Recovery from Critical Illness
Tackling the Post ICU Syndrome
Now and in the Future

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@ICU_Recovery
Disclosures

Society of Critical Care Medicine
Department of Defense
• What is Post Intensive Care Syndrome?
• Why does it matter?
• What can we do about it?
The Burden of Survivorship

Survival is not the end-point for patients and families

Iwashyna 2011 JAGS
In your current ICU practice, do you:

• **A)** see all your ICU patients for an outpatient follow up visit
• **B)** see select patients at high risk for post-ICU complications
• **C)** chart stalk interesting patients to see what happened to them after ICU
• **D)** congratulate yourself for a job well done as your patient rolls off the unit
Post-Intensive Care Syndrome

Mental Health
- Depression
- Anxiety
- PTSD

Cognitive Impairments
- Executive Function
- Mental Processing Speed
- Visuo-spatial
- Memory
- Attention

Stressed Families
- Depression
- Anxiety
- PTSD

Physical Impairments
- Muscle Weakness and Loss
- Neuropathies
- Pulmonary Function

High Burden of Chronic Health Conditions

Adapted with permission from Hallie Prescott
The Esels – path is blocked because of falling stones. To enter the restricted area is strictly prohibited!

There is a DANGER OF LIFE!

The owner assumes no liability.

For the state of NRW the district government Cologne.
Physical sequelae

Herridge et al. NEJM 2011
Critical illness myopathy and polyneuropathy

- Limb, respiratory weakness
- Risk factors: sepsis, inflammation, immobility, (steroids, NMB, sugar)
- women >>>>> men

Kress and Hall NEJM 2014
Immobility in the ICU

Kamdar et al. AJCC 2017
Physical sequelae
Alopecia

Onychomadesis

Battle et al. J Crit Care 2018
<table>
<thead>
<tr>
<th>Assessment</th>
<th>Shoulder Impairment, n (%)</th>
<th>Pain</th>
<th>Decreased Range of Movement</th>
<th>Abnormal Constant-Murley Score (Shoulder Impairment Assessment Score)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inpatient</td>
<td>19 (76)</td>
<td>4 (21)</td>
<td>19 (100)</td>
<td>Not assessed</td>
</tr>
<tr>
<td>3 mo</td>
<td>45 (73)</td>
<td>11 (24)</td>
<td>45 (100)</td>
<td>41 (91)</td>
</tr>
<tr>
<td>6 mo</td>
<td>41 (67)</td>
<td>21 (51)</td>
<td>39 (95)</td>
<td>37 (40)</td>
</tr>
</tbody>
</table>

Gustafson et al Crit Care Med 2018
Cognitive outcomes

- deficits in verbal learning and memory,
- decreased hippocampal volume,
- more low frequency EEG activity indicating brain dysfunction

Annane and Sharshar Lancet Resp Med 2015
Semmler et al J Neurol Neurosurg Psych 2013
Cognitive Impairment after sepsis

Iwashyna, et al. JAMA. 2010

**Before sepsis**

**After sepsis**

**Patients With Cognitive Impairment, %**

- **Cognitive impairment**
  - Mild
  - Moderate to severe

- **Second Survey Before Sepsis**
  - Mild: 2%
  - Moderate to severe: 3%

- **Last Survey Before Sepsis**
  - Mild: 3%
  - Moderate to severe: 4%

- **First Survey After Sepsis**
  - Mild: 15%
  - Moderate to severe: 20%

- **Second Survey After Sepsis**
  - Mild: 10%
  - Moderate to severe: 15%

**p<0.001**
Global Cognition Scores in ICU Survivors

Pandharipande et al. NEJM 2013
Delirium is the strongest independent predictor of cognitive impairment

P = 0.004 for 0 vs. 5 days of delirium

RBANS Global Cognitive Score

N = 382

Days of ICU Delirium

Pandharipande et al. NEJM 2013
Cognitive deficits - implications

Hodgson et al Intensive Care Med 2017
PTSD after critical illness

- Meta-analysis:
  - Clinically important PTSD symptoms in 1/5 at 1 year
  - Higher prevalence in those with
    - Comorbid psychopathology
    - Benzodiazepines
    - Early memories of frightening ICU experiences
  - In European studies, ICU diaries reduced PTSD

Parker et al CCM 2015
PTSD after critical illness

Kaplan-Meier survival estimates

Number at risk
PTSS = 0 78
PTSS = 1 36

Months from Post-discharge Assessment

Proportion without MACE/ACM

95% CI
PTSS = 0
PTSS = 1

Agarwal et al CCM 2019
Post ICU deficits - implications

Sevin et al J Crit Care 2018
Return to Work

Cumulative Incidence of Returning to Work

- **Charlson Comorbidity Index = 0; Discharge Home**
- **Charlson Comorbidity Index = 2; Discharge Home**
- **Charlson Comorbidity Index = 0; Discharge to Healthcare Facility**
- **Charlson Comorbidity Index = 2; Discharge to Healthcare Facility**

Months after ARDS

Noman et al CCM 2016
Kamdar et al Thorax 2017
Risk of new chronic illness after ICU

van Beusekom et al Crit Care Med 2019
Unmet medical need implications

Prescott et al JAMA 2015
What can we do to prevent PICS?
ICU PAD Guidelines
ABCDEF Bundle Checklist*

• A – Assess, Prevent and Manage Pain
• B – Both SATs and SBTs
• C – Choice of Sedation
• D – Delirium: Assess, Prevent and Manage
• E – Early Mobility and Exercise
• F – Family Engagement and Empowerment

*www.icudelirium.org
*www.iculiberation.org
# ICU Liberation: ABCDEF Bundle

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Monitoring Tools</th>
<th>Care ABCDEF Bundle</th>
<th>Done</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pain</strong></td>
<td>Critical-Care Pain Observation Tool (CPOT)</td>
<td>A: Assess, Prevent and Manage Pain</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NRS Numeric Rating Scale</td>
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<tr>
<td></td>
<td>BPS Behavioral Pain Scale</td>
<td></td>
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<tr>
<td><strong>Agitation</strong></td>
<td>Richmond Agitation-Sedation Scale (RASS)</td>
<td>B: Both Spontaneous Awakening Trials (SAT) and Spontaneous Breathing Trials (SBT)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sedation-Agitation Scale (SAS)</td>
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<tr>
<td><strong>Delirium</strong></td>
<td>Confusion Assessment Method for the Intensive Care Unit (CAM-ICU)</td>
<td>C: Choice of Analgesia and Sedation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Intensive Care Delirium Screening Checklist (ICDSC)</td>
<td>D: Delirium: Assess, Prevent and Manage</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>E: Early Mobility and Exercise</td>
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<td>F: Family Engagement and Empowerment</td>
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Cameron and Gignac 2008
Art by Nancy Andrews
What we can do to ensure good recovery?

- Summarize hospitalization
- Execute discharge planning
  - Med reconciliation
  - Rehab
  - Vaccines
  - Home health/PT/OT/DME/assistive devices
  - Follow up appointments
- Provide WRITTEN information
- Talk to families about trajectory
- Give patients resources to contact

https://sccm.org/MyICUCare/During-the-ICU
https://sccm.org/MyICUCare/THRIVE/Post-intensive-Care-Syndrome.
ICU Delirium @ICUdelirium · 19 Dec 2017

After I recovered from 20 days of ICU care, I sought outpatient advice from intensivist who, like most, maintains an office where he sees outpatients. He declined to see me. “What”, he asked, “is there to talk about?”
Current US Standard

Physical impairment:
- Pulmonary
  - Pulmonary specialist
- Neuromuscular
  - Physiatrist
- Physical function
  - Neurologist/neurophysiologist

Cognitive impairment:
- Memory, Attention, Executive function
  - Neurologist/Neuropsychologist

Mental health:
- Depression
  - Intensivist
- Anxiety/ASD
  - Psychiatrist
- PTSD
  - General Practitioner

Adapted with vague permission from Liz Wilcox
Potential models of care
A patient

✓ 37 yo woman with profound critical illness due to H1N1 ARDS
  o respiratory failure culminating in
  o tracheostomy for extended vent wean
  o ECMO
  o DVT
  o bleeding at her cannulation site on anticoagulation
  o IVC filter placement
  o profound critical illness myopathy
Would you:

A. Discharge to home, follow up with PCP?
B. Discharge to home with home health, follow up with PCP?
C. Discharge to LTAC, with plans for inpatient rehab, then home?
D. Keep in house until she could participate in 3 hours of therapy daily?
The Vanderbilt Model

TEAM:
- Respiratory therapy
- Pharmacy
- Critical Care
- Psychology
- Case management

SELECTION CRITERIA:
- ARDS or sepsis
- Mechanical ventilation
- Delirium
In clinic

✓ 37 yo woman profound critical illness* due to H1N1
✓ *vent, trach, ecmo, paralysis, delirium, DVT, filter

1. myopathy
2. polyneuropathy
3. malnutrition
4. hair loss
5. anticoagulation
6. hypotension
7. syncopal episodes
8. diarrhea
9. off work
10. not driving
11. trach
A typical cognitive evaluation

- MOCA 21/30
  - "significant impairment"
  - problems organizing and attending
  - errors on a clock drawing
- multiple errors on a serial 7's task
  - 100, 93, 83, 73, 63
- concrete thinking on similarities test
  - how are a watch and a ruler alike?
    - they both have numbers
  - how are a car and a train alike?
    - they are both made of metal

“Although her job is not particularly cognitively demanding, her cognitive problems are so great that they would likely interfere with her performance.”
“Interventions”

- Stop meds
  - metoprolol, enoxaparin
- Start (“better”) meds
  - rivaroxaban
- Prevent complications
  - IVC filter out
  - Immune
- Educate, reassure
  - PT/OT
  - ADLs
  - Alopecia
- Counsel
  - Return to work
  - Driving
  - Nutrition and weight
- Navigate
  - Letter to housing
  - Disability placard
Readmission after critical illness

Bloom, Stollings
Critical Care Citations

All critical care citations  ICU Survivor outcomes

Tumbull et al CCM 2016
The Thrive Collaboratives

- Peer support
- Clinic
- Both
ICU Recovery at Vanderbilt

James Jackson
Joanna Stollings
Tess Huggins
Sarah Bloom
Olivia Kirkpatrick
Art Wheeler
Wes Ely

The Center for Critical Illness, Brain Dysfunction, and Survivorship (CIBS)