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Torino, IT
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# Anemia and ACS

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# No conflicts or disclosures

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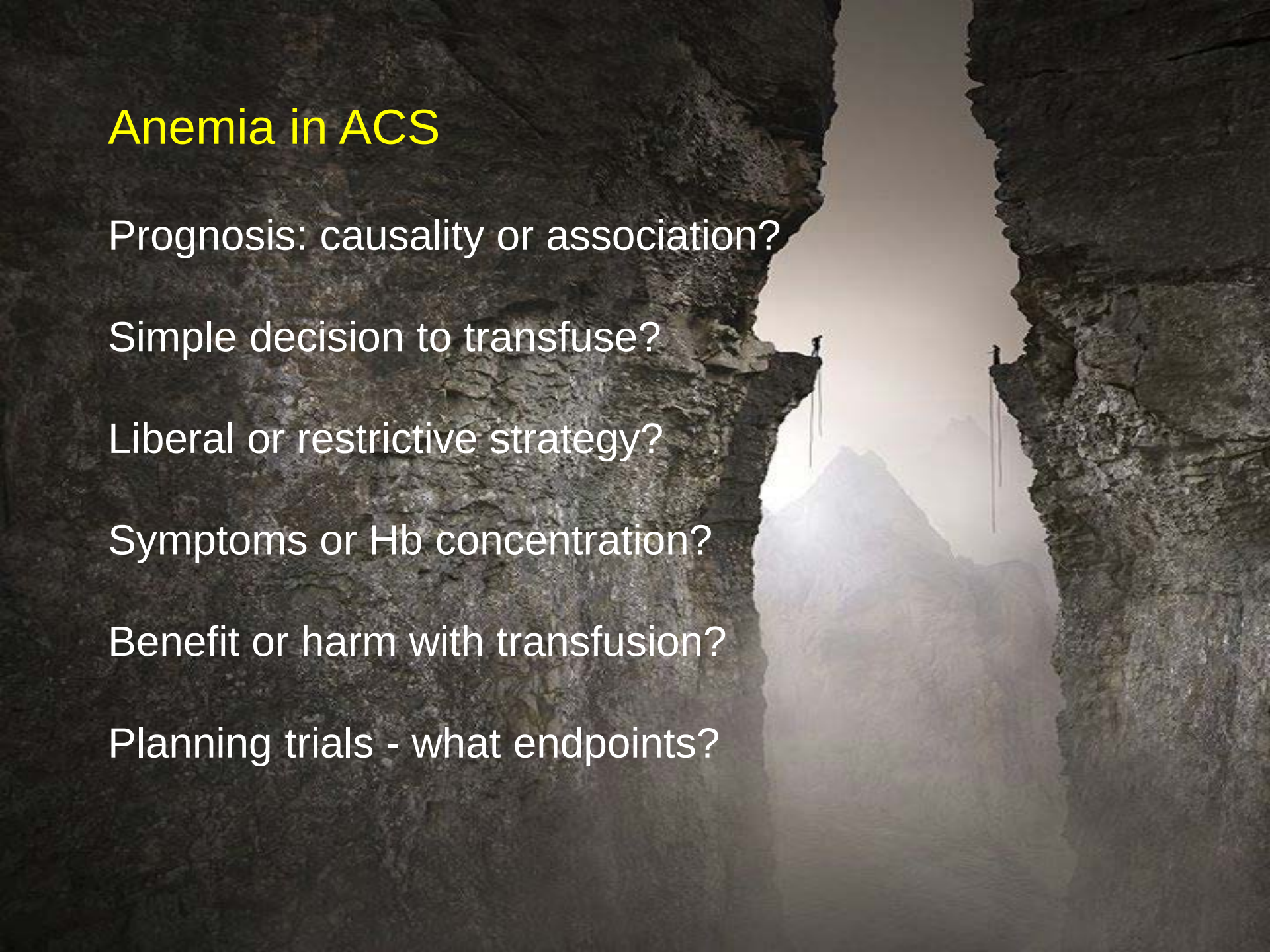

# Anemia in ACS

Prognosis: causality or association?

Simple decision to transfuse?

Liberal or restrictive strategy?

Symptoms or Hb concentration?

Benefit or harm with transfusion?

Planning trials - what endpoints?


Transfusions per year:
85 million units worldwide
15 million units in USA

# Wasting Health-care Money

2009 - $210 billion wasted on unnecessary services

2012 - AMA and JCAHO “National Summit on Overuse”

1. Blood transfusions
2. Coronary stents
3. Ear tubes
4. Antibiotics
5. Induction of birth in pregnant women

http://www.amednews.com/article/20130812/opinion/130819971/4/
(accessed March 29, 2016)

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# Transfusions in Adults

*Restrictive* rather than *liberal* strategy is preferred

- Hb concentration <7 to 8 g/dL
- Treatment of symptoms
- Patients' wishes

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# Blood Transfusion Standardization Project

Introduced restrictive guidelines in 2013

2 years later….

Transfusions, outside of published guidelines, had fallen from 40% to 25%

Cost savings of >$11 million

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# Are coronary heart disease patients at greater risk with anemia?

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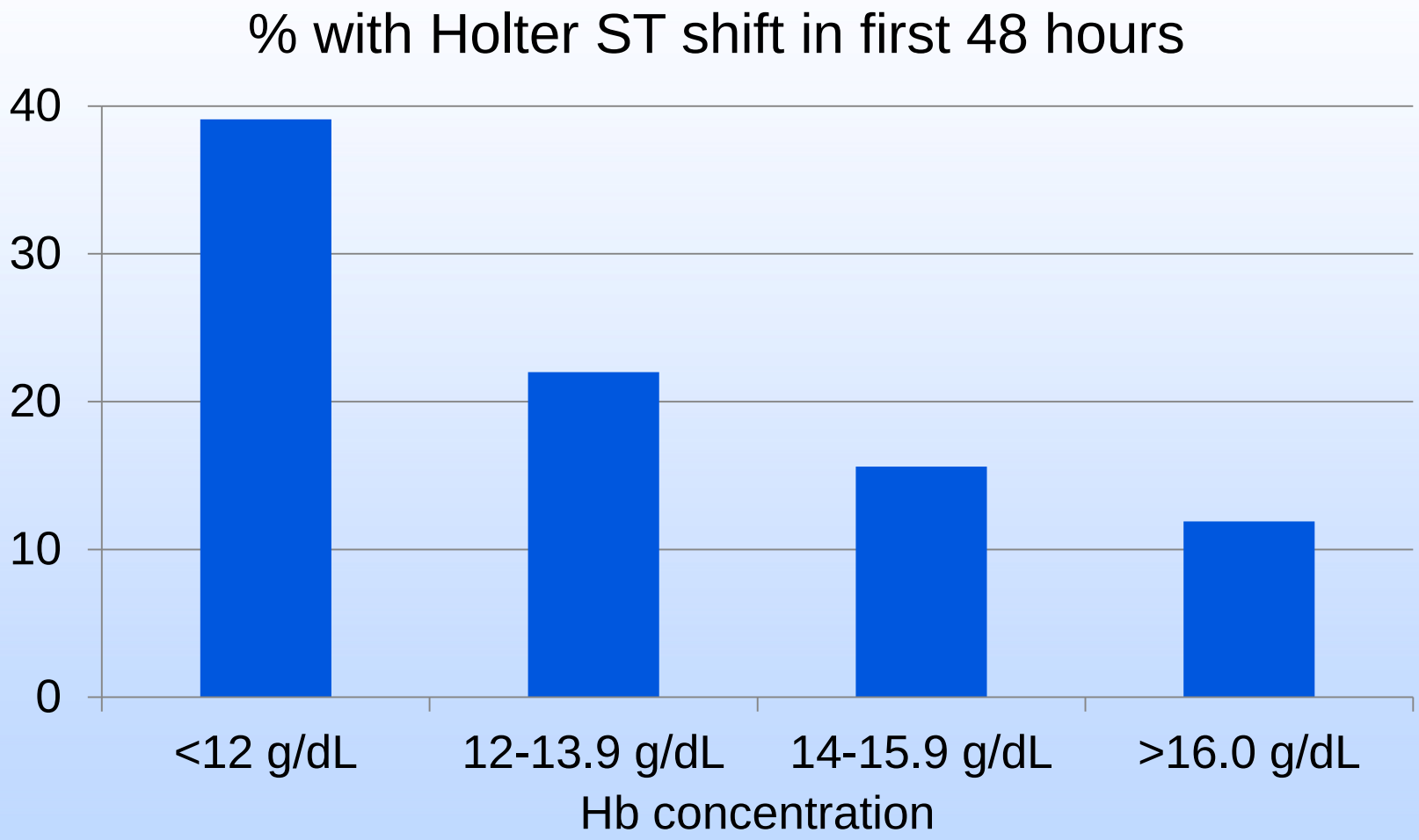
# Baseline anemia in ACS causes ischemia




INTERACT trial – Rousseau M: Am J Cardiol: 2010

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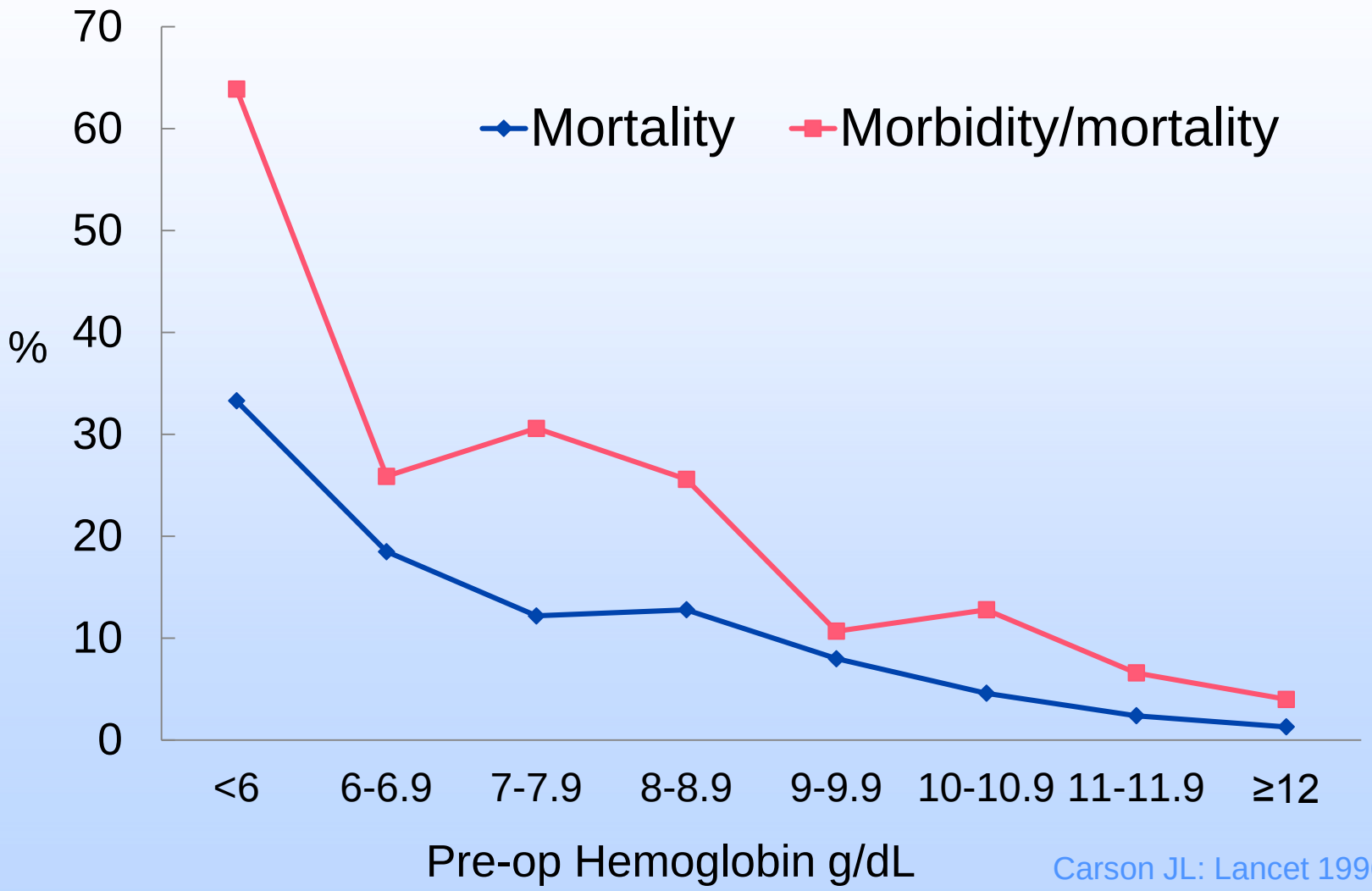
# Anemia and 30-Day Surgical Outcome

## A "Natural History" Study in 1958 patients




Carson JL: Lancet 1996

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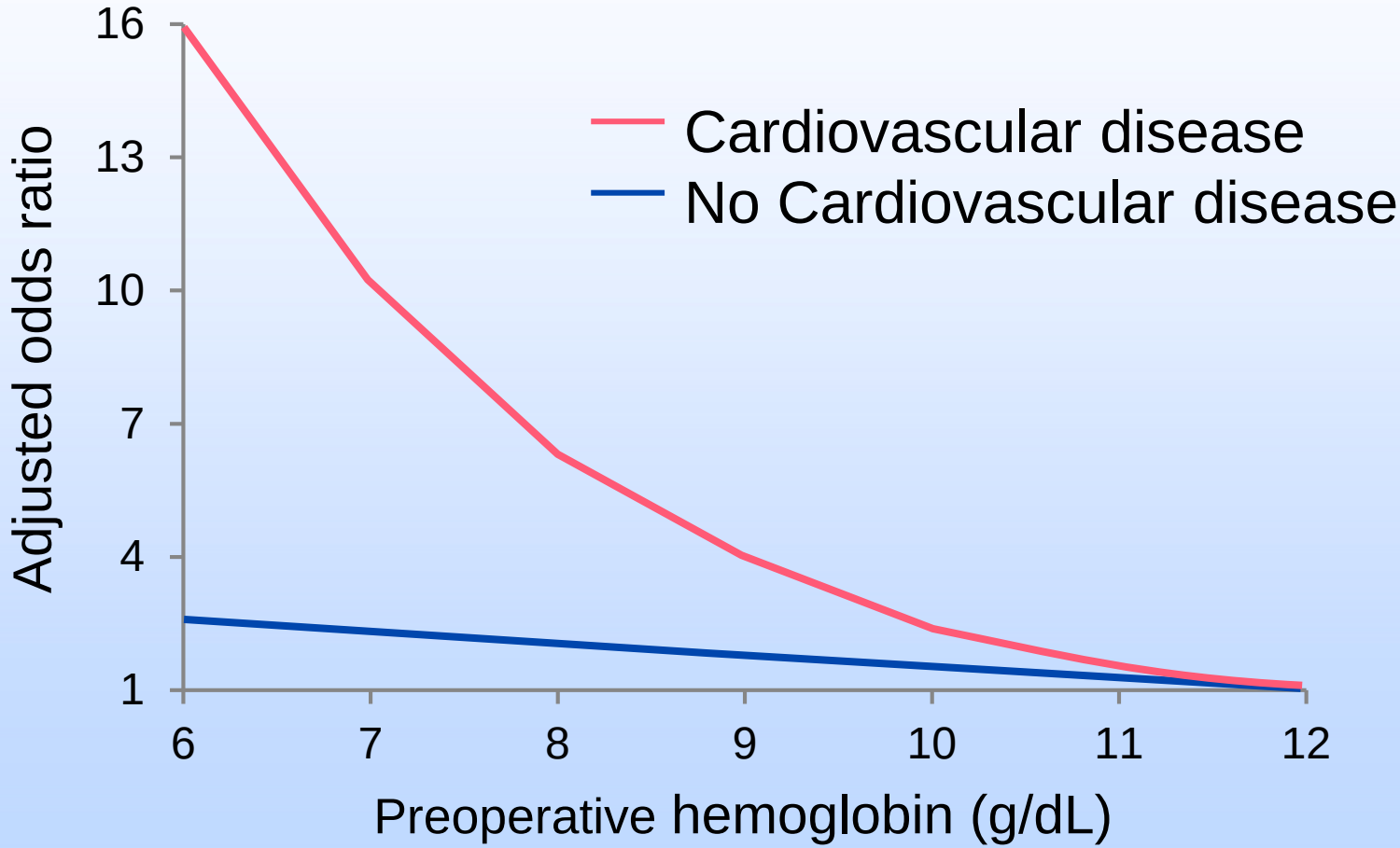
# Anemia and 30-Day Surgical Mortality

## A "Natural History" Study




Carson JL: Lancet, 1996

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# Major bleeding occurs in 2-10% of ACS Patients

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# Strong association between bleeding or anemia with mortality in ACS patients

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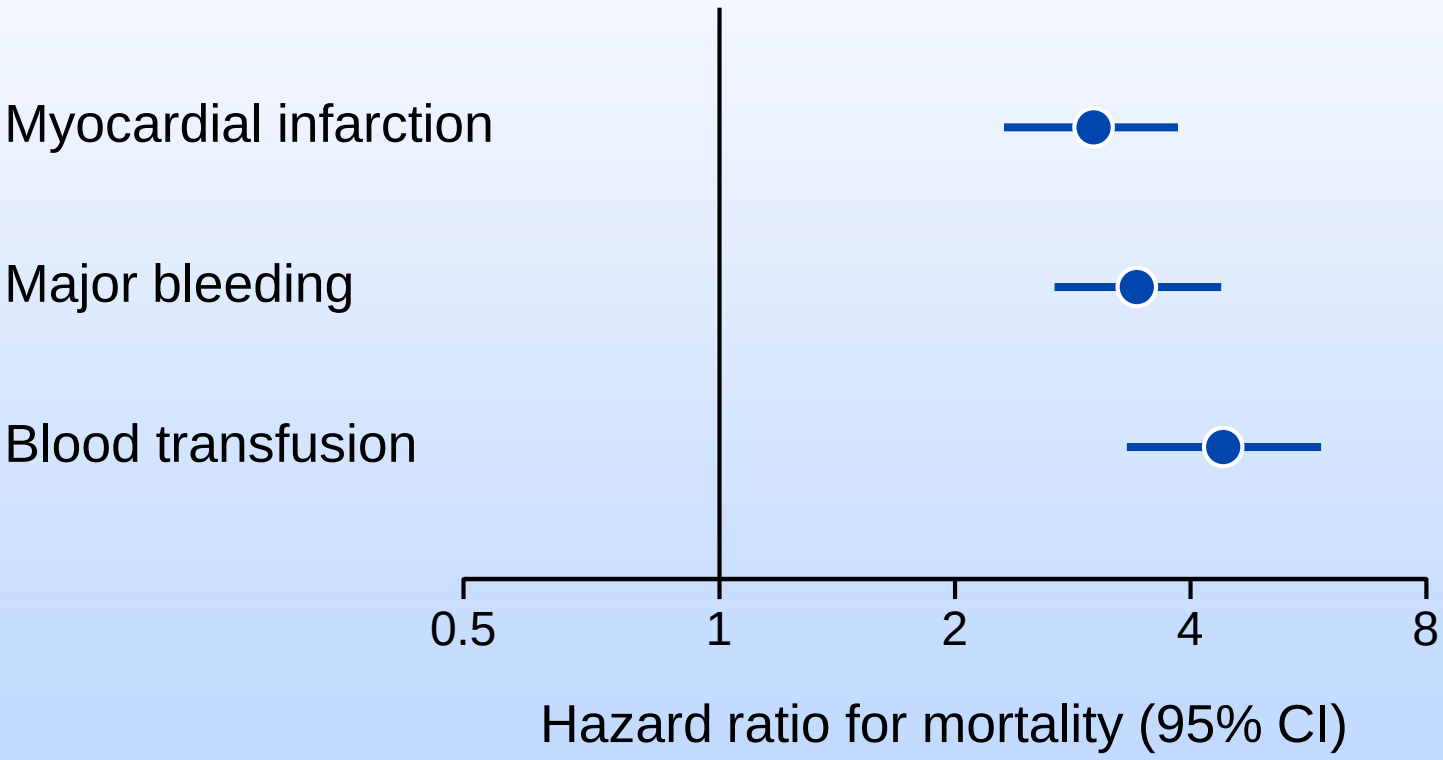
# Bleeding equivalent to having an MI
## Observations from ACUITY




Mehran R: EHJ, 2009

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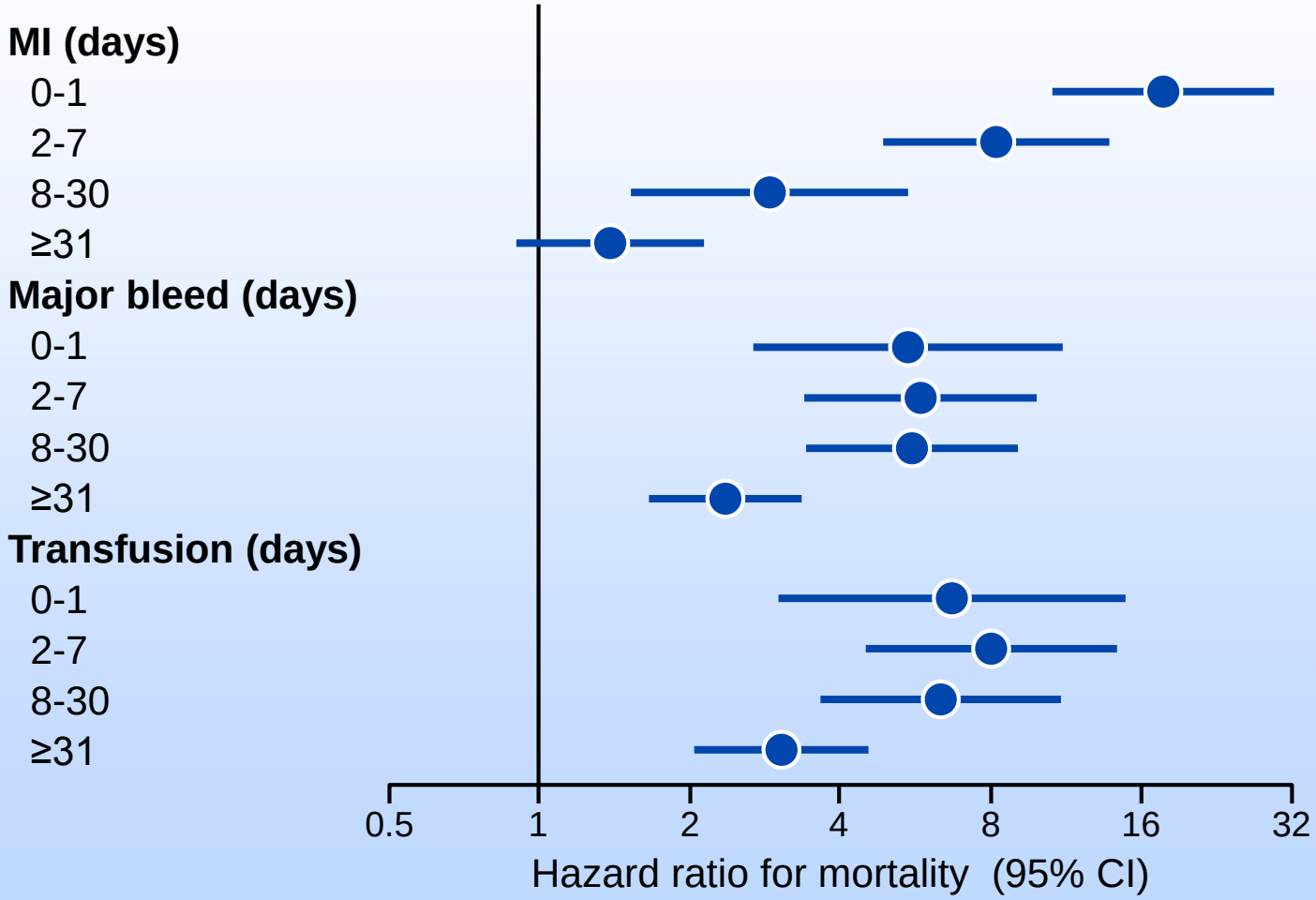
# Any major bleed in first month is associated with higher mortality




Observations from ACUITY

Mehran R: EHJ, 2009

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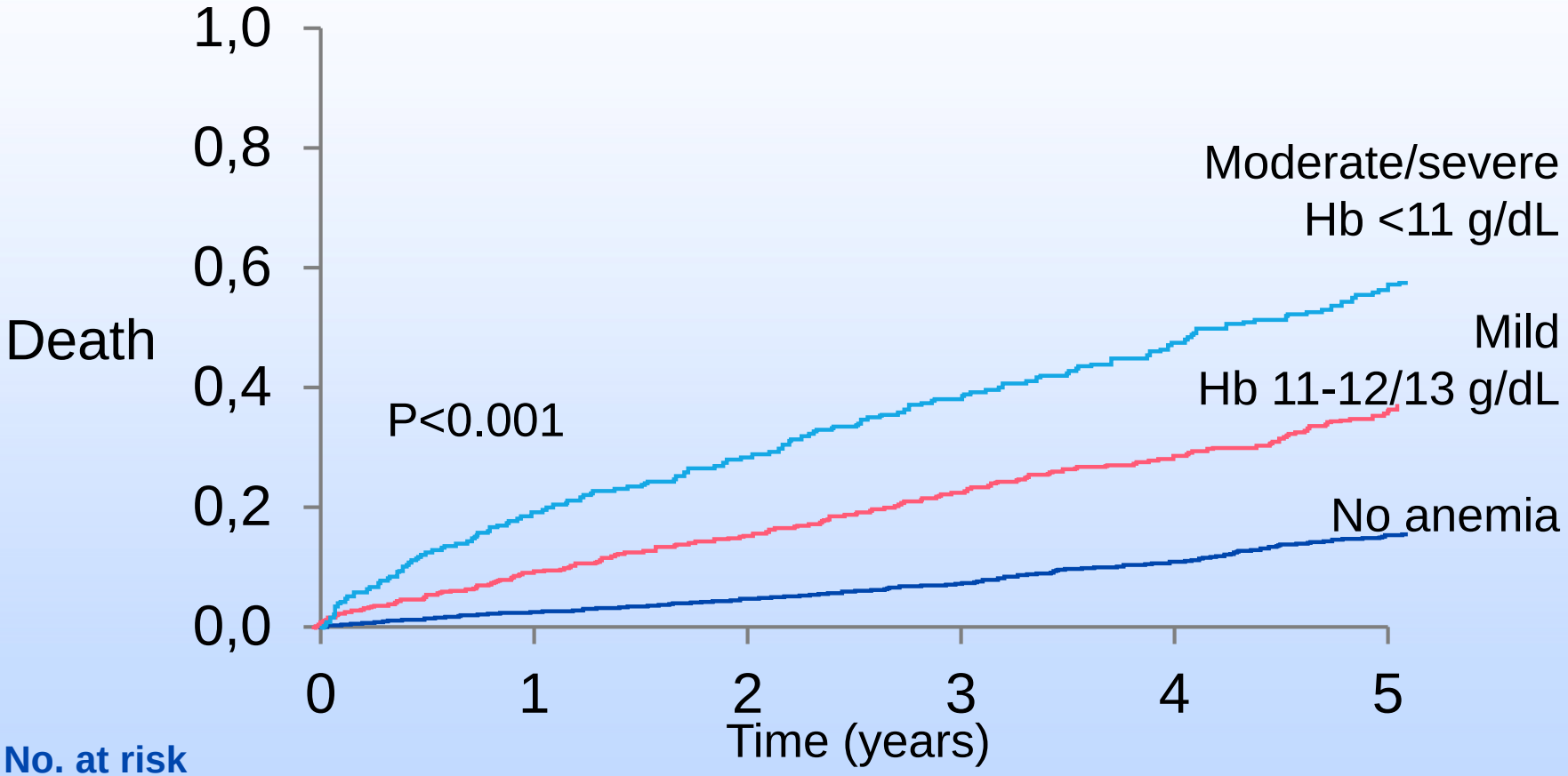
# Anemia in ACS patients undergoing PCI
## Mayo Clinic




**No. at risk**

| | | | | | | |
|---|---|---|---|---|---|---|
| None | 3,762 | 2,747 | 2,347 | 1,924 | 1,423 | 891 |
| Mild anemia | 1,041 | 740 | 608 | 494 | 361 | 225 |
| Moderate-severe | 706 | 429 | 336 | 253 | 165 | 89 |

Al-Hijji M (under review): 2016

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# Why might bleeding lead to higher mortality?

Physiologic stress

Cessation of antiplatelet and anticoagulant therapy ± other guideline-directed therapy

Hypotension – remote ischemic organs

Unmask occult malignancy

Transfusion risk?

Risk by association – not causality

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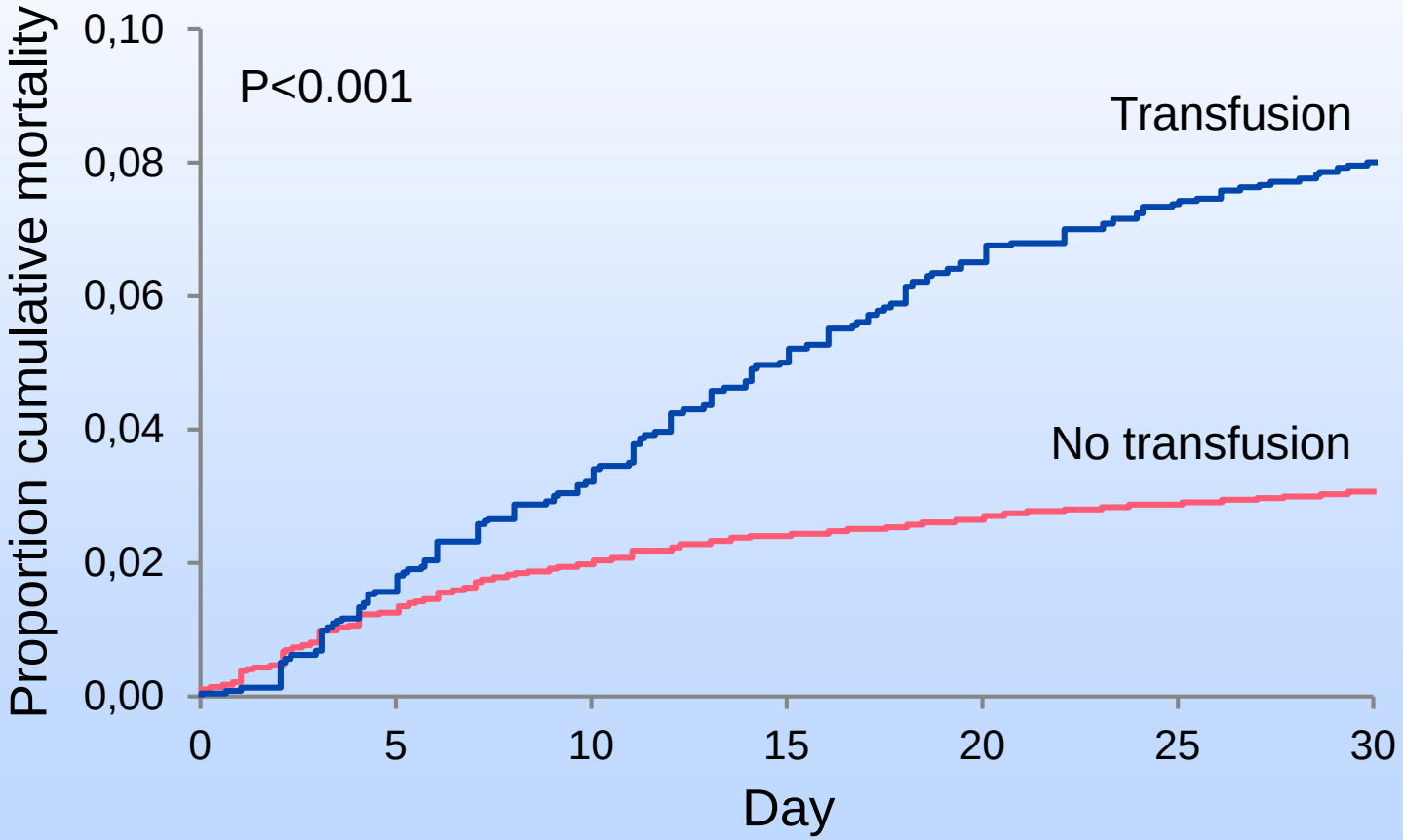
# Transfusions and Higher Mortality in ACS

## Data from GUSTO IIb, PURSUIT, PARAGON B




Rao SV: JAMA, 2004

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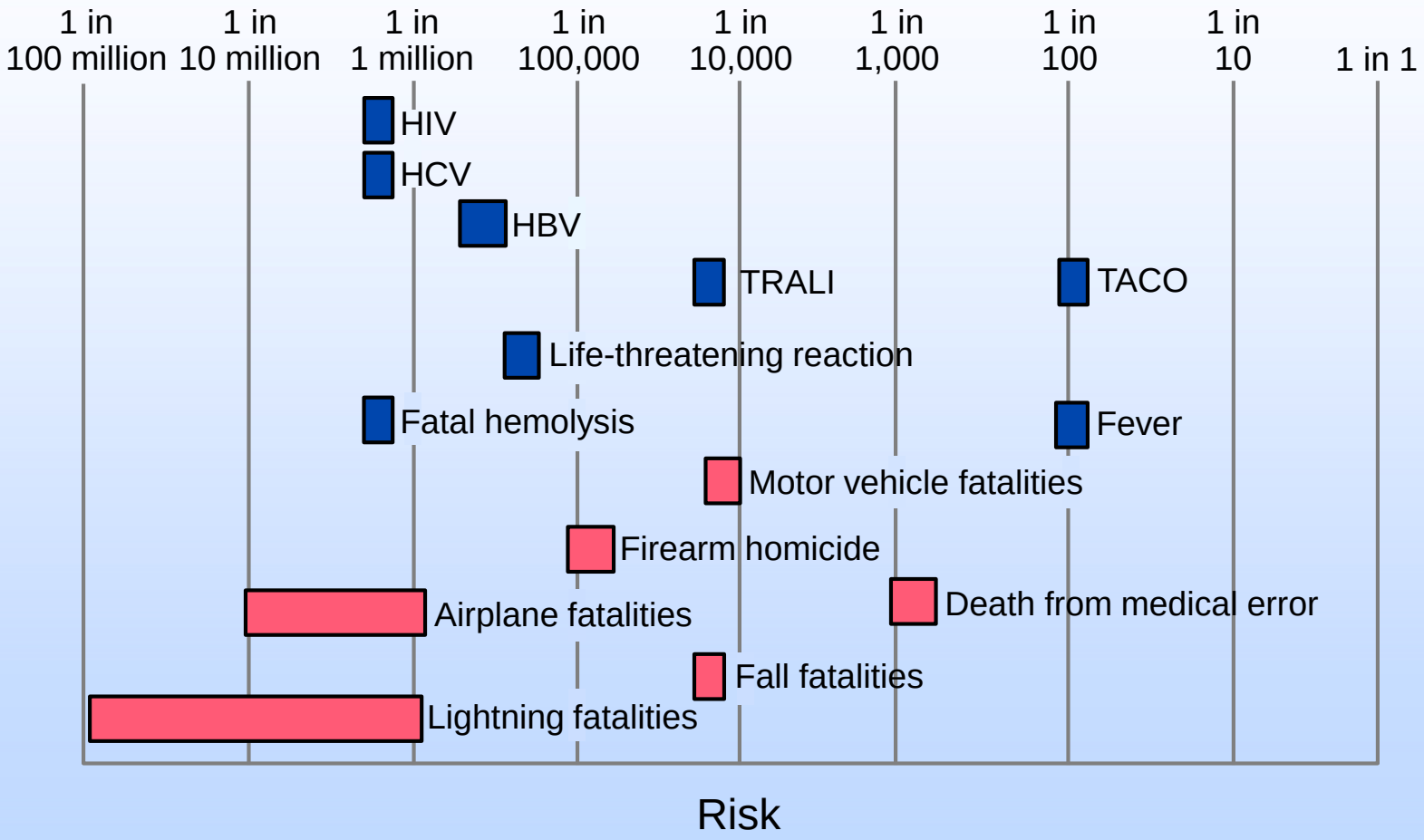
# Risks of RBC Transfusions




Carlson JL: Ann Intern Med, 2012

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# Guidelines for RBC Transfusion in ACS Limited to Observational Data Only

| Organization | Recommendation | Grade |
|---|---|---|
| ACC/AHA | Routine transfusion if Hb >8g/dL | III |
| ESC | Transfuse if hemodynamically unstable or Hb ≤7 g/dL or hematocrit <25% | IIb |
| AABB | None | -- |

Amsterdam EA: JACC 2014; Roffi M: EHJ 2015; Carson JL: Ann Intern Med 2012

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# AABB Guidelines: Evidence from RCTs

| Hospitalized patients | Quality of evidence | Strength of rec. |
|---|---|---|
| Pre-existing CV disease and stable<br>*Restrictive strategy recommended*<br>*Hb ≤8 g/dL or symptoms** | Moderate | Weak |

*Chest pain, orthostatic hypotension or tachycardia unresponsive to fluid, CHF

Carson JL: Ann Intern Med 2012

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# AABB Guidelines: Evidence from RCTs

| Hospitalized patients | Quality of evidence | Strength of rec. |
|---|---|---|
| Pre-existing CV disease and stable<br>*Restrictive strategy recommended*<br>*Hb ≤8 g/dL or symptoms** | Moderate | Weak |
| ACS and hemodynamically stable<br>*Unable to argue for or against a liberal or restrictive transfusion strategy* | Very low | ? |

*Chest pain, orthostatic hypotension or tachycardia unresponsive to fluid, CHF

Carson JL: Ann Intern Med 2012

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# MINT Trial – Transfusion Strategy in ACS

Hypothesis:

Liberal versus a restrictive transfusion strategy will reduce the primary endpoint of *all-cause death and recurrent MI* through 30 days

| Liberal transfusion | vs. | Restrictive transfusion |
|---|---|---|
| Recommend if Hb <10 g/dL | | Permitted if Hb <8 g/dL<br>Recommend if Hb <7 g/dL |

3500 ACS patients

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# Summary of anemia and bleeding in ACS

Relatively common with prognostic implications
    By association or causal?

Quality of data to guide management is poor

Transfusions: a precious and expensive resource

Restrictive transfusion but with clinical judgement
    Symptoms or Hb threshold?

Focus on identification of high risk patients and prevention of bleeding

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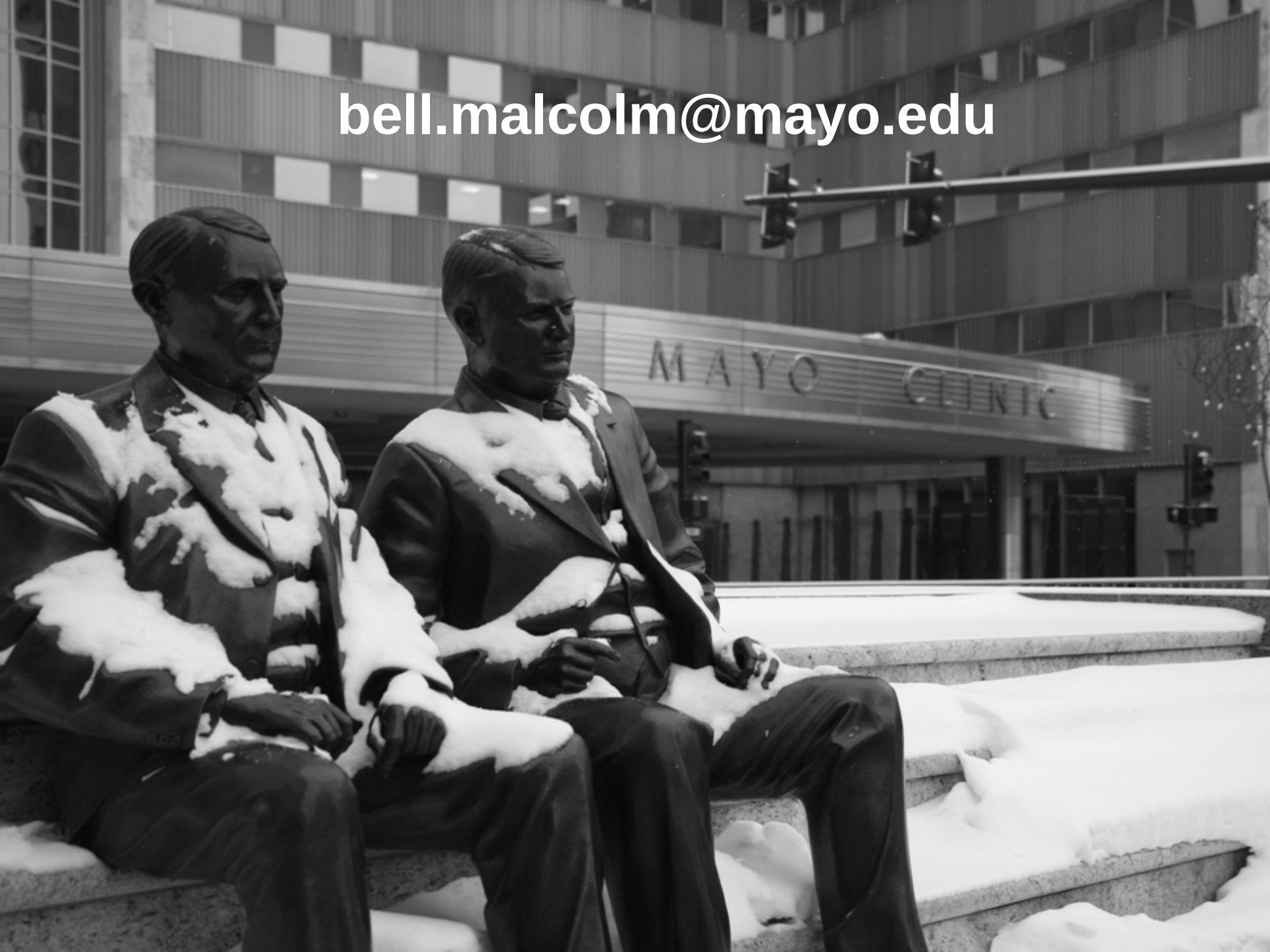


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