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Goals of the Conference

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Clinical Service Chief, Division of Pulmonary, Critical Care Medicine and Sleep
Medical Director of Respiratory Care and Pulmonary Function Laboratory
University of California, San Diego

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Why define "respiratory compromise"?

- Respiratory illness is just another reason for hospitalization
- The care of patients who are worsening is obvious
- Existing "rescue systems" are already adequate
  - ICU
  - Rapid response teams
- My hospital won't benefit by focusing on respiratory patients at risk of respiratory failure

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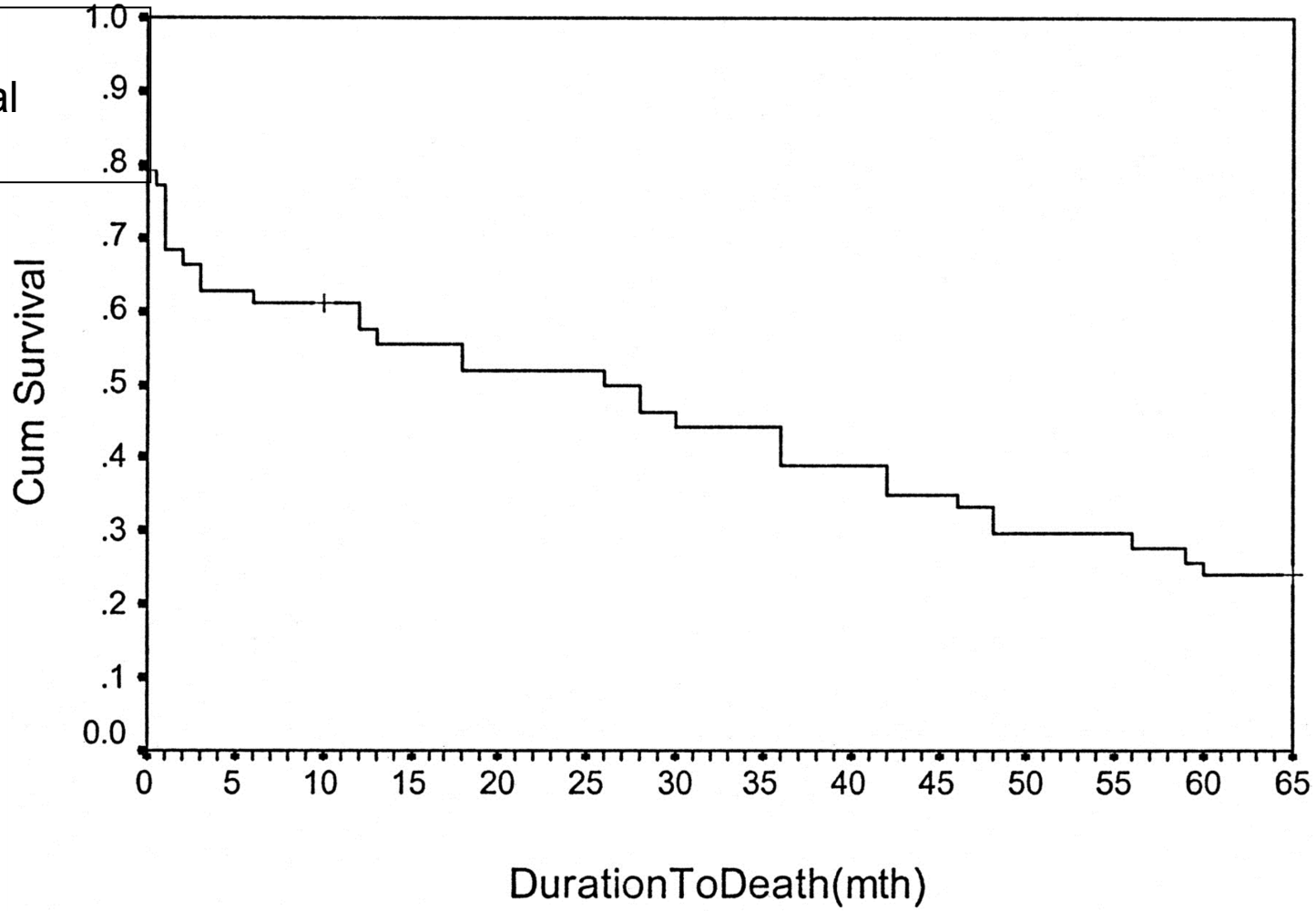
Survival of COPD patients in resp failure admitted to ICU

24.5% in-hospital mortality



1. Ai-Ping, et al. In-hospital and 5-year mortality of patients treated in the ICU for acute exacerbation of COPD: a retrospective study. Journal/Chest. 128(2)518-524

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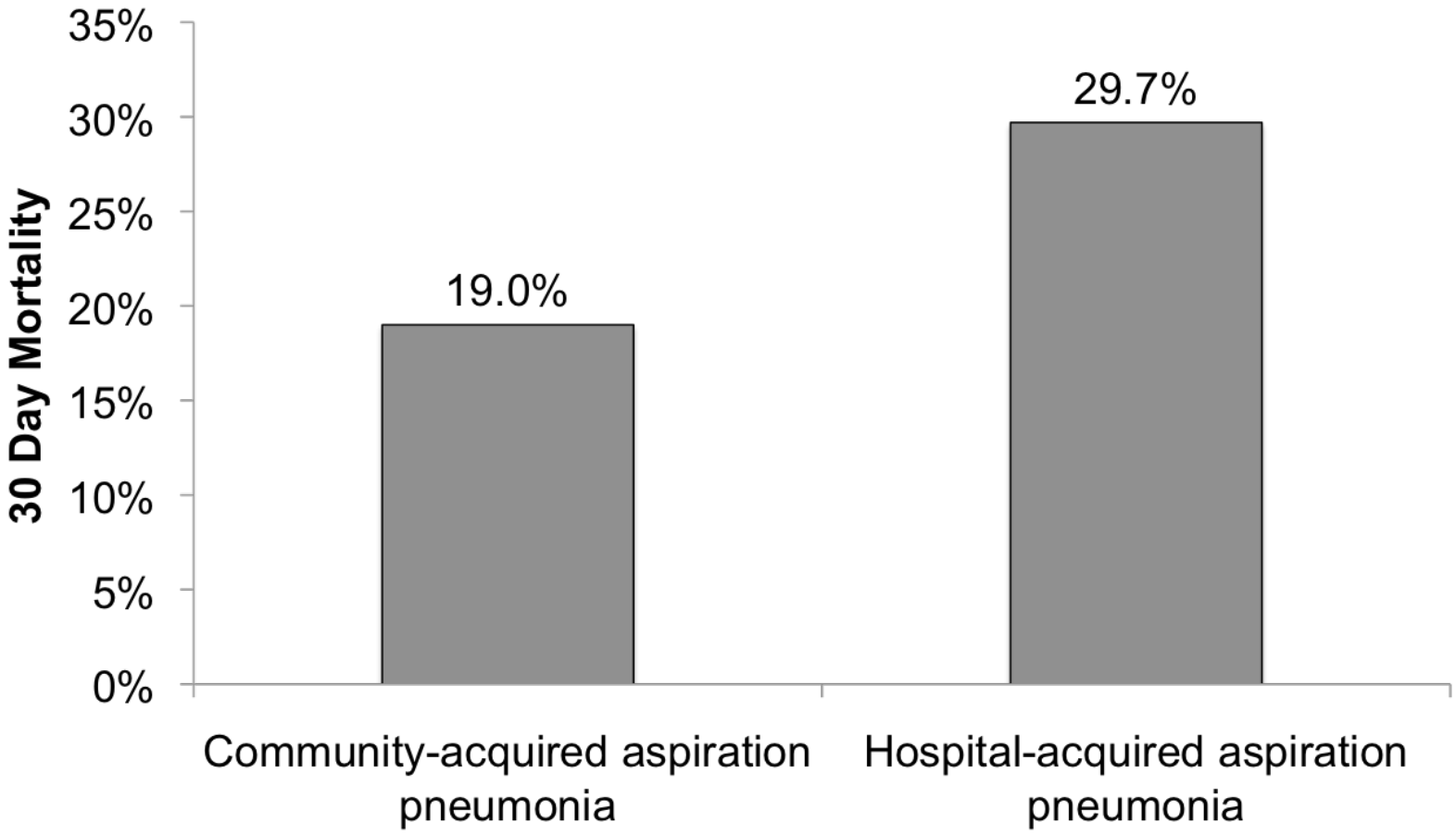
Aspiration Pneumonia in Hospitalized Patients



1. Lanspa, et al. Mortality, morbidity, and disease severity of patients with aspiration pneumonia. Journal/Journal of hospital medicine : an official publication of the Society of Hospital Medicine. 2013. 8(2)83-90

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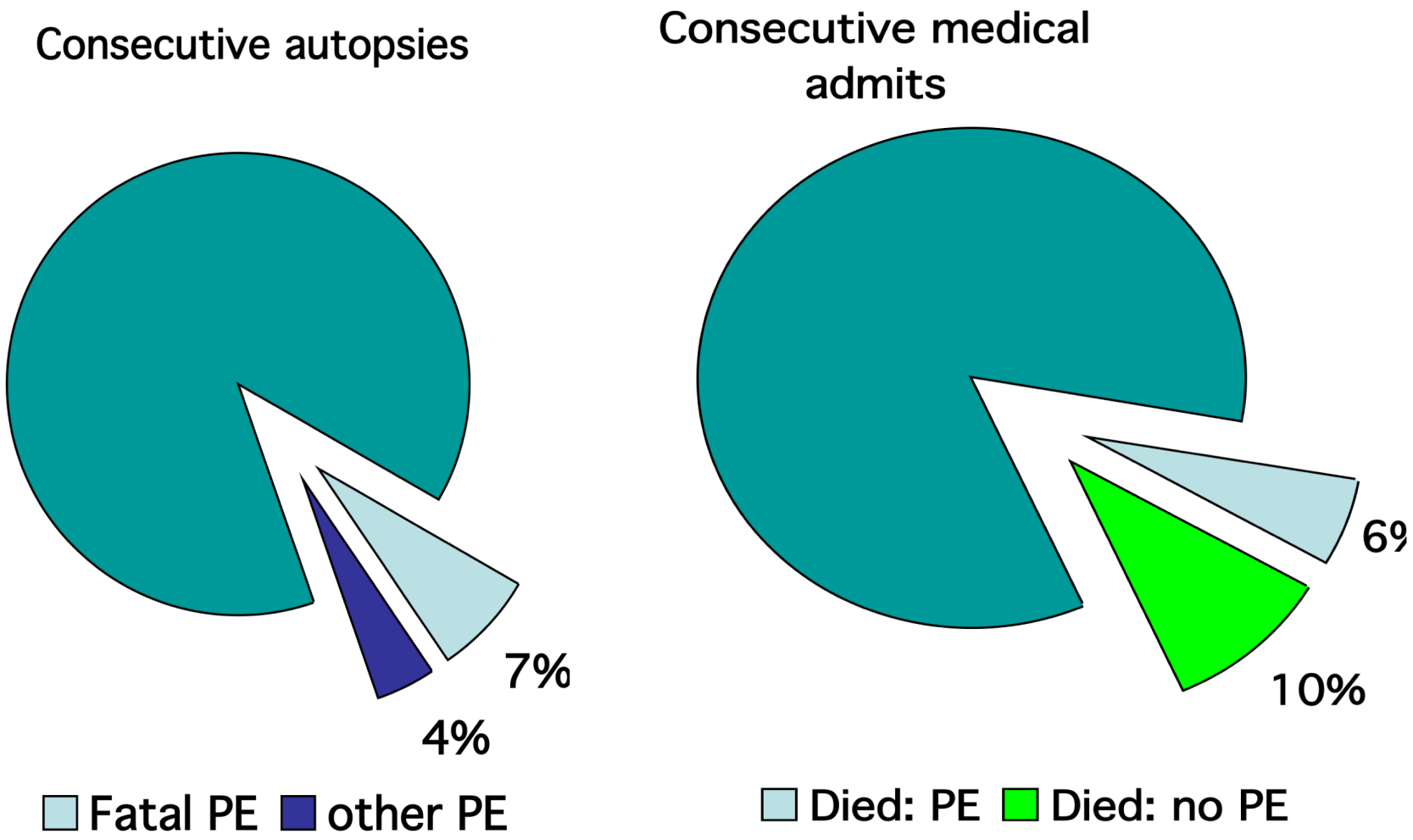
Pulmonary embolism as a cause of inpatient death



Baglin et al. J Clin Path 1997

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IDSA/ATS criteria for CAP severity

- Minor criteria
  - Respiratory rate ≥30 breaths/min
  - PaO2/FiO2 ratio ≤250
  - Multilobar infiltrates
  - Confusion/disorientation
  - Uremia
  - Leukopenia
  - Thrombocytopenia
  - Hypothermia
  - Hypotension requiring aggressive fluid resuscitation

1. IDSA/ATS Guidelines for CAP in Adults

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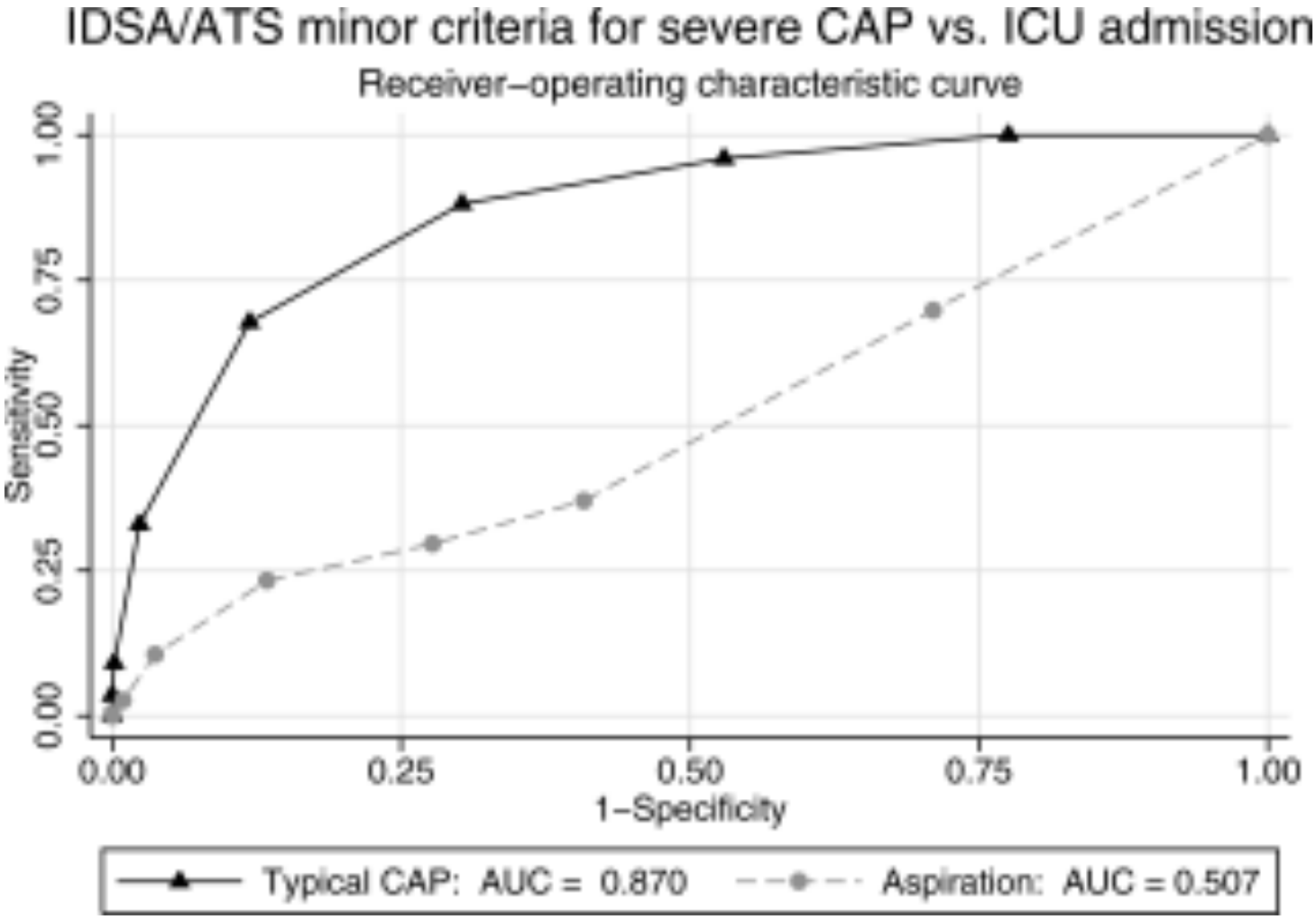
IDSA/ATS CAP criteria doesn't work well for aspiration



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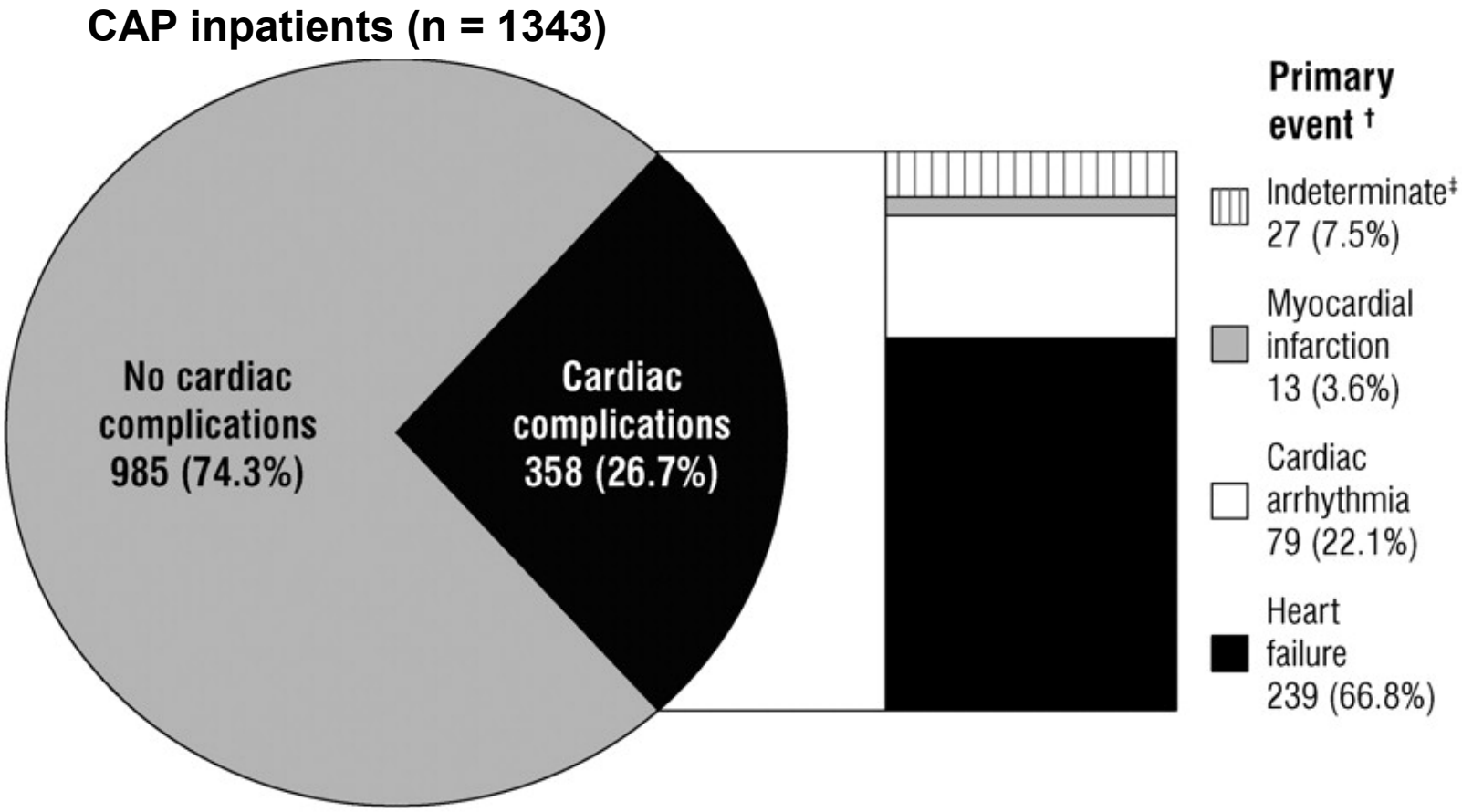
Complications in respiratory patients might not be respiratory!



1. Corrales-Medina, et al. Cardiac complications in patients with community-acquired pneumonia: incidence, timing, risk factors, and association with short-term mortality. Journal/Circulation. 2012. 125(6)773-781

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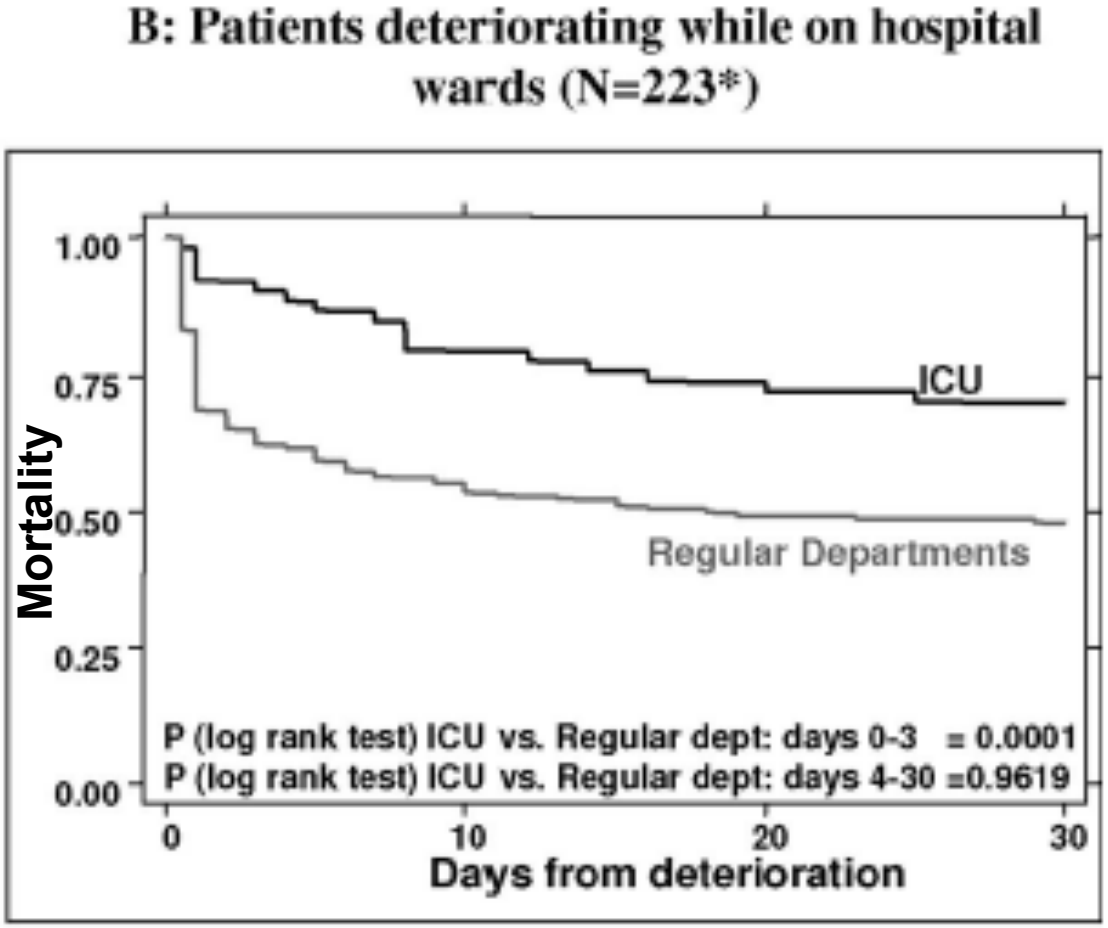
Mortality is worse if deterioration does not lead to change in care



1. Simchen E, Sprung CL, Galai N, Zitser-Gurevich Y, Bar-Lavi Y, Levi L, Zveibil F, Mandel M, Mnatzaganian G, Goldschmidt N, Ekka-Zohar A, Weiss-Salz I. Survival of critically ill patients hospitalized in and out of intensive care. *Crit Care Med.* 2007;35(2): 449-457.

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Early intervention is best; but better late than never

Table 4. Multivariate analysis of the effect of admission into intensive care unit (ICU) on 30-day mortality, adjusting for interdepartmental differences in risk for mortality (Cox model)

Variable	Category	Hazard Ratio	*p* Value
Effect of department on mortality			
During early period (0–3 days)			
	ICU	0.262	.000
	Specialized care unit	0.308	.000
	Regular department (ref.)	1.000	(Ref.)
During late period (4–30 days)			
	ICU	1.083	.84
	Specialized care unit	0.405	.005
	Regular department (ref.)	1.000	(Ref.)

1. Simchen E, Sprung CL, Galai N, Zitser-Gurevich Y, Bar-Lavi Y, Levi L, Zveibil F, Mandel M, Mnatzaganian G, Goldschmidt N, Ekka-Zohar A, Weiss-Salz I. Survival of critically ill patients hospitalized in and out of intensive care. *Crit Care Med.* 2007;35(2): 449-457.

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ICU Admission Criteria: Respiratory

- Acute respiratory failure requiring ventilatory support
- Pulmonary emboli with hemodynamic instability
- Patients in an intermediate care unit who are demonstrating respiratory deterioration
- Need for nursing/respiratory care not available in lesser care areas such as floor / IMU
- Massive hemoptysis
- Respiratory failure with imminent intubation

1. Guidelines for intensive care unit admission, discharge, and triage. Task Force of the American College of Critical Care Medicine, Society of Critical Care Medicine. Crit Care Med. 1999;27:633-638. "**Retired**" Revision Underway

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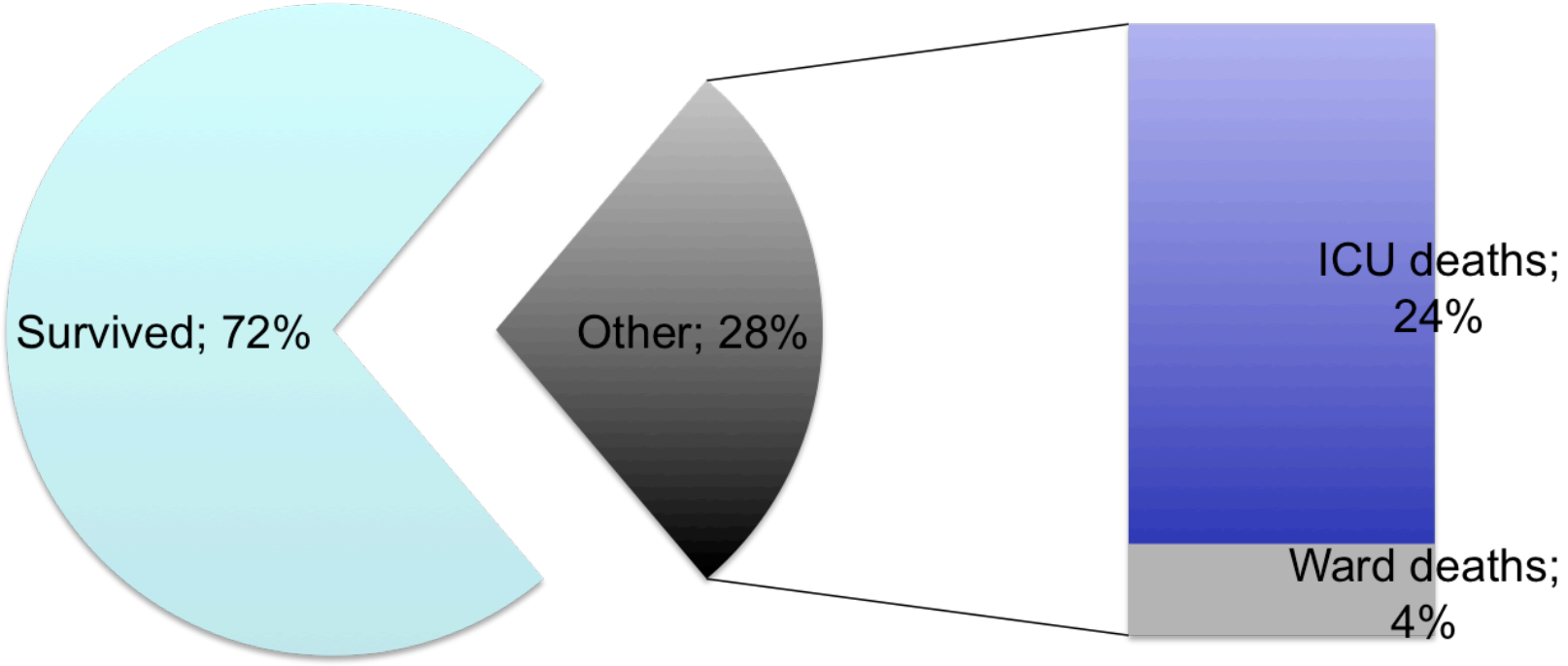
Severe CAP



1. Sirvent, et al. Predictive factors of mortality in severe community-acquired pneumonia: a model with data on the first 24h of ICU admission. Journal/Medicina intensiva / Sociedad Espanola de Medicina Intensiva y Unidades Coronarias. 2013. 37(5)308-315

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Severity scores and mortality

Table 5 SAPS II and pneumonia severity scores on hospital admission.[a]

Characteristics	Non-survivors at 28 d ($N = 56$)	Survivors at 28 d ($N = 186$)	Odds ratio or mean difference (95%CI)[b]	p value
SAPS II				
SAPS II, points	50.3 ± 15.7	33.2 ± 13.0	17.0 (12.9–21.2)	<0.001
PSI				
PSI, total points	153.7 ± 38.7	113.8 ± 38.8	39.9 (28.2–51.5)	<0.001
PSI risk classes I, II and III	6 (10.7)	51 (27.4)		
PSI risk classes IV and V	50 (89.3)	135 (72.6)	3.1 (1.3–7.8)	0.01
CURB				
CURB scores 1 and 2	24 (42.9)	144 (77.4)		
CURB scores 3 and 4	32 (57.1)	42 (22.6)	4.6 (2.4–8.6)	<0.001
CURB 65				
CURB 65 scores 1 and 2	18 (32.1)	123 (66.1)		
CURB 65 scores 3, 4 and 5	38 (67.9)	63 (33.9)	4.1 (2.1–7.8)	<0.001

[a] Data are expressed as no. (%) or mean (SD).
[b] Odds ratios are reported for mortality at 28-days and mean differences are reported for quantitative variables.

1. Sirvent, et al. Predictive factors of mortality in severe community-acquired pneumonia: a model with data on the first 24h of ICU admission. Journal/Medicina intensiva / Sociedad Espanola de Medicina Intensiva y Unidades Coronarias. 2013. 37(5)308-315

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CURB-65

One point each for:

- **C**onfusion of new onset
- Blood **U**rea nitrogen greater than 19 mg/dL
- **R**espiratory rate of 30 bpm or greater
- S**B**P< 90 mmHg systolic or DBP< 60 mmHg
- age **65** or older

1. Lim WS, van der Eerden MM, Laing R, et al. (2003). "Defining community acquired pneumonia severity on presentation to hospital: an international derivation and validation study". Thorax 58 (5): 377–82. doi:10.1136/thorax.58.5.377. PMC 1746657. PMID 12728155.

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Rapid Response Criteria

- Any staff member (nurse, physical therapist, respiratory therapist, physician) is worried about the patient
- Acute change in heart rate <40 or >130 bpm
- Acute change in systolic blood pressure <90 mmHg
- Acute change in respiratory rate <8 or >28 per min
- Acute change in saturation <90 percent despite O2
- Acute change in conscious state
- Acute change in urinary output to <50 ml in 4 hours

Institute for Healthcare Improvement.
http://www.ihi.org/resources/Pages/Changes/EstablishCriteriaforActivatingtheRapidResponseTeam.aspx

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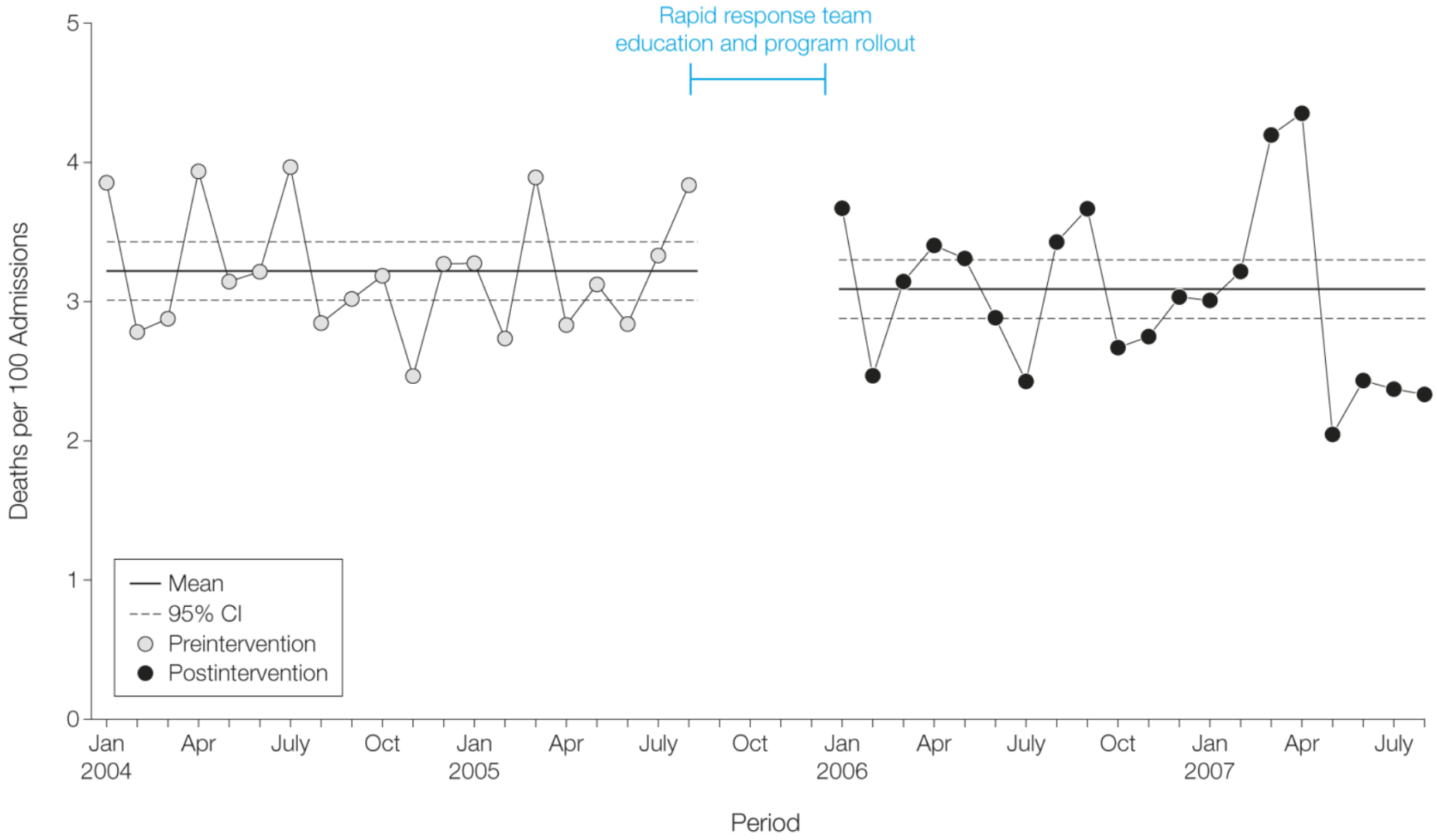
RRTs may not change mortality rates



1. Chan, et al. Hospital-wide code rates and mortality before and after implementation of a rapid response team. Journal/JAMA : the journal of the American Medical Association. 2008. 300(21)2506-2513

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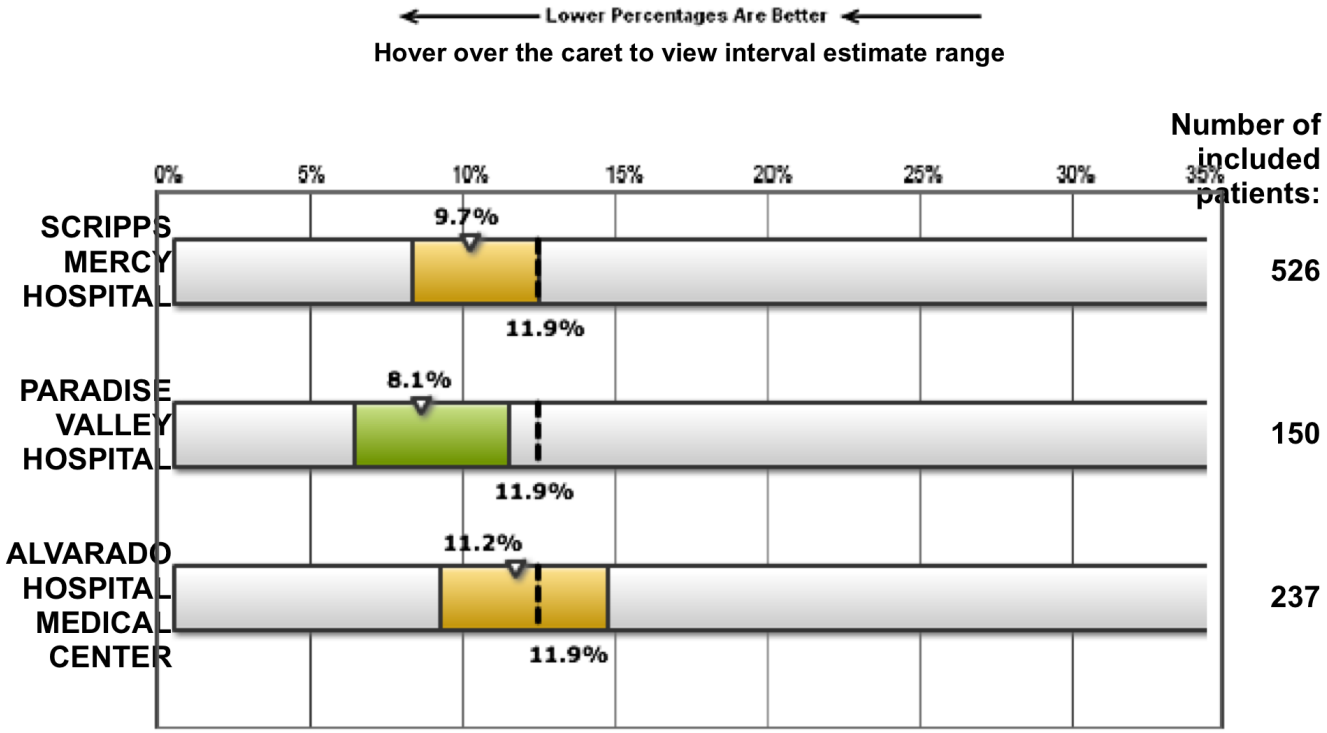
Hospital Risk-Adjusted Mortality Rates

Death rate for pneumonia patients

Why is this important?

Hide Graph



1. http://www.medicare.gov/hospitalcompare/compare.html#vwgrph=1&cmprTab=3&cmprID=050077%2C050024%2C050757&cmprDist=0.5%2C8.3%2C8.4&dist=25&loc=92103&lat=32.749789&lng=-117.1676501&AspxAutoDetectCookieSupport=1

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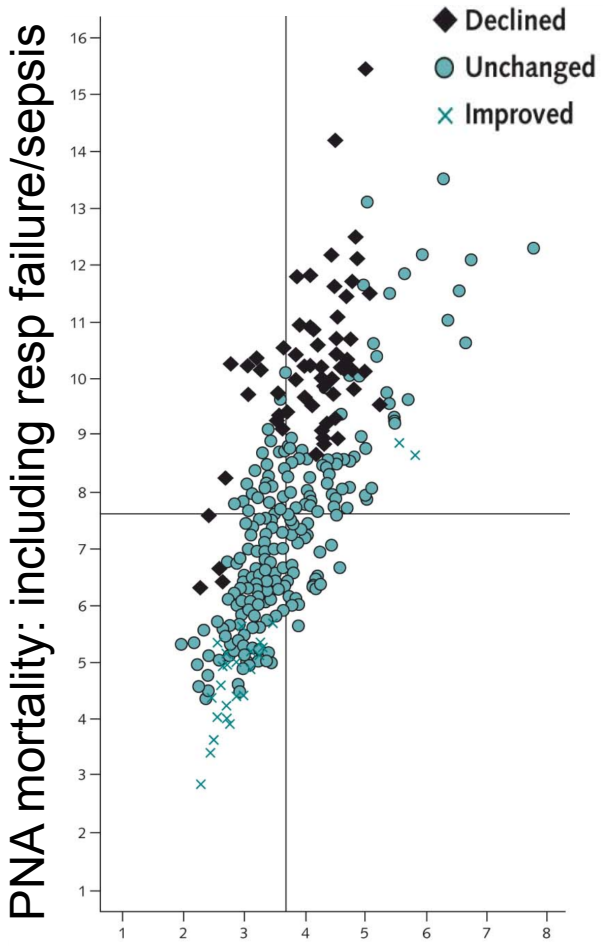
Effect of defining “pneumonia” to include “resp failure/sepsis”



1. Rothberg MB, Pekow PS, Priya A, Lindenauer PK. Variation in diagnostic coding of patients with pneumonia and its association with hospital risk-standardized mortality rates: a cross-sectional analysis. *Ann Intern Med.* 2014;160(6):380-388.

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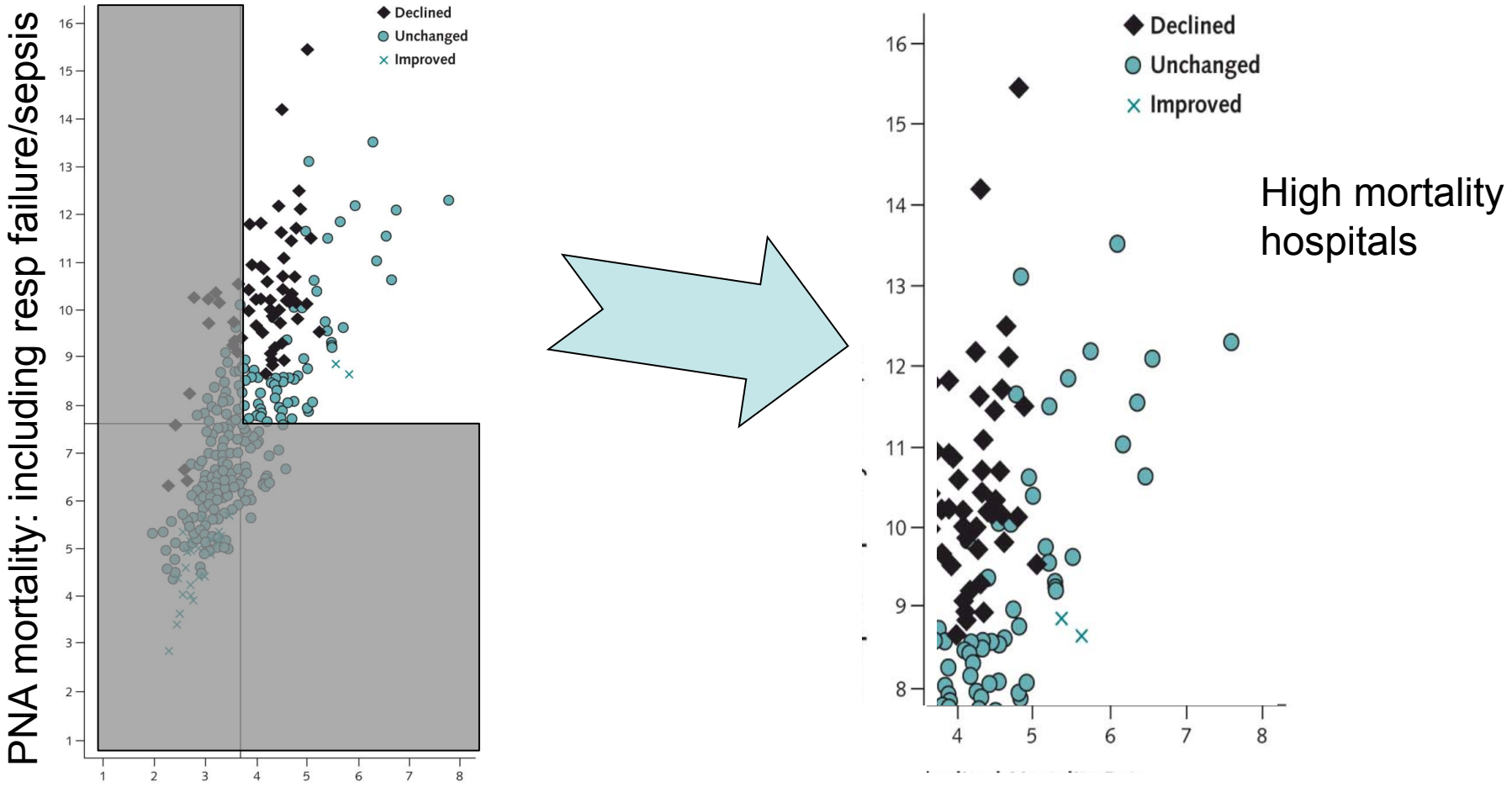

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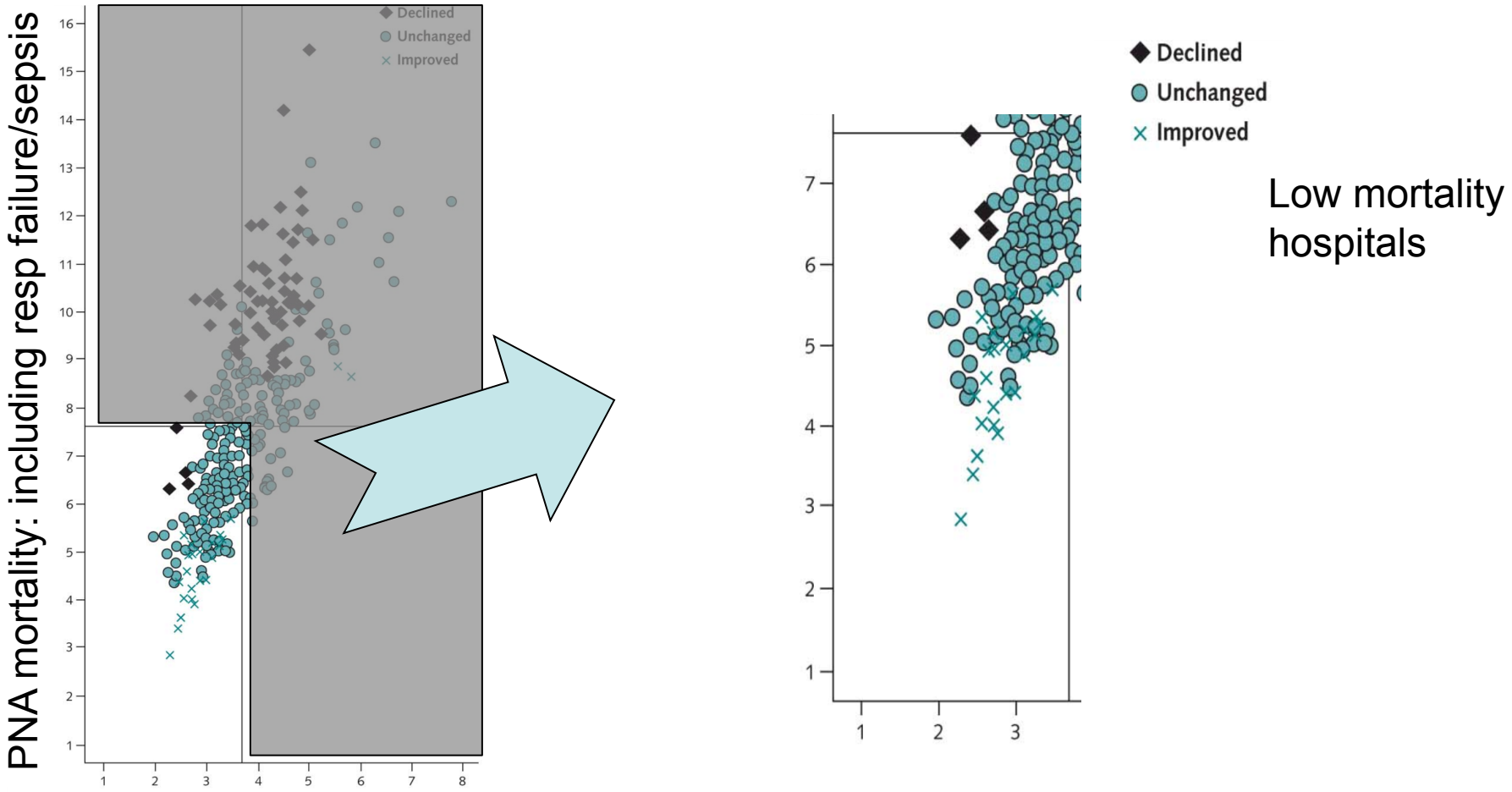

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Conclusions

- Respiratory illness hospitalizations can be high risk
- Respiratory patients deteriorate in a variety of ways
- Rescue systems neglect important signals
- Opportunity to benefit patients and hospitals

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Presumption

- Compromise *temporally* precedes failure

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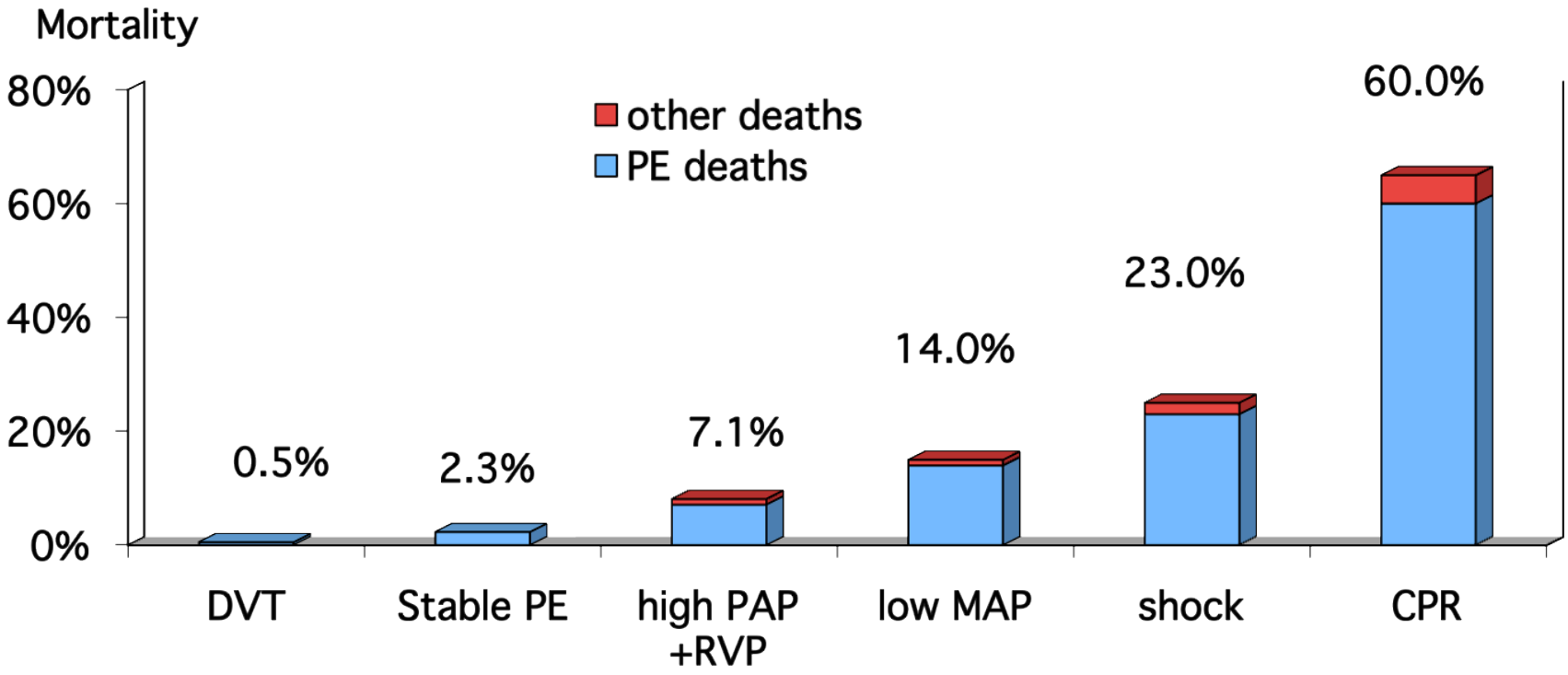
Mortality from pulmonary embolism



1. Douketis. JAMA 1998; 279:458-62
2. Kasper, et al. J Am Coll Cardiol, 1997

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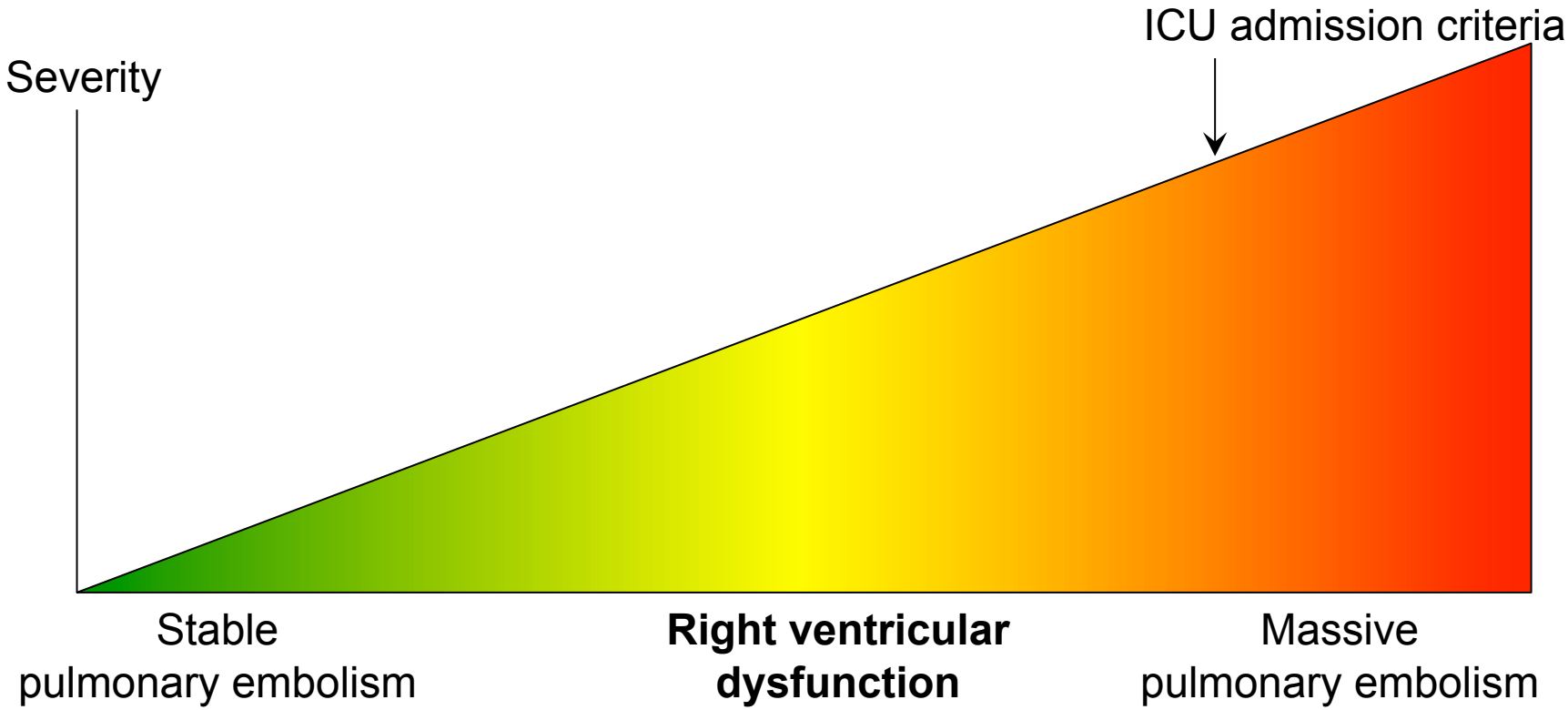
Pulmonary Embolism



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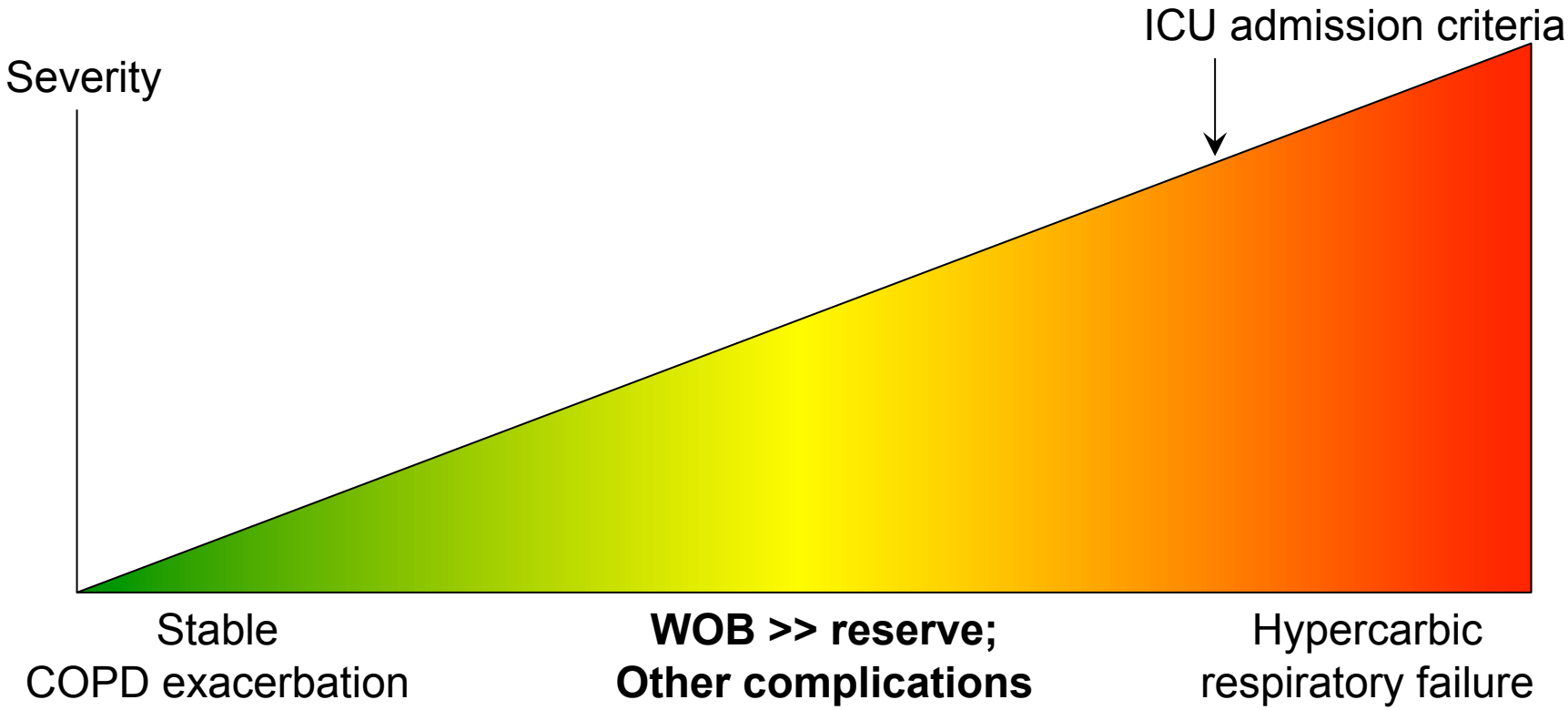
COPD exacerbation



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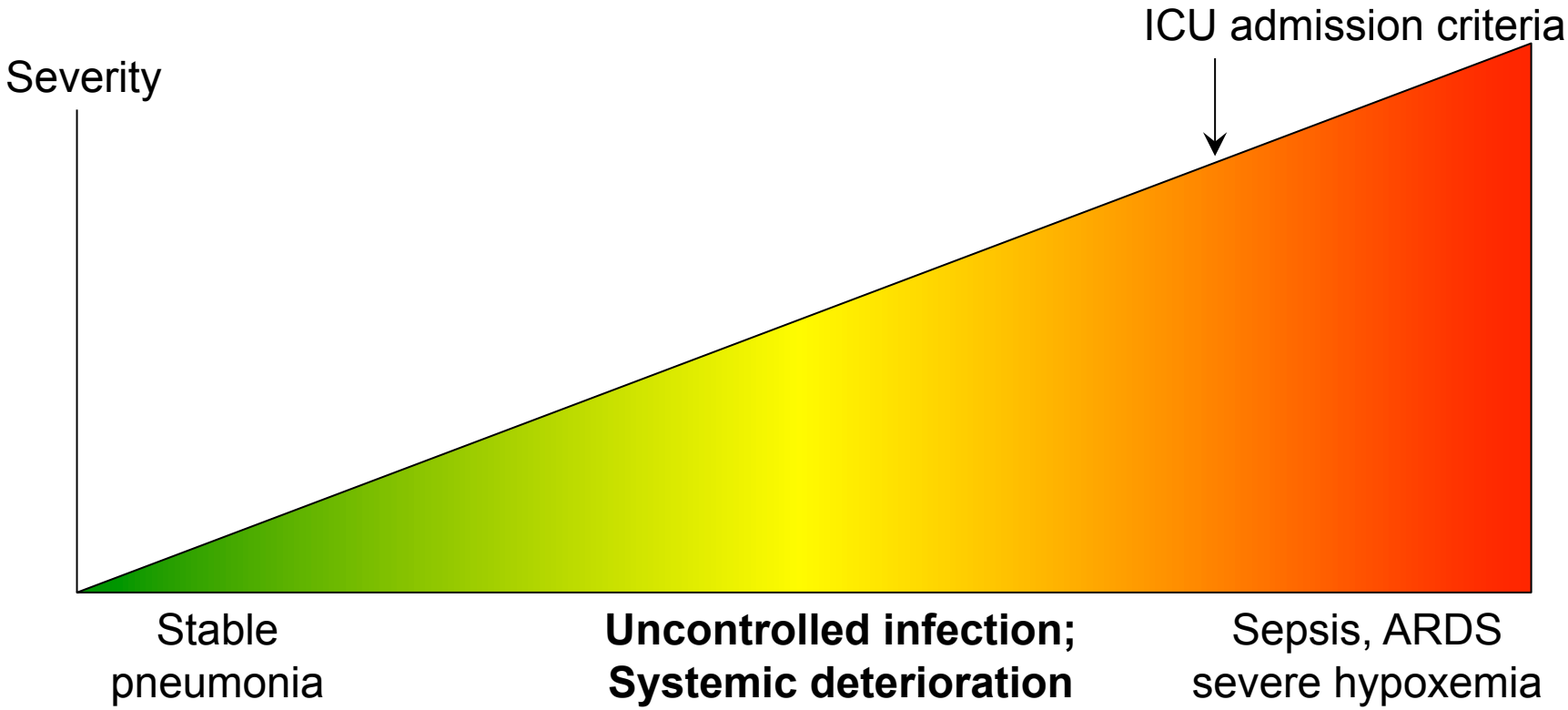
Community acquired pneumonia



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Presumptions

- Compromise *temporally* precedes failure
- Respiratory compromises of different etiologies have important similarities

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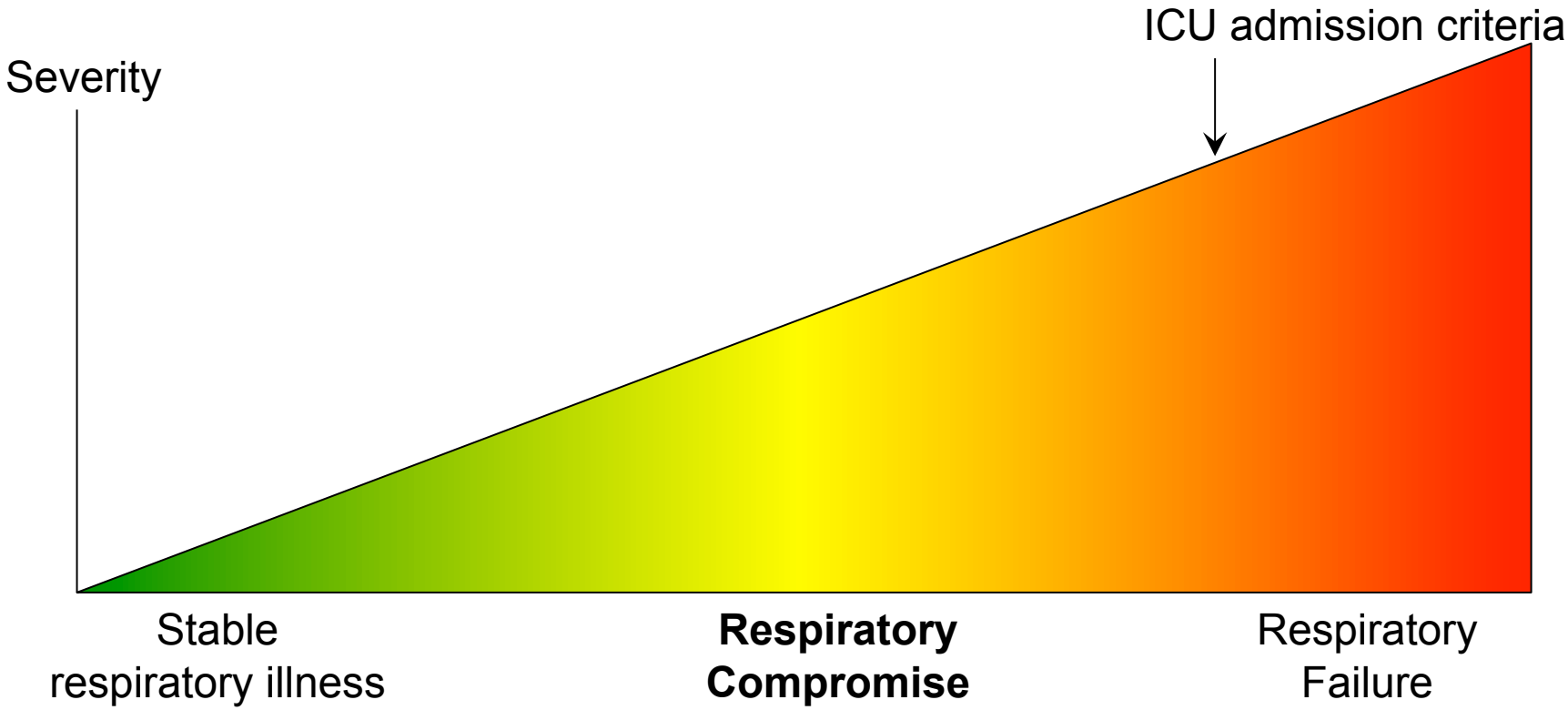
Respiratory Illness



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- Compromise *temporally* precedes failure
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  - Or at least subgroups have similarities

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Presumptions

- Compromise *temporally* precedes failure
- Respiratory compromises of different etiologies have important similarities
  - Or at least subgroups have similarities
- Data can be used to identify discrete clinical points at which special observation and interventions might be helpful.

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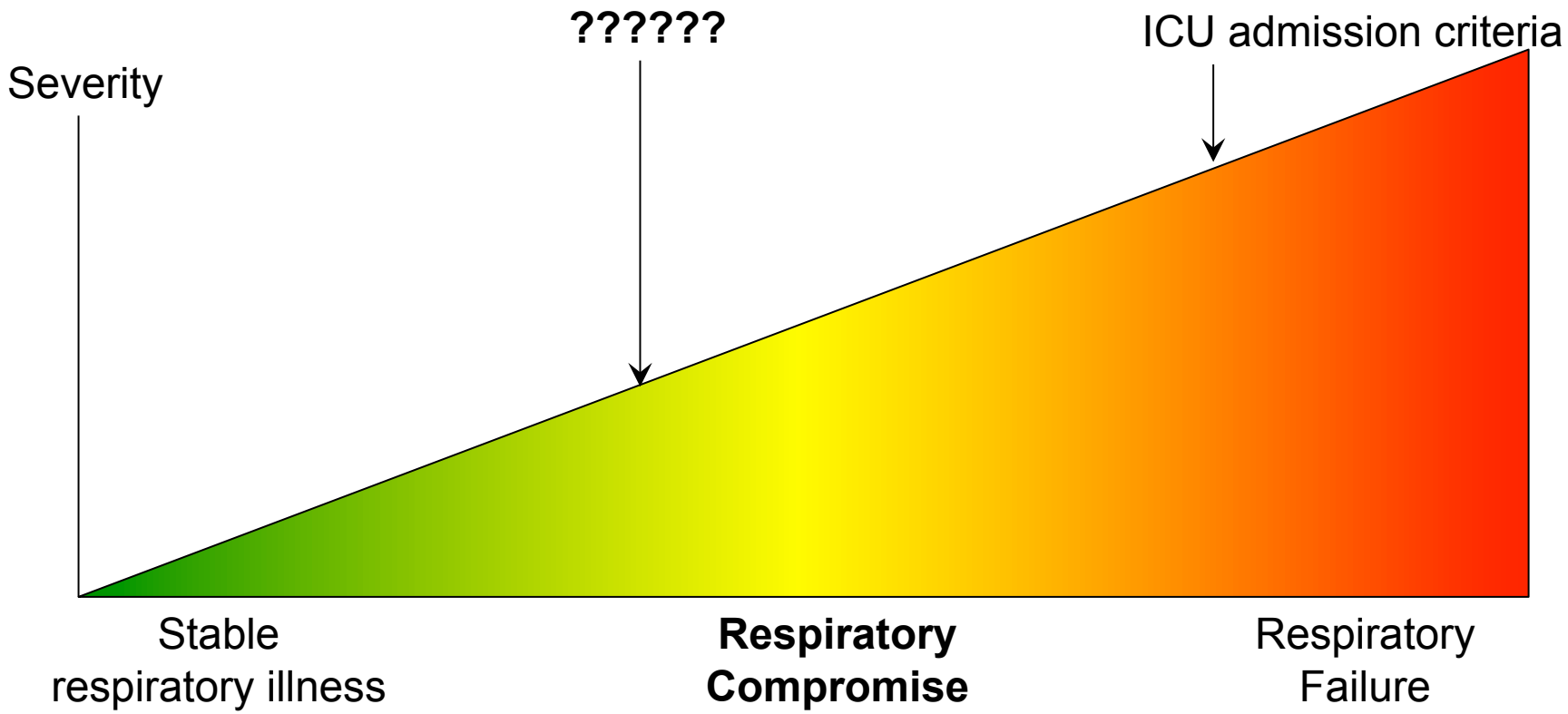
Respiratory Illness



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Plan for day 1: Expert speakers

- Existing systems to rescue respiratory compromise
  - Peter Morris, MD
- Mechanistic categories of respiratory compromise
  - Neil MacIntyre, MD
- Examples of ways to identify specific respiratory compromise in some disease states
  - Peter Marshall, MD

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Day 1 (cont): Small groups

- Small groups based on subsets
  - Control of breathing and airway protection (anesthesia, drugs, sleep)
  - Acute lung injury (sepsis, infection)
  - Obstruction and work of breathing (Asthma, COPD)
  - Cardiovascular (edema/CHF, pulmonary emboli)

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Small groups

- COB, airway
  - Hess
  - Gay
  - Seckel
  - Gantt
  - Wong
- Acute lung injury
  - Morris, P
  - Hill
  - Sonnesso
  - Vender
  - Slesinger

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Small groups

- Obstruction, WOB
  - MacIntyre
  - Mathers
  - Lamb
  - Doherty
  - Rosen
- Cardiovascular
  - Morris, T
  - Marshall
  - Balk
  - Lamberti
  - Chang

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Small group tasks for day 1

- Tasks for day 1
  - **Elect a spokesperson!**
  - Create clinically meaningful definitions of respiratory compromise for each subset
  - Make “wish list” for data to identify respiratory compromise

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Day 1: final speaker

- Current and future tools to provide data
  - Dean Hess, PhD, RRT

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Discussion

- Open discussion in plenary room
- Dinner discussion
  - Special invitation to our industry partners

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Day 2: small groups

Speculate

- Objective data and monitoring to identify respiratory compromise
- Role of (existing) non-conventional monitoring
- Therapies appropriate for resp compromise
- Data collection methods that don't yet exist
- Promising therapeutic interventions

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Day 2: reconvene

- Spokespersons discuss your findings
- Group discussion

- Governmental, Regulatory and Fiscal Considerations
  - James Mathers, MD

- Group discussion

- Lunch

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Conclusion

- Summary of conference
- Wish list for 2016
- Plans for writing and publication*

*Writing committee still has room!

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Thank you!

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