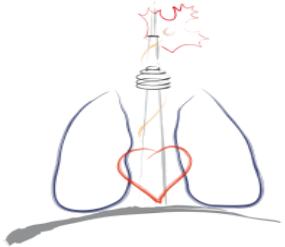


# Accurate Prognostication?

Michael E. Detsky, M.D., M.S.H.P., F.R.C.P.C.

*Assistant Professor of Medicine, University of Toronto*

*Attending Physician, Sinai Health System, Toronto*



# Importance of Prognosis in the ICU

- Prognosis is essential to shared decision making

*Kon AA, et al Crit Care Med, 2016*

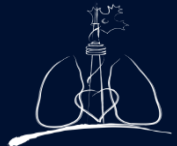
- Families value prognostication, recognize it is imperfect

*Evans LR ,et al. AJRCCM, 2009*

- ICU prognostication influences decision making about withdrawal of life support

*Turnbull AE et al. Crit Care Med, 2014*

*Cook et al, NEJM, 2003*

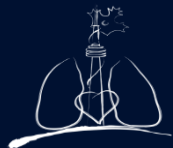


# Accuracy of Predicting ICU Mortality

Mortality predictions in the intensive care unit:  
Comparing physicians with scoring systems\*

Tasnim Sinuff, MD; Neill K. J. Adhikari, MD; Deborah J. Cook, MD; Holger J. Schünemann, PhD;  
Lauren E. Griffith, MSc; Graeme Rocker, MD; Stephen D. Walter, PhD

- Discrimination (area under the ROC curve)
  - Physicians: **0.85**
  - Scoring systems: **0.63**
  - P=0.002



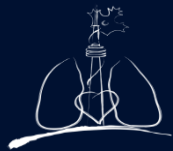
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**Self-fulfilling prophecy?**



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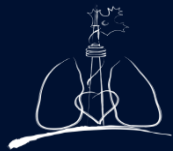
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**Self-fulfilling prophecy?**

**Subjective data?**



# Recognizing other Outcomes

The **NEW ENGLAND**  
**JOURNAL of MEDICINE**

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VOL. 348 NO. 8

## 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

*Herridge MS, et al. N Engl J Med, 2003*

*Elliott D, et al. Crit Care Med, 2014*

## Exploring the Scope of Post-Intensive Care Syndrome Therapy and Care: Engagement of Non-Critical Care Providers and Survivors in a Second Stakeholders Meeting

Doug Elliott, RN, PhD<sup>1</sup>; Judy E. Davidson, DNP, RN, FCCM<sup>2</sup>; Maurene A. Harvey, RN, MPH, MCCM;  
Anita Bemis-Dougherty, PT, DPT, MAS<sup>3</sup>; Ramona O. Hopkins, PhD<sup>4,5</sup>; Theodore J. Iwashyna, MD, PhD<sup>6</sup>;  
Jason Wagner, MD, MSHP<sup>7</sup>; Craig Weinert, MD, MPH<sup>8</sup>; Hannah Wunsch, MD, MSc<sup>9</sup>; O. Joseph  
Bienvenu, MD, PhD<sup>10</sup>; Gary Black, BFA, BS (Ed), Med; Susan Brady, MS, CCC-SPL, BRS-S<sup>11</sup>;



UNIVERSITY OF  
**TORONTO**

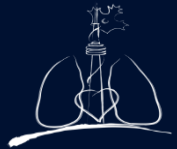
Interdepartmental  
Division of Critical  
Care Medicine



# Objective

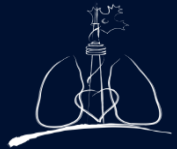
**Determine the discriminative accuracy of physicians and nurses in predicting 6-month mortality and functional outcomes of critically ill patients**

*Detsky ME, et al JAMA, 2017*



# Study Design

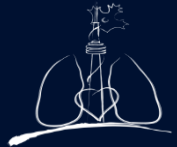
- Prospective cohort study in the Penn Health System
  - 5 ICUs (3 medical, 2 surgical)
- Enrolled patients on days 3-6 of ICU admission
  - Required 48 hours of mechanical ventilation and/or 24 hours of vasoactive infusions
- Enrolled ICU clinicians
  - ICU attending physician
  - ICU bedside nurse





# Predicted Outcomes

- In hospital mortality
- 6 month:
  - Mortality
  - Inability to return to original place of residence
  - Inability to toilet independently
  - Inability to ambulate 10 stairs independently
  - Abnormal Cognition

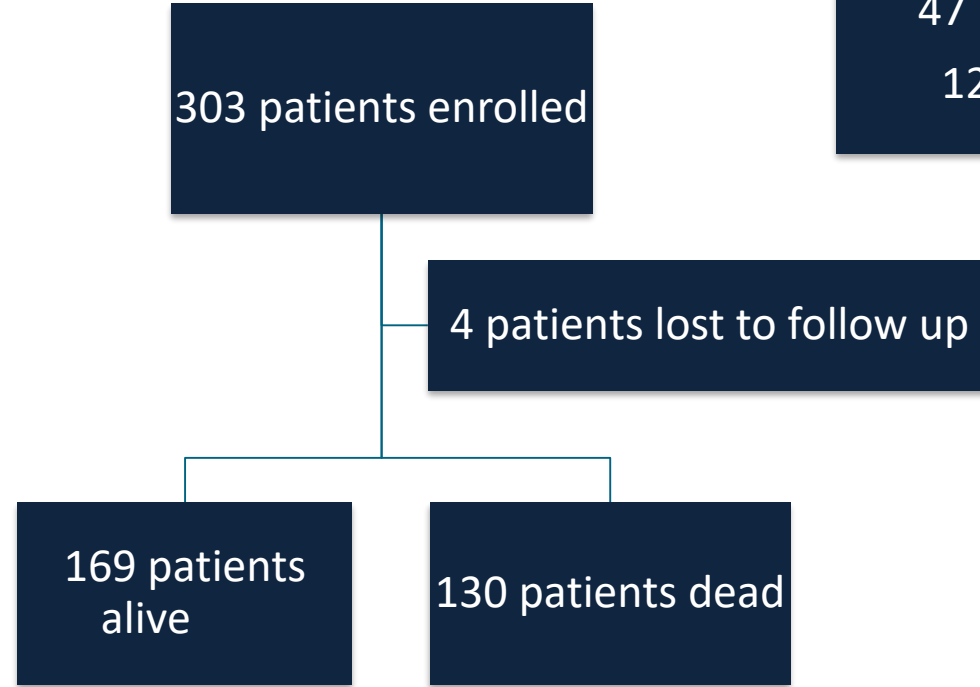


# Predicted Outcomes

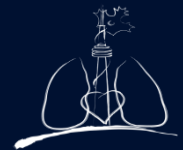
## Each outcome included:

1. Dichotomous response  
(i.e. “Yes” or “No” for each outcome)
2. Confidence in prediction rated on a 1-5 Likert scale  
(1=“not confident at all” to 5=“very confident”)

# Study Overview



47 physicians  
128 nurses



**Table 1. Patient Characteristics**

Characteristic	Patients, No. (%) (n = 303)
Age, median (IQR), y <sup>a</sup>	62 (53-71)
Men <sup>a</sup>	173 (57.1)
Hospitalized in prior year	213 (70.3)
Ability to ambulate up 10 stairs before hospitalization <sup>b</sup>	243 (80.7)
Toileting independently before hospitalization <sup>b</sup>	267 (88.4)
Normal cognition before hospitalization <sup>b</sup>	249 (80.8)
Medical ICU <sup>a</sup>	190 (62.7)
APACHE III score, median (IQR), d <sup>a</sup>	96 (75-120)
ICU length of stay, median (IQR), d <sup>a</sup>	8 (5-14)
Hospital length of stay, median (IQR), d <sup>a</sup>	17 (11-27)
Requiring ventilation <sup>a</sup>	276 (91.1)
Ventilator days, median (IQR) <sup>a</sup>	6 (3-10)
Requiring vasoactive infusions <sup>a</sup>	247 (81.5)

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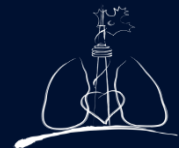
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# Likelihood Ratios (LRs)

- LR positive represents predictions of adverse outcomes
- LR negative represents predictions of favourable outcomes

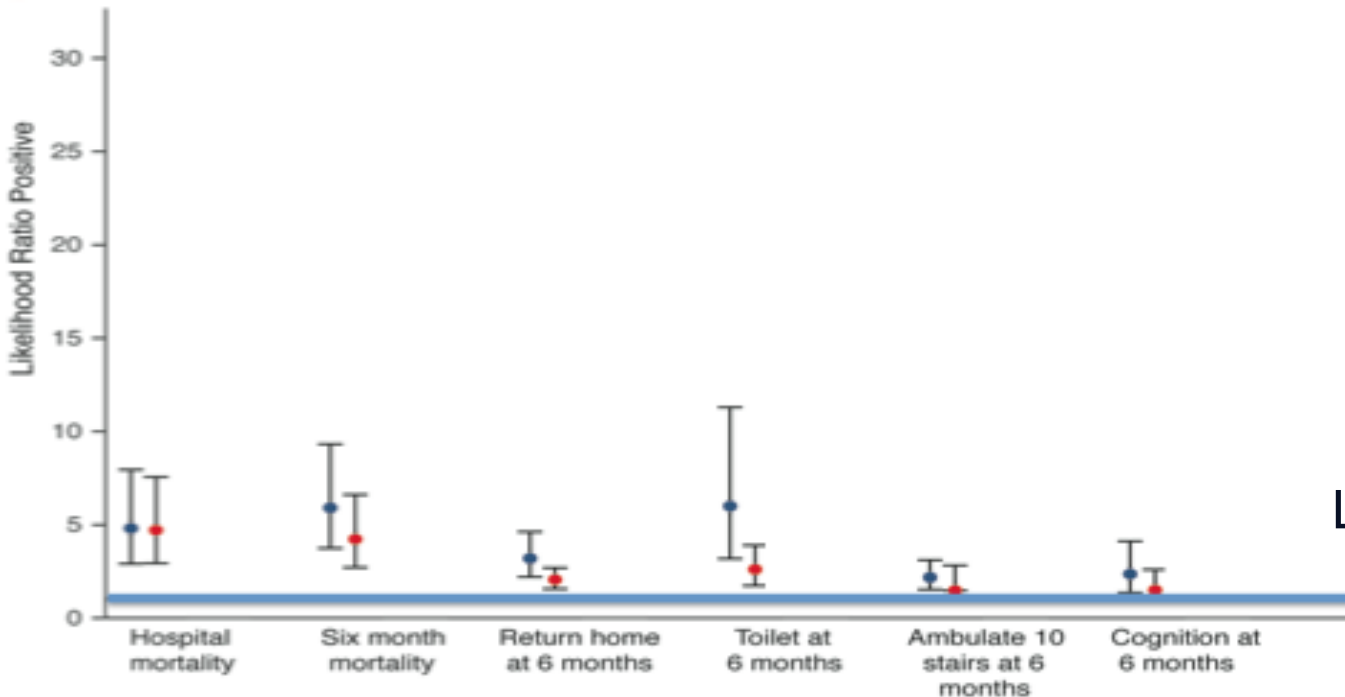
	LR positive	LR negative
Excellent	>10	<0.1
Good	5-10	0.1-0.4
OK	2-5	0.4-0.8
Useless	1	1





# All Predictions of Adverse Outcomes

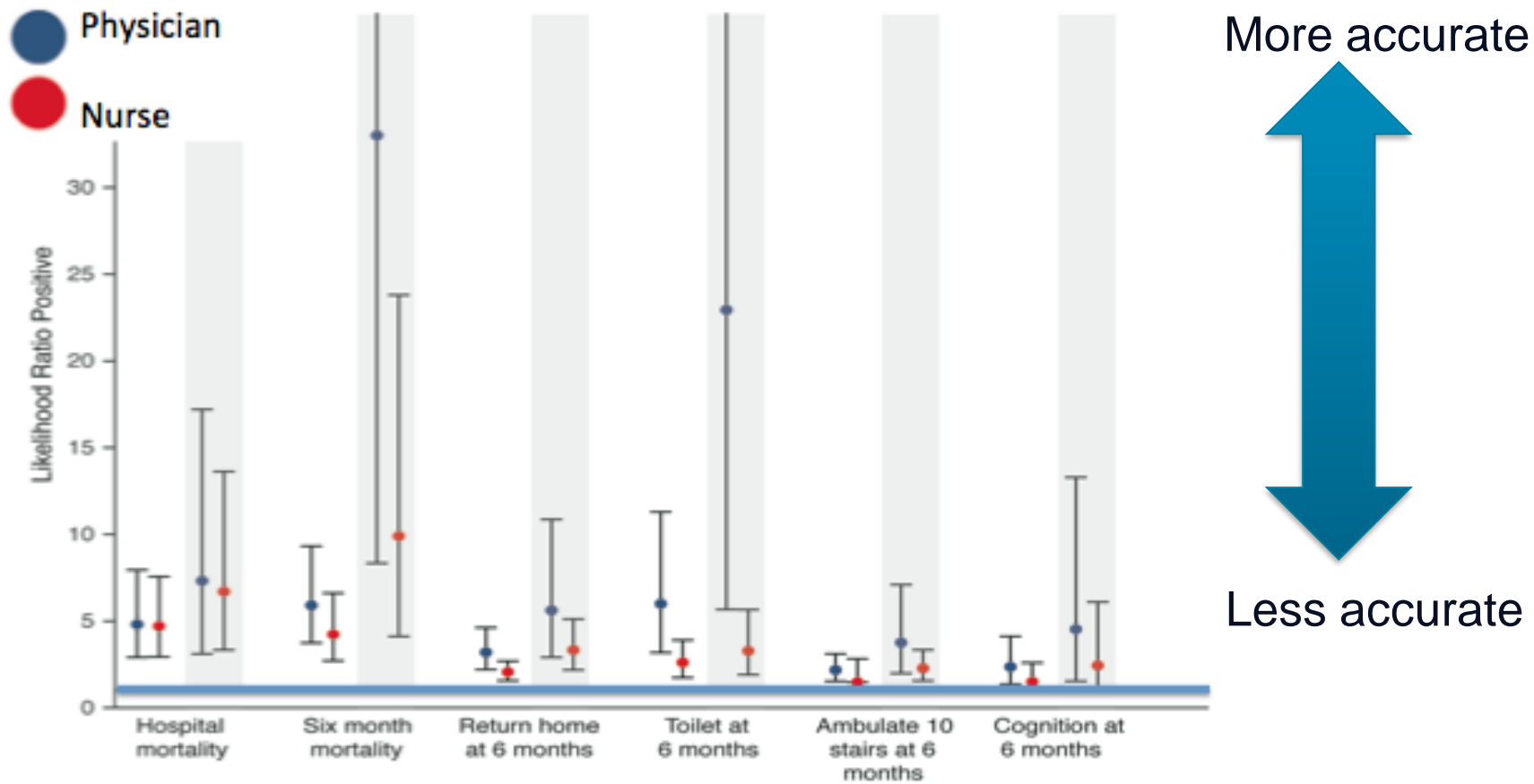
● Physician  
● Nurse



More accurate

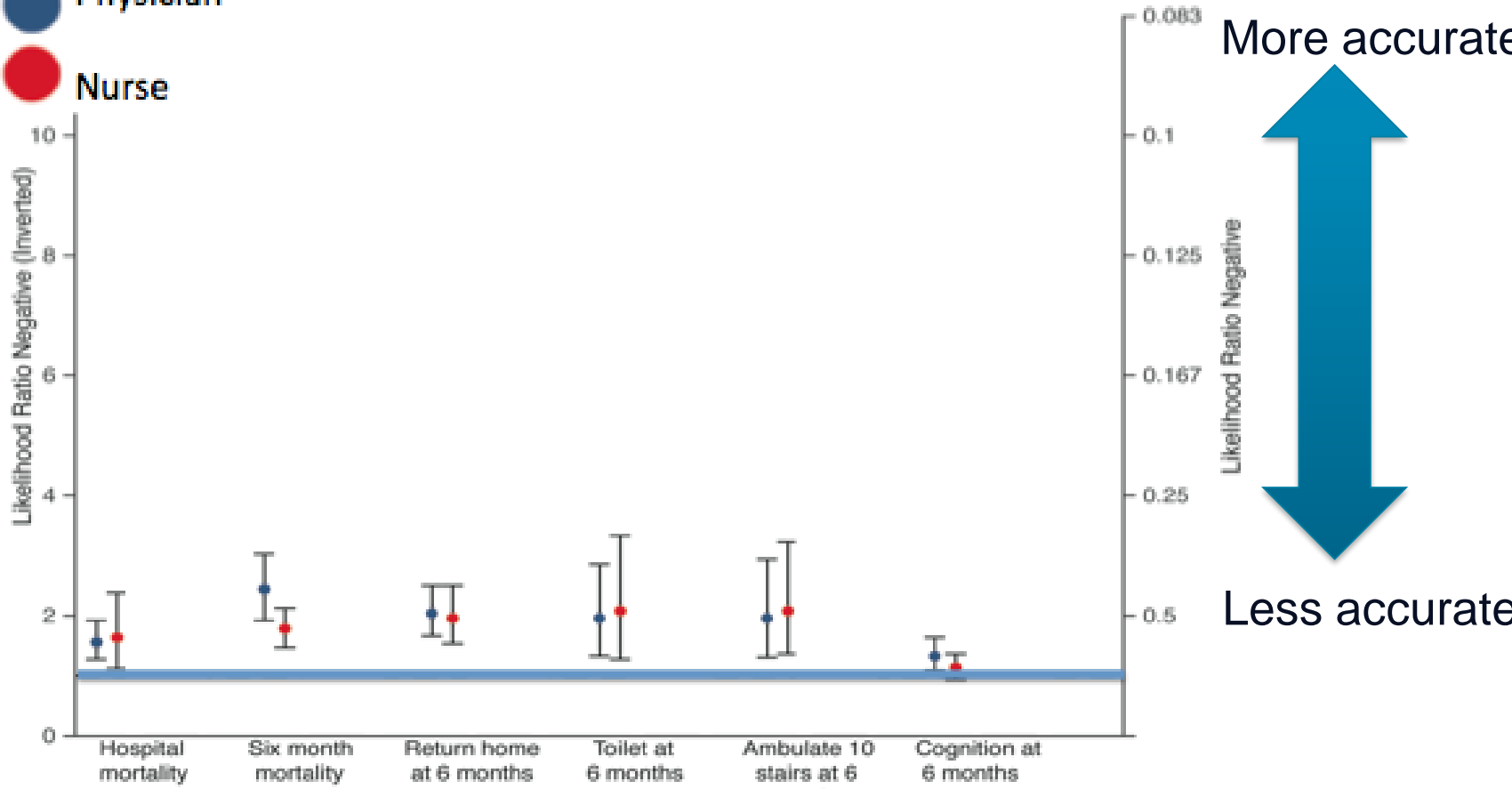
Less accurate

# Confident Predictions of Adverse Outcomes

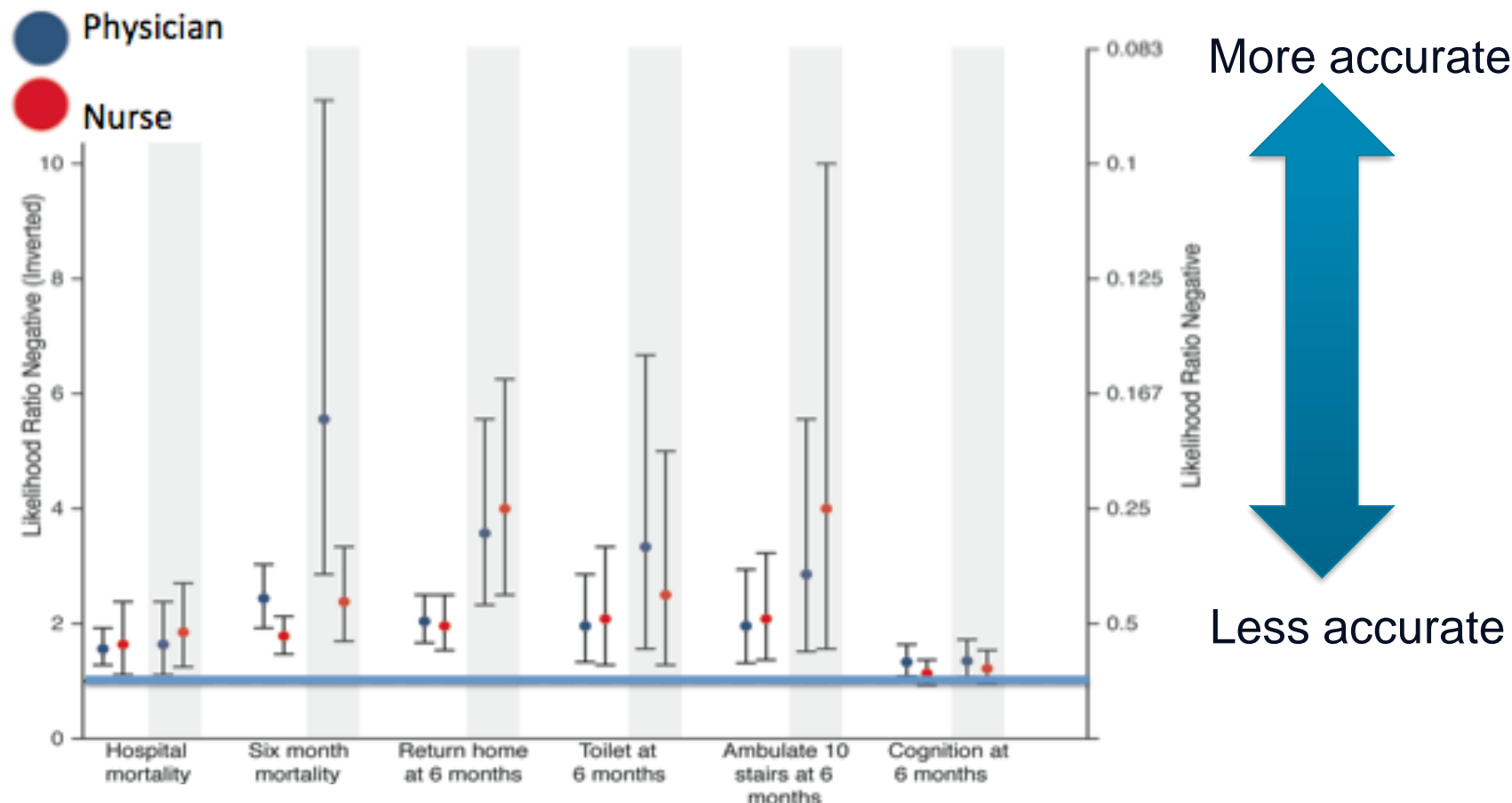


# All Predictions of Favorable Outcomes

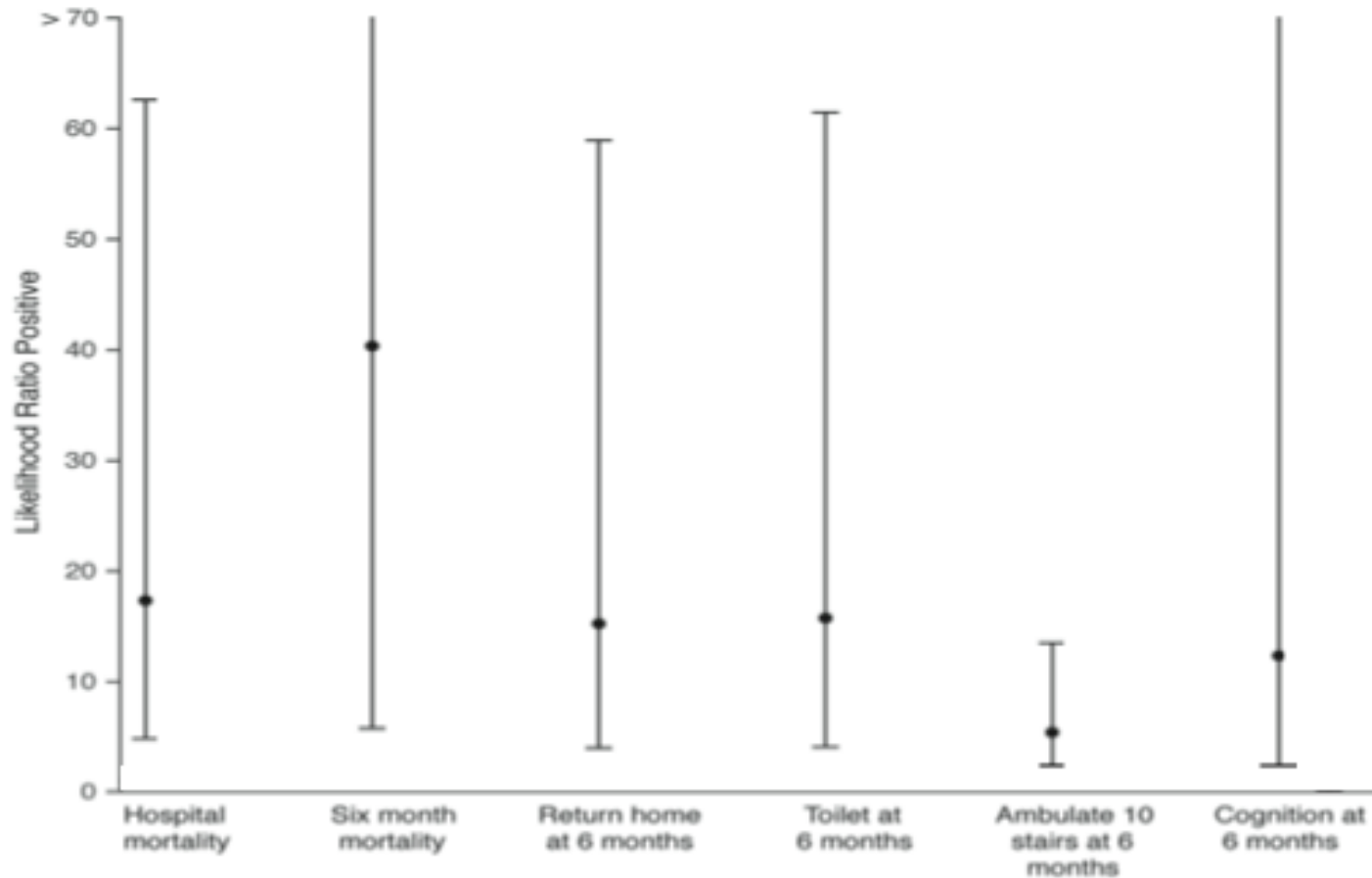
- Physician
- Nurse



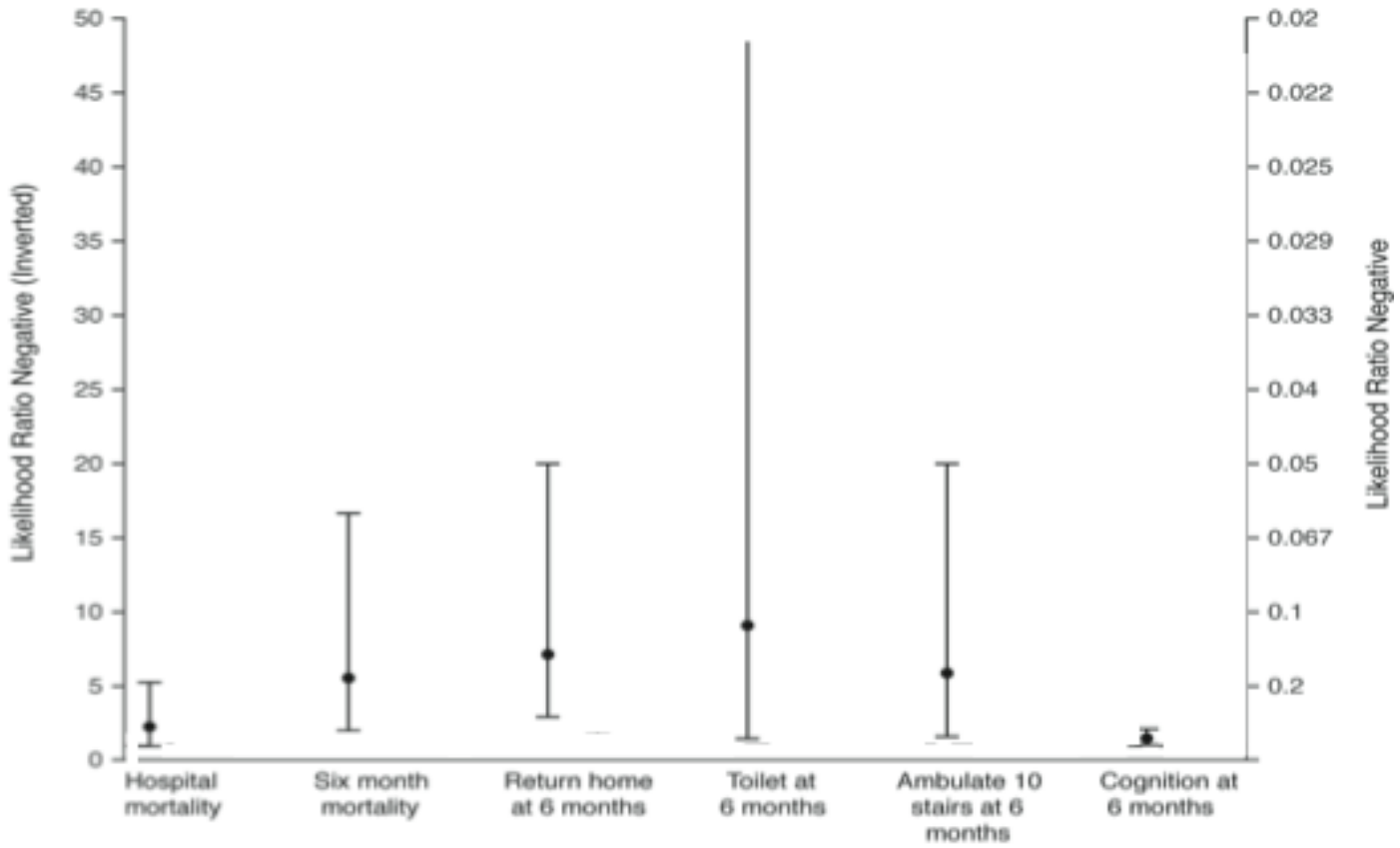
# Confident Predictions of Favorable Outcomes



# Concordant Predictions of Adverse Outcomes

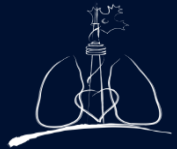


# Concordant Predictions of Favorable Outcomes



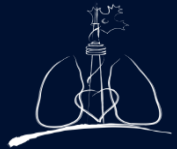
# Physicians and Nurses

- Agreement was fair to moderate
  - Kappa scores ranged from 0.32 to 0.51
- Physicians were more optimistic than nurses
  - Return to original place of residence ( $p=0.0024$ )
  - Toileting independently ( $p<0.0001$ )



# Limitations

- Focused on discrimination but did not assess calibration
- Assessments made on ICU days 3-6, may be too early to predict accurately
- Outcomes verified by telephone by patient or surrogate





# Implications

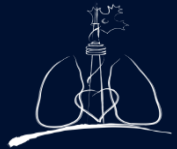
**Discriminative accuracy varies, depending on:**

1. The outcome being predicted

# Implications

**Discriminative accuracy varies, depending on:**

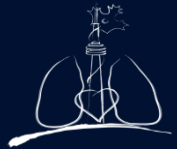
1. The outcome being predicted
2. The confidence of the predictor



# Implications

**Discriminative accuracy varies, depending on:**

1. The outcome being predicted
2. The confidence of the predictor
3. The concordance of physician and nurse



# Acknowledgments

Dominique Bayard

Anna Buehler

Isabella Ciuffetelli

Beth Cooney

Aaron Delman

Nicole Gabler

Scott Halpern

Michael Harhay

Saida Kent

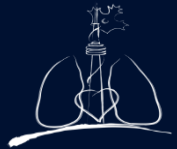
Mark Mikkelsen

Sarah Ratcliffe

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Special thanks to the participants  
of the study



# Thank You.

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