Post-Intensive Care Syndrome (PICS)

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Mr. G.
ICU Stay per Medical Record

• 39 year old male
• PMH: Asthma, upper GI disease
  – No psychiatric Hx, no drug use
  – Gym 90 min/day
  – Work 55 hr/week; father of 4 children
• ICU admit: pneumonia with ARDS; 10 day LOS
• On Floor x 6 day: independent in ADLs by discharge
• D/C to Home: out-patient physiotherapy

Source: @DrDaleNeedham (twitter)
## Mr. G.
### Self-Reported Outcomes

<table>
<thead>
<tr>
<th></th>
<th>Pre-ICU</th>
<th>6 mo.</th>
<th>12 mo.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bench press</strong></td>
<td>325 lbs</td>
<td>225 lbs</td>
<td>270 lbs</td>
</tr>
<tr>
<td><strong>Jogging</strong></td>
<td>3 miles</td>
<td>1 mile</td>
<td>2 miles</td>
</tr>
<tr>
<td><strong>Gym workout</strong></td>
<td>90 min</td>
<td>40 min</td>
<td>85 min</td>
</tr>
<tr>
<td><strong># of daily tasks</strong></td>
<td>7 tasks</td>
<td>3 tasks</td>
<td>5 tasks</td>
</tr>
<tr>
<td><strong># productive hr/day</strong></td>
<td>16 hour</td>
<td>8 hour</td>
<td>12 hour</td>
</tr>
<tr>
<td><strong>Employment</strong></td>
<td>53 hr/wk*</td>
<td>None</td>
<td>55 hrs/wk Lower work**</td>
</tr>
</tbody>
</table>

* Grocery store manager that required physical & cognitive effort
**Manager at Family Dollar

Source: @DrDaleNeedham (twitter)
Mr. G.

First 6 months at home...

- Cognition: difficult s-t memory & multi-tasking
  - Completing son’s *simple* school form was almost impossible
- Distressing ICU memories - ICU “haunts” him
- Mood:
  - “Always on edge” and frustrated/impatient
  - Thinks about dying everyday
  - Fears ARDS may return whenever he gets a cold
- Distanced from others

Source: @DrDaleNeedham (twitter)
Mr. G.
Psychological Outcomes *(Validated surveys)*

<table>
<thead>
<tr>
<th></th>
<th>Pre-ALI</th>
<th>6 mo</th>
<th>12 mo</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTSD (IES-R; 0-4, Cut-off &gt;1.5)</td>
<td>N/A</td>
<td>2.6</td>
<td>1.7</td>
</tr>
<tr>
<td>Anxiety (HAD; 0-21, Cut-off ≥8/11)</td>
<td>N/A</td>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td>Depression (HAD; 0-21, Cut-off ≥8/11)</td>
<td>N/A</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>Fatigue (FACIT-IV; 0-100 higher better; cut-off 68)</td>
<td>59</td>
<td>51</td>
<td>62</td>
</tr>
</tbody>
</table>

Source: @DrDaleNeedham (twitter)
Outline

1. Post-Intensive Care Syndrome (PICS) term \textit{(from SCCM)}

2. Highlight common post-ICU complications using systematic reviews
   - Physical function
   - Psychiatric, Cognitive
   - QOL, Return to work

Concise Definitive Review \underline{Section Editor, Jonathan E. Sevransky, MD, MHS}

\textit{Crit Care Med 2011 Vol. 39, No. 2}

Long-term complications of critical care

Sanjay V. Desai, MD; Tyler J. Law, BHSc; Dale M. Needham, MD, PhD

Source: \texttt{@DrDaleNeedham (twitter)}
new or worsening impairments in physical, cognitive, or mental health arising after ICU & persisting beyond acute care hospitalization
Important Notes about Post-Intensive Care Syndrome (PICS)

- Created via Society of Critical Care Medicine (SCCM) multi-disciplinary int’l stakeholder conf. (incl. patient/family)

- Term applied to either a survivor (PICS) or family (PICS-F)

- Created with following intentions:
  - synthesis of >20 years of prior research on post-ICU outcomes
  - increase awareness in stakeholders (patient/family, clinicians & public) • Patients/families & clinicians not understand Post-ICU challenges
  - prompt out-patient screening for specific impairments after ICU
  - stimulate investigation into specific impairments after ICU
  - no intention for investigation of epidemiology of “PICS,” or interventions/trials for treatment of “PICS”

Source: @DrDaleNeedham (twitter)
Physical Function: IADL

- **IADL**: phone, shop, food prep, housekeeping, laundry, transport, meds, finances

- ~2/3 have impairments over 1-2 year follow-up
  - ICU survivors vent for >48 hrs:
    - Impairment in >70% at 1-yr follow up
  - ARDS cohort over 2 years:
    - NEW impairment in 66% of cohort

Source: @DrDaleNeedham (twitter)

**Instrumental Activities of Daily Living after Critical Illness: A Systematic Review**


Ramona O. Hopkins¹, ², ³, ⁴, Mary R. Suchyta⁵, Biren B. Kamdar⁶, Emily Darowski⁷, James C. Jackson⁸, ⁹, and Dale M. Needham¹⁰

Chelluri CCM 2004; 61-69; Boumendil ICM 2004; 647-654; Bienvenu AJRCCM 2011
Systematic review of 5 year follow-up

- 26 articles of 16 unique international cohorts

Main Results

- All timepoints below norms
- Large increase btwn 3 & 12 mo.

Source: @DrDaleNeedham (twitter)
Mental Health

• **PTSD** pooled incidence (meta-analysis):
  
  – ~25% over 1 year (range 17%-44%; IES meta-analysis, 6 studies)
  
  32% & 10% by clinical interview (2 studies)

  - Symptoms up to 8 yrs after ARDS

• **Depression** pooled prevalence (meta-analysis):
  
  – ~30% over 1 year (range: 4%-64%; general ICU, 38 studies)
  
  – No improvement over 1st year

PTSD: Parker et al *Critical Care Med* 2015
Depression: Rabiee et al *Critical Care Med* 2016

Source: @DrDaleNeedham (twitter)
Long-Term Cognitive Impairment after Critical Illness


- 821 ICU pts w/ respiratory failure or shock
- ~1/3 & 1/4 had cognitive scores at 1 year follow-up c/w moderate TBI & mild Alzheimer's, respectively
  - Affected both older and younger pts

Source: @DrDaleNeedham (twitter)
Understanding patient outcomes after acute respiratory distress syndrome: identifying subtypes of physical, cognitive and mental health outcomes

Samuel M Brown, Emily L Wilson, Angela P Presson, Victor D Dinglas, Tom Greene, Ramona O Hopkins, Dale M Needham, with the National Institutes of Health NHLBI ARDS Network

Results: severity of physical & mental impairment closely tied

- 4 post-ARDS outcome subtypes:
  - Mildly impaired physical & mental health (22%)
  - Moderately impaired physical & mental health (39%)
  - Severely impaired physical & moderately impaired MH (15%)
  - Severely impaired physical & mental health (24%)

- Cognitive function not associated with subtypes
- ICU variables/severity of illness not associated with subtypes
- Baseline differed among sub-types; each subtype had decrement

Source: @DrDaleNeedham (twitter)
Fatigue Symptoms During the First Year after ARDS
Chest 2020

- Prospective study at 38 US hospitals (2008-2014)
- Patients (n=732): ~49yo, MV ~11d, Hosp LOS~22d
- 6 & 12 mo. outcomes measures: FACIT-F (fatigue)

Results (≥94% response rate):
- At 6 & 12 mo: 70% & 66% fatigue
- 12 mo: 28% worsen; 31% no change, 41% improve

NO association: with ICU or ARDS severity

Source: @DrDaleNeedham (twitter)
Fatigue Symptoms During the First Year after ARDS

- Prospective study at 38 US hospitals (2008-2014)
- Patients (n=732): ~49yo, MV ~11d, Hosp LOS~22d

Fatigue, Anxiety & Depression

- 27% (6 months post ARDS)

Fatigue & Physical Impairment

- 46% (6 months post ARDS)

Source: @DrDaleNeedham (twitter)
Quality of Life (decreases from norms)

Meta-analysis: SF-36 1-4 year after ARDS

Dowdy DW, ICM 2006; 32:1115-1124

Source: @DrDaleNeedham (twitter)
Return to Work after Critical Illness: Systematic Review and Meta-analysis
BB Kamdar, R Suri, MR Suchyta, KF Digrande, KD Sherwood, E Colantuoni, VD Dinglas, DM Needham, RO Hopkins

Thorax 2020

52 studies in 10,015 previously-employed ICU survivors

- Proportion **NOT** returning to work after critical illness:
  - ~2/3 at 1-3 months,
  - ~1/3 at 6 mo. to 5 years

- No difference in RTW for: ARDS status or Geographic (USA, EU, Au/NZ)

- Additional outcomes:
  - 20-36% lost job after returning to work
  - 17-66% had occupation change
  - 5-84% had worsening employment status (e.g., fewer work hours)
  - ~70% accrued lost earnings (~$26k at 12 mo., ~$180k at 60 mo.)

Source: @DrDaleNeedham (twitter)
Next Steps for PICS

THE ACUTE RESPIRATORY FAILURE SURVIVOR

CORE OUTCOME MEASUREMENT SET

WHAT IS IT?
A minimum set of outcomes and associated measurement instruments for use in all clinical research studies evaluating acute respiratory failure survivors.

HOW LONG DOES IT TAKE?
12 MINUTES BY PHONE

HOW MUCH DOES IT COST?
$1.50 PER ASSESSMENT

WHY USE IT?
Comparability of your results with other studies in the field
Panel of 77 international stakeholders (including patients, caregivers, clinicians & researchers) from >16 countries agree on these essential measures
Make outcomes research STRONGER!

FOR MORE INFORMATION
 côImproveLTO@jhu.edu côwww.ImproveLTO.com cô@ImproveLTO

NHLBI-funded Resource-Related Research Project (R24HL111895)

Source: @DrDaleNeedham (twitter)
Int’l Delphi Consensus:
25% patients, 25% clinicians, 50% researchers

www.improveLTO.com

Modified Delphi Consensus Process
GRADE Scale: Not important (1–3); Important but NOT critical (4–6); Critical (7–9); Unable to score
A priori consensus definition: ≥70% rated as Critical (≥7) AND ≤15% as Not important (≤3)

Stage 1: Core Outcome Set
- Preliminary Framework
  - SCCM PICS (Post-Intensive Care Syndrome)
  - NIH PROMIS (Patient-Reported Outcomes Measurement Info Sys.)
  - WHO ICF (Int’l Classification of Functioning, Disability, and Health)
- Survey
  - 279 clinical researchers, ARDS survivors & family
- Qualitative interviews
  - 48 ARF survivors
- Scoping review of outcome measurement in ICU survivorship research
- Information sheet for each measure (e.g., cost, time, psychometrics)
- Brief explanation of psychometric properties

Stage 2: Core Outcome Measurement Set

Panel members (n=77)
- Clinical researchers (35*)
- Clinicians/Professional Assoc. (19^)
- Patients & Caregivers (19 ^)
- U.S. Fed Research Funding Org (4)
- From >16 countries (6 continents)
- From US, Canada, UK & Australia

Two Delphi Rounds
- 19 Outcomes + Panel suggested 8 outcomes
- Vote without consideration of availability, feasibility, ease of use, or psychometric properties
- Response rates: 97% and 99% in round 1 and round 2, respectively

Three Delphi Rounds
- 38 Measures + Panel suggested 37 measures
- Explicit consideration of the feasibility, ease of use, and psychometric properties of existing instruments
- Response rate: 91% - 97% across the 3 rounds

Source: @DrDaleNeedham (twitter)
Next Steps for PICS

www.improveLTO.com

Core Outcome Set (COS) and Core Outcome Measurement Set (COMS) for Clinical Research in Acute Respiratory Failure Survivors

Core Outcome Measure * (Recommended Survey/Test if No consensus)

Core Outcome *

Survival
- No Instrument
  - Recommend collecting date and location of death

HRQOL
- EQ-5D
  - Optional: SF-36 v2

Mental Health
- HADS
- IESR

Pain
- EQ-5D Pain Question

Cognition
- None
  - (MoCA BLIND)

Physical Function
- None
  - (6MWT)

Muscle and/or Nerve Function
- None
  - (Manual Muscle Test And Handgrip)

Pulmonary Function
- None
  - (All measures rejected)

Source: @DrDaleNeedham (twitter)
Next Steps for PICS

www.improveLTO.com

Acceptable Configurations of the Core Outcome Measurement Set (COMS) for Clinical Research in Acute Respiratory Failure Survivors

- MoCA-BLIND
  - IES-R
  - HADS
  - EQ-5D
  - Survival
  - Total Number of Questions: 55
  - Estimated Time to Complete (Mins): 17

- SF-36 v2
  - IES-R
  - HADS
  - EQ-5D
  - Survival
  - Total Number of Questions: 58
  - Estimated Time to Complete (Mins): 21

- SF-36 v2
  - IES-R
  - HADS
  - EQ-5D
  - Survival
  - Total Number of Questions: 69
  - Estimated Time to Complete (Mins): 26

Source: @DrDaleNeedham (twitter)
Risk factors for Post-intensive care syndrome: A systematic review and meta analysis.

Minju Lee PhD, Jiyeon Kang PhD, Jin Jeong PhD.

- **Design:** English articles from 2008-2018; 2/3 from last 5 years

- **Results:** 119,049 articles screened; 89 eligible studies
  - Geography: ~40% from each of USA & Europe
  - Quality: 80% “good” (Newcastle-Ottawa scale)
  - Sample size: 61% N=100-300; 30% single ICU
  - Follow-up: most 1 time point only; ~70% at ≤6 mo. time

- **Domain:** 90% assessed only 1; ~40% mental, 40% physical, 20% cognitive

- **Risk factors:** 60 different factors; 50/50 for patient/ICU risk factors
  - Most not modifiable...
    - **Physical:** older age, severity of illness
    - **Mental health:** female, prior MH problem, negative ICU experience
    - **Cognitive:** delirium

Source: @DrDaleNeedham (twitter)
Nonpharmacologic Interventions to Prevent or Mitigate Adverse Long-Term Outcomes Among ICU Survivors: Sys Review

Wytske W. Geense, MSc; Mark van den Boogard, PhD; Johannes G. van der Hoeven, MD, PhD; Hester Vermeulen, PhD; Gerjon Hannink, PhD; Marieke Zegers, PhD

- **Aim:** Assess effectiveness of non-pharma Tx for outcomes post-discharge
- **Results:** 5,165 pt in 36 studies (95% RCT; 56% single-center)
- **Risk of bias:** Incomplete data in 50% of studies

**Intervention in 36 (%) studies**

<table>
<thead>
<tr>
<th>ICU (44%), Post-ICU (22%), Post-hosp (31%)</th>
<th>Exercise/physical rehab</th>
<th>56%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Follow-up services</td>
<td>14%</td>
<td></td>
</tr>
<tr>
<td>Psychosocial</td>
<td>8%</td>
<td></td>
</tr>
<tr>
<td>Diaries</td>
<td>8%</td>
<td></td>
</tr>
<tr>
<td>Information/education</td>
<td>6%</td>
<td></td>
</tr>
</tbody>
</table>

**Outcomes:** 73 instruments

- 49 used once; 7 PTSD, 6 QOL
- <3mo. (81%), 3-6 (56%), >6 (22%)

<table>
<thead>
<tr>
<th>Quality of Life</th>
<th>47%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mental Health</td>
<td>36%</td>
</tr>
<tr>
<td>Physical Health</td>
<td>28%</td>
</tr>
<tr>
<td>Cognitive Health</td>
<td>11%</td>
</tr>
</tbody>
</table>

- **Conclusion:** Non-pharma for LTO NEW (only 34 RCT for any outcome) reduce loss to follow-up & standardize instrument (www.improveLTO.com)

Source: @DrDaleNeedham (twitter)
Post-Hospital Syndrome — An Acquired, Transient Condition of Generalized Risk

Harlan M. Krumholz, M.D.

JANUARY 10, 2013

The New England Journal of Medicine

Source: @DrDaleNeedham (twitter)