Wilhelmina Kinderziekenhuis

Colloquium: Vroeg-mobliseren op de PICU

PICU

Linda van Wagenberg

Definitie

Vroeg-mobiliseren:

Mobiliseren binnen 48-72 uur na opname

Volwassen IC

Table 3. Outcomes (survivors)

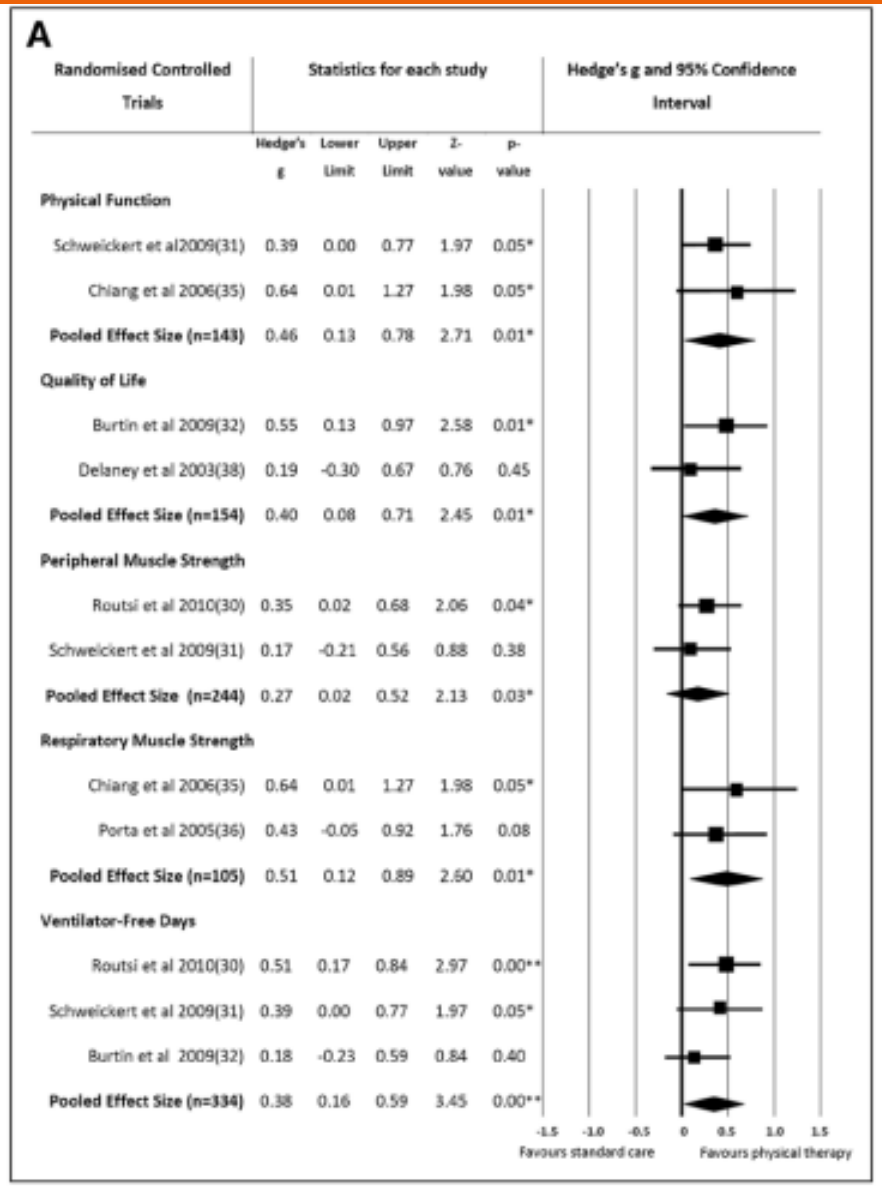
	Usual Care (n = 135)	Protocol (n = 145)	*p*
Days to first out of bed	13.7 (11.7–15.7)	8.5 (6.6–10.5)	<.001
Days to first out of bed (adjusted[a])	11.3 (9.6–13.4)	5.0 (4.3–5.9)	<.001
Ventilator days	9.0 (7.5–10.4)	7.9 (6.4–9.3)	.298
Ventilator days (adjusted[a])	10.2 (8.7–11.7)	8.8 (7.4–10.3)	.163
ICU LOS days	8.1 (7.0–9.3)	7.6 (6.3–8.8)	.084
ICU LOS days (adjusted[a])	6.9 (5.9–8.0)	5.5 (4.7–6.3)	.025
Hospital LOS days	17.2 (14.2–20.2)	14.9 (12.6–17.1)	.048
Hospital LOS days (adjusted[a])	14.5 (12.7–16.7)	11.2 (9.7–12.8)	.006

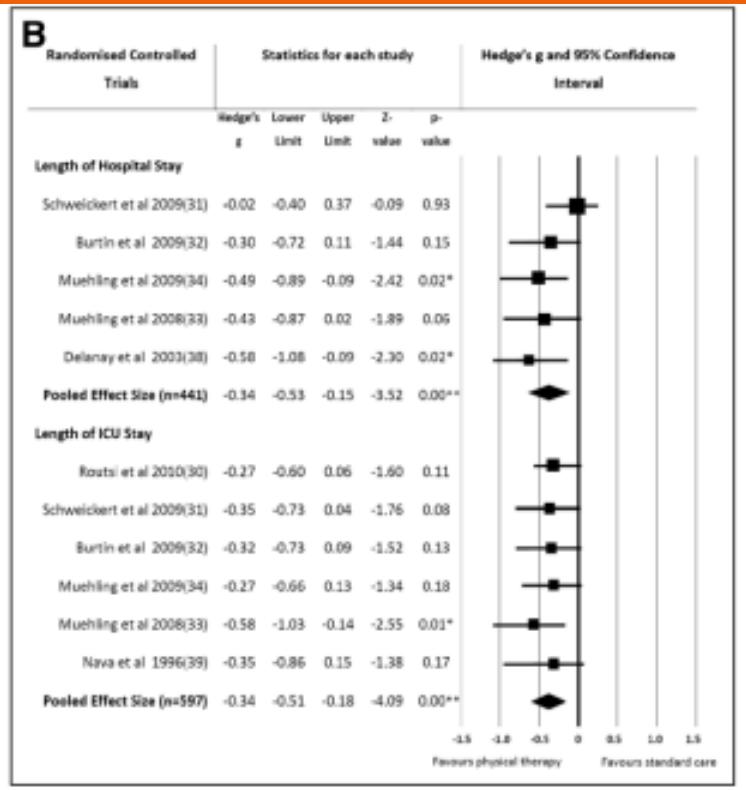
Data are presented as means (confidence intervals).

Adjusted[a], adjusted for body mass index, Acute Physiology and Chronic Health Evaluation II, and vasopressors.

ICU, intensive care unit; LOS, length of stay.

PE Morris et al. CCM 2008: 36: 2238-2243





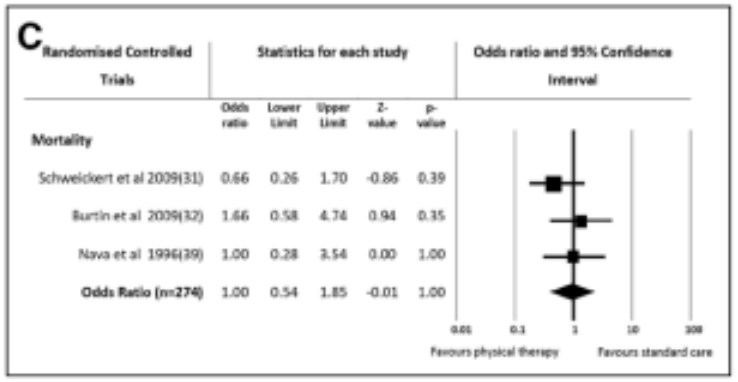
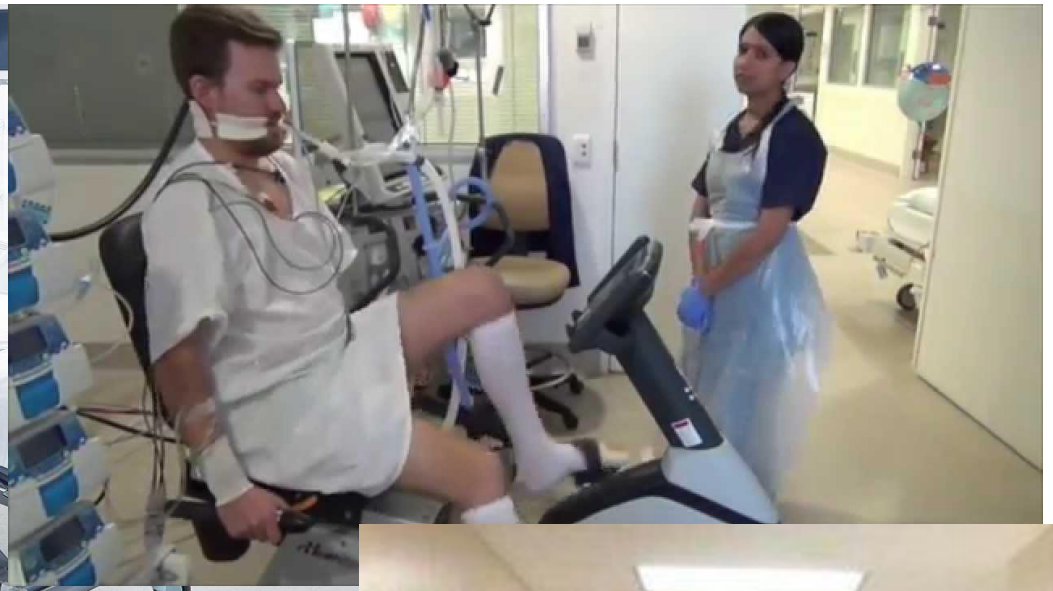
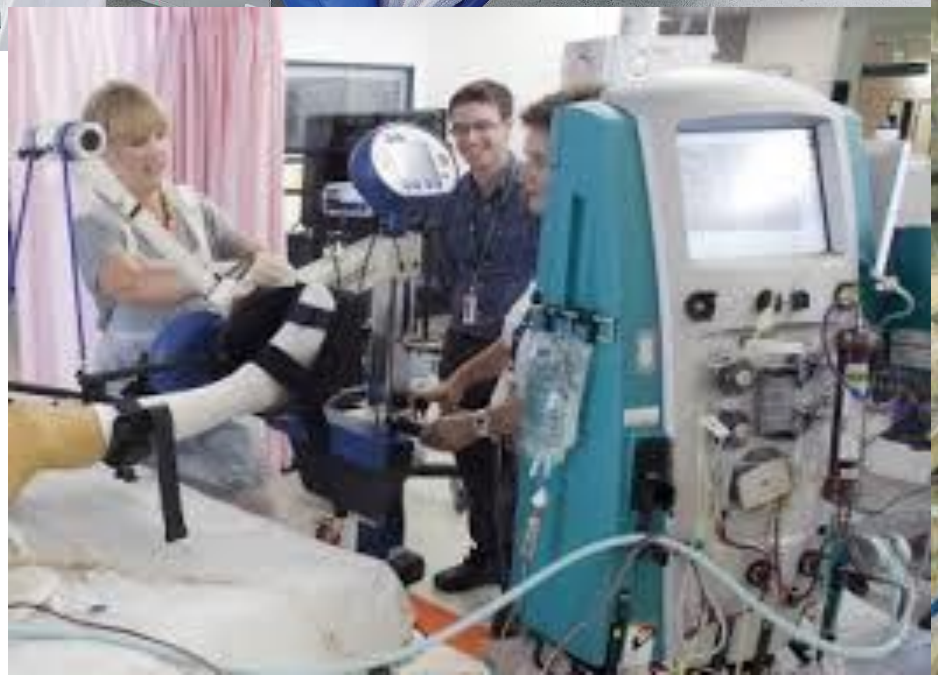
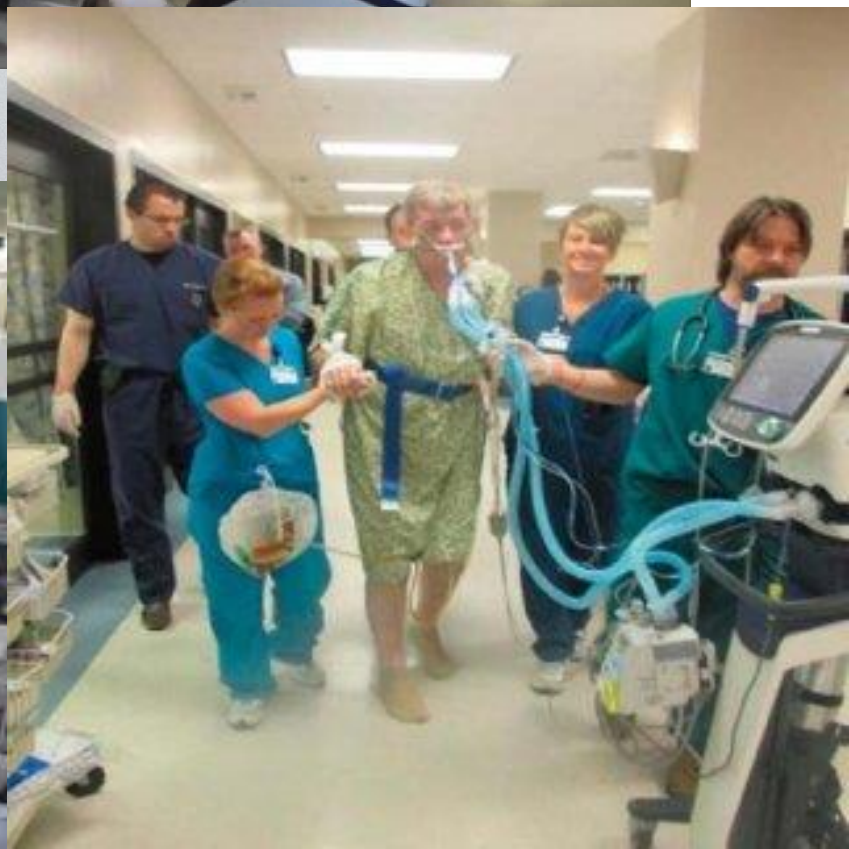


Figure 2. A, Meta-analysis and pooled effect sizes (Hedges. *g*) on physical function, quality of life, muscle strength, ventilator-free days for physical therapy or standard care in the ICU. $^{*}p \leq 0.05$ and $^{**}p \leq 0.01$. **B**, Meta-analysis and pooled effect sizes (Hedges. *g*) on length of hospital and intensive care stay for physical therapy or standard care in the ICU. $^{*}p \leq 0.05$ and $^{**}p \leq 0.01$. **C**, Odds ratio on mortality for physical therapy or standard care in the ICU.

Kambuya CCM 2013; 41: 1543-1554

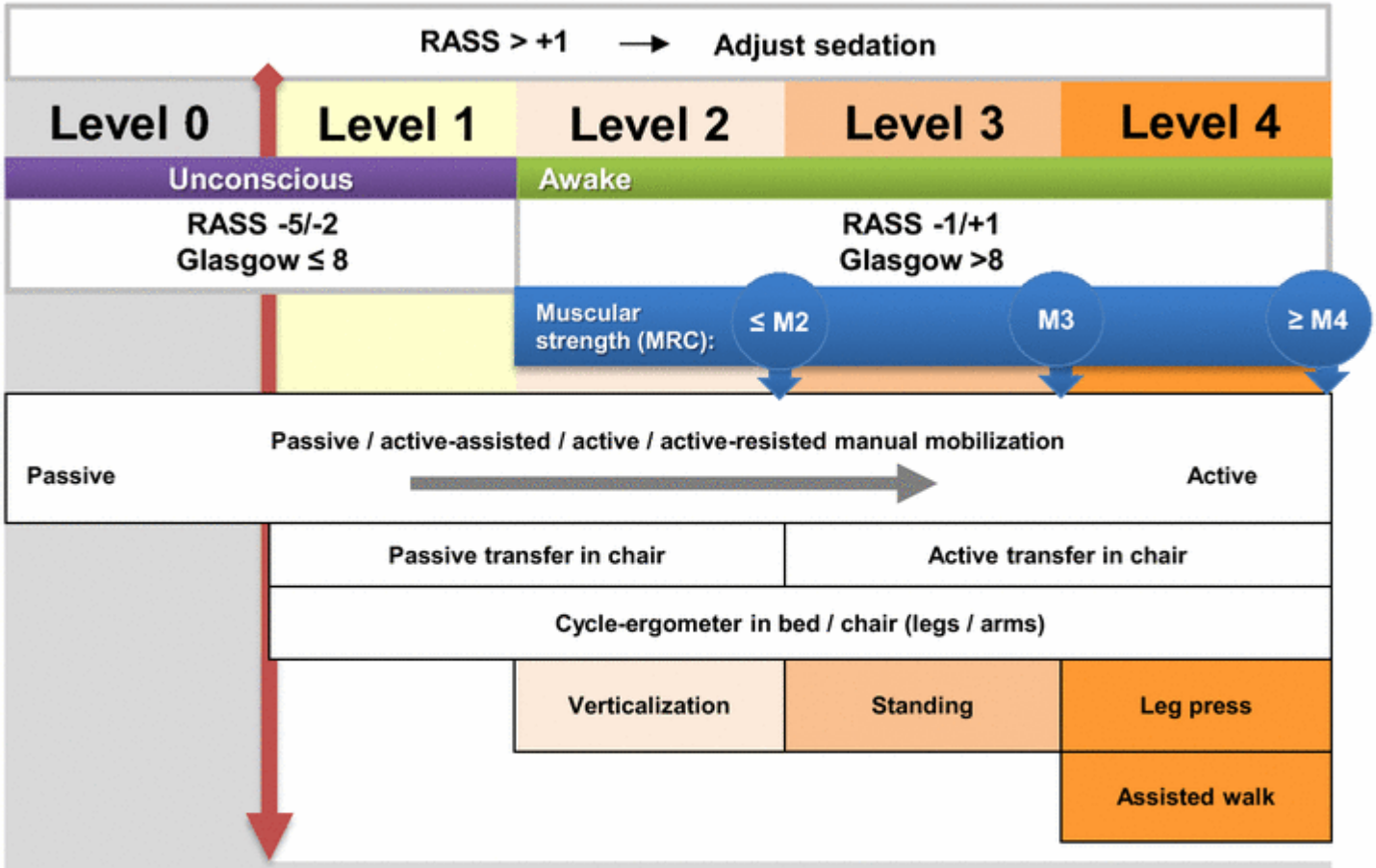






Early mobilization protocol

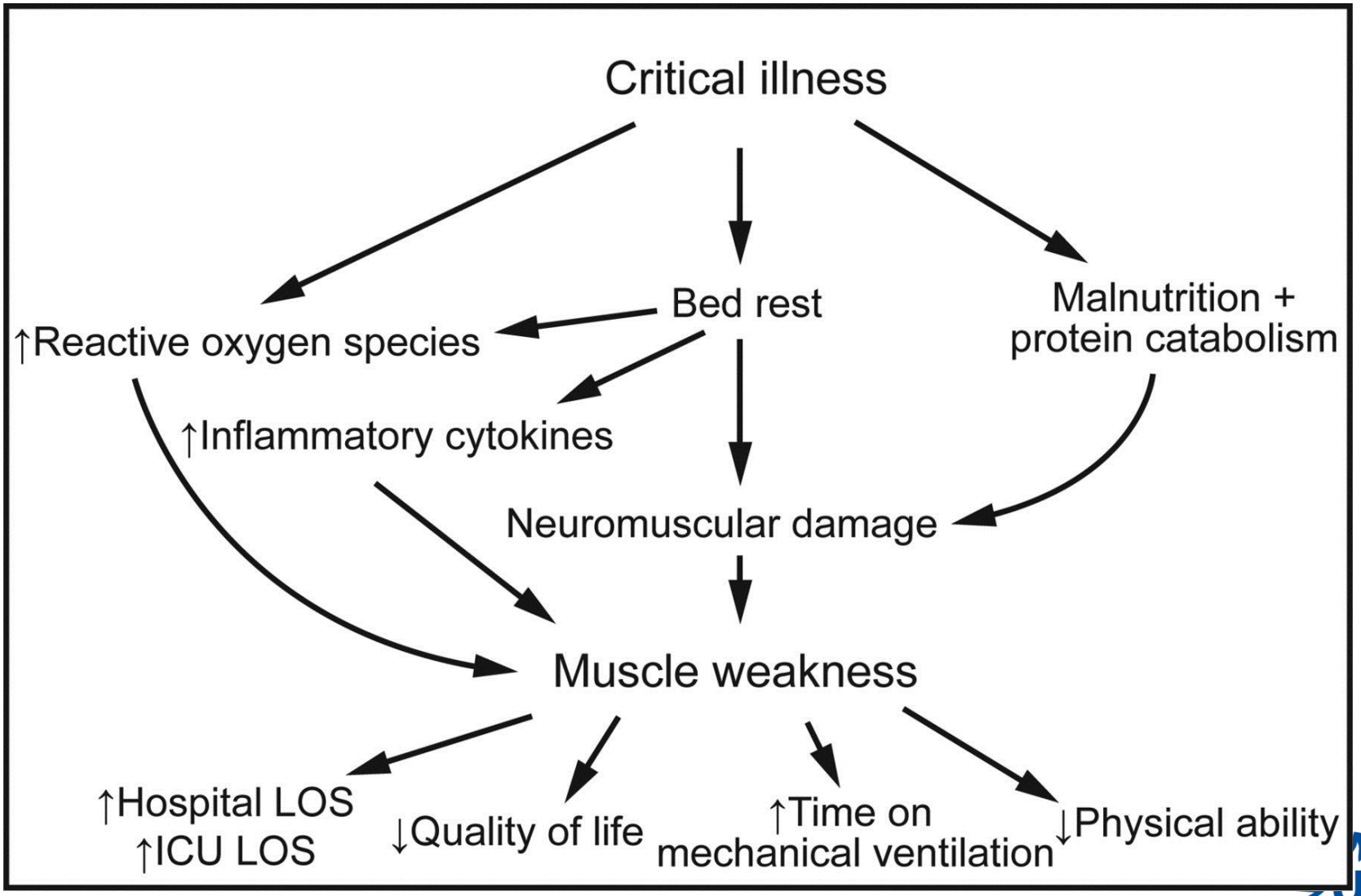
M. Patri, CE. Hickmann, E. Bialais, J. Dugernier, P-F Laterre , J. Roeseler
Intensive care unit, Saint Luc university hospital, Brussels.



Contraindications of early mobilization *(level 1 to 4)*

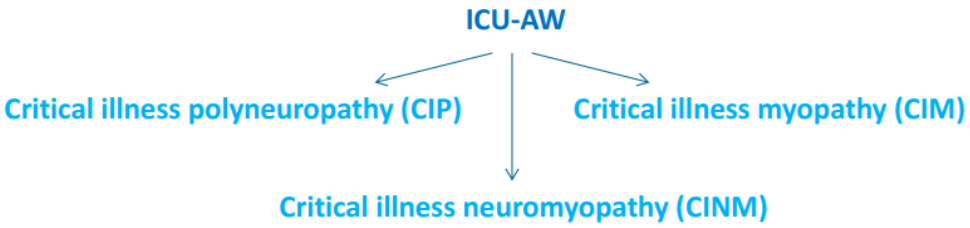
Acute myocardial infarction (confirmed by ECG)
Active bleeding
Increased intracranial pressure with major instability
Spine or pelvis instable fracture
Therapy withdrawal

Pathofysiologie



ICU acquired weakness

- Bestaat uit:



- Klinische diagnose:
  - Wakkere en coöperatieve patiënt
  - MRC score
  - Subjectief

Functions assessed
Upper extremity: wrist flexion, forearm flexion, shoulder abduction
Lower extremity: ankle dorsiflexion, knee extension, hip flexion
Score for each movement
0: No visible contraction
1: Visible muscle contraction, but no limb movement
2: Active movement, but not against gravity
3: Active movement against gravity
4: Active movement against gravity and resistance
5: Active movement against full resistance
Maximum score: 60 (four limbs, maximum of 15 points per limb) (normal)
Minimum score: 0° (quadriplegia)
ICU-AW: mean MRC scores of <48

ICU-AW, ICU-acquired weakness; MRC, medical research council.

G. Hermans, CCM 2015; 19 (1): 274

Risicofactoren

'Probable'	'Possible'
Ernstige sepsis, shock, MOF	Leeftijd
Lange duur sepsis, shock, MOF	Vrouwelijk geslacht
Langdurig mechanische ventilatie	Hypoalbuminemie
Langdurige bedrust	Parenterale voeding
Hyperglycemie	Vasopressie
	Steroiden
	Aminoglycosiden
	Neuromusculaire blockade

G. Hermans, CCM 2015; 19 (1): 274

Risicofactoren

- Medicatie:
  - Steroïden:
    - Katabool
    - Kleine studies: spieratrofie en myopathie
  - Neuromusculaire blokkade:
    - Directe relatie met verlies aan spiermassa
    - Functionele denervatie van de spier
  - Aminoglycosides:
    - Neurotoxisch
  - Colistine
    - Neurotoxisch

G. Hermans, CCM 2015; 19 (1): 274, K. Kourourikos Acta Inform Med. 2014; 22 (6): 406; H. Farhan, Anesthesiology 2016; 124; 207-234

Risicofactoren

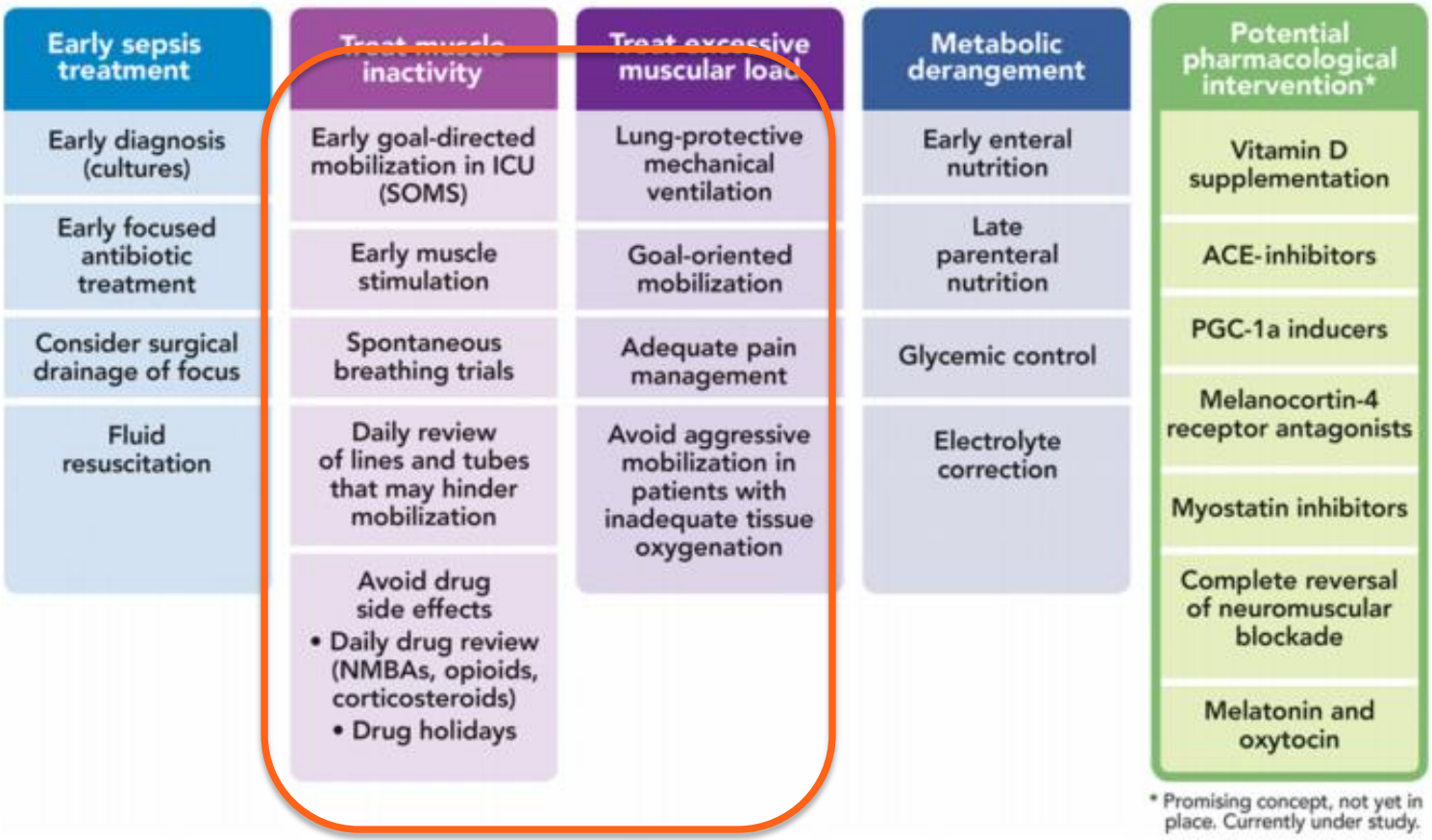
- Voeding
  - Ondervoeding
    - Disbalans tussen te weinig eiwit en verhoogd metabolisme
    - Aminozuren vrij maken uit eigen spieren
  - TPV
    - Onverzadigde vetzuren schadelijk effect op perifere zenuwen
    - Daarnaast hyperglycemie, hyperosmolariteit, waardoor microcirculatie verder verslechtert.

G. Hermans, CCM 2015; 19 (1): 274, K. Kourourikos Acta Inform Med. 2014; 22 (6): 406, H. Farhan, Anesthesiology 2016; 124; 207-234

Risicofactoren

- Sepsis
  - Door verminderde bloedtoevoer naar de spieren
- MODS
  - Onduidelijkheid in literatuur of ICU-AW gevolg is van ernstig ziek zijn, immobilisatie en lange opnameduur of apart falend orgaan
- Immobiliteit
  - Zorgt voor verminderde spieropbouw, verhoogt spiermetabolisme en atrofie, m.n. in onderste extremiteiten

G. Hermans, CCM 2015; 19 (1): 274, K. Kourourikos Acta Inform Med. 2014; 22 (6): 406. H. Farhan, Anesthesiology 2016; 124; 207-234



H. Farhan, Anesthesiology 2016; 124; 207-234

PICU-AW

- Field-Ridley et al, PCCM 2016:
  - Incidentie 0,02%
  - Vaker bij respiratoire opnamereden
  - Langere beademingsduur, langere PICU-LOS, vaker tracheotomie en vaker ontslag naar chronic care facilitation

- Shantanu et al. PCCM 2019:
  - > 7 dagen beademd
  - 90,6% polyneuropathie op EMG (90% axonaal)
  - 78.9% ook MRC score als PICU-AW
  - Geen verschil in mortaliteit (40% overall), opnameduur en MV-duur

PICU vroeg-mobiliseren outcome

- Wii-Hab
  - 2x min. 10 minuten gedurende 2 dagen Wii-en
  - N=21> 12> 8
  - Safe and feasible
  - Geen verschil in grip-strength

- Cincinatti
  - N=133, kinderen na SSLTP
  - TI, wakker en unrestrained vs TI, gesedeerd en restrained
  - In wakkere groepe kortere LOS PICU, LOS hospital
  - Echter: group 1, n = 54; mean age, 113 +/- 8 months, group 2, n = 79; mean age, 33 +/- 3 months

Abdulsatar et al. J. Pediatr. Rehabil. Med. 2013, 6 (4): 193-204
Jacobs et al. Crit Care Med. 2001 Jan;29(1):164-8.

PICU vroeg-mobiliseren outcome

- wEECYCLE trial
  - N=30
  - 5x 30 minuten bed fiets + usual care vs usual care
  - Safe en feasible
  - Meer beweging met bedfiets
  - Geen verschil in LOS PICU
  - Geen groep-analyse ICU-AW, ventilator-free days

- Neuro-ICU
  - N=53, 3-17 jaar, neurotrauma of na insult. Opname> 48h
  - RCT, EM binnen 72 uur vs usual care
  - Veilig en feasible
  - Meer consulten in EM-groep, maar 88% consult PT in groep 2
  - Geen verschil in functioneel of QoL outcome

Choong et al. Pediatr Crit Care Med 2017; 18:e546–e554
Fink et al. Pediatr Crit Care Med 2018; 20:540–550

PICU vroeg mobiliseren

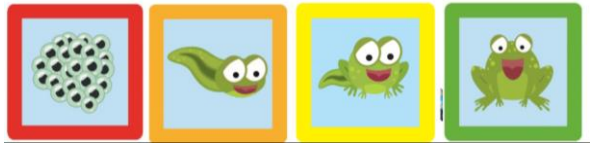
- QI Rotterdam
  - Voor en na QI project
  - Voor n=55, na n=58
  - Geen verschil in beademing, beademingduur of LOS PICU
  - Meer bewegingen gemeten

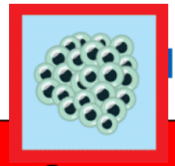
- Guidelines en protocollen
  - 2013: Canada 3,14% PICU heeft EM-guideline
  - 2020: 16% PARK-PICU trial

- PARK-PICU trial komt binnenkort in ICM

Choong et al. Crit Care Med 2013; 41:1745–1753

Voorbeeld






	Frogspawn	Tadpole	Froglet	Frog
CNS	Medical paralysis ICP bolt in situ Neuro protection	Heavily sedated Comfort B Score: <10 or 10-12	Sedated Comfort B score: 12-17	Sedated but able to communicate/not sedated Comfort B Score 12-17
	Open chest Mutliple inotro	Inotropic support other than milrinone Unstable BP in past 24 hours	**No inotropes ***'Stable BP'	No cardiovascular support required
	O2 100%	Intubated New tracheostomy O2 ≥ 60% PEEP ≥ 10	Intubated or tracheostomy O2 < 60% PEEP <10	Self-ventilating Non-invasive ventilation O2 ≤ 60%
	ECMO	Positional CVVH line 3+ active infusions	CVVH line 2 active infusions	Minimal IV lines
Other	Open abdomen Unstable spine/fracture Premature neonate ≤32 weeks			

Tadpole: Resp

Intubated/
NewTrachy
O2 ≥ 60%
PEEP ≥10

* Individually risk assess as may be able to screen to higher level if benefit of mobility outweighs the risk.
**May have Milrinone infusion.
***No IV fluid or inotropes in last 24 hours.

MOVE4WARD Activity Selection

Frogspawn	Tadpole	Froglet	Frog
Encouraged Activities: Consider timetable (see template) to include set morning and bedtime, wash and dress etc. Should be age appropriate. Introduce self, place and time to patient throughout the day (orientation). Positioning for pressure relief and joint support as able – 2-4 hourly. Head of bed 0-30° as able/appropriate. Consider nutrition and dietitian involvement if appropriate. Passive range of movement exercises by therapists. **Additonal Activities:** Family involvement as guided by nursing staff.	Any Frog spawn activities, plus: **Encouraged Activities:** Increase head of bed 45-50° as able/appropriate. Active family involvement as guided by nursing staff/therapists. 4 hourly scoring of comfort B and titration of sedation accordingly. Seating provided as appropr **Additional Activities:** MotoMed bike as appropriate by therapists. Consider transfer out of bed into seating/cuddles as appropriate. Encourage sensory experience (seek advice from therapists if required). Consider referral to SALT as appropriate. Consider referral to OT.	Any Frogspawn and Tadp Plus: **Encouraged Activ** Active assisted range of exercises with the develo g Positioning f ntal/functiona back of bedsi n bed (upright put on daily t xposure to sc ditional Activ Refer to school if age a Sitting on edge of bed therapists. Bed/mat play with thera staff/family. Age appropriate activities for up to 15 mins x3 a day (See examples in bedside bundle).	

MOVE4WARD Activity Levels. H. Child and MOVE4WARD Team Version 2.0. Updated June 2019. Review October 2020.

Tadpole

All frogspawn activities

PLUS

- Increase head of bed to 45-50° as tolerated
- 4 hrly COMFORT B
- Active family involvement

Additional activities

Eg Motomed bike

Level 2	• Intubated or tracheostomy with FiO2 ≤ 60% +/or PEEP ≤ 8 *and* SBS -1 to +3 *Or* • Non-invasive support with FiO2 > 60% *or* • Dialysis/Renal Replacement Therapy *or* • Femoral access	• Level 1 activities *plus* • Positive touch for infants/toddlers • Sitting up in bed TID • Team to consider OOB to chair +/or ambulation • OT/PT consult by PICU day 3 • Assess for difficulty with communication or phonation and consult SLP • Assess for swallowing readiness in high risk children and consult SLP • Assess need for daily schedule • psCAM-ICU or pCAM-ICU BID
Level 3	• Non-invasive pulmonary support with FiO2 ≤ 60% *or* • Baseline pulmonary support *or* • EVD cleared by NUS *and* SBS-1 to +3	• Level 1 and 2 *plus* • OOB to chair TID or sitting up in bed TID if appropriate chair is not available • Ambulate BID if trunk control present