OACIS

Outcomes After Critical Illness and Surgery

JOHNS HOPKINS MEDICINE

Core Outcomes Measures for Patient-Centered Clinical Research in Acute Respiratory Failure Survivors

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www.improveLTO.com

R24 Grant Mechanism: Aims to enhance research infrastructure or to provide resources to other research projects

Improving Long-Term Outcomes Research for Acute Respiratory Failure (NHLBI Grant # R24HL111895)

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Aim 1: National web-based electronic database of validated and recommended survey instruments and clinical testing methods for long-term outcomes

Aim 2: Practical resources for maximizing retention in long-term, longitudinal research

Aim 3: Statistical methods & programs for evaluating functional outcomes in the presence of high patient mortality ("truncation due to death")

www.ImproveLTO.com

Presentation Outline

- Scoping review
- Core Outcome & Measurement Sets
  - Understanding patient-important outcomes
  - Psychometric evaluations of instruments
  - Modified Delphi consensus process

Systematic Review

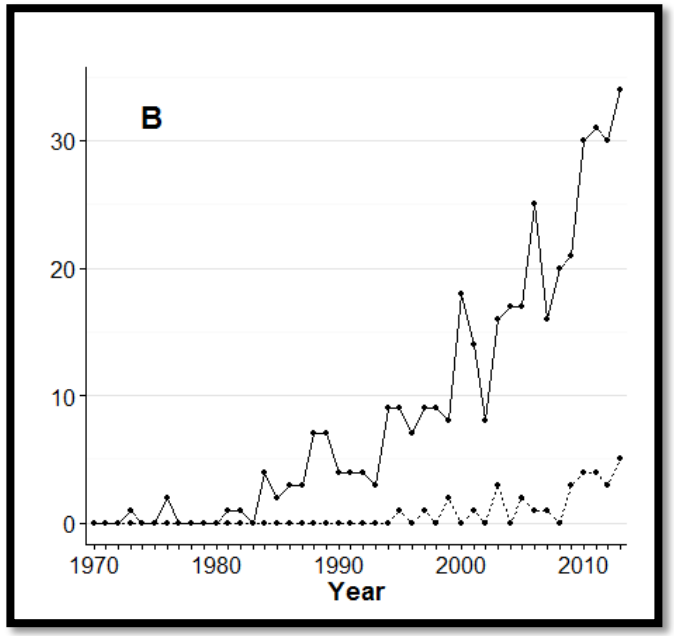
Scoping Review Post DC Outcomes (1970-2013)

Critical Care Medicine
Society of Critical Care Medicine
The Intensive Care Professionals

Crit Care Med. 2016;44:1267-77.

Outcome Measurement in ICU Survivorship Research From 1970 to 2013: A Scoping Review of 425 Publications*

Alison E. Turnbull, DVM, MPH, PhD[1–3]; Anahita Rabiee, MD[1,2]; Wesley E. Davis, BA[1,2]; Mohamed Farhan Nasser, MBBS[1]; Venkat Reddy Venna, MBBS[1]; Rohini Lolitha, MBBS[1]; Ramona O. Hopkins, PhD[4–6]; O. Joseph Bienvenu, MD, PhD[1,7]; Karen A. Robinson, MSc, PhD[3,8,9]; Dale M. Needham, FCPA, MD, PhD[1,2,10]



- Increasing number of studies per year

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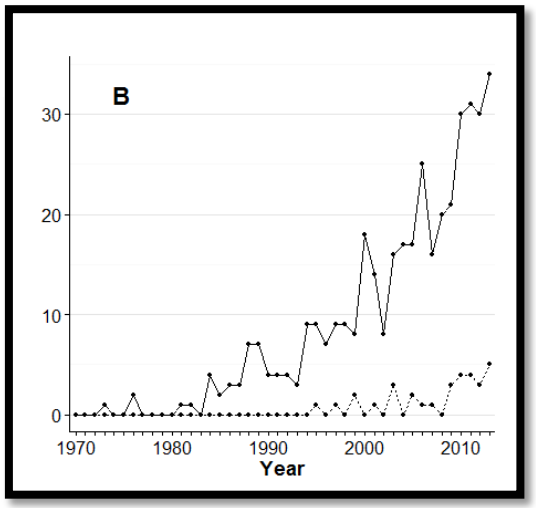

425 peer-reviewed papers

- Great variability in outcomes reported:
  - Quality of Life (QOL) reported in 276/425 (65%) papers
  - Physical activity limitation (via in-person assessment) in 6% of papers
- Reflects lack of standardization
- Prevents comprehensive/comparable representation of ICU survivorship
- **NEED to understand & focus on patient-important outcomes**

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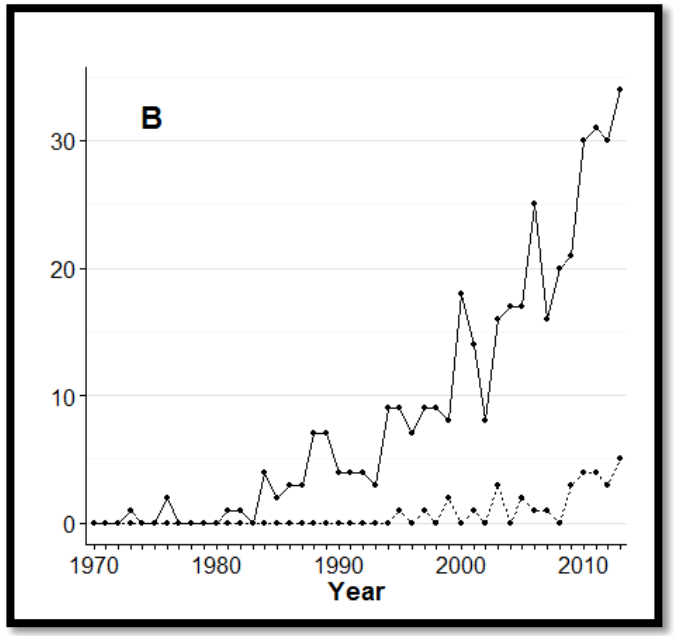

425 peer-reviewed papers

- Outcomes assessed using 250 different measurement instruments

Systematic Review

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PTSD symptoms[e] ($n = 70$; article to instrument ratio = 4.7)	
IES	26 (37)
PTSS 10-Questions	17 (24)
IES-Revised	13 (19)
Clinician-Administered PTSD Scale for *Diagnostic and Statistical Manual of Mental Disorders*, 4th Edition	8 (11)
Symptom Checklist-90-R	5 (7)
PTSD Checklist-Civilian Version	5 (7)
PTSS 14-Questions	4 (6)
Post-Traumatic Stress Diagnostic Scale	4 (6)
Other named instruments assessing PTSD symptoms[f]	7 (10)

Scoping Review Post DC Outcomes (1970-2013)

Why is this a problem?

- Important outcomes may not be assessed
- Difficult to compare results
- Barrier to meta-analyses
- Potential for bias from selective outcome reporting

Presentation Outline

- Scoping review
- Core Outcome & Measurement Sets 
  - Understanding patient-important outcomes
  - Psychometric evaluations of instruments
  - Modified Delphi consensus process

Definitions related to Core Sets

- **Core outcome** - a concept, health-related condition, or aspect of health that must always be measured within a specific field of research

  (***What*** *outcomes should we all measure?)*

- **Core outcome measure** - an agreed-upon outcome measure to evaluate a core outcome

  *(**How** should we measure them?)*

Definitions related to Core Sets

- **Core outcome set -** A minimum collection of **outcomes** reported in all studies within a specific field

- **Core outcome measurement set -** A minimum collection of measurement instruments reported in all studies within a specific field

Core Sets do NOT prevent investigators from collecting data on additional outcomes/measures

Definitions related to Core Sets

A Core Outcome Set/Core Outcome Measurement Set designed for studies conducting follow-up after hospital discharge

- Does **NOT** require all studies to follow patients post-dc
- Only applies to studies that have goals of evaluating post-dc outcomes

Presentation Outline

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Understanding patient-important outcomes

- National qualitative research study
- Systematic review of qualitative studies
- Pt outcome measures vs. survivorship experience
- Clinician perspective – Pilot Delphi Consensus
- Patient, family, and researcher survey

Summary of all of the above available as FREE full text article at:
bit.ly/2M3plUy

AJCC American Journal of Critical Care
Evidence-based interdisciplinary knowledge for high acuity and critical care
Am J Crit Care. 2017. 2017;26:456-465.

JOHNS HOPKINS MEDICINE

Patient outcomes after acute respiratory failure: A qualitative study of survivors' experience using the PROMIS framework

Eakin MN, Patel Y, Mendez-Tellez P, Dinglas VD, Needham DM, Turnbull AE

Using qualitative methods:

describe the survivorship experience of acute respiratory failure (ARF) patients

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Am J Crit Care. 2017. 2017;26:456-465.

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Patient outcomes after acute respiratory failure: A qualitative study of survivors' experience using the PROMIS framework

Eakin MN, Patel Y, Mendez-Tellez P, Dinglas VD, Needham DM, Turnbull AE

- 48 survivors from 35 hospitals across U.S.
- Interviewed at median 9 [IQR 7-13] month follow-up
- Semi-structured, telephone interviews, using
  - Open-ended questions, and then
  - Prompts guided by PROMIS framework
    - PROMIS = Patient Reported Outcomes Measurement Information System

Example quotes

“I feel that I have a tendency to forget a little bit more and my brain's a bit more scattered.” (Male, 34 y/o, 12 months)

“I am a useless person. I am basically a parasite…, a parasite is just an emptiness inside, it leaves you an emptiness. You wonder, you don’t know why wake up, you know.” (Male, 67 y/o, 6 months)

“And I even had to learn how to swallow you know, swallow my food so I didn't choke.” (Female, 63 y/o, 9 months)

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Patient outcomes after acute respiratory failure: A qualitative study of survivors' experience using the PROMIS framework

Eakin MN, Patel Y, Mendez-Tellez P, Dinglas VD, Needham DM, Turnbull AE

Key findings:

- Physical impairments: mobility, pulmonary symptoms, ↓ stamina
- Mental health: depression & anxiety; concern about getting sick again
- Social health: change in employment & in participation in activities

Understanding patient-important outcomes

- National qualitative research study
- Systematic review of qualitative studies
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- Patient, family, and researcher survey

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bit.ly/2M3plUy

CRITICAL CARE

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Crit Care. 2016;20:345.

Patient outcomes after critical illness: a systematic review of qualitative studies following hospital discharge.

Hashem MD[1,2], Nallagangula A[1,2], Nalamalapu S[1,2], Nunna K[1,2], Nausran U[1], Robinson KA[3], Dinglas VD[1,2], Needham DM[1,2,4], Eakin MN[5,6].

- 21 articles included: ICU survivors interviewed for pt outcomes
- Key Findings
  - Physical function
  - Mental health
  - Social health also important
  - Some experience positive impact (e.g. gratitude, outlook)

Qualitative interviews + Systematic Review

Triangulation between systematic review & our qualitative study:

- Impairments across all outcome domains
- Positive impact on general attitude for some survivors
- Social health impacts not considered in most empirical (i.e., quantitative) studies

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Acute Respiratory Failure Survivors' Physical, Mental Health, and Cognitive Outcomes: Outcome Measures vs. Semi-structured Interviews

Nelliot A, Dinglas VD, O'Toole J, Pater Y, Mendez-Tellez P, Nabeel M, Friedman LA, Hough CL, Hopkins RO, Eakin MN, Needham DM

Annals of ATS, 2019

Objective: To compare

- **Patient outcome measures *vs.* patient survivorship experience**
  - Survivorship: semi-structured interviews in qualitative study (N=48 ARF pt)*
  - **Physical:** SF-36 PCS & EQ-5D mobility score *vs.* "mobility impairment"
  - **Mental health:** HADS & IES-R score *vs.* "anxiety/depression" & "PTSD" Sx
  - **Cognition:** Logical memory I & II + Digit Span *vs.* "memory impairment"

* Eakin et al. *Am J Crit Care*. 2017; 26 (6) 456 – 465.

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Annals of ATS, 2019

SF-36 PCS & EQ-5D scores **worse** for survivors endorsing associated symptoms

	Qualitative Study: Symptoms Present Median (IQR)	Qualitative Study: Symptoms Absent Median (IQR)	p-value
SF-36 Physical Component Summary score	33 (26-38)	52 (35-56)	0.002
EQ-5D Mobility score	2 (1-2)	1 (1-2)	0.012
HADS Anxiety Score	8 (4-15)	4 (2-7)	0.002
HADS Depression Score	10 (5-12)	2 (1-9)	0.010
IES-R Total Score	1.6 (0.2-2.4)	0.4 (0.0-0.7)	0.017
Immediate Memory - Logical Memory I Age-adjusted Score	8 (5-12)	8 (7-11)	0.688
Delayed Memory - Logical Memory II, Age-adjusted Score	8 (4-10)	8 (6-11)	0.469
Attention/Working Memory - Digit Span Age-adjusted Score	9 (7-10)	10 (6-12)	0.587

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Annals of ATS, 2019

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Annals of ATS, 2019

Cognitive scores not different for survivors endorsing vs not memory impairment

	Qualitative Study: Symptoms Present Median (IQR)	**Qualitative Study: Symptoms Absent** Median (IQR)	**p-value**
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Annals of ATS, 2019

- **Commonly-used standardized outcome measures** reflect survivorship experience (from semi-structured qualitative interviews) for:
  - **mobility/physical function, anxiety, depression & PTSD symptoms**
- **Patient report of memory impairment not reflect cognitive scores**

Understanding patient-important outcomes

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Physical Therapy
Journal of the American Physical Therapy Association
Phys Ther. 2017;97:168-174.

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Core Domains in Evaluating Patient Outcomes After Acute Respiratory Failure: International Multidisciplinary Clinician Consultation.

Hodgson CL, Turnbull AE, Iwashyna TJ, Parker A, Davis W, Bingham CO, Watts NR, Finfer S, Needham DM.

- 100 clinicians responded to online poll in **US**
  - 44 also attended in-person meeting - modified Delphi
- 78 clinicians responded to online poll in **Australia**
  - 85 attended in-person meeting - modified Delphi

Physical Therapy
Journal of the American Physical Therapy Association
Phys Ther. 2017;97:168-174.

JOHNS HOPKINS MEDICINE

Core Domains in Evaluating Patient Outcomes After Acute Respiratory Failure: International Multidisciplinary Clinician Consultation.

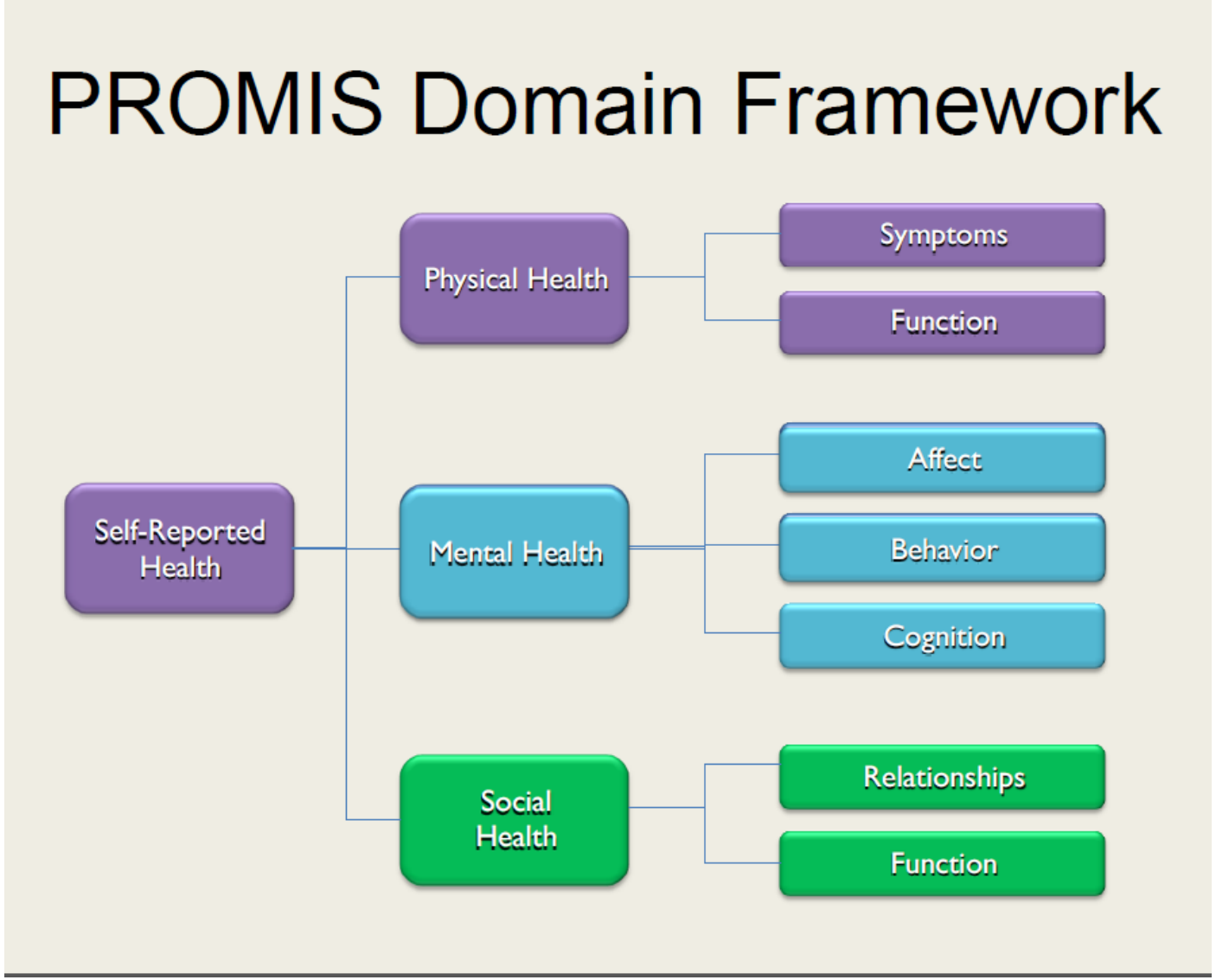
Hodgson CL, Turnbull AE, Iwashyna TJ, Parker A, Davis W, Bingham CO, Watts NR, Finfer S, Needham DM.

- 19 domains identified, for voting, based on each of: *(see next slides)*
  - US National Institutes of Health Patient-Reported Outcomes Measurement Information System (PROMIS) outcome framework,
  - Society of Critical Care Medicine Post–Intensive Care Syndrome (PICS)
  - World Health Organization International Classification of Functioning, Disability and Health (ICF)
  - **Patient and clinician input**

PROMIS Framework

Patient-Reported Outcomes Measurement Information System (PROMIS)

NIH-funded, owned by the US Department of Health and Human Services



http://www.healthmeasures.net/explore-measurement-systems/promis

PROMIS Framework

Patient-Reported Outcomes Measurement Information System (PROMIS)

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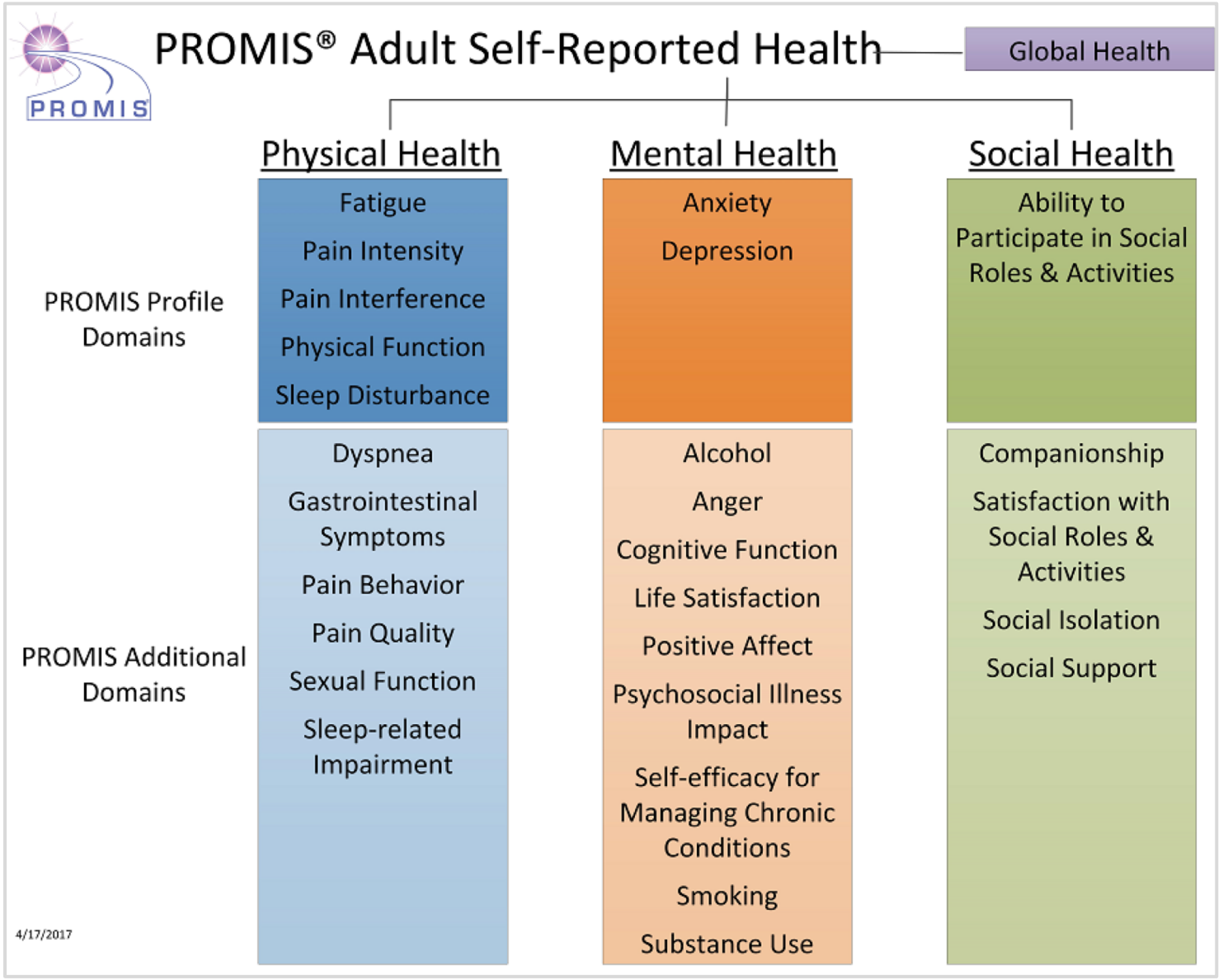

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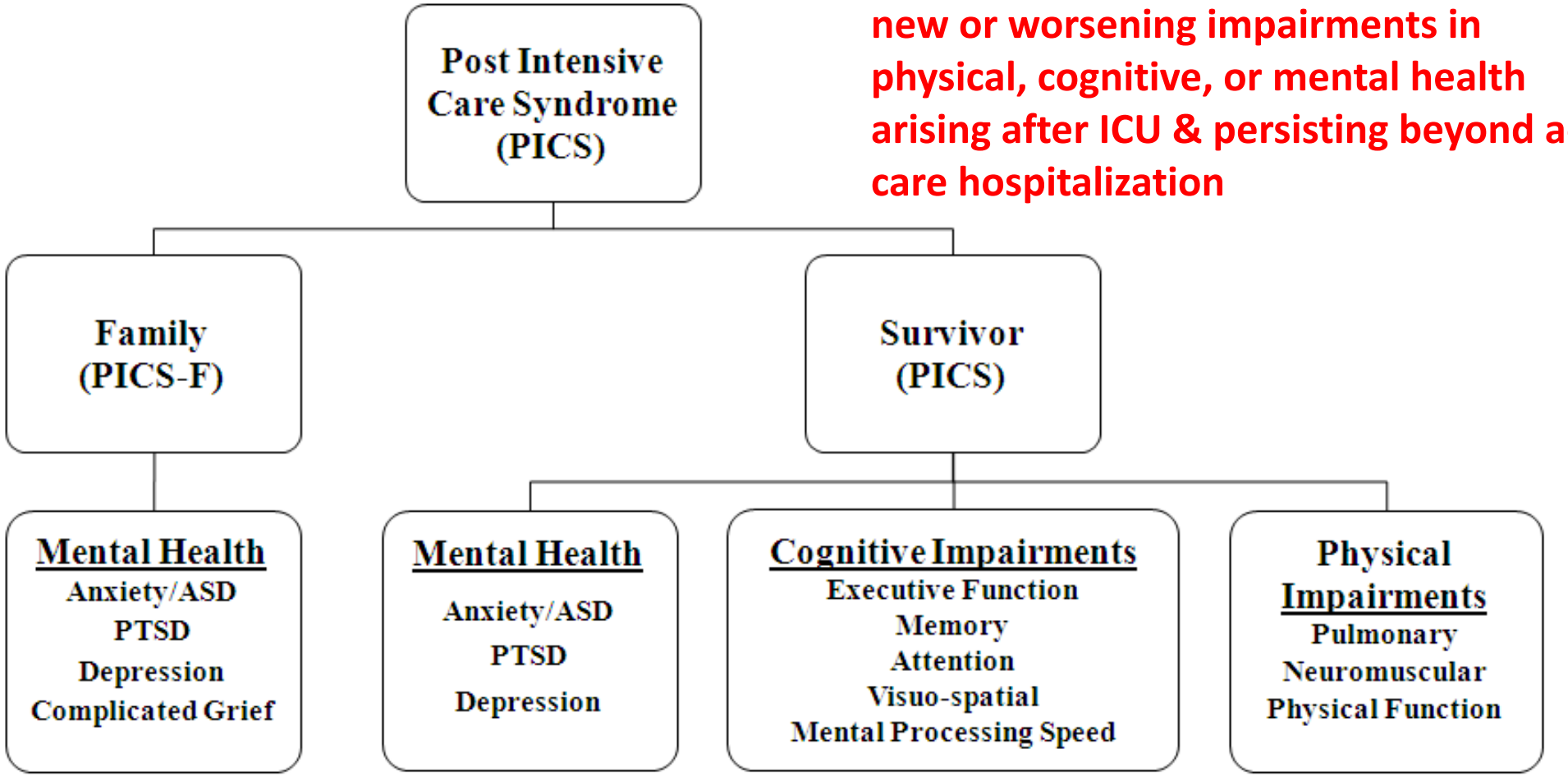
SCCM Post Intensive Care Syndrome (PICS)



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

Crit Care Med. 2012;40:502-9.

WHO Int'l Classification of Functioning (ICF)

- WHO International Classification of Functioning, Disability, and Health (ICF) – a system for classifying outcomes

Structure/function impairment
- Physiology, psychology, anatomy
- e.g. muscle ultrasound & hand grip strength

→

Activity limitation
- Tasks execution & activities assessed in standardized environment
- e.g. 6MWT, TUG

→

Participation restriction
- Life situation & participation in usual environment
- e.g. ADL/IADL

Crit Care Med 2012; 40(2):502-509; *Semin Respir Crit Care Med* 2012; 33(4):327-338

Physical Therapy
Journal of the American Physical Therapy Association

Phys Ther. 2017;97:168-174.

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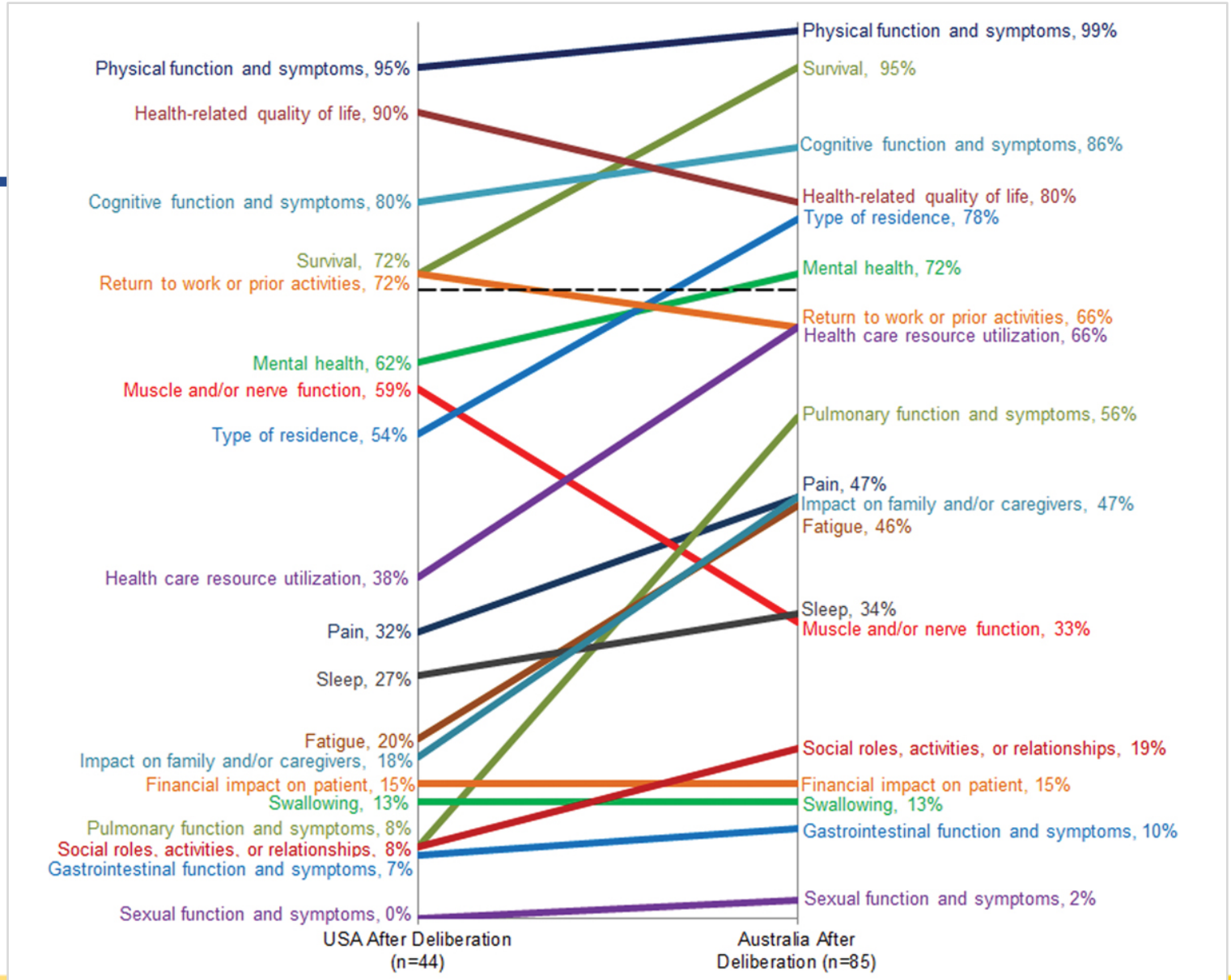
>70% agree that below outcomes must <u>ALWAYS</u> be measured

- Survival
- Physical function
- Cognition
- HRQOL



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THORAX

Thorax. 2018. 73:7-12.

Perspectives of survivors, families, and researchers on key outcomes for research in acute respiratory failure

Dinglas VD, Chessare CM, Davis WE, Parker A, Friedman LA, Colantuoni E, Bingham CO, Turnbull AE, Needham DM

Survey with 279 participants…

- 78 ARDS/ARF survivors from across U.S. (survey via phone)
- 80 family (55 paired w/ survivors) from across U.S. (via phone)
  - 45% spouse, 21% adult children
- 121 researchers (International) - via online survey
  - 60% from Europe, 26% North America

THORAX

Thorax. 2018. 73:7-12.

Perspectives of survivors, families, and researchers on key outcomes for research in acute respiratory failure

Dinglas VD, Chessare CM, Davis WE, Parker A, Friedman LA, Colantuoni E, Bingham CO, Turnbull AE, Needham DM

Survey evaluating

- 19 outcomes (same as US/Australia clinician Delphi)
  - each **rated on level of support for requiring measurement of the domain within a minimum set of domains to be assessed in all studies** of post-hospital survivorship in ARF patients.

THORAX

JOHNS HOPKINS MEDICINE

Thorax. 2018. 73:7-12.

Perspectives of survivors, families, and researchers on key outcomes for research in acute respiratory failure

Dinglas VD, Chessare CM, Davis WE, Parker A, Friedman LA, Colantuoni E, Bingham CO, Turnbull AE, Needham DM

- Patients and family rated outcomes similarly
  - Supporting (agree or strongly agree) 18 of 19 outcomes
- Researchers rated all outcomes (except survival) *less* strongly
- Patients, family and researchers all provide strong support for
  - **Physical function,**
  - **Cognition,**
  - **Mental health, and**
  - **Return to work or prior activities**

Imp't to include patient/family perspective with consensus process

Synthesis: Patient-Important Outcomes

- National qualitative research study
- Systematic review of all qualitative studies
- Clinician perspective – 2 Int'l Pilot Delphi projects
- Patient, family, and researcher survey (national/international)

Important outcomes to consider:

Survival

Physical Function

Cognition

Mental Health

Return to work/activities; social health

Quality of Life

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Systematic Review
Psychometric Properties

JCE JOURNAL OF CLINICAL EPIDEMIOLOGY

J Clin Epidemiol 2017;82:37-46.

A systematic review finds limited data on measurement properties of instruments measuring outcomes in adult intensive care unit survivors.

Robinson KA[1], Davis WE[2], Dinglas VD[2], Mendez-Tellez PA[3], Rabiee A[2], Sukrithan V[2], Yalamanchilli R[2], Turnbull AE[4], Needham DM[5].

- 20 studies on measurement properties of 21 instruments used in ICU survivors
- Studies reporting these had poor to fair quality (methods or reporting)

New psychometric analyses

1. Hospital **Anxiety & Depression** Scale (HADS): Internal consistency (*J Crit Care*. 2015; 30:793-8)
2. **Distribution-based MID of HADS & IES-R**: (*Gen Hosp Psychiatry*. 2016;42:32-5)
3. **SF-36 & mental health symptoms:** SF-36 MH domain correlated w/ psych Sx (*Ann ATS*. 2016;13:1343-50)
4. **PTSD** - Impact of Event Scale–Rev'd (IES-R): Criterion validity (*Chest*. 2013;144:24-31)
5. **PTSD** – validating IES-6 in ARF/ARDS *(in progress)*
6. **Mixed methods** – compares qualitative interviews with standardized surveys (*Ann ATS*. 2019)
7. **Fatigue** – FACIT fatigue survey vs. SF-36 Vitality domain cross-walk/IRT analysis *(in progress)*

Citations for these analyses at: www.ImproveLTO.com/publications/

New psychometric analyses, continued

10. **6-Minute Walk Test: validity, responsiveness; MID** (Chest. 2015;147:1316-26)
11. **4-Meter Gait Speed: validity, responsive, reliability; MID** (Crit Care Med. 2016; 44:859-68)
12. **Physical performance-based measures vs. PRO** (Thorax. 2017;72 884-892.)
13. **Dual energy X-ray absorptiometry (DXA) body composition** (Eur J Clin Nutr. 2018;72:613-617 and Crit Care Med. 2018;46:1238-1246.)

Citations for these analyses at: www.ImproveLTO.com/publications/

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Modified Delphi Consensus Process

Delphi Method: *a consensus method for experts to address questions for which empirical data are unavailable or inadequate*

- Recruit a panel of informed experts
- Maintain anonymity of panel members
- Provide a summary of results after each round of voting
- *a priori* criteria to determine consensus

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

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

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

Expert Panel Composition: Clinical Researchers (pg 1 of 3)

International Forum for Acute Care Trialists (as of 01-06-16)
Acute Care for Africa Research and Training
Asian Critical Care Trials Group
Australian New Zealand Intensive Care Society Clinical Trials Group
Brazilian Research in Intensive Care Network
Canadian Critical Care Trials Group
Chinese Critical Care Clinical Trials Group
European Society of Intensive Care Medicine Clinical Trials Group
Hellenic Sepsis Study Group
International Forum for Acute Care Trialists (InFACT)
Intensive Care National Audit & Research Centre (UK)
Intensive Care Society - Clinical Trials Group (UK)

Expert Panel Composition: Clinical Researchers (pg 2 of 3)

International Forum for Acute Care Trialists (as of 01-06-16)
Italian Group for Evaluation of Interventions in Intensive Care (GIVITI)
Irish Critical Care Trials Group
Latin American Critical Care Trials Investigators Network
Latin American Sepsis Institute
The Clinical Trials Network for the Prevention and Early Treatment of Acute Lung Injury (USA)
Scandinavian Critical Care Trials Group
Scottish Critical Care Trials Group
SepNet Trials Group
UK Critical Care Research Forum
US Critical Illness and Injury Trials Group

Expert Panel Composition:
Clinical Researchers, U.S. Federal Funding Bodies, and Patient and Caregivers

Clinical Researchers	9 authors of internationally-recognized ARF outcomes research
	6 corresponding authors from published ICU survivorship research
U.S. Federal Funding Bodies	Agency for Healthcare Research and Quality
	National Institute on Aging
	National Institute of Child Health and Human Development
	National Library of Medicine
Patients and Caregivers	2 from Australia
	2 from Canada
	2 from the United Kingdom
	13 from the United States

Expert Panel Composition: Clinicians and Professional Associations (pg 1 of 2)

Australia	Australian College of Critical Care Nurses
	Australian New Zealand Intensive Care Society
	Australian Physiotherapy Association
Canada	Canadian Association of Critical Care Nurses
	Canadian Critical Care Society
	Canadian Physiotherapy Association
United Kingdom	British Association of Critical Care Nurses
	Association of Chartered Physiotherapists in Respiratory Care (UK)
	Intensive Care Society (UK)

Expert Panel Composition: Clinicians and Professional Associations (pg 2 of 2)

United States/ International	American Association of Critical-Care Nurses
	American Physical Therapy Association
	American Occupational Therapy Association
	American Speech-Language-Hearing Association
	American College of Chest Physicians
	American Thoracic Society
	American Academy of Physical Medicine and Rehabilitation
	Association of Academic Physiatrists (USA)
	American College of Clinical Pharmacy
	Society of Critical Care Medicine

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)

Stage 1: Core Outcome Set[†]

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)

Preliminary Framework

- SCCM PICS (Post-Intensive Care Syndrome)
- NIH PROMIS (Pt-Reported Outcomes Msmt. Info Sys.)
- WHO ICF (Int'l Classification of Functioning, Disability, and Health)

Modified Delphi

44 & 85 clinicians from US & Australia[↕]

Survey

279 clinical researchers, ARDS survivors & family[¶]

Qualitative interviews

48 ARF survivors[◊]

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 & Round 2, respectively**

[†]*Crit Care Med.* 2017;45:1001-1010
[‡]*Am J Resp Crit Care Med*. 2017;196:1122-1130.
[↕]*Physical Therapy Journal*. 2016; 97: 167-174.
[◊]*Am J Crit Care*. 2017;26:456-465.
[¶]*Thorax.* 2018;73:7-12.
[§]*Crit Care Med.* 2016;44:1267-77

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

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Survey

279 clinical researchers, ARDS survivors & family¶

Qualitative interviews

48 ARF survivors◊

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

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**

†*Crit Care Med.* 2017;45:1001-1010
‡*Am J Resp Crit Care Med*. 2017;196:1122-1130.
↕*Physical Therapy Journal*. 2016; 97: 167-174.
◊*Am J Crit Care*. 2017;26:456-465.
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For more information, visit www.ImproveLTO.com/coms/

Improving Long-Term Outcomes Research for Acute Respiratory Failure

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

Core Outcome [†]

- Survival
- HRQOL
- Mental Health
- Pain
- Cognition
- Physical Function
- Muscle and/or Nerve Function
- Pulmonary Function

[†]*Crit Care Med.* 2017; 45:1001-1010 [‡]*Am J Resp Crit Care Med.* 2017;196:1122-1130.

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

Core Outcome †

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

Survival

No Instrument
Recommend collecting date and location of death

HRQOL

EQ-5D
(3L or 5L version)

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)

† *Crit Care Med.* 2017; 45:1001-1010 ‡ *Am J Resp Crit Care Med.* 2017;196:1122-1130.

Improving Long-Term Outcomes Research for Acute Respiratory Failure

An NHLBI-funded Resource-Related Research Project (R24HL111895)
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Acceptable Configurations of the Core Outcome Measurement Set (COMS) for Clinical Research in Acute Respiratory Failure Survivors

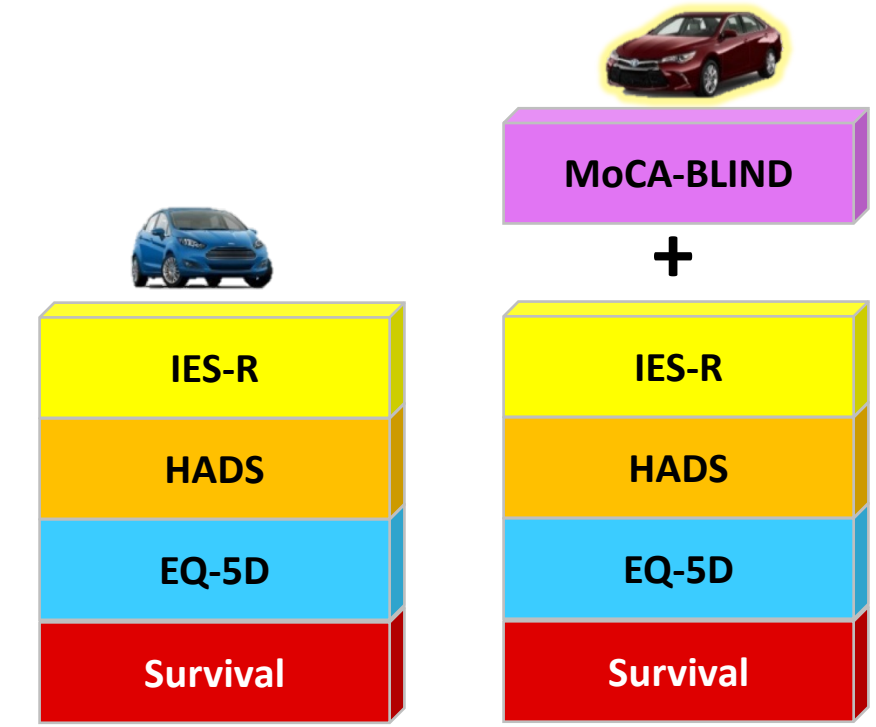
IES-R	
HADS	
EQ-5D	
Survival	
Total Number of Questions	42
Estimated Time to Complete (Mins)	12
Estimated Cost per Visit (as of June 2017)	$1.50

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

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

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



Total Number of Questions	42	55
Estimated Time to Complete (Mins)	12	17
Estimated Cost per Visit (as of June 2017)	$1.50	$1.50

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

Improving Long-Term Outcomes Research for Acute Respiratory Failure

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

IES-R
HADS
EQ-5D
Survival

MoCA-BLIND

+

IES-R
HADS
EQ-5D
Survival

SF-36 v2

+

IES-R
HADS
EQ-5D
Survival

Total Number of Questions	42	55	78
Estimated Time to Complete (Mins)	12	17	21
Estimated Cost per Visit (as of June 2017)	$1.50	$1.50	≥ $3.00

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

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

		MoCA-BLIND	SF-36 v2	SF-36 v2
		+	+	+
		MoCA-BLIND	SF-36 v2	MoCA-BLIND
	IES-R	IES-R	IES-R	IES-R
	HADS	HADS	HADS	HADS
	EQ-5D	EQ-5D	EQ-5D	EQ-5D
	Survival	Survival	Survival	Survival
Total Number of Questions	42	55	78	91
Estimated Time to Complete (Mins)	12	17	21	26
Estimated Cost per Visit (as of June 2017)	$1.50	$1.50	≥ $3.00	≥ $3.00

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

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

≥ 15 Languages Available for Core Outcome Measurement Set (COMS) for Clinical Research in Acute Respiratory Failure Survivors *(as of January 2018)*

Language	EQ-5D	HADS	IES-R	SF-36 V2	MoCA-BLIND
Chinese	✓	✓	✓	✓	✓
Dutch	✓	✓	✓	✓	✓
English	✓	✓	✓	✓	✓
French	✓	✓	✓	✓	✓
German	✓	✓	✓	✓	✓
Greek	✓	✓	✓	✓	✓
Hebrew	✓	✓	✓	✓	✓
Japanese	✓	✓	✓	✓	✓
Korean	✓	✓	✓	✓	✓
Lithuanian	✓	✓	✓	✓	✓
Norwegian	✓	✓	✓	✓	✓
Russian	✓	✓	✓	✓	✓
Spanish	✓	✓	✓	✓	✓
Swedish	✓	✓	✓	✓	✓
Turkish	✓	✓	✓	✓	✓
Farsi	✓	✓	✓		

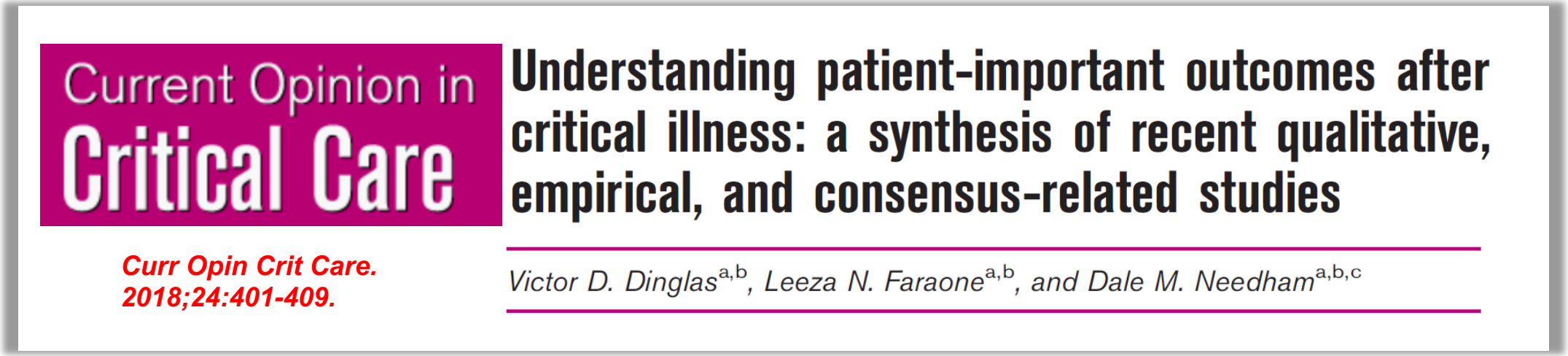
Next steps: Future research agenda

- ARF survivor & researcher feedback on using Core Measure Set
- Can IRT/CAT be used to reduce redundancy of questions?
- Evaluate MoCA in ARF survivors
- Evaluate muscle strength measures (MMT & grip), including feasibility
- Evaluate physical function measures (both PRO and performance-based)
- Evaluate pain item from EQ-5D in ARF survivors
- Evaluate/develop a patient-reported outcome measure of pulmonary function and symptoms in ARF survivors
- See Figure 2 in AJRCCM paper for more

COMS User Feedback Survey

- Separate survey for participants and staff
- <5 questions
- Participant survey available for download now
- Staff survey – for online use

For synthesis of all of the preceding work…



FREE full text at: bit.ly/2orp5X6

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Please contact us if you are planning a study of ICU survivors.

www.ImproveLTO.com

✉Contact us: improveLTO@jhmi.edu

Follow us: @improvelto

MORE INFO ABOUT FREE RESOURCES AT

www.improveLTO.com

...

Aim 1: Instruments

About | Core Outcome Set (COS) | Instruments | Cohort Retention | Statistical Tools | COS Resources | Publications | Media | Account Access

Please see the list of instruments below:

- Cognitive
- Mental Health
- Muscle and/or Nerve Function
- Pain
- Physical Function
- Pulmonary Function
- Quality of Life
- Return to Work
- Helpful links

Physical Function

- Surveys
- Tests
  - Acute Care Index of Function (ACIF)
  - Body Composition
  - Cardiopulmonary Exercise Test (CPET)
  - Chelsea Critical Care Physical Assessment Tool (CPAx)
  - Critical Care Functional Rehabilitation Outcome Measure (CcFROM)
  - de Morton Mobility Index (DEMMI)
  - Functional Assessment Measure (FAM)
  - Functional Independence Measure (FIM)
  - Functional Status Score for the Intensive Care Unit (FSS-ICU) – English Version
  - Functional Status Score for the Intensive Care Unit (FSS-ICU) – Other Languages
  - ICU Mobility Scale (IMS)
  - Manchester Mobility Score (MMS)
  - Perme Score
  - Physical Function in Intensive Care Test scored (PFIT-s)
  - Short Physical Performance Battery (SPPB) | Quality Assurance

Aim 1: Instruments

Delphi Consensus for Core Outcome Set for Measuring Patient Outcomes After ICU

Instrument	Short Physical Performance Battery
Acronym	SPPB
Core Domain	Physical Function and Symptoms
Area assessed (Number of questions)	Total tasks: 3 Balance Walking Speed Getting in and out of a chair
Description	An assessment to measure leg function using tasks that mimic daily activities. The SPPB examines 3 areas of lower limb function: static balance, 4-meter walk test (gait speed), and getting in and out of a chair (5x sit to stand).
Versions	N/A
Recall Period	N/A
Scoring information	Each task or subscale is scored 0-4, with 0 being "unable to complete the task" and 4 being the "highest level of performance." The subscale scores are summed to create a summary score with the following ranges[1]: 0-3: Severe limitations 4-6: Moderate limitations 7-9: Mild limitations 10-12: Minimal limitations
Estimated time to complete	5 – 10 minutes
Administer to	Patient
Require trained administrator	Yes
Mode of administration	In-person
Order from	N/A
Licensing Fee *Fees and licensing information is effective as of 2016, but is subject to change over time*	No Cost
Equipment required	Survey form, pen, chair, stop watch, and a marked 4-meter walking course.
Number of published Critical Care publications using instrument (1970 – 2013)*	0
Highest COSMIN** rating (from a systematic review up to March 2015***)	No evaluation completed
Additional comments	•Construct Validity (Compared to Physical Function in Intensive Care Test-scored [Spearman r=0.70-0.86]) •Divergent Validity (Compared to Medical Research Council Sum-score [Spearman r=0.30])[2] •Predictive Validity (Not predictive of discharge home [p>0.05]) •Responsiveness (Significant change in scores across ICU time points, Effect size=0.33)[2] •Minimal Important Difference (1.3-1.5[2]) out of 12 •Floor/Ceiling Effects for test: (Awakening: Floor = 83%; Ceiling = 0%), (Intensive Care Unit Discharge: Floor = 57%; Ceiling = 0%[2])

Last updated on **April 24, 2017.** If you are aware of any updates required for this document, please notify us via ImproveICTO@jhmi.edu.

Page 1 of 2

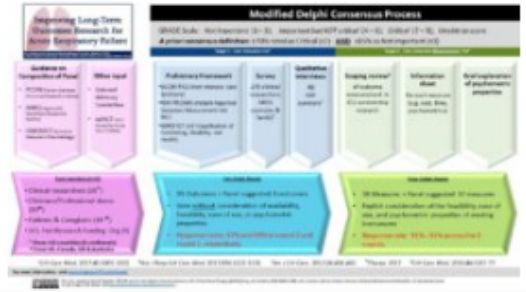
Aim 1: COS/COMS Resources

About	Core Outcome Set (COS)	Instruments	Cohort Retention	Statistical Tools	COS Resources	Publications	Media	Account Info

Delphi Methodology

A **2-stage modified Delphi consensus process** was conducted as part of Aim 1 of this project, which includes **creation of a minimum set of outcomes and associated measurement instruments** for use in all clinical research studies that are planning to evaluate acute respiratory failure/acute respiratory distress syndrome (ARF/ARDS) survivors after hospital discharge.

The protocol developed for our modified Delphi process can be found under Aim 1 on the "About us" page.



Templates:

- Contact Information Form
- Communication Templates (E-mail templates)
  - First Reminder to Stakeholder Organization for Representative
  - Second Reminder to Stakeholder Organization for Representative
  - Invitation to Representative of Stakeholder Organization
  - Acknowledgement to Representative of Stakeholder Organization
  - Registration Stage 1 Round 1
  - Registration Stage 1 Round 1 Reminder
  - Stage 1 Round 2
  - Stage 1 Round 2 Reminder
- Post-Delphi Survey for panel members | Post Delphi Survey results are here
- Instrument Card

Helpful links:

Core Outcome Set – Methodology

- COMET (Core Outcome Measures in Effectiveness Trials) Initiative
- Standardising outcomes for clinical trials and systematic reviews
- COMET DelphiManager Online Software
- Students for Best Evidence – Delphi Consensus Technique

Reporting and Dissemination

- Core Outcome Set-STAndards for Reporting: The COS-STAR Statement (Guidance on the minimum standards for reporting a COS)
- Ideas to optimize dissemination of core outcome sets

Other

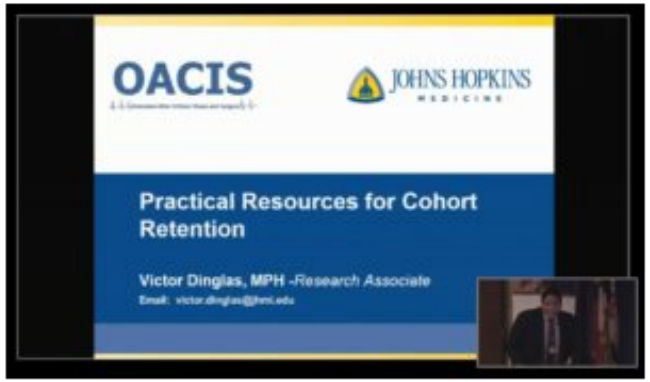
- Operations Manual for abstracting data for a Scoping Review of ICU Post-discharge Outcomes
- PROMIS: Patient-Reported Outcomes Measurement Information System
- Report on improving uptake of Core Outcome Sets (COS)

Aim 2: “Menu” of retention tools (>30)

About	Core Outcome Set (COS)	Instruments	Cohort Retention	Statistical Tools	COS Resources	Publications	Media	Account Access

One of the aims of this project is to assist researchers conducting long-term outcomes studies to maximize retention of research participants.

Victor Dinglas, MPH discusses (click image for the video) lessons learned regarding cohort retention including dispelling common myths in the field. He then discusses a Cohort Retention Toolbox (see menu below) which contains content developed based on a systematic review of the literature and semi-structured interviews of clinical researchers. Lastly, he discusses a case study that used many of these tools.



Below are tools we have available to help researchers maximize retention of research participants.

- **Participant Contact Information Form**
- **Follow-up Protocols**
- **Locating Participants**
- **Retention Strategies from Systematic Review**
- **Communication Templates and Manuals**
- **Staff Training**
- **Other Tools**
- **Presentations**
- **Helpful links**

Searchable Database of Retention Strategies (from our systematic review)

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About | Core Outcome Set (COS) | Instruments | Cohort Retention | Statistical Tools | COS Resources | Publications | Media | Account Access

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Show 100 entries Search:

First Author	Publication Year	Theme	Strategies extracted from paper
Anastasi	2005	Reminders	The study coordinator gave each participant a reminder telephone call
Anas			or other
Anastasi	2005	Contact and Scheduling Methods	Study participants were required to provide the study coordinator with instructions on leaving telephone messages at home, in the event a roommate, partner, or answering machine was available to take messagesThis procedure was instituted to protect the confidentiality of study participants' HIV status.

>600 cohort retention strategies in database

www.improvelto.com/cohort-retention-tools/

Communication Templates and Manuals

Phone Communication:

- **Phone Communication Procedures Manual** – Provides guidelines for different scenarios requiring phone calls with the participant or proxy.
- **Telephone Scripts: Challenging Participants** – This script is intended to help research staff facilitate communication with participants who are more challenging than the typical participant, for a variety of reasons; health, family-life, lack-of-interest.
- **Telephone Scripts: Phone Follow-up** – This script is intended to help research staff facilitate communication for scheduling and completing follow-up via phone.
- **Telephone Scripts: Scheduling In-person or Home Visit** – This script is intended to help research staff facilitate communication for scheduling and completing in-person (e.g., research clinic) or home visits.

Written Communication:

- **Written Communication Procedures Manual** – Provides guidelines for different scenarios requiring mail correspondence with the participant or proxy.
- **Templates of Letters** – Provides example letters and postcards to mail to participants for varying scenarios, for example a "Thank You" letter after completing an assessment or a "Hard-to-find" letter for unreachable participants.
- **Newsletter Templates** (example) – Modifiable templates to inform participants of updated study information (e.g., new study staff, recent study publication, discussion about disease/ailment, research visit specifics, etc.)
  - Summer Newsletter – Featuring Study Publications Template
  - Winter Newsletter – Featuring Generic Topic Template
  - Instructions

MORE on this page

>30 tools available now

Staff Training

Quality Assurance:

- **Survey Administration QA** -This customizable Quality Assurance (QA) template allows the trainer/reviewer to thoroughly assess and comment on the trainee's abilities to administer surveys while adhering to study protocol.

Other Tools

Research Group Meeting:

- **Progress Report for Participant** – This modifiable report template summarizes the status of participants' scheduling and completion of follow-up visits, including notes on methods of communication to/from subject and/or proxies. This report is designed to be discussed during regular (e.g., weekly) meetings with the study leaders and team, with the purpose of devising an action plan for each participant.

Locating Participants

- **Participant Contact Attempt and Locate Log –** This document aids research staff in recording standardized information for each contact attempt (e.g., phone call, online search, mailed letter, etc.)
- **Hard-to-Find Participant Checklist and Manual –** A checklist of various strategies for contacting difficult-to-reach research participants.

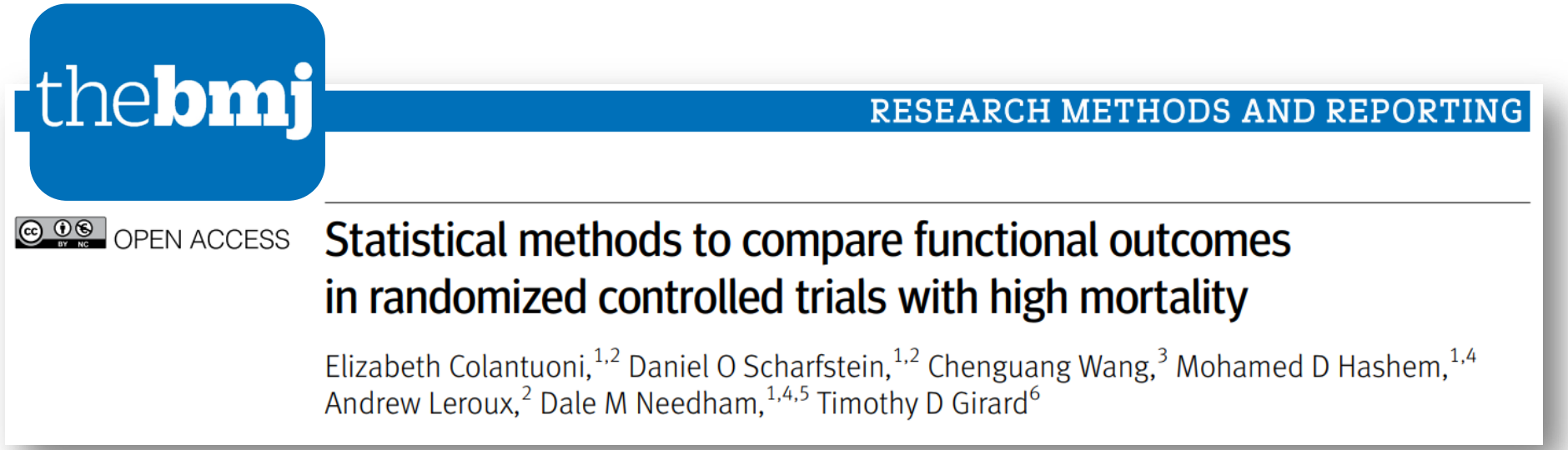
Follow-up Protocols

- **Cohort Retention Protocol** – Outlines the participant follow-up process from initial recruitment into the study to maintaining contact with the research participant throughout the duration of the study.
- **Follow-up Assessment Timeline and Escalation of Retention Strategies Flow Diagram Template and Manual** – Provides a suggested protocol for escalating participant contact attempts and utilizing participant retention strategies. These issues are important in maximizing completion of timely assessments.
- **Home Visit Protocol** – Provides guidelines and safety tips for instances when it is necessary to visit patient's homes (e.g., scheduled home visit or when telephone and written correspondence produce no results).
- **Overcoming Follow-up Delay and Cancellation –** Provides methods for reducing delayed and missed follow-up assessments, for example, communication tips for rescheduling the assessment and maintaining the participant's participation in the study.
- **Tools for Facilitating In-Person Assessment** – Provides suggested tools to help incentivize or facilitate an in-person follow-up assessment visit with a study participant.
- **Tools for Facilitating Phone Assessment** – Provides suggested tools to help incentivize or facilitate a phone-based follow-up assessment with a study participant.

Hard-to-Find Participant Checklist

	Step 1 – Calling phone numbers *(Disconnected and other non-working phone numbers should be called frequently to check if the numbers are working again).* **If neither participant nor proxies have returned our phone calls within 3 days OR there are NO working phone numbers, immediately do the following:** • **send a "Hard to find" letter to the participant (see "Step 3 – Sending mail" further below), then** • **complete "Step 2 – Online searching," and** • **if appropriate, investigate if there have been any recent hospitalizations and/or new contact info (e.g., review your medical records system).**	
	Did you call all available phone numbers for the participant? ***Note: If you need to call from a different number, use Google© voice.***	☐ Done. Additional notes:
	Did you call all available phone numbers for the proxies?	☐ Done. Additional notes:
	Step 2 - Online searching *(Online searches should be repeated every 1-2 weeks, to check for updates).*	
	Did you "reverse search" the participant using name, phone number and address (e.g., using Superpages.com)?	☐ Done. Additional notes:
	Did you "reverse search" all proxies using name, phone number and address (e.g., using Superpages.com)?	☐ Done. Additional notes:
	Step 3 – Sending mail **If you have performed all of the above steps and have not made contact with a subject within 2 weeks of the *initial* call:** • **Send a "Hard to Find" (HTF) letter (see example at www.ImproveLTO.com)** • **If no response to above, send "Signature Required Letter" (SRL) via USPS 1 week later** • **Discuss with study supervisor or investigator regarding whether to send a "Hard to Find" (HTF) letter to any searched address.**	
	Did you send a Hard To Find letter to the participant?	☐ Done. Additional notes:
	Did you send a Hard To Find letter to each proxy?	☐ Done. Additional notes:

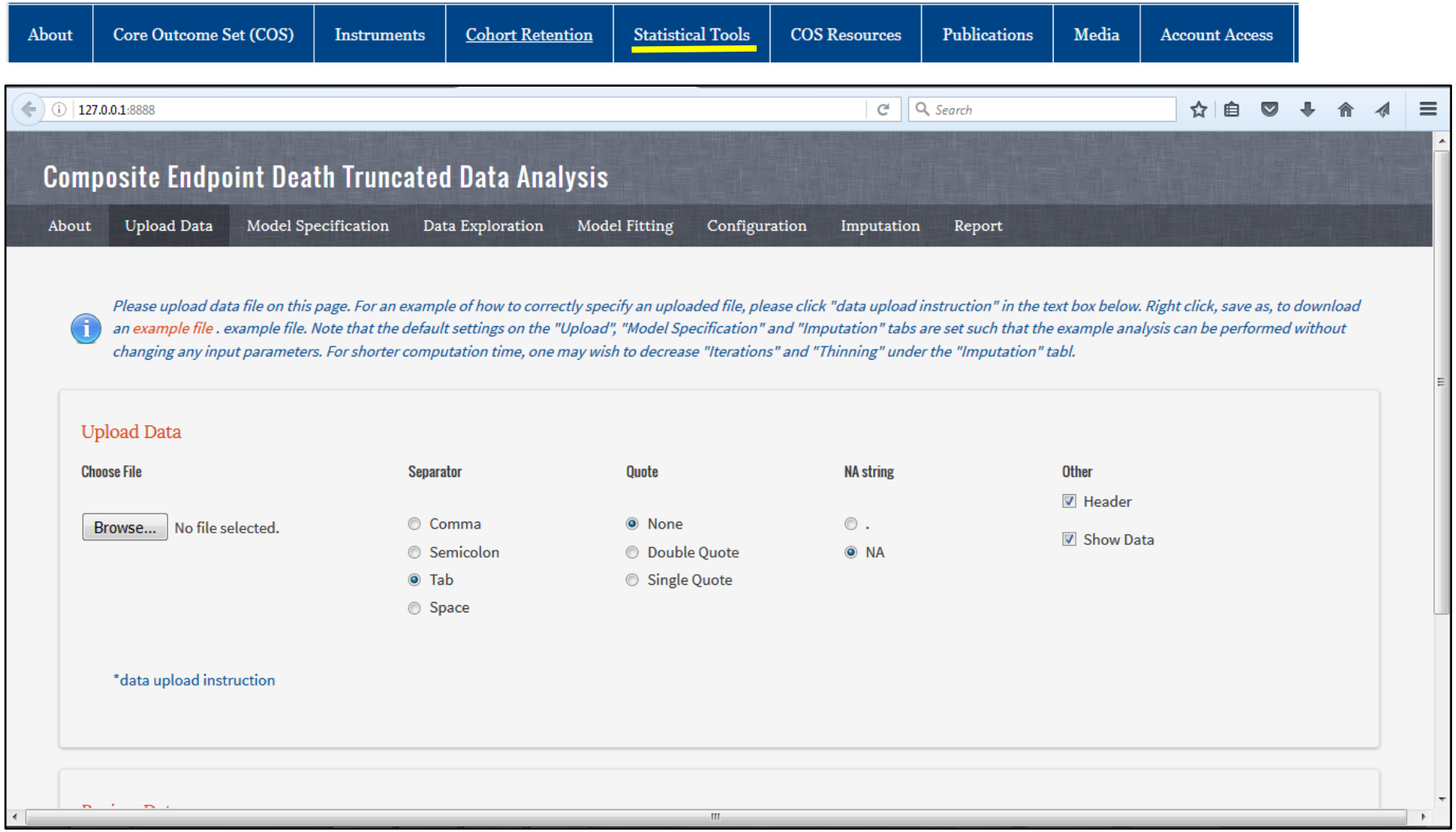
Aim 3: Statistical approaches when function outcomes 'truncated due to death'



- Survivors only
- Survivor average causal effect
- Composite endpoint

BMJ. 2018;360:j5748. doi: 10.1136/bmj.j5748.

Aim 3: Standalone statistical app



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www.ImproveLTO.com

✉Contact us: improveLTO@jhmi.edu

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