Le kinésithérapeute de réanimation d'hier à demain

Guidelines actualisés

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Intensive Care Med
DOI 10.1007/s00134-008-1026-7

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Physiotherapy for adult patients with critical illness: recommendations of the European Respiratory Society and European Society of Intensive Care Medicine Task Force on Physiotherapy for Critically Ill Patients

Intensive Care Med (2008) 34:1188–1199
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Description of levels of evidence

Level of evidence	Sources of evidence
A	RCTs. Rich body of data
B	RCTs Limit body of data
C	Non RCTs, observational studies
D	Panel consensus, judgement

Pauwels, R. A.et al 2001 Am.J Respir Crit Care Med 163:1256

Physiotherapy

- **Management of acute, subacute and chronic respiratory conditions**
- **Deconditioning, sequelae of immobility and recumbency**
- **Emotional problems**

The Active Role of The European Physiotherapist

- **Respiratory therapy** **95%**
- **Mobilization** **100%**
- **Positioning** **90%**

Norrenberg et al, 2000 ICM 26:988-994

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ESICM STATEMENT

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Physiotherapy for adult patients with critical illness: recommendations of the European Respiratory Society and European Society of Intensive Care Medicine Task Force on Physiotherapy for Critically Ill Patients

Aims of respiratory physiotherapy

- To clear airways secretions
- To improve ventilation and lung compliance
- To reduce airway resistance and work of breathing

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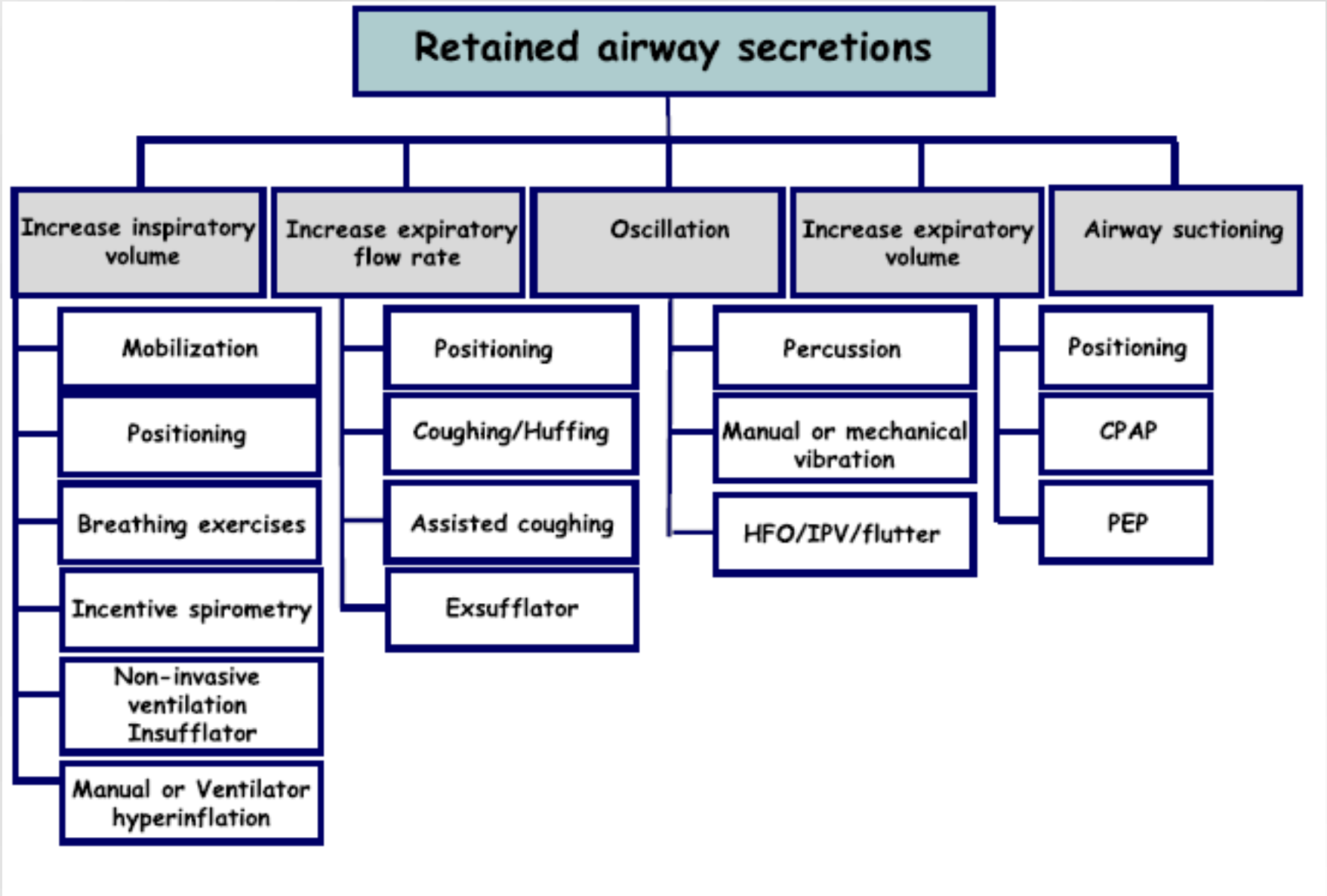
Retained airway secretions
Increase inspiratory volume
Increase expiratory flow rate
Oscillation
Increase expiratory volume
Airway suctioning
Mobilization
Positioning
Breathing exercises
Incentive spirometry
Non-invasive ventilation Insufflator
Manual or Ventilator hyperinflation
Positioning
Coughing/Huffing
Assisted coughing
Exsufflator
Percussion
Manual or mechanical vibration
HFO/IPV/flutter
Positioning
CPAP
PEP

Intubated patient

Recommendations

- Manual hyperinflation and suctioning are indicated: level B
- MHI should be used with cautions in patients at risk of baro and volotrauma or haemodynamically unstable (no over-or under-ventilation, pressure manometer): level B

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Non-intubated patient

Recommendations

- Interventions to increase inspiratory volume: level B
- Interventions to increase expiratory flow: level B
- Cough assist should be applied in non-intubated patients with retained secretions secondary to expiratory muscle weakness: level B
- Oral or nasal suctioning should be used only when other techniques fail to clear secretions and with extreme cautions: level D

RESEARCH Open Access

Benefits and risks of manual hyperinflation in intubated and mechanically ventilated intensive care unit patients: a systematic review

Fr. Paulus, Jan M Binnekade, M. B Vroom and M J Schultz

Crit Care 2012;16

Results: 50 articles (19 relevant). Trials differed too much to permit meta-analysis.

Short-term improvements in lung compliance, oxygenation, and secretion clearance, no changes in outcomes.

!!! decreases in CO, alterations of HR, and increased CVP.

Conclusions: Studies have failed to show that MH benefits intubated and mechanically ventilated patients.

!!! short-term side effects.

Experimental study on the efficiency and safety of the manual hyperinflation maneuver as a secretion clearance technique

8 respiratory therapists

CONCLUSIONS:

MHI produced safe P_{alv} levels. However, the MH maneuver was often performed in a way that did not favor secretion removal (PIF exceeding PEF), even after instruction. The unfavorable PIF/PEF ratio was attributable to overly rapid inflations and low V_T.

de Arruda Ortiz T et al J 2013 Bras Pneumol

Lung hyperinflation by mechanical ventilation versus isolated tracheal aspiration in the bronchial hygiene of patients undergoing mechanical ventilation

50 patients were included.

Compared to the Control Group, the MVH Group showed greater aspirated secretion amount (3.9g versus 6.4g, p = 0.0001)

C Assmann et al Rev Bras Ter Intensiva 2016;1

Effects of duty cycle and positive end-expiratory pressure on mucus clearance during mechanical ventilation

Li Bassi G et al Crit Care 2012; 40

In the semirecumbent position, mucus clearance is improved with prolongation of the duty cycle.

Effects of manual rib cage compressions on expiratory flow and mucus clearance during mechanical ventilation.

Marti D et al Crit Care 2013; 41

Hard manual rib cage compression improved mucus clearance in the semirecumbent position. The technique appeared to be safe. Conversely, soft manual rib cage compression was not effective and potentially unsafe.
Predominant role of peak expiratory flow on mucus clearance.

Comparison of changes in tidal volume associated with expiratory rib cage compression and expiratory abdominal compression in patients on prolonged mechanical ventilation.

Morino A J et al 2015 Phys Ther Sci

18 patients: Vt at rest: 7.2 ± 1.7 mL/kg

Vt chest compression: 8.3 ± 2.1 mL/kg

Vt abdominal « :9.1 ± 2.2 mL/kg *

* Vt rest# abdo $p < 0,05$

Expiratory abdominal compression may be an effective alternative to the manual breathing assist procedure.

Atelectasis

RECOMMENDATIONS:

- **PT: treatment of acute lobar atelectasis: level B**
- **Treatment: body positioning and techniques to increase inspiratory volume and enhance forced expiration: level B**
- **If the patient is intubated, MHI and suctioning are the techniques indicated, with the patient positioned with affected lung up: level B**

Intensive Care Med (2008) 34:1188–1199
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Optimal technique for deep breathing exercises after cardiac surgery

E. WESTERDAHL et al 2015 Minerva

Key messages:

— Breathing exercises/are routinely prescribed but no consensus for most effective technique.

— DB exerc with or without mechanical devices: positive effects on atelectasis, lung volumes, oxygenation and dyspnea.

— A maximal slow inspiration with an inspiratory hold at peak inspiration is advocated.

— Suggestion: three sets of 10 deep breaths with a 30-60-second pause between each set, performed hourly during the first postoperative days.

Pneumonia

RECOMMENDATIONS:

It is not possible to make any specific recommendations for or against other physiotherapy treatments due to lack of evidence in this setting.

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Physiotherapy does not prevent, or hasten recovery from VAP in patients with acquired brain injury

- 144 patients 2 groups:control-treatment

- Outcome measures: - incidence of VAP
  - duration MV
  - length of ICU and hospital stay

Patman S et al ICM 2009;35

Physiotherapy does not prevent, or hasten recovery from VAP in patients with acquired brain injury

33 patients(23%) with VAP

19< control group (26%)

7 lobar collapses (44%)

14 < treatment group (19%)

2 lobar collapses(12%) P<0,05

Duration mech vent ns

Lenght ICU stay ns

Patman S et al ICM 2009;35

December 2016 : online expert panel as part of a Delphi Process, to determine expert consensus regarding **physiotherapy management of intensive care patients with community acquired pneumonia (CAP) during the acute, intubated period.**

Lisa van der Lee

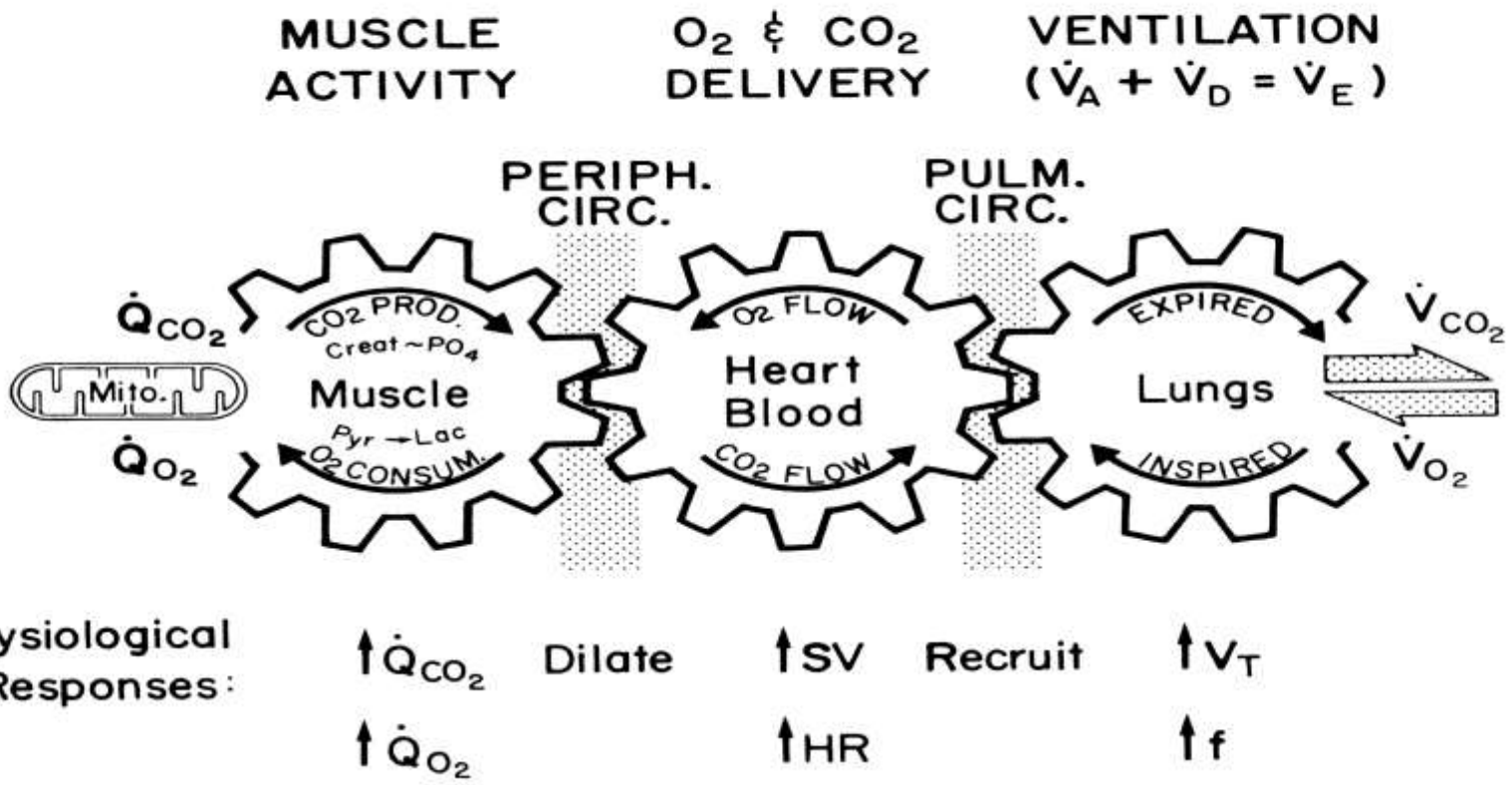
PhD Candidate, School of Physiotherapy

University of Notre Dame Australia

Physiotherapy

- **Management of acute, subacute and chronic respiratory conditions**
- **Deconditioning, sequelae of immobility and recumbency**
- **Emotional problems**

Interaction between muscle activity and the cardiorespiratory system



Wasserman C et al Principles of exercice testing and interpretation 1994

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Physical deconditioning and related complications

- **Recommendations**

Early active or passive mobilization, positioning, stretching, EMS: level C

Intensive Care Med (2008) 34:1188–1199
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Early activity is feasible and safe in patients with respiratory failure

103 patients MV > 4 days

Sit on bed, in chair, ambulate

Adverse events: fall to knee

feeding tube removal

systolic blood pressure < 90 or > 200 mmHg

O2 desaturation < 80%, extubation

Bailey P et al CCM 2007;35

Early activity is feasible and safe in patients with respiratory failure

- Results: 1449 activity events
- 16% sit on bed, 31% sit on chair, 53% ambulate
- Activity of mechanically ventilated patients: 19 % site on bed, 39% sit in chair, 42% ambulation
- ICU survivors 69% ambulate > 100 feet
- Adverse events: < 1%

Bailey P et al CCM 2007;35

Early mobility therapy in the treatment of respiratory failure

330 medical patients

Within 48h of mechanical ventilation

Protocol group:

Out of bed earlier (5 vs 11 days)

Shorter ICU and hospital length of stay

(5,5 vs 6,9 days and 11,2 vs 14,5 days)

Morris P et al CCM 2008;36

The Active Role of The European Physiotherapist

- Respiratory therapy 95%
- Mobilization 100%
- Positioning 90%

Norrenberg et al, 2000 ICM 26:988-994





The effects of active mobilisation and rehabilitation in ICU on mortality and function: a systematic review.

Review 14 studies, 1753 patients
Greater muscle strength, greater MRC score, greater probability of walking without assistance.
There were no consistent effects on function, QOL, ICU or hospital length of stay, duration of mechanical ventilation or discharge destination, no impact on short- and long-term mortality.

Tipping CJ et al ICM 2016

Physiotherapy in the intensive care unit: an evidence-based, expert driven, practical statement and rehabilitation recommendations

Juultje Sommers[1], Raoul HH Engelbert[1,2], Daniela Dettling-Ihnenfeldt[1], Rik Gosselink[3], Peter E Spronk[4], Frans Nollet[1] and Marike van der Schaaf[1]

CLINICAL REHABILITATION

2015

Table 1. The effects of physiotherapeutic interventions on functional movement in intensive care patients according to the ICF classification.

Intervention	Effect on level of anatomical features	Outcome measure	Author, year (level of evidence)	Scientific level of conclusion
Mobilization in chair	↑ respiratory frequency ↑ oxygen saturation, ↑ respiratory reserve, ↑ heart rate, ↑ blood pressure/MAP, ↑,Ve, Vt, fr, Vt/TI	Respiratory and haemodynamic parameters and blood values	Genc, 2012 (B); Stiller, 2004 (C); Zafiropoulos 2004 (C)	2 and 3
Exercise therapy (passive and active); training of ADL's (mobilization protocol)	↑ Il-10 anti-inflammatory cytokine	Blood values	Winkelman, 2012 (B)	2
CPM	Decreased loss of proteins ↑ wet weight/ magnesium DNA ↓ Il-6 inflammatory cytokine	Muscle biopsy, blood values	Griffiths, 1995 (B); Amidei, 2013 (B)	2
Stretching	↑ ROM	Passive knee extension test	Reid, 2004 (B)	2
EMS	↑ Muscle thickness, ↑micro circulation, ↑ oxygen consumption, ↑ reperfusion, ↓ muscle atrophy	Ultrasound, NIRS, outline upper limb (of the lower extremity)	Gruther, 2010 (A2); Gerovasili, 2009 (B); Meesen, 2010 (B); Angelopoulos, 2013 (B); Hirose, 2013 (B)	1 and 2

Summers J et al 2015 Clin Rehab

Intervention	Effect on level of functioning	Outcome measure	Author, year (level of evidence)	Scientific level of conclusion
Mobilization in chair	↑ Vt ↑ inspiratory and expiratory muscle strength	MIP, MEP, Vt	Chang, 2011 (B)	2
Immobilization	↑ Impairment in ROM	Measuring angles of ROM	Clavet, 2008 and 2011 (C)	3
(Stationary) cycling	↑ Strength in muscles. Quadriceps at hospital discharge	HHD- isometric quadriceps strength	Burtin, 2009 (B)	2
EMS	↑ Muscle strength (prevention CIPNM)	MRC sum score, handgrip strength	Karatzanos, 2012 (B); Routsi, 2010 (B); Rodrigues, 2012 (B); Parry, 2013 (A1); Williams, 2014 (A1)	1 and 2

Intervention	Effects on level of activity	Outcome measure	Author, year (level of evidence)	Scientific level of conclusion
Exercise therapy (passive and active); training of ADL's	↑ ADL's at hospital discharge	Katz-ADL, BI, FIM	Schweickert, 2009 (A2); Chen 2012 (B)	1 and 2
(Stationary) cycling	↑ ADL's at hospital discharge	6MWT, SF36	Burtin, 2009 (B)	2

Summers J et al 2015 Clin Rehab

Intervention	Other effects	Outcome measure	Author, year (level of evidence)	Scientific level of conclusion
Exercise therapy 20 min (passive and active) Training of ADL's (mobilization protocol)	↓ ICU, hospital LOS	LOS ICU, hospital	Morris, 2008 (C); Winkelman, 2012 (B)	2 and 3
EMS	↓ Weaning time, ↓ ICU, hospital LOS	MRC (sum) score, LOS ICU, hospital	Routsi, 2010 (B); Williams, 2014 (A1)	1 and 2

Summers J et al 2015 Clin Rehab

Non-responsive and non-cooperative patient

- RASS Score < -2 (level 2)
- S5Q < 3 (level 4)

Responsive and adequate patient

- RASS Score ≥ -2 (level 2)
- S5Q≥ 3 (level 4)

Passive (Note 3)

- Passive Exercise (level 2)
  - Repetitions: 5 times/joint
  - Sets: 1
  - Frequency: Once daily
- Stretching (level 2)
  - Duration: 20 minutes
- Passive cycling (level 2)
  - Duration: 20 minutes
- EMS (level 1 and 2)
  - Duration: 60 minutes
  - Intensity: 45 Hz
  - Frequency: Daily
- CPM (level 2)
  - 3 x 3 hours daily
- Splinting (level 4)
  - Duration: 2 hours on and 2 hours off

Active (Note 3)

- Exercise Therapy (level 4)
  - Intensity: (level 4)
    - BORG 11 – 13
  - Duration: (level 4)
    - Repetitions: 8-10
  - Sets: 3 (level 4)
  - Frequency: 1-2 times daily (level 4)
  - Build up: (level 4)
    - Step 1: Increase duration
      - Increase repetitions to 10
    - Step 2: Increase number of sets
      - From 1 set to 3 sets
    - Step 3: Increase intensity
      - From Borg score 11 to 13
    - Step 4: Increase frequency
      - From once daily to twice daily
- ADL training: Balance, standing, walking (level 3)
- Out of bed mobilization (level 2)
- Cycling (level 2)
  - Duration: 20 minutes
  - Build up: Build up interval training towards 20 minutes

Summers J et al 2015 Clin Rehab

Physiotherapy

- **Management of acute, subacute and chronic respiratory conditions**
- **Deconditioning, sequelae of immobility and recumbency**
- **Emotional problems**

Level c-d

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ICU delirium

The Impact of Early Mobilization in Mechanically Ventilated Patients

- 49 patients in early PT/OT
- 55 patients routine care
- Same risk factors (age, APACHE II score, % sepsis), % of daily interruption of sedation
- % of days with delirium: ICU 33 vs 57%($p<0.01$)
  hospital 25 vs 39% ($p<0.01$)

Schweickert WD et al Lancet 2009

Physical therapists'management of patients with Post-Intensive Care Syndrome

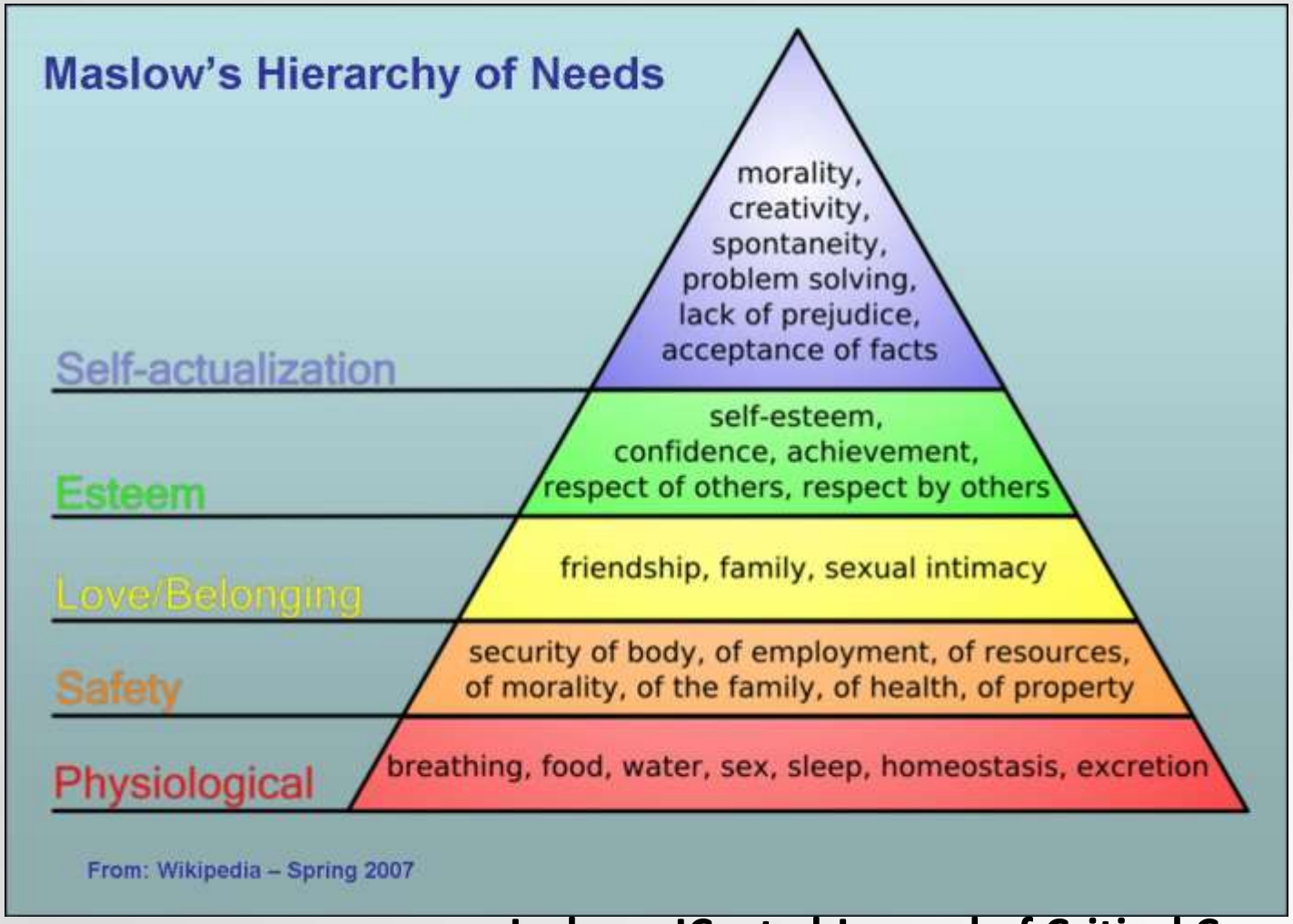
- The evolution of life-saving interventions have created an iatrogenic state in which many of the manifestations of the critical illness are consequences of the ICU treatment rather than the pathology responsible of ICU stay
- Reduced QOL, autonomy, physical abilities, activities of daily living, anxiety, depression

= Post Intensive Care Syndrome

PT in ICU team= best practice

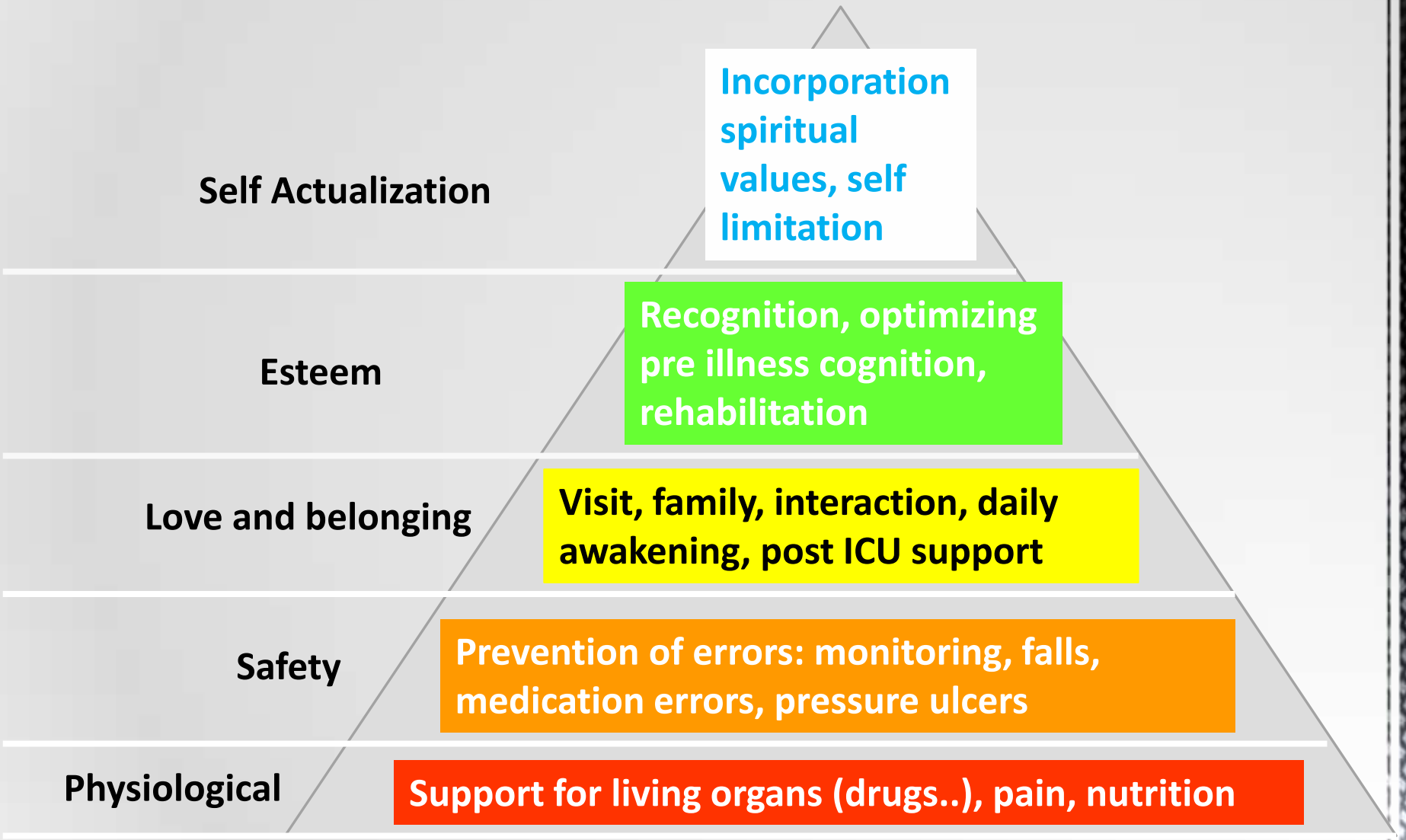
Bemis-Dougherty AR et al Physical Therapy 2013;93

Improving patient care through the prism of psychology:Application of the Maslow's hierarchy



Jackson JC et al Journal of Critical Care 2014

Improving patient care through the prism of psychology:Application of the Maslow's hierarchy



Improving patient care through the prism of psychology:Application of the Maslow's hierarchy

- **Actual techniques: holidays sedation ,delirium monitoring, early mobilization…**
- **Cognitive rehabilitation: memory book, daily planner, smart phone (alarms) to compensate impaired memory**

Jackson JC et al Journal of Critical Care 2014

Comfort and patient-centred care without excessive sedation: the eCASH concept.

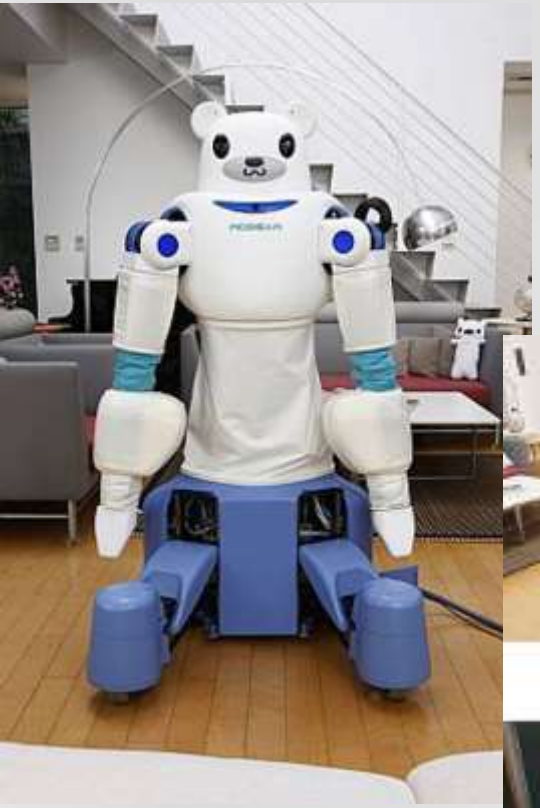
the mnemonic eCASH-early Comfort using Analgesia, minimal Sedatives and maximal Humane care
Effective analgesia and minimal sedation facilitate promotion of sleep, early mobilization strategies improved communication , assist rehabilitation and avoid isolation, confusion and possible long-term psychological complications of an ICU stay

Vincent JL et al 2016 ICM

Early Mobilization and Rehabilitation in the ICU: Moving Back to the Future

Needham D et al 2016 Resp Care

Early Mobilization and Rehabilitation in the ICU: Moving Back to the Future



Needham D et al 2016 Resp Care


FLAVIA SCHAUB

Hocoma

Conclusions

RT: MHI can be recommended but with caution

Chest wall or abdominal compression can be recommended but P exp flow > Pinsp flow

Atelectasis - pneumonia: no new recommendations

PT: early mobilization safe and feasible level 1-2

Emotional aspects: PT decreases delirium

Role of physiotherapist in the post-ICU syndrome

MERCI

Treatment of acute lobar atelectasis

CPT is the treatment of choice for patients with acute lobar atelectasis, without the need for additional fiberoptic bronchoscopy.

Stiller et al Physiother Theory Pract 1996;12

Stiller et al Chest 2000;118

Marini et al ARRD 1979;119

Rothen HU et al Brit J Anesth 1993;71

Prevention of ventilator-associated pneumonia

60 patients receiving mechanical ventilation:

24 patients with CPT: 8% nosocomial pneumonia

36 patients without CPT: 39% « «

Statistical difference p<0.02

CPT is associated with a reduction in VAP

Ntoumenopoulos et al, Intensive Care Med 2002;28

Prevention of pulmonary complications

46 patients receiving mechanical ventilation:

22 patients with CPT: 13.6% nosocomial pneumonia

24 patients without CPT: 16.7% « «

(No statistical difference)

No difference in ABG, length of mechanical ventilation, length of ICU stay, mortality rate

CPT could reduce the incidence of nosocomial pneumonia in the sickest patients

Ntoumenopoulos et al Anaesth Intensive Care 98

A recovery program to improve quality of life, sense of coherence and psychological health in ICU survivors: a multicenter randomized controlled trial, the RAPIT study

Janet F. Jensen[1*], Ingrid Egerod[2], Morten H. Bestle[1], Doris F. Christensen[1], Ask Elklit[3], Randi L. Hansen[1], Heidi Knudsen[4], Louise B. Grode[5] and Dorthe Overgaard[6]

Intensive Care Med (2016) 42:1733–1743
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The effect of physiotherapy on ventilatory dependency and the length of stay in an intensive care unit

Mehtap Malkoç, Didem Karadibak and Yücel Yıldırım

International Journal of Rehabilitation Research 2009, 32:85–88

Table 2 The spectrum of respiratory chronic diseases and nonrespiratory comorbid condition

	Intervention group ($n = 277$)	Control group ($n = 233$)
Pneumonia (%)	20.6	22.7
COPD (%)	17.3	18.1
Cancer (%)	18.4	19.7
Chronic renal failure (%)	11.5	12.4
Chronic heart failure (%)	5.1	4.7
Pulmonary emboli (%)	3.2	3.2
Diabetes mellitus (%)	17.6	17.1
Parkinson's (%)	6.3	2.1

COPD, chronic obstructive pulmonary diseases.

The effect of physiotherapy on ventilatory dependency and the length of stay in an intensive care unit

Mehtap Malkoç, Didem Karadibak and Yücel Yıldırım

International Journal of Rehabilitation Research 2009, 32:85–88

Table 3 Comparison of two groups concerning the ventilatory dependency and lengths of ICU stay

	Intervention group ($n = 277$)	Control group ($n = 233$)	P value
Ventilatory dependence (days) mean ± SD	14.0 ± 5.9	20.0 ± 6.1	*
Lengths of ICU stay (days) mean ± SD	15.8 ± 8.5	25.5 ± 4.5	*

ICU, intensive care unit.
*$P < 0.05$.

Improving patient care through the prism of psychology:Application of the Maslow's hierarchy

- **Developpment of evidenced based guidelines for sedation by SCCM in 2013**
- **Number studies showind deleterious effects of oversedation and immobilization.**
- **Lowest compliance and adaptation (safety reason)**
- **Slow adoption of evidence because of invisible problem.**
- **Need to identify cognitive dysfunction (poor outcome)**
- **Multidisciplinary team to provide holistic care**
- **Patients are debilitaded, physical activities, pain, cognitive impairement (Alzheimer or TBI)**

Jackson JC et al Journal of Critical Care 2014