Does the level of mobility at ICU discharge impact post-ICU outcomes? A retrospective analysis

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Existing evidence base

- Increasing volume of research
- Inconsistent results
- Optimum dose, type, and timing of rehabilitation interventions remains unclear

Tipping et al Intensive Care Med 2017; 43(2)

Conclusion: Active mobilisation and rehabilitation in the ICU ha
term mortality, but may improve mobility status, muscle strengt
to 180 days.

Paton et al NEJM Evid 2023; 2(2)

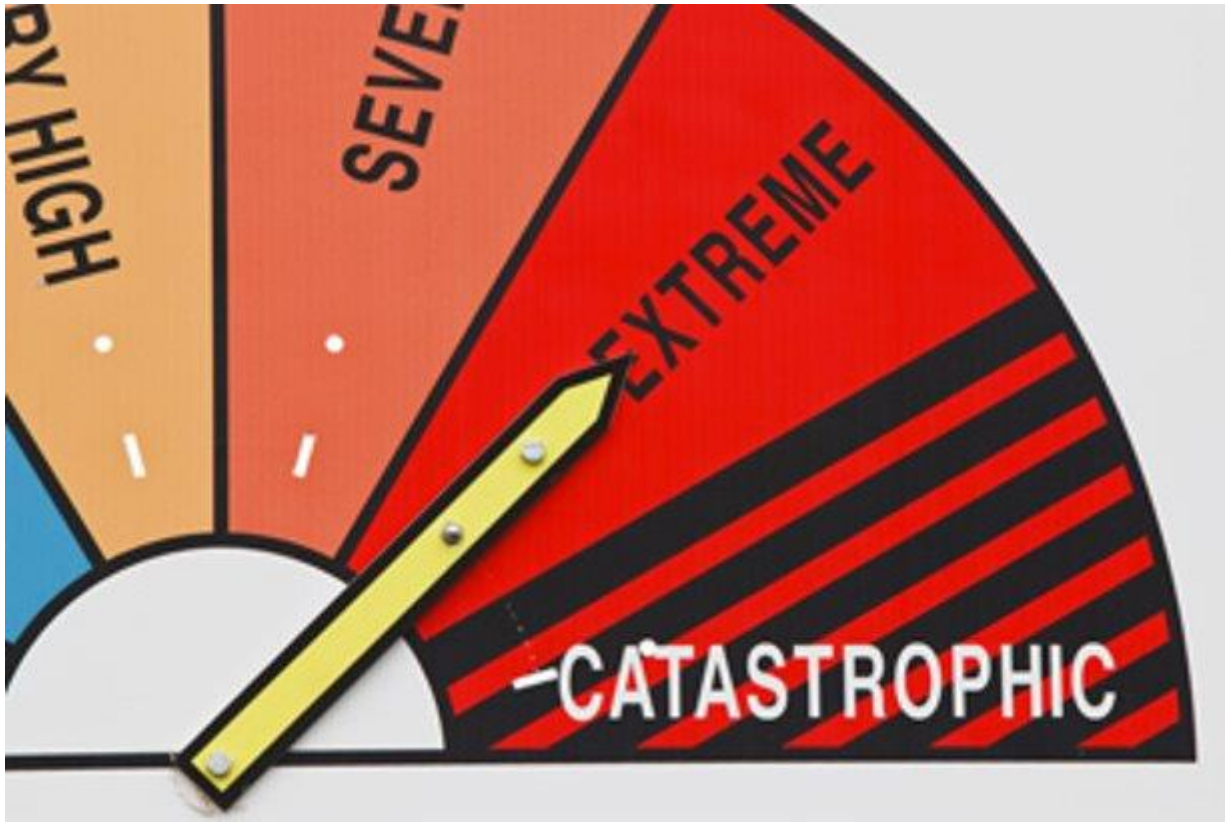
CONCLUSIONS

Use of early active mobilization for critically ill adults did not significantly affect days alive and out of hospital to day 180. Early active mobilization was associated with improved physical function in survivors at 6 months; however, the possibility that it might increase mortality and adverse events needs to be considered when interpreting this finding. (PROSPERO number, CRD42022309650.)

Challenges to research in ICU

Population	Interventions	Comparison	Outcome measures
• Inclusions (Intubated) • Significant exclusions (Non-frail) • Numbers • Heterogeneity	• Mobility • Exercise • Dose • Timing	• Usual care variation • Varying comparators	• Mobility • Function • Exercise capacity • HRQoL • Hospital discharge • 6/12/24 months • 5+ years

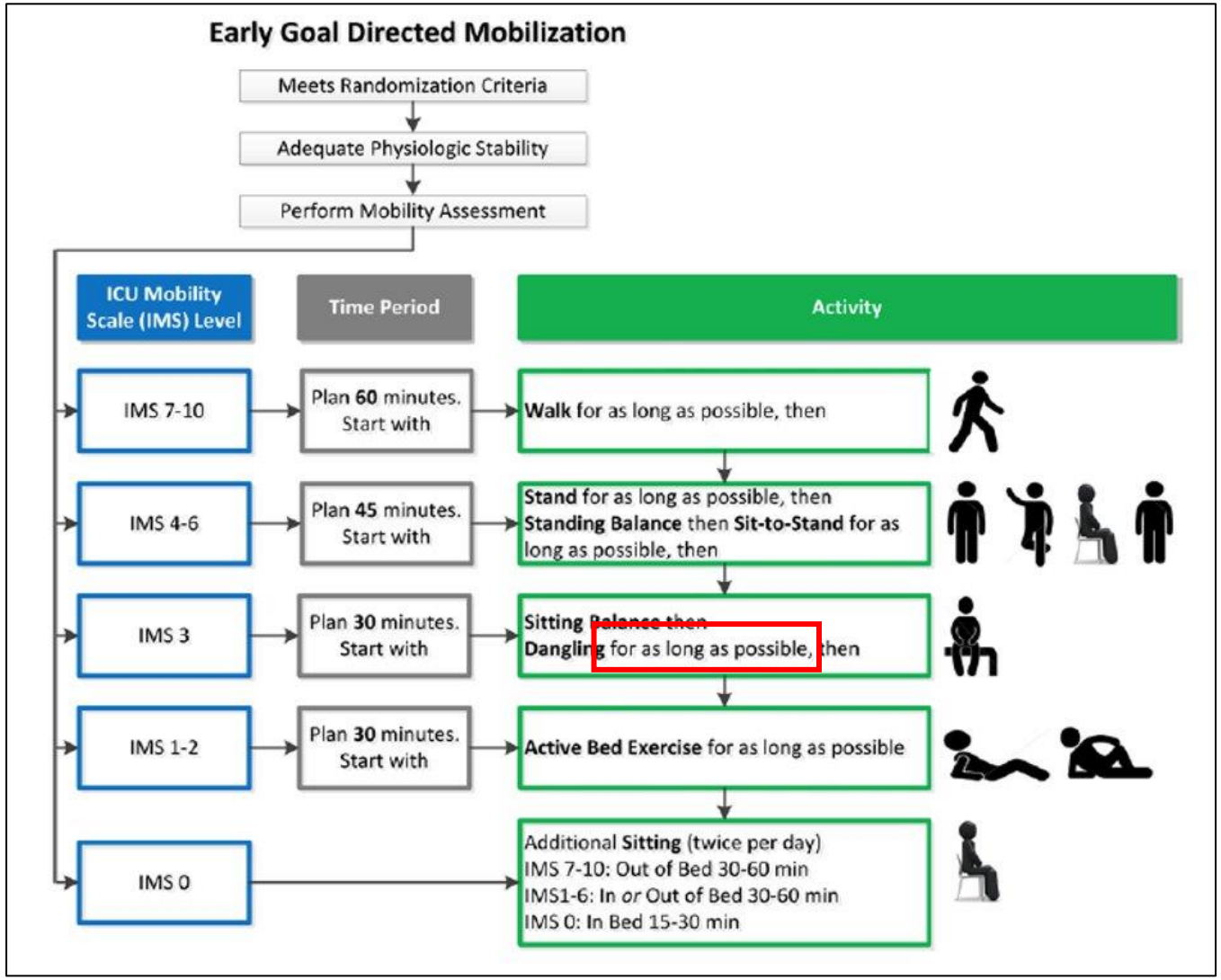
Time vs physiological state



Early increase in dose – TEAM trial

Protocol Vs usual mobilisation

- HR 150 (SR)
- Lactate 4
- Adrenaline 0.2 mcg/kg/min
- FiO2 0.6
- PEEP 16
- RRT
- RASS -3/-2



Hodgson et al N Engl Med 2022; 387

Dose - response

Table 2. Mobilization in the ICU.*

Characteristic	Early Mobilization (N=371)	Usual Care (N=370)	Between-Group Difference (95% CI)†
Patients who were assessed by a physiotherapist on day of randomization — no./total no. (%)	320/370 (86.5)	265/363 (73.0)	13.5 (6.7 to 20.3)
No. of days per patient when physiotherapy assessment occurred	0.94±0.11	0.81±0.24	0.14 (0.12 to 0.16)
No. of minutes of active mobilization per day	20.8±14.6	8.8±9.0	12.0 (10.4 to 13.6)
Mobilization milestones‡			
IMS 3 or higher			
Patients — no. (%)	331 (89.2)	330 (89.2)	0 (–4.3 to 4.3)
Median no. of days since randomization (IQR)	3 (1 to 6)	4 (2 to 7)	–1 (–2.2 to –0.2)
IMS 4 or higher			
Patients — no. (%)	287 (77.4)	286 (77.3)	0.1 (–6.0 to 6.1)
Median no. of days since randomization (IQR)	3 (2 to 7)	5 (3 to 8)	–2 (–3.4 to –0.6)
IMS 7 or higher			
Patients — no. (%)	176 (47.4)	150 (40.5)	6.9 (–0.2 to 14.0)
Median no. of days since randomization (IQR)	5 (3 to 8)	7 (4 to 13)	–2 (–3.4 to –0.7)
Median peak IMS (IQR)	6 (4 to 8)	6 (4 to 8)	0 (–1 to 1)

Hodgson et al N Engl Med 2022; 387

Table S7. Levels of mobilization achieved in the ICU on the ICU mobility scale*.

Characteristic	Early Mobilization (n=371)	Usual Care (n=370)	Between group difference+ (95% CI)
Sitting over the edge of the bed (IMS 3), no. (%)	329 (88.7)	328 (88.6)	0 (-4.9 to 4.9)
Time spent per day, minutes, mean ±SD	14.4±8.7	7.3± 6.1	7.1 (6.1 to 8.2)
Standing (IMS 4), no. (%)	284 (76.5)	282 (76.2)	0.3 (-5.9 to 6.6)
Time spent per day, minutes, mean ±SD	6.7± 5.7	4.0±4.2	2.8 (2.1 to 3.5)
Transferring to a chair (IMS 5), no. (%)	243 (65.5)	243 (65.7)	-0.2 (-6.7 to 6.3)
Time spent per day, minutes, mean ±SD	3.9±4.7	3.8±6.0	0.3 (-0.6 to 1.1)
Marching on the spot (IMS 6), no (%)	220 (59.3)	196 (53.0)	6.3 (-0.6 to 13.2)
Time spent per day, minutes, mean ±SD	4.0±4.1	2.4±2.8	1.5 (0.9 to 2.2)
Walking with the assistance ≥2 people (IMS 7), no (%)	175 (47.2)	149 (40.3)	6.9 (-0.2 to 14)
Time spent per day, minutes, mean ±SD	5.3±7.1	4.1±4.4	1.3 (0.1 to 2.6)
Walking with the assistance of 1 person (IMS 8), no (%)	121 (32.6)	97 (26.2)	6.4 (-1.1 to 13.9)
Time spent per day, minutes, mean ±SD	12.7±10.2	7.4±7.8	5.1 (2.8 to 7.4)
Walking independently with a gait aid (IMS 9), no (%)	45 (12.1)	50 (13.5)	-1.4 (-6.1 to 3.3)
Time spent per day, minutes, mean ±SD	8.8±8.0	6.2±5.5	3.2 (0.5 to 5.9)
Walking independently without a gait aid (IMS 10), no (%)	25 (6.7)	23 (6.2)	0.5 (-3.4 to 4.5)
Time spent per day, minutes, mean ±SD	19.4±16.0	14.4±13.4	8.0 (0.3 to 15.2)

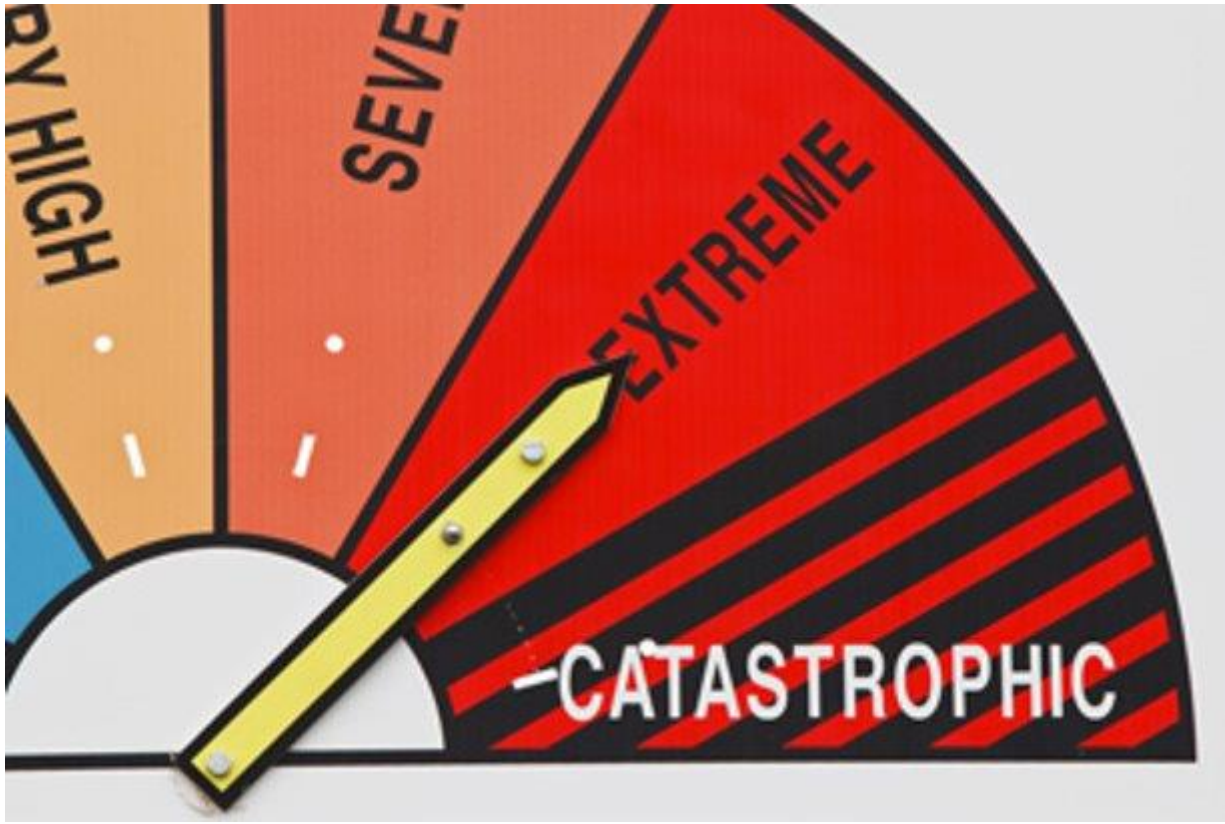
Relation to practice/critique

- Advancing the time mobility started did not affect outcomes at ICU discharge or other measures

- Important to note:
  - This was applying a different dose of rehab (not comparing rehab to no rehab)
  - The goal of ICU rehabilitation is not to exercise to physiological fatigue

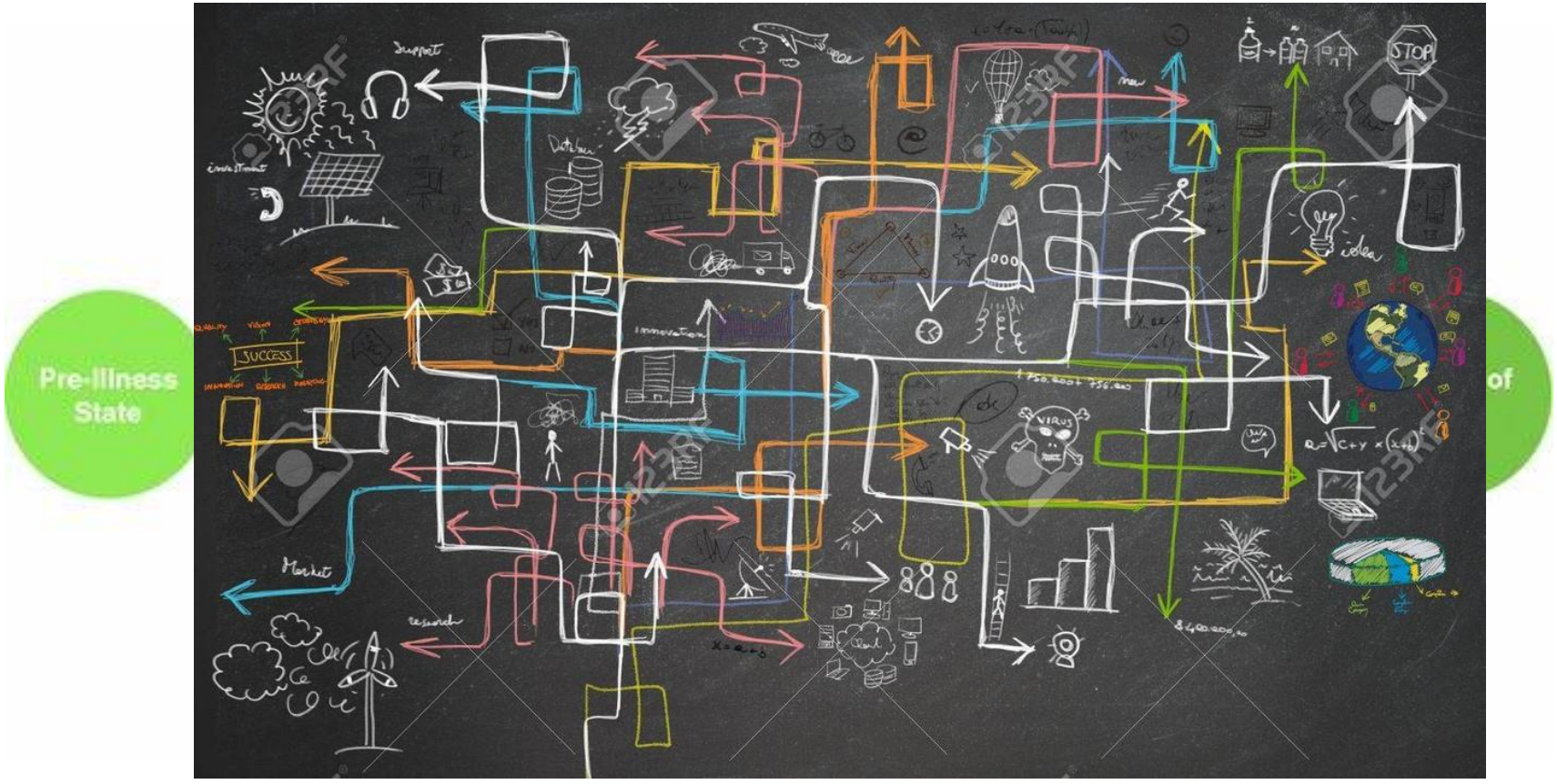
- Evidence of increased adverse events in intervention group

Time vs physiological state



Realities of interventions in/post ICU

Would we expect a single intervention applied in ICU to affect outcomes at distant time points?



So what did we want to know?

- Can mobility in ICU influence shorter term outcomes?
  - Hospital based outcomes

- What is the relationship between increasing mobility and outcomes?

Does the level of mobility at ICU discharge impact post-ICU outcomes? A retrospective analysis

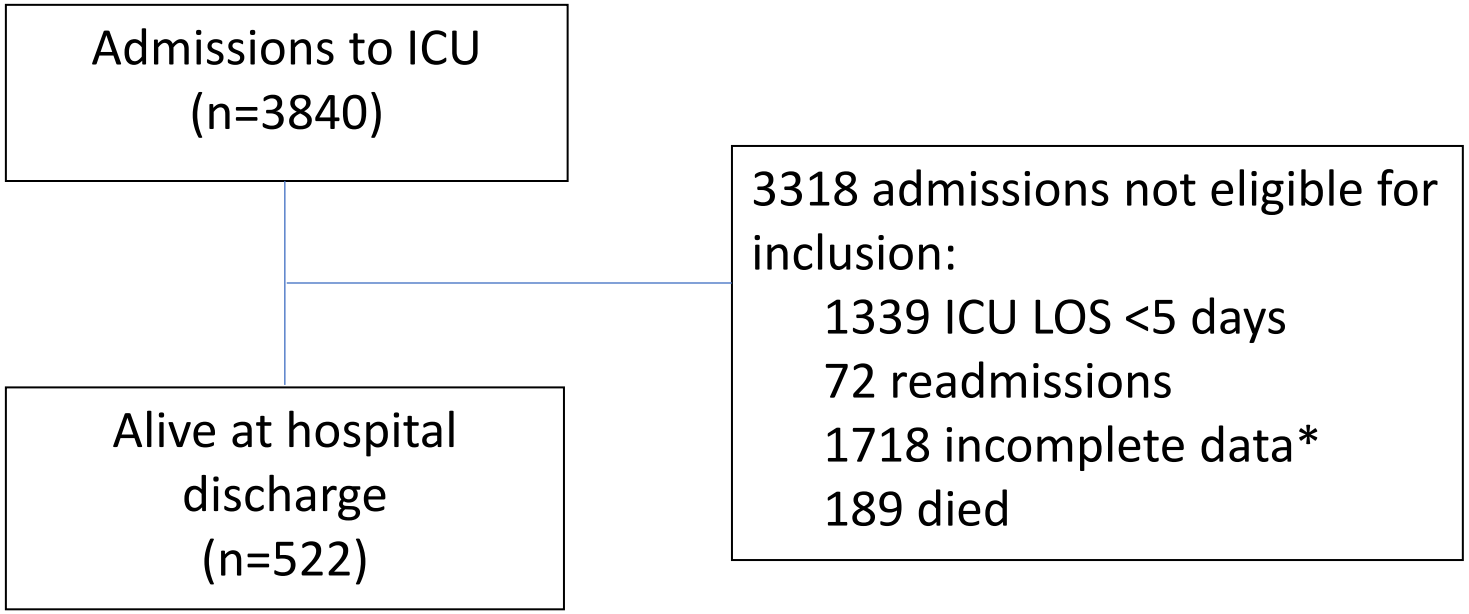
Rebekah Haylett, Jonathan Grant, Dr Mark Williams, Owen Gustafson

Aim

- To evaluate the association of the level of mobility on ICU discharge with discharge destination and hospital length of stay

Methods

- Retrospective statistical analysis
- Inclusions:
    - All admissions - 1st Feb 2018 to 30th June 2022
    - Consecutive admissions >18 years old
    - ICU LOS ≥5 days
    - Alive at hospital discharge
- Exclusions:
    - Discharged to another ICU/remained an inpatient at the time of analysis
    - Incomplete data



*pause in data collection due to COVID-19

- Level of mobility – Manchester Mobility Score (MMS)[1]
- MMS ≥5 and ≤4
- Discharge destination defined as either discharged to usual residence or other setting

MMS	Descriptor
1	Passive movements, active exercise, chair position in bed
2	Sit on edge of bed
3	Hoisted to chair
4	Standing practice
5	Step transfer with assistance
6	Mobilising with or without assistance
7	Mobilising with or without assistance >30m

[1] McWilliams D, Atkins G, Hodson J, Boyers M, Lea T, Snelson C. Is the manchester mobility score a valid and reliable measure of physical function within the intensive care unit. ICMx 2015;3(Suppl 1):1.

Patient characteristics and variables

Patient characteristics	Clinical variables
Age	Ventilator days
Sex	Day of 1st rehab contact
Admission type (emergency/elective)	MRC SS on ICU discharge
Specialty (medical/surgical/trauma)	ICU LOS
APACHE II on ICU admission	MMS on ICU discharge
Frailty/comorbidity: CFS FCI	
Pre-admission function: WHODAS 2.0	

Association of variables to discharge to usual residence

	OR	95% CI	p
ICU LOS	0.98	0.95 – 1.00	0.49
Age	0.97	0.95 – 0.99	0.01
Hospital LOS	0.99	0.98 – 0.99	0.009
Speciality			
Medical	1.68	0.86 – 3.26	0.13
Surgical	0.56	0.24 – 1.32	0.19
MMS ≥5	3.86	2.14 – 6.94	<0.001

Patients who achieved an MMS ≥5 on ICU discharge were 3.8 times more likely to be discharged home

Association of variables to Hospital LOS

	B	95% CI	p
ICU LOS	1.36	1.10 – 1.61	<0.001
Days to initial rehab	-0.91	-1.47 – -0.36	0.001
MMS ≥5 on ICU discharge	-11.83	-17.56 – -6.10	<0.001
CFS	2.80	0.92 – 4.67	0.004
Speciality	4.54	1.05 – 8.02	0.01

Patients who achieved an MMS ≥5 on ICU discharge had a 11.8 day reduction in hospital LOS

Ability to achieve MMS ≥5

- N ailty, co

	MMS on ICU discharge		
	≤ 4	≥ 5	p
Ventilated, n (%) Yes No	 142 (38) 25 (17)	 232 (62) 120 (83)	 <0.001
Ventilator days, median (IQR)	7 (3-16)	3 (0-7)	<0.001
Day of 1st rehab, median (IQR)	6 (4-11)	3 (2-6)	<0.001
MRC SS, median (IQR)	42 (36-50)	60 (54-60)	0.000
ICU LOS, median (IQR)	13 (7-23)	8 (6-12)	<0.001

Discussion

- Rehabilitation in ICU is a complex intervention
- Useful to understand the component parts
- Supports progressive mobility interventions throughout an ICU admission – all patients

- Aim for an active step transfer to the chair in ICU prior to discharge
- Reduce dependency on ICU discharge

- How do we measure the effectiveness of our interventions?

Thankyou for listening

Any questions?

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