





FEDERAZIONE NAZIONALE
ASSOCIAZIONI
TRAUMA CRANICO



ASSOCIAZIONE
AMICI DI SAMUEL

**21ª GIORNATA NAZIONALE
DEL TRAUMA CRANICO**

**ANATOMIA DI UN
RITORNO ALLA VITA
DOPO UN GRAVE
TRAUMA CRANICO**

La grave cerebrolesione acquisita:
un problema sanitario, sociale e familiare
(dalla Fase Acuta al Ritorno al Territorio)

16 novembre 2019
8:30 - 16:30


BERGAMO

Auditorium Casa del Giovane
via Gavazzeni, 13

Intervento Riabilitativo in Terapia Intensiva: una prassi ancora poco applicata

Michelangelo Bartolo

*Dipartimento di Riabilitazione, Unità di Neuroriabilitazione
HABILITA Zingonia (Bergamo)*



Recommendations for clinical practice and research in Severe Brain Injury in intensive rehabilitation: the Italian Consensus Conference.

A. De Tanti ¹, M. Zampolini ², S. Pregno ³ on Behalf of the CC3 Group [Corporate Authors]

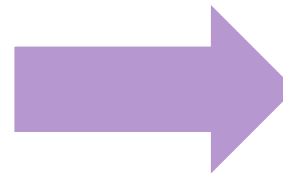
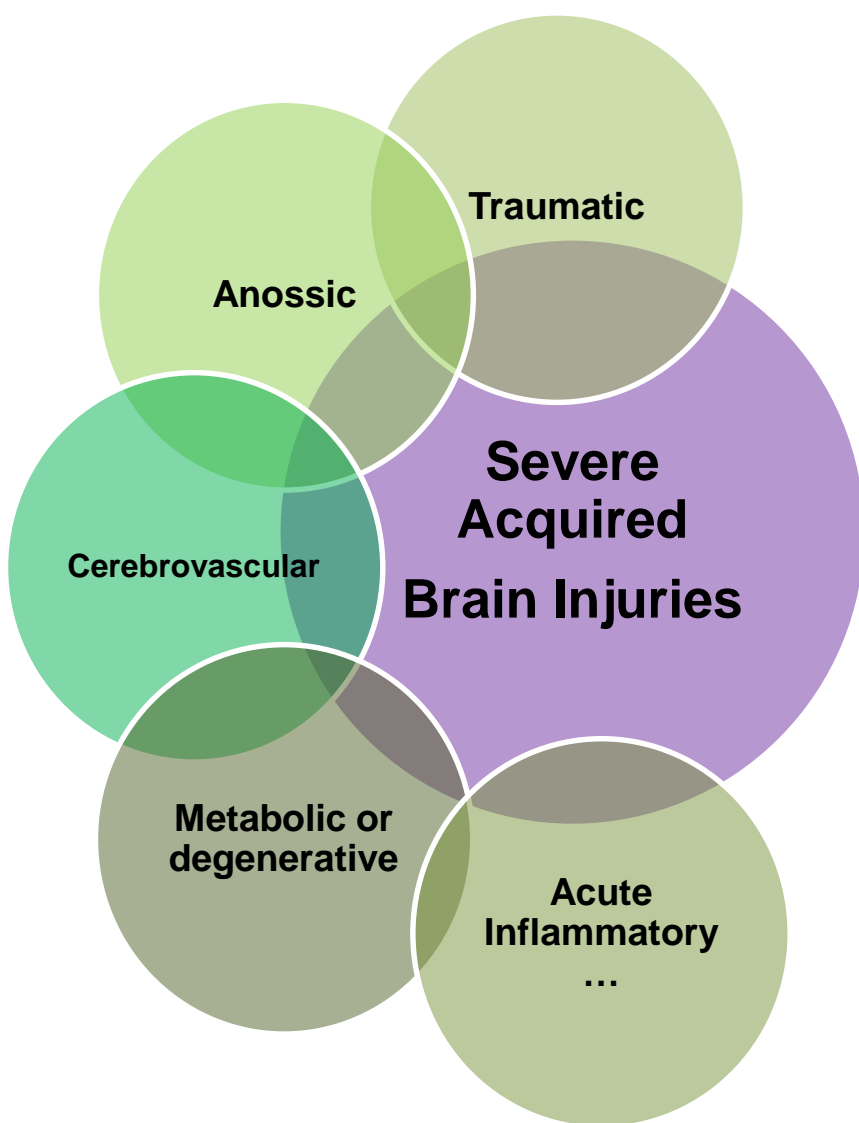
Eur J Phys Rehabil Med 2014 Sep 03 [Epub ahead of print]



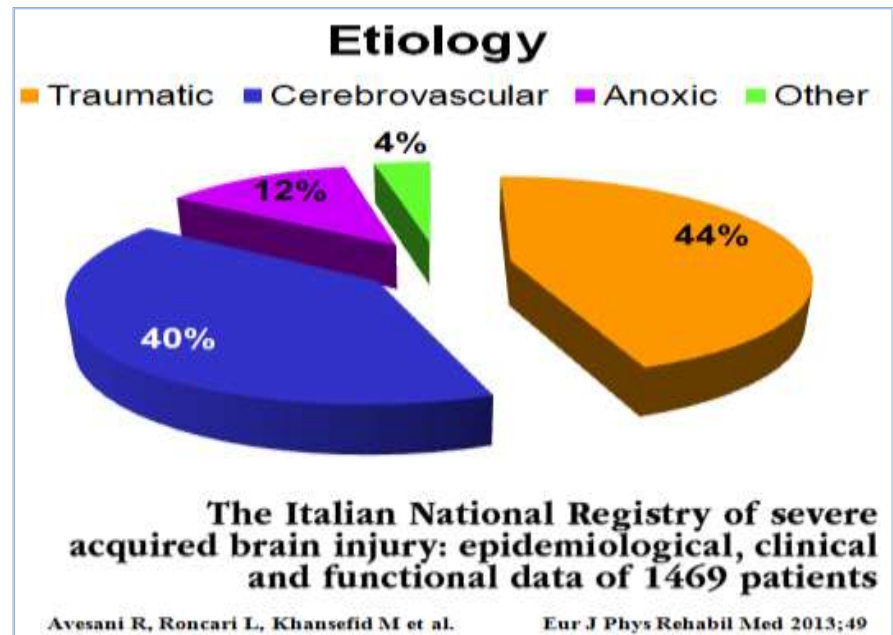
**3° CONFERENZA
NAZIONALE DI
CONSENSO**

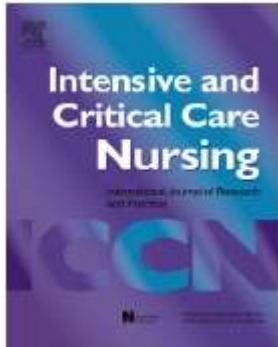
Salsomaggiore Terme
5-6 novembre 2010

The term severe acquired brain injury (ABI) includes a variety of traumatic and non-traumatic acute brain lesions, characterised by onset of variably prolonged coma (Glasgow Coma Scale ≤ 8) and simultaneous motor, sensory, cognitive and/or behavioural impairment. Non-traumatic ABI arises from brain tumours, anoxia, brain haemorrhage, infections (encephalitis) and toxic-metabolic encephalopathy. While “locked-in syndrome” caused by thrombosis of the basilar artery does not necessarily present at the onset of coma, its care and rehabilitation is likewise complex and similar to those of ABI.



**Severe alterations
of consciousness**





Recovery post ICU

Christina Jones^{a,b,*}

Intensive and Critical Care Nursing (2014) 30, 239–245

... change in the opinion of ICU clinicians ...

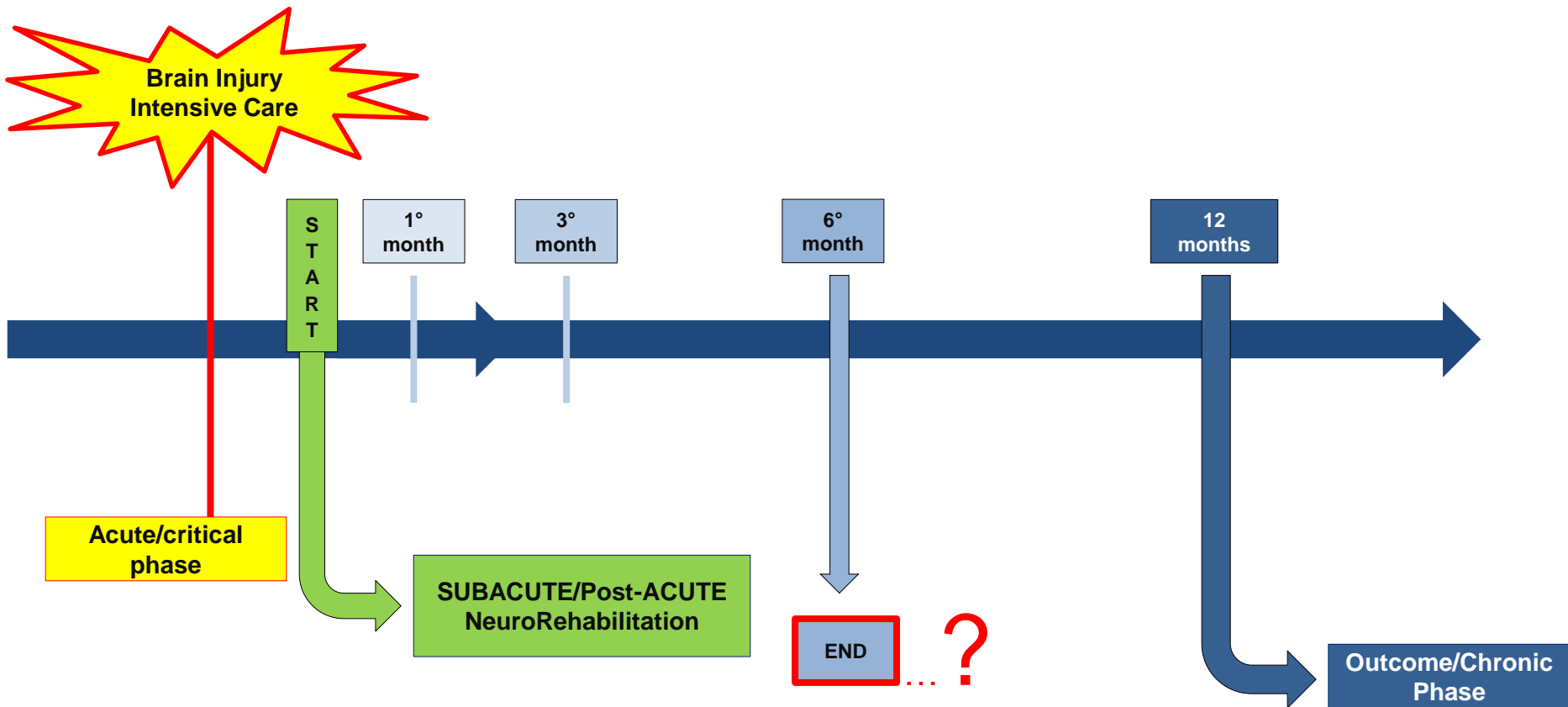
Mortality rates



Recovery

... It is now clear that morbidity following an ICU stay can be high with a wide range of physical, psycho-logical and cognitive sequelae, which can persist for some months to years.

“coma to community”



Disability rating scale for severe head trauma: coma to community.

Rappaport M, Hall KM, Hopkins K, Belleza T, Cope DN.

Arch 1982 Mar;63(3):118-23.

ICU-Acquired Weakness and Recovery from Critical Illness

John P. Kress, M.D., and Jesse B. Hall, M.D.

N Engl J Med 2014;370:1626-35.

RECOVERY FROM CRITICAL ILLNESS

Survival among patients in the ICU has improved dramatically over the past 20 years. Indeed, the observation that extremely ill patients often survive their illnesses has led to a relatively new focus of clinical investigation on patients who survive critical illness. Rehabilitation after critical illness is arduous and often frustratingly slow, particularly in elderly patients. The greatest burdens

Factors to be considered for prognosis

1. Premorbid health status

- ☐ frailty
- ☐ co-morbidities
- ☐ functional status

2. Factors/Interventions occurring during critical illness:

- ☐ medications (*sedatives, analgesic, drug to control anxiety and agitation,...*)
- ☐ presence of sepsis
- ☐ length of mechanical ventilation ...

1. Herridge MS, Tansey CM, Matte A, Tomlinson G, Diaz-Granados N, Cooper A, Guest CB, Mazer CD, Mehta S, Stewart TE, Kudlow P, Cook D, Slutsky AS, Cheung AM, Canadian Critical Care Trials Group (2011) Functional disability 5 years after acute respiratory distress syndrome. *N Engl J Med* 364(14):1293–1304.
2. Bagshaw SM, Stelfox HT, Johnson JA, McDermid RC, Rolfson DB, Tsuyuki RT, Ibrahim Q, Majumdar SR (2015) Long-term association between frailty and health-related quality of life among survivors of critical illness: a prospective multicenter cohort study. *Crit Care Med* 43(5):973–982.
3. McNelly AS, Rawal J, Shrikrishna D, Hopkinson NS, Moxham J, Harridge SD, Hart N, Montgomery HE, Puthucherry ZA (2016) An exploratory study of long-term outcome measures in critical illness survivors: construct validity of physical activity, frailty, and health-related quality of life measures. *Crit Care Med* 44(6):e362–e369.
4. Connolly B, O'Neill B, Salisbury L, Blackwood B, Enhanced Recovery After Critical Illness Programme Group (2016) Physical rehabilitation interventions for adult patients during critical illness: an overview of systematic reviews. *Thorax*. doi:10.1136/thoraxjnl-2015-208273.
5. Cameron S, Ball I, Cepinskas G, et al.: Early mobilization in the critical care unit: a review of adult and pediatric literature. *J Crit Care*, 2015, 30: 664–672.
6. Hough CL, Needham DM: The role of future longitudinal studies in ICU survivors: understanding determinants and pathophysiology of weakness and neuromuscular dysfunction. *Curr Opin Crit Care*, 2007, 13: 489–496.
7. Schweickert WD, Pohlman MC, Pohlman AS, et al.: Early physical and occupational therapy in mechanically ventilated, critically ill patients: a randomised controlled trial. *Lancet*, 2009, 373: 1874–1882.

Consequences of bed rest in critically ill patients

1. Profound muscle weakness (ICU acquired weakness)
 2. Cognitive impairments
 3. Psychological difficulties
 4. Reduced physical function
 - ✓ in Activities of Daily Living
 - ✓ Decreased Quality of Life
 5. Increase the costs of care
-
- ... and in critically ill patients' caregivers**
1. Joint contractures
 2. Thromboembolism
 3. Resistance to insulin
 4. Microvascular alterations
 5. Pressure ulcers
 6. Atelectasis
 7. Pneumonia
 8. Extension of the weaning period
 9. Delirium
 10. Increase in the days of income
 11. Increased mortality
 12. Development of disabilities

1. Puthuchearry ZA, Rawal J, McPhail M, et al. (2013) Acute skeletal muscle wasting in critical illness. *JAMA* 310(15):1591–1600.
2. Winkelman C (2007) Inactivity and inflammation in the critically ill patient. *Crit Care Clin* 23(1):21–34.
3. Truong AD, Fan E, Brower RG, Needham DM (2009) Bench-to-bedside review: mobilizing patients in the intensive care unit—from pathophysiology to clinical trials. *Crit Care* 13(4):216.
4. Clavert H, Hébert PC, Fergusson D, et al. Joint contracture following prolonged stay in the intensive care unit. *CMAJ* 2008;11:178(6):691-697.
5. Allman RM, Goode PS, Patrick MM, et al. Pressure ulcer risk factors among hospitalized patients with activity limitation. *JAMA* 1995;15:273(11):865-870.
6. Timmerman RA. A mobility protocol for critically ill adults. *Dimens Crit Care Nurs* 2007;Sep-Oct;26(5):175-9.
7. Morris PE, Goad A, Thompson C, et al. Early intensive care unit mobility therapy in the treatment of acute respiratory failure. *Crit Care Med* 2008;Aug;36(8):2238-43.
8. Vollman KM. Introduction to progressive mobility. *Crit Care Nurse* 2010;Apr;30(2):S3-5.
9. Greenwood R. Rehabilitation: advanced but not translated. *Curr Opin Neurol* 2012;Dec;25(6):649-50.

Main “early” goals for rehabilitation in ICU

- (Clinical stability)
- Mobilization
- Weaning from mechanical ventilation / endotracheal tube
- Recovery of state of consciousness / cognition



a rehabilitative project with specific aims, tailored on patients' clinical conditions and needs



the work of an interdisciplinary rehabilitation team

1. Kress JP. Sedation and mobility: changing the paradigm. *Crit Care Clin*. 2013 Jan;29(1):67-75.
2. Kocan MJ, Lietz H. Special considerations for mobilizing patients in the neurointensive care unit. *Crit Care Nurs Q* 2013;Jan-Mar;36(1):50-55.
3. Lippert-Grüner M. Early rehabilitation of comatose patients after traumatic brain injury. *Neurol Neurochir Pol* 2010 Sep-Oct;44(5):475-80.
4. Kress JP. Clinical trials of early mobilization of critically ill patients. *Crit Care Med*. 2009 Oct;37(10 Suppl):S442-7.
5. Morris PE, Goad A, Thompson C, Taylor K, Harry B, Passmore L, Ross A, Anderson L, Baker S, Sanchez M, Penley L, Howard A, Dixon L, Leach S, Small R, Hite RD, Haponik E. Early intensive care unit mobility therapy in the treatment of acute respiratory failure. *Crit Care Med*. 2008 Aug;36(8):2238-43.
6. Needham DM. Mobilizing patients in the intensive care unit: improving neuromuscular weakness and physical function. *JAMA*. 2008 Oct 8;300(14):1685-90.
7. Allman RM, Goode PS, Patrick MM, Burst N, Bartolucci AA. Pressure ulcer risk factors among hospitalized patients with activity limitation. *JAMA*. 1995 Mar;273(11):865-70.

Early intervention (mobilization or active exercise) for critically ill adults in the intensive care unit (Review)

Doiron KA, Hoffmann TC, Beller EM

Main results – were included four RCTs (a total of 690 participants). Participants were adults (median age ranging from 56 to 62 years) who were mechanically ventilated in a general, medical or surgical ICU. Admitting diagnoses in three of the four studies were indicative of critical illness, while participants in the fourth study had undergone cardiac surgery. **Three studies included range-of-motion exercises, bed mobility activities, transfers and ambulation. The fourth study involved only upper limb exercises. Studies were not blinded to participants and personnel, and two of four did not blind outcome assessors. Three of four studies reported only on those participants who completed the study, with high rates of dropout. The description of intervention type, dose, intensity and frequency in the standard care control group was poor in two of four studies.**

Early intervention (mobilization or active exercise) for critically ill adults in the intensive care unit (Review)

Doiron KA, Hoffmann TC, Beller EM

Authors' conclusions – There is insufficient evidence on the effect of early mobilization of critically ill people in the ICU on physical function or performance, adverse events, muscle strength and health-related quality of life at this time. ... We assessed that there is currently low-quality evidence for the effect of early mobilization of critically ill adults in the ICU due to:

- ☐ **small sample sizes**
- ☐ **lack of blinding of participants and personnel**
- ☐ **variation in the interventions**
- ☐ **inadequate descriptions of the interventions delivered as usual care**
- ☐ **variation in the outcomes used to measure the effect**

Early rehabilitation for severe acquired brain injury in intensive care unit: multicenter observational study

Michelangelo BARTOLO ^{1*}, Stefano BARGELLES ², Carlo A. CASTIONI ³, Donatella BONAIUTI ⁴
Intensive Care and Neurorehabilitation Italian Study Group *

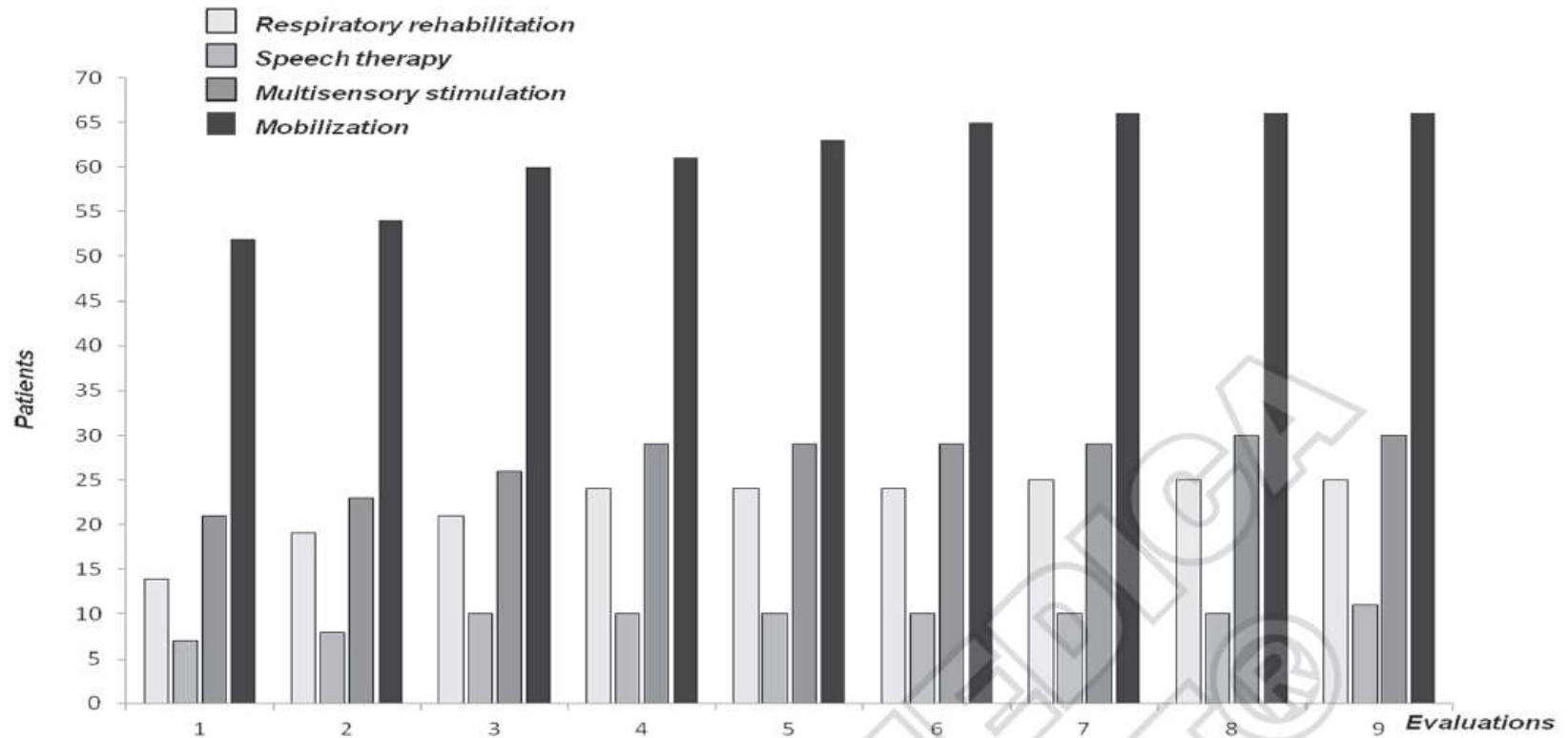
European Journal of Physical and Rehabilitation Medicine 2016 February;52 (1):90-100

Patients enrolled	102 (F/M - 44/58)
ICU stay (days)	24.7 ± 13.9
First rehabilitative evaluation (days)	8.7 ± 8.8
Rehabilitative prescriptions	
Regular postural changes	63.7%
Multijoint mobilization	64.7%
Session duration (minutes)	38 ± 11.5
Other interventions	
Swallowing evaluation	14.7%
Psychological support	12.7%
Psychoeducational intervention	17.6%
Interdisciplinary team meetings	28.4%
Discharge destination	
sABI Rehabilitation Units	43.7%
Intensive Neurorehabilitation	20.7%

Early rehabilitation for severe acquired brain injury in intensive care unit: multicenter observational study

Michelangelo BARTOLO ^{1*}, Stefano BARGELLES ², Carlo A. CASTIONI ³, Donatella BONAIUTI ⁴
Intensive Care and Neurorehabilitation Italian Study Group *

European Journal of Physical and Rehabilitation Medicine 2016 February;52 (1):90-100



Starting point for rehabilitation interventions

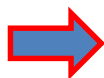
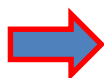
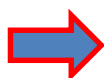
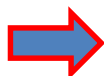


Table 1
Barriers and facilitators to implementation of early mobilization in intensive care unit

Barrier	Facilitator
<i>Patient-Associated Factors</i>	
<ul style="list-style-type: none">• Unstable physiologic stability (cardiovascular, respiratory, neurologic)• High sedation levels• Presence of delirium/agitation• Pain• Medical limitations (procedures, orders)	<ul style="list-style-type: none">• Thorough multidisciplinary systematic assessment• Development of unit-specific protocols or mobilization pathways• ABCDE bundle• Sleep management• Patient and family goal setting and engagement
<i>Structural Issues</i>	
<ul style="list-style-type: none">• Low staff numbers• Inexperienced clinical staff• Deficiency in staff training• Lack of defined EM programs	<ul style="list-style-type: none">• Manual handling and risk management staff training• Suitable equipment• Adequate staff numbers—submission of business case regarding economic benefits for the organization
<i>Process Factors</i>	
<ul style="list-style-type: none">• Absence of coordinated review for suitability for EM• No EM leadership• Poor communication	<ul style="list-style-type: none">• Thorough multidisciplinary systematic assessment• Development of unit-specific protocols or mobilization pathways• Creation of mobility leaders and mobilization teams
<i>Cultural Factors</i>	
<ul style="list-style-type: none">• Nonexistence education regarding risks and benefits of EM• Lack of prioritizing EM in daily care plans• Deficient knowledge regarding EM techniques and equipment	<ul style="list-style-type: none">• Creation of mobility leaders and mobilization teams• Education and promotion of the importance and benefits of EM• Development of unit-specific protocols or mobilization pathways

1. Schepens T, Verbrugghe W, Dams K, et al. The course of diaphragm atrophy in ventilated patients assessed with ultrasound: a longitudinal cohort study. *Crit Care* 2015;19:422.
2. Elkins M, Dentice R. Inspiratory muscle training facilitates weaning from mechanical ventilation among patients in the intensive care unit: a systematic review. *J Physiother* 2015;61(3):125–34.
3. Iwashyna TJ, Hodgson CL. Early mobilization in ICU is far more than just exercise. *Lancet* 2016;388(10052):1351–2.
4. Stiller K, Phillips A. Safety aspects of mobilizing acutely ill inpatients. *Physiotherapy Theory and Practice* 2003;19:239–57.
5. Morandi A, Brummel N, Wesley EE. Sedation, delirium and mechanical ventilation: the 'ABCDE' approach. *Curr Opin Crit Care* 2011;17(1):43–9.

Early Physiotherapy by Passive Range of Motion Does Not Affect Partial Brain Tissue Oxygenation in Neurocritical Care Patients

Christian Roth¹ Hubertus Stitz² Jens Kleffmann³ Stefanie Kaestner³ Wolfgang Deinsberger³
Andreas Ferbert¹ Markus Gehling⁴

J Neurol Surg A 2017;78:42–45.

Introduction

Patients in the intensive care unit (ICU) are regularly treated with physiotherapy. For neuro-intensive care patients with neurologic deficits, physiotherapy is an especially important therapeutic strategy. The fear of harming critical ill patients using different procedures often results in a policy of “minimal handling” or “no-touch therapy” and therefore a lack of physiotherapy.

ABCDE Bundle Components

Awakening &
Breathing Trial
Coordination

Delirium
Assessment &
Management

Early Exercise &
Progressive
Mobility



AMERICAN
ASSOCIATION
of CRITICAL-CARE
NURSES

ABCDE

Sample Progressive Mobility Protocol

Safety Screening

(Patient must meet all criteria)

M – Myocardial stability

- No evidence of active myocardial ischemia x 24 hrs.
- No dysrhythmia requiring new antidysrhythmic agent x 24 hrs.

O – Oxygenation adequate on:

- FiO₂ < 0.6
- PEEP < 10 cm H₂O

V - Vasopressor(s) minimal

•**No increase of any vasopressor x 2 hrs.**

E – Engages to voice

- Patient responds to verbal stimulation

Level 1

Passive ROM TID
Turn Q 2 hrs.
Active resistance PT
Sitting position 20 mins. TID

Level 2

Passive ROM TID
Turn Q 2 hrs.
Active resistance PT
Sitting position 20 mins. TID
Sitting on edge of bed

Level 3

Passive ROM TID
Turn Q 2 hrs.
Active resistance PT
Sitting position 20 mins. TID
Sitting on edge of bed
Active transfer to chair 20 mins./day

Level 4

Passive ROM TID
Turn Q 2 hrs.
Active resistance PT
Sitting position 20 mins. TID
Sitting on edge of bed
Active transfer to chair 20 mins./day
Ambulation (marching in place, walking in halls)

Able to move arm against gravity

Able to move leg against gravity

AMERICAN
ASSOCIATION
of CRITICAL-CARE
NURSES

ABCDE

Conclusioni

1

Insufficienti evidenze dalle revisioni sistematiche sull'efficacia della mobilizzazione/riabilitazione precoce in persone con GCA, sebbene MOLTI STUDI RIPORTINO RISULTATI FAVOREVOLI (prevenzione complicanze e riduzione del tempo di degenza)

2

Aumentare e diffondere le conoscenze per SUPERARE LE BARRIERE CULTURALI e favorire il LAVORO INTERDISCIPLINARE

3

REGISTRI DI MALATTIA e STUDI MULTICENTRICI potrebbero permettere di superare i bassi livelli di evidenza (BIG DATA analysis)