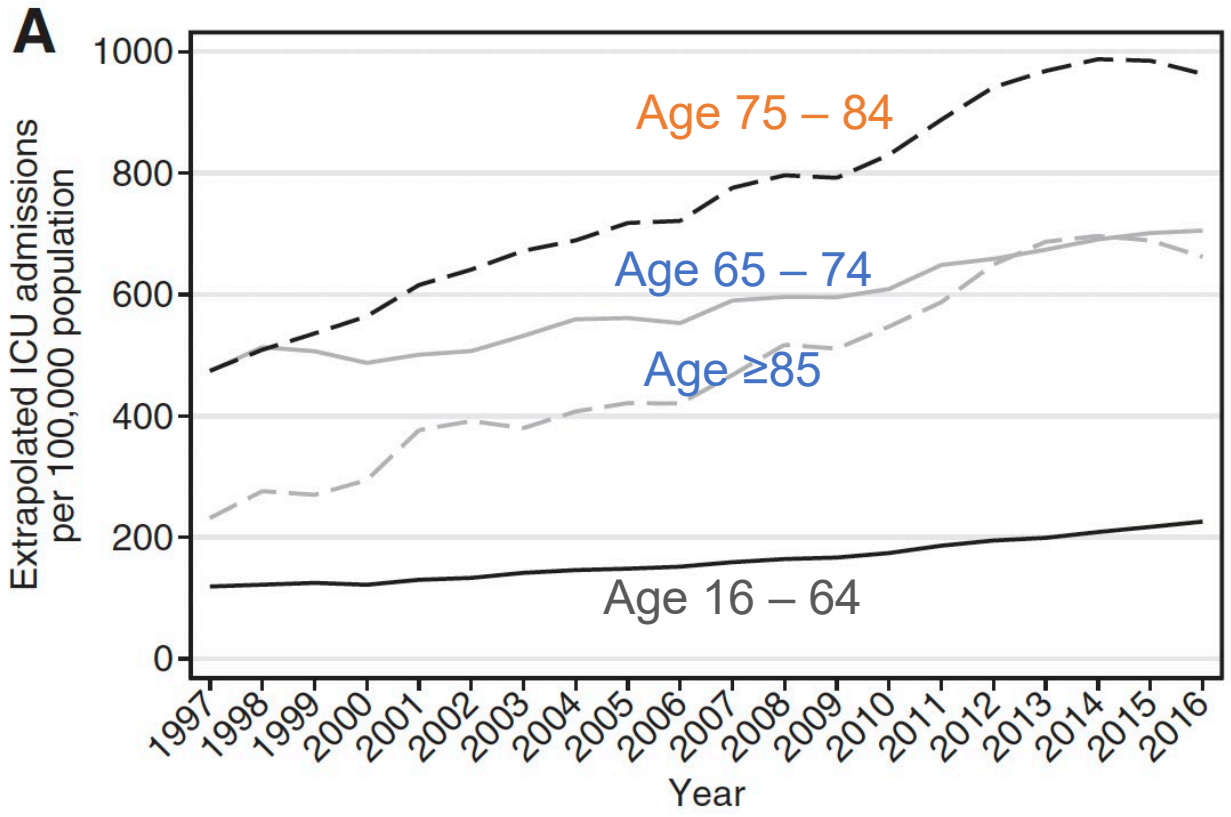


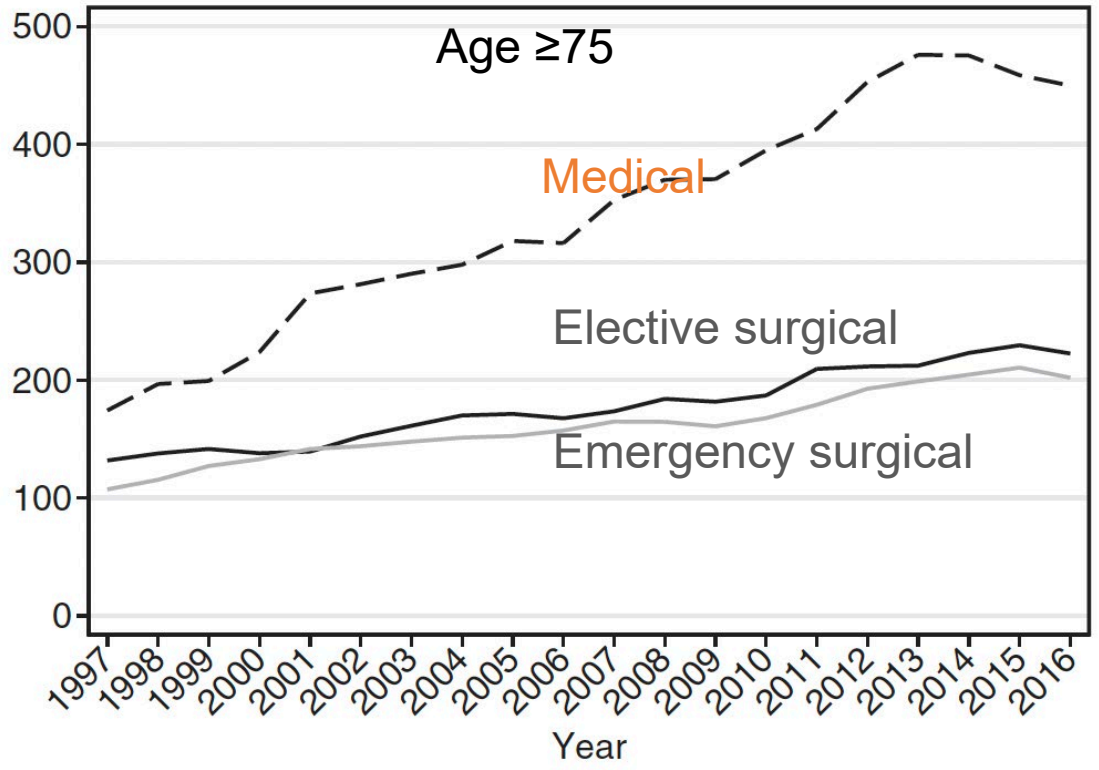
López-Otín C et al., Cell. 2023 Jan 19;186(2):243-278.

Older patients in ICU

ICU admission of older patients is increasing

- Retrospective, 1997 to 2016, England/Wales/Northen Ireland

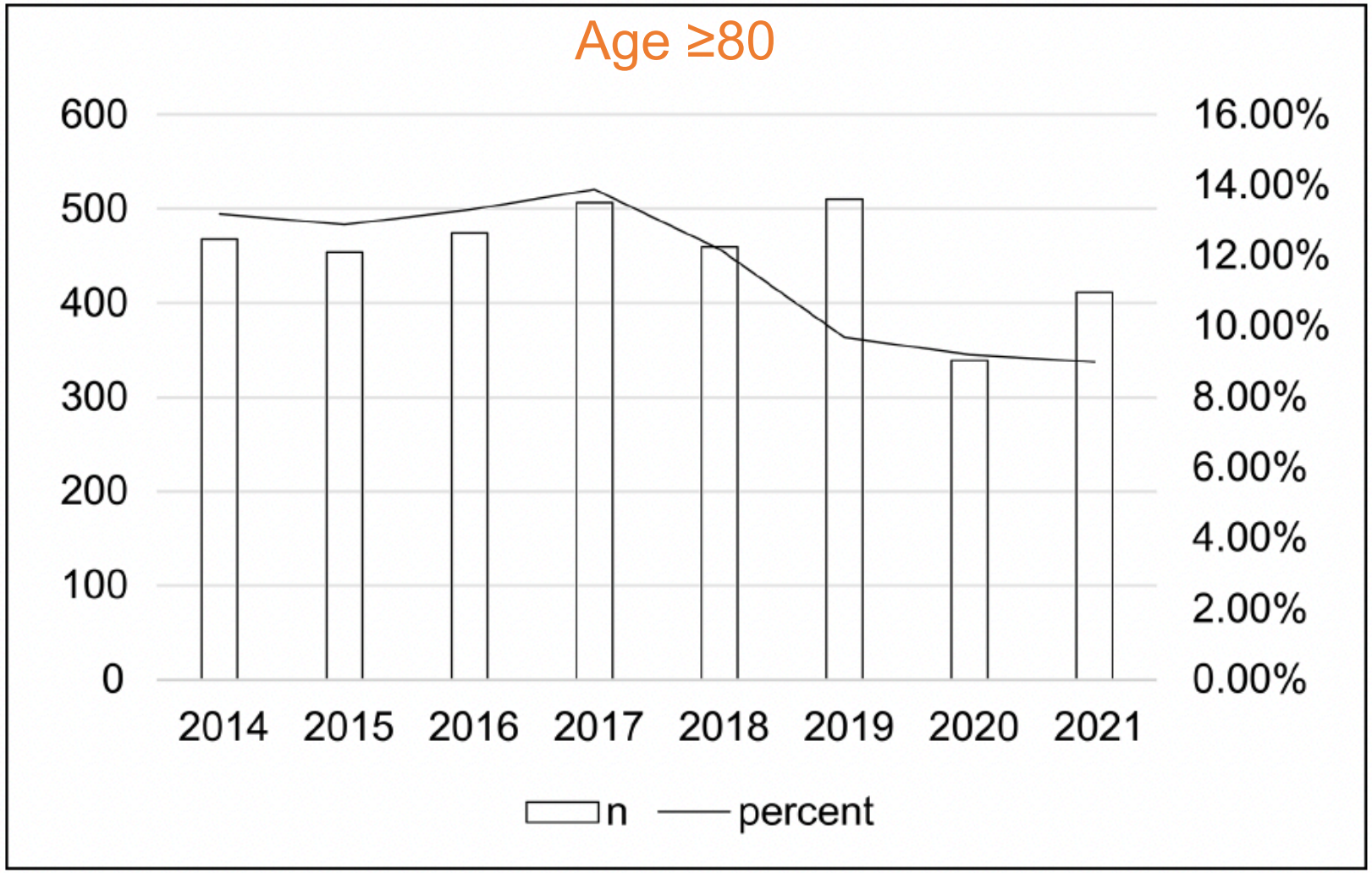




Jones A et al., Crit Care Med. 2020 Apr;48(4):466-474.

ICU admission of older patients is increasing

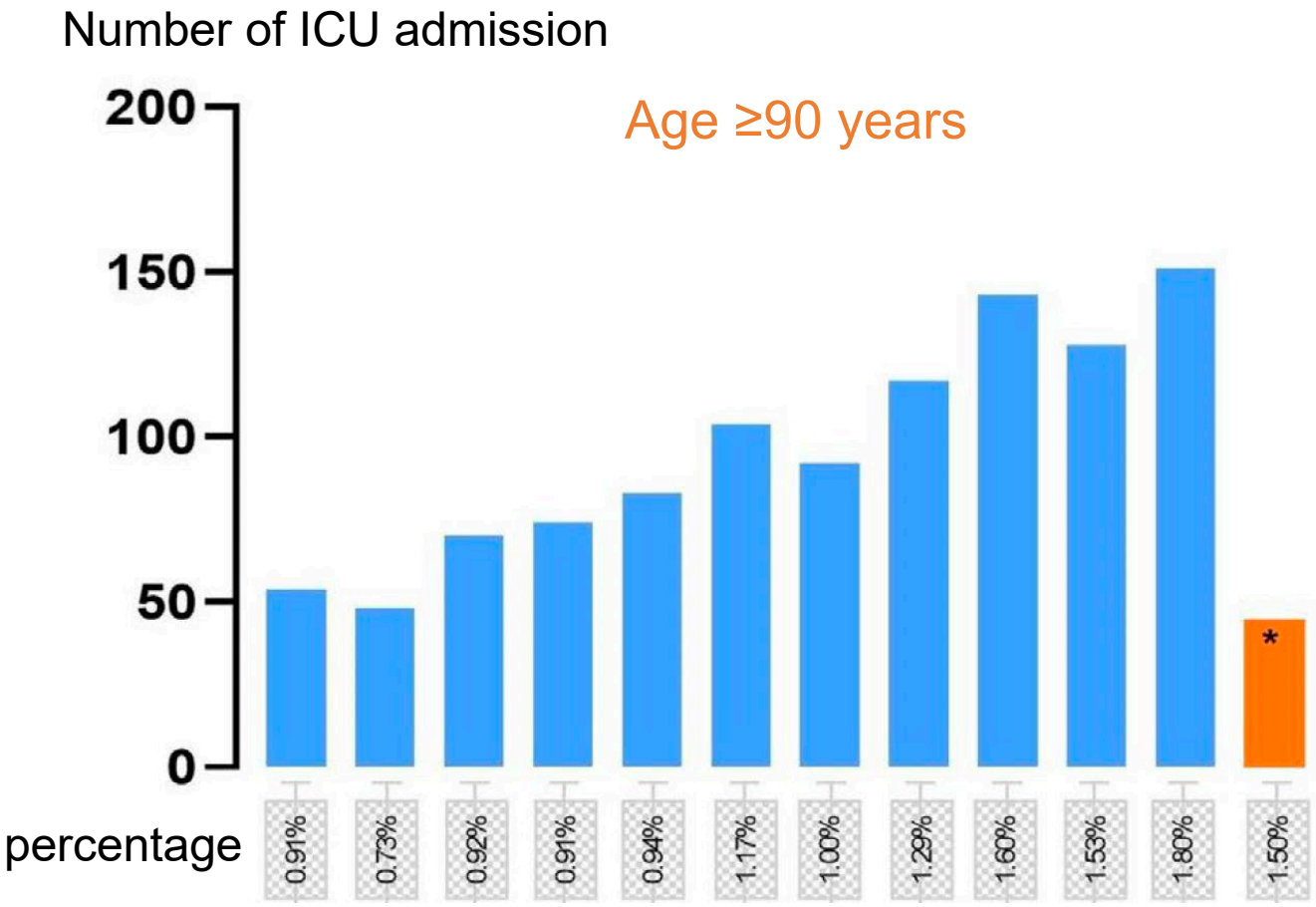
- Retrospective, 2014 – 2021, China

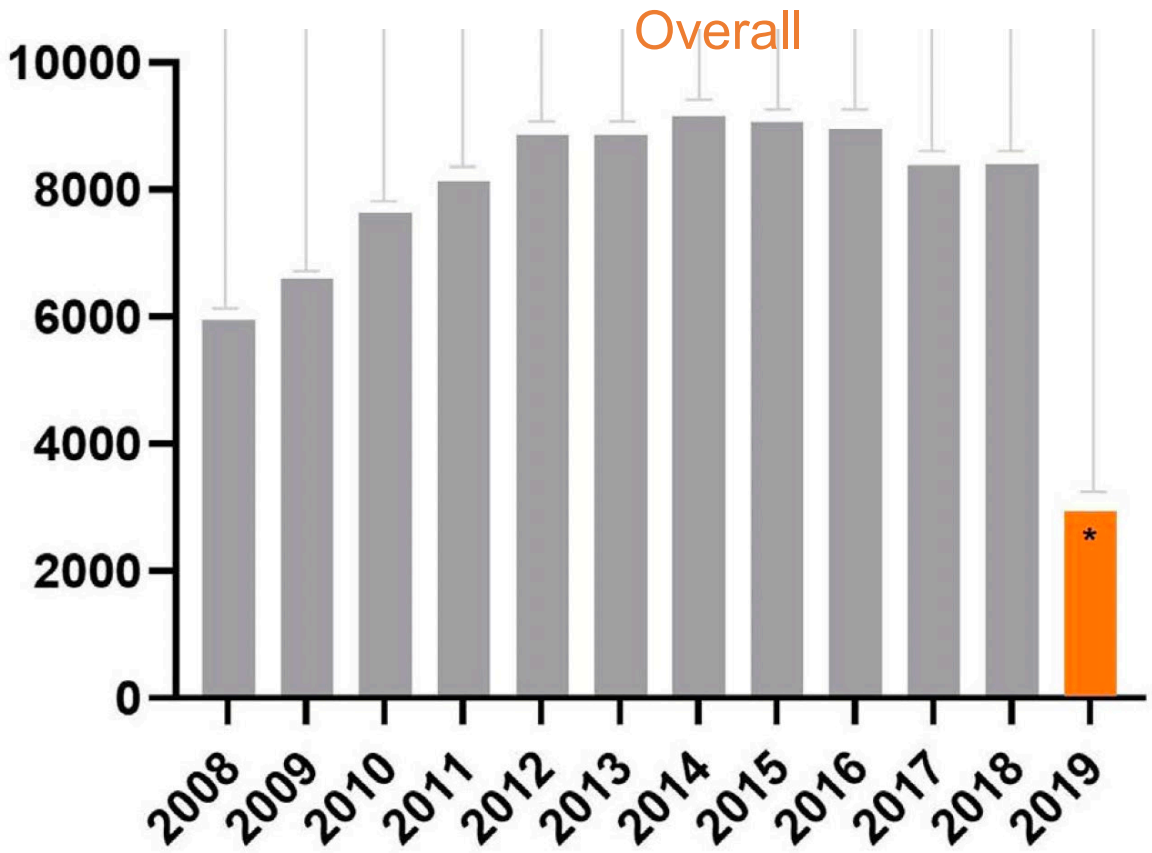


Zhu X et al., PLoS One. 2026 May 15;21(5):e0348768.

ICU admission of older patients is increasing

- Retrospective, 2008 to 2019, Germany

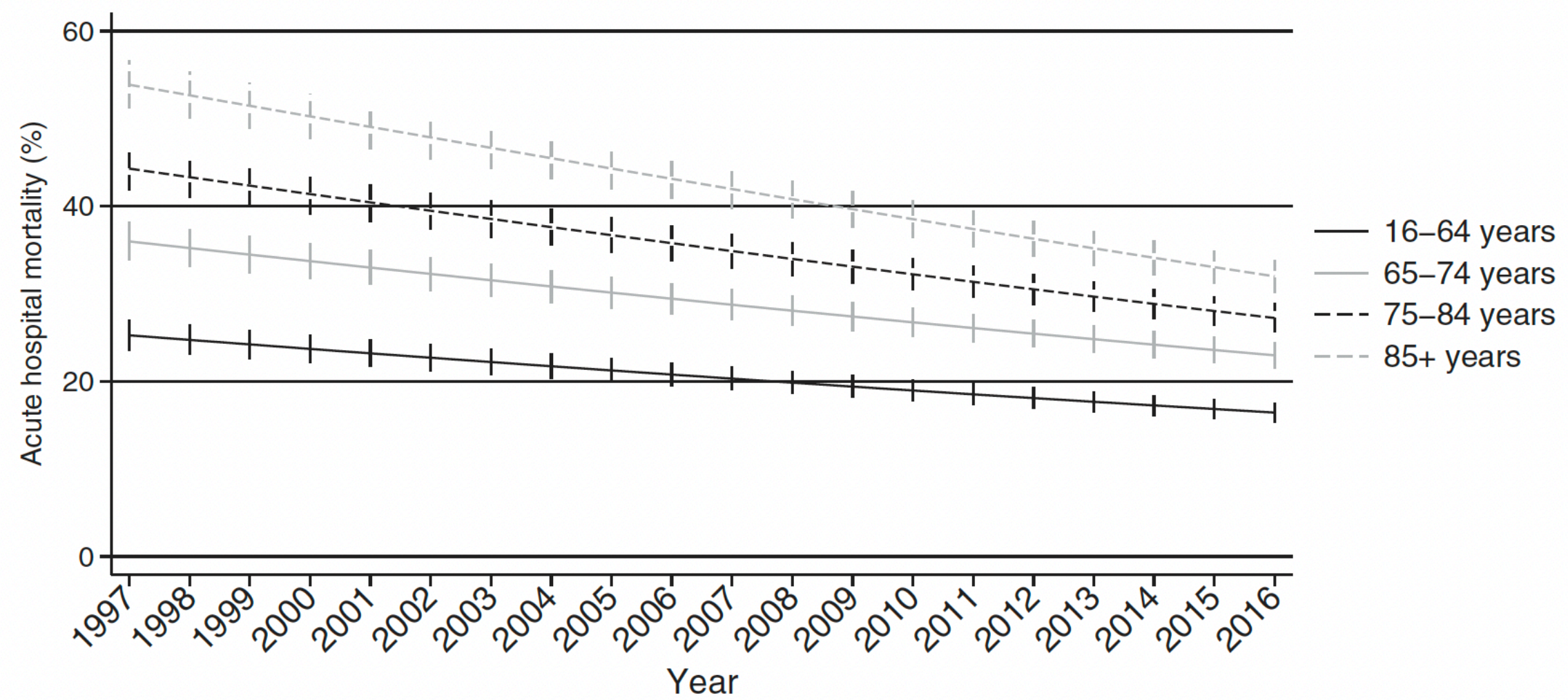




Daniels R et al., Crit Care Med. 2024 Jun 1;52(6):e258-e267.

Outcomes of critical ill older patients

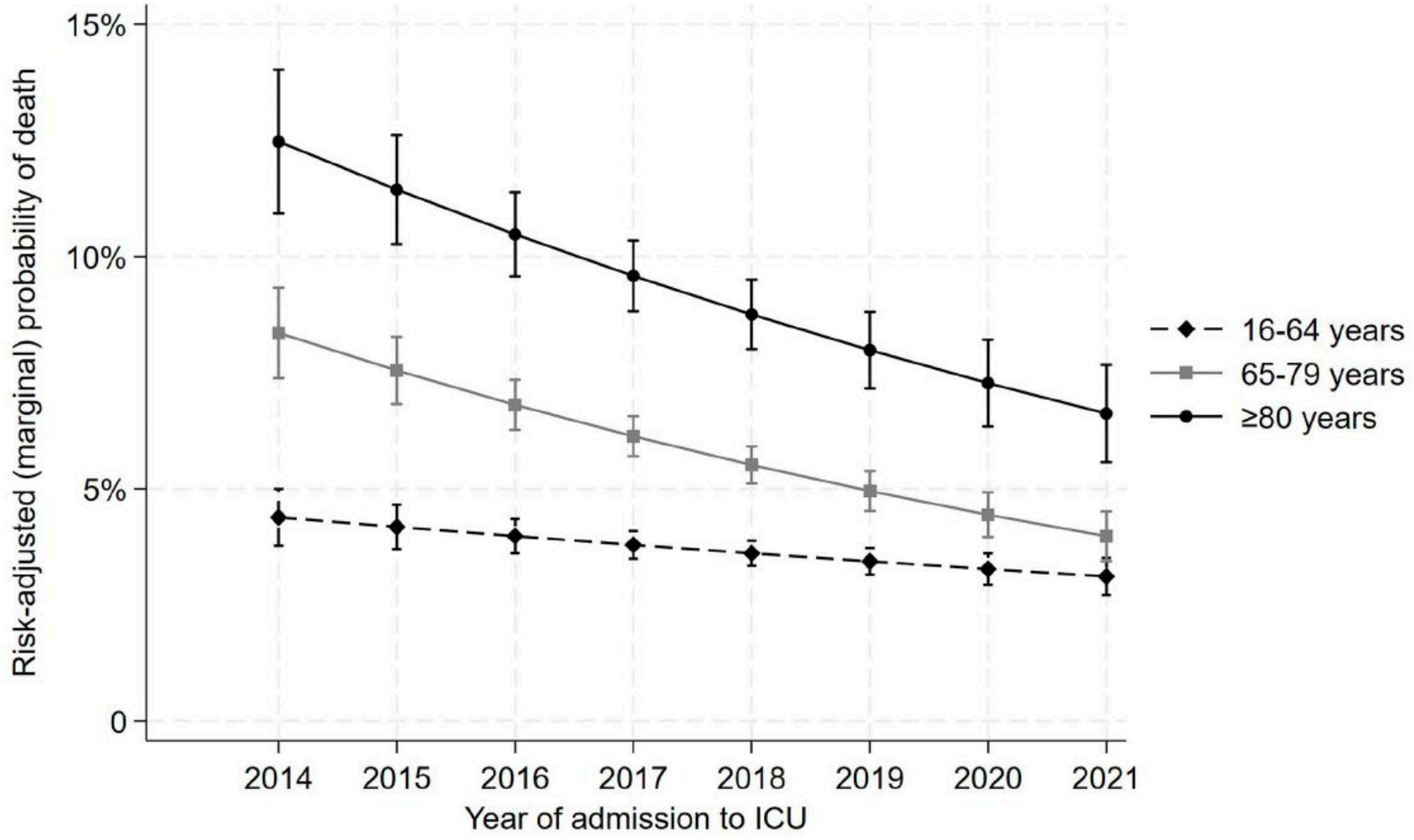
- Retrospective, 1997 to 2016, England/Wales/Northen Ireland



Jones A et al., Crit Care Med. 2020 Apr;48(4):466-474.

Outcomes of critical ill older patients

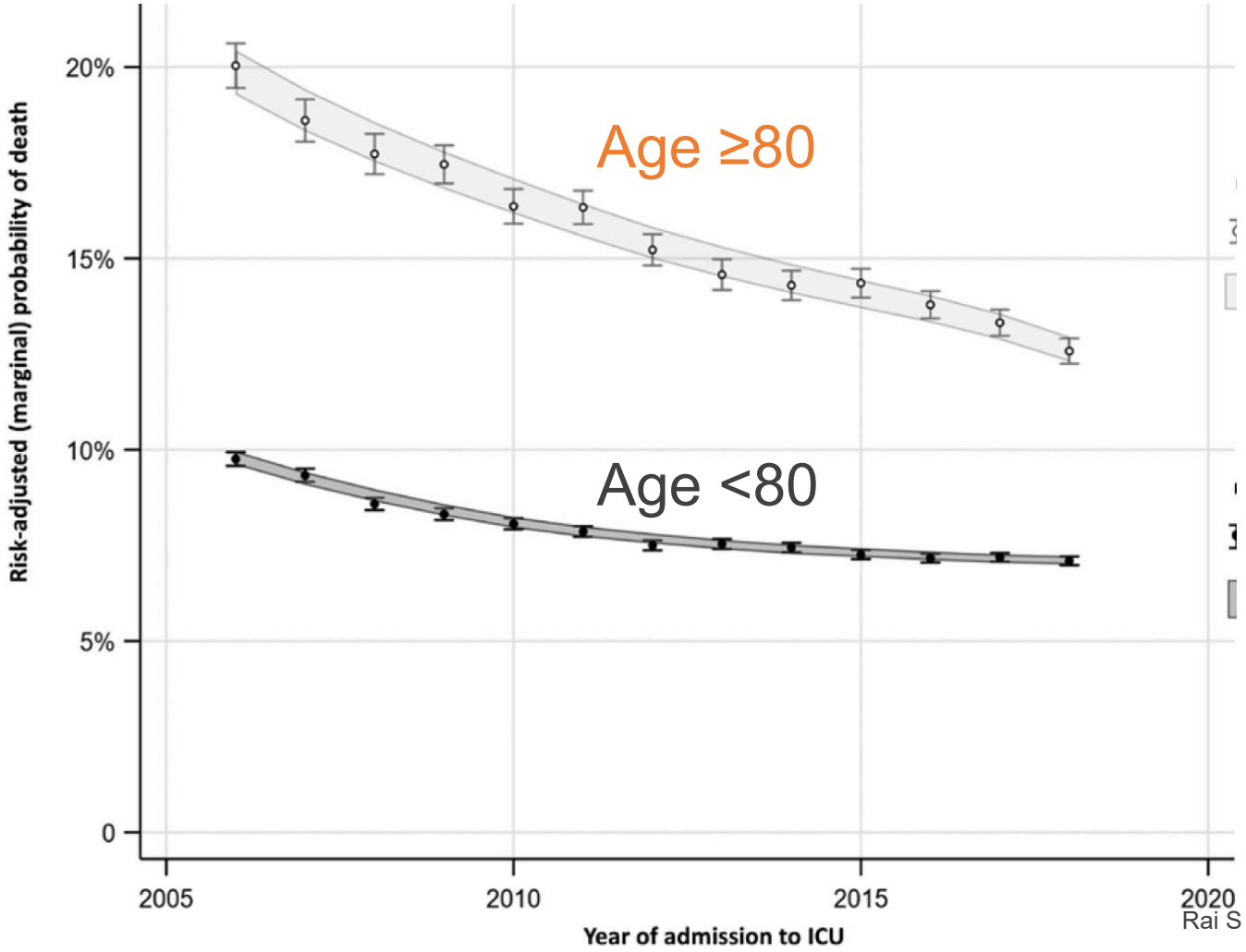
- Retrospective, 2014 – 2021, China



Zhu X et al., PLoS One. 2026 May 15;21(5):e0348768.

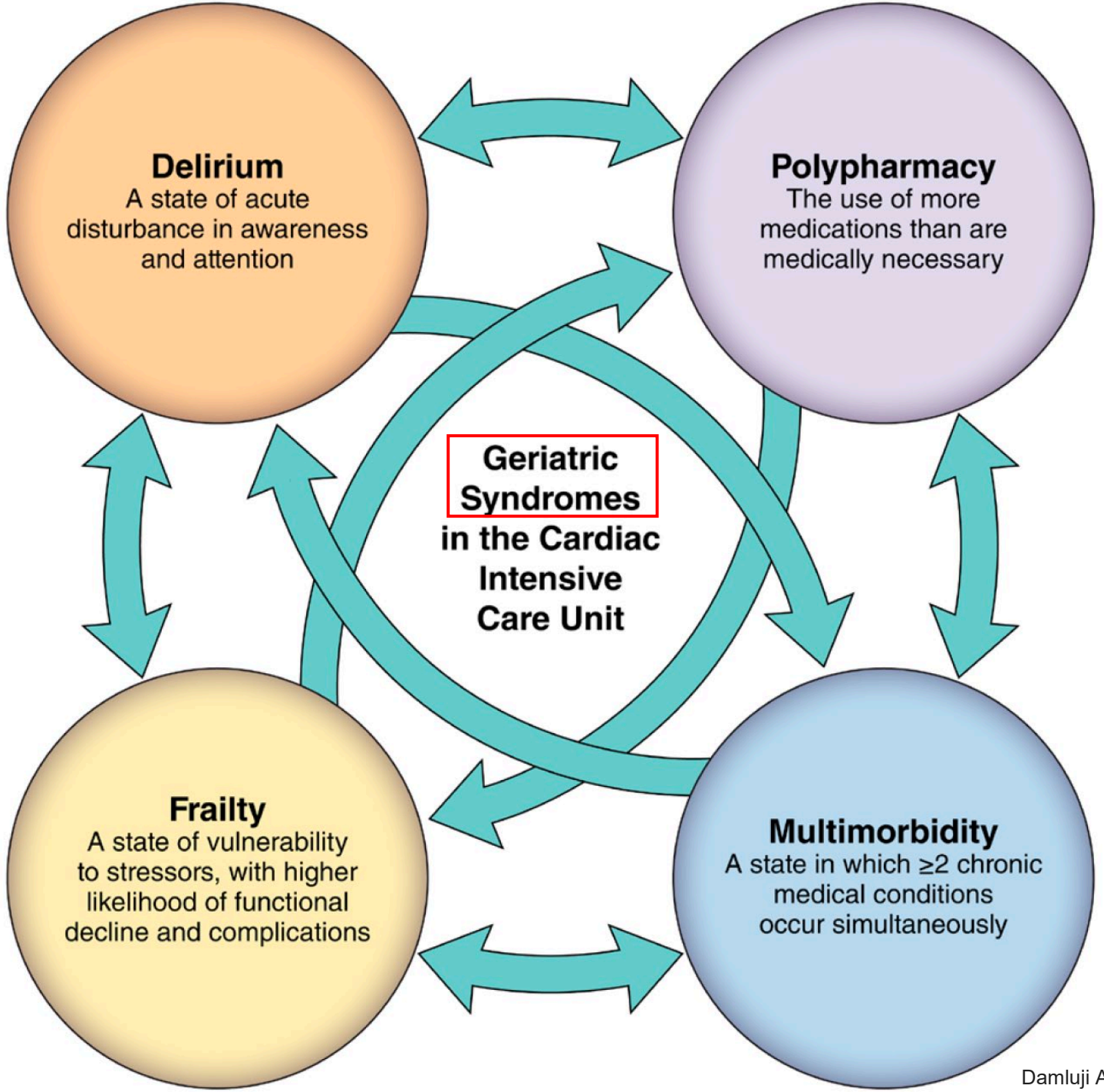
Outcomes of critical ill older patients

- Retrospective, 2006 to 2018, New Zealand



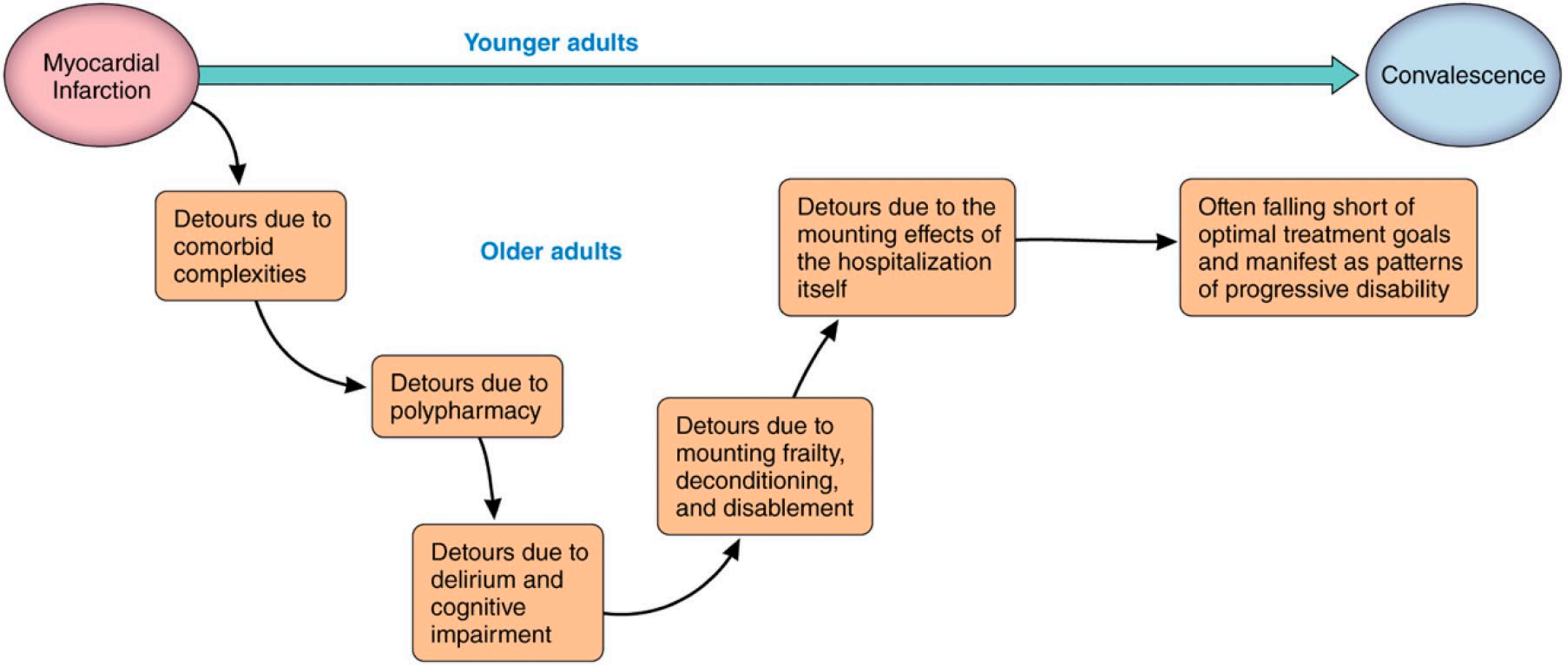
Rai S et al., Crit Care Med. 2023 Oct 1;51(10):1328-1338.

Comprehensive Geriatric Assessment in the ICU



Damluji AA et al., Circulation. 2020 Jan 14;141(2):e6-e32.

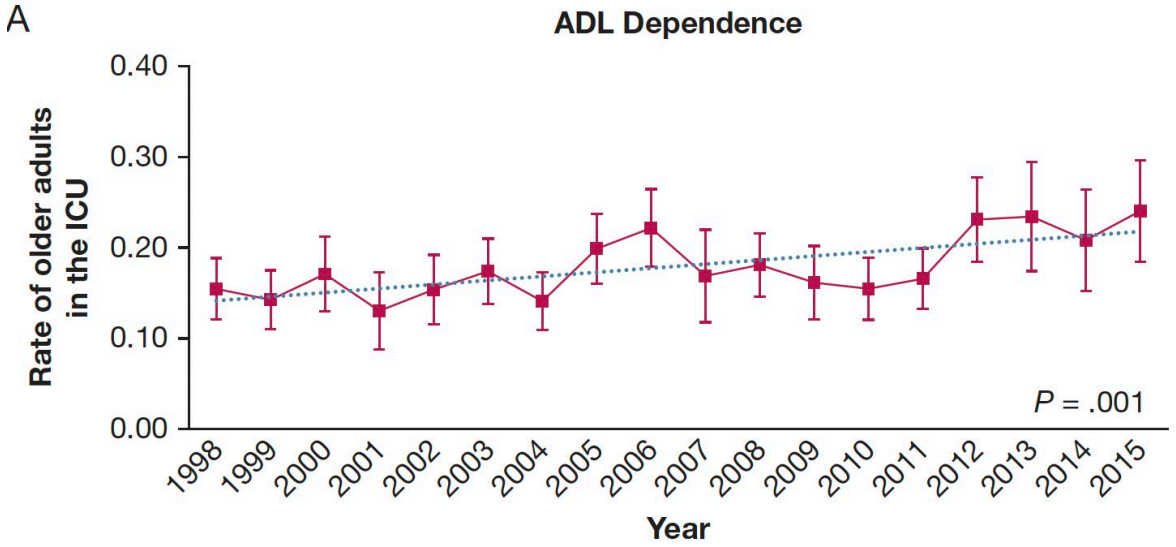
Influence of acute illness on convalescence in younger and older adults

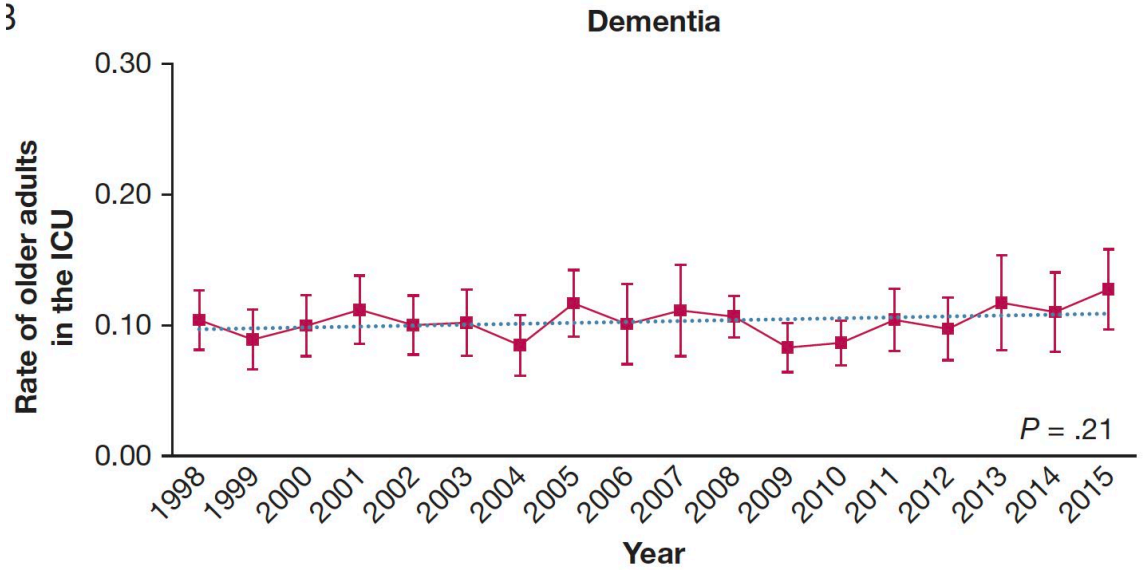


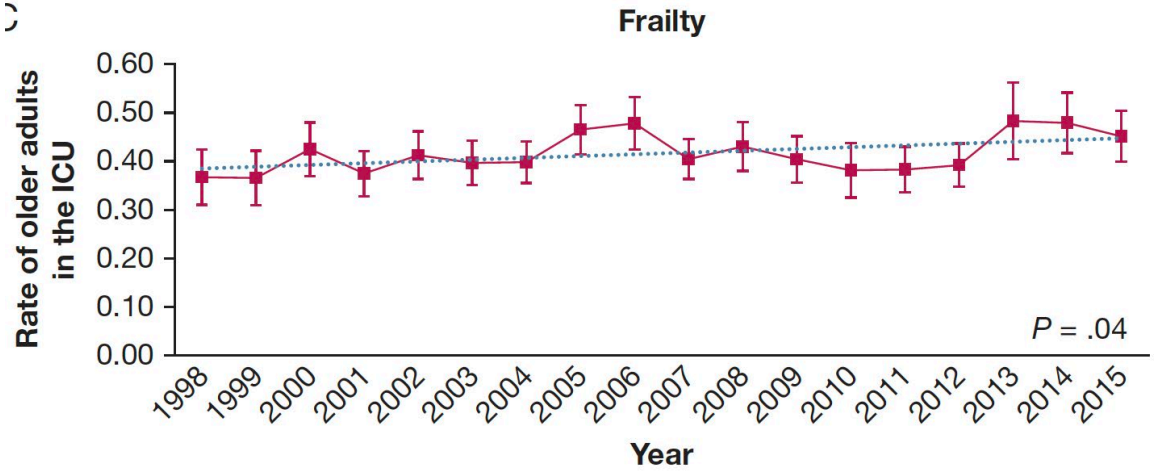
Damluji AA et al., Circulation. 2020 Jan 14;141(2):e6-e32.

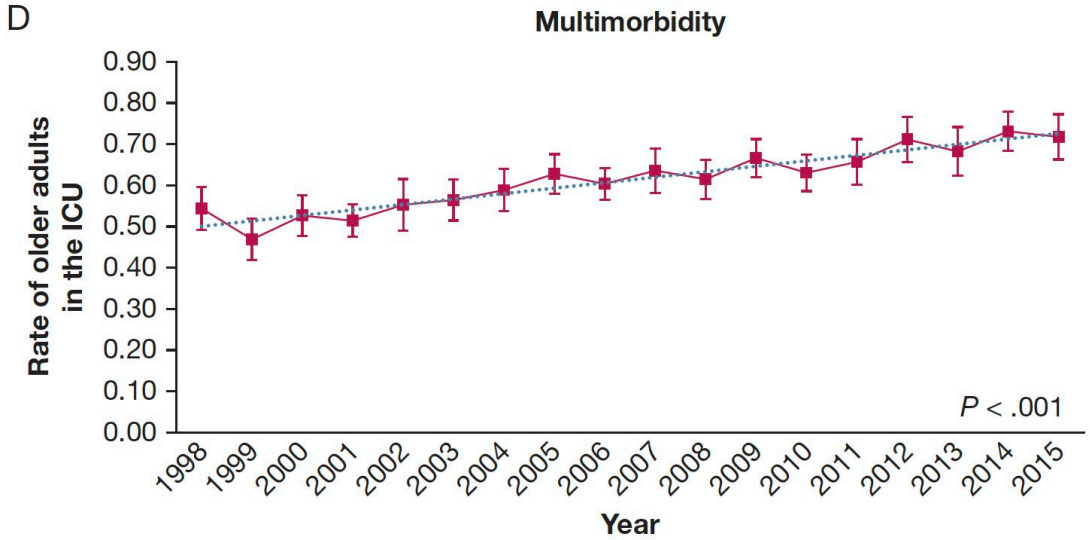
Multimorbidity admission in ICU

- HRS data from US, 1998 to 2015, aged ≥65 years



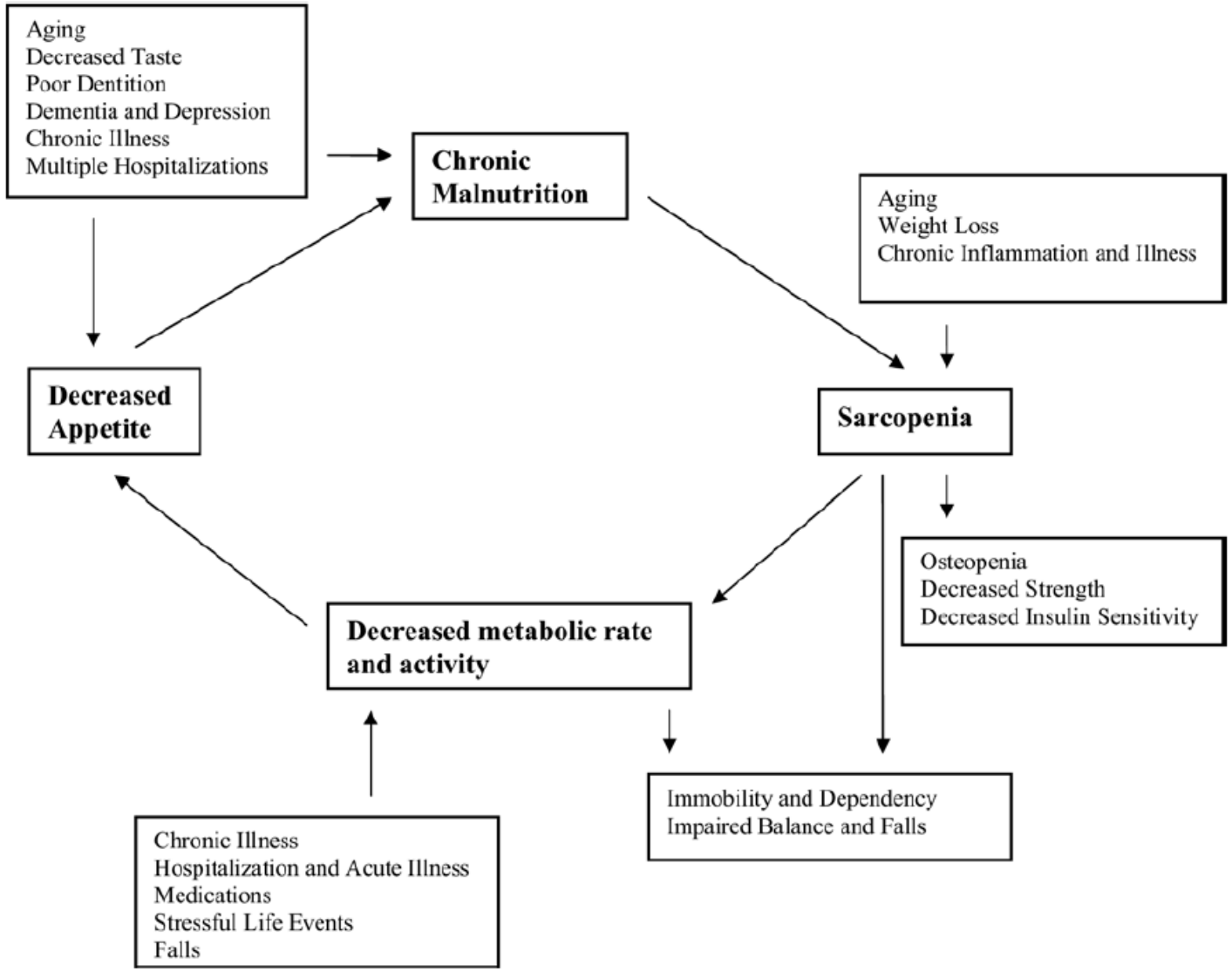






Cobert J et al., Chest. 2022 Jun;161(6):1555-1565

Frailty



- Decreased reserve in multiple organ system

Ahmed et al. Am J Med. 2007 Sep;120(9):748-53.

Frailty

Box 1: The CSHA Clinical Frailty Scale

1 *Very fit* — robust, active, energetic, well motivated and fit; these people commonly exercise regularly and are in the most fit group for their age

2 *Well* — without active disease, but less fit than people in category 1

3 *Well, with treated comorbid disease* — disease symptoms are well controlled compared with those in category 4

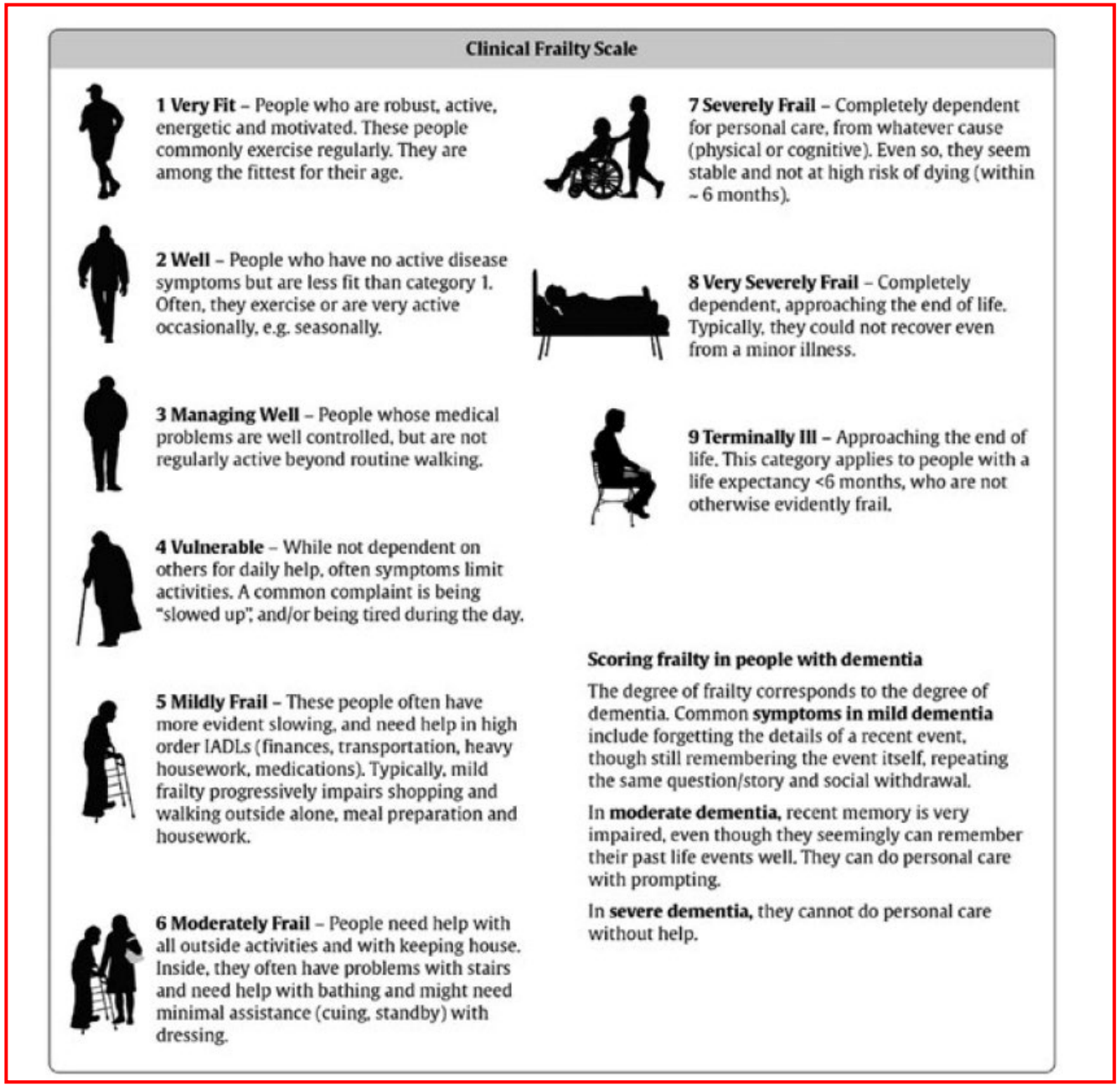
4 *Apparently vulnerable* — although not frankly dependent, these people commonly complain of being "slowed up" or have disease symptoms

5 *Mildly frail* — with limited dependence on others for instrumental activities of daily living

6 *Moderately frail* — help is needed with both instrumental and non-instrumental activities of daily living

7 *Severely frail* — completely dependent on others for the activities of daily living, or terminally ill

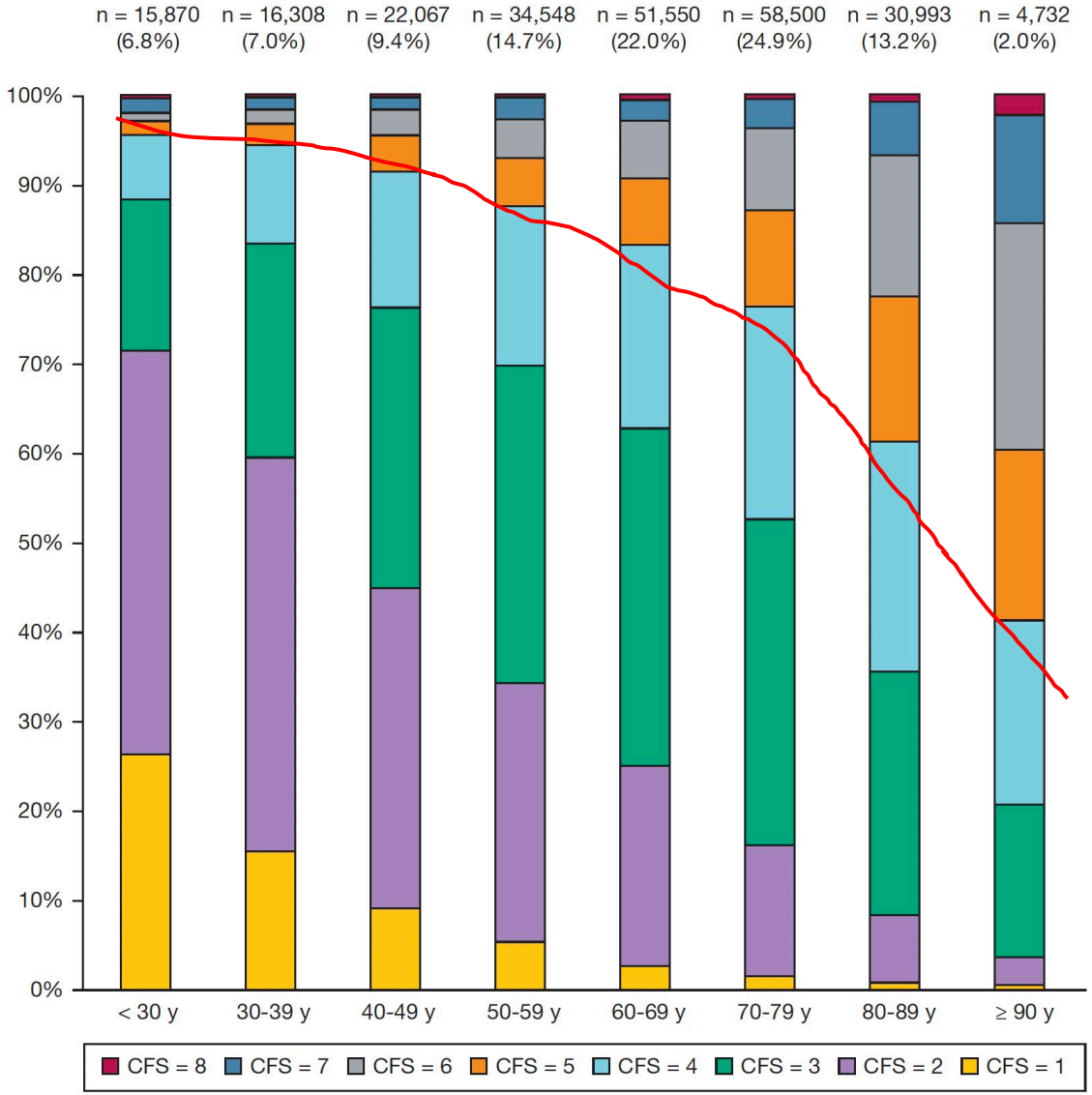
Note: CSHA = Canadian Study of Health and Aging.

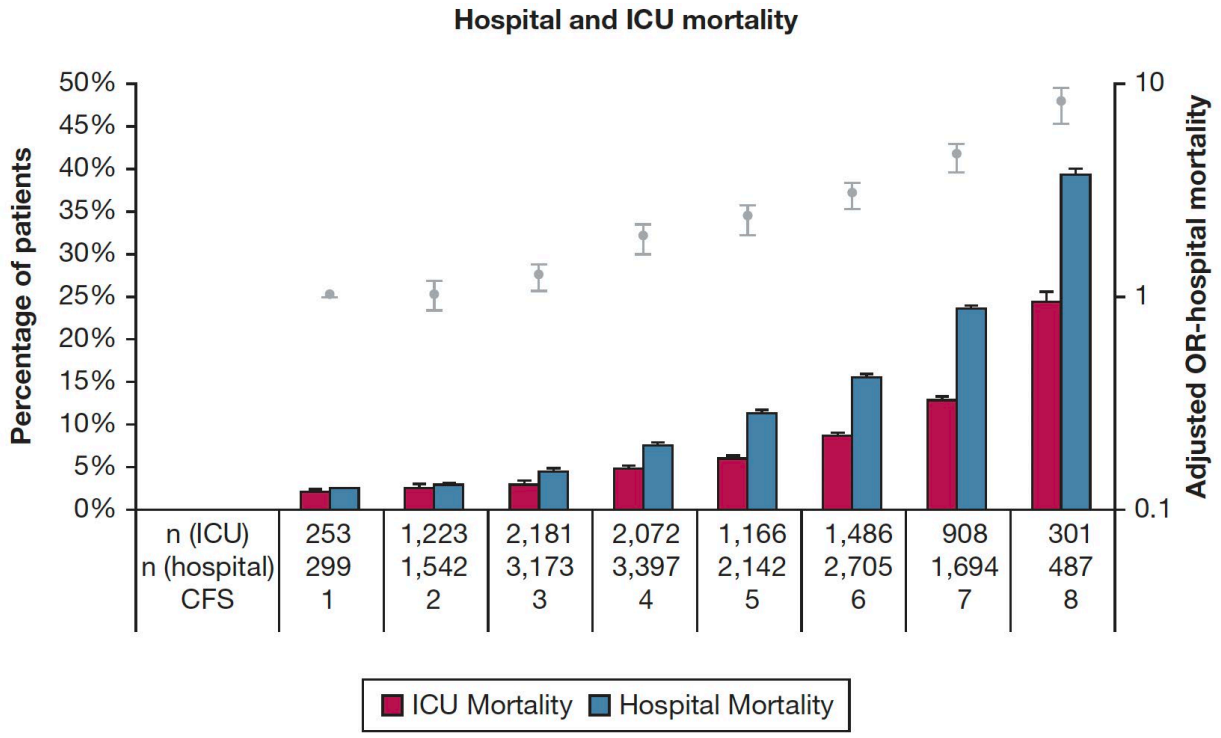


Rockwood et al., CMAJ. 2005 Aug 30;173(5):489-95.

Prevalence of frailty in ICU

- Population-based, New Zealand and Australia, 2018 to 2020

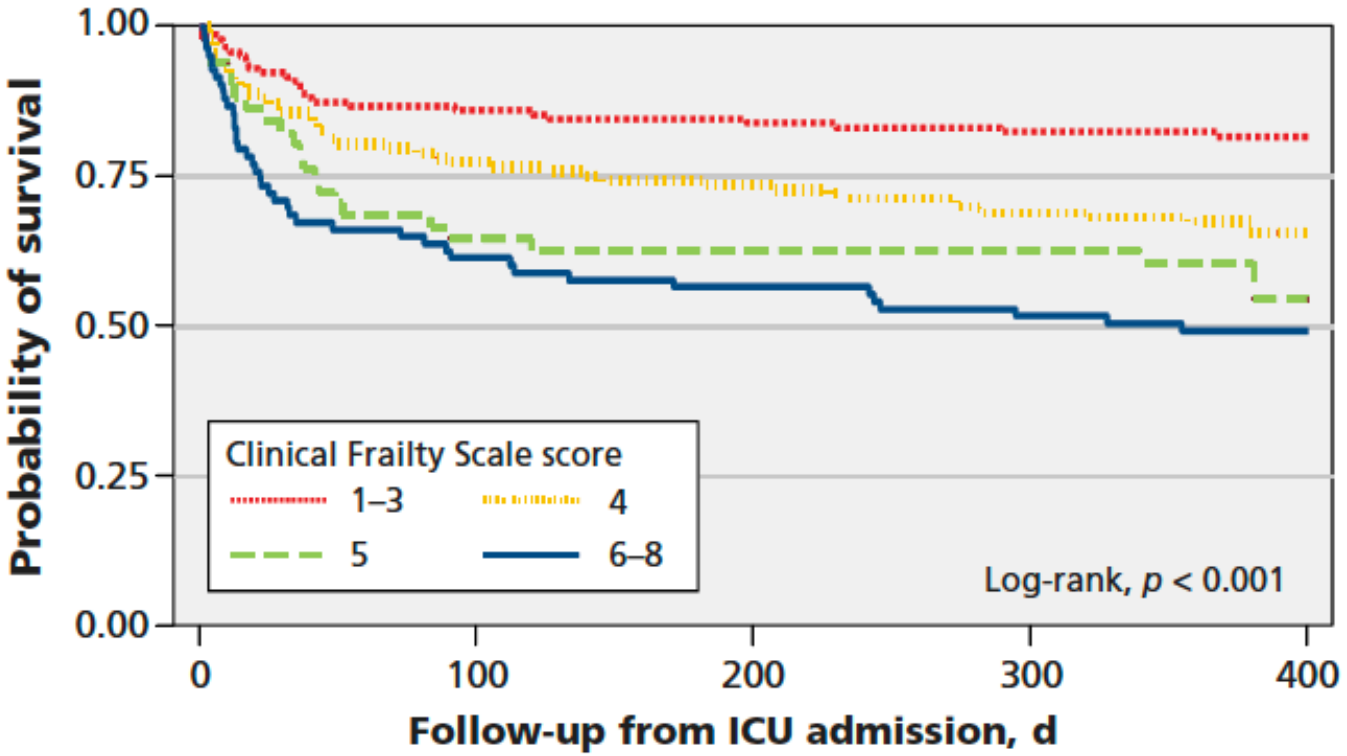




Darvall JN et al., Chest. 2021 Oct;160(4):1292-1303.

Frailty is associated mortality

- **Prospective cohort study in Canada**
- **Patients aged ≥50 years and admitted to ICU**
- **N=421**
- **CFS ≥5 = Frail**



Bagshaw et al. CMAJ. 2014 Feb 4;186(2):E95-102.

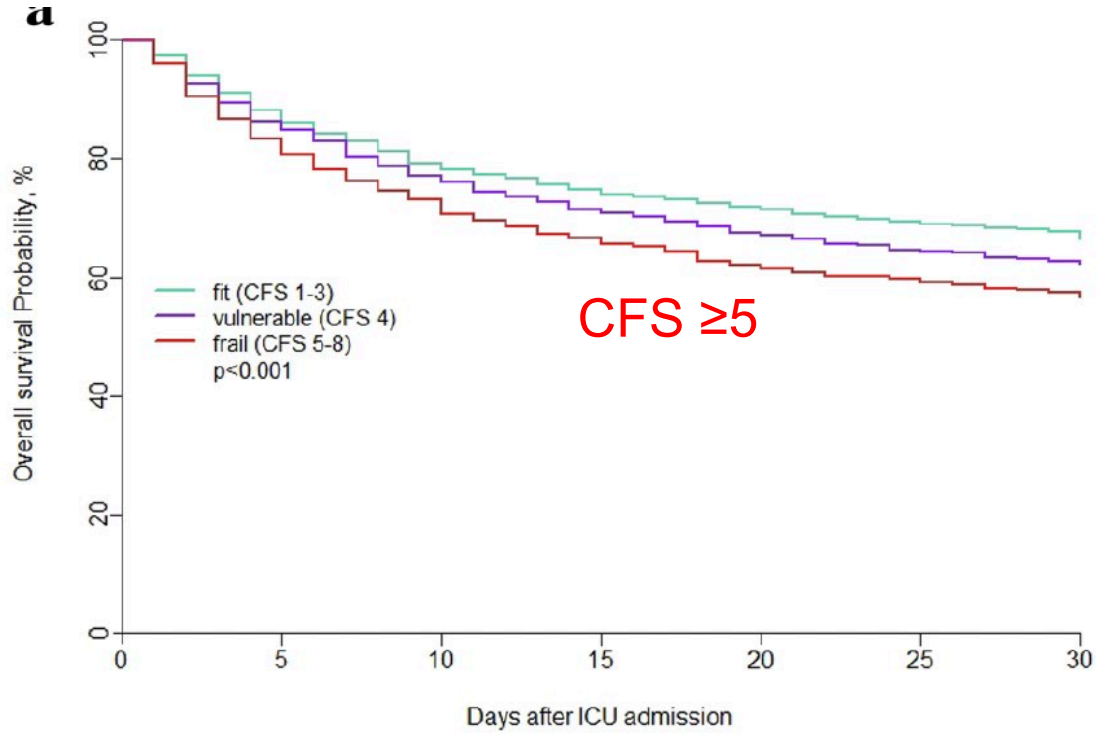
Frailty independently associated with mortality

VIP2

- Prospective, EU, 2018 to 2019, Age ≥80 years, N=3,920

Variables	Categories	ALL covariates		CFS	
		HR (95%CI)	*p*-value	HR (95%CI)	*p*-value
Age	One-point increase	1.02 (1–1.03)	0.01	1.02 (1.01–1.03)	0.006
Habitat (ref = not home)	Own home	1.01 (0.9–1.14)	0.83	1 (0.89–1.12)	0.96
Gender (ref = male)	Female	0.98 (0.88–1.09)	0.68	0.98 (0.88–1.09)	0.67
Reason for admission	Combined respiratory/circulatory failure	1.07 (0.89–1.29)	0.46	1.07 (0.89–1.29)	0.46
(Ref = circulatory failure)	Emergency surgery	0.64 (0.52–0.78)	< 0.0001	0.64 (0.52–0.78)	< 0.0001
	Multitrauma w/wo head injury	1.16 (0.81–1.64)	0.41	1.15 (0.81–1.64)	0.42
	Multitrauma without head injury	0.86 (0.58–1.29)	0.46	0.87 (0.58–1.29)	0.48
	Other	0.81 (0.67–0.97)	0.025	0.81 (0.67–0.98)	0.03
	Respiratory failure	0.81 (0.69–0.96)	0.017	0.82 (0.69–0.97)	0.02
	Sepsis (according to Sepsis3)	0.71 (0.59–0.86)	0.0003	0.71 (0.59-0.86)	0.0003
SOFA	One-point increase	1.15 (1.14–1.17)	< 0.00001	1.15 (1.14–1.17)	< 0.00001
CPS	One-point increase	1 (0.99–1.01)	0.75	1 (0.99–1.01)	0.74
CFS	One point increase	1.1 (1.05–1.15)	0.0001	1.12 (1.09–1.15)	< 0.0000

1-month mortality



CFS HR, 1.1

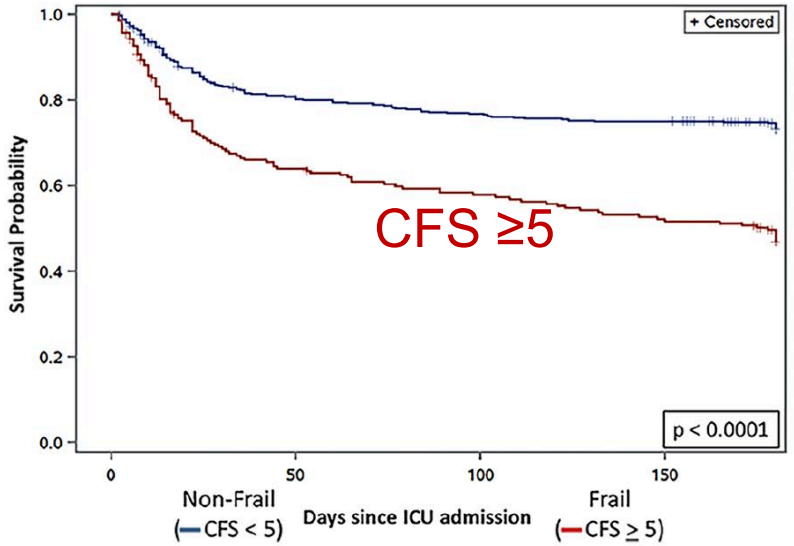
Guidet B et al., Intensive Care Med. 2020 Jan;46(1):57-69.

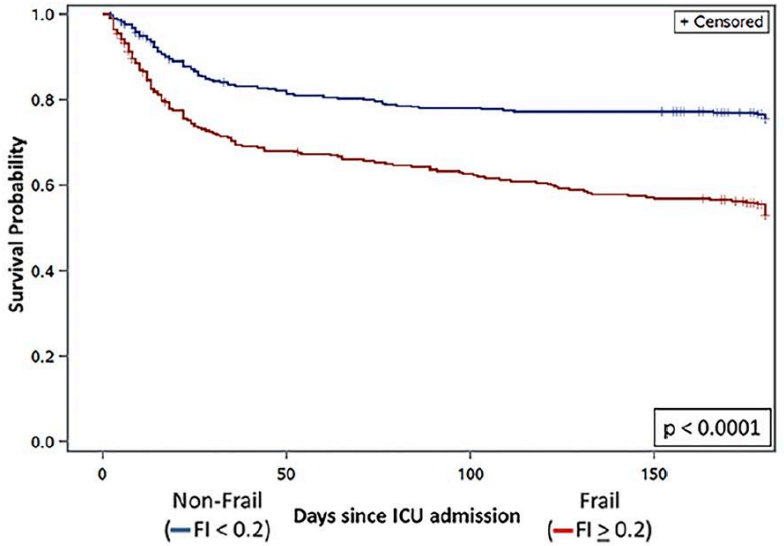
Frailty is associated mortality and functional dependence

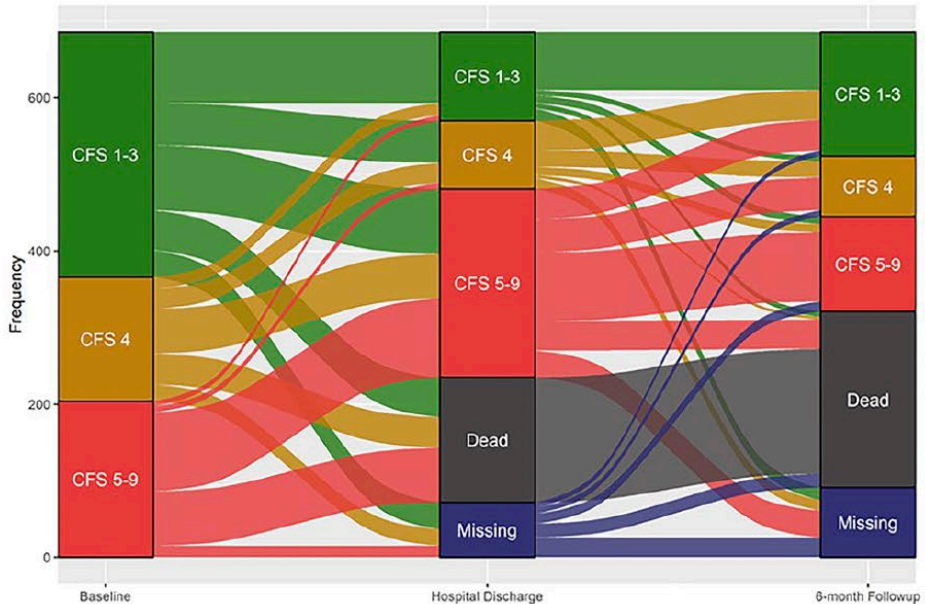
FORECAST

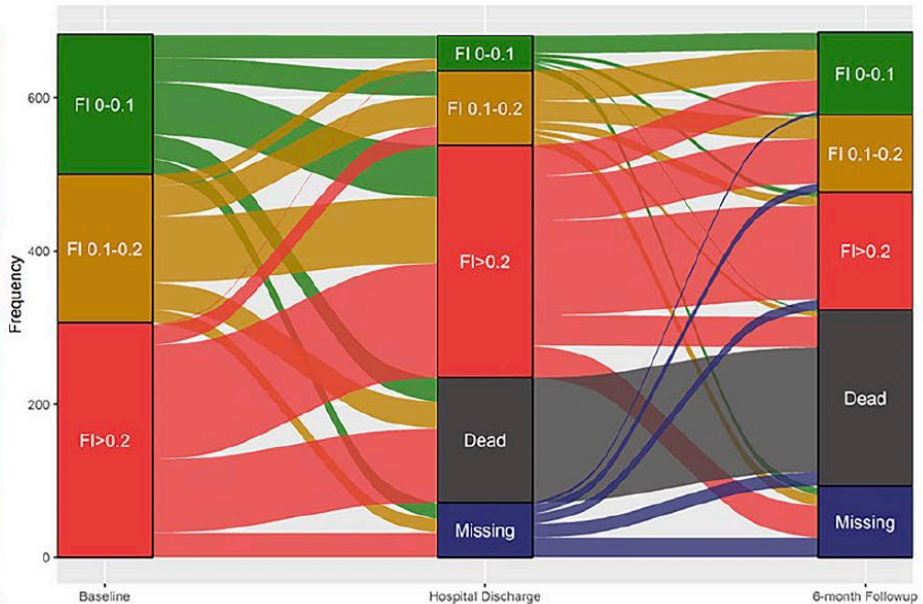
- Prospective, multicenter, Canada
- 2019 to 2021, Age ≥50 years, N=687
- Comparison between CFS vs frailty index

Muscedere J et al., Intensive Care Med. 2024 Jul;50(7):1064-1074.



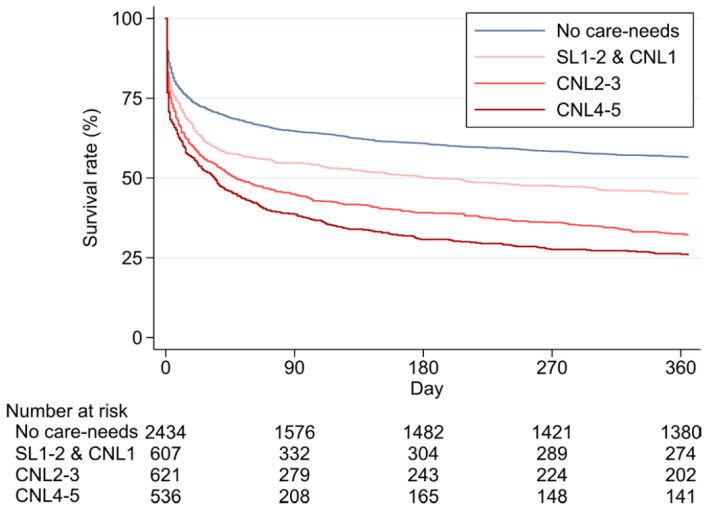


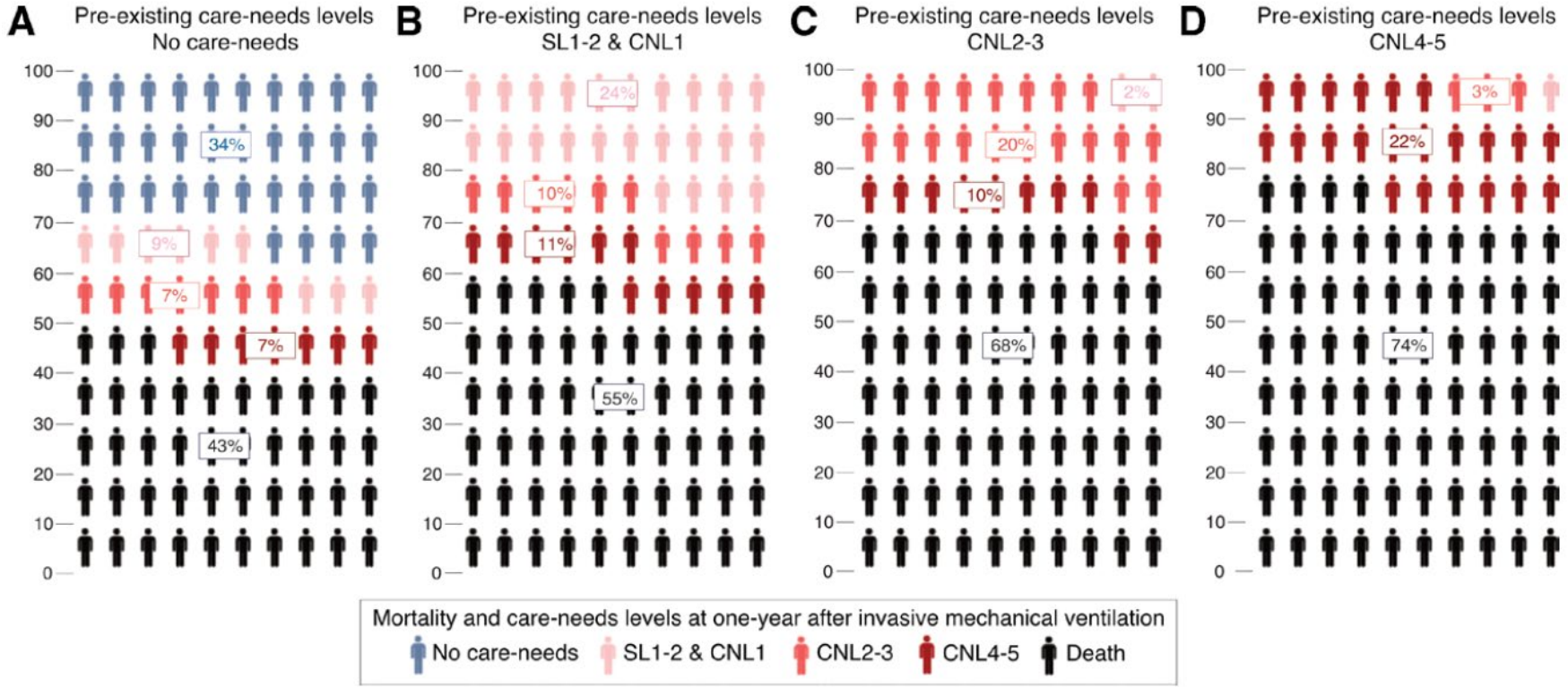




One-Year Functional Outcomes After Invasive Mechanical Ventilation for Older Adults (≥65 years)

Population-based cohort study in Tochigi Prefecture, Japan (n=4,198).





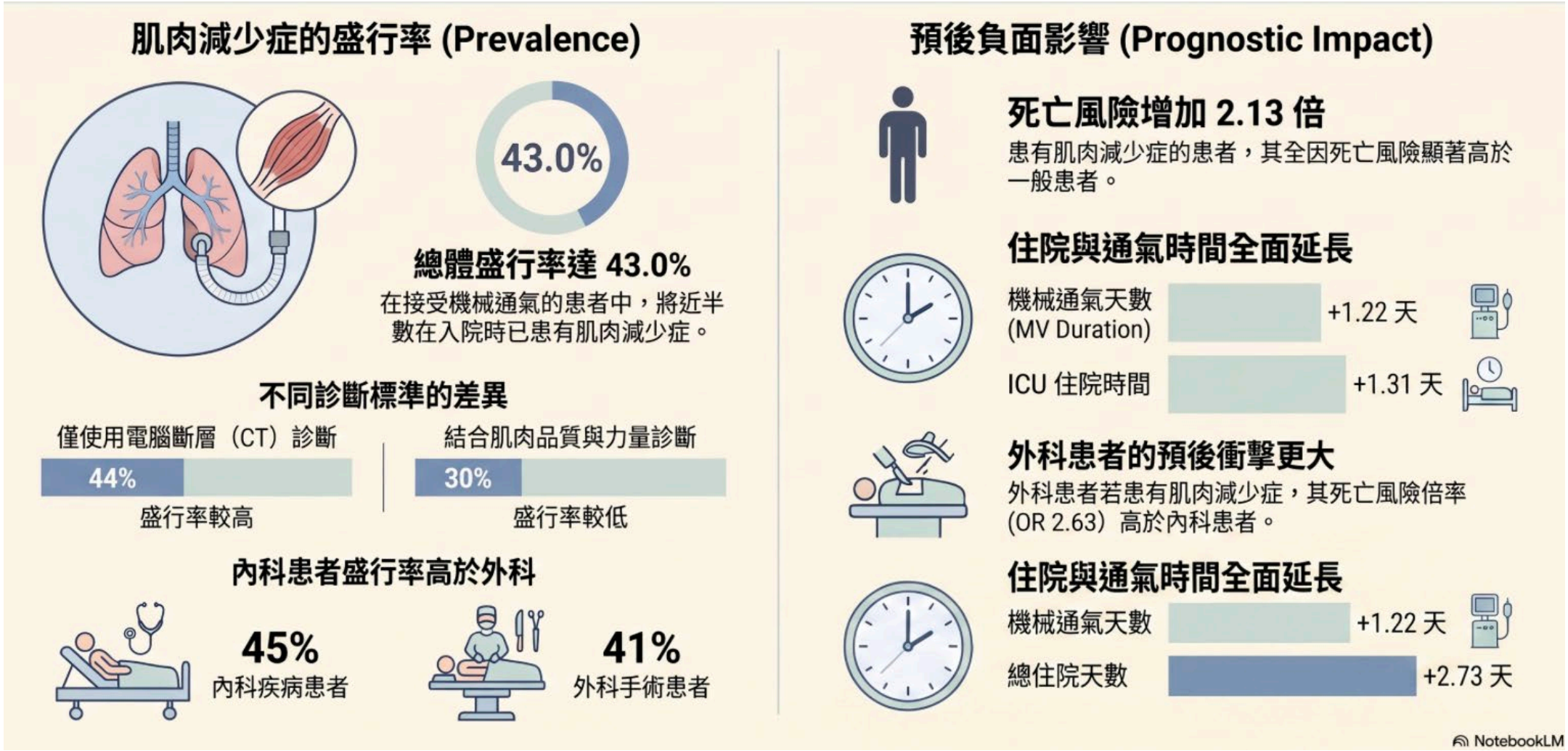
Among patients in preexisting care-needs levels 2-5 who received invasive mechanical ventilation, 76.0-79.2% died or had worsened care-needs within 1 year.

Ohbe et al., Crit Care Med. 2023 May 1;51(5):584-593.

Sarcopenia and Malnutrition

Systematic review and meta-analysis

- 17 studies, patients with mechanical ventilation, n=3,582



Jiang T et al., Crit Care. 2022 May 16;26(1):140.

Sarcopenia is independently associated with difficult weaning and mortality

Data from Chang Gung, Taiwan

- Retrospective, 2013 to 2014, surgical ICU patients with mechanical ventilation
- N=86, median age **73 years**, **31.3%** had **sarcopenia**

Psoas muscle mass at L3 level

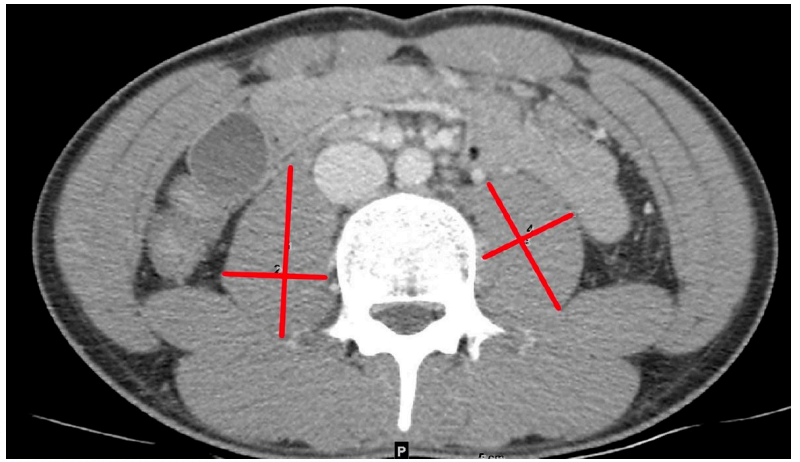


Table 5. Multivariate logistic regression analysis of independent predictive factors for weaning outcome and ICU mortality.

Variables	Difficult-to-wean			ICU mortality		
	OR	95% CI	*P* value	OR	95% CI	*P* value
Sarcopenia	4.767	1.094–20.772	**0.038**	5.071	1.059–24.277	**0.042**
Emergent operation	-	-	NS	5.866	1.152–29.873	**0.033**
Sepsis	-	-	NS	-	-	NS
APACHE II score	1.440	1.201–1.726	**<0.001**	-	-	NS
SOFA score	-	-	NS	1.414	1.116–1.791	**0.004**
Creatinine (mg/dl)	-	-	NS	-	-	NS
Albumin (g/dl)	-	-	NS	-	-	NS
RR<30 breaths/min	0.047	0.002–0.918	**0.044**			
Vt >5 ml/kg	0.063	0.009–0.421	**0.004**			
RSBI <105	0.030	0.001–0.923	**0.045**			

Kou HW et al., PLoS One. 2019 Aug 8;14(8):e0220699.

Sarcopenia is independently associated with difficult weaning and mortality

- Retrospective, 2014 to 2019, Korea
- Patients with MV ≥7 days, n=45
- Extubation failure (n=34) vs extubation success (n=11)

Psoas muscle mass at L3 level

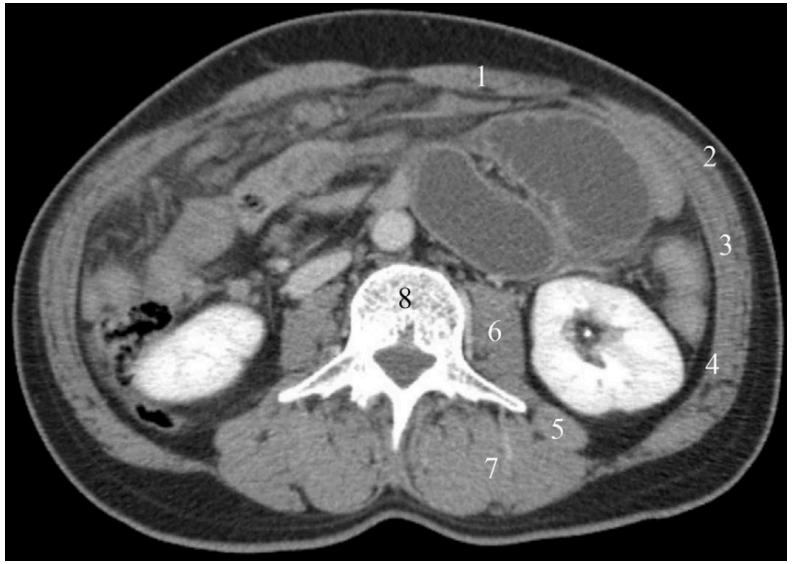


Table 5
Multivariate analysis of risk factors for extubation failure after long-term mechanical ventilation.

	p - value	OR (95% CI)
Duration of mechanical ventilation (days)	0.004	1.439 (1.12–1.85)
Decreased skeletal muscle mass	0.050	24.382 (0.10–594.86)

OR, odds ratio; CI, cofidence interval.

Woo HY, et al. Clin Nutr. 2020 Sep;39(9):2764-2770.

Sarcopenia is independently associated with difficult weaning and mortality

- Retrospective, 2017 to 2019, Korea
- Patients with brain injury and MV, N=73
- Successful liberation (n=61) vs failure liberation (n=12)

Thoracic skeletal muscle volume

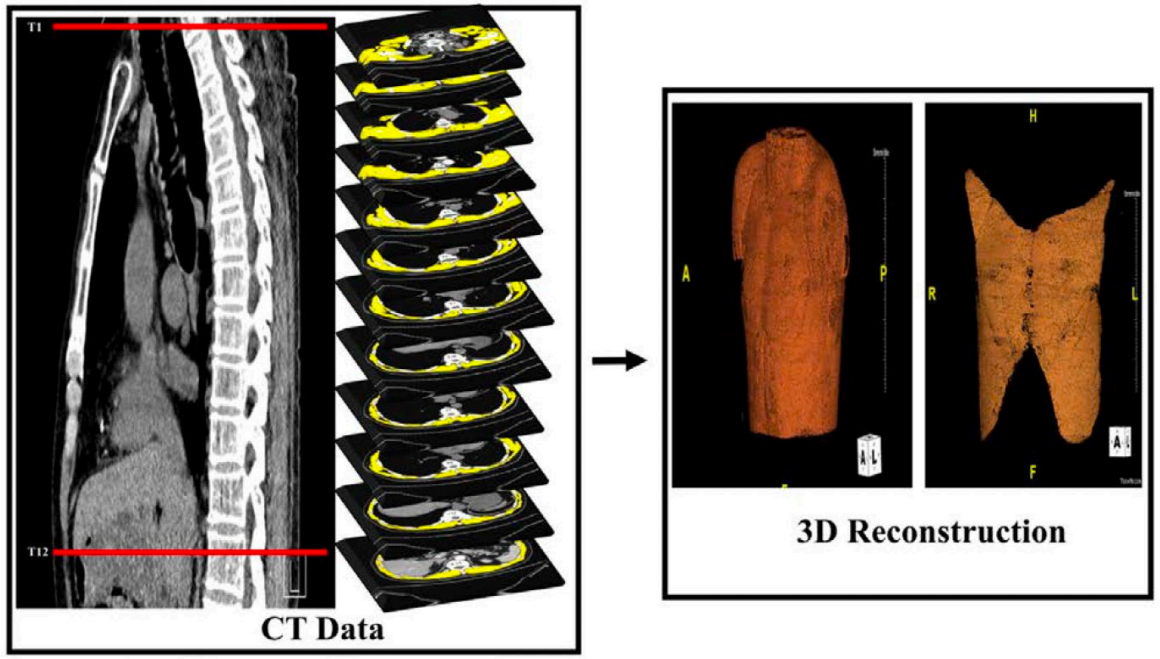


Table 2

Predictors associated with liberation failure in study patients.

	Univariate		Multivariate	
Variables	**Odds ratio (95% CI)**	***P* value**	**Odds ratio (95% CI)**	***P* value**
Sarcopenia	9.28 (2.42–38.93)	.001	12.72 (2.87–70.48)	**.001**
Sex (female)	1.19 (0.29–4.32)	.792		
Age, years	1.02 (0.98–1.07)	.429		
Body mass index, kg/m^2	1.02 (0.05–7.18)	.987		
Cardiology cause	1.30 (0.06–9.86)	.824		
Pulmonary cause	2.07 (0.59–8.42)	.274		
SOFA at procedure day	1.35 (1.04–1.79)	.029	1.43 (1.07–2.03)	**.024**
LIS at procedure day	1.23 (0.53–2.80)	.620		

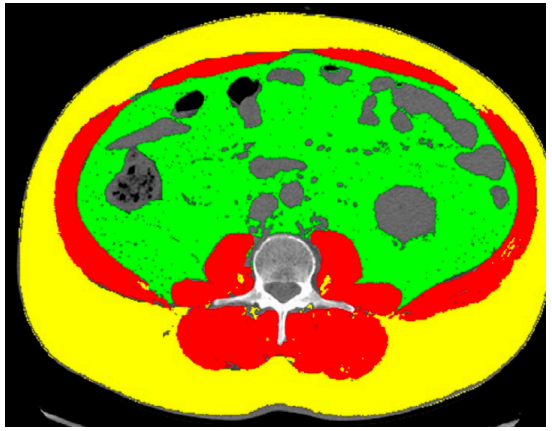
Bold type indicates statistical significance.

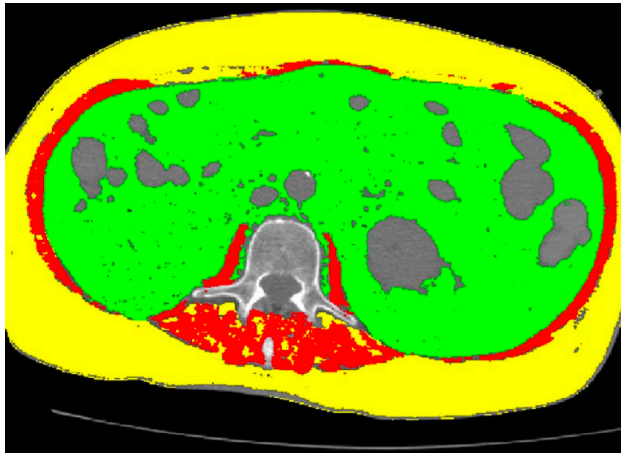
LIS = lung injury score, SOFA = sequential organ failure assessment.

Oh J et al., Medicine (Baltimore). 2023 Oct 27;102(43):e35847.

Sarcopenia is independently associated with difficult weaning and mortality

- Retrospective, 2020, Italy
- patients with critical COVID-19 illness under MV, n=81





Extubation success

Extubation success			
Adjusted analyse[a]			
	OR	95% C.I.	p
SMI	0.97	0.9–1.03	0.33
Muscle density	1.02	0.96–1.1	0.55
Adjusted analyse[b]			
Muscle CSA	0.99	0.98–1.01	0.6
SMI	0.96	0.94–0.99	0.01
Muscle density	1.03	0.98–1.1	0.23

Mortality

ICU mortality			
Adjusted analyse[a]			
Muscle CSA	0.99	0.96–1.01	0.31
SMI	0.98	0.92–1.06	0.68
Muscle density	1.02	0.96–1.1	0.48
Adjusted analyse[b]			
Muscle CSA	1.01	0.98–1.02	0.93
SMI	0.96	0.93–0.99	0.03
Muscle density	1.04	0.98–1.1	0.18

CSA cross-sectional area.
SMI skeletal muscle index.
[a] Adjusted for: age, sex and body mass index.
[b] Adjusted for: age, sex and frailty index.

Damanti S et al., Clin Nutr. 2022 Dec;41(12):2965-2972.

Respiratory and hemodynamic care for older adults patients in ICU

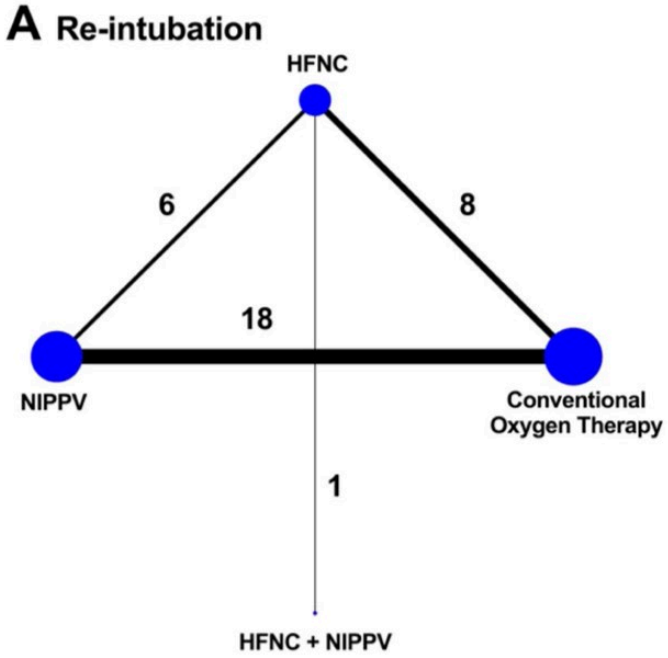
High risk patients following mechanical ventilation

High risk groups (mechanical ventilation more than 12 hours)
• **Age ≥65 years** • Heart failure • Moderate to severe COPD • APACHE II ≥12 on the day of extubation • BMI ≥30 • Airway patency problems • Respiratory secretions (inadequate cough, suction ≥2 times within 8 hrs) • Difficult weaning (re-intubated) • Mechanical ventilation for more than 7 days • ≥2 Comorbidities

NIV or HFNC reduce re-intubation after mechanical ventilation

- 36 RCTs (6,806 patients)
- Comparing NIV, HFNC, and conventional O_2 therapy after following mechanical ventilation

Re-intubation



Comparison	Network odds ratio (95% CI)	Absolute risk difference (95% CI)	Number needed to treat
NIPPV vs conventional oxygen	0.65 (0.52–0.82)	− 5.18 (− 8.09 to − 2.26)	20 (13 to 45)
HFNC vs conventional oxygen	0.63 (0.45–0.87)	− 3.84 (− 6.7 to − 0.98)	26 (15 to 102)
NIPPV vs HFNC	1.04 (0.78–1.38)	− 1.34 (− 4.4 to 1.72)	N/A
HFNC + NIPPV vs conventional oxygen	0.38 (0.19–0.74)	− 10.25 (− 18.49 to − 2.01)	10 (6 to 50)
HFNC + NIPPV vs NIPPV	0.58 (0.3–1.11)	− 5.07 (− 13.38 to 3.24)	N/A
HFNC + NIPPV vs HFNC	0.6 (0.33–1.08)	− 6.41 (− 14.13 to 1.31)	N/A

Fernando et al., Intensive Care Med. 2022 Feb;48(2):137-147.

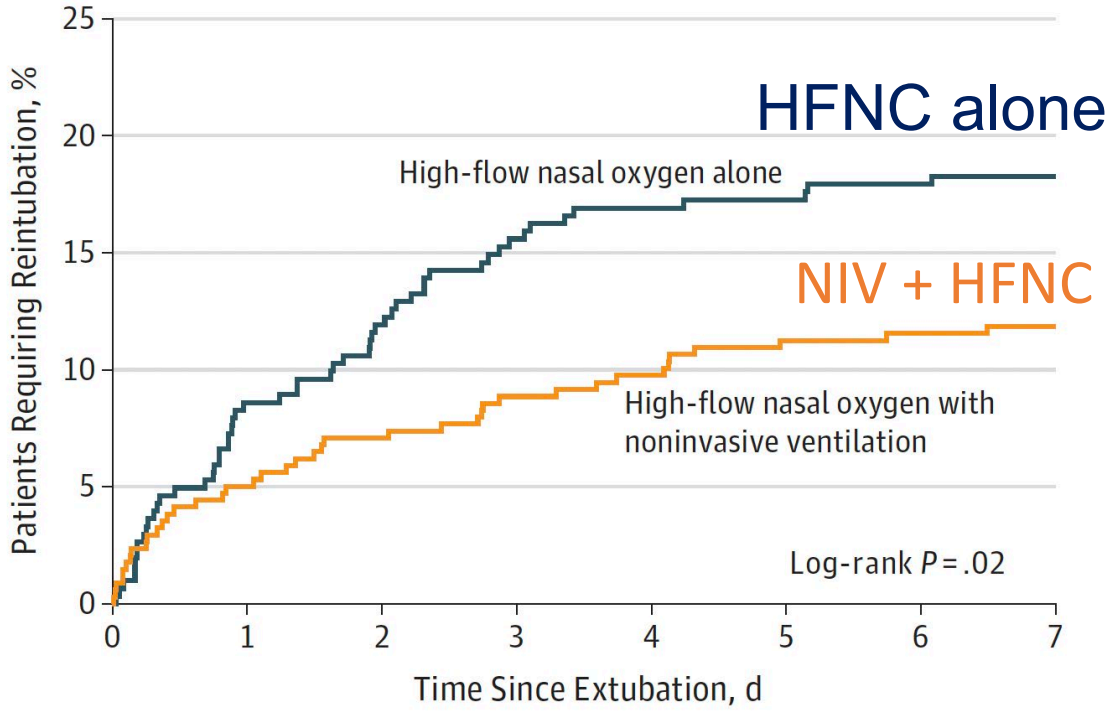
Combination with NIV and HFNC following extubation

- 30 ICU in France
- Patients at high risk of extubation failure
- HFNC or HFNC + NIPPV for at least 48 hours
- 70% ≥aged 65 years

Reintubation rate at day 7

11.8% vs **18.2%**

(difference, −6.4%; *P* = 0.02)



No. at risk								
High-flow nasal oxygen								
Alone	302	276	265	253	248	246	244	243
With noninvasive ventilation	339	321	314	308	305	294	292	291

Thille et al., JAMA. 2019 Oct 15;322(15):1465-1475

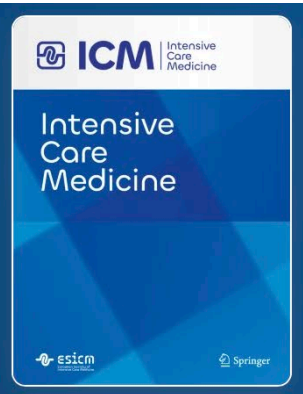
Blood pressure target in older patients with shock

OVATION

Home > Intensive Care Medicine > Article

Higher versus lower blood pressure targets for vasopressor therapy in shock: a multicentre pilot randomized controlled trial

Original | Published: 18 February 2016
Volume 42, pages 542–550 (2016) Cite this article



Intensive Care Medicine

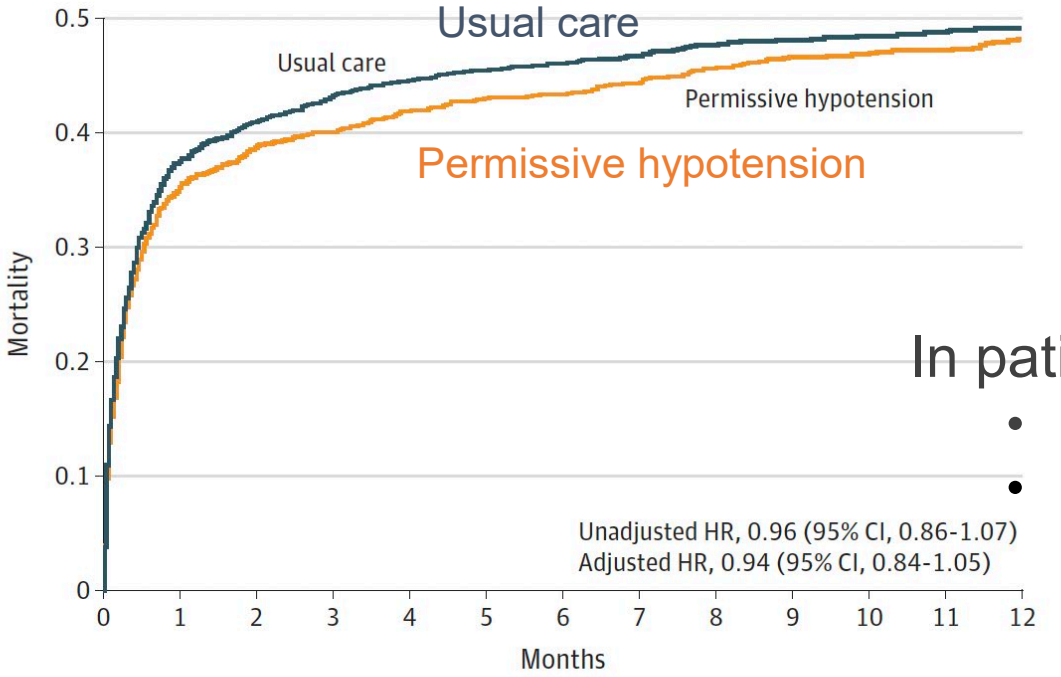
- 118 patients from 11 centers
- **MAP** target **60–65** mmHg **vs** **75–80** mmHg
- Among **patients aged ≥75 years**, a **lower MAP** target was associated with **reduced hospital mortality** (13 versus 60 %, $p = 0.03$) but not in younger patients.

Lamontagne F et al, Intensive Care Med. 2016 Apr;42(4):542-550.

Reduced Exposure to in Older Critically Ill Patients

65 Trial

- 65 ICUs in UK, RCT, from 2017–2019, n=2,463
- Patients aged ≥65 years using vasopressor for vasodilatory shock
- MAP target 60–65 mmHg (permissive hypotension) vs usual care



No. at risk

Permissive hypotension	1283	794	743	721	699	667	631	596	545	509	480	442	409
Usual care	1300	772	727	697	677	642	604	569	525	489	459	435	395

90-day mortality
41.0 vs 43.8%
HR, 0.94 (0.84–1.05)

In patients aged ≥65 years, **permissive hypotension**

- A **trend of lower** 90-day **mortality**
- **Higher rates of acute renal failure** (3.2 vs 2.5%)

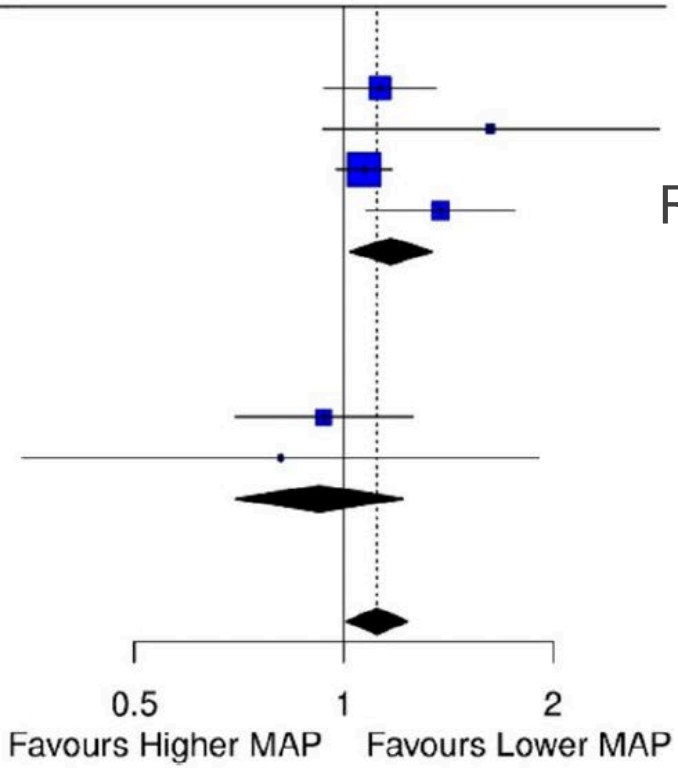
Lamontagne F et al., JAMA. 2020 Mar 10;323(10):938-949.

Higher versus lower blood pressure targets in vasodilatory shock

Systemic review and meta-analysis

- 4 RCTs, n=3,873

Study or Subgroup	Higher MAP Events	Higher MAP Total	Lower MAP Events	Lower MAP Total	Weight	Risk Ratio MH, Random, 95% CI
subgroup = ≥ 65 years old						
SEPSISPAM 2014	110	200	105	215	21.8%	1.13 [0.94; 1.36]
OVATION 2016	15	27	13	38	3.2%	1.62 [0.93; 2.83]
65 trial 2020	544	1242	500	1221	49.3%	1.07 [0.98; 1.17]
OPTPRESS 2025	101	257	74	259	14.1%	1.38 [1.08; 1.76]
Total (95% CI)		**1726**		**1733**	**88.3%**	**1.17 [1.02; 1.34]**
Heterogeneity: $Tau^2 = 0.0081$; $Chi^2 = 5.37$, df = 3 (P = 0.1468); $I^2 = 44.1\%$						
subgroup = < 65 years old						
SEPSISPAM 2014	60	188	59	173	10.3%	0.94 [0.70; 1.26]
OVATION 2016	8	31	7	22	1.4%	0.81 [0.35; 1.91]
Total (95% CI)		**219**		**195**	**11.7%**	**0.92 [0.70; 1.22]**
Heterogeneity: $Tau^2 = 0$; $Chi^2 = 0.1$, df = 1 (P = 0.7564); $I^2 = 0\%$						
Total (95% CI)		**1945**		**1928**	**100.0%**	**1.12 [1.01; 1.23]**
Heterogeneity: $Tau^2 = 0.0032$; $Chi^2 = 7.15$, df = 5 (P = 0.2100); $I^2 = 30.0\%$						
Test for overall effect: Z = 2.13 (P = 0.0331)						
Test for subgroup differences: $Chi^2 = 2.24$, df = 1 (P = 0.1341)						



90-day mortality

Age ≥65 years
RR, 1.17 (1.02–1.34)

Overall
RR, 1.12 (1.01–1.23)

Mendes H et al., Crit Care. 2025 Nov 23;30(1):17.

Surviving Sepsis Campaign: International Guidelines for Management of Sepsis and Septic Shock 2026

Mean Arterial Pressure (MAP) Targets

13. For adults with septic shock, we "recommend" an initial MAP target of 65 mm Hg over higher MAP targets. (strong recommendation, moderate certainty evidence) *Remark*: In practice, it is not feasible to maintain MAP at exactly 65 mm Hg, so a reasonable range (e.g., within 5 mm Hg) should be used. Vasopressors should be titrated to maintain MAP within this range.	Carryover with new remark
14. For adults with septic shock 65 years old or older, we "suggest" an initial MAP range of 60–65 mm Hg over higher ranges. (conditional recommendation, low certainty evidence)	New

New MAP target suggested by SSC guideline 2026 in patients aged ≥65

60 – 65 mmHg

Prescott HC et al., Crit Care Med. 2026 Apr 1;54(4):725-812.

ICU Delirium and Cognitive Decline

Risk factors of delirium

前驅因子

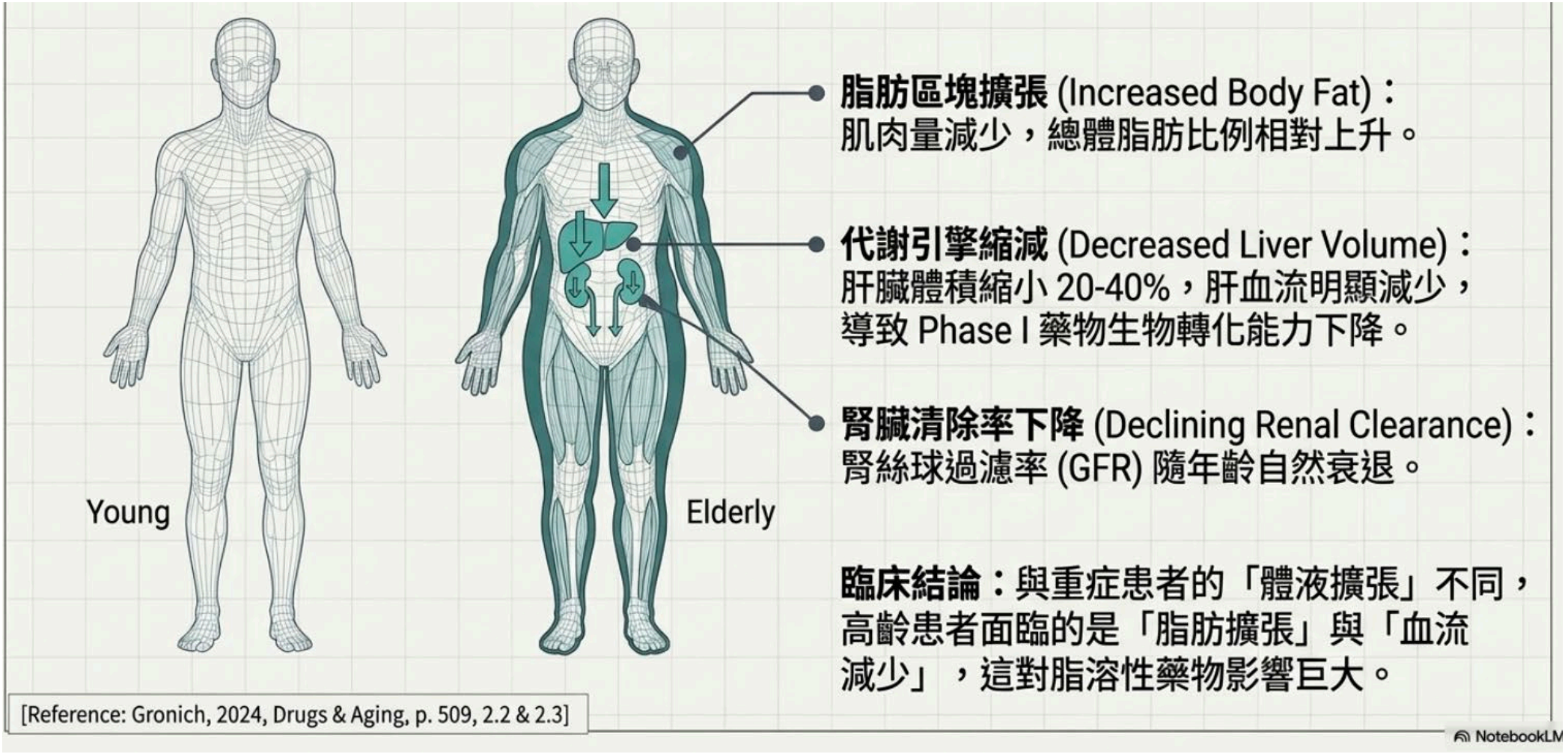
加速因子

Predisposing Factors	Precipitating Factors	
Advanced age	Metabolic disturbances	Benzodiazepines
Baseline cognitive impairment	Hypotension	Opioids (meperidine, morphine)
Increased comorbid disease	Sepsis	Deep versus light sedation
Frailty	Poor pain control	Anticholinergics
Alcohol and drug abuse	Mechanical ventilation	Steroids
High severity of illness	Sleep disturbances	Surgery (abdominal, cardiac, hip)

Hayhurst et al. Anesthesiology. 2016 Dec;125(6):1229-1241.

Pharmacokinetics and pharmacodynamics in older adults

- Absorption, distribution, metabolism, elimination



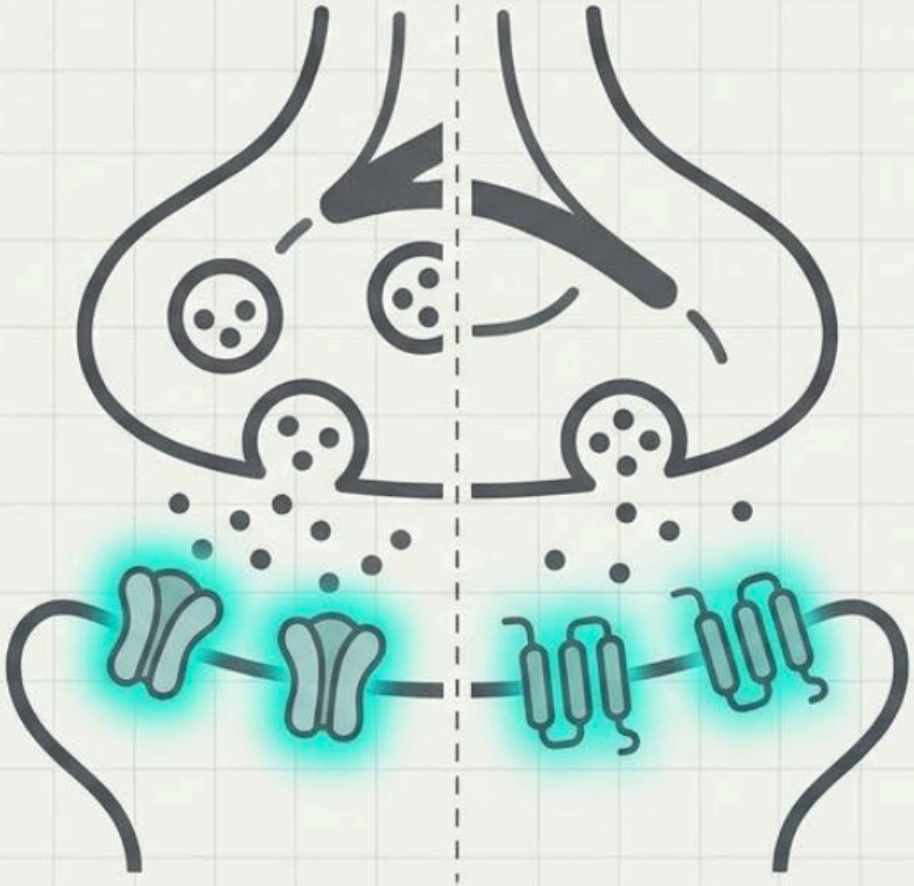
Gronich N et al.. Drugs Aging. 2024 Jun;41(6):507-519.

Altered receptors of neurotransmitter in older adults

機理解析：高齡患者不僅藥物代謝變慢，其大腦對同等血藥濃度的反應閾值亦發生改變。

Benzodiazepines (BZD) 與 GABA 系統

- 即使藥物曝露量相同，高齡者對 BZD 的鎮靜效應具有更高的敏感性。
- 臨床風險：極易引發跌倒與髖部骨折。



Opioids (鴉片類藥物) 與 Mu 受體

- 對 Fentanyl 等 Mu-opioid 受體激動劑的敏感度顯著增加。
- 臨床風險：呼吸抑制與中樞神經系統過度抑制。

[Reference: Gronich, 2024, Drugs & Aging, p. 507, 513-514; Table 1]

NotebookLM

Gronich N et al.. Drugs Aging. 2024 Jun;41(6):507-519.

臨床關鍵族群的藥代動力學 (PK) 變異指南：重症與高齡患者

協助醫療人員快速理解重症與高齡患者在長時間輸注與神經系統藥物使用時的 PK/PD 關鍵變化，以優化個人化給藥策略。

重症患者的 PK 顯著變異 (長時間輸注研究)

分佈容積 (Vdss) 劇增

重症患者因液體復甦與蛋白質結合改變，咪達唑侖與丙泊酚的 Vdss 分別增加 2 倍與 4 倍。

藥物半衰期顯著延長

相比非重症者，重症患者的咪達唑侖消除半衰期平均延長 3 倍，增加藥物蓄積風險。

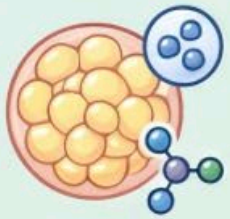
疾病嚴重度 (APACHE II) 的影響

APACHE II 評分 > 20 的患者，藥物清除率顯著降低，需更謹慎調整維持劑量。

關鍵鎮靜藥物 PK 參數差異比較 (重症 vs. 一般)

藥物類別	患者類型	分佈容積 (L)	清除率 (L/h)	消除半衰期 (h)
咪達唑侖 (Midazolam)	重症患者	169	15	9
	一般患者	77–119	24–38	1.7–3.5
丙泊酚 (Propofol)	重症患者	2915	104	33

老年患者的 PK/PD 生理變化 (CNS 藥物)



脂肪增加導致脂溶性藥物蓄積

體脂比例上升使脂溶性藥物（如地西泮）分佈更廣，導致藥物作用時間延長。

肝臟清除率下降 10–40%

肝血流減少與體積萎縮降低了第一相（Phase I）代謝效率，提高穩態血藥濃度。

藥效學 (PD) 敏感度上升

老年人對鴉片類與苯二氮卓類的鎮靜作用更敏感，增加跌倒與呼吸抑制風險。

Tse AHW et al., Clin Ther. 2018 Sep;40(9):1598-1615.e2; Gronich N et al.. Drugs Aging. 2024 Jun;41(6):507-519.

Decreased clearance of antipsychotics in older adults

高齡精神科用藥：特定藥物的清除率與風險矩陣

抗精神病藥物 (Antipsychotics)	
Risperidone	若肌酸酐清除率 (CrCl) <60 mL/min，藥物清除率劇降 60%⬇。 血藥濃度隨年齡每十歲增加 35%⬆。
Olanzapine	血藥濃度隨年齡每十歲增加 10%⬆。
Haloperidol	阻斷多巴胺受體，誘發帕金森氏症與遲發性運動不能的頻率顯著增高⬆。

抗憂鬱藥物 (Antidepressants)	
Citalopram (SSRI)	消除半衰期延長達 30%⬆。

行動指南：必須從最低劑量開始，嚴密監控錐體外徑症候群 (EPS) 與過度鎮靜。

Tse AHW et al., Clin Ther. 2018 Sep;40(9):1598-1615.e2; Gronich N et al.. Drugs Aging. 2024 Jun;41(6):507-519.

Benzodiazepine Versus Nonbenzodiazepine-Based Sedation for Mechanically Ventilated, Critically Ill Adults

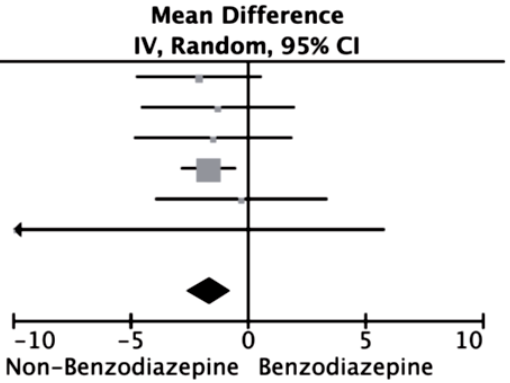
Systemic review and meta-analysis, 6 RCTs, n=1235

ICU length of stay

Study or Subgroup	Non-Benzodiazepine Mean	SD	Total	Benzodiazepine Mean	SD	Total	Weight	Mean Difference IV, Random, 95% CI
Carson 2006	8.3	7.4	68	10.4	8.2	64	12.3%	−2.10 [−4.77, 0.57]
Jakob 2012	8.8	22.1	249	10.1	14.5	251	8.1%	−1.30 [−4.58, 1.98]
Pandharipande 2007	7.5	10.4	52	9	6.7	51	7.7%	−1.50 [−4.87, 1.87]
Riker 2009	5.9	5.2	244	7.6	5.4	122	65.1%	−1.70 [−2.86, −0.54]
Roukonen 2009	6.6	4.6	41	6.9	6.9	16	6.5%	−0.30 [−3.96, 3.36]
Weinbroum1997	21	22.3	31	31	42	36	0.3%	−10.00 [−25.81, 5.81]
Total (95% CI)			**685**			**540**	**100.0%**	**−1.64 [−2.57, −0.70]**

Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 1.76$, df = 5 (P = 0.88); $I^2 = 0\%$

Test for overall effect: Z = 3.44 (P = 0.0006)

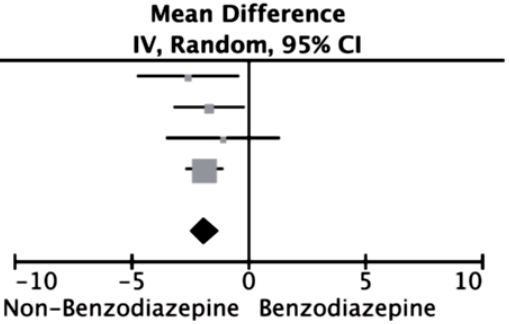


Duration of mechanical ventilation

Study or Subgroup	Non-Benzodiazepine Mean	SD	Total	Benzodiazepine Mean	SD	Total	Weight	Mean Difference IV, Random, 95% CI
Carson 2006	5.8	5	68	8.4	7.5	64	8.7%	−2.60 [−4.79, −0.41]
Jakob 2012	5.1	8.3	251	6.8	8.9	249	18.4%	−1.70 [−3.21, −0.19]
Pandharipande 2007	5.5	7.8	52	6.6	4.3	51	7.1%	−1.10 [−3.53, 1.33]
Riker 2009	3.7	3.6	244	5.6	3.7	122	65.8%	−1.90 [−2.70, −1.10]
Total (95% CI)			**615**			**486**	**100.0%**	**−1.87 [−2.51, −1.22]**

Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 0.87$, df = 3 (P = 0.83); $I^2 = 0\%$

Test for overall effect: Z = 5.66 (P < 0.00001)



Crit Care Med 2013; 41:S30–S38.

Benzodiazepine Versus Nonbenzodiazepine-Based Sedation for Mechanically Ventilated, Critically Ill Adults

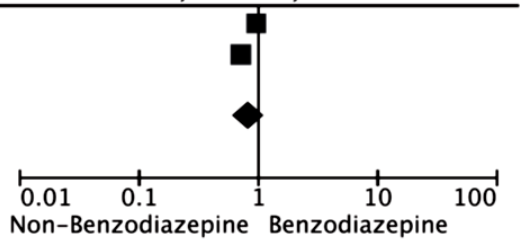
Systemic review and meta-analysis, 6 RCTs, n=1235

Delirium prevalence

Study or Subgroup	Non-Benzodiazepine Events	Total	Benzodiazepine Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
Pandharipande 2007	41	52	42	51	48.2%	0.96 [0.79, 1.16]
Riker 2009	132	244	93	122	51.8%	0.71 [0.61, 0.83]
Total (95% CI)		**296**		**173**	**100.0%**	**0.82 [0.61, 1.11]**
Total events	173		135			

Heterogeneity: $Tau^2 = 0.04$; $Chi^2 = 6.11$, df = 1 (P = 0.01); $I^2 = 84\%$

Test for overall effect: Z = 1.30 (P = 0.19)

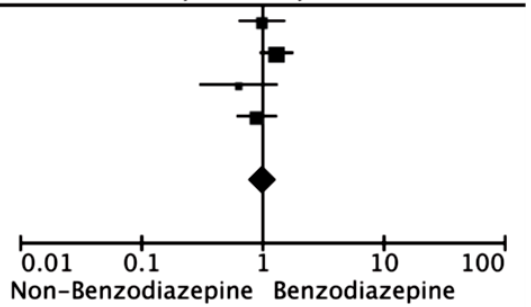


All-cause short-term mortality

Study or Subgroup	Non-Benzodiazepine Events	Total	Benzodiazepine Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
Carson 2006	25	68	24	64	23.7%	0.98 [0.63, 1.53]
Jakob 2012	68	249	53	251	36.8%	1.29 [0.95, 1.77]
Pandharipande 2007	9	52	14	51	10.4%	0.63 [0.30, 1.33]
Riker 2009	55	244	31	122	29.0%	0.89 [0.60, 1.30]
Total (95% CI)		**613**		**488**	**100.0%**	**1.01 [0.78, 1.30]**
Total events	157		122			

Heterogeneity: $Tau^2 = 0.02$; $Chi^2 = 4.33$, df = 3 (P = 0.23); $I^2 = 31\%$

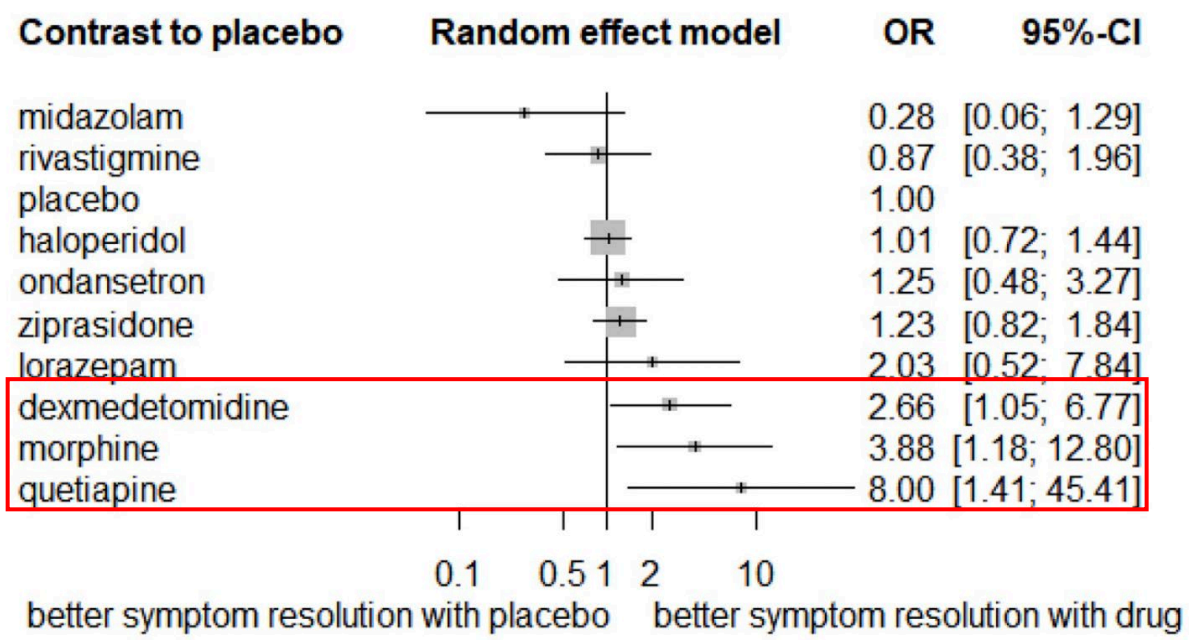
Test for overall effect: Z = 0.05 (P = 0.96)



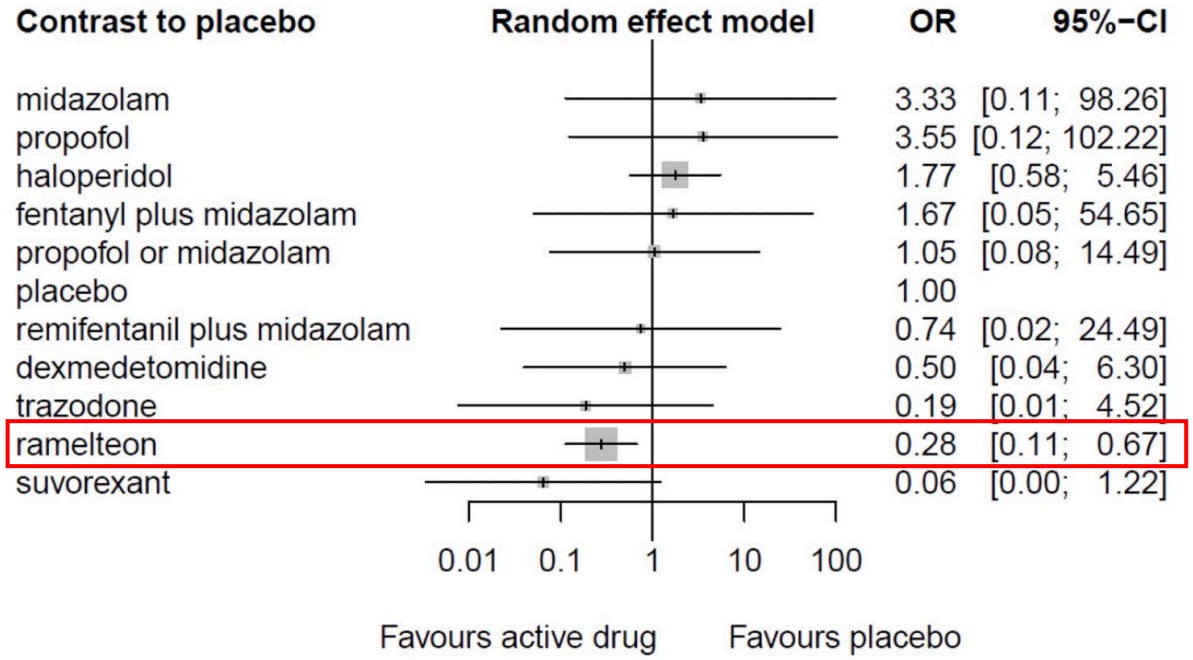
Crit Care Med 2013; 41:S30–S38.

Management and preventing delirium in ICU

Treating delirium (response rate)



Preventing delirium (incidence)

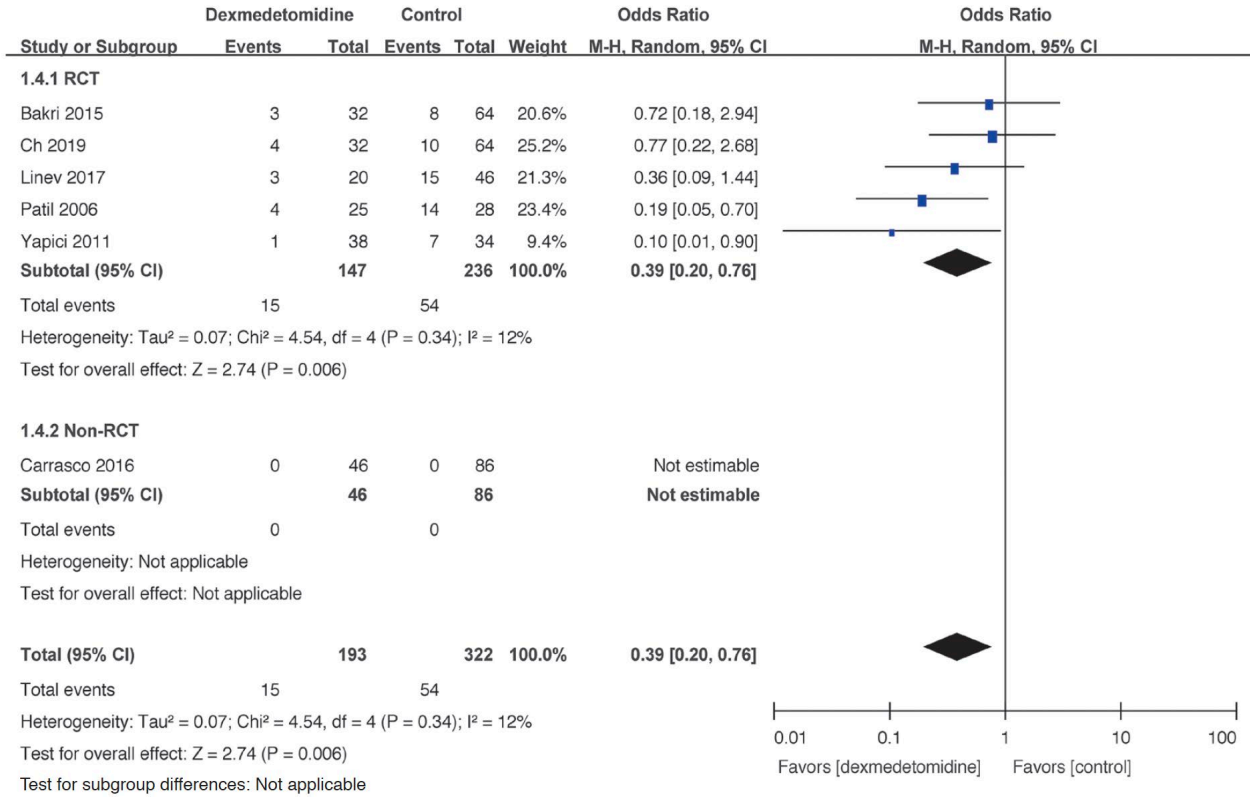


- Dexmedetomidine, morphine, and quetiapine were effective in managing ICU delirium
- Ramelton reduced the incidence of ICU delirium

Kim MS et al., J Psychiatr Res. 2020 Jun;125:164-176.

Dexmedetomidine in treating delirium

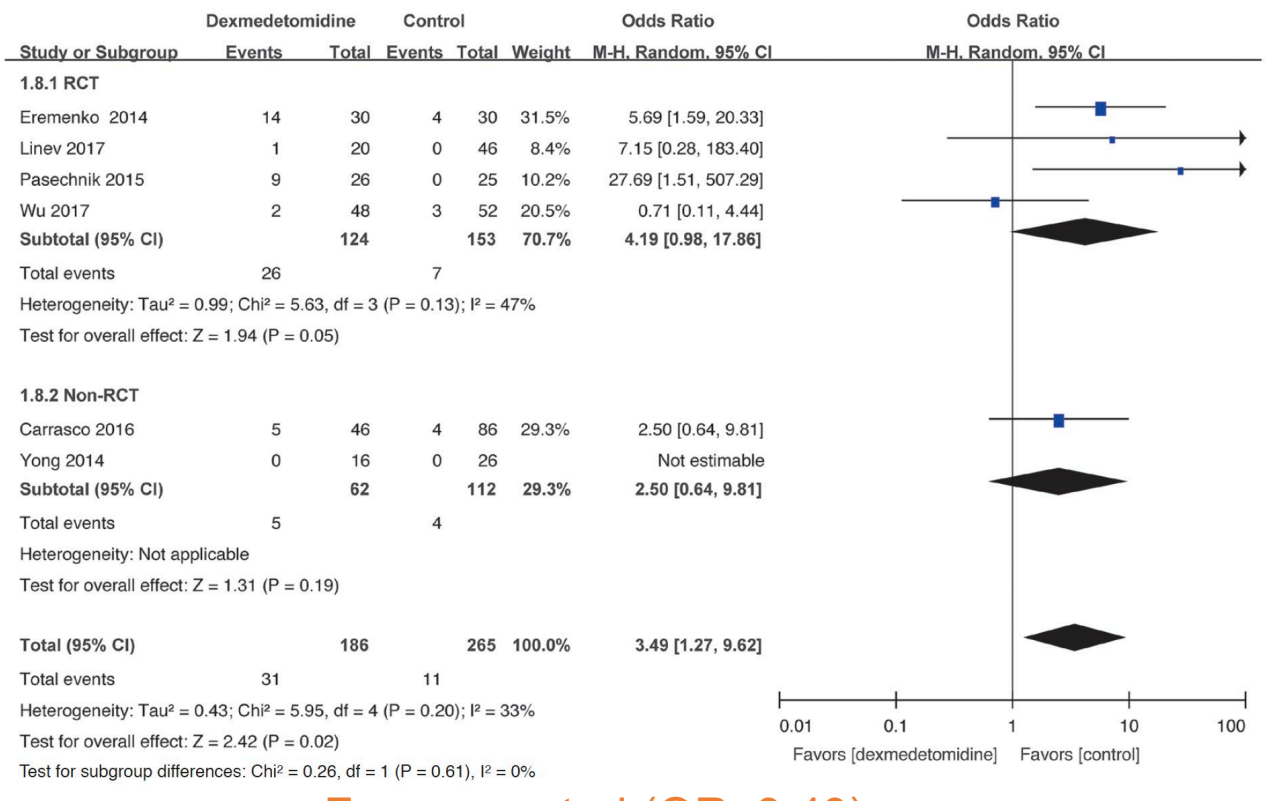
Delirium prevalence after treatment



Study or Subgroup	Dexmedetomidine Events	Total	Control Events	Total	Weight	Odds Ratio M-H, Random, 95% CI
1.4.1 RCT						
Bakri 2015	3	32	8	64	20.6%	0.72 [0.18, 2.94]
Ch 2019	4	32	10	64	25.2%	0.77 [0.22, 2.68]
Linev 2017	3	20	15	46	21.3%	0.36 [0.09, 1.44]
Patil 2006	4	25	14	28	23.4%	0.19 [0.05, 0.70]
Yapici 2011	1	38	7	34	9.4%	0.10 [0.01, 0.90]
Subtotal (95% CI)		**147**		**236**	**100.0%**	**0.39 [0.20, 0.76]**
Total events	15		54			
Heterogeneity: Tau² = 0.07; Chi² = 4.54, df = 4 (P = 0.34); I² = 12%						
Test for overall effect: Z = 2.74 (P = 0.006)						
1.4.2 Non-RCT						
Carrasco 2016	0	46	0	86		Not estimable
Subtotal (95% CI)		**46**		**86**		**Not estimable**
Total events	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Total (95% CI)		**193**		**322**	**100.0%**	**0.39 [0.20, 0.76]**
Total events	15		54			
Heterogeneity: Tau² = 0.07; Chi² = 4.54, df = 4 (P = 0.34); I² = 12%						
Test for overall effect: Z = 2.74 (P = 0.006)						
Test for subgroup differences: Not applicable						

Favors dexmedetomidine (OR, 0.39)

Incidence of bradycardia



Study or Subgroup	Dexmedetomidine Events	Total	Control Events	Total	Weight	Odds Ratio M-H, Random, 95% CI
1.8.1 RCT						
Eremenko 2014	14	30	4	30	31.5%	5.69 [1.59, 20.33]
Linev 2017	1	20	0	46	8.4%	7.15 [0.28, 183.40]
Pasechnik 2015	9	26	0	25	10.2%	27.69 [1.51, 507.29]
Wu 2017	2	48	3	52	20.5%	0.71 [0.11, 4.44]
Subtotal (95% CI)		**124**		**153**	**70.7%**	**4.19 [0.98, 17.86]**
Total events	26		7			
Heterogeneity: Tau² = 0.99; Chi² = 5.63, df = 3 (P = 0.13); I² = 47%						
Test for overall effect: Z = 1.94 (P = 0.05)						
1.8.2 Non-RCT						
Carrasco 2016	5	46	4	86	29.3%	2.50 [0.64, 9.81]
Yong 2014	0	16	0	26		Not estimable
Subtotal (95% CI)		**62**		**112**	**29.3%**	**2.50 [0.64, 9.81]**
Total events	5		4			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.31 (P = 0.19)						
Total (95% CI)		**186**		**265**	**100.0%**	**3.49 [1.27, 9.62]**
Total events	31		11			
Heterogeneity: Tau² = 0.43; Chi² = 5.95, df = 4 (P = 0.20); I² = 33%						
Test for overall effect: Z = 2.42 (P = 0.02)						
Test for subgroup differences: Chi² = 0.26, df = 1 (P = 0.61), I² = 0%						

Favors control (OR, 3.49)

- **Dexmedetomidine** promotes the **resolution of delirium** but also **increases** the incidence of **bradycardia** during treatment

Liu X et al., Minerva Anestesiol. 2021 Jan;87(1):65-76.

SCCM guideline for managing and preventing delirium

Recommendation: PADIS 2018

We **suggest** using **either** propofol or dexmedetomidine over benzodiazepines for sedation in critically ill mechanically ventilated adults (conditional recommendation, low quality of evidence).

- **PADIS 2018**:
  - ✓ **Propofol or dexmedetomidine** over BZD
  - ✓ **Light sedation** over deep sedation
- **PADIS 2025**
  - ✓ **Dexmedetomidine** over propofol for **light sedation**
  - ✓ Early mobilization/rehabitation
  - ✓ **Melatonin** to reduce sleep disruption

PADIS 2025

P Prevention and management of Pain	(No updates made to previous guidelines recommendations for pain.)	
A Anxiety, Agitation/Sedation	Insufficient Evidence For explanation, see Full Focused Update Guidelines.	1. There is insufficient evidence to make a recommendation on the use of benzodiazepines to treat anxiety in adult patients admitted to the ICU.
	Conditional Recommendation For Moderate Certainty of Evidence ⊕⊕⊕◯	2. **We suggest** using dexmedetomidine over propofol for sedation in mechanically ventilated adult patients admitted to the ICU where light sedation and/or a reduction in delirium are of highest priorities.
D Delirium	Conditional Recommendation For Intervention or Comparison Low Certainty of Evidence ⊕⊕◯◯	3. We are unable to issue a recommendation for or against the use of antipsychotics over usual care for the treatment of delirium in adult patients admitted to the ICU.
I Immobility	Conditional Recommendation For Moderate Certainty of Evidence ⊕⊕⊕◯	4. **We suggest** providing enhanced mobilization/ rehabilitation over usual care mobilization/rehabilitation to adult patients admitted to the ICU.
S Sleep Disruption	Conditional Recommendation For Low Certainty of Evidence ⊕⊕◯◯	5. **We suggest** administering melatonin over no melatonin in adult patients admitted to the ICU.

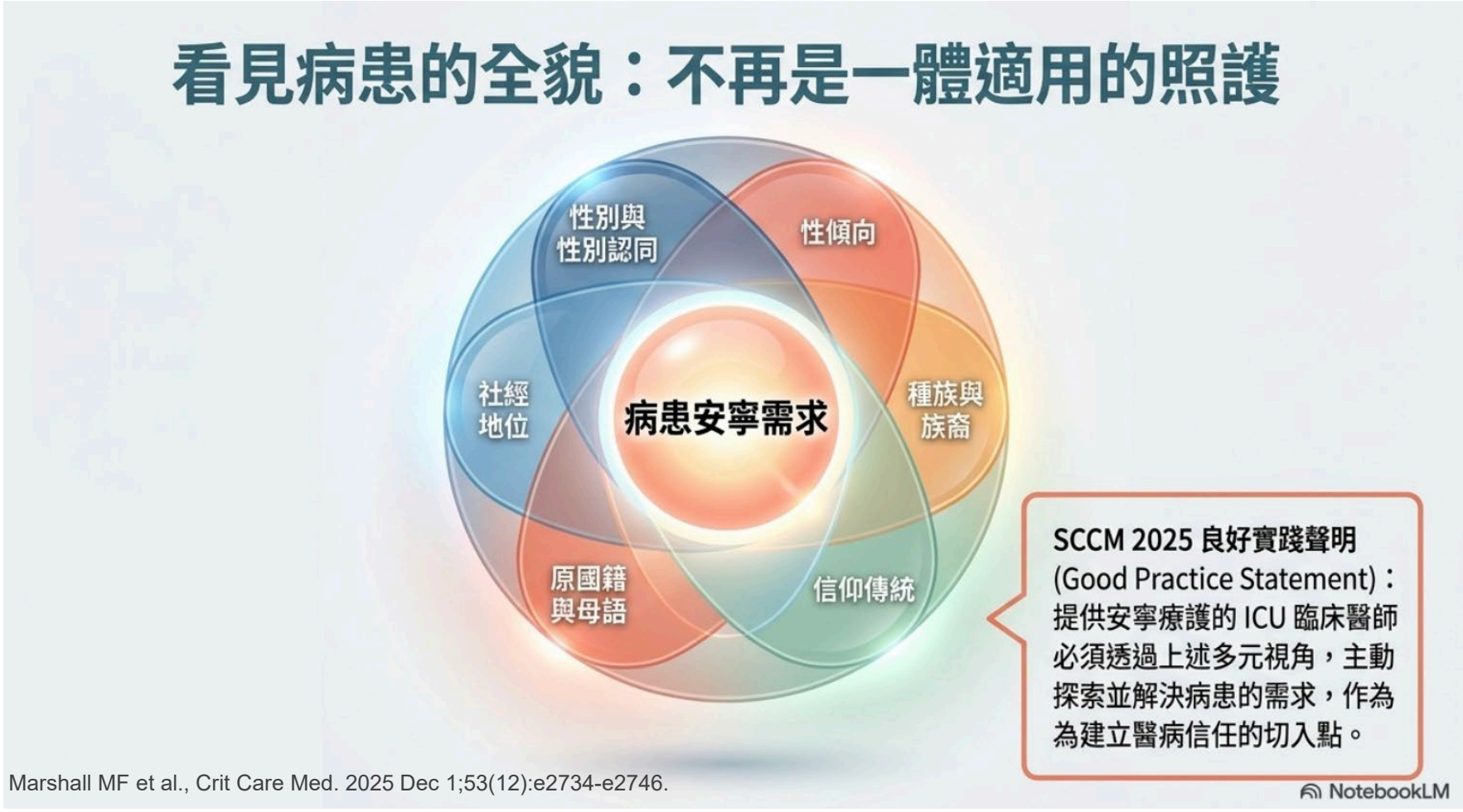
Devlin JW et al., Crit Care Med. 2018 Sep;46(9):e825-e873; Lewis K et al., Crit Care Med. 2025 Mar 1;53(3):e711-e727.

Palliative care and post-intensive care syndrome (PICS)

Critical Care Medicine
December 2025 • Volume 53 • Number 12 • Pages e2734–e2746

SPECIAL ARTICLE

Society of Critical Care Medicine Clinical Practice Guidelines on Adult End-of-Life Care in the ICU



Marshall MF et al., Crit Care Med. 2025 Dec 1;53(12):e2734-e2746.

範式轉移：從退路到並行的照護標準

傳統 ICU 模式		整合安寧 ICU 模式
 治療失敗的最後退路	啟動時機	 與維生治療並行的早期支持
 單向醫療告知	決策視角	 基於多元價值的醫病共享決策
 高耗費、潛在道德困境	資源與效益	 縮短 ICU 停留天數、優化資源配置

Late/Failed → Early/Parallel

2025 SCCM 核心理念：安寧療護不應被視為 ICU 的「失敗備案」，而必須是常規的高品質照

Marshall MF et al., Crit Care Med. 2025 Dec 1;53(12):e2734-e2746.

2025 重症醫學會 (SCCM) 指引

2025 重症安寧療護臨床指引：全方位需求評估與篩檢標準

全方位安寧需求評估

評估安寧需求時需納入性別認同、種族信仰、原籍國、語言及社會經濟地位等因素。

專業安寧療護篩檢指標

治療適切性存有重大分歧

- 當加護病房團隊成員與家屬對當前治療方案的適切性產生嚴重意見不一時。

考慮限制維生醫療 (LST)

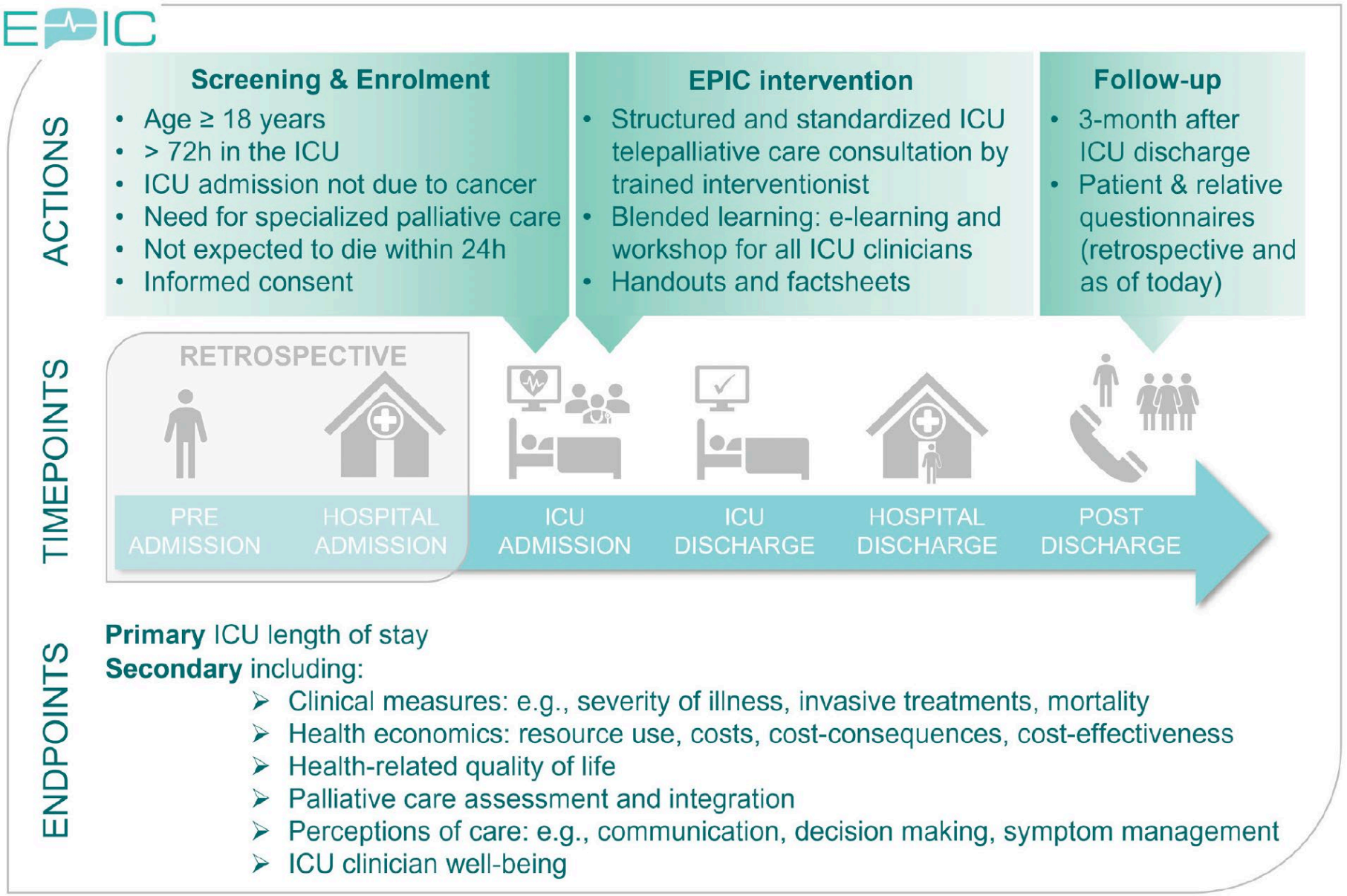
- 醫療團隊開始評估或考慮限制、撤除維生生醫療措施時，應進行篩檢。

預期諮詢能帶來臨床效益

- 預判專業安寧諮詢能使患者、家屬或重症團隊在情緒或決策上獲得實質幫助。

Marshall MF et al., Crit Care Med. 2025 Dec 1;53(12):e2734-e2746.

Enhance palliative care in ICU (EPIC)



Mentzelopoulos SD et al., MJ Open. 2026 Feb 17;16(2):e108168.

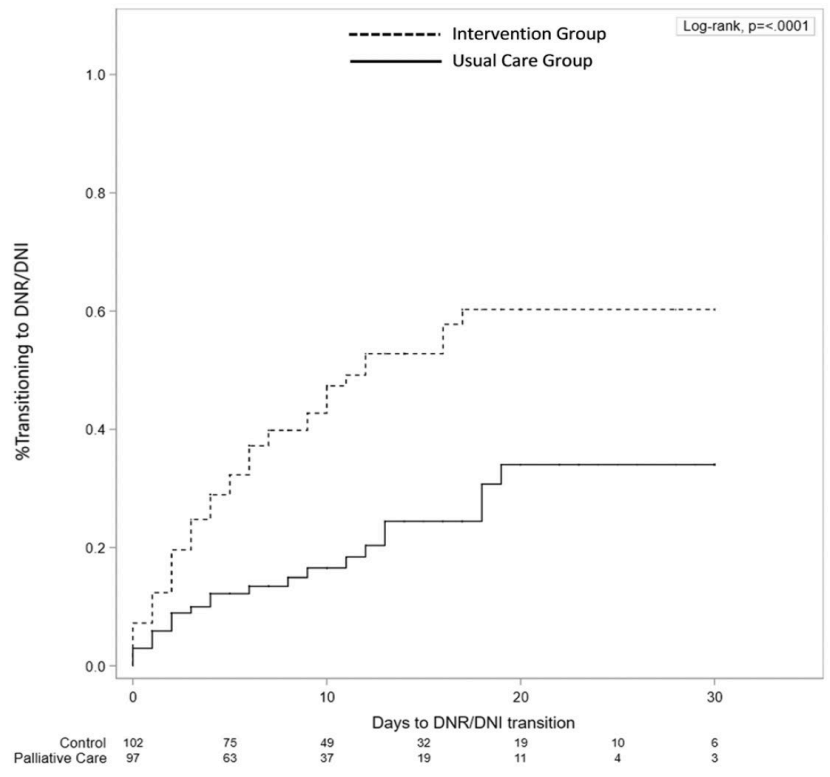
Early integrate palliative care

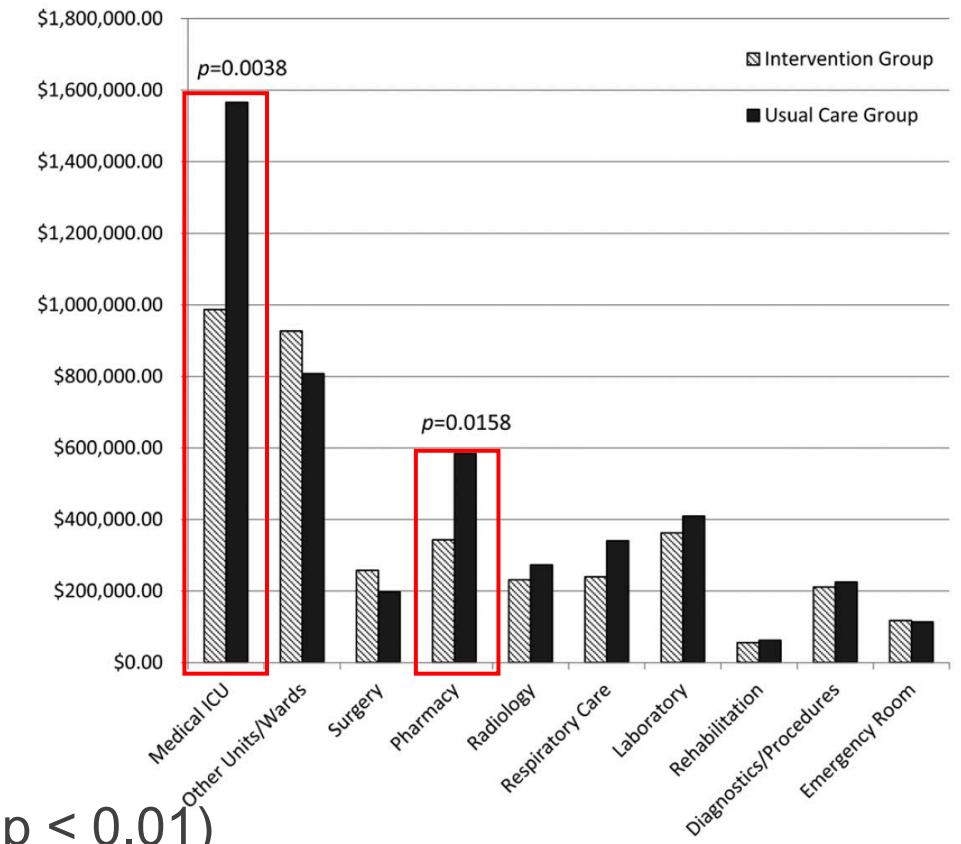
- Single center, Washington, US
- 2017 - 2018, n=199 patients with positive palliative care screening
- Consult palliative care within 48 hrs vs usual care

Item No.	Screening Criteria
1	Admitted from long-term skilled nursing facility or acute care facility, or admitted from home with activities of daily living dependencies requiring skilled nursing
2	End-stage dementia, amyotrophic lateral sclerosis, Parkinson's disease, or multiple sclerosis
3	Advanced or metastatic cancer
4	Cardiac or respiratory arrest with neurologic compromise
5	Multiple organ system failure
6	Known end-stage organ disease including cirrhosis, renal disease on dialysis, New York Heart Association class III or IV heart failure, or chronic obstructive pulmonary disease on home oxygen
7	Acute shock requiring at least 6 hr of vasopressors or inotropic support
8	Acute respiratory failure requiring mask ventilation or intubation
9	Hospital stay greater than 5 d or ICU readmission for the same diagnosis within 30 d
	Exclusion criteria
1	History of any stem cell transplant
2	Solid organ transplant within 1 yr of transplant, or actively undergoing workup for solid organ transplant
3	Non-English speaking patients for whom an interpreter was unavailable
4	Patients without capacity to participate in palliative care discussions with no identifiable surrogate
5	Patients who refused to had a surrogate refuse palliative care consultation
6	Patients who had received a palliative care consultation earlier during the same hospitalization
7	Patients already determined to be do-not-resuscitate/do-not-intubate

Ma J et al., Crit Care Med. 2019 Dec;47(12):1707-1715.

Early integrate palliative care



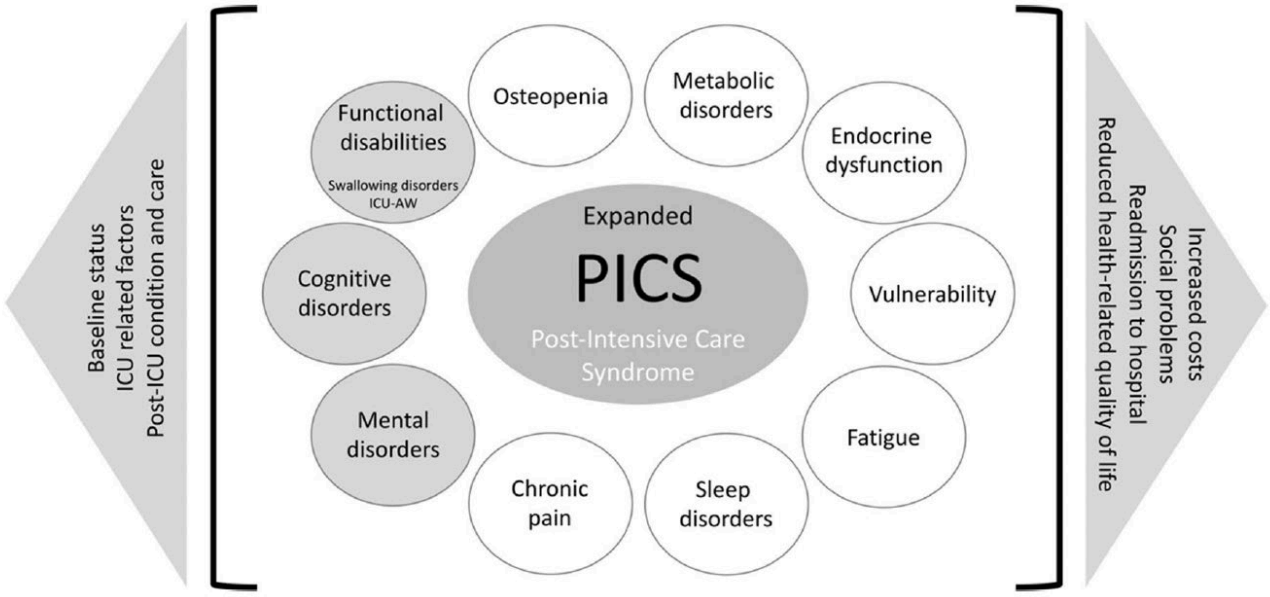


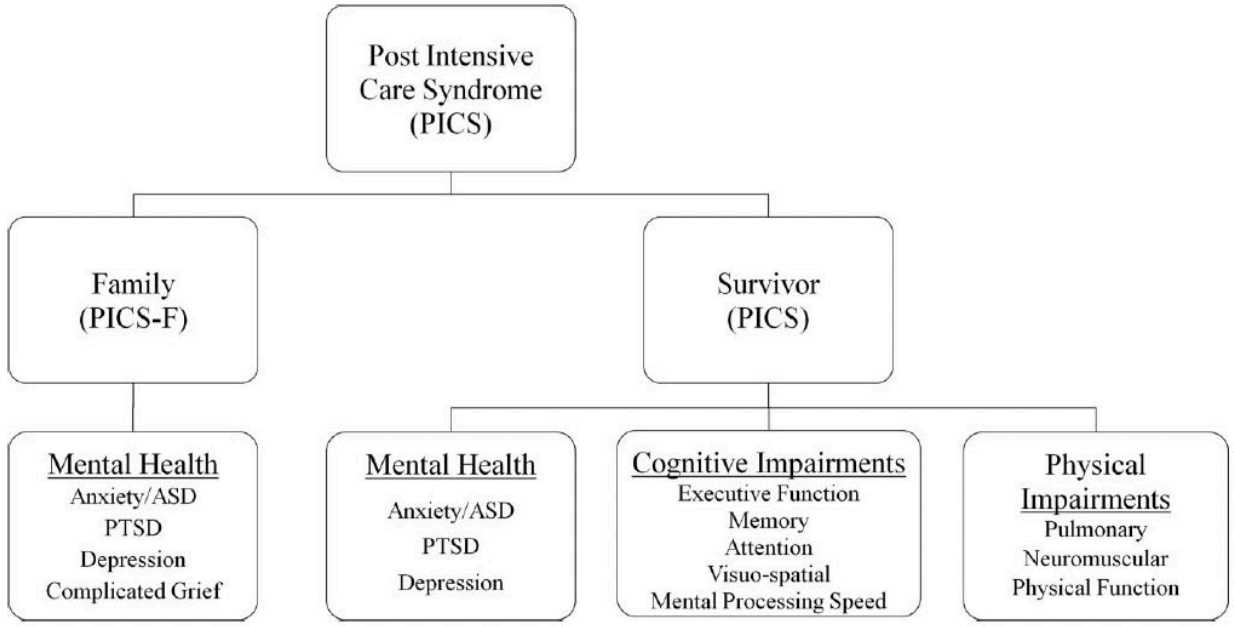
- More transfers to hospice care (18.6% vs 4.9%; p < 0.01)
- Fewer ventilator days (median 4 vs 6 d; p < 0.05), tracheostomies (1% vs 7.8%; p < 0.05), and postdischarge emergency department visits and/or readmissions (17.3% vs 38.9%; p < 0.01)
- **Lower** medical ICU (p < 0.01) and pharmacy (p < 0.05) **costs**
- Similar ICU length of stay (median 5 vs 5.5 d), hospital length of stay (median 10 vs 11 d), **in-hospital mortality (22.6% vs 29.4%), or 30-day mortality between groups (35.1% vs 36.3%) (p > 0.05).**

Ma J et al., Crit Care Med. 2019 Dec;47(12):1707-1715.

Post-intensive care syndrome (PICS)

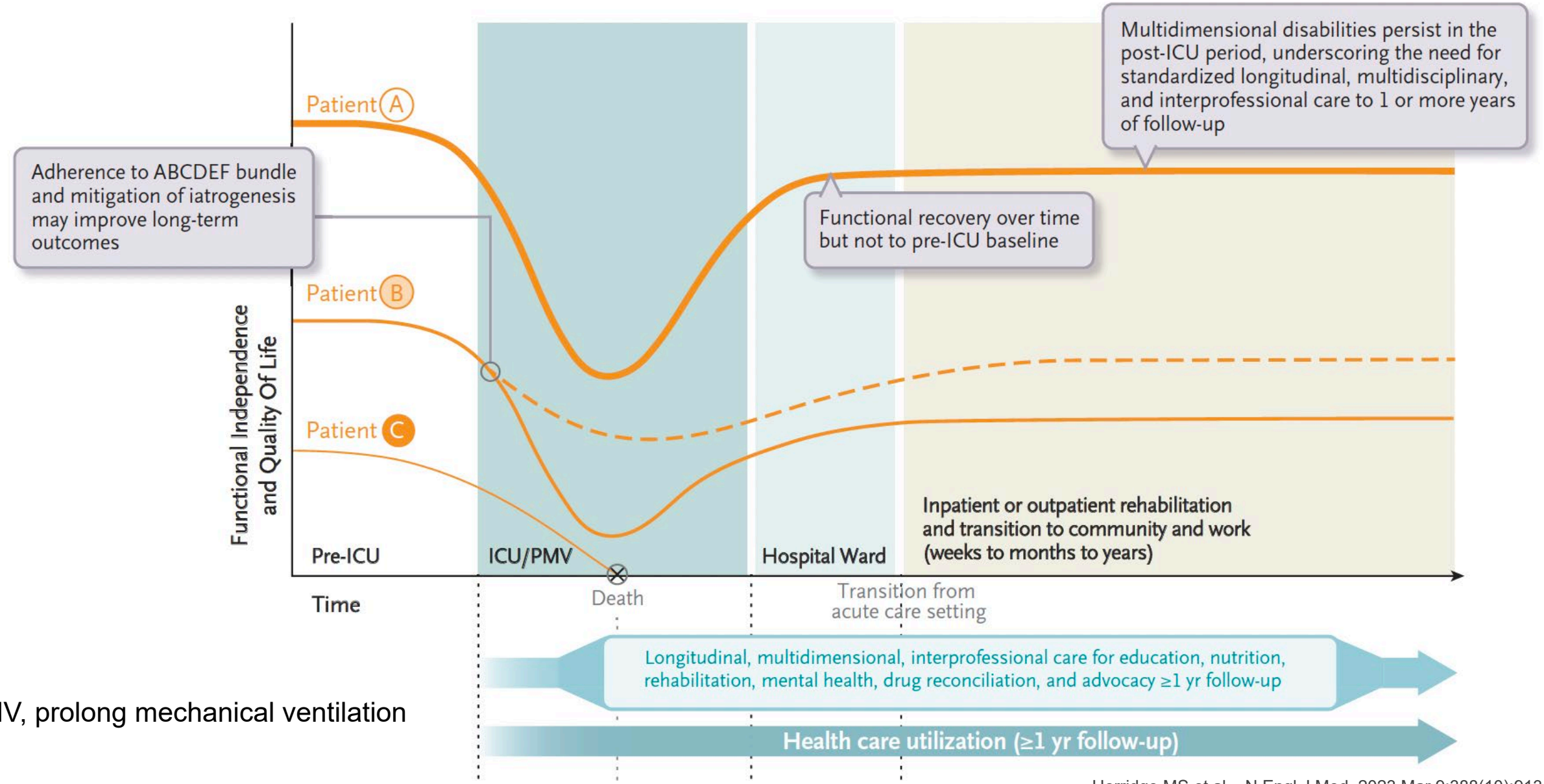
- New or worsening physical, mental, and neurocognitive disorder
- Negatively impact quality of life
- Financial consequences
- Influence patients and their family members





Needham DM et al., Crit Care Med. 2012 Feb;40(2):502-9; Rousseau AF et al., Crit Care. 2021 Mar 17;25(1):108.

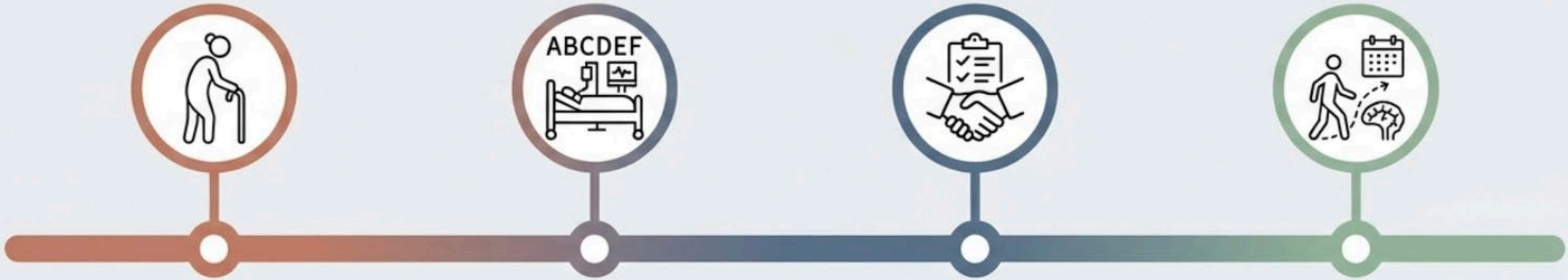
Pre-ICU health status and post-ICU trajectory



PMV, prolong mechanical ventilation

Herridge MS et al ., N Engl J Med. 2023 Mar 9;388(10):913-924.

全人全程照護模型 (The Continuum of Care)



Phase 1：
基準線 (Pre-ICU)
認知到高齡與衰弱的脆弱性。

Phase 2：
急性防禦 (In-ICU)
全面啟動 ABCDEF Bundle，將譫妄與無力的傷害降至最低。

Phase 3：
功能重整 (Discharge)
出院前的功能盤點與交接 (Functional Reconciliation)。

Phase 4：
長期修復 (Post-ICU)
在 2-4 週啟動標準化工具篩檢 (MoCA, HADS)，並配合復健與日記治療。

核心總結：對於高齡患者，加護病房的使命不在於出院的那一刻結束，而在於幫助他們重拾原有的生活軌跡。

Reference: Synthesis based on NEJM 2023 Continuum Construct

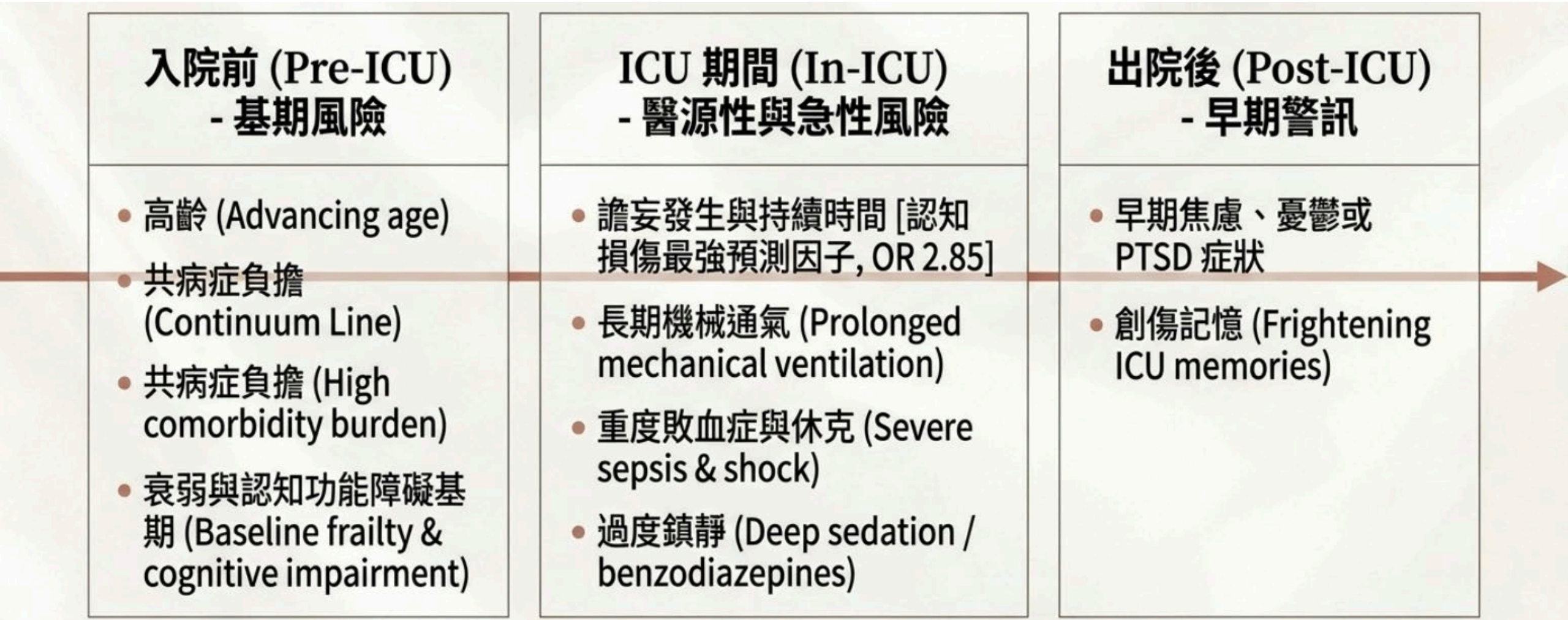
Prevalence and risk factors of PICS

- Prevalence 45 – 60%
- Could lasts for years or permanent disabilities

Physical impairment	
Risk factors	Odds ratio
Disease severity	2.5 (1.8 – 3.7)
Older age	**2.2 (1.1 – 4.3)**
Female	2.0 (1.3 – 2.9)
Mental health disorder	
Prior mental health problems	9.5 (2.1 – 42.9)
ICU hallucinations	2.6 (2.0 – 3.3)
Cognitive impairment	
Delirium	**2.9 (1.1 – 7.4)**

Ayenew T et al., PLoS One. 2025 May 8;20(5):e0323311; Lee M et al., Aust Crit Care. 2020 May;33(3):287-294; Butcher BW et al., Post-Intensive Care Syndrome. JAMA. 2026 Feb 10;335(6):542-543.

Risk factor for PICS



Reference: SCCM International Consensus Conference 2020 (Crit Care Med 2020:48);

Rengel KF et al., Anesth Analg. 2019 Apr;128(4):772-780; Mikkelsen ME et al., Crit Care Med. 2020 Nov;48(11):1670-1679.

ABCDE or ABCDEF bundle

Assess, prevent & manage pain

- CPOT or BPS to assess pain, insure adequate pain control
- Use of regional anesthesia and nonopioid adjuncts
- Analgesia-based sedation techniques with fentanyl

Both SAT & SBT

- Daily linked SAT and SBT
- Multidisciplinary coordination of care
- Faster liberation from MV

Choice of sedation

- Targeted light sedation when sedation necessary
- Avoidance of benzodiazepines
- Dexmedetomidine if high delirium risk, cardiac surgery, MV weaning

Delirium monitoring & management

- Routine CAM-ICU or ICDSC assessments
- Nonpharmacologic intervention, including sleep hygiene
- Dexmedetomidine or antipsychotic if hyperactive symptoms

Early mobility & exercise

- Physical and occupational therapy assessment
- Coordinate activity with SAT or periods of no sedation
- Progress through range of motion, sitting, standing, walking, ADLs

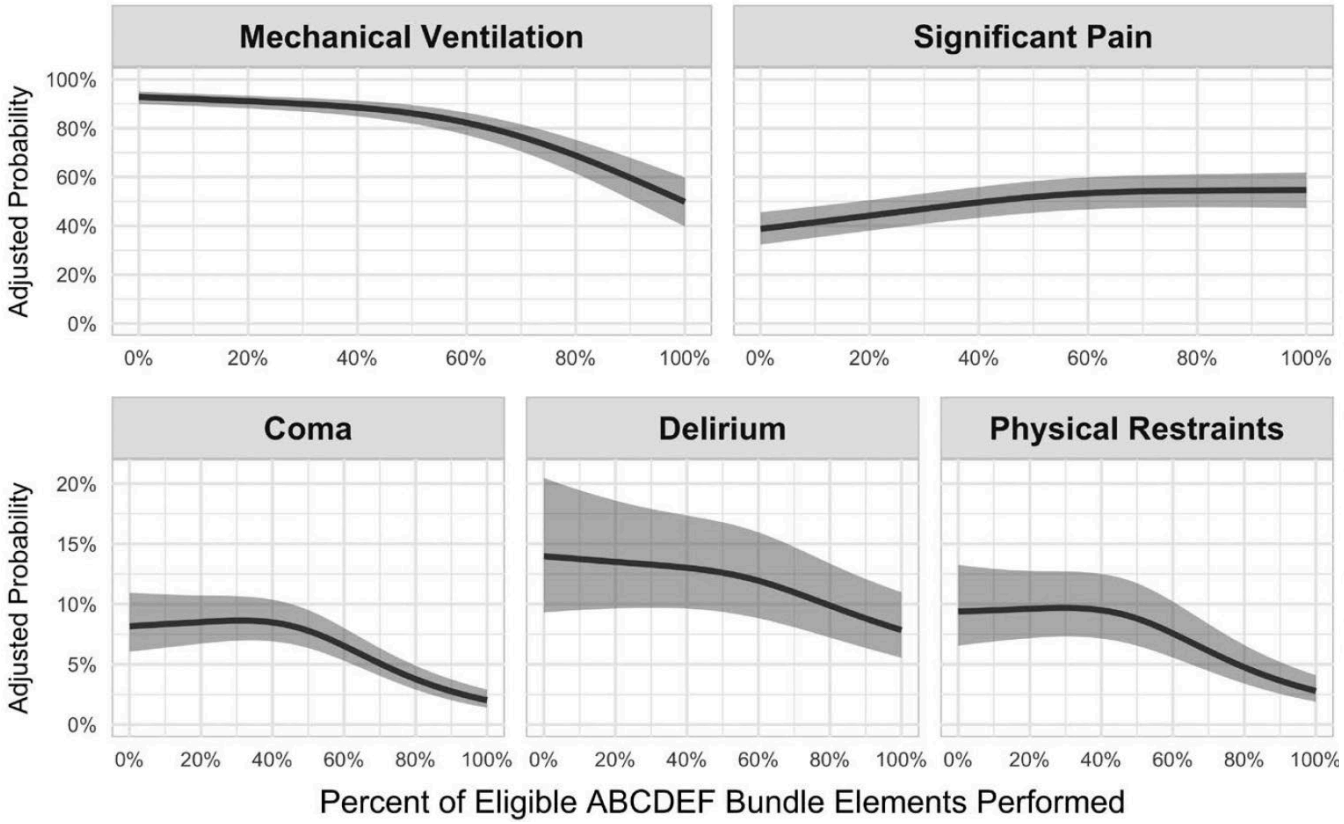
Family engagement & empowerment

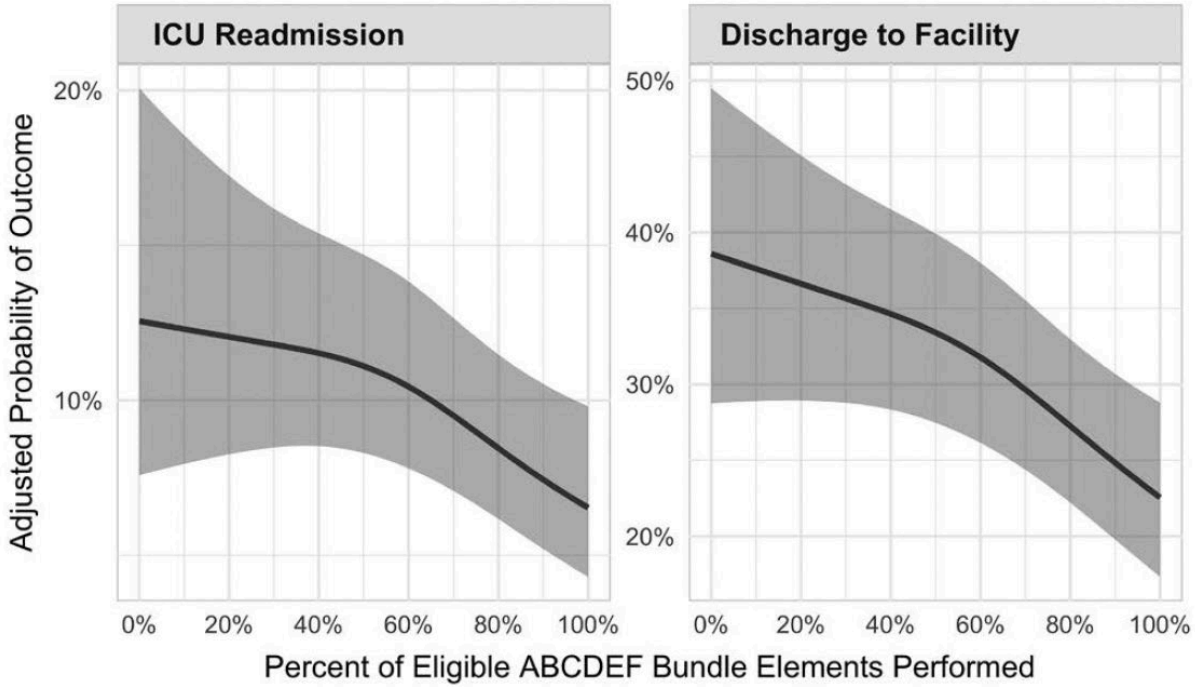
- Reorientation, provision of emotional and verbal support
- Cognitive stimulation, participation in mobilization
- Participation in multidisciplinary rounds

Caring for Critically Ill Patients with the ABCDEF Bundle

- Prospective cohort study, from 2015 to 2017, 68 ICUs in US
- n= 15,226, **60% age ≥60 years**

ABCDEF bundle performance significantly **improves** outcomes including survival, mechanical ventilation use, coma, delirium, restraint-free care, ICU readmissions, and **post-ICU discharge disposition**.

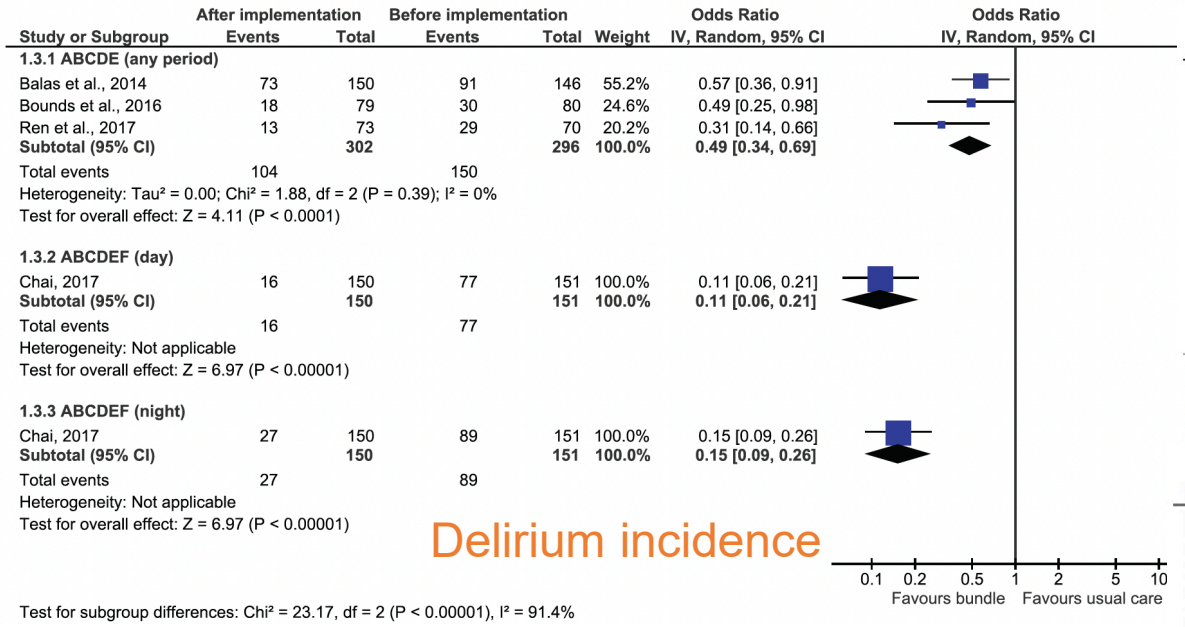




Pun BT et al., Crit Care Med. 2019 Jan;47(1):3-14.

Caring for Critically Ill Patients with the ABCDEF Bundle

Meta-analysis results: implementation of the **ABCDE/ABCDEF** bundles **reduce** length of ICU stay, mechanical ventilation time, **delirium**, ICU and hospital mortality, and **promoted early mobilization** in critically-ill patients



Study or Subgroup	After implementation Events	Total	Before implementation Events	Total	Weight	Odds Ratio IV, Random, 95% CI
1.3.1 ABCDE (any period)						
Balas et al., 2014	73	150	91	146	55.2%	0.57 [0.36, 0.91]
Bounds et al., 2016	18	79	30	80	24.6%	0.49 [0.25, 0.98]
Ren et al., 2017	13	73	29	70	20.2%	0.31 [0.14, 0.66]
Subtotal (95% CI)		**302**		**296**	**100.0%**	**0.49 [0.34, 0.69]**
Total events	104		150			
Heterogeneity: Tau² = 0.00; Chi² = 1.88, df = 2 (P = 0.39); I² = 0%						
Test for overall effect: Z = 4.11 (P < 0.0001)						
1.3.2 ABCDEF (day)						
Chai, 2017	16	150	77	151	100.0%	0.11 [0.06, 0.21]
Subtotal (95% CI)		**150**		**151**	**100.0%**	**0.11 [0.06, 0.21]**
Total events	16		77			
Heterogeneity: Not applicable						
Test for overall effect: Z = 6.97 (P < 0.00001)						
1.3.3 ABCDEF (night)						
Chai, 2017	27	150	89	151	100.0%	0.15 [0.09, 0.26]
Subtotal (95% CI)		**150**		**151**	**100.0%**	**0.15 [0.09, 0.26]**
Total events	27		89			
Heterogeneity: Not applicable						
Test for overall effect: Z = 6.97 (P < 0.00001)						

Odds Ratio IV, Random, 95% CI

0.1 0.2 0.5 1 2 5 10

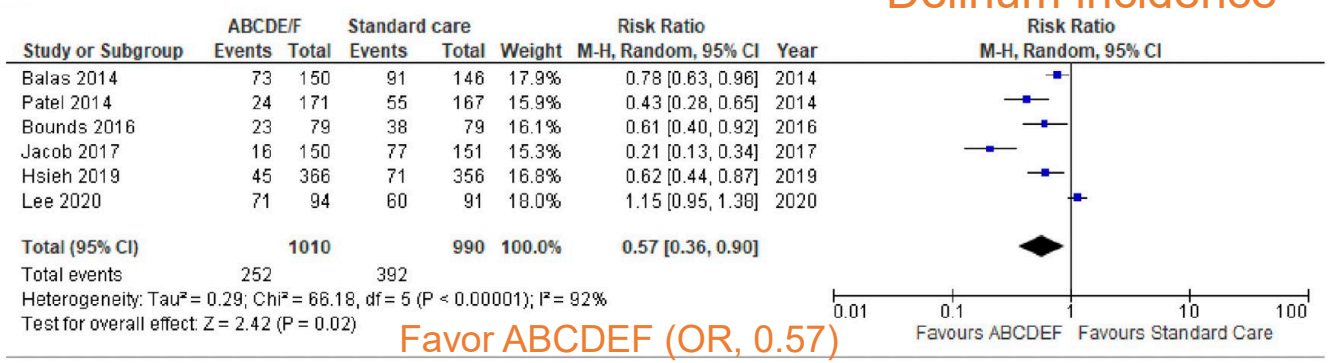
Favours bundle Favours usual care

Test for subgroup differences: Chi² = 23.17, df = 2 (P < 0.00001), I² = 91.4%

Delirium incidence

Favor bundle care (OR, 0.15)

Delirium incidence



Study or Subgroup	ABCDE/F Events	Total	Standard care Events	Total	Weight	Risk Ratio M-H, Random, 95% CI	Year
Balas 2014	73	150	91	146	17.9%	0.78 [0.63, 0.96]	2014
Patel 2014	24	171	55	167	15.9%	0.43 [0.28, 0.65]	2014
Bounds 2016	23	79	38	79	16.1%	0.61 [0.40, 0.92]	2016
Jacob 2017	16	150	77	151	15.3%	0.21 [0.13, 0.34]	2017
Hsieh 2019	45	366	71	356	16.8%	0.62 [0.44, 0.87]	2019
Lee 2020	71	94	60	91	18.0%	1.15 [0.95, 1.38]	2020
Total (95% CI)		**1010**		**990**	**100.0%**	**0.57 [0.36, 0.90]**	
Total events	252		392				
Heterogeneity: Tau² = 0.29; Chi² = 66.18, df = 5 (P < 0.00001); I² = 92%							
Test for overall effect: Z = 2.42 (P = 0.02)							

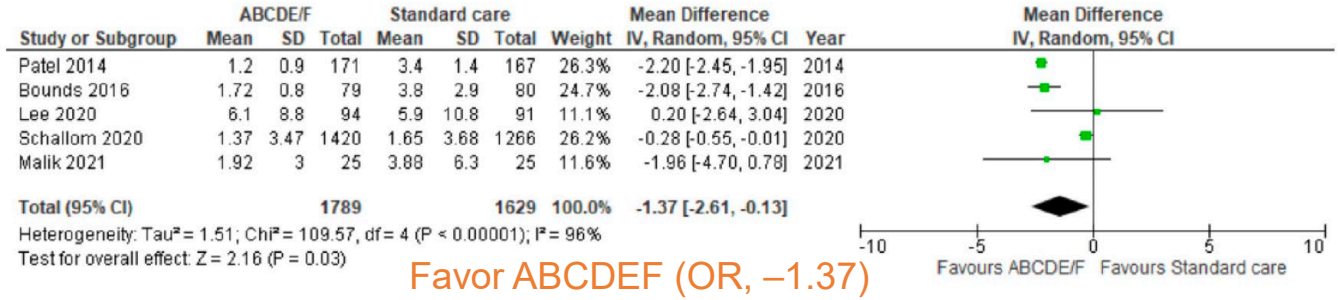
Risk Ratio M-H, Random, 95% CI

0.01 0.1 1 10 100

Favours ABCDEF Favours Standard Care

Favor ABCDEF (OR, 0.57)

Delirium duration



Study or Subgroup	ABCDE/F Mean	SD	Total	Standard care Mean	SD	Total	Weight	Mean Difference IV, Random, 95% CI	Year
Patel 2014	1.2	0.9	171	3.4	1.4	167	26.3%	-2.20 [-2.45, -1.95]	2014
Bounds 2016	1.72	0.8	79	3.8	2.9	80	24.7%	-2.08 [-2.74, -1.42]	2016
Lee 2020	6.1	8.8	94	5.9	10.8	91	11.1%	0.20 [-2.64, 3.04]	2020
Schallom 2020	1.37	3.47	1420	1.65	3.68	1266	26.2%	-0.28 [-0.55, -0.01]	2020
Malik 2021	1.92	3	25	3.88	6.3	25	11.6%	-1.96 [-4.70, 0.78]	2021
Total (95% CI)		**1789**				**1629**	**100.0%**	**-1.37 [-2.61, -0.13]**	
Heterogeneity: Tau² = 1.51; Chi² = 109.57, df = 4 (P < 0.00001); I² = 96%									
Test for overall effect: Z = 2.16 (P = 0.03)									

Mean Difference IV, Random, 95% CI

-10 -5 0 5 10

Favours ABCDE/F Favours Standard care

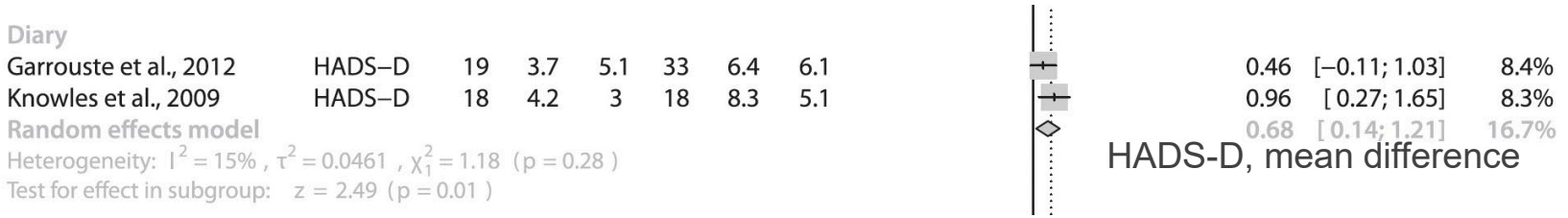
Favor ABCDEF (OR, –1.37)

Moraes FDS et al., Medicine (Baltimore). 2022 Jun 24;101(25):e29499; Sosnowski K et al., Int J Nurs Stud. 2023 Feb;138:104410.

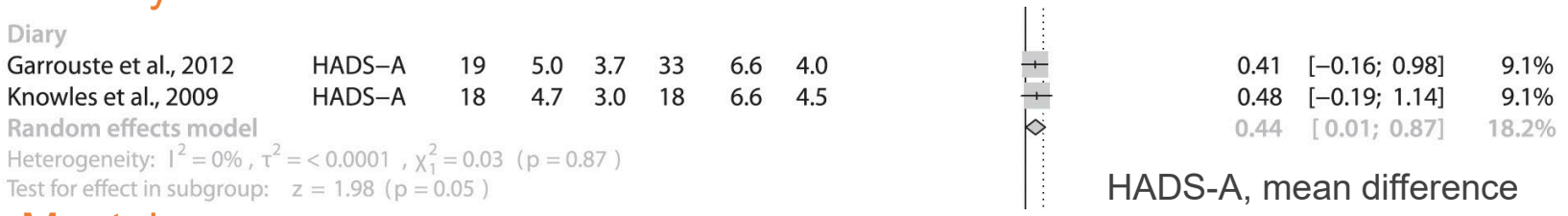
Other interventions

Meta-analysis including 36 studies (5,165 ICU patients)

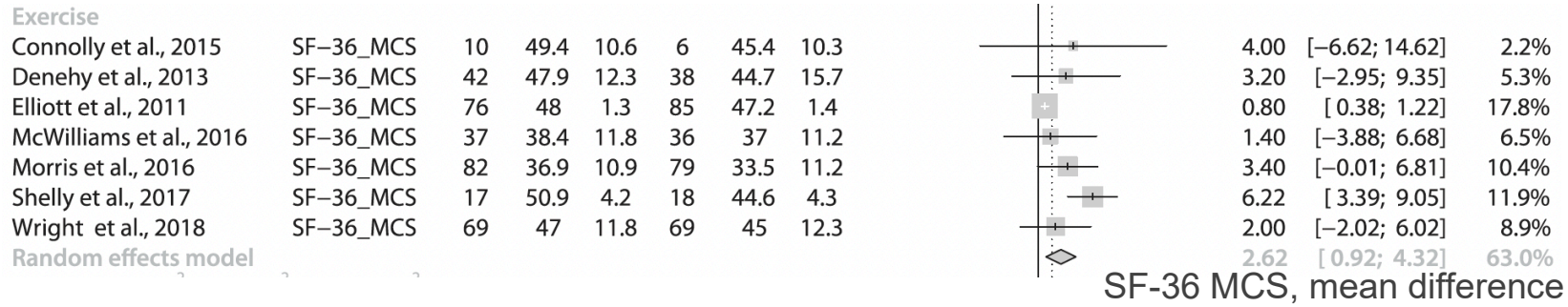
Depression



Anxiety



Mental score



- Diary reduce depression (HADS-D, +0.68) and anxiety (HADS-A, +0.44)
- Exercise improve mental status (SF-36 MCS, + 2.62)

Geense WW et al., Crit Care Med. 2019 Nov;47(11):1607-1618.

出院後篩檢指引 (Post-ICU Screening Protocol)

篩檢對象 (Target: High-Risk Patients)

具備以下任一特徵的高齡患者：入院前衰弱或認知障礙、曾發生 ICU 譫妄、長期機械通氣、ARDS、敗血症、休克，或早期出現 PTSD 症狀。

篩檢時機 (Timing: Serial Sustained Assessment)

初始篩檢：
出院後 2-4 週內。

動態追蹤：
在重要的健康或生活變化時（如醫療假結束、復健停滯期、重症週年紀念）進行串聯式的反覆評估。PICS 是慢性進程，並非單一時間點的事件。

Reference: SCCM International Consensus Conference 2020 (Crit

Tools for the assessment of PICS

PICS 領域 (Domain)	篩檢工具 (Tool)	閾值與建議強度 (Cutoff & Recommendation)
認知 (Cognition)	MoCA (蒙特利爾認知評估)	分數 < 26 提示損傷 (強烈建議)
焦慮與憂鬱 (Mental)	HADS (醫院焦慮及憂鬱量表)	子量表分數 ≥ 8 (強烈建議)
創傷後壓力 (Mental)	IES-R 或 IES-6 (事件衝擊量表)	閾值 > 1.6 或 1.75 (弱建議)
身體功能 (Physical)	6MWT (六分鐘步行測試) / EQ-5D-5L	與常模數據比較 (弱建議)

Reference: SCCM International Consensus Conference. Crit Car

加護病房後症候群 (PICS)：從風險識別到 ABCDEF 照護組合的早期介入

PICS 風險評估
(RISK FACTORS)

入住前與入住中的關鍵預測指標
(KEY PREDICTORS: PRE & IN-ICU)

- 高齡 Advanced Age
- 基層衰弱 Frailty
- 嚴重敗血症 Severe Sepsis
- ICU > 4 Days

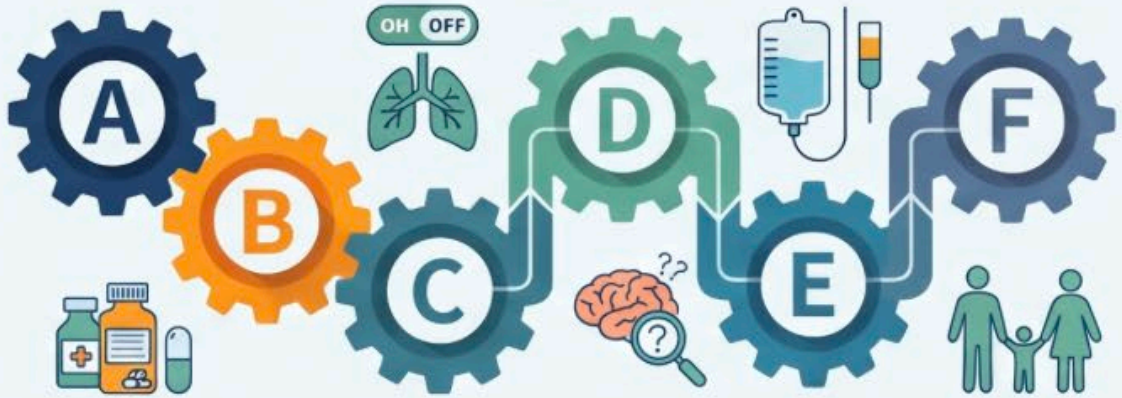
可調控的危險因子
(MODIFIABLE RISK FACTORS)

- 長時間使用呼吸器 Prolonged Ventilation
- 譫妄持續時間 Delirium Duration
- 低氧血症 Hypoxemia
- 使用苯二氮平類 Benzodiacepine Use

PICS 的三大範疇
(THREE DOMAINS OF PICS)

- 認知功能下降 (Cognitive Decline: Memory & Executive Function)
- 生理功能障礙 (Physical Impairment)
- 心理健康問題 (Mental Health Issues: Anxiety, Depression, PTSD)

介入預防：ABCDEF 照護組合
(INTERVENTIONS: ABCDEF BUNDLE)



- A: 疼痛管理 Pain Management
- B: 喚醒與呼吸練習 Breathing & Awakening Trials
- C: 鎮靜藥物選擇 Choice of Sedation
- C: 鎮靜藥物選擇 Choice of Sedation
- D: 譫妄防治 Delirium Monitoring & Management
- E: 早期活動 Early Mobility
- F: 家屬參與 Family Engagement & Empowerment

完整執行照護組合的顯著效益
(SIGNIFICANT BENEFITS OF FULL IMPLEMENTATION)

- 降低 7 天內死亡風險 (AHR 0.32)
- 提升出院返家率 (Increased Home Discharge Rates)

預後結果改善
(OUTCOME IMPROVEMENT: PUN ET AL. 2019)

Take home message

- ICU admission of older patients is increasing
- Geriatric syndrome: Delirium, polypharmacy, multimorbidity, frailty
- Frailty is independently associated with outcomes of older patients in ICU
- Specific supportive measurement for older patients
  - ✓Respiratory support following mechanical ventilation
  - ✓Lower MAP goal (60 to 65 mmHg) during sepsis
  - ✓Light sedation, less BZD, consider melatonin at night
- Comprehensive geriatric care prevents PICS
  - ✓Early palliative care
  - ✓ABCDEF bundle
  - ✓Post-acute care, rehabilliation program, follow-up

Thanks for your attention