



University Hospitals
Coventry and Warwickshire
NHS Trust

Rehabilitation in Critical Care:

Where are we, and where do we want to be?

Dr David McWilliams

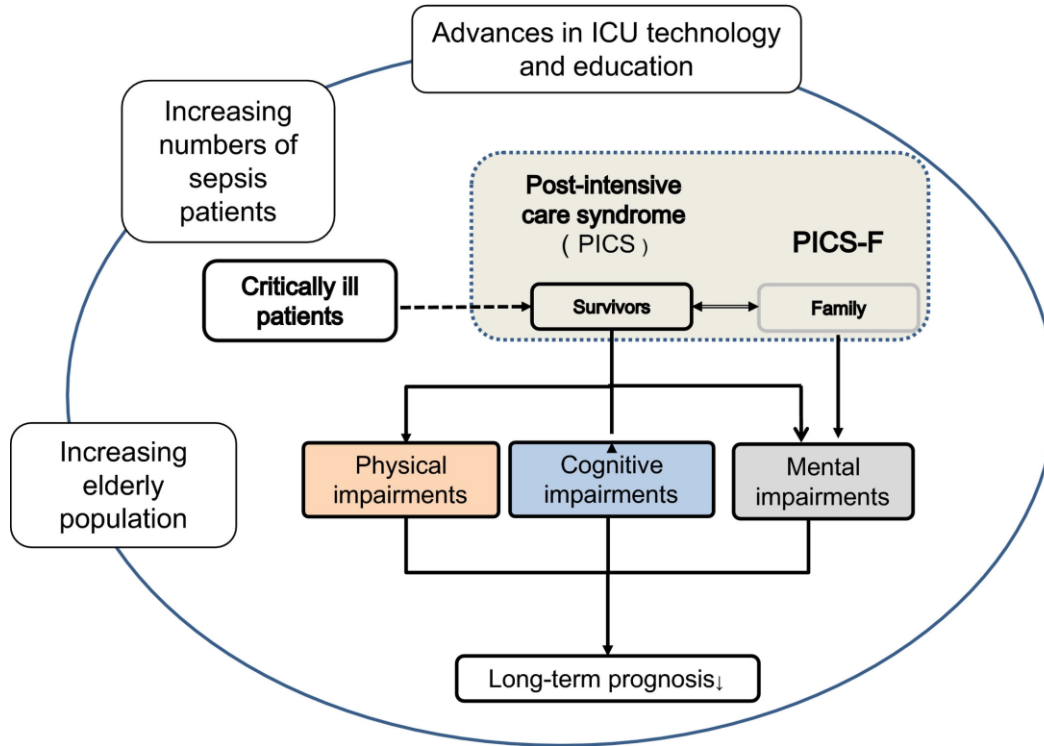
Associate Clinical Professor – Physiotherapy

Background

- Advances in critical care have resulted in improved critical care mortality - Increased focus on long term survivorship
- Significant and rapid muscle loss associated with critical illness and ICU stay
- A strong correlation between muscular weakness and prolonged mechanical ventilation has been observed



Post Intensive Care Syndrome (PICS)

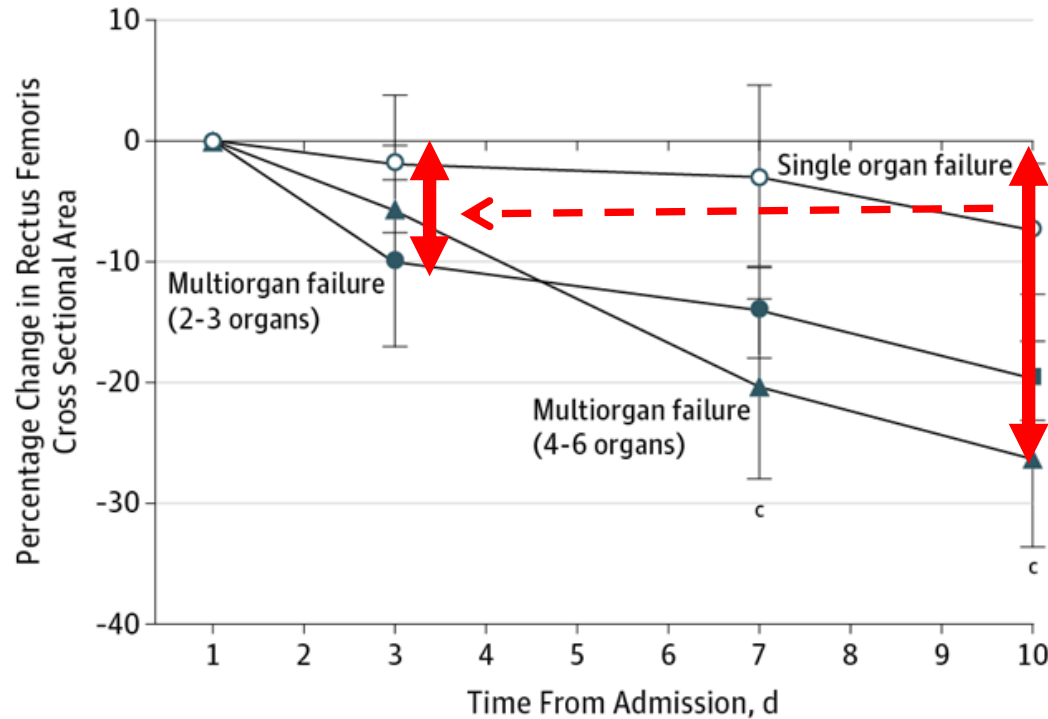


At 1 year

- 1/3 still require help with ADL's
- Only 40% of patients back at work
- Up to 50% readmitted to hospital
- 1/3 patients cognitive dysfunction
- 1/3 anxiety +/- depression
- 1/5 PTSD
- Up to 30% of family / caregivers experience stress, anxiety, depression and complicated grief

The concept of early rehabilitation




B Single vs multiorgan failure



**Rehab
Gap**

Expert consensus and recommendations on safety criteria for active mobilization of mechanically ventilated critically ill adults

Carol L Hodgson^{1,2*}, Kathy Stiller³, Dale M Needham⁴, Claire J Tipping², Megan Harrold⁵, Claire E Baldwin^{6,7}, Scott Bradley², Sue Berney⁸, Lawrence R Caruana⁹, Doug Elliott¹⁰, Margot Green¹¹, Kimberley Haines^{8,12},

	Low risk of an adverse event. Proceed as usual according to each ICU's protocols and procedures.
	Potential risk and consequences of an adverse event are higher than green, but may be outweighed by the potential benefits of mobilization. The precautions or contraindications should be clarified prior to any mobilization episode. If mobilized, consideration should be given to doing so gradually and cautiously.
	Significant potential risk or consequences of an adverse event. Active mobilization should not occur unless specifically authorized by the treating intensive care specialist in consultation with the senior physical therapist and senior nursing staff.

Safety of Patient Mobilization and Rehabilitation in the Intensive Care Unit

Systematic Review with Meta-Analysis

Peter Nydahl^{1*}, Thiti Sricharoenchai^{2*}, Saurabh Chandra³, Firuzan Sari Kundt⁴, Minxuan Huang⁵, Magdalena Fischill⁶, and Dale M. Needham⁷

Potential Safety Event	Total	Mobility Sessions	Frequency	# Studies Reporting
Fall	11	16,342	0.07%	27
Endotracheal Tube Removal	2	17,148	0.01%	28
Intravascular Catheter Event	35	16,397	0.2%	31
Other Catheter/tube Removal	15	15,761	0.09%	25
Desaturation	126	16,487	0.03%	33
Hemodynamic Changes	78	18,083	0.5%	33
Cardiac Arrest	4	5,830	0.0007%	26
Other	312	17,132	1.8%	32

2.6% potential safety events, 0.6% actual

The Evidence for early rehabilitation

- Decreased weaning times
- Decreased length of stay
- Reduced delirium
- Improved muscle strength and functional outcomes
- Greater walking distance at hospital discharge



National Guidelines

NHS
National Institute for
Health and Clinical Excellence

NICE National Institute for
Health and Care Excellence

Issue date: March 2009

Rehabilitation after critical illness

NICE clinical guideline 83
Developed by the Centre for Clinical Practice at NICE

Rehabilitation after critical illness in adults

Quality standard
Published: 7 September 2017
www.nice.org.uk/guidance/qs158

NICE
quality
standard

The Faculty of
**Intensive
Care Medicine**

**Intensive
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GUIDELINES FOR THE PROVISION OF INTENSIVE CARE SERVICES


Version 2.1
June 2022

So where are we?

Country	ICU/patients	Mobilised out of bed (\geq sitting edge of bed)	
		Spontaneously	Mech. Vent.
Australia/NZ ¹	38/498	60%	3%
Germany ²	116/775	-	24%
USA ³	42/770	56%	16%
United Kingdom ⁴	12/704	65%	20%
Switzerland ⁵	35/161	-	33%
Brazil ⁶	11/140	-	10%

1 Berney 2013, 2 Nydahl 2014, 3 Jolley 2016, 4 McWilliams 2016, 5 Sibilla 2017, 6 Fontela 2018

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United Kingdom ⁴	12/704	65%	20%
Switzerland ⁵	35/161	-	33%
Brazil ⁶	11/140	-	10%
Worldwide 	135/1229	-	7% (9%)





Question: What is 'early' mobilisation?

- A. Mobilisation before 10am
- B. Mobilisation within < 24 hours of ICU admission
- C. Mobilisation within < 72 hours of ICU admission
- D. Mobilisation dependent on patient status irrespective of days



Author	Setting	Design	Key Findings	1 st day out of bed
Morris 2008 CCM	Medical ICU n =330	Mobility protocol led by mobility team, initiated within 48 hours	More physiotherapy received, Patients sat out of bed earlier Reduced ICU and hospital LOS Reduced duration of MV	5 days
Schweickert 2009 Lancet	2 x Medical ICU's n = 104	PT / OT initiated within 72 hours until discharge	Achieved mobility milestones earlier Improved function at hospital d/c Reduced incidence and duration of delirium Reduced duration of MV	1.7 days
McWilliams 2018 J. Crit care	Mixed ICU n=87	Enhanced rehabilitation team with individualised goals, initiated within 96 hours	Reduced time to first mobilise Greater proportion of active rehabilitation sessions Improved function at ICU discharge	8 days
Schaller 2016 Lancet	5 x Surgical ICU's n = 200	Coordinated progressive activity by nurse/therapist within 72hrs	Higher mobilisation levels in ICU Reduced ICU LOS Improved function at hospital d/c Reduced delirium	Not stated

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Early, Early, Early!!



Early Active Mobilization during Mechanical Ventilation in the ICU

The TEAM Study Investigators and the ANZICS Clinical Trials Group*

- 750 patients
- Median
- No difference

But...

- ↑ Adverse
- ↑ Mortality



WARNING

ness



Are we always talking the same language??







0180V24E | Barry Slaven | www.medicalimages.com

01 Mar 2019



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Rehabilitation Levels in Patients with COVID-19 Admitted to Intensive Care Requiring Invasive Ventilation

An Observational Study

David McWilliams¹, Jonathan Weblin¹, James Hodson², Tonny Veenith³, Tony Whitehouse³, and Catherine Snelson³;

- 90% paralysed (mean 7 days)
- 67% were prone (multiple times)
- Mean 13 days sedation
- Mean duration 19 days ventilation (77% had tracheostomy)



Rehabilitation

- 100% incidence of ICU-AW at awakening
- 14 days to first mobilisation (defined as sitting on edge of bed or higher)



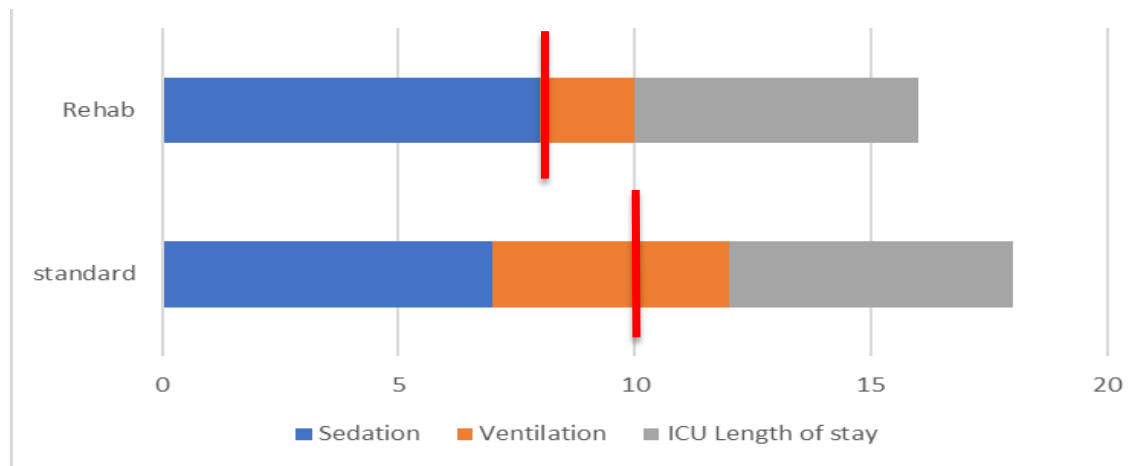
Rehabilitation

- All patients mobilised prior to ICU discharge
- Mobilisation commenced < 24 hours after sedation stopped (5 days before weaned from MV)
- Mean MMS at ICU discharge = 5 (step transfers)



Earlier and enhanced rehabilitation of mechanically ventilated patients in critical care: A feasibility randomised controlled trial

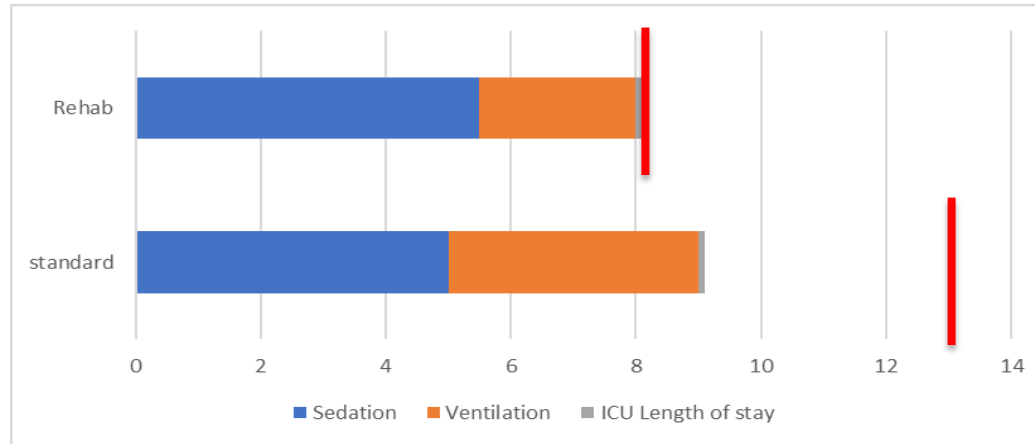
David McWilliams ^{a,*}, Charlotte Jones ^a, Gemma Atkins ^a, James Hodson ^b, Tony Whitehouse ^c,



	Control (n = 43)	Enhanced (n = 44)	p
Time to 1st mobilisation (days)	10 (7-12)	8 (7-11)	0.035
SOFA at 1st mobilisation	4 (3-6)	6 (4-8.25)	0.0278
MMS at ICU discharge	5 (4-7)	7 (5-7)	0.016

Early intensive care unit mobility therapy in the treatment of acute respiratory failure

Peter E. Morris, MD; Amanda Goad, RN; Clifton Thompson, RN; Karen Taylor, MPT; Bethany Harry, MPT;



*Unadjusted figures





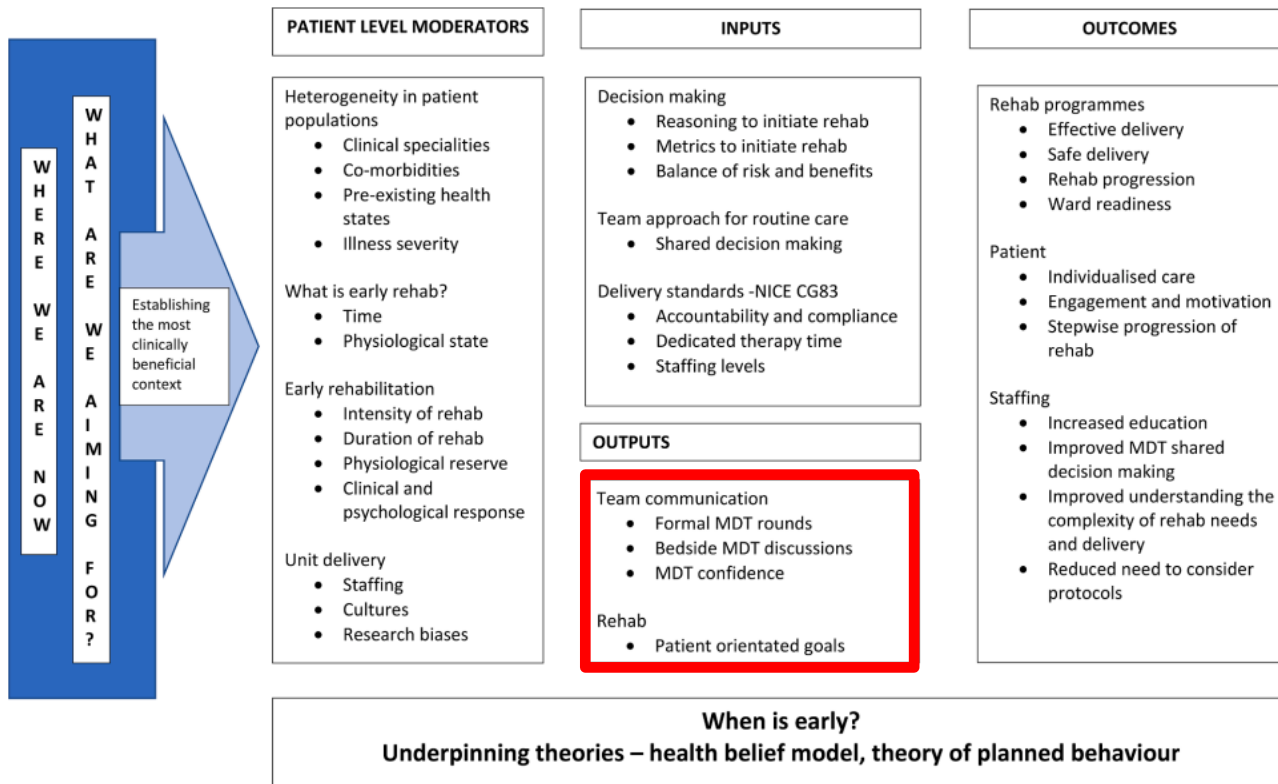


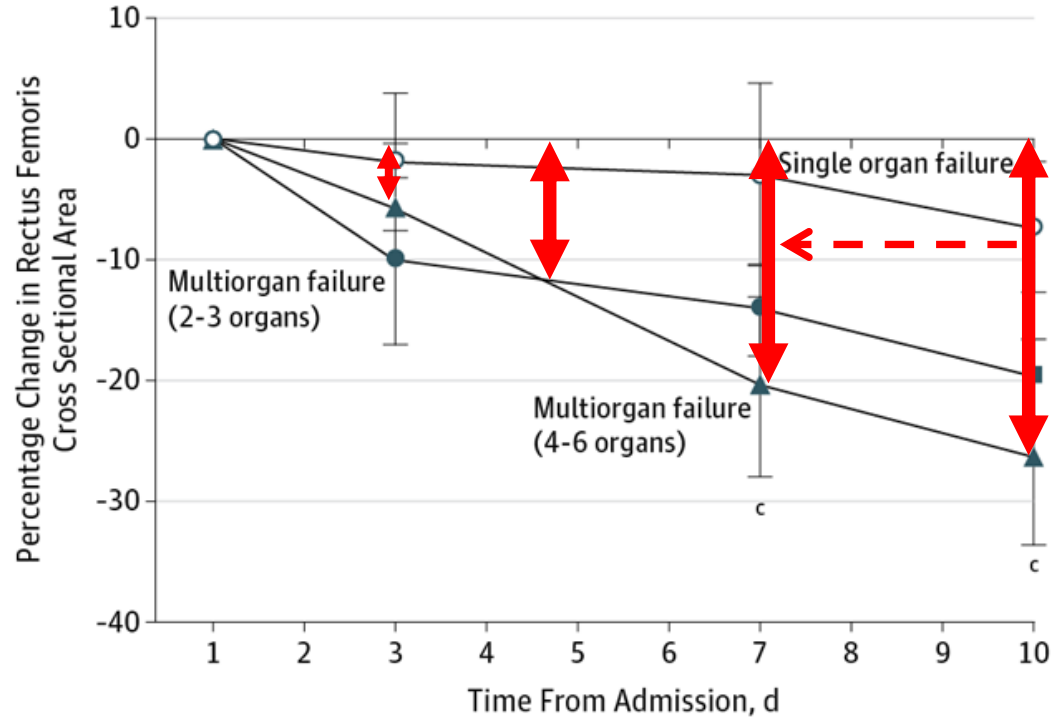
Fig. 1. Logic model for rehabilitation in the ICU.

Rehabilitation starts from day 1 (even if mobility doesn't)

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The concept of early rehabilitation

B Single vs multiorgan failure



**Rehab
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Conclusion

- Early = interventions that commence immediately after stabilization of physiologic derangements

~~Early~~ = Earlier!



- Key to success is
 - Teamwork and communication
 - Personalised rehabilitation
 - Clear safety parameters
 - Appropriate equipment



So where we want to be?





Therapy professionals in critical care: A UK wide workforce survey

Paul Twose ¹, Ella Terblanche ², Una Jones⁴, James Bruce⁴, Penelope Firshman⁵, Julie

	Responses	Service Provided
Dietetics	169	97%
OT	176	53%
Psychology	131	44%
Physio	213	99.5%
SLT	173	97%





Therapy professionals in critical care: A UK wide workforce survey

Paul Twose ¹, Ella Terblanche ², Una Jones⁴, James Bruce⁴, Penelope Firshman⁵, Julie

	Responses	Service Provided	Ring Fenced Service
Dietetics	169	97%	56.7%
OT	176	53%	36.2%
Psychology	131	44%	64.9%
Physio	213	99.5%	60.6%
SLT	173	97%	22.6%

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Paul Twose ¹, Ella Terblanche ², Una Jones⁴, James Bruce⁴, Penelope Firshman⁵, Julie

	Responses	Service Provided	Ring Fenced Service	7 Day Service
Dietetics	169	97%	56.7%	0%
OT	176	53%	36.2%	6%
Psychology	131	44%	64.9%	0%
Physio	213	99.5%	60.6%	97%**
SLT	173	97%	22.6%	6%

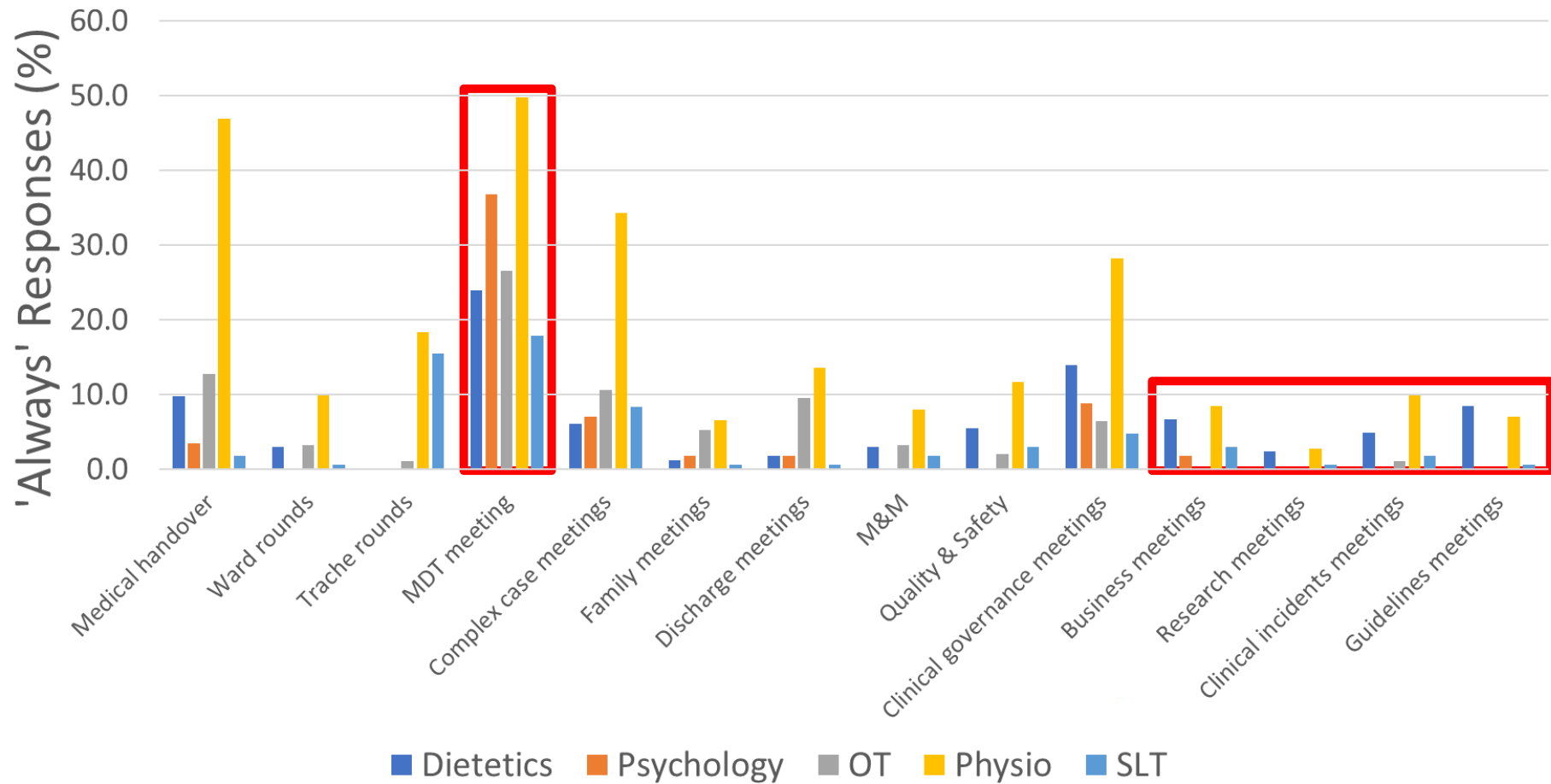
Impact on provision

	GPICS	Ring Fenced Service
Dietetics	1 : 10	1 : 24.7
OT	1 : 10	1 : 37.2
Psychology*	1 : 10	1 : 41.5
Physio	1 : 4	1 : 6.8
SLT	1 : 10	1 : 30.0



Impact on provision

	GPICS	Ring Fenced Service	Any Service
Dietetics	1 : 10	1 : 24.7	1 : 29.8
OT	1 : 10	1 : 37.2	1 : 179.1
Psychology*	1 : 10	1 : 41.5	1 : 90.1
Physio	1 : 4	1 : 6.8	1 : 17.3
SLT	1 : 10	1 : 30.0	1 : 157.6





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Comparing rehabilitation outcomes for patients admitted to the intensive care unit with COVID-19 requiring mechanical ventilation during the first two waves of the pandemic: A service evaluation

	Wave 1 (n=110)	Wave 2 (n=164)	
Age	53 +/- 12	56 +/- 11	0.072
Gender - Male	83 (75%)	104 (63%)	<0.05
APACHE 2	16 (13 – 25)	13 (10 – 16)	<0.05
Trache	85 (77%)	123 (75%)	0.773
prone	74 (67%)	120 (73%)	0.0343
Renal failure req. CVVH	37 (34%)	43 (26%)	0.223
Sedation days	13 +/- 6	13 +/- 10	1.000
Neuromuscular blockade	99 (90%)	142 (87%)	0.452
Rehab outcomes			
Mobilised in ICU	110 (100%)	162 (99%)	0.518
Time to first mobilise	14 +/- 7	15 +/- 11	0.286
MMS ICU discharge	5 (4-6)	4 (3-5)	<0.05
MMS at Hospital d/c	7 (7-7)	6 (6-7)	<0.0001
Discharge destination			
Home no rehab	55 (50%)	53 (34%)	<0.05
ICU outcomes			
ICU LOS days	22 +/- 11	24 +/- 18	0.508
Duration of vent (days)	19 +/- 10	21 +/- 16	0.406

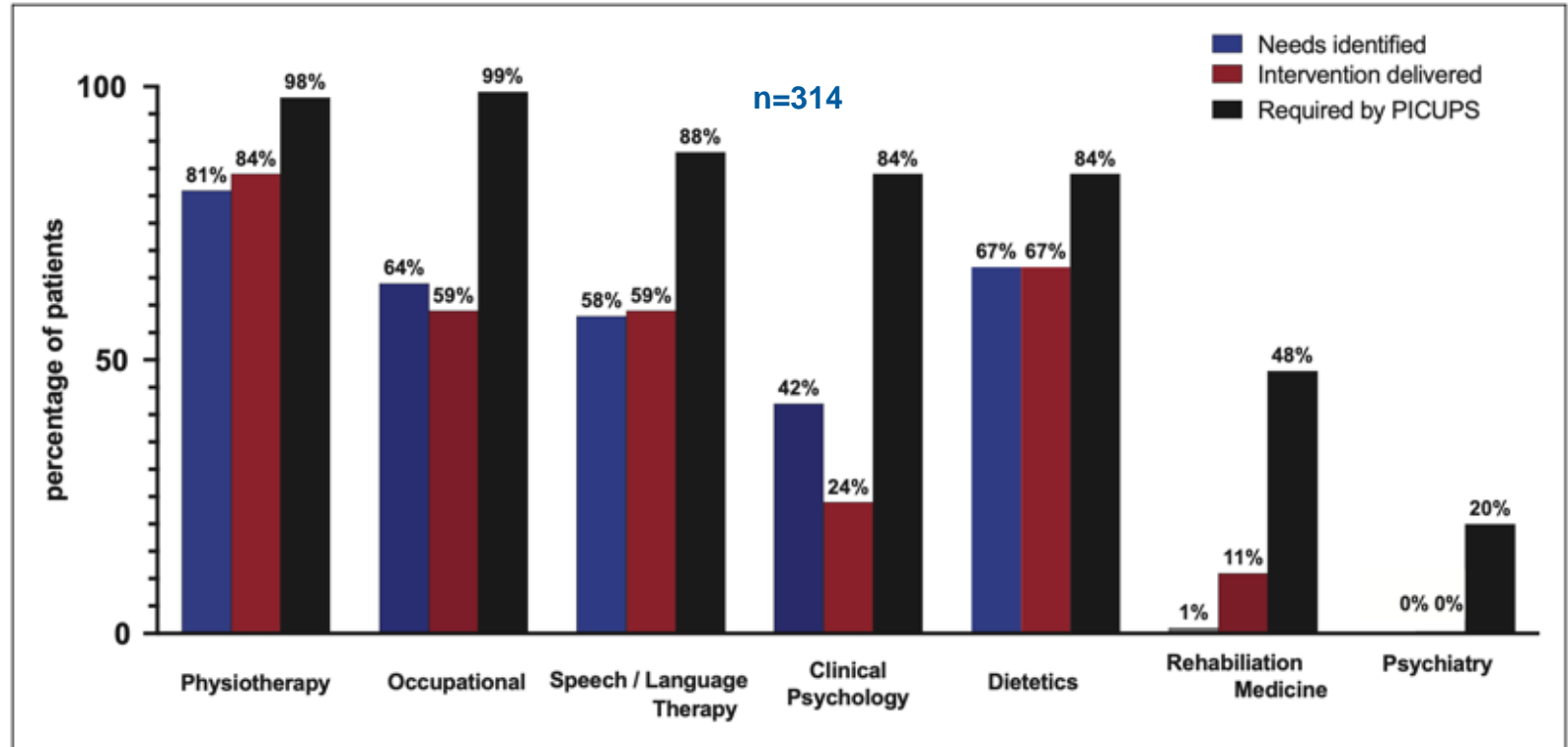
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ICU discharge



The post-ICU presentation screen (PICUPS) and rehabilitation prescription (RP) for intensive care survivors part I: Development and preliminary clinimetric evaluation



A human factors analysis of missed mobilisation after discharge from intensive care: a competition for care?

O.D. Gustafson^{a,*}, S. Vollam^b, L. Morgan^c, P. Watkinson^b

- Competing priorities for ward staff impact on consistency of rehab provision
- MDT provision and skill mix significantly impacted likelihood of mobilisation
- Those leaving most debilitated ($\text{MMS} \leq 5$) most likely to be impacted

Implications

- >50% of patients show a decline in mobility on 1st ward day (Hopkins et al, 2012)
- Increased ward length of stay, readmissions or need for ongoing rehab



Problems in care and avoidability of death after discharge from intensive care: a multi-centre retrospective case record review study

- Multi-centre retrospective review of 250 consecutive post ICU deaths between Jan 2015 and March 2018
- 20 (8%) Avoidable and 65 (26%) some degree of avoidability

Common problems

- 67% Out of hours discharge
- 69% Suboptimal Rehabilitation
- 41% absent nutritional planning
- 33% incomplete sepsis management



Ongoing challenges

- Early and structured rehabilitation is complex (not one size fits all)
- Structure and consistency are key to improve outcomes
- Staffing levels need to consider more than just patient contact
- There remains limited wider MDT availability / provision

After ICU

- Patients discharged to the wards with complex, multifactorial rehabilitation needs
- Lack of support and provision available due to competing priorities
- Lack of community rehabilitation / support post hospital discharge



Get a baseline - Where are you now?

Measures of rehabilitation

- Proportion of patients mobilised in ICU
- Time to first mobilise
- Consistency of delivery
- Highest level of mobility achieved in ICU



Any questions



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