Post-Intensive Care Syndrome and COVID-19

Kristin Schwab, MD

The New York Times

Here's What Recovery From Covid-19 Looks Like for Many Survivors

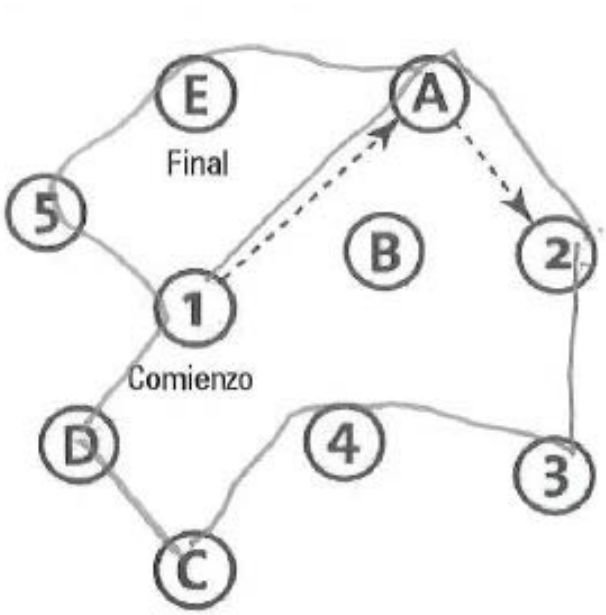
Continuing shortness of breath, muscle weakness, flashbacks, mental fogginess and other symptoms may plague patients for a long time.

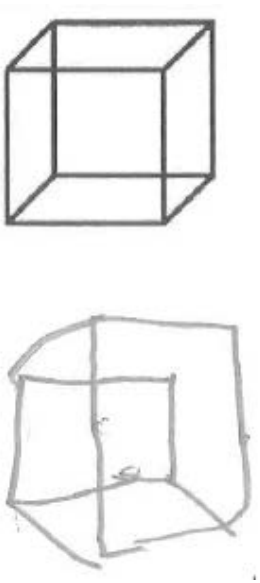
Post-ICU Clinic Patient

- 64yo M with DM, HTN, HL, who previously worked as a seafood distributor, presenting for follow-up after hospitalization for COVID-19 PNA/severe ARDS requiring intubation x9 days.
- Seen in post-ICU clinic 32 days after d/c to home:
  - Significant anxiety and insomnia: lies awake all night with mind racing. Has tried 4 different sleeping pills.
  - New ADL dependence: cannot bathe or transfer independently
  - ROS: cough/SOB, intermittent dysuria (since foley removal), new blurry vision, limited shoulder ROM
  - Polypharmacy: taking 1.5x dose of amlodipine and losartan and redundant inhalers

Post-ICU Clinic Patient, cont

- Objective results:
  - 6MWT <50 meters
  - MOCA 16/30:





PICS isn’t unique to COVID-19 survivors

“I'm in desperate need of some advice. I'm a year post cardiogenic shock, ARDS, MRSA pneumonia, kidney failure, sepsis among a slew of other complications, all from a ruptured appendix. **I'm physically getting stronger every day but the mental aspect is literally killing me! I am an accountant and at this point I can not return with my current impairments**. I'm 49 years old and feel like my life is over. I have been researching post-sepsis syndrome but my PCP doesn't know about it and thinks that it's all PTSD […] **I'm so lost and not sure who to turn to for help or what kind of doctor I would see for this**.”

ICU Survivorship

- An increasing number of patients survive critical illness

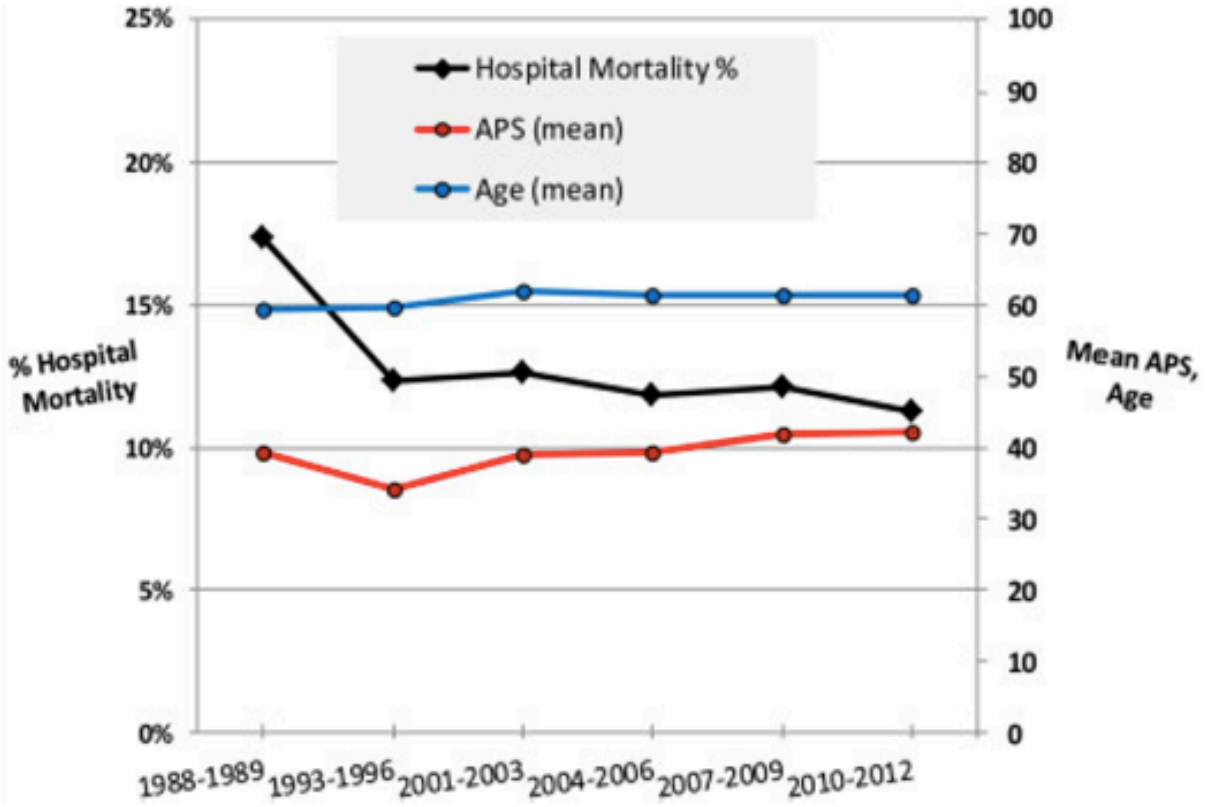


Figure 1 Hospital mortality, age, and acute physiology score (APS) for 482,601 ICU admissions from 1988-1989 to 2010-2012.

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Zimmerman et al. Crit Care 2013

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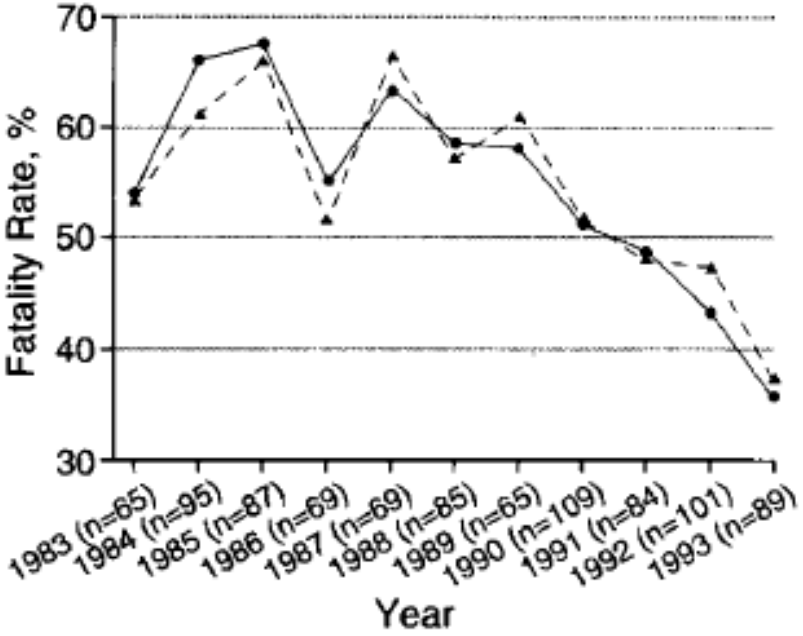
ARDS mortality has also decreased over time



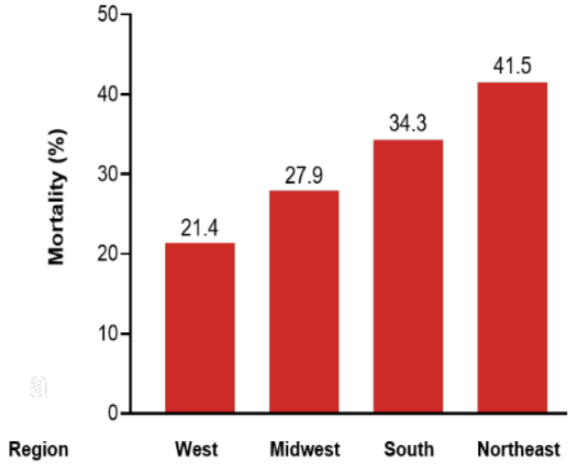
Milberg et al. JAMA 1995.

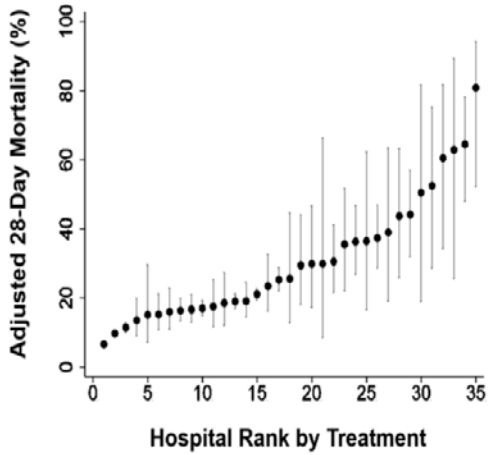
Current ARDS mortality (Bellani et al, JAMA 2016):

-35% for mild ARDS
-40% for moderate ARDS
-46% for severe ARDS

COVID-19 Mortality

- ICU mortality for COVID-19 = ~40% (with ranges 0-85%)
  - Substantial geographic and center variability





- With ~60% of patients surviving, more patients than ever will need post-ICU care

Gupta et al. JAMA IM 2020; Armstrong et al. Anesthesia 2020.

ICU Survivorship, cont

- There is a cost to this increase in survivorship:
  - Medical + psychological sequelae:
    - High prevalence of depression, cognitive impairments, disability
  - Financial sequelae:
    - 33% of ICU survivors report lower family income at 6 months
    - 44% of previously-employed ARDS survivors are jobless at 12 months
- "Survivorship will be the defining challenge of critical care in the 21st century." –Jack Iwashyna. Ann Intern Med 2010
- "Improving outcomes after critical illness is a mandate to the critical care community" –Marc Moss

Griffiths et al, Crit Care 2013
Kamdar et al, AJRCCM 2017

Post-Intensive Care Syndrome (PICS)

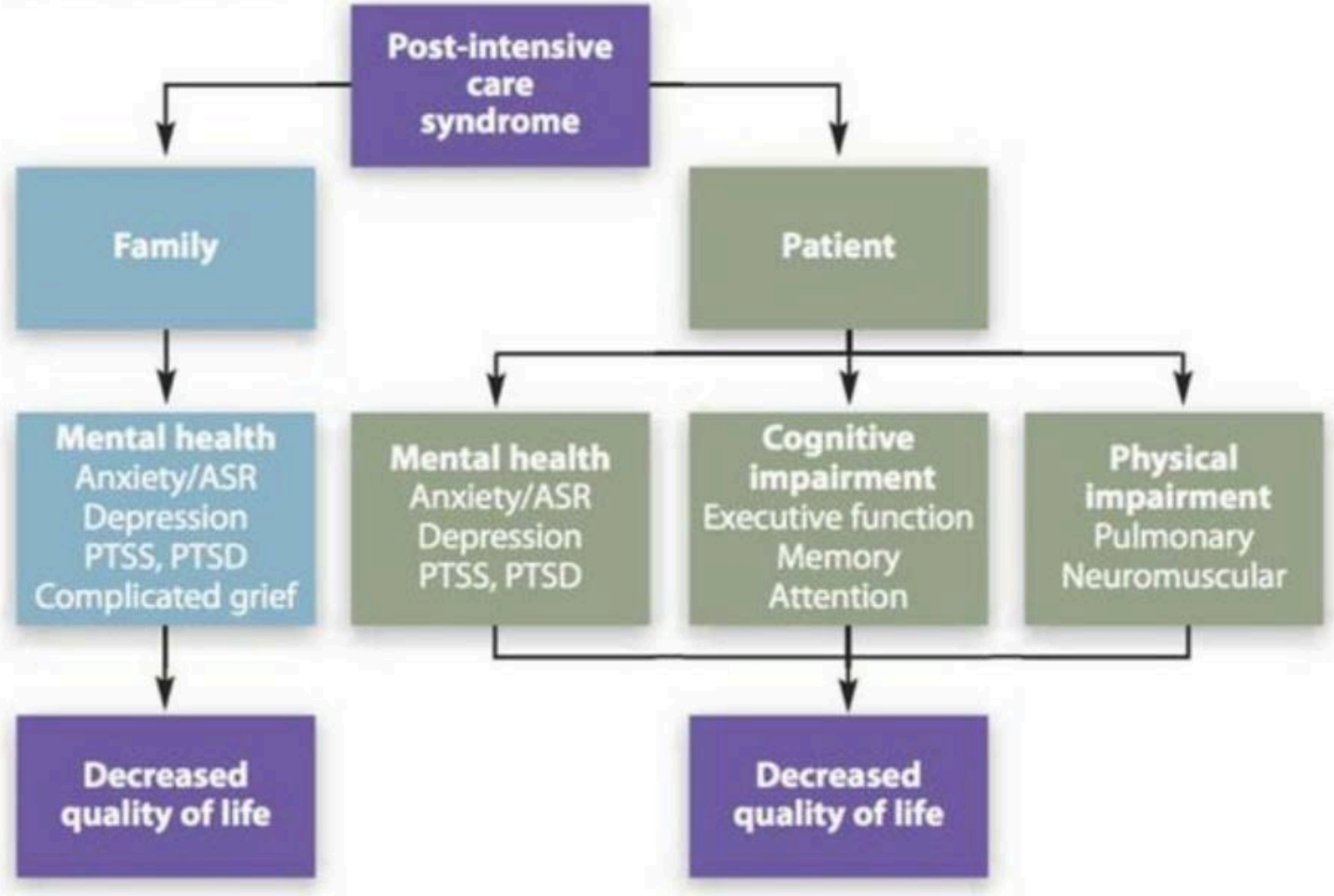
New or worsened impairment (in one or more of the following domains) after an ICU stay, persisting past hospital discharge:

-Cognition

-Mental Health

-Physical Function

Post-Intensive Care Syndrome (PICS)



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Needham et al. Crit Care Medicine 2012
Davidson et al. Crit Care Medicine 2013

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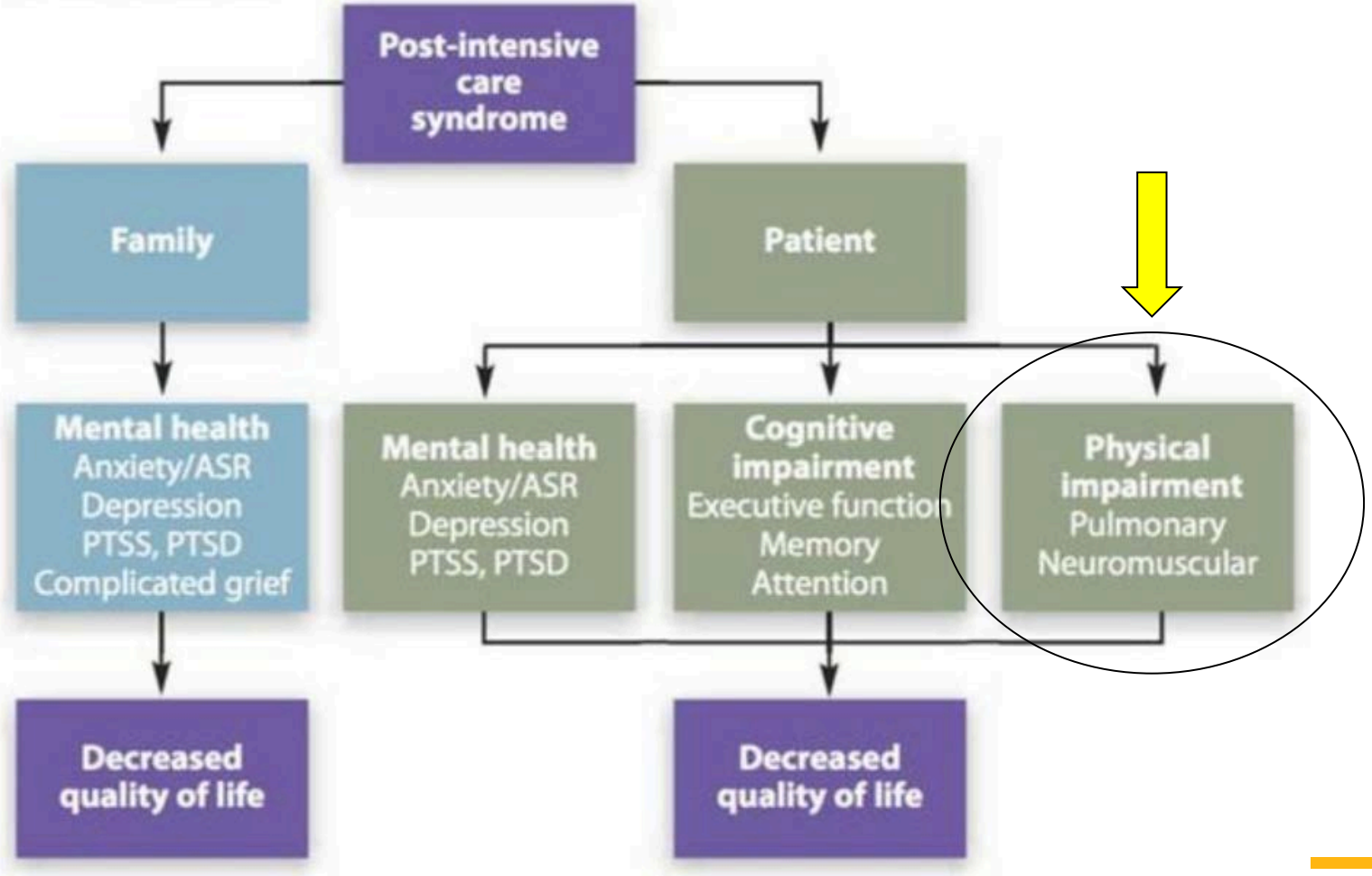
Risk Factors for PICS

- Mechanical ventilation
- Sedation
- Delirium
- Immobility
- Multiorgan dysfunction
- Prolonged critical illness
- Systemic corticosteroids
- Hyperglycemia
- Hypoxia

Post-Intensive Care Syndrome (PICS)



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Physical Impairment

- Longitudinal study of 109 ARDS survivors
- 6MWT: 281m (3mo) → 396m (6mo) → 422m (12mo)
- Spiro + lung volumes normalized by 6mo, DLCO remained low at 12mo

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One-Year Outcomes in Survivors of the Acute Respiratory Distress Syndrome

Margaret S. Herridge, M.D., M.P.H., Angela M. Cheung, M.D., Ph.D., Catherine M. Tansey, M.Sc., Andrea Matte-Martyn, B.Sc., Natalia Diaz-Granados, B.Sc., Fatma Al-Saidi, M.D., Andrew B. Cooper, M.D., Cameron B. Guest, M.D., C. David Mazer, M.D., Sangeeta Mehta, M.D., Thomas E. Stewart, M.D., Aiala Barr, Ph.D., Deborah Cook, M.D., and Arthur S. Slutsky, M.D., for the Canadian Critical Care Trials Group

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

Variable	3 Mo (N=71)*	6 Mo (N=77)†	12 Mo (N=80)‡
	median (interquartile range)		
Forced vital capacity (% of predicted)	72 (57–86)	80 (68–94)	85 (71–98)
Forced expiratory volume in one second (% of predicted)	75 (58–92)	85 (69–98)	86 (74–100)
Total lung capacity (% of predicted)§	92 (77–97)	92 (83–101)	95 (81–103)
Residual volume (% of predicted)§	107 (87–121)	97 (82–117)	105 (90–116)
Carbon monoxide diffusion capacity (% of predicted)§¶	63 (54–77)	70 (58–82)	72 (61–86)

Physical Impairment, cont.

- Patients felt that muscle weakness + fatigue were the cause of functional limitations

  → Physical impairments in PICS are largely due to extrapulmonary factors

- ICU-acquired weakness
  - Critical illness myopathy
  - Critical illness neuropathy

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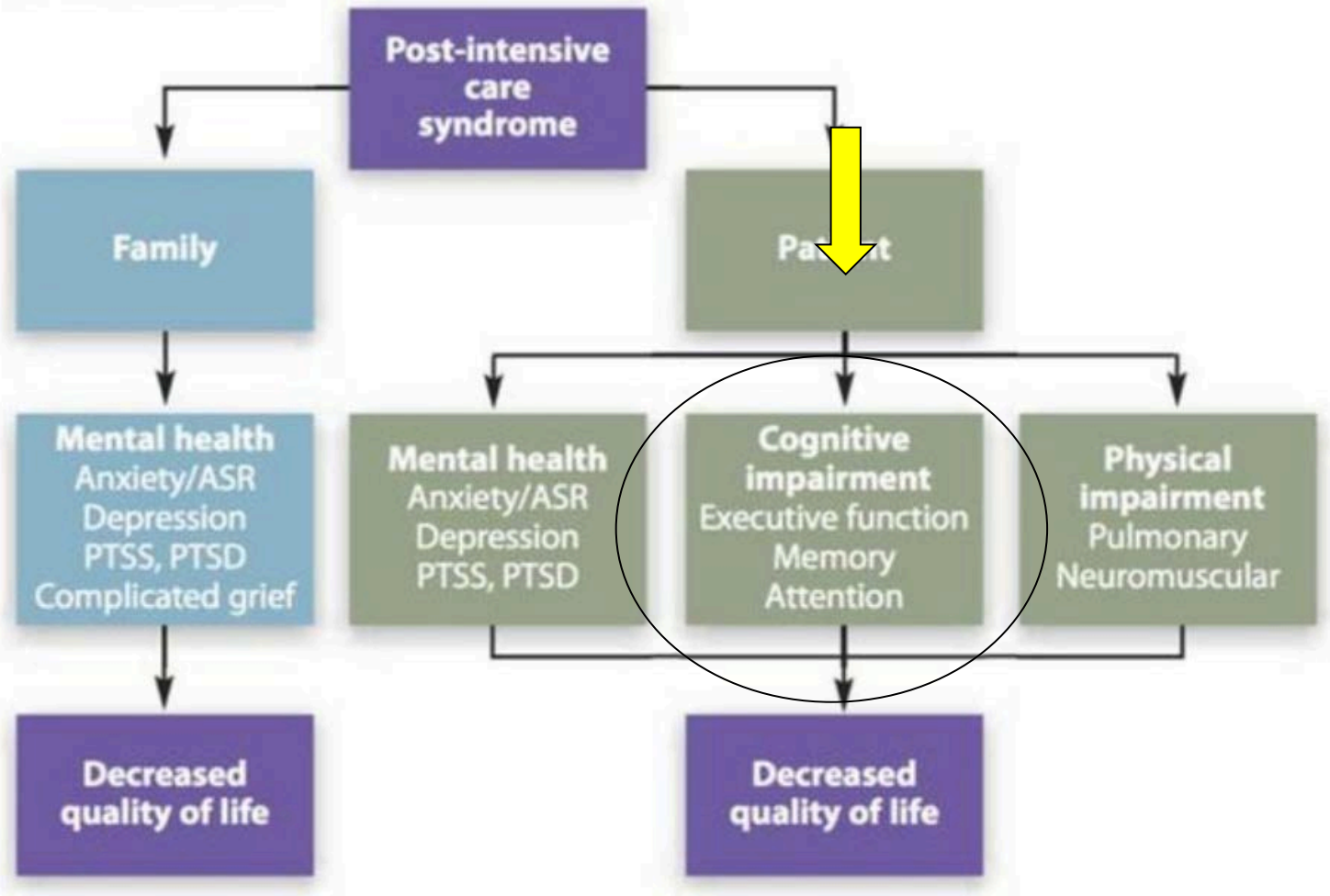
Post-Intensive Care Syndrome (PICS)



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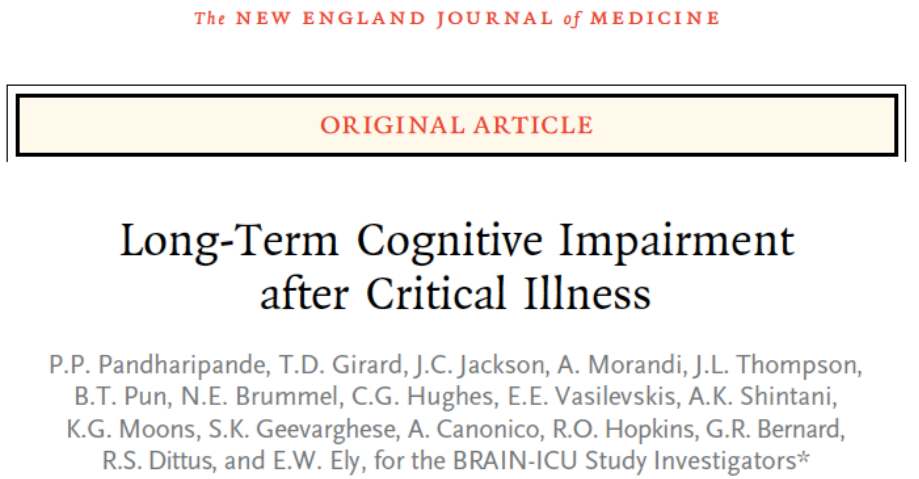
Cognitive Dysfunction

- BRAIN-ICU study, 2013:
  - 821 MICU or SICU patients with respiratory failure or shock
  - Assessed with the Repeatable Battery for the Assessment of Neuropsychological Status (RBANS) at 3mo and 12mo
  - 6% of patients had cognitive impairment at baseline



Cognitive Dysfunction, cont

- Median global cognition score (100 = normal): 79 (3mo) and 80 (12mo)
- At 3 months, 40% had scores similar to scores for pts with TBI, 26% had scores similar to those with mild Alzheimer's
- A longer duration of delirium was independently associated with worse global cognition

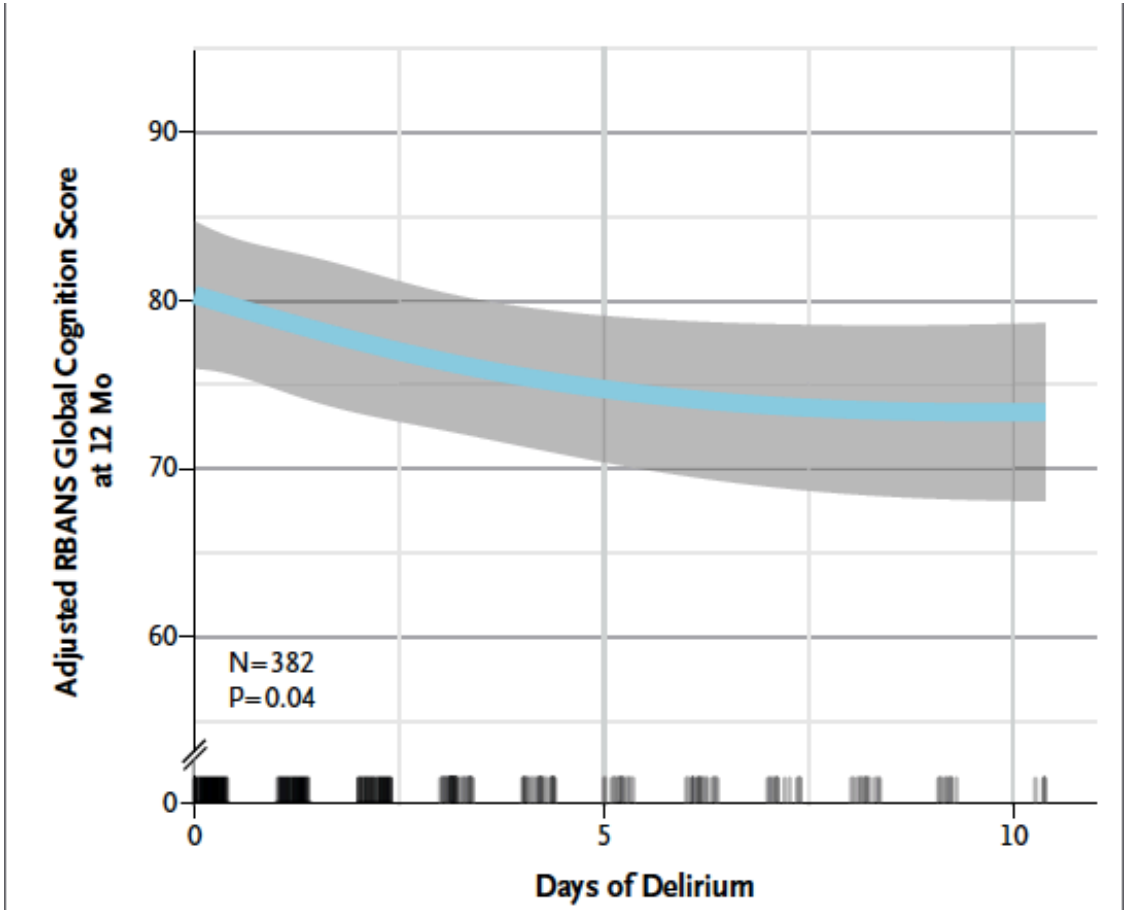
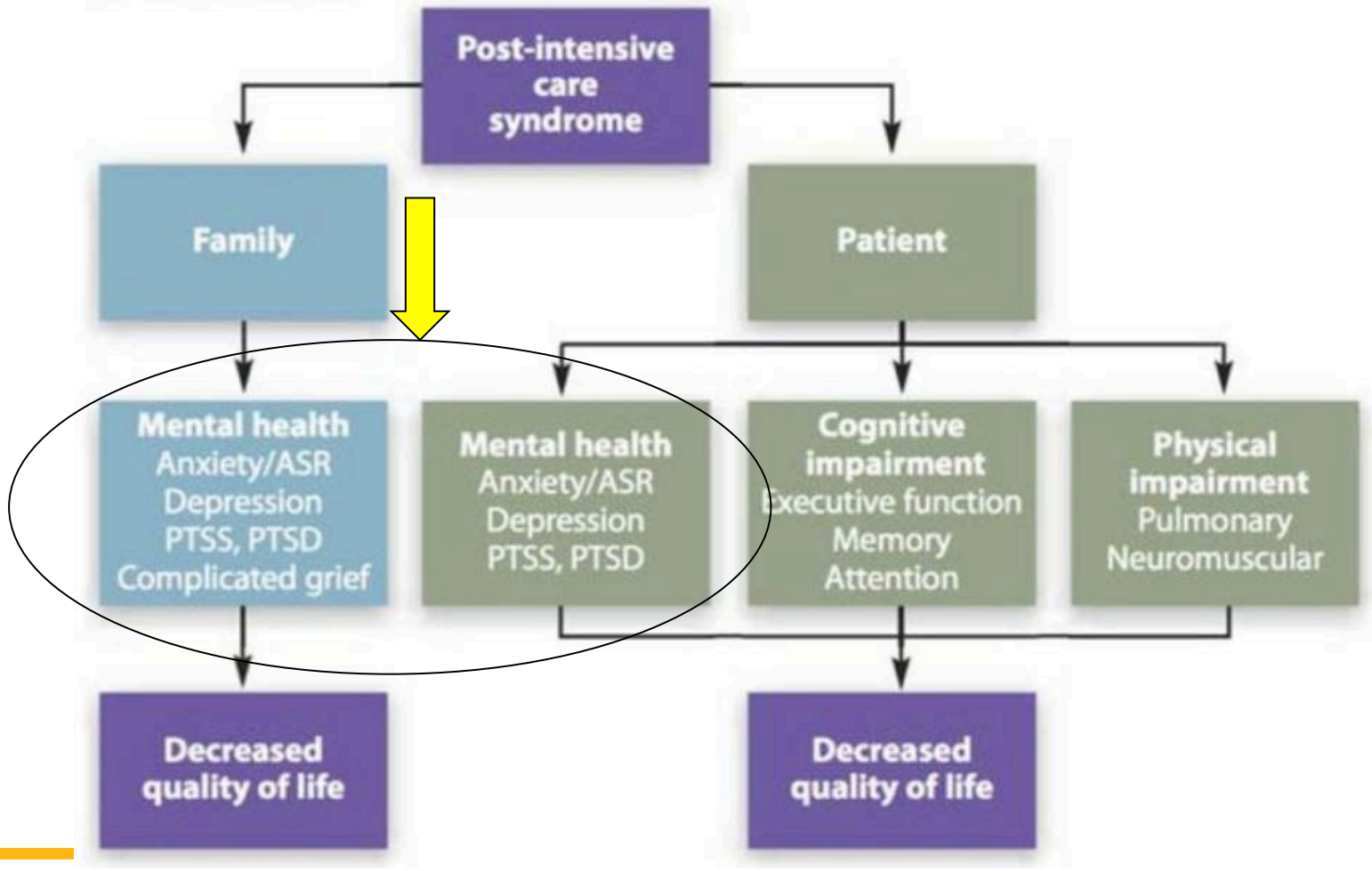


Figure 2. Duration of Delirium and Global Cognition Score at 12 Months.

Post-Intensive Care Syndrome (PICS)

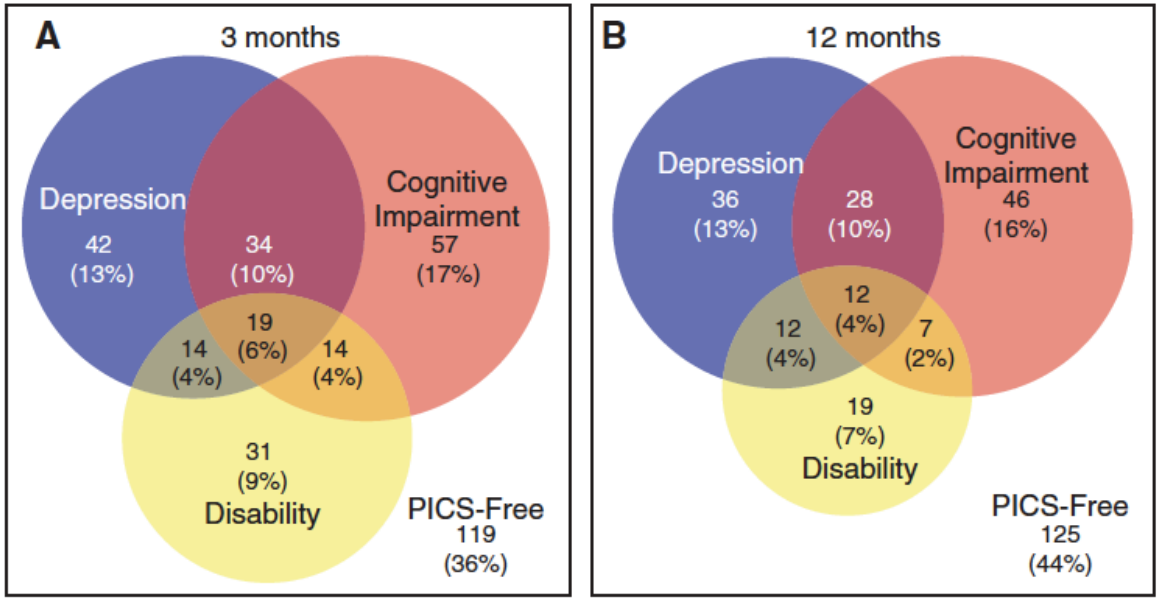


Needham et al. Crit Care Medicine 2012
Davidson et al. Crit Care Medicine 2013

Co-Occurrence of PICS in Survivors

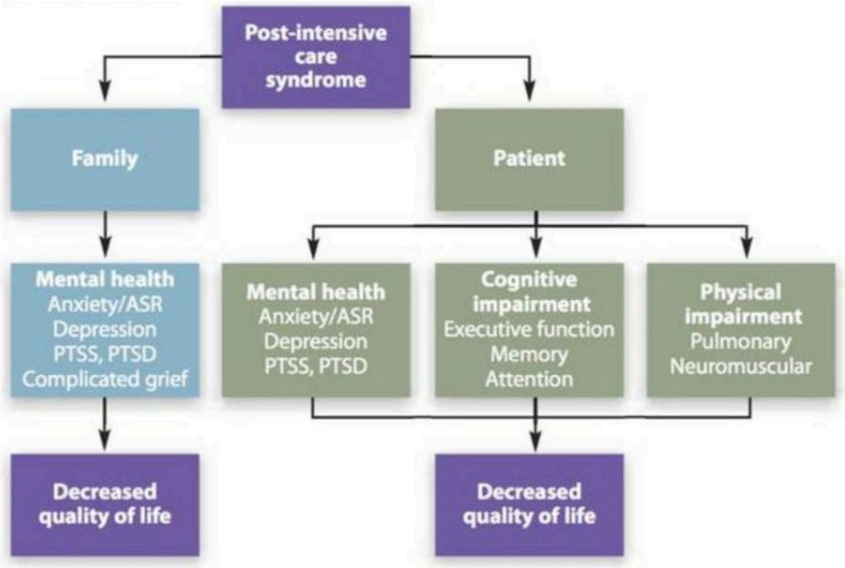
Adult pts discharged from 5 US ICUs:

- One or more PICS problems in 64% (3 mos) and 56% (12 mos)
- Co-occurring problems in 25% (3 mos) and 21% (12 mos)



Summary

- PICS is common and under-recognized
- COVID-19 survivors seem to be at particularly high risk for PICS
- Improving outcomes for our ICU survivors is both a challenge and imperative for the critical care community



Thank You!

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