Long-term effects of critical illness

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Disclosure: none
Questions

• Are there long-term effects of critical illness?
• If so, what are they? How often do they occur? How long do they last?
• How are these effects related to their experience in the ICU?
• How do they affect the patient’s quality of life?
• What about the chronically critically ill?
Physical effects of critical illness

- Nutrition
- Neuropathy
- Respiratory
- Cardiac
- Sexual
- Other
Physical effects of critical illness

- Nutrition
- Neuropathy
- Respiratory
- Cardiac
- Sexual
- Other

- Cachexia
  - 2% loss of muscle mass per day
  - 50% during stay

Herridge et al, NEJM 2003
Physical effects of critical illness

- Nutrition
- Neuropathy
- Respiratory
- Cardiac
- Sexual
- Other

• ↓ appetite – weakness, altered taste, depression, dyspnea
• Mechanical difficulties
Physical effects of critical illness

- Nutrition
- Neuropathy
- Respiratory
- Cardiac
- Sexual
- Other

- Critical illness polyneuropathy
  - Ischemia of microcirculation
  - Severity of illness, LOS
  - Effects: disability, death

- Peripheral neuropathy
- Entrapment neuropathy
  - Peroneal nerve – footdrop (3%)
  - Effect rehabilitation
Figure 1. Kaplan-Meier curves showing the fraction of patients developing critical illness polyneuropathy and myopathy (CIPNM) during 30 days after start of the artificial respiration. Upper panel, the Acute Physiology and Chronic Health Evaluation (APACHE) III score ≤70, >70–≤85, and >85 (p = .02). Lower panel, presence or absence of systemic inflammatory response syndrome (SIRS) or no SIRS (p = .04).
Physical effects of critical illness

- Nutrition
- Neuropathy
- Respiratory
- Cardiac
- Sexual
- Other

  Dyspnea = common!
  - Muscle weakness, neuropathy, fibrosis, progression of pre-morbid conditions, psychological

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1Davidson et al, AJRCCM 1999
Pulmonary Function

• Most ARDS survivors – abnormal PFT @ discharge but achieve normal spirometry & volumes @ 6 – 12 months\(^1\-^3\)
• Some restrictive defect, ↓ DLCO
  – Significance unclear
  • ?exercise tolerance

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**Table 2. Recovery of Pulmonary Function among Patients with the Acute Respiratory Distress Syndrome during the First 12 Months after Discharge from the ICU.**

<table>
<thead>
<tr>
<th>Variable</th>
<th>3 Mo (N=71)(^\circ)</th>
<th>6 Mo (N=77)(^\dagger)</th>
<th>12 Mo (N=80)(^\ddagger)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forced vital capacity (% of predicted)</td>
<td>72 (57–86)</td>
<td>80 (68–94)</td>
<td>85 (71–98)</td>
</tr>
<tr>
<td>Forced expiratory volume in one second (% of predicted)</td>
<td>75 (58–92)</td>
<td>85 (69–98)</td>
<td>86 (74–100)</td>
</tr>
<tr>
<td>Total lung capacity (% of predicted)(^|$</td>
<td>92 (77–97)</td>
<td>92 (83–101)</td>
<td>95 (81–103)</td>
</tr>
<tr>
<td>Residual volume (% of predicted)(^|$</td>
<td>107 (87–121)</td>
<td>97 (82–117)</td>
<td>105 (90–116)</td>
</tr>
<tr>
<td>Carbon monoxide diffusion capacity (% of predicted)(^|$</td>
<td>63 (54–77)</td>
<td>70 (58–82)</td>
<td>72 (61–86)</td>
</tr>
</tbody>
</table>

\(^*\) Ten patients were too sick to be evaluated at three months (six were too weak and unable to sit up, two were cognitively unable to be tested, and two were isolated because of an infection with methicillin-resistant *Staphylococcus aureus*), and two other patients were also not evaluated.

\(^\dagger\) Four patients were too sick to be evaluated at six months (two were cognitively unable to be tested, and two were isolated because of an infection with methicillin-resistant *S. aureus*), and one other patient was also not evaluated.

\(^\ddagger\) Two patients were cognitively unable to complete testing at 12 months, and one other patient was also not evaluated.

\(^\|$ This variable could not be assessed during home visits.

\(^\|$\|$ Carbon monoxide diffusion capacity was not corrected for hemoglobin.

\(^1\) McHugh et al, AJRCCM 1994
\(^2\) Heyland et al, Crit Care Med 2005
\(^3\) Herridge et al, NEJM 2003

Herridge et al, NEJM 2003
Physical effects of critical illness

- Nutrition
- Neuropathy
- Respiratory
- Cardiac
- Sexual
- Other

• Persistent CXR changes
  – CT: Coarse reticular pattern, ground glass
Long-term radiographs changes

Figure 3. CT scans obtained in a 25-year-old man who survived ARDS. (a) Initial scan obtained during the acute illness shows typical areas of intense parenchymal opacification in the dependent lung and nondependent ground-glass opacification. (b) Follow-up scan obtained 8 months after a demonstrates relatively normal lung parenchyma in the posterior quadrants and a reticular pattern anteriorly (arrows). There are two secondary pulmonary lobules (arrowheads) with inconspicuous decreased attenuation.

Desai et al, Radiology 1999

- Related to MV duration
- Importance unclear
- Most normal @ 1 year
Physical effects of critical illness

- Nutrition
- Neuropathy
- Respiratory
- Cardiac
- Sexual
- Other

- ? Postural hypotension
- No documented adverse effects of ICU on cardiac function
- Sparse data
Physical effects of critical illness

• Nutrition
• Neuropathy
• Respiratory
• Cardiac
• Sexual
• Other

• Sexual dysfunction (25%)
  – No desire
  – Impotence
  – Dyspnea
  – Surgical disfigurement
  – Concern that sex may precipitate relapse
  – Improves with time

¹Quinlan, Br J Anesthesia 1998
Physical effects of critical illness

- Nutrition
- Neuropathy
- Respiratory
- Cardiac
- Sexual
- Other

- Reduced mobility (6MWT)
  - ↓ muscle mass, weakness
  - Joint stiffness
  - Poor balance
  - Learn to walk, bear weight

- Swallowing difficulties
  - Pharyngeal muscle lack of coordination
  - Tethering of skin to trach site
Common physical complaints following an ICU stay

- Proximal muscle weakness
- Myopathy
- Heterotopic ossification
- Arthralgia, stiffness
- Voice changes
- Insomnia & sleep problems
- Hair loss
- Pruritis
- Amenorrhoea
- Poor cough

Broomhead & Brett, Crit Care 2002
Griffiths & Jones, BMJ 1999
Factors influencing physical functional status in intensive care unit survivors two years after discharge

Jacqueline S Haas, Cassiano Tenenbaum, Claudia R Calaf, Alessandra H D Filga, Ana Paula R Fettian, Erika C Trepo, Marcia B Roza, Andre E Machado, Patricia C Batiano, Marco P Neto, Daniele M Galligani, Edelmira F Oliveira, Augusto Tan and Silva W Vieira

ICU admission during 1 year (n=1,216)

Excluded because of:
- Death in ICU (n=288) (23.7%)
  - Excluded because of:
    - Refusal (n=34) (2.8%)
    - Not found (n=35) (2.9%)

Died after ICU discharge (n=353) (29.0%)

Alive at 24 months (n=506) (41.6%)

Excluded because of:
- Missing data (n=7)

Planned surgical patients (n=199)

Medical and unplanned surgical patients (n=300)
Factors influencing physical functional status in intensive care unit survivors two years after discharge

Jaqueline S Haas¹, Cassiano Teixeira², Claudia R Cabral³, Alessandra H D Fleig³, Ana Paula R Freitas³, Erika C Treptow³, Márcia IB Rizzotto³, André S Machado⁴, Patrícia C Balzano⁴, Márcio P Hetzel³, Daniele M Dallegrave³, Roselaine P Oliveira⁴, Augusto Savi⁴ and Silvia RR Vieira¹

Conclusions: Twenty-four months after ICU discharge, PFS was significantly poorer in patients with neurological injury, trauma, age ≥ 65 tears, and mechanical ventilation ≥ 8 days. Future studies should focus on the relationship between PFS and health-related quality of life in this population.
Neuropsychological effects of critical illness

- Cognitive impairment
- Psychological impairment
Neuropsychological effects

- ICU environment
  - Noisy
  - Stressful & foreign
  - Confusing, no day/night
  - Painful & uncomfortable
  - Sleepless
  - Psychoactive drugs
  - Sickness

Traumatic!
Prevalence of neurocognitive effects

- 25% - 100% of ICU survivors!
  - Greater in specific groups (i.e. ARDS)

Figure 2. The number of studies that report neurocognitive impairments listed by neurocognitive domain.
Neuropsychological effects

- Delirium
- Affective disorders
- Stress disorders
- Disorders of cognition
- Social & family problems
DELIRIUM:

“a disturbance of consciousness that is accompanied by a change in cognition that cannot be better accounted for by a preexisting or evolving dementia”

AMERICAN PSYCHIATRIC ASSOCIATION
Estimated delirium rate:

Mechanically ventilated ICU pts 26-50%

Non ventilated pts 10-25%

Patel Crit Care Med 2009 825-832
Recognition of delirium:

MD  28%
RN  35%
CONCLUSIONS

Patients in medical and surgical ICUs are at high risk for long-term cognitive impairment. A longer duration of delirium in the hospital was associated with worse global cognition and executive function scores at 3 and 12 months. (Funded by the National Institutes of Health and others; BRAIN-ICU ClinicalTrials.gov number, NCT00392795.)
Neuropsychological effects

- Delirium
- Affective disorders
- Stress disorders
- Disorders of cognition
- Social & family problems

- Anxiety & depression: 47% - 69% >1 year post ICU*
- More likely in those with impaired memory of events

* Scragg et al, Anesthesia 2001
* Nelson et al, Crit Care Med 2000
Neuropsychological effects

- Delirium
- Affective disorders
- Stress disorders
- Disorders of cognition
- Social & family problems

- PTSD – 38%
  - Flashbacks, avoidance of reminiscent situations, ↑ arousal
  - ↑ in ARDS, young
    - Delusions, amnesia: ↑ risk*
    - Factual memories: ↓ risk**
  - Affect QoL, psychosocial functioning

* Schelling et al, Crit Care Med 1998
** Jones et al, Crit Care Med 2001
Neuropsychological effects

- Delirium
- Affective disorders
- Stress disorders
- Disorders of cognition
- Social & family problems

- Memory
- Executive function
- Attention
- Intellectual function
- Visual spatial

* Hopkins et al, Crit Care Med 1999
Neuropsychological effects

- Delirium
- Affective disorders
- Stress disorders
- Disorders of cognition
- Social & family problems

- Family members – develop anxiety, depression
- Post-D/C = overprotective, unrealistic expectations = frustration
- Quit work or major life changes
what can we do?
Medical humanities: to cure sometimes, to relieve often, to comfort always.

Jill Gordon

Faculty of Arts, University of Sydney, Sydney, NSW.
Source: PubMed

ABSTRACT The medical humanities are concerned with "the science of the human", and bring the perspectives of disciplines such as history, philosophy, literature, art and music to understanding health, illness and medicine. The medical humanities are designed to
The use of sedatives and analgesics has been linked to delirium, particularly in the context of excessive sedation.

Ergo (often/seldom/always)

It is the collateral effect of our treatment.
Confusion assessment method-ICU

Acute onset of changes or fluctuations in the course of mental status and

inattention

and/or

disorganized thinking/altered level of consciousness

Ely JAMA 2001 2703-2710
Intensive Care Delirium screening checklist

Altered level of consciousness
Inattentiveness
Disorientation
Hallucination-delusion-psycosis
Psycomotor agitation or retardation
Inappropriate speech or mood
Sleep/wake cycle disturbance
Symptoms fluctuation

\[ \geq 4 \text{ DELIRIUM} \]

Bergeron ICM 2001
Intensive care diaries reduce new onset post traumatic stress disorder following critical illness: a randomised, controlled trial

Christina Jones¹,², Carl Bäckman³, Maurizia Capuzzo⁴, Ingrid Egerod⁵, Hans Flaatten⁶, Cristina Granja⁷, Christian Rylander⁸, Richard D Griffiths¹,²*, the RACHEL group

Conclusions: The provision of an ICU diary is effective in aiding psychological recovery and reducing the incidence of new PTSD.
Figure 2 Change in PTSS-14 scores between one and three months by study group and PTSS-14 of 45 or more at one month. Patients in the intervention group with a post-traumatic stress syndrome (PTSS)-14 score above the cut-off of 45 at one month had a significant reduction in the PTSS-14 symptom score at three months (Fisher's exact test $P = 0.04$).
Con questo opuscolo vogliamo fornirvi utili informazioni sulla nostra Terapia Intensiva per rispondere ad alcune delle domande più frequenti:

come funziona il nostro reparto, come noi medici ed infermieri ci prendiamo cura del vostro caro, cosa potete fare Voi durante il ricovero.

Per qualsiasi dubbio, richiesta o necessità il personale del reparto è a vostra disposizione per fornirvi il supporto necessario.

I medici e gli infermieri della Terapia Intensiva
Ecco un esempio di alcune apparecchiature di una “unità posto letto”:

1. **Respiratore:**
   - aiuta i polmoni a respirare e ossigena il sangue in caso di problemi respiratori

2. **Pompe infusionali:**
   - permettono la somministrazione continua di liquidi, alimenti, farmaci

3. **Monitor:**
   - è uno schermo sul quale si visualizzano sotto forma di onde e numeri le funzioni principali del paziente e che permette di intervenire rapidamente se qualcosa non va

4. **Apparecchio per emofiltrazione:**
   - permette di eseguire una dialisi continua in caso di problemi ai reni.

**COME SI SVOLGE LA VISITA**

Per poter passare più tempo possibile con i propri cari, abbiamo **prolungato l’orario di visita**.

Vista la particolarità del reparto e degli spazi, vi chiediamo comunque di **entrare uno alla volta** e, se possibile, di limitare il numero totale di visitatori.

Per qualsiasi problema o dubbio relativo alle modalità di visita, non esitate a contattare l’infermiere o il medico di riferimento: cercheremo di venire incontro alle vostre necessità.

La Terapia Intensiva non è un ambiente adatto alla visita di **bambini piccoli**, può essere molto stressante per loro.

Comunque, in particolari circostanze, è possibile discutere il loro possibile ingresso con l’infermiere e il medico di riferimento.

In caso di **bambini ricoverati**, i genitori resteranno il più possibile accanto a loro, compatibilmente con le esigenze di gestione degli altri pazienti nella stanza.
Giornata AIR 2013
La precoce mobilizzazione ed il training nel paziente critico

Gratuita per i soci AIR

MILANO
Ospedale Niguarda
9 Novembre 2013

Programma

8.00-8.45 Registrazione dei partecipanti