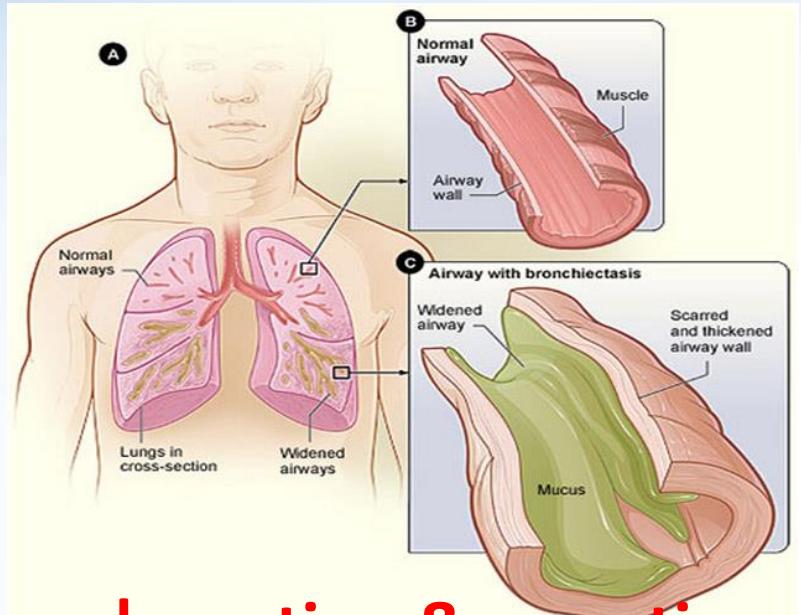


Rehabilitation for patients with mechanical ventilation



教育部部定教授
奇美醫療財團法人奇美醫院
品質管理中心醫療副主任
加護醫學部 陳欽明醫師

Effects of Immobility/ICUAW



↓ motion & secretions

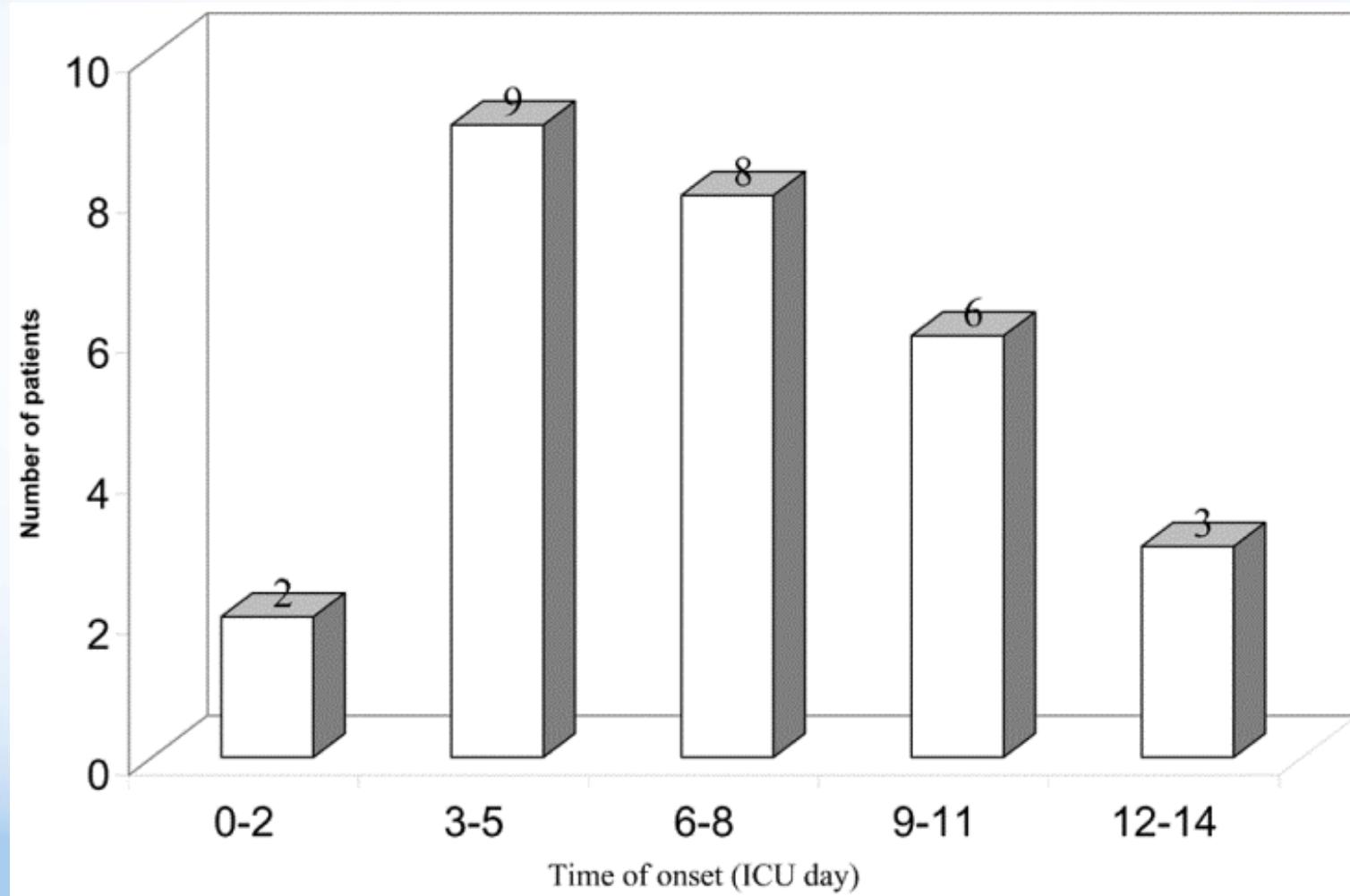


Orthostatic intolerance, VTE

#1 risk factor → Immobility

Critical Illness Myopathy (CIM) Critical Illness Polyneuropathy (CIP)

Latronico, N., G. Bertolini, et al. (2007). "Simplified electrophysiological evaluation of peripheral nerves in critically ill patients: the Italian multi-centre CRIMYNE study." Crit Care 11(1): R11.



The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812

FEBRUARY 20, 2003

VOL. 348 NO. 8

One-Year Outcomes in Survivors of the Acute Respiratory Distress Syndrome

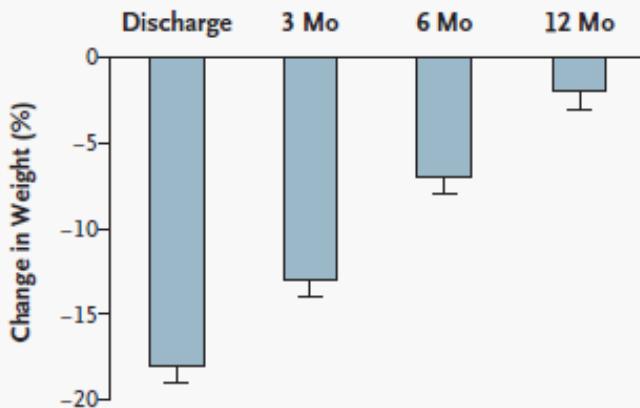


Figure 2. Mean (+SE) Change in Weight from Base Line among Patients with the Acute Respiratory Distress Syndrome at the Time of Discharge from the ICU and at 3, 6, and 12 Months.

Lost 18% of body weight in ICU

Table 3. Ability to Exercise and Return to Work and Health-Related Quality of Life among Patients with the Acute Respiratory Distress Syndrome during the First 12 Months after Discharge from the ICU.

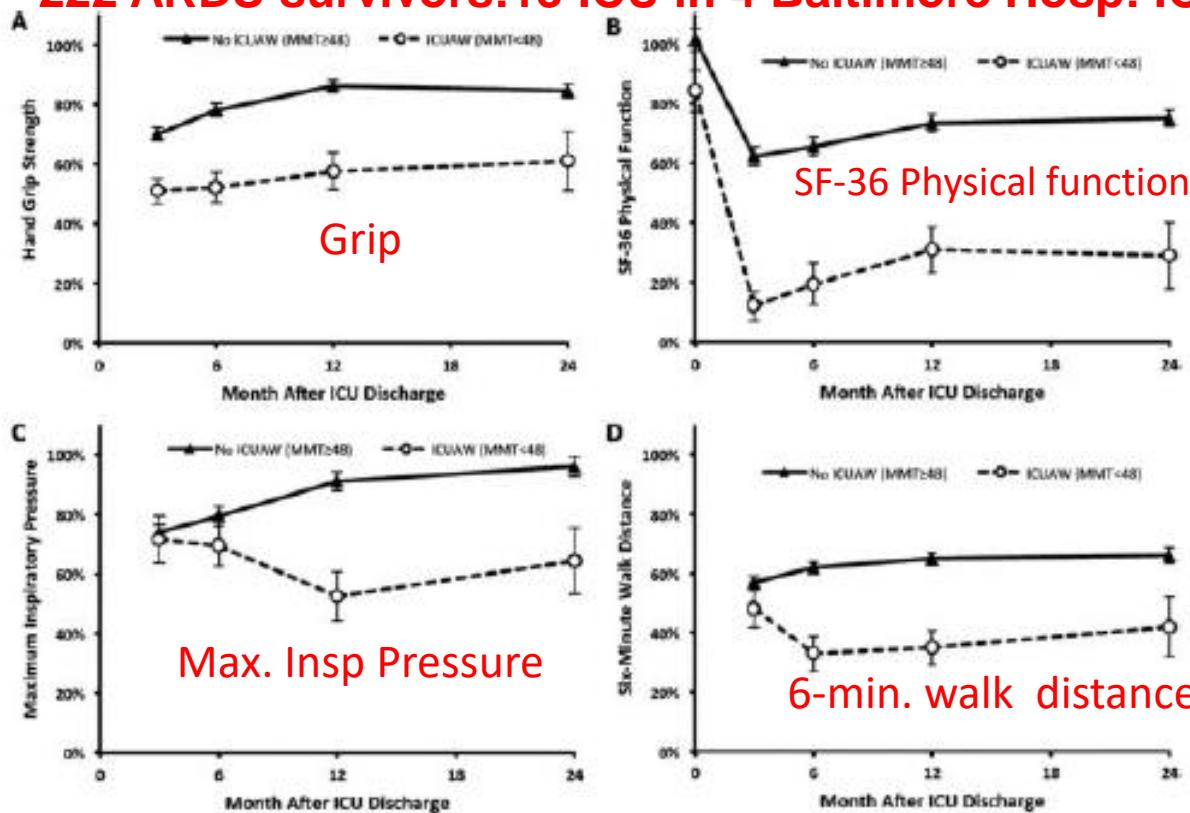
Outcome	3 Months	6 Months	12 Months
Distance walked in 6 min			
No. evaluated	80*	78†	81‡
Median — m	281	396	422
Interquartile range — m	55–454	244–500	277–510
Percentage of predicted value§	49	64	66
Returned to work — no./total no. (%)¶	13/83 (16)	26/82 (32)	40/82 (49)

6MWD improved over 1 year, but still abN as:
• muscle wasting & weakness, foot drop, joint immobility

Physical Complications in Acute Lung Injury Survivors: A 2-Year Longitudinal Prospective Study

Crit Care Med. 2014 April ; 42(4): 849–859.

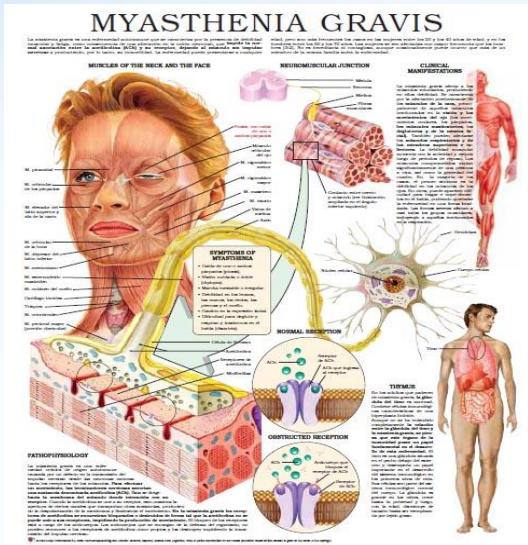
222 ARDS survivors: 13 ICU in 4 Baltimore Hosp: ICUAW



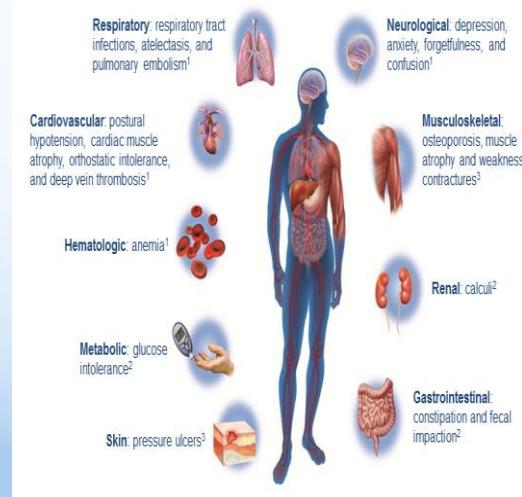
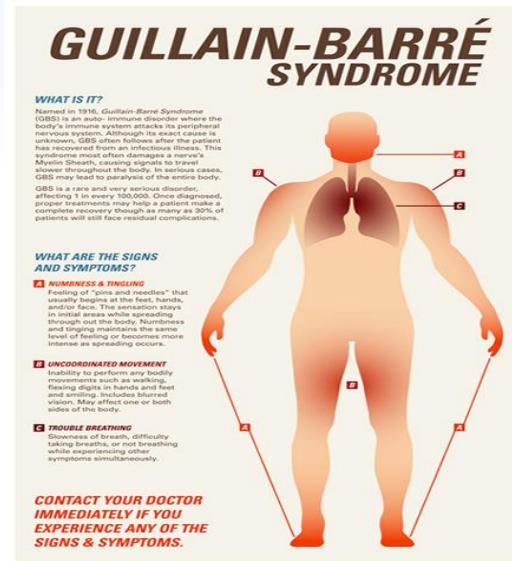
Multi-variable Predictors of Decrease in Strength

Variable (after adjusting for all variables below)	Time Since Discharge				
	D/C	3 Mo.	6 Mo.	12 Mo.	24 Mo.
Age (per 10 yr)	17% (3,34)	4% (-12,23)	19% (1,41)	15% (-5,39)	28% (2,60)
Duration of ICU bed rest (per day)	3% (0,7)	4% (0,8)	3% (0,7)	7% (3,12)	11% (4,19)

Causes of muscle weakness in ICU

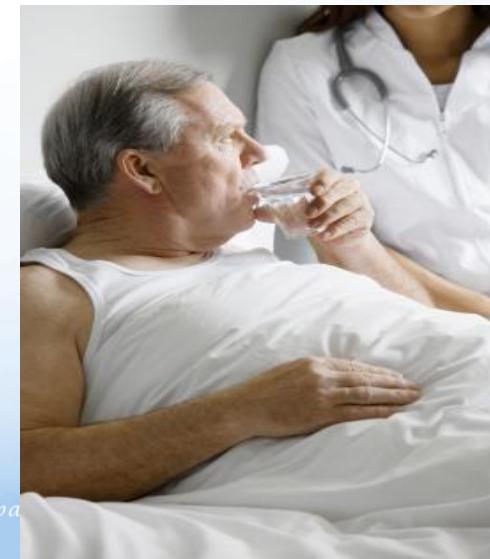


Preexisting



Complication
ICUAW

Post-ICU
mood change
persistent pain



Mobility is Medicine

↑endothelium
function



↓Chronic
inflammation



↓depression

↑ neuromuscular
integrity



↑CV
function



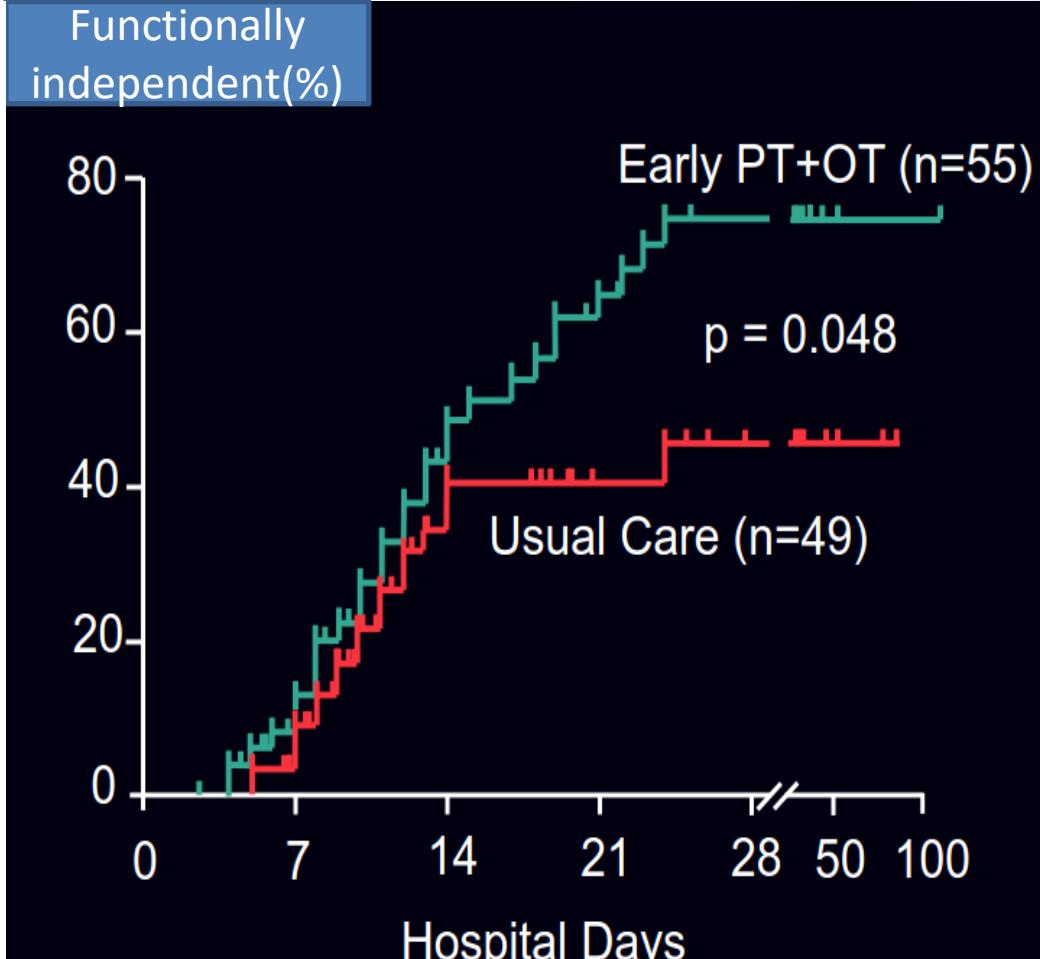
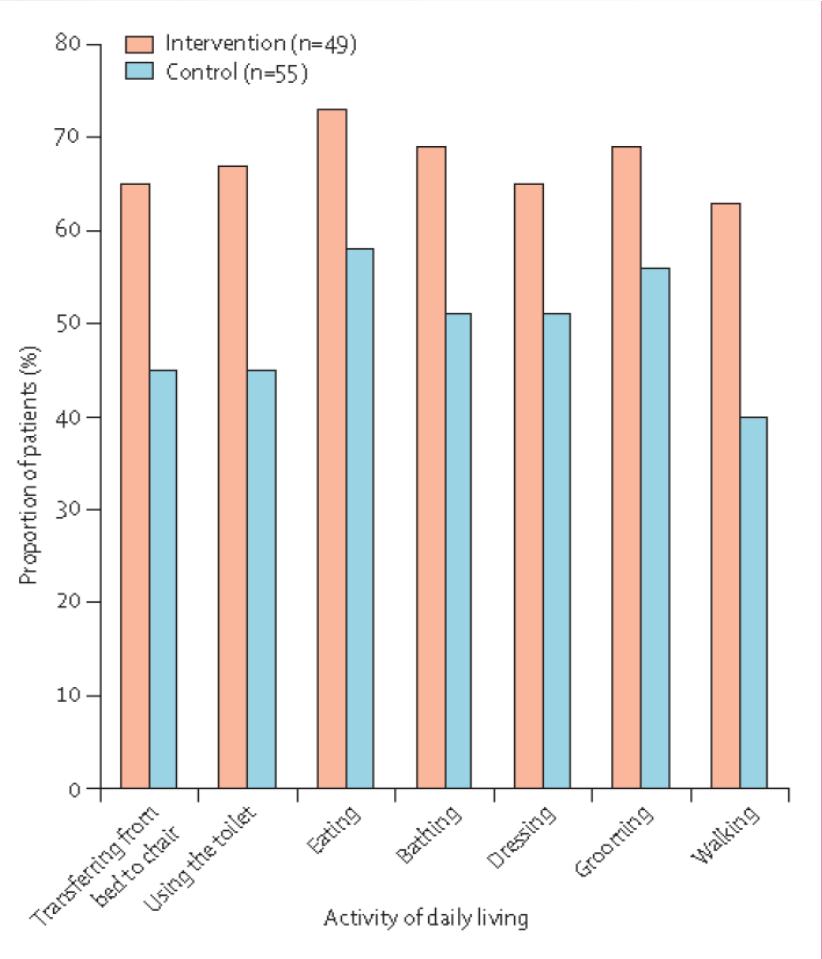
Early intensive care unit mobility therapy in the treatment of acute respiratory failure* **Crit Care Med 2008; 36:2238–2243**

Peter E. Morris, MD; Amanda Goad, RN; Clifton Thompson, RN; Karen Taylor, MPT; Bethany Harry, MPT; Leah Passmore, MS; Amelia Ross, RN, MSN; Laura Anderson; Shirley Baker; Mary Sanchez; Lauretta Penley; April Howard, RN; Luz Dixon, RN; Susan Leach, RN; Ronald Small, MBA; R. Duncan Hite, MD; Edward Haponik, MD

Outcomes (survivors)	Usual care (n=135)	Protocol (n=145)	P-value
% received PT	47%	80%	<0.001
Days to first out of bed	11.3	5.0	<0.001*
Ventilator days	10.2	8.8	0.163*
ICU length of stay	6.9	5.5	0.025*
Hospital LOS	14.5	11.2	0.006*

*Adjusted for body mass index, APACHE II, and vasopressor use in ICU (yes/no)

Early physical rehabilitation



Early, goal-directed mobilisation in the surgical intensive care unit: a randomised controlled trial

The Lancet 2016

Stefan J Schaller, Matthew Anstey, Manfred Blobner, Thomas Edrich, Stephanie D Grabitz, Ilse Gradwohl-Matis, Markus Heim, Timothy Houle, Tobias Kurth, Nicola Latronico, Jarone Lee, Matthew J Meyer, Thomas Peponis, Daniel Talmor, George C Velmahos, Karen Waak, J Matthias Walz, Ross Zafonte, Matthias Eikermann, for the International Early SOMS-guided Mobilization Research Initiative*

	Mobility (n=104)	Control (n=96)	P value
Total PT minutes in ICU	60 (0-110)	48 (20-128)	
Sedation Score (RASS)	-0.7 (0.1)	-0.8 (0.1)	
Mean SOMS in ICU	2.2 (1.0)	1.5 (0.8)	<0.001
Walking at ICU D/C	52%	25%	
ICU / Hospital LOS	7 (5-12) / 15 (11-27)	10 (6-15) / 22 (15-30)	0.005 / 0.01
Func Independ / DC home	51% / 51%	28% / 27%	0.003 / <0.001
ICU delirium-free days	25 (16-27)	22 (15-25)	0.016

- Adverse events:**

- No serious adverse events, no imp't difference between groups
- In-hospital/3-mo. death: 16% v. 8% (p=0.09) / 22% v. 17% (p=0.35)

Effectiveness of early rehabilitation on patients with chronic obstructive lung disease and acute respiratory failure in intensive care units: A case-control study

Early rehabilitation for COPD pts in the ICU with ARF ↓ MV duration

Willy Chou^{1,2,*}, Chih-Cheng Lai^{3,*}, Kuo-Chen Cheng^{4,5}, Kuo-Shu Yuan^{6,7},
 Chin-Ming Chen^{2,8} and Ai-Chin Cheng^{9,10}

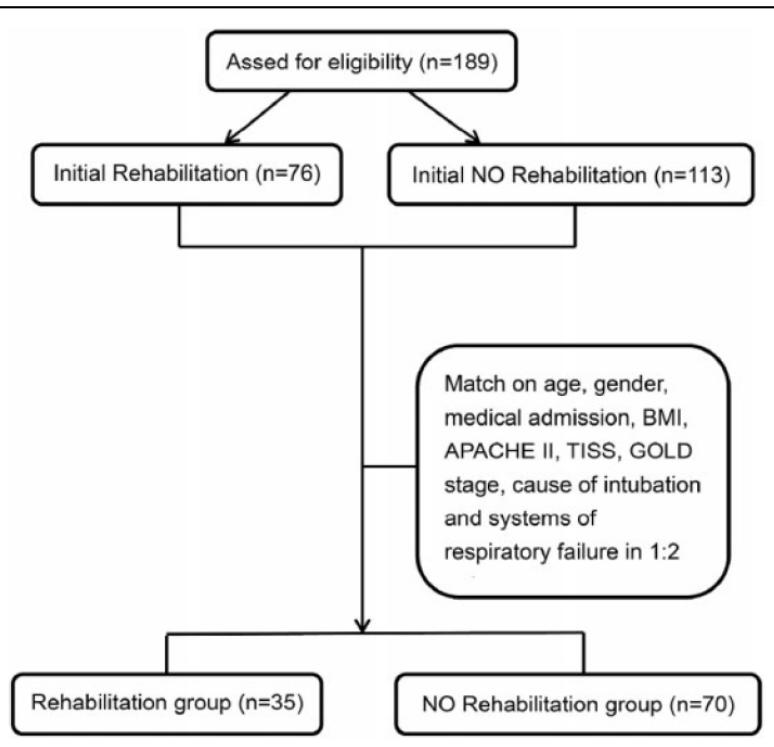


Table 3. Clinical outcomes of the groups.^a

Groups: Variables	Total (n = 105)	Rehabilitation (n = 35)	No rehabilitation (n = 70)	p
28-Day survival	97 (92.4)	33 (94.3)	64 (91.4)	0.716
Survival at discharge	90 (85.7)	31 (88.6)	59 (84.3)	0.554
Successful extubation	93 (88.6)	33 (94.3)	60 (85.7)	0.329
MV duration (hours)	152.5 ± 129.3	137.3 ± 136.9	160.1 ± 125.7	0.396
ICU stays (days)	8.1 ± 7.8	5.8 ± 6.1	9.2 ± 8.3	0.033
Hospital stays (days)	22.9 ± 21.5	17.9 ± 14.6	25.4 ± 24.0	0.095
Medical costs (×NT\$10,000)	20.3 ± 19.7	15.2 ± 13.6	22.9 ± 21.7	0.058

Table 4. Multiple regression model: the predictors of MV, ICU stays, hospital stays, and medical costs after planned extubation in COPD patients with respiratory failure.

Variables	Mechanical ventilation (hours)				ICU stays (days)				Hospital stays (days)				Medical costs (×NT\$10,000)					
	β	SE	t	p	95.0% CI	β	SE	t	p	95.0% CI	β	SE	t	p	95.0% CI			
Rehabilitation therapy	-.188	24.327	2.115	0.037	-99.754 -3.137	-0.001	1.361	-0.008	0.994	-2.713	2.693	-0.058	4.622	-0.568	0.572	-11.802	6.554	
Age	-0.007	1.086	-0.908	0.759	-2.446	1.789	0.090	0.060	1.110	0.270	-0.052	0.185	-0.39	0.203	-0.388	0.699	-4.481	0.324
Gender	-0.088	1.064	-0.290	77.465	23.417	-0.033	1.421	-0.422	0.674	-3.422	2.222	0.038	4.826	0.397	0.692	-7.668	11.498	0.052
APACHE II Score	-0.117	2.360	-1.035	0.304	-7.129	2.245	0.128	0.132	1.222	0.223	-0.101	0.424	0.110	0.448	0.854	0.395	-5.07	1.273
TISS	0.062	1.868	0.668	0.506	-2.461	4.959	-0.005	0.105	-0.058	0.954	-0.214	0.202	0.103	0.355	0.967	0.336	-0.362	1.048
Hemoglobin	-0.300	5.700	-3.188	0.002	-29.522	-6.859	-0.156	0.319	-1.781	0.078	-1.203	0.065	-1.40	1.084	-1.307	0.194	-3.570	0.736
Albumin	-0.089	26.254	-1.047	0.298	-79.629	24.640	-0.033	1.469	-0.411	0.682	-3.521	2.313	0.026	4.988	-0.266	0.791	-11.232	8.578
Comorbidity	-.198	14.089	-2.294	0.024	-60.307	-4.349	-0.076	0.788	-0.951	0.344	-2.315	0.816	0.074	2.677	0.750	0.455	-3.309	7.323
Pulmonary cause of respiratory failure	0.277	25.561	3.319	0.001	34.081	135.598	0.110	1.430	1.413	0.161	-0.819	4.861	0.220	4.856	2.308	0.023	1.566	20.853

Chronic Respiratory Disease

Volume 16: 1–8

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(SCI, IF: 2.275, *correspondence author, 39/60)

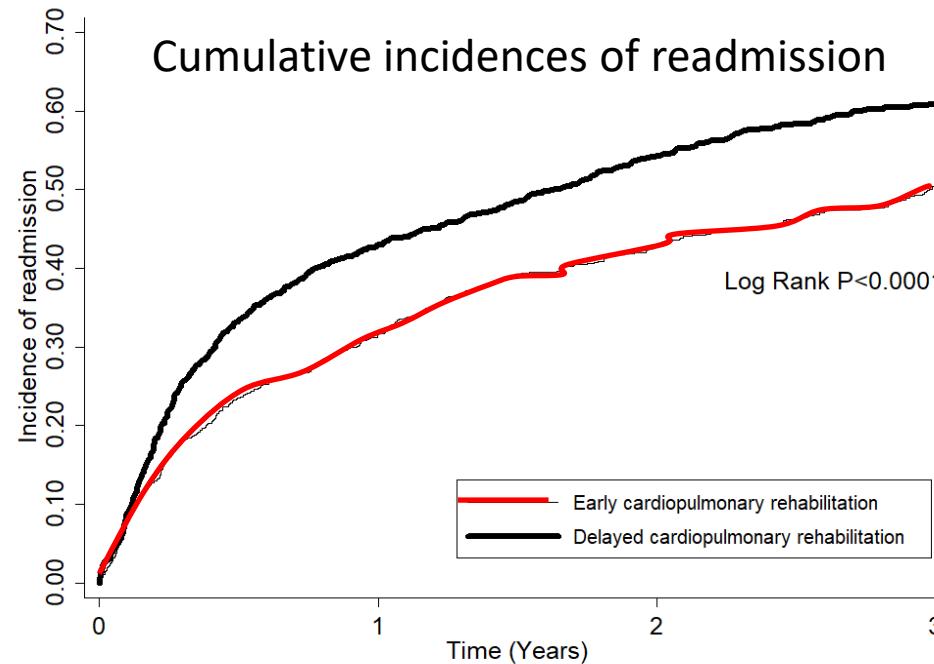
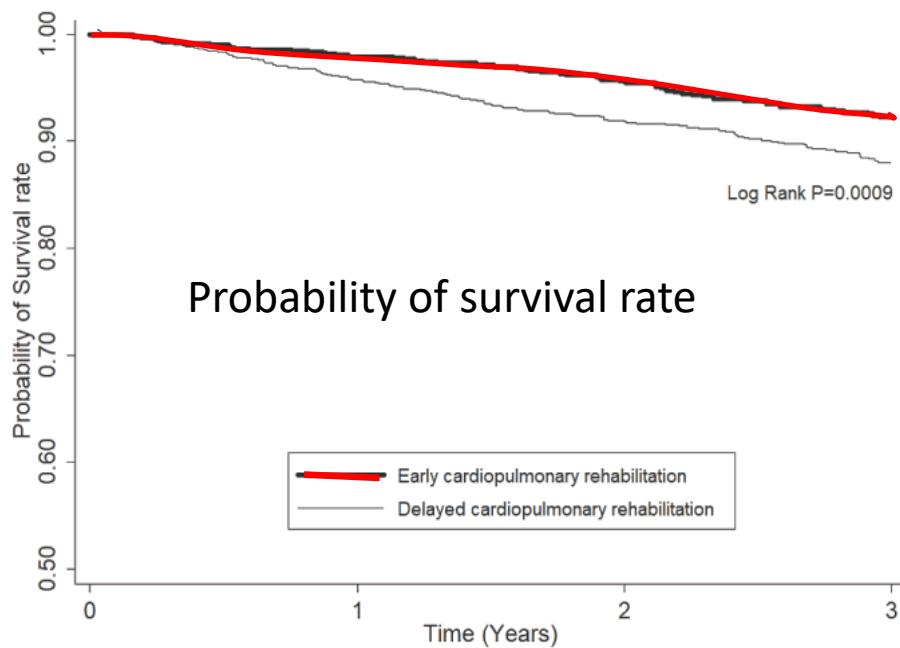
(SCI, IF:2.028, *correspondence author, 56/154)

OPEN

The effect of early cardiopulmonary rehabilitation on the outcomes of intensive care unit survivors

Chih-Cheng Lai, MD^a, Willy Chou, MD^{b,c}, Ai-Chin Cheng, RRT^{d,e}, Chien-Ming Chao, MD^a, Kuo-Chen Cheng, MD^{f,g}, Chung-Han Ho, PhD^h, Chin-Ming Chen, MD^{i,*}

Early post-discharge rehabilitation among ICU survivors has the long-term **survival** benefit and significantly ↓ **readmission** rate



Strategies to facilitate implementation of ICU analgesia, sedation, and delirium guidelines (2/3)

Should early rehabilitation be practiced in ICUs to suppress the onset or to reduce the duration of delirium?

Taiwan

We recommend performing **early rehabilitation** to reduce the occurrence of delirium (+1B).

We recommend **early ambulation** and **early mobilization** as the patient's general condition becoming stable (+1B).

小組決定證據等級	全體決定推薦強度
B	+1

26. 復健和活動是否可改善成人加護病房病人的臨床結果？

共識：

推薦成人加護病房病人應**盡早進行復健和活動**

編記：

1. ICU 的病人原先是約束，希望讓他可以儘早活動。
2. 運動也是活動的一種，「運動」這個詞的強度會比「活動」來得強，也因此國內專家決定用「活動」來取代「運動」一詞。

說明：

根據 CCM 2018 PADIS 指引。

進行復健和運動，可改善成人加護病房病人的肌力和縮短呼吸器使用時間。

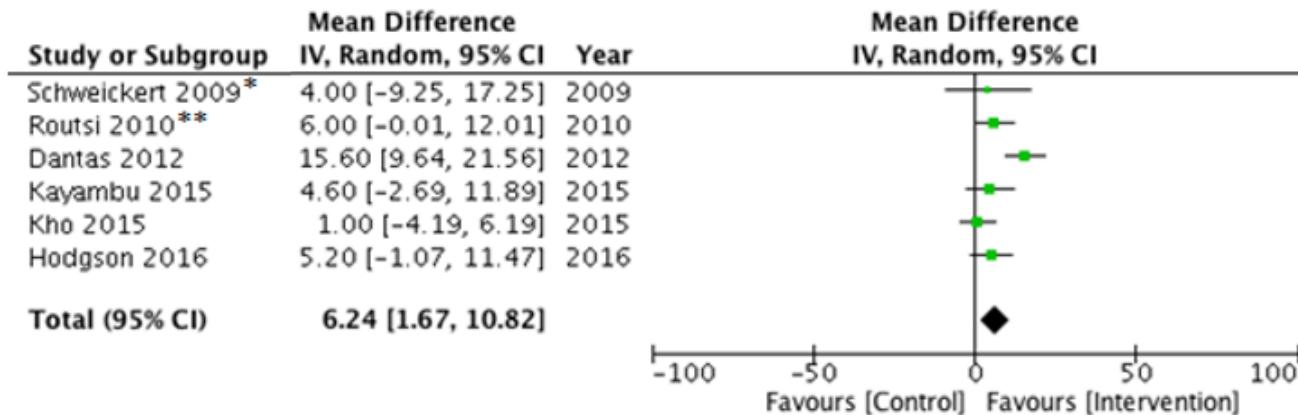
參考資料

Devlin JW, et al. Crit Care Med. 2018 Sep;46(9):e848-e849.

Efficacy and Benefit

1. Muscle strength at ICU discharge (6 RCTs, 304 patients)

- Improved by 6.2 points (95% CI, 1.7 to 10.8; scale is 0 to 60)
 - Low quality (statistical heterogeneity, CI includes MCID)



* At hospital discharge

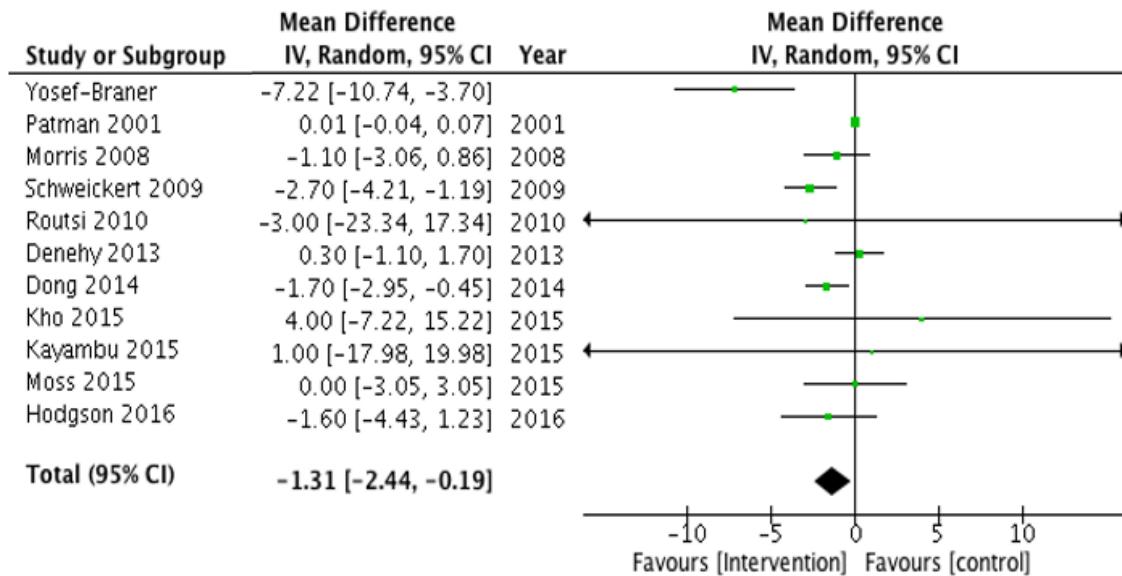
** At ICU awakening

Slide development by: R. Nikooie, MD, C. Chessare, MS, D. Needham, MD, PhD

Efficacy and Benefit

2. Duration of mechanical ventilation (11 RCTs, 1,128 patients)

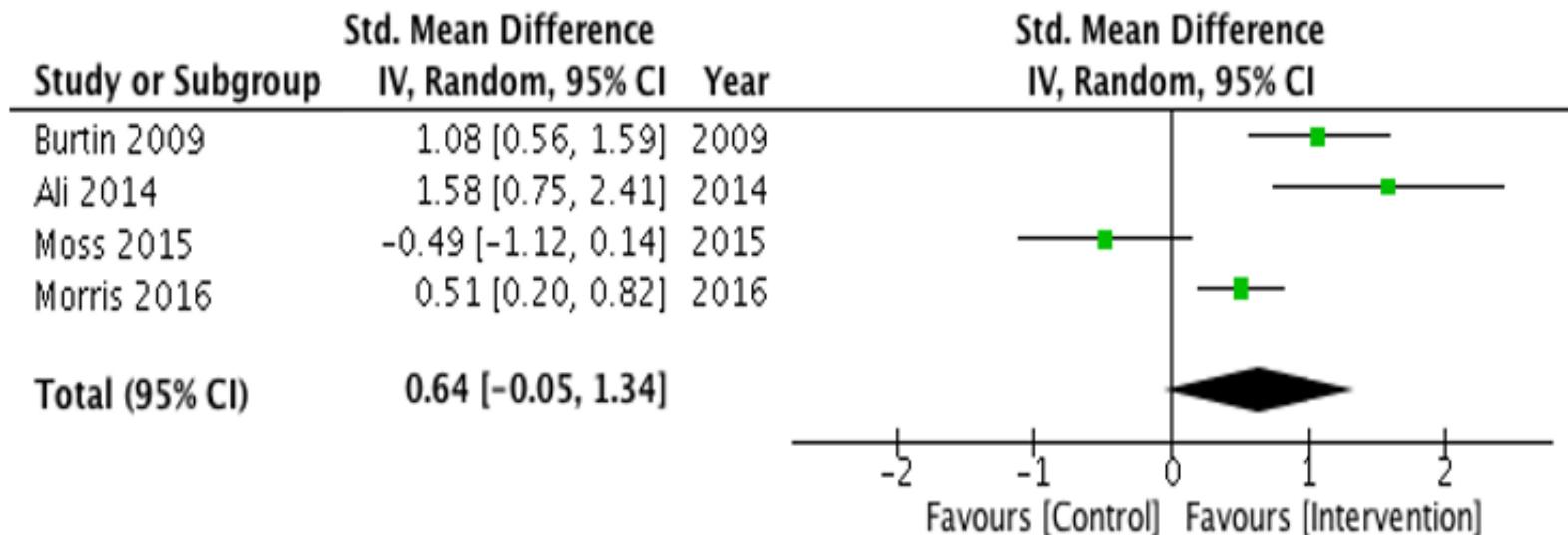
- Reduced by 1.3 days (95% CI, 2.4 to 0.2 days)
 - Low quality (2 large RCTs, high ROB, competing risk, heterogeneity)



Slide development by: R. Nikooie, MD, C. Chessare, MS, D. Needham, MD, PhD

Efficacy and Benefit

3. Quality of life (SF-36 physical function) within 2 months (4 RCTs, 303 patients)
- Improved by SMD of 0.64 (95% CI, -0.05 to 1.34), **not significant**



Slide development by: R. Nikooie, MD, C. Chessare, MS, D. Needham, MD, PhD

27. 成人加護病房病人進行復健和活動是否安全?

<p>共識:</p> <p>進行復健和活動時，並不常發生嚴重的安全事件或傷害。</p> <p>應由加護病房團隊共同合作，避免低血氧、管路滑脫、高血壓或跌倒等風險。</p>	<p>編記:</p> <ol style="list-style-type: none">國內專家認為「應由加護病房團隊合作，避免低血氧、管路滑脫、高血壓或跌倒等風險」。加護病房團隊應包含職能治療、物理治療師、呼吸治療師、護理師及醫師。
<p>說明:</p> <p>根據 CCM 2018 PADIS 指引。</p> <p>文獻顯示 12,200 個病例中，有 15 個病人發生嚴重的安全事件或傷害。</p>	<p>參考資料</p> <p>Devlin JW, et al. Crit Care Med. 2018 Sep;46(9):e849.</p>

Safety of Patient Mobilization and Rehabilitation in the ICU: Systematic Review with Meta-Analysis

Nydale, P.; Sricharoenchai, T.; Chandra, S; Kundt, F.; Huang, M.; Fischill, M.; Needham, DM.

Annals of the American Thoracic Society; 2017

- Adult studies of ICU mobility with safety data
- Exclusion: in-bed intervention (cycle, NMES); no report of # of sessions
- 48 publications (n=7,546 pts; 22,351 sessions)
 - 6 RCT, 2 non-rdm trial, 5 before-after, 22 prosp. cohort, 11 retro cohort, 2 pt prev
- 583 (2.6%) potential safety events
 - Most common: De-sat, hemodynamic changes, catheter removal
 - Only 2 ETT removals (1 without replacement; 1 with in-bed mobility)
 - Events w/ consequence, incl. stop rehab (subset of studies): 78 (0.6%)
 - 1 fall, 11 tube removal, 34 hemodynamic change, 18 desaturation, 14 other
 - Pooled incidence per 1,000 sessions (in studies reporting data):

Hemodynamic Changes	3.8 episodes	Oxygen desaturation	1.9 episodes
High heart rate	1.9 episodes		
Low blood pressure	4.3 episodes	High blood pressure	3.9 episodes
Low systolic blood pressure	1.8 episodes	High systolic blood pressure	0.3 episodes

28. 有哪些指標可用來啟動或終止復健和活動？

共識：

28.1 有下列任何徵象或症狀，不宜開始復健和活動：

- (1) 新發生或有症狀的心率不整
- (2) 心肌缺血引起的胸痛
- (3) 不穩定的脊椎受傷
- (4) 不穩定的骨折
- (5) 活動或不可控制的出血
- (6) 由臨床醫師認為不合適的症狀

說明：

根據 CCM 2018 PADIS 指引。

編記：

國內專家認為需要尊重臨床醫師裁量，因此增加了第六點：臨床醫師認為不合適的症狀亦不宜開始復健和活動。

參考資料

Devlin JW, et al. Crit Care Med. 2018 Sep;46(9):e849.

Perceived Barriers

Patient/Family



Hemodynamics?

Specialist Attitudes



Dislodgement of tube?



Team work?

Patient comfort?



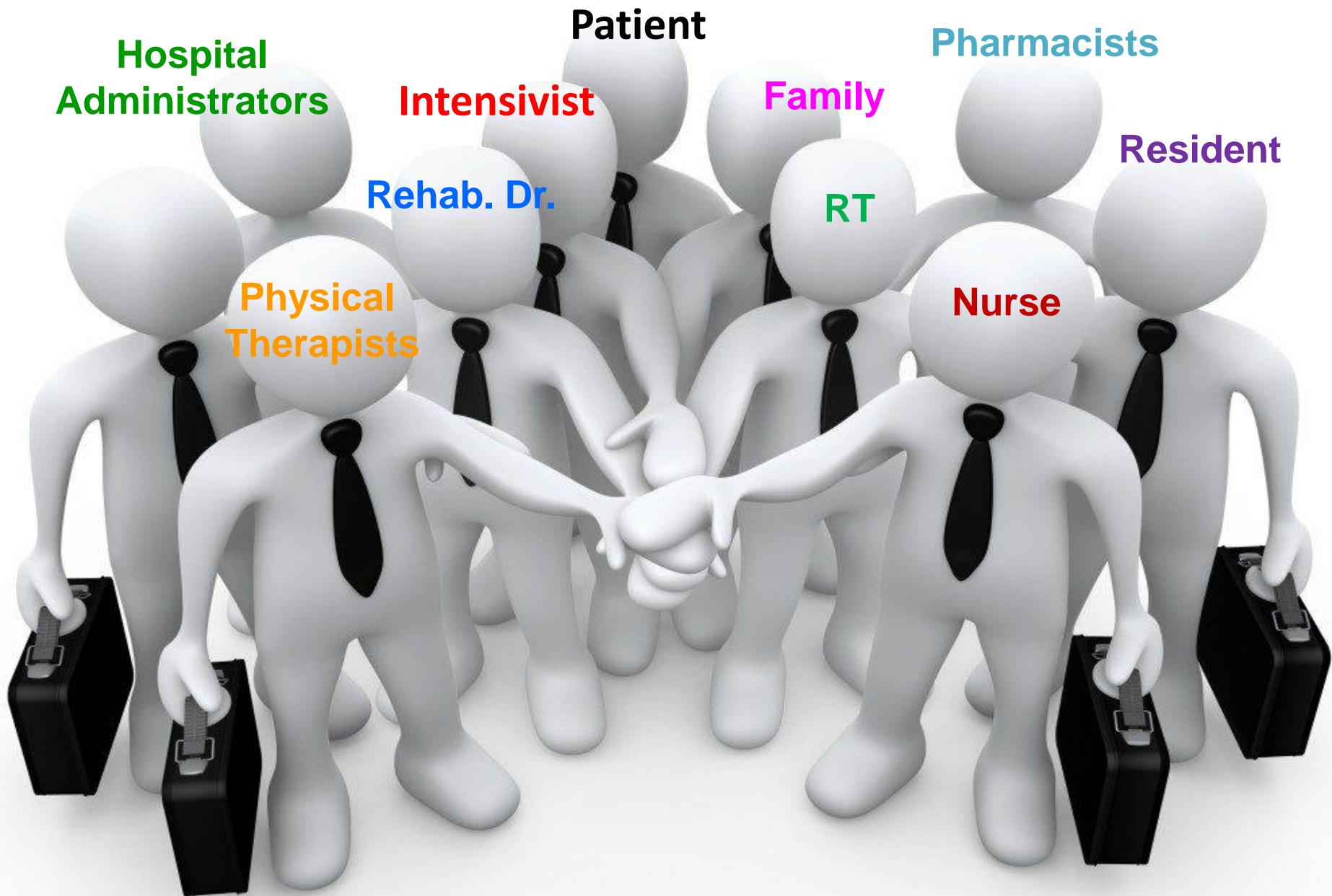
Gas exchange↓?



Over-sedation?

Trained staff





Interdisciplinary Team

Safety Screening --- MOVE

● M yocardial stability

- (1) 超過24小時無心肌缺血
- (2) 24小時內無增加抗心律不整藥物

● O xygénéation adequate

- (1) $\text{FiO}_2 < 0.6$
- (2) $\text{PEEP} < 10 \text{ cmH}_2\text{O}$

● V asopressor minimal

● E ngaged to voice

A systematic literature review by a meeting of 23 multidisciplinary ICU experts

RESEARCH

Open Access

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

4 categories: Chest, CV, neuro & other.

好處>>壞處		Low risk of an adverse event. Proceed as usual according to each ICU's protocols and procedures.
好處≥壞處		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.
好處<<壞處		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: Mobilization

Respiratory condition

RESPIRATORY CONSIDERATIONS	IN-BED EXERCISES	OUT-OF-BED EXERCISES
Intubation		
Endotracheal tube ^a	插管/ 氣切	
Tracheostomy tube		
Respiratory parameters		
Fraction of inspired oxygen		
≤ 0.6	●	●
> 0.6	△ FiO ₂ >0.6?	△
Percutaneous oxygen saturation		
≥ 90%	●	●
< 90% ^b	△ SpO ₂ <90%	○
Respiratory rate		
≤ 30 bpm	●	●
> 30 bpm	△ RR>30?	△
Ventilation		
Mode HFOV	△ HFOV	○
PEEP		
≤ 10 cmH ₂ O	●	●
> 10 cmH ₂ O	△ PEEP>10?	△
Ventilator dysynchrony ^c		
Rescue therapies		
Nitric oxide	△ NO?	△
Prostacyclin	△	△
Prone positioning ^d	△ Prone	○

Safety: Mobilization

Compassion • Accountability • Effectiveness

Cardiovascular condition

CARDIOVASCULAR CONSIDERATIONS	IN-BED EXERCISES	OUT-OF-BED EXERCISES
Blood pressure		
Intravenous antihypertensive therapy for hypertensive emergency ^a	○	○
IV anti-H/T		
MAP ^b :		
Below target range and causing symptoms ↓ MAP & sx	▲	○
Below target range despite support (vasoactive and/or mechanical) vasopressor	▲	○
Greater than lower limit of target range while receiving no support or low level support	●	●
Greater than lower limit of target range while receiving moderate level support	▲	▲
Greater than lower limit of target range on high level support High support	▲	○
Known or suspected severe pulmonary hypertension	▲	▲
Cardiac arrhythmias	Bradycardia with drugs	
Bradycardia:		
/pacemaker		
Requiring pharmacological treatment (e.g., isoprenaline) or awaiting emergency pacemaker insertion	○	○
Not requiring pharmacological treatment and not awaiting emergency pacemaker insertion	▲	▲
Transvenous or epicardial pacemaker:	TVP (dependent)	
Dependent rhythm	▲	○
Stable underlying rhythm	●	●

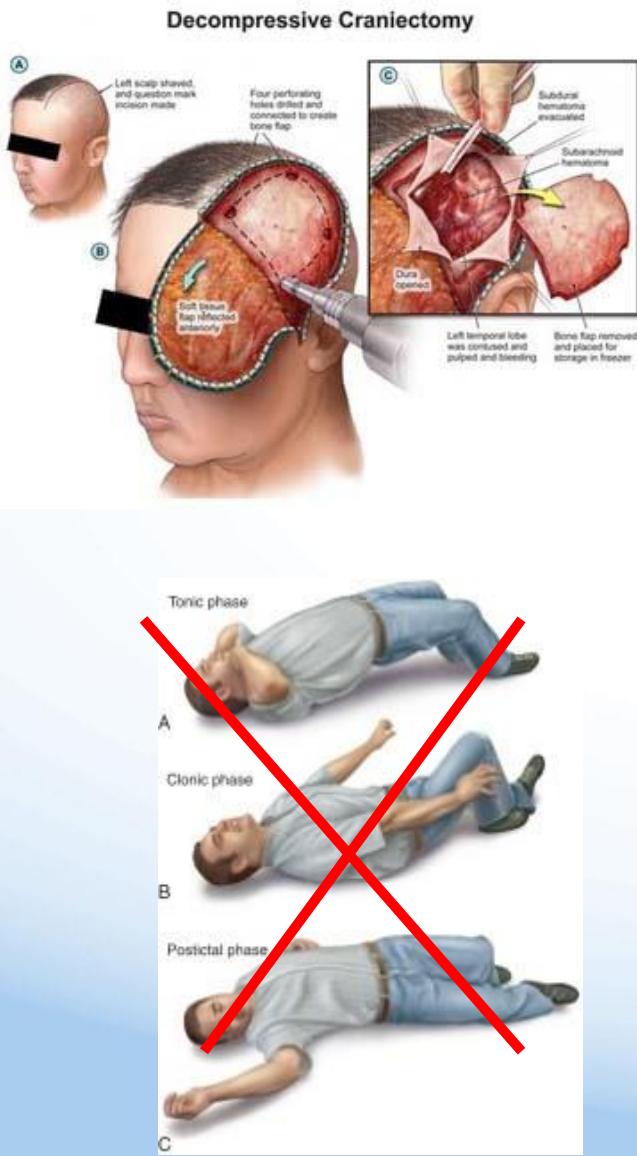
Any stable tachyarrhythmia:	Tachycardia >150	
Ventricular rate >150 bpm	▲	○
Ventricular rate 120 to 150 bpm	▲	▲
Any tachyarrhythmia with ventricular rate < 120 bpm	●	●
Devices	Tachycardia <120	
Femoral IABP ^c	●	○
ECMO:		
Femoral ^c or subclavian (not single bicaval dual lumen cannulae)	●	○
Femoral ECMO	●	○
Single bicaval dual lumen cannulae inserted into a central vein	●	▲
Ventricular assist device	●	●
VAD	●	●
Pulmonary artery catheter or other continuous cardiac output monitoring device	●	▲
PCWP/PicCO	●	▲
Other cardiovascular considerations		
Shock of any cause with lactate >4mmol/L		
Lactate>4	▲	▲
Known or suspected acute DVT/PE	▲	▲
DVT	▲	▲
Known or suspected severe aortic stenosis	●	▲
AS	●	▲
Cardiac ischemia (defined as ongoing chest pain and/or dynamic EKG changes)	▲	○
IHD	▲	○

Safety: Mobilization

NEUROLOGICAL CONSIDERATIONS	IN-BED	OUT-OF-BED
	EXERCISES	
Level of consciousness		
Patient drowsy, calm or restless (e.g., RASS -1 to +1)		
Patient lightly sedated or agitated (e.g., RASS -2 or +2)		
Patient unrousable or deeply sedated (e.g., RASS <-2)		
Deep sedation		
Patient very agitated or combative (e.g., RASS >+2)		
Agitation		
Delirium		
Delirium tool (e.g., CAM-ICU) –ve		
Delirium-		
Delirium tool +ve and able to follow simple commands		
Delirium+		
Delirium tool +ve and not able to follow commands		
Intracranial pressure		
Active management of intracranial hypertension, with ICP not in desired range		
IICP		
Intracranial pressure monitoring without active management of intracranial hypertension		
Normal ICP		

Neurologic condition

Safety: Mobilization



Neurologic condition

Other neurological considerations

Craniectomy	Craniectomy		
Open lumbar drain (not clamped)	Open Lumbar drain		
Subgaleal drain			
Spinal precautions (pre-clearance or fixation)	Spinal precautions		
Acute spinal cord injury	SCI		
Subarachnoid haemorrhage with unclipped aneurysm	SAH		
Vasospasm post-aneurysmal clipping			
Uncontrolled seizures	Uncontrolled seizure		

RASS = Richmond Agitation Assessment Scale; CAM-ICU = confusion assessment method for the ICU.

Hodgson et al. Critical Care (2014) 18:658

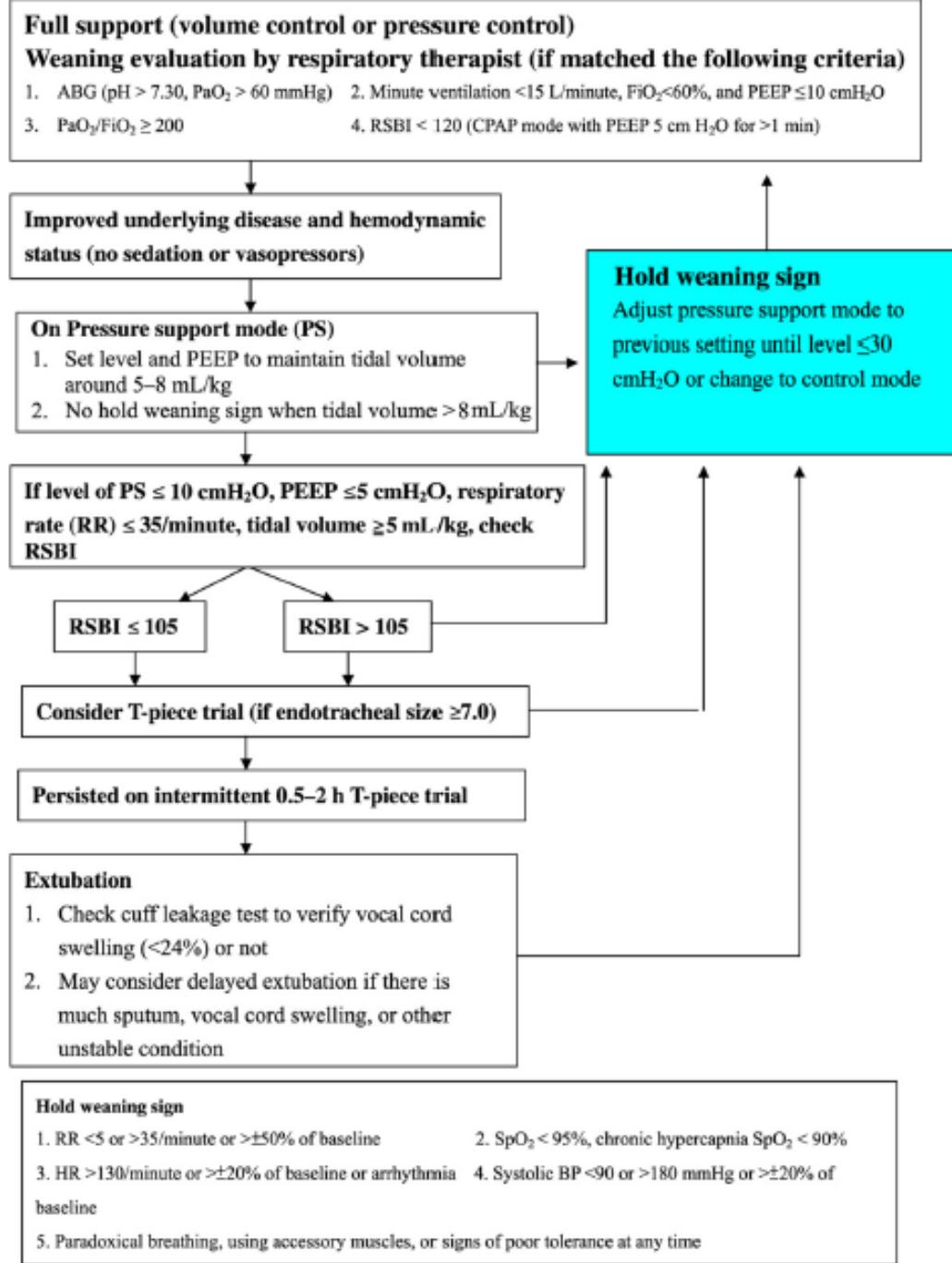
Safety: Mobilization



Surgical			
Unstable/unstabilized major fracture Pelvic Spinal Lower limb long bone	Unstable Fx		
Large open surgical wound Chest/sternum ^a Abdomen ^a	Large open W'd		
Medical			
Known uncontrolled active bleeding	Uncontrolled bleeding		
Suspicion of active bleeding or increased bleeding risk ^b			
Patient is febrile with a temperature exceeding acceptable maximum despite active physical or pharmacological cooling management			
Active hypothermia management	Active hypothermia		
Other considerations			
ICU-acquired weakness	ICUAW		
Continuous renal replacement therapy (including femoral dialysis catheters)	CVVH		
Venous and arterial femoral catheters	Femoral line		
Femoral sheaths	Femoral sheath		
All other drains and attachments, e.g., Nasogastric tube Central venous catheter Pleural drain Wound drain Intercostal catheter Urinary catheter			

奇美醫院

Weaning protocol



W: weaning parameter
 E: electrolyte
 A: ABG
 N: nutrtion
 S: Secretion
 N: Neuromuscular
 O: airway obstruction
 W: wait underlying

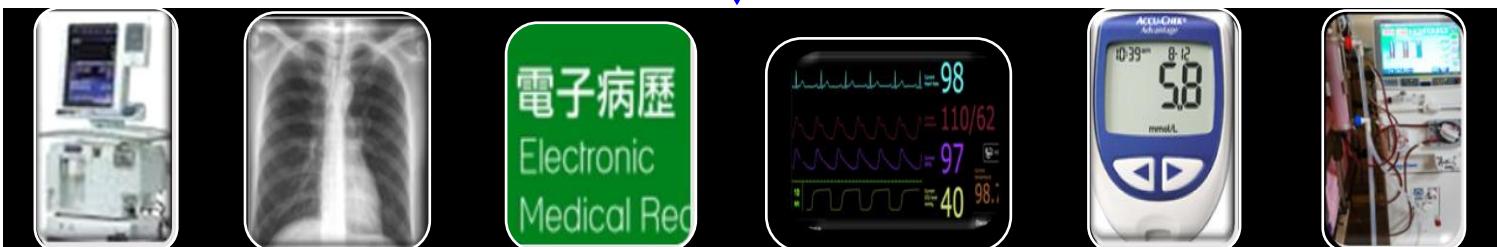
奇美雲

數據
收集

創新
研發

統計
分析

整合
運用



電子病歷
Electronic
Medical Rec





提供照護團隊即時資訊

TPR/疼痛
10/23/2017
護理記錄
10/23/2017
護理計畫
10/18/2017
出院準備服務
10/04/2017

導管
10/07/2017
急診
檢傷
ER NOTE
護理
醫嘱
入10/04/2017
Admission Note
10/04/2017
感染科...
10/23/2017

交班
10/04/2017
檢驗檢查
危険值
女 58 歲
入10/04/2017
Progress Note
10/23/2017
心臟血管內科...
10/20/2017

呼吸治療
10/07/2017
麻醉
計劃
術後訪視
記錄單
10/06/2017
手術
Pre OP
OP note
手術全期
Post OP
10/06/2017
Order Sheet
10/23/2017
復健科
10/11/2017

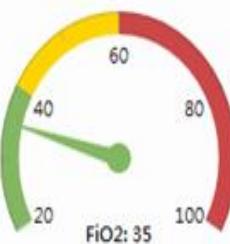
營養篩檢與照護
10/23/2017
藥師照護
10/16/2017
口腔顏面外科...
10/05/2017
眼科
10/05/2017
耳鼻喉科...
10/09/2017

來源 3住院
住院日期 10/13/2017 ~ 10/13/2017
查詢
預覽

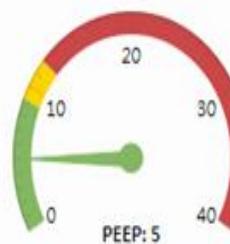
■ 區間列印 10/23/2017 0000 ~ 10/23/2017 2359
病歷號 269 黃
 已印註記
轉PDF

儀表板
趨勢圖
24小時警示顯示
【轉PDF】存在【C:\cm\dat\ipo7810

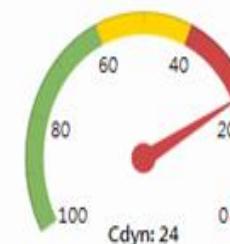
印	已印	來源	病歷號	急診日或原始住...	原始住院...	科別	班別	看診序...	出院日	開始
<input checked="" type="checkbox"/>		3	269	10/13/2017	1156	7370				10/13/2017
<hr/>										



FiO₂: 35



PEEP: 5



Cdyn: 24

早 齊 下 床



創新與特色

Mobilization is Medicine

EARLY GOAL-DIRECTED MOBILIZATION

早
齊
下
床



文獻查證(依據Peter E. Morris 2008年介入計畫,分為四個階段)

	階段 I	階段 II	階段 III	階段 IV
介入	<ul style="list-style-type: none"> 每天3次 被動關節運動 	<ul style="list-style-type: none"> 每天3次 主動/協助式主動運動 坐在床上30分鐘 	<ul style="list-style-type: none"> 每天3次 坐在床邊30分鐘 	<ul style="list-style-type: none"> 主動由床邊移位至床旁陪伴椅30分鐘
進入下一階段的標準	意識情況的進步	當上肢肌力可以抗重力活動-肱二頭肌肌力3/5以上	當下肢肌力可以抗重力活動-股四頭肌肌力3/5以上	
意識情況	無意識	能達成3個以上指令：開(關)眼睛、看著我、打開嘴巴、伸出舌頭、點頭、數到五時抬高眉毛	和階段 II 相同	和階段 II 相同

第一階段-北冥神功



第二階段-降龍18掌



第三階段-移形換位



第四階段-乾坤大挪移





管路滑脫



病人跌倒

0%
0%



ORIGINAL RESEARCH

SCI, IF:3.289, 5/65

Early Mobilization Reduces Duration of Mechanical Ventilation and Intensive Care Unit Stay in Patients With Acute Respiratory Failure



Chih-Cheng Lai, MD,^{a,*} Willy Chou, MD,^{b,*} Khee-Siang Chan, PhD,^c
Kuo-Chen Cheng, MD,^{d,e} Kuo-Shu Yuan, PhD,^{f,g} Chien-Ming Chao, MD,^a
Chin-Ming Chen, MD^{b,c}

Correspondence author

Journal Metrics

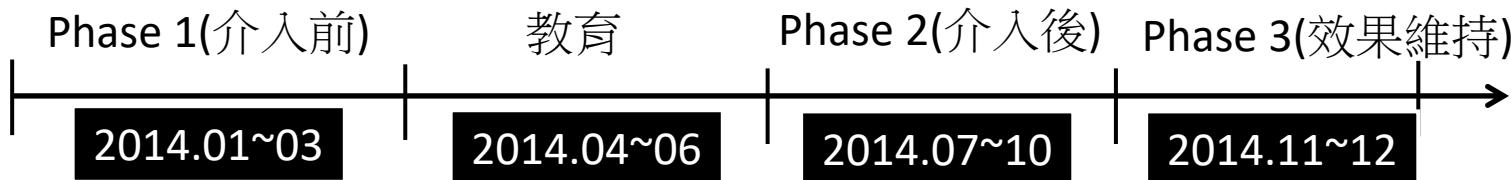
2016 Impact Factor: 3.289

[View More on Journal Insights](#)

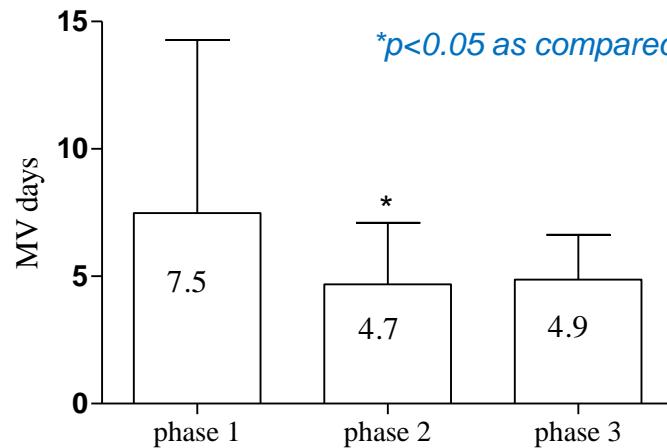
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® Clarivate Analytics, 2017

Clinical outcomes of different groups



介入前(63 pts)



介入前(90 pts)

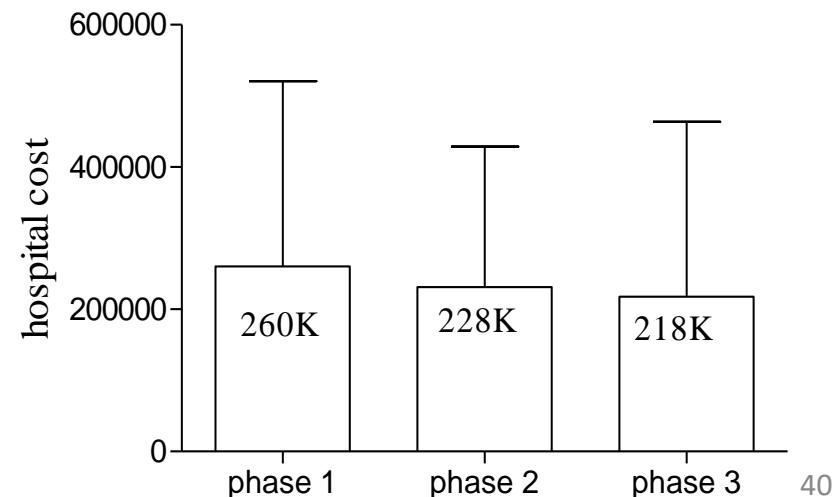
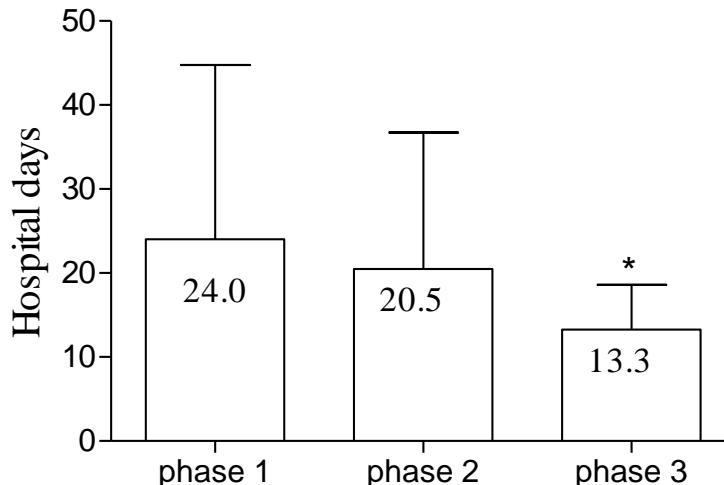
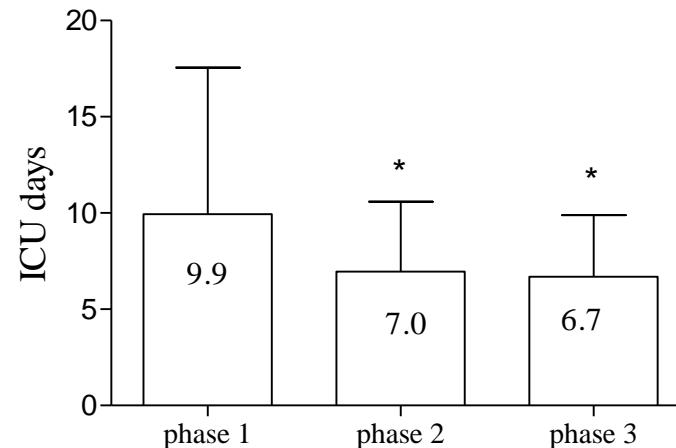


Table 4. Hierarchical regression model for associated factors and mechanical ventilation duration

Variables	β	S.E.	t	P	95% CI
Age	-0.038	0.033	-0.365	0.715	-0.079 to 0.054
Sex	-0.032	0.965	-0.358	0.721	-2.256 to 1.564
Body mass index	0.100	0.096	1.082	0.281	-0.086 to 0.295
APACHE II	0.259	0.112	2.016	0.046*	0.004 to 0.449
TISS Scale	0.052	0.106	0.529	0.598	-0.153 to 0.265
Glasgow coma scale	-0.055	0.191	-0.516	0.607	-0.477 to 0.280
Number of comorbidities	-0.080	0.536	-0.920	0.360	-1.554 to 0.568
BUN	0.308	0.027	2.820	0.006**	0.023 to 0.132
Sodium	-0.019	0.117	-0.220	0.826	-0.256 to 0.205
Potassium	0.022	0.886	0.243	0.808	-1.539 to 1.970
Calcium	0.101	0.614	1.148	0.253	-0.511 to 1.921
Phosphate	-0.015	0.348	-0.157	0.875	-0.744 to 0.634
Albumin	-0.010	1.108	-0.096	0.924	-2.301 to 2.089
Hemoglobin	-0.225	0.331	-1.908	0.059	-1.288 to 0.024
Hematocrit	0.008	0.090	0.072	0.943	-0.172 to 0.185
FiO ₂	0.009	0.191	0.094	0.925	-0.360 to 0.396
PaO ₂	-0.002	0.018	-0.015	0.988	-0.036 to 0.035
PaCO ₂	0.115	0.093	1.312	0.192	-0.062 to 0.306
PaO ₂ /FiO ₂	-0.068	0.007	-0.586	0.559	-0.017 to 0.009
Respiratory rate	-0.028	0.097	-0.320	0.749	-0.223 to 0.161
Heart rate	0.102	0.028	1.188	0.237	-0.022 to 0.088
Mean arterial pressure	-0.096	0.031	-1.136	0.258	-0.096 to 0.026
Tidal volume	0.007	0.006	0.048	0.962	-0.011 to 0.012
Minute ventilation	0.039	0.306	0.374	0.709	-0.491 to 0.720
MIP	-0.004	0.033	-0.044	0.965	-0.067 to 0.064
MEP	0.035	0.020	0.353	0.725	-0.032 to 0.046
RSBI	0.019	0.033	0.142	0.888	-0.060 to 0.070
Early mobilization	-0.269	0.933	-3.129	0.002**	-4.767 to -1.072

Table 5. Logistic regression for the predictors of mechanical ventilation for ≥ 7 days

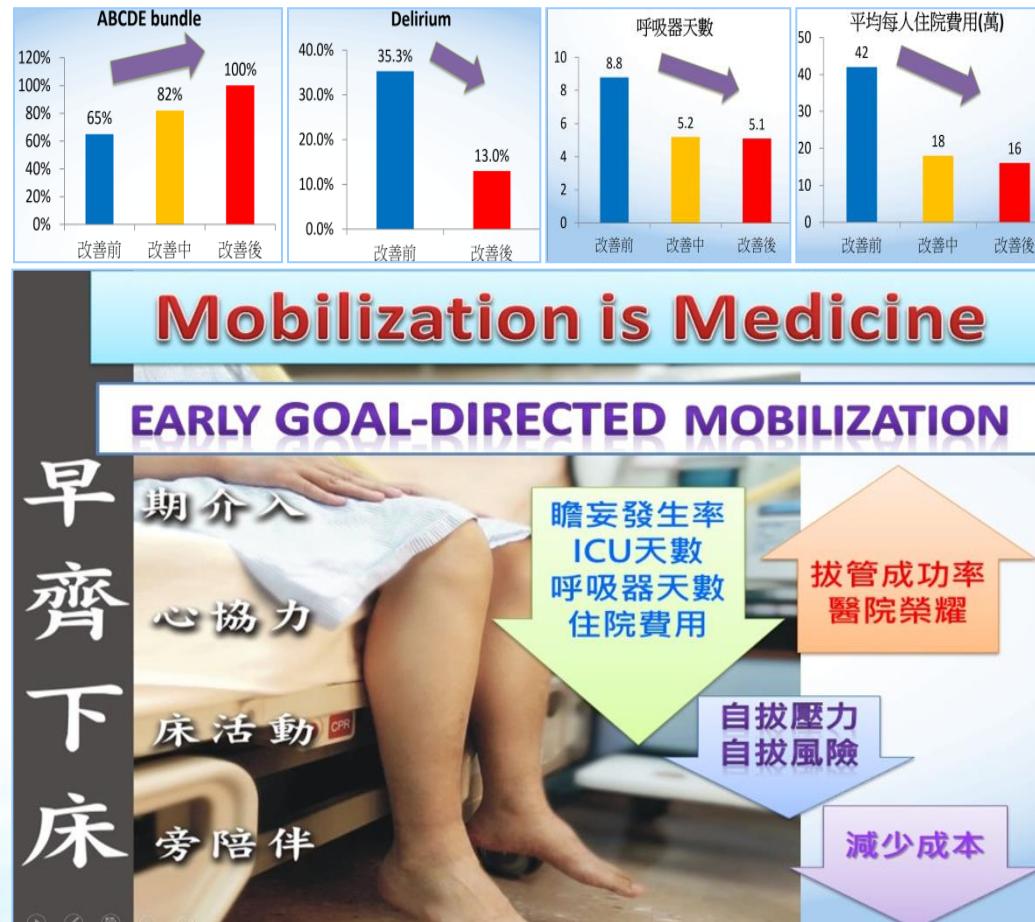
Variable	β	S.E.	P	OR	95% CI
Age	0.041	0.022	0.061	1.042	0.998 to 1.087
Sex	0.474	0.673	0.481	1.606	0.430 to 6.003
Body mass index	-0.077	0.064	0.232	0.926	0.816 to 1.050
APACHE II	0.002	0.073	0.975	1.002	0.869 to 1.155
TISS score	0.073	0.065	0.260	1.075	0.947 to 1.221
Glasgow coma scale	-0.240	0.119	0.044*	0.787	0.623 to 0.993
No. of comorbidities	-0.017	0.315	0.958	0.983	0.530 to 1.825
Blood urea nitrogen	0.013	0.015	0.402	1.013	0.983 to 1.043
Sodium	-0.081	0.070	0.247	0.922	0.804 to 1.058
Potassium	-0.699	0.613	0.254	0.497	0.150 to 1.653
Calcium	0.462	0.376	0.219	1.587	0.760 to 3.315
Phosphate	0.097	0.255	0.704	1.102	0.668 to 1.817
Albumin	-1.081	0.708	0.127	0.339	0.085 to 1.358
Hemoglobin	-0.386	0.216	0.073	0.680	0.445 to 1.037
Hematocrit	0.023	0.060	0.700	1.023	0.910 to 1.150
FiO ₂	0.123	0.123	0.317	1.131	0.889 to 1.440
PaO ₂	-0.032	0.023	0.165	0.969	0.927 to 1.013
PaCO ₂	0.291	0.083	0.000***	1.338	1.137 to 1.574
PaO ₂ /FiO ₂	0.009	0.006	0.107	1.009	0.998 to 1.021
Respiratory rate	0.051	0.057	0.378	1.052	0.940 to 1.177
Heart rate	-0.009	0.019	0.650	0.991	0.954 to 1.030
Mean arterial pressure	-0.042	0.022	0.058	0.958	0.917 to 1.002
Tidal volume	0.000	0.003	0.895	1.000	0.993 to 1.006
Minute ventilation	0.298	0.217	0.171	1.347	0.879 to 2.063
MIP	0.018	0.028	0.523	1.018	0.964 to 1.075
MEP	0.003	0.013	0.798	1.003	0.979 to 1.029
RSBI	0.000	0.020	0.992	1.000	0.962 to 1.039
Early mobilization	-2.507	0.684	0.000***	0.082	0.021 to 0.311

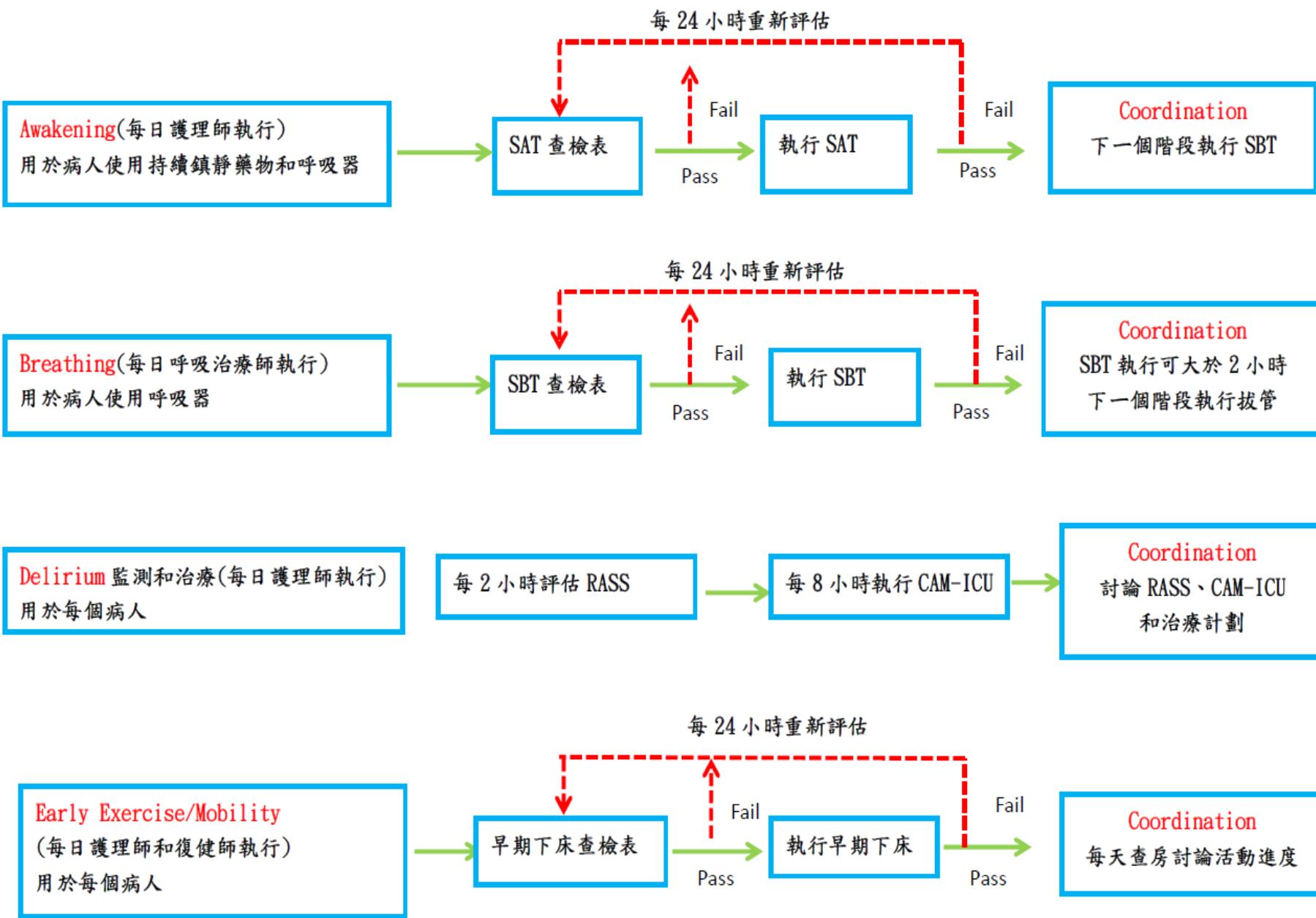


運用ABCDE bundle 提升加護病房呼吸器病人 臨床照護成效

要活就要動 沒活動多病痛

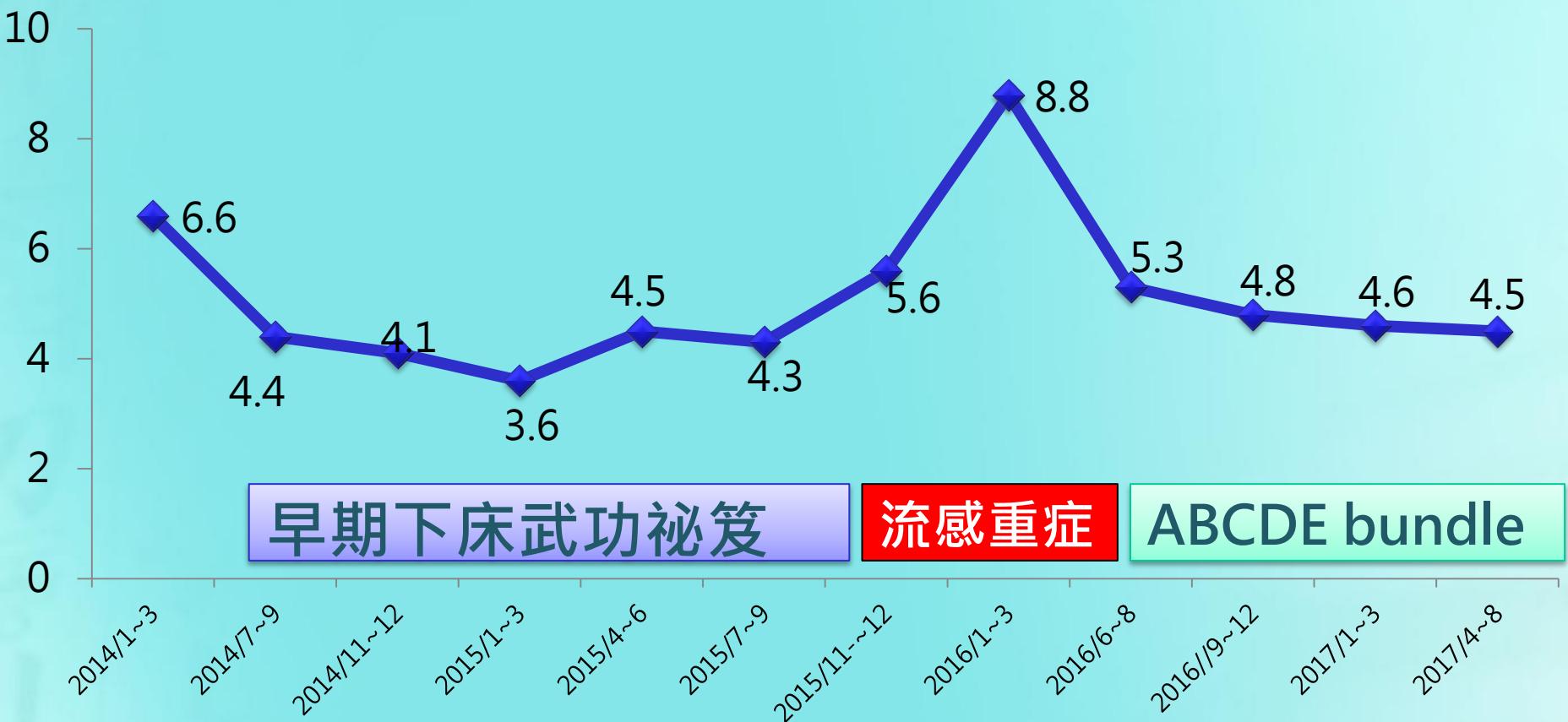
主題類
主題改善組
金獎
創意獎





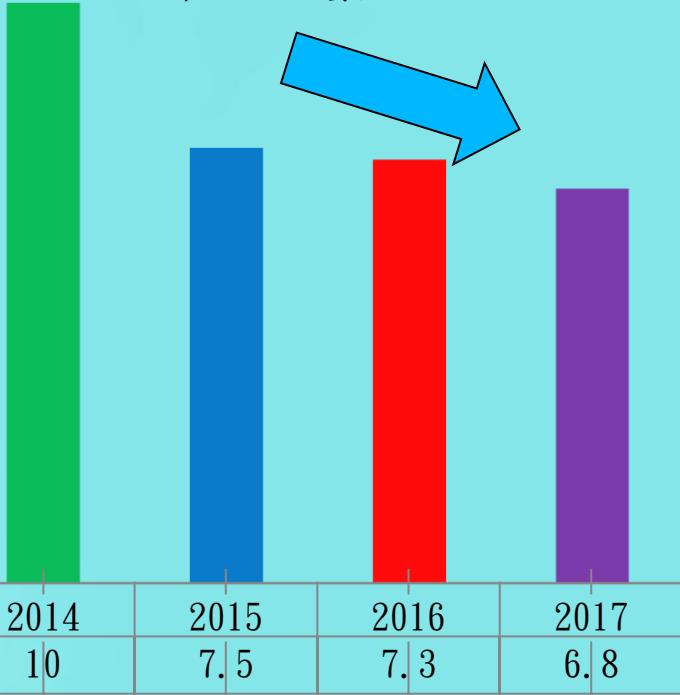
從武功祕笈到ABCDE bundle來改善呼吸器病人預後

呼吸器天數

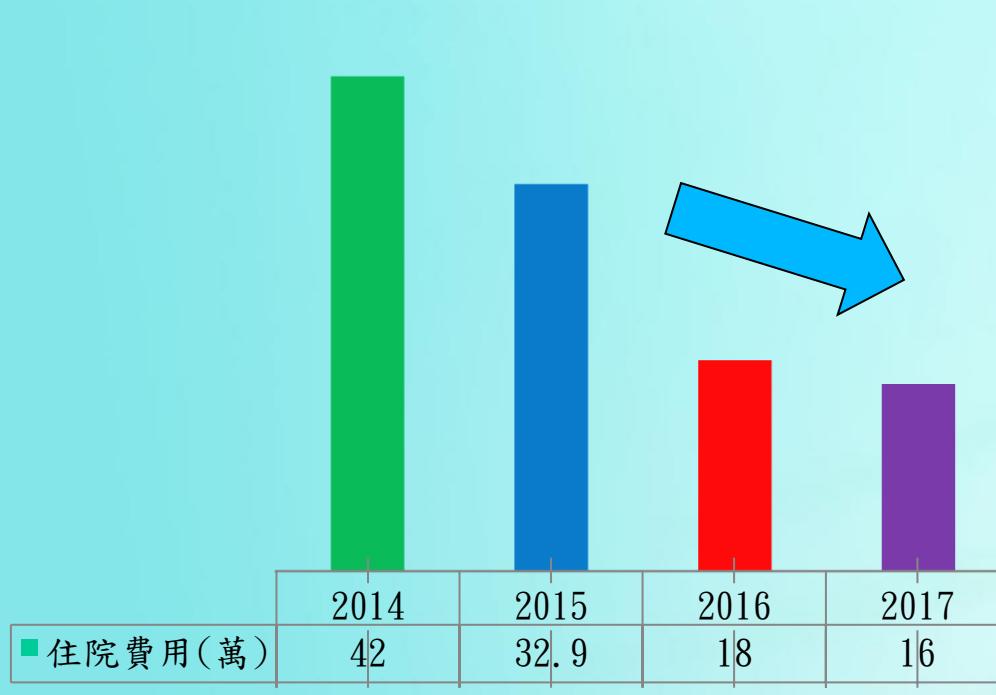


從武功祕笈到ABCDE bundle來改善呼 吸器病人預後

住ICU天數



平均住院費用(每人)



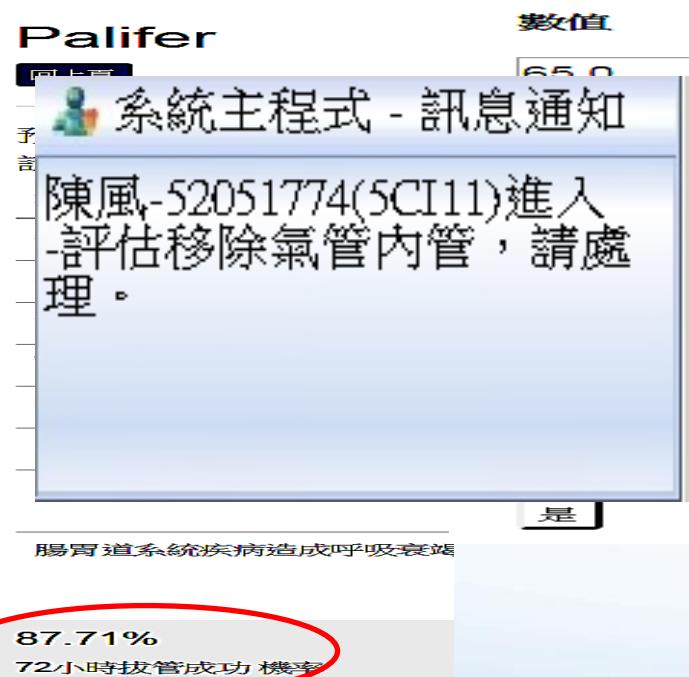
Hierarchical regression model for associated factors and ICU days (N=173)

Variable	b	SE	t	p	95% CI
Age	-0.077	0.046	-1.026	0.306	-0.137~0.043
Sex	-0.137	1.391	-1.849	0.066	-5.317~0.174
Body mass index	-0.166	0.108	-2.227	0.027	-0.453~-0.027
APACHE II score	-0.087	0.081	-1.137	0.257	-0.252~0.068
TISS score	-0.025	0.113	-0.336	0.745	-0.261~0.187
GCS score	0.098	0.205	1.311	0.192	-0.136~0.673
No. of comorbidities	-0.062	0.035	-0.838	0.403	-0.097~0.039
Blood urea nitrogen	0.269	0.021	3.344	0.001	0.029~0.114
Creatinine level	0.063	0.307	0.807	0.421	-0.358~0.853
Sodium level	0.041	0.138	0.547	0.585	-0.197~0.348
Potassium level	-0.028	1.101	-0.371	0.711	-2.582~1.766
Calcium level	0.113	0.621	1.437	0.153	-0.335~2.120
Phosphate level	-0.058	0.423	-0.699	0.485	-1.132~0.540
Albumin level	-0.094	1.252	-1.213	0.227	-3.991~0.953
Hemoglobin level	-0.232	0.317	-3.172	0.002	-1.631~-0.380
FiO ₂	-0.051	0.325	-0.601	0.549	-0.839~0.448
PaO ₂					0.037~0.039
PaCO ₂					0.017~0.214
PaO ₂ /FiO ₂					0.032~0.009
Respiratory rate					0.013~0.539
Heart rate					0.049~0.174
Mean arterial pressure					0.151~0.019
Tidal volume	-0.185	0.009	1.650	0.103	-0.032~0.003
Minute ventilation	-0.145	0.466	-1.278	0.206	-1.523~0.333
MIP	-0.063	0.107	-0.550	0.584	-0.272~0.154
MEP	-0.210	0.040	-1.881	0.064	-0.156~0.005
RSIB	0.109	0.037	0.962	0.339	-0.038~0.108
Phase 2 (ABCDE bundle)	-0.214	1.379	-2.864	0.005	-6.673~-1.228
F	8.202				
R ²	0.046				
△R ²	0.005				

ABCDE bundle is associated
with Lower ICU stays

導入智慧化組合照護模式

- 運用智慧化呼吸器資訊拋轉(呼吸雲)/AI人工智慧加速呼吸器脫離



A B C

每天讓病人**清醒** (Awakening)

接受自主**呼吸**訓練(Breathina)

藥物**調整**(Coordination)

D

監測和管理**曠妄** (Delirium
survey & management)

E

早期下床 (Early Exercise
and Mobility)

ABCDE *Bundle*

作伙幫助伊

*Awakening and Breathing Coordination Delirium
Early Exercise and Mobility*



Family

6BICU醫療團隊邀請您一同參與

