Post-Intensive Care Syndrome (PICS)

Dale Needham, MD, PhD

Professor
Outcomes After Critical Illness & Surgery (OACIS) Group
Pulmonary & Critical Care, and Physical Medicine & Rehabilitation
Medical Director, Critical Care Physical Medicine & Rehab Program

dale.needham@jhmi.edu **www.hopkinsmedicine.org/oacis**

Twitter: @DrDaleNeedham @icuRehab #icuRehab

Mr. G.
ICU Stay per Medical Record

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- 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

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

* 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)

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

Source: @DrDaleNeedham (twitter)

Outline

1. **Post-Intensive Care Syndrome (PICS)** term *(from SCCM)*
2. Highlight common post-ICU complications using **systematic reviews**
   - Physical function
   - Psychiatric, Cognitive
   - QOL, Return to work

Concise Definitive Review ═══ Section Editor, Jonathan E. Sevransky, MD, MHS

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

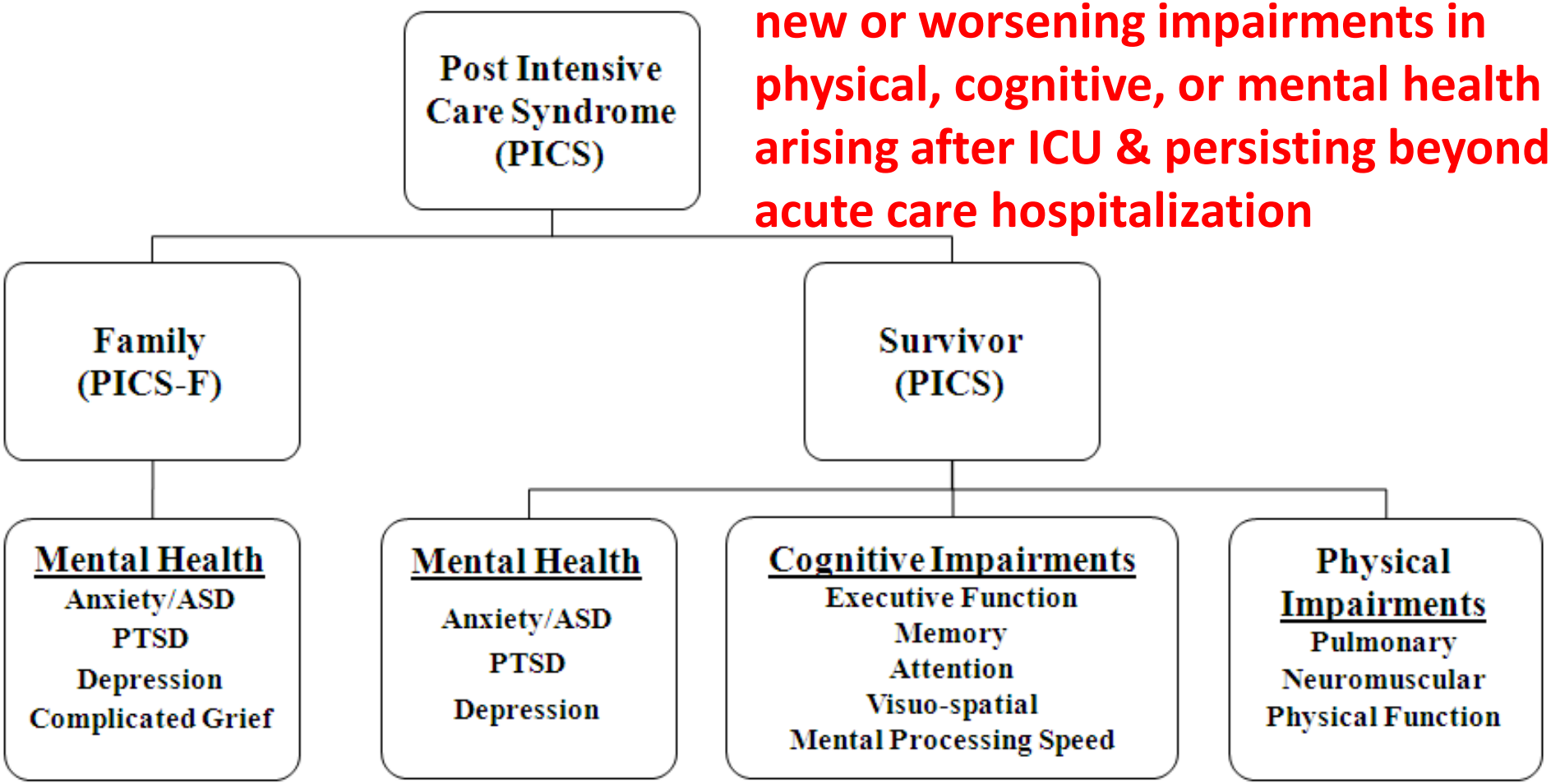
Source: @DrDaleNeedham (twitter)

Improving long-term outcomes after discharge from intensive care unit: Report from a stakeholders' conference*

(Crit Care Med 2012; 40:502–509)

Dale M. Needham, MD, PhD; Judy Davidson, DNP, RN; Henry Cohen, PharmD; Ramona O. Hopkins, PhD;

new or worsening impairments in physical, cognitive, or mental health arising after ICU & persisting beyond acute care hospitalization



Source: @DrDaleNeedham (twitter)

Important Notes about Post-Intensive Care Syndrome (PICS)

Care Med 2012; 40:502–509)

- 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**

Chelluri *CCM* 2004; 61-69; Boumendil *ICM* 2004; 647-654; Bienvenu *AJRCCM* 2011

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

Ann Am Thorac Soc Vol 14, No 8, pp 1332–1343, Aug 2017

Ramona O. Hopkins[1,2,3,4], Mary R. Suchyta[5], Biren B. Kamdar[6], Emily Darowski[7], James C. Jackson[8,9], and Dale M. Needham[10]

Source: @DrDaleNeedham (twitter)

Analytic Review

Six-Minute Walk Distance After Critical Illness: A Systematic Review and Meta-Analysis

Selina M. Parry, PT, PhD[1], Swaroopa R. Nalamalapu, MD[2], Krishidhar Nunna, MD[3], Anahita Rabiee, MD[4], Lisa Aronson Friedman, ScM[5,6], Elizabeth Colantuoni, PhD[5,7], Dale M. Needham, FCPA, MD, PhD[5,6,8], and Victor D. Dinglas, MPH[5,6]

Journal of Intensive Care Medicine
1-9

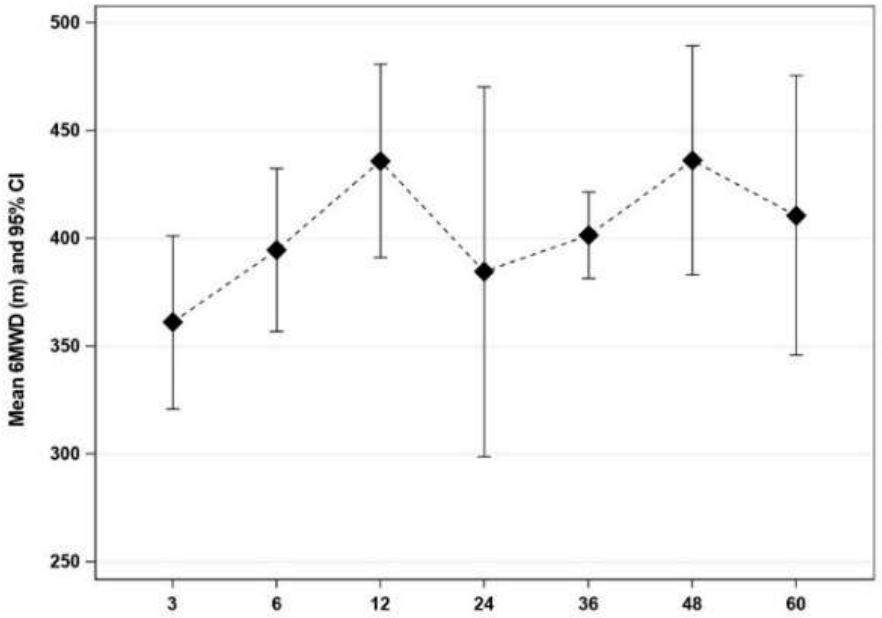
DOI: 10.1177/0885066619885838
journals.sagepub.com/home/jic
SAGE

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)

The NEW ENGLAND JOURNAL of MEDICINE

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Long-Term Cognitive Impairment after Critical Illness

N Engl J Med 2013;369:1306-16.

P.P. Pandharipande, T.D. Girard, J.C. Jackson, A. Morandi, J.L. Thompson, B.T. Pun, N.E. Brummel, C.G. Hughes, E.E. Vasilevskis, A.K. Shintani, K.G. Moons, S.K. Geevarghese, A. Canonico, R.O. Hopkins, G.R. Bernard, R.S. Dittus, and E.W. Ely, for the BRAIN-ICU Study Investigators*

- **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

Thorax 2017

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

Neufeld K, Leoutsakos JM, Yan H, Lin S, Zabinski J, Dinglas V, Hosey MM, Parker A, Hopkins R. Needham D

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)

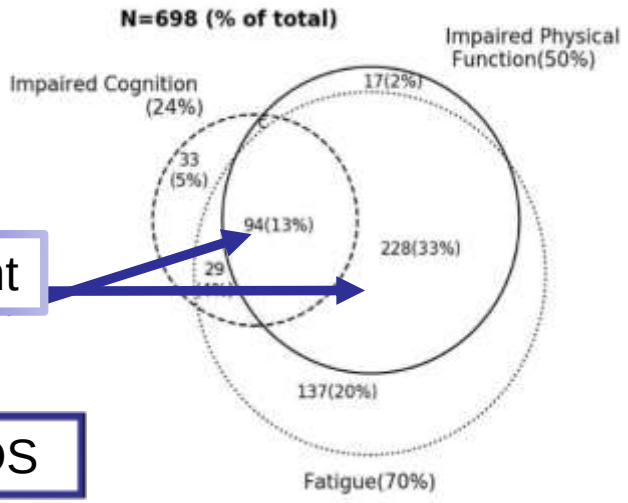
Fatigue Symptoms During the First Year after ARDS

Neufeld K, Leoutsakos JM, Yan H, Lin S, Zabinski J, Dinglas V, Hosey MM, Parker A, Hopkins R. Needham D

Chest 2020

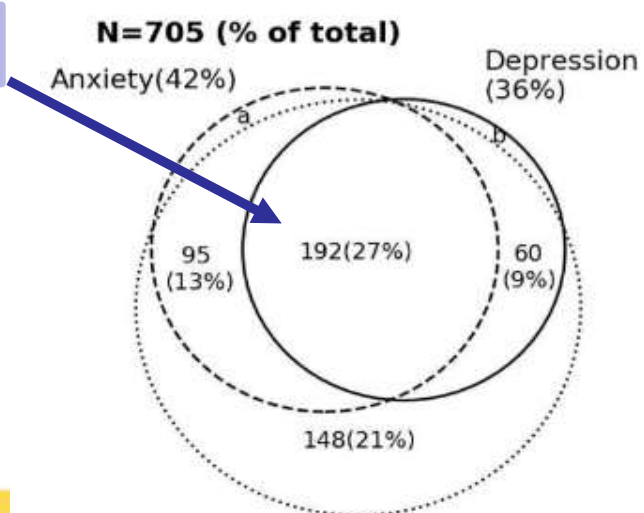
- **Prospective study at 38 US hospitals (2008-2014)**
- **Patients (n=732): ~49yo, MV ~11d, Hosp LOS~22d**

46% Fatigue & Physical Impairment



6 months post ARDS

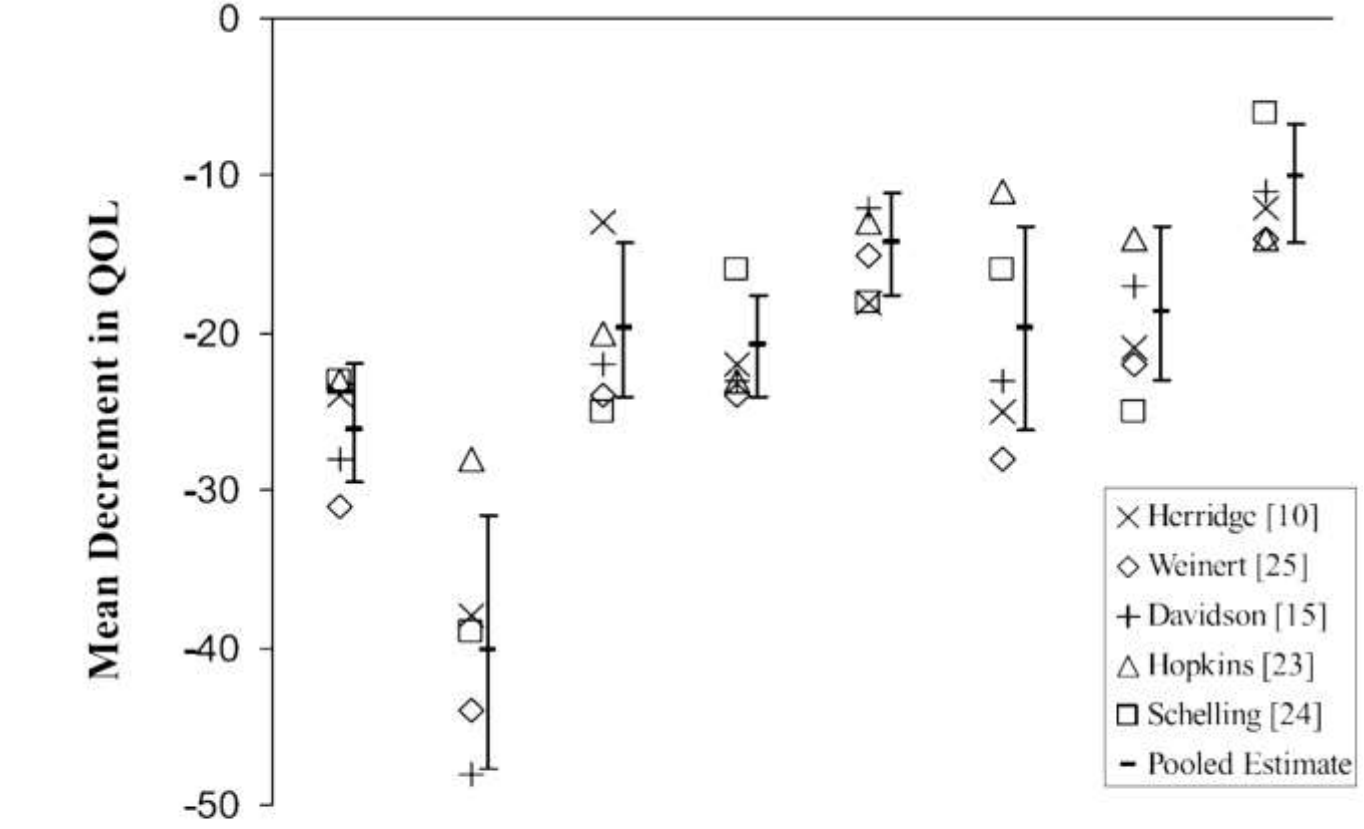
27% Fatigue, Anxiety **&** Depression



Source: @DrDaleNeedham (twitter)

Quality of Life (decreases from norms)

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



	PF	RP	BP	GH	VI	SF	RE	MH
Pooled Estimate	26	39	20	21	15	20	19	11
(95% CI)	(23,30)	(32,47)	(16,25)	(18,24)	(12,18)	(14,26)	(15,24)	(7,14)

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

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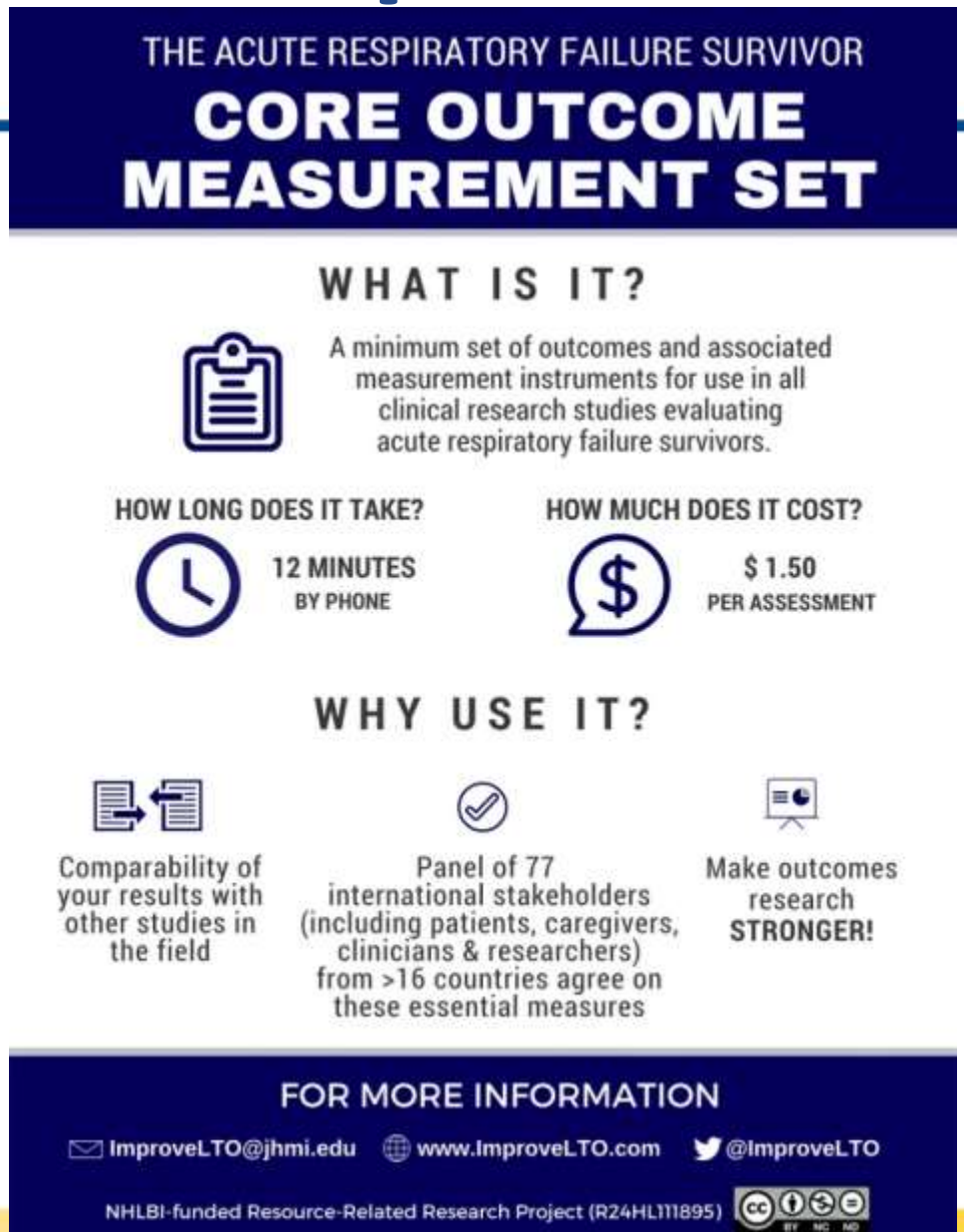
Thorax 2020

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



Source: @DrDaleNeedham (twitte

Int'l Delphi Consensus:

25% patients, 25% clinicians, 50% researchers

www.improveLTO.com

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Improving Long-Term Outcomes Research for Acute Respiratory Failure

An NHLBI-funded Resource-Related Research Project (R24HL111895)
Johns Hopkins University's Outcomes After Critical Illness and Surgery (OACIS) Group

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)

Guidance on Composition of Panel

- PCORI (Patient-Centered Outcomes Research Institute)
- AHRQ (Agency for Healthcare Research & Quality)
- OMERACT (Outcome Measure in Rheumatology)

Other input

- External Advisory Committee
- InFACT (Int'l Forum for Acute Care Trialists)

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

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◊

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

Stage 2: Core Outcome Measurement Set‡

Scoping review§

of outcome measurement in ICU survivorship research

Information sheet

for each measure (e.g. cost, time, psychometrics)

Brief explanation of psychometric properties

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

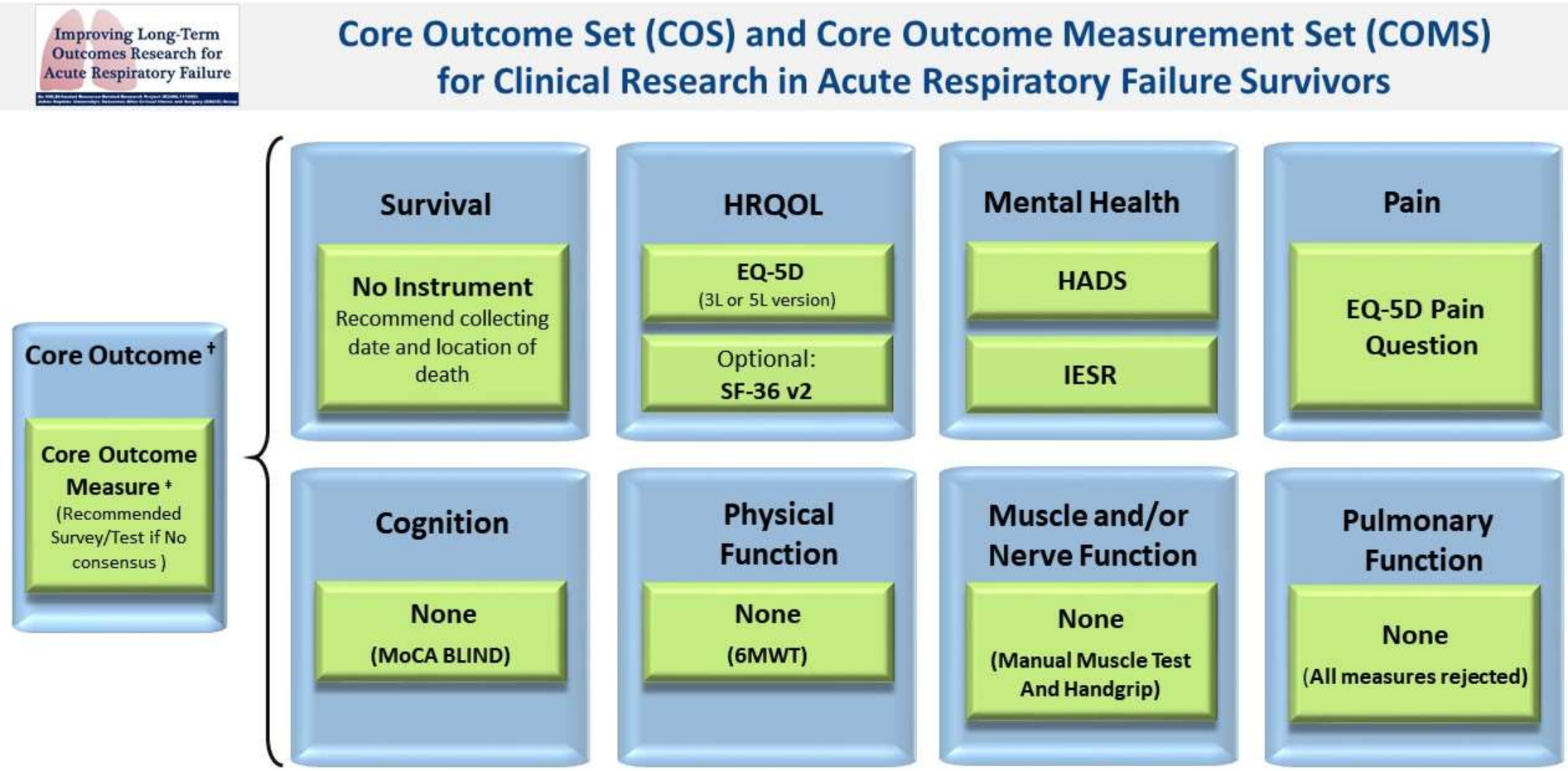
*Crit Care Med. 2017;45:1001-1010 ‡Am J Resp Crit Care Med. 2017;196:1122-1130. ◊Am J Crit Care. 2017;26:456-465. ¶Thorax. 2017 §Crit Care Med. 2016;44:1267-77

For more information, visit www.ImproveLTO.com/coms/

Source: @DrDaleNeedham (twitter)

Next Steps for PICS

www.improveLTO.com



Source: @DrDaleNeedham (twitter)

Next Steps for PICS

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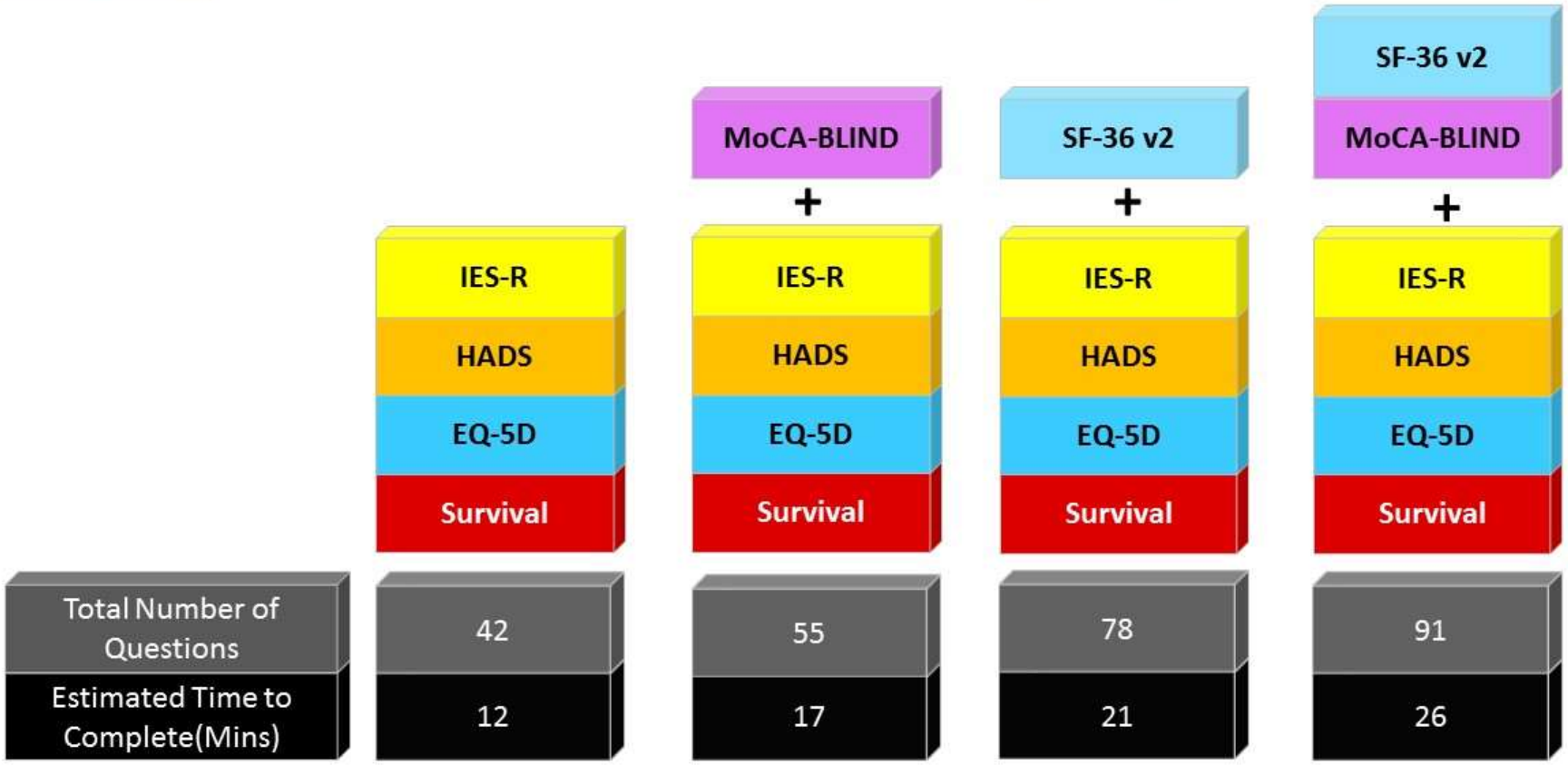
Improving Long-Term Outcomes Research for Acute Respiratory Failure

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



Am J Resp Crit Care Med. 2017;196:1122-1130.

Source: @DrDaleNeedham (twitter)

Risk factors for Post-intensive care syndrome: A systematic review and meta analysis.

Aus Crit Care 2020

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 Hoevan, MD, PhD; Hester Vermeulen, PhD; Gerjon Hannink, PhD; Marieke Zegers, PhD

CCM 2019

- **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**

ICU (44%), Post-ICU (22%), Post-hosp (31%)	
Exercise/physical rehab	56%
Follow-up services	14%
Psychosocial	8%
Diaries	8%
Information/education	6%

Outcomes: 73 instruments

49 used once; 7 PTSD, 6 QOL <3mo. (81%), 3-6 (56%), >6 (22%)	
Quality of Life	47%
Mental Health	36%
Physical Health	28%
Cognitive Health	11%

- **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)

Not just the ICU…

Post-Hospital Syndrome — An Acquired, Transient Condition of Generalized Risk

Harlan M. Krumholz, M.D.

N ENGL J MED 368;2 NEJM.ORG JANUARY 10, 2013

The New England Journal of Medicine

Source: @DrDaleNeedham (twitter)