Update in Hospital Medicine

October 13, 2018

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Tulsa, OK

No Financial Disclosures

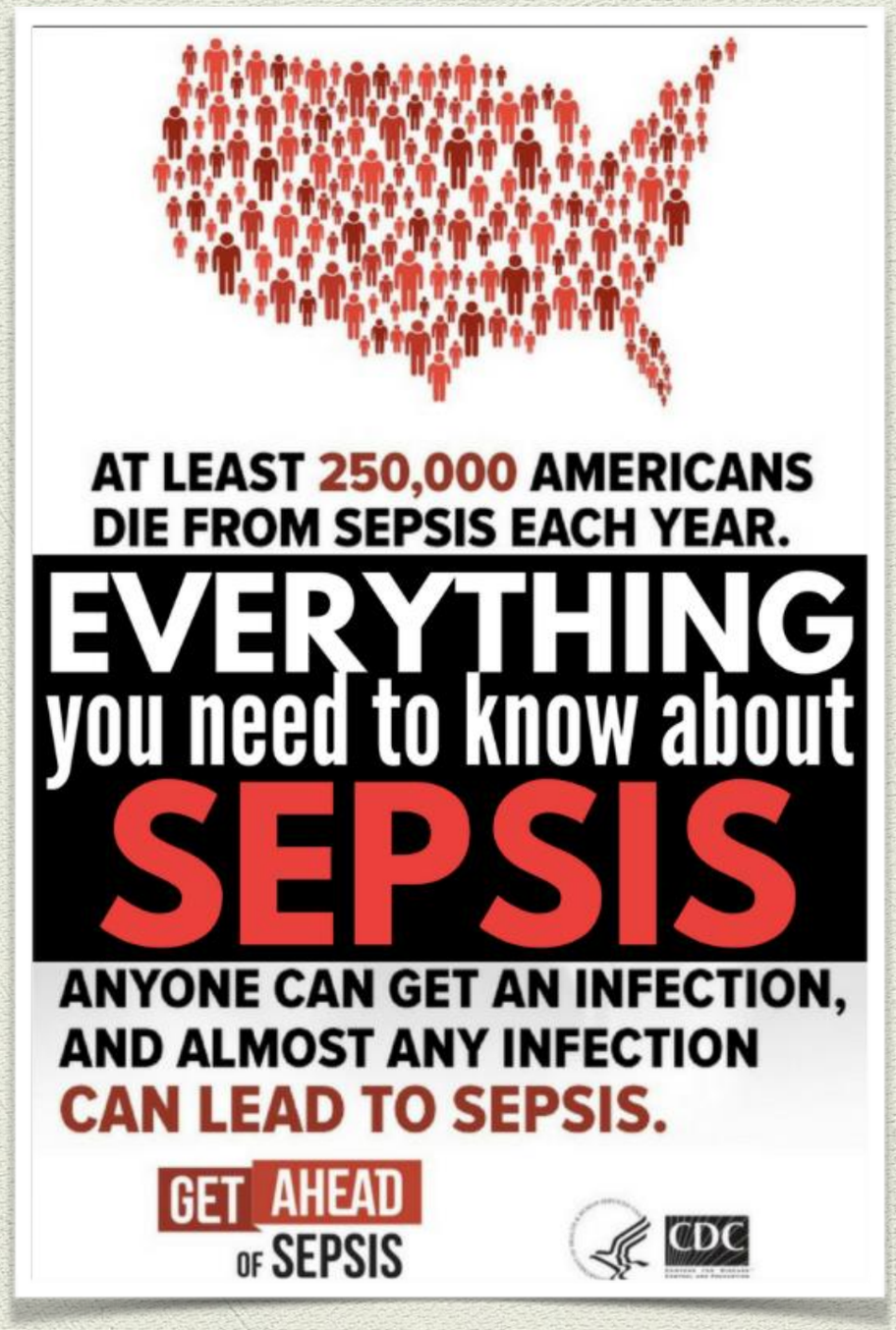
Agenda

- Sepsis
  - Establish an overview of Sepsis Timeline
  - Discuss sepsis definitions, guidelines, and reimbursement
  - Review new evidence
- Myocardial Infarction
  - Discuss 2018 Guideline Updates
  - Review a Chest Pain Protocol
  - List New MI Definitions
- Clostridium Difficile
  - Review 2018 Updated Guidelines
  - Discuss Eosinopenia Prediction Score

Sepsis

Sepsis Facts

- **Leading Cause of Death**
- 1.5 Million Cases
  - 1 case **every 20 seconds**
- **20% Mortality**
- 92% Community Origin



Sepsis - Organizations

- Surviving Sepsis Campaign

GUIDELINES

- Sepsis-1, Sepsis-2, Sepsis-3

DEFINITIONS

- Medicare SEP-1

REIMBURSEMENT

Surviving Sepsis Campaign

CMS
CENTERS FOR MEDICARE & MEDICAID SERVICES

ESICM
EUROPEAN SOCIETY OF INTENSIVE CARE MEDICINE

Society of Critical Care Medicine
The Intensive Care Professionals

A 32 year-old female presented with nausea, vomiting, + epigastric pain radiating to her back.
She drinks 1 **pint of liquor daily**.
+Murphy's sign.
She is only oriented to person.

VS: T 38.0C HR 105 RR 32 BP 89/ 50 O2 sat 88% RA

Labs:
Lipase >3x ULN
WBC 32,000 + 8% bands
Lactate 2.4 mmol/ L
Cr 1.6 mg/ dL

It is **2.5 hours** since triage, **Do you start antibiotics?**

Sepsis Timeline

SIRS Definition

MOD

Sepsis-1

Sepsis-2

~~Severe~~ Sepsis

Sepsis-3

EGDT

SS 1

1L

SS 2

30 mL/ kg

SS 3

~~SIRS~~

~~EGDT~~

3-hr

SOFA

SS 4

1-hr

SS Update

1991 ‘01 ‘03 ‘08 ’12 ’14 ’15 ‘16 ‘18 2018

SEP-1

Rivers, et al.
EGDT (+)

Rory Gabby

ProCESS
ARISE
ProMISE
EGDT = Usual Care

Time2Tx

Sepsis Definition

Sepsis Definitions

SIRS Definition

MOD

Severe Sepsis

Sepsis-1 **Sepsis-2** **Sepsis-3**

SIRS

SOFA

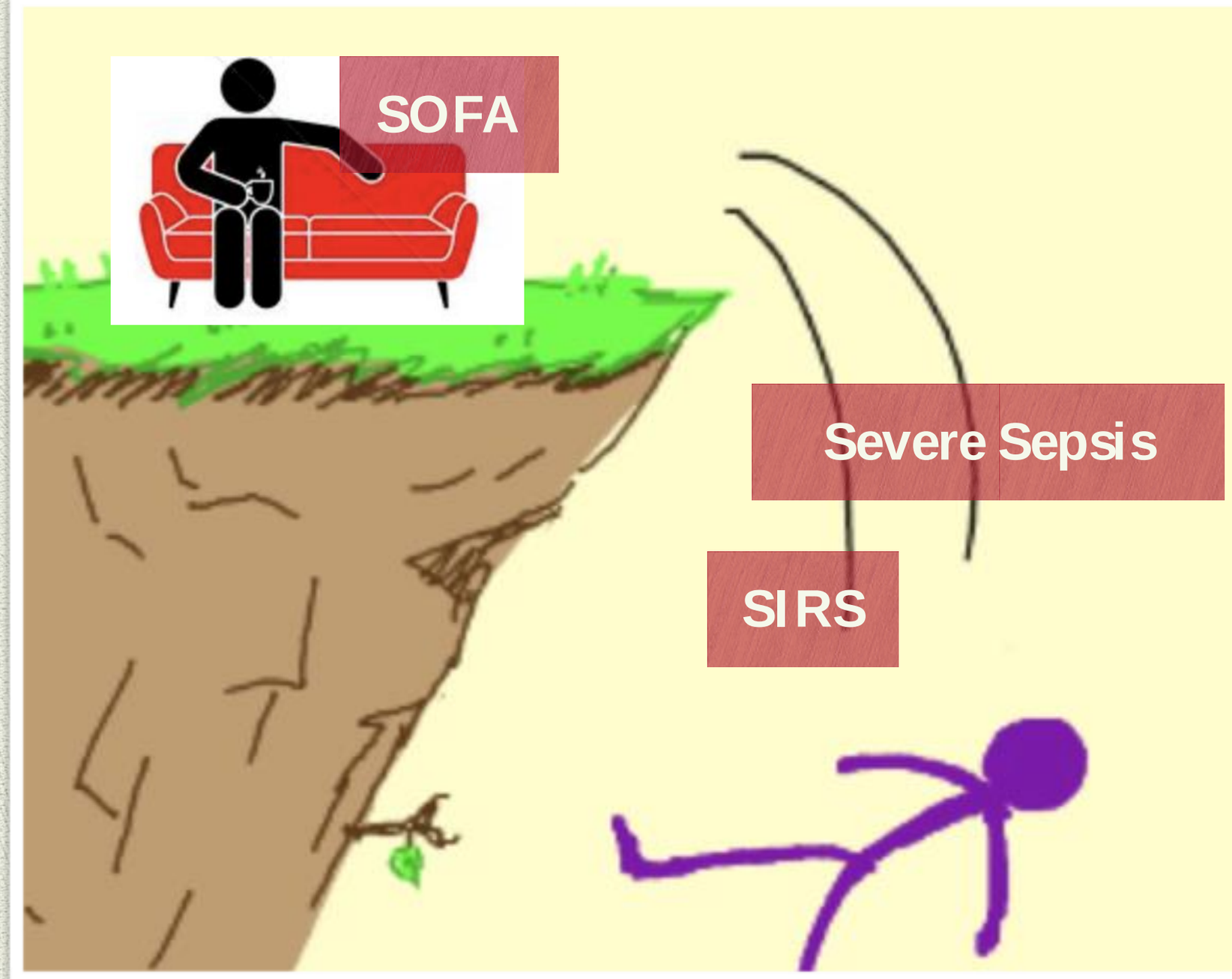
1991 2001 2015

(Rivers, Nguyen et al. 2001)

(Bone, Balk et al. 1992)

2015: Definition
Sepsis-3

JAMA Network™



Sepsis-3

Sepsis = SEVERE sepsis:

A life threatening dysfunction caused by a dysregulated host response to infection.

Organ dysfunction:

SOFA 2 points increase from baseline

Septic Shock:

Requiring Vasopressors with Lactate >2 + MAP <65

Absence of Hypovolemia

(Singer et al. 2016, JAMA)

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SOFA >2 = Sepsis
SIRS = 2/4
qSOFA = 3/3

It is **2.5 hours** since triage, **Do you start antibiotics?**

SIRS vs SOFA vs qSOFA

SIRS/qSOFA = NON-ICU
SOFA = ICU

	Use	Required	Mortality Risk
SIRS	Screen	WBC HR, T, RR	
SOFA	ICU** Mortality	ABG, Tbili, Cr, Plt, BP, GCS	2pts > 10%
qSOFA	Non-ICU** Mortality Screen	GCS, RR, BP	2:/3 Risk X3 3/3: Risk X14

(Singer et al. 2016)

February 2018

REVIEW

Annals of Internal Medicine

Prognostic Accuracy of the Quick Sequential Organ Failure Assessment for Mortality in Patients With Suspected Infection

A Systematic Review and Meta-analysis

Shannon M. Fernando, MD, MSc; Alexandre Tran, MD; Monica Taljaard, PhD; Wei Cheng, PhD; Bram Rochwerg, MD, MSc; Andrew J.E. Seely, MD, PhD; and Jeffrey J. Perry, MD, MSc

	Sensitivity	Specificity
SIRS	88%	26%
qSOFA	61%	72%

qSOFA ICU Specificity = 33%

(Fernando et al. 2018, Ann Intern Med)

Sepsis Guidelines

Surviving Sepsis Campaign

Sepsis Guidelines

Fluids!
Pressors!
Blood!

EGDT

1L

30 mL/ kg

SS 1

SS 2

SS 3

~~EGDT~~

3-hr

SS 4

1-hr

SS Update

‘01 ‘03 ‘08 ’12 ’14 ‘16 ‘17 2018

Rivers, et al.
EGDT (+)

Rory Gabby

ProCESS
ARISE
ProMISE
EGDT = Usual Care

Time2Tx

The Rory Staunton Foundation

for Sepsis Prevention

- 2013 NY Law
- Rory's Regulations
- Sepsis Measures

https://rorystauntonfoundationforsepsis.org/

Gabby's Law

- 2016 Illinois
- Gabby's Law
- Sepsis Measures

https://www.sepsis.org/faces/gabriella-galbo/

The Rule of Rescue

"A single death is a **tragedy**, a million deaths is a statistic"

–J. Stalin
Who killed more than 17 million of his own Russian people

2017: EBM

Antibiotics vs Fluids

The NEW ENGLAND JOURNAL of MEDICINE

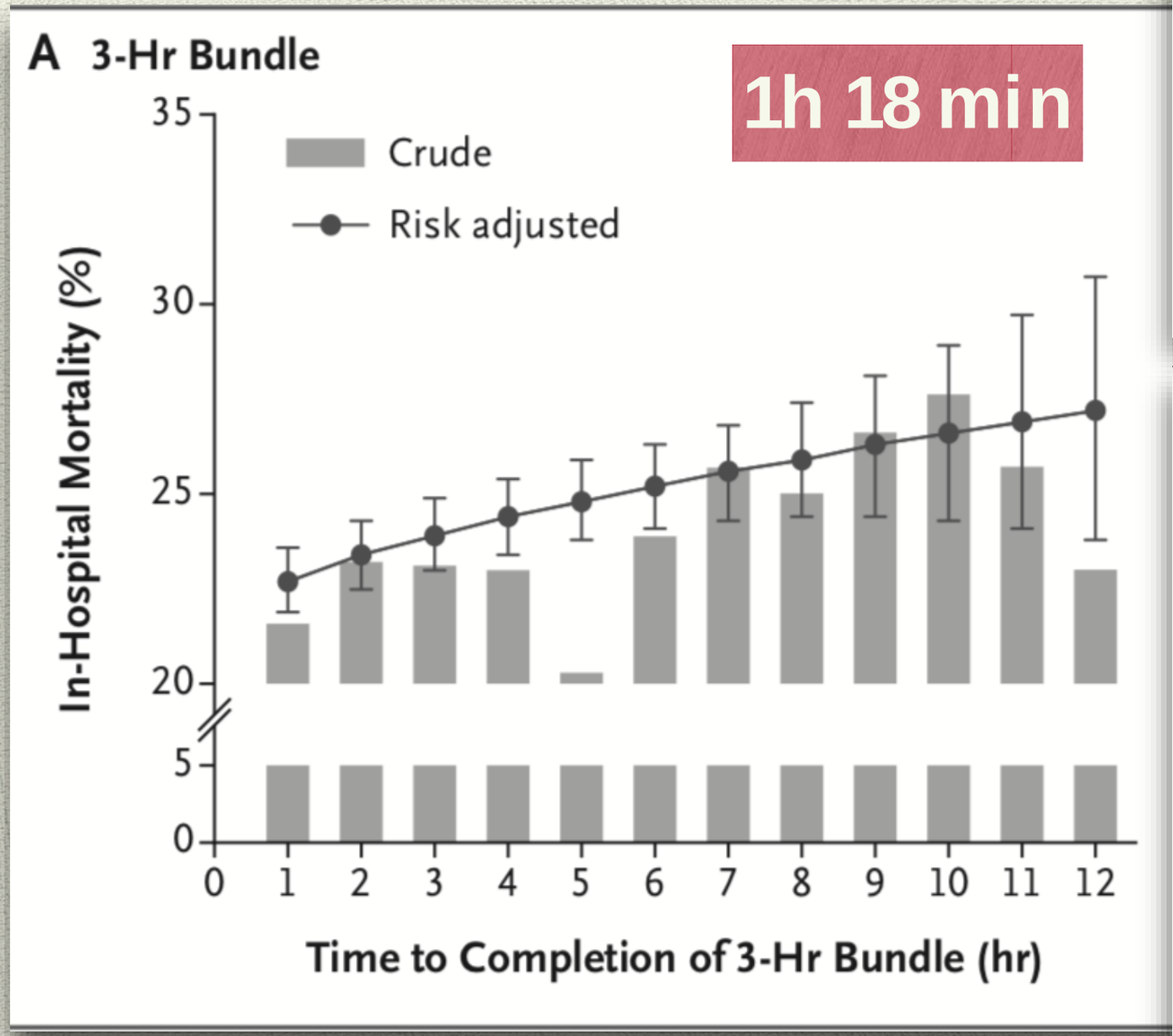
ORIGINAL ARTICLE

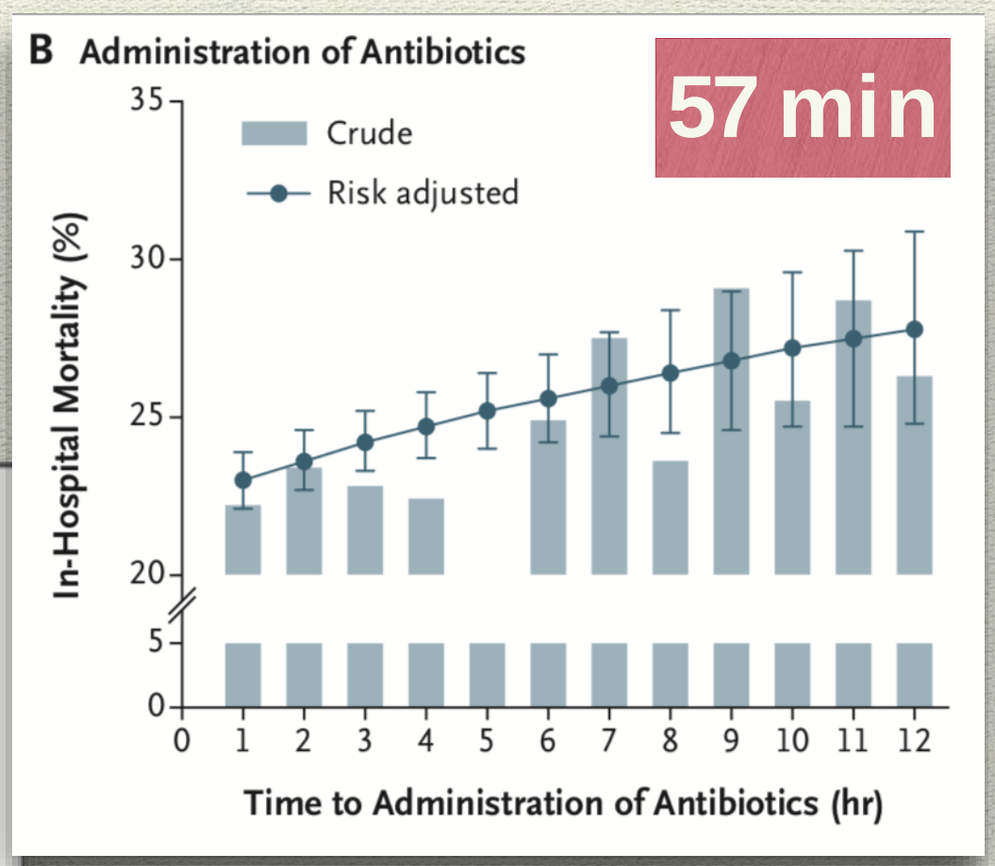
Time to Treatment and Mortality during Mandated Emergency Care for Sepsis

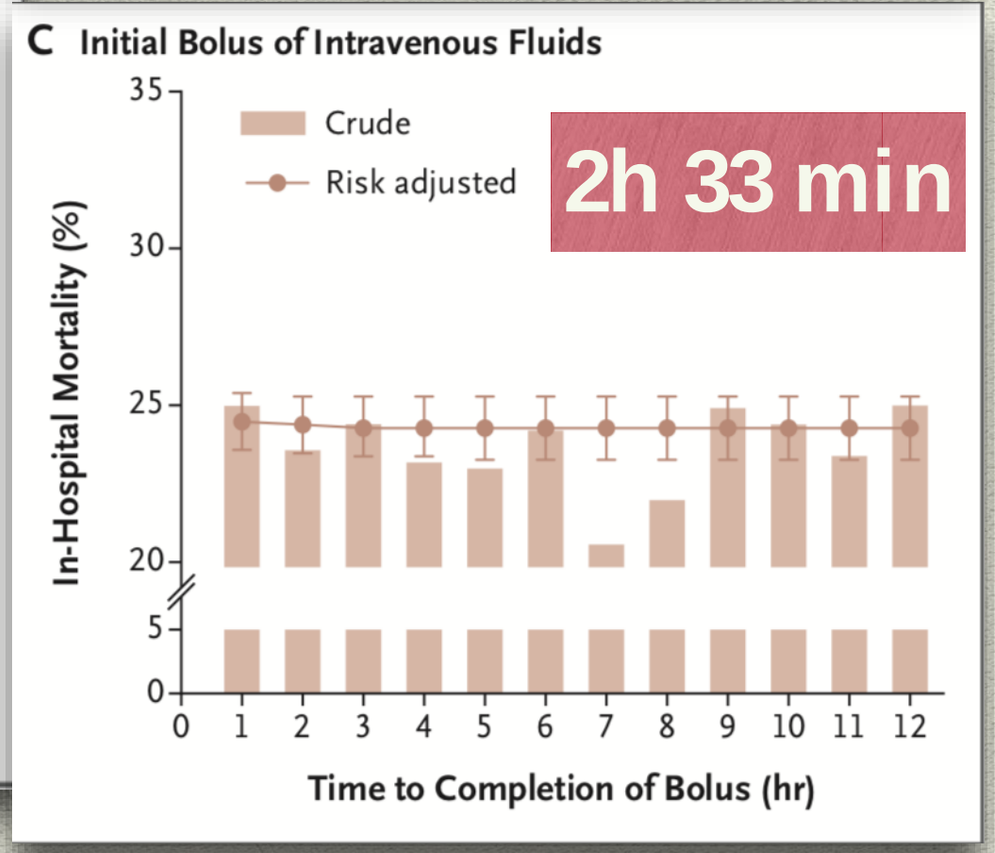
Christopher W. Seymour, M.D., Foster Gesten, M.D., Hallie C. Prescott, M.D., Marcus E. Friedrich, M.D., Theodore J. Iwashyna, M.D., Ph.D., Gary S. Phillips, M.A.S., Stanley Lemeshow, Ph.D., Tiffany Osborn, M.D., M.P.H., Kathleen M. Terry, Ph.D., and Mitchell M. Levy, M.D.

Antibiotics, Antibiotics, Antibiotics!

Mortality increases 14% Antibiotics >3hr



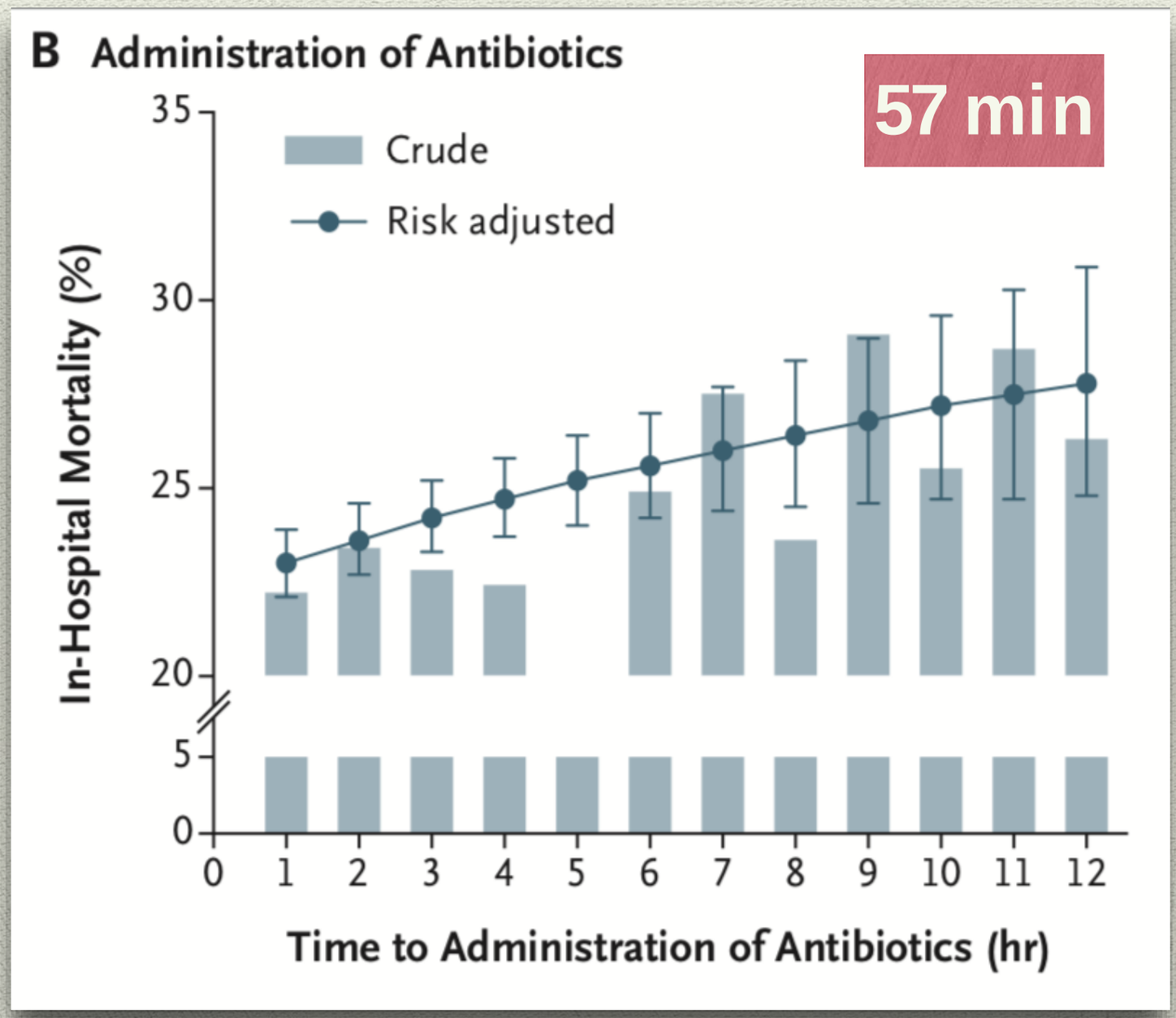




2018: Guidelines

Surviving Sepsis Revision

- 1 hour bundle



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Guidelines:
SIRS
1 hour Bundle!

It is **2.5 hours** since triage, **Do you start antibiotics?**

Sepsis Reimbursement

Sepsis Reimbursement

(Pepper et al. 2018, Ann Intern Med)

2015: Medicare SEP-1 Version 5.4 (2018)

3-Hour Bundle

- Blood Cultures
- Broad Spectrum Abx
- 30 mL/kg (hypotension)
- Lactate

6-Hour Bundle

- Remeasure Lactate >2

SHOCK

- 2+ Hypotension - Pressor
- Specific Bedside PE or
- 2/4 Advanced Interventions

Value Based Purchasing
2018 = 2% Medicare Reimbursement

Severe Sepsis

2+ SIRS

- SBP < 90 Or MAP <70
- Plt <100K
- Cr >2 OR UOP <0.5
- Tbili > 2
- Lactate >2
- INR >1.5 or aPTT >60s

Medicare Value Programs

CMS Hospital Value Programs

Hospital Value Based Purchasing	Readmission Reduction Program	Hospital Acquired Conditions	Promoting Interoperability
Rewards hospitals for improving the quality of care by redistributing payment among hospitals with higher quality performance than lower performing hospitals	Hospitals with excess readmissions receive a negative payment adjustment	Hospitals that rank in the worst performing quartile based on quality metrics receive a negative payment adjustment	Electronic quality measures Pay for reporting

2% Medicare Reimbursement

Affordable Care Act (ACA)

Fiscal Year	Value Based Purchasing Program	Hospital Readmission Reduction Program*	Hospital Acquired Conditions Program*	Overall Potential Payment Reduction Risk
2013	1%	1%	N/A	2%
2014	1.25%	2%	N/A	3.25%
2015	1.50%	3%	1%	5.50%
2016	1.75%	3%	1%	5.75%
2017	2%	3%	1%	6%
2018	2%	3%	1%	6%

*Potential Reduction in Payment by Fiscal Year

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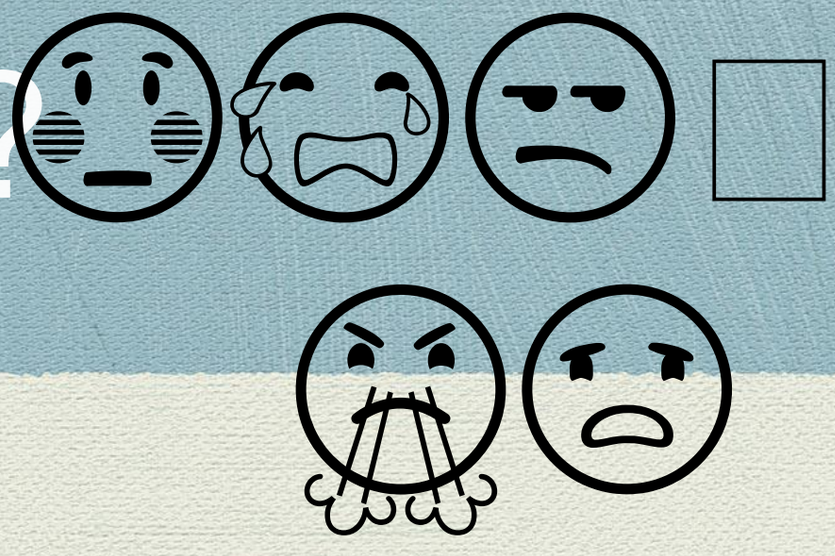
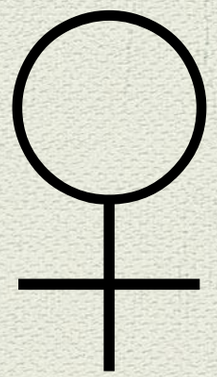
Yes!
3 hr bundle
Documentation:
SIRS
Severe Sepsis

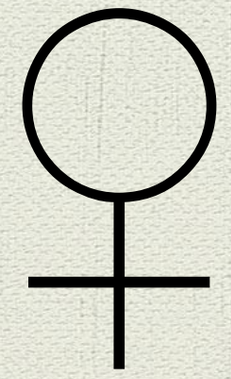
It is **2.5 hours** since triage, **Do you start antibiotics?**

What do we do?



- Evidence Based Medicine
- Hospital Reimbursement
- Patient Outcomes
- Mix?





Students, How do you know you are on a **surgery** or **medicine** rotation?

– *Fluid Selection*

SALT-ED: March 2018

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

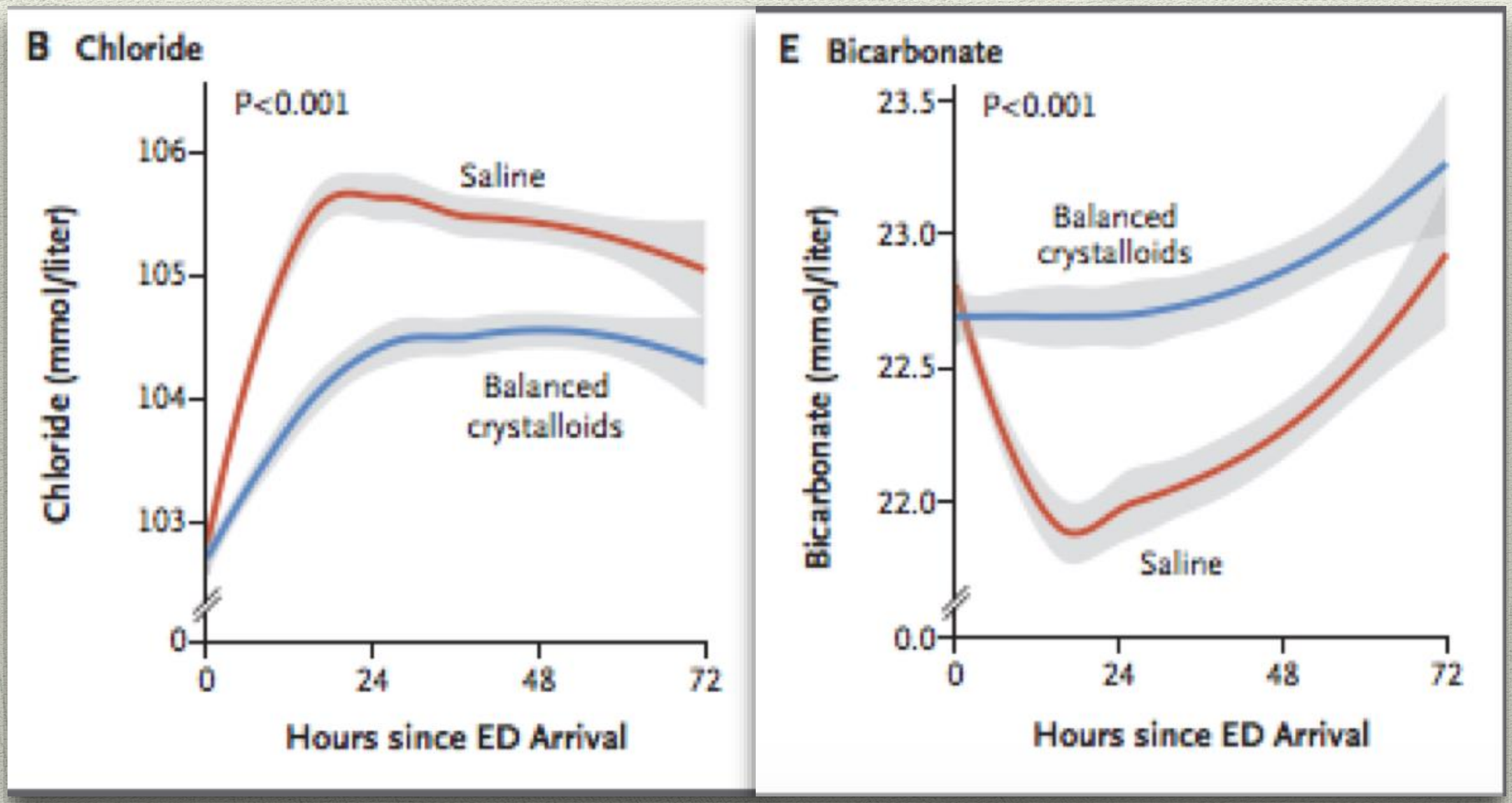
Balanced Crystalloids versus Saline in Noncritically Ill Adults

Wesley H. Self, M.D., M.P.H., Matthew W. Semler, M.D.,
Jonathan P. Wanderer, M.D., Li Wang, M.S., Daniel W. Byrne, M.S.,
Sean P. Collins, M.D., Corey M. Slovis, M.D., Christopher J. Lindsell, Ph.D.,
Jesse M. Ehrenfeld, M.D., M.P.H., Edward D. Siew, M.D.,
Andrew D. Shaw, M.B., Gordon R. Bernard, M.D.,
and Todd W. Rice, M.D., for the SALT-ED Investigators*

Fluid Components

	Normal Saline	LR	Plasma-Lyte
Na+	154	130	140
K+	0	4	5
Ca2+	0	3	0
Mg2+	0	0	3
Cl -	154	109	98
Lactate	0	28	0
Osmolarity	308	275	294
pH	5.5	6.75	7.4

SALT-ED


B Chloride
P<0.001
106
105
104
103
0
Saline
Balanced crystalloids
Chloride (mmol/liter)
0
24
48
72
Hours since ED Arrival
E Bicarbonate
P<0.001
23.5
23.0
22.5
22.0
0.0
Balanced crystalloids
Saline
Bicarbonate (mmol/liter)
0
24
48
72
Hours since ED Arrival

SALT-ED

	NS	Balanced	P value
Hospital Free Days	25	25	0.41
MAKE-30	5.6%	**4.7%**	**0.01**
AKI (>Stage II)	8.6%	8.0%	0.14
In Hospital Death	1.6%	1.4%	0.36

MAKE-30: Major Adverse Kidney Event in 30 days

Death, Renal Replacement, 2x Cr @Discharge

NNT = 111

CONFOUNDING, Single Center

2017: Vitamin C and Sepsis

CITRIS-ALI: Phase 2

- Single Center, unblinded
- MICU + Severe sepsis/ Septic shock + Procalcitonin >2
- IV vitamin C 6g, thiamine, Hydrocortisone 50 q6

41% vs 9% (intervention)

(Marik et al. 2017, CHEST)

Sepsis Review

- Timely Antibiotics!
- Consider LR
- Still Document Severe Sepsis $$$
- Do not use qSOFA in the ICU

Chest Pain

Updates

- Last Updates
  - STEMI 2015
  - NSTEMI 2014
  - DAPT 2016
- Discuss new chest pain scores
- Review Imaging vs Standard Care
- List new MI definition

Chest Pain Facts

- 6% of all ED visits
  - $14 Billion
    - 75% Noncardiac
    - <20% ACS

- Missed ACS largest ED malpractice
  - 2-8% misdiagnosed/ discharged

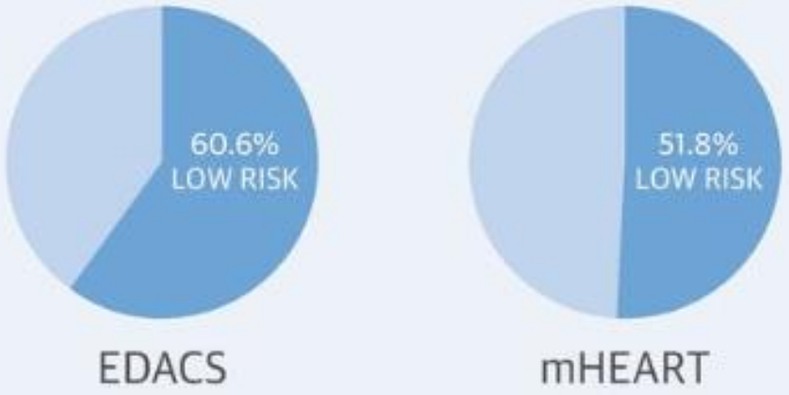
A 55 year-old female with no PMH presented to the ED with substernal chest pain at rest.
Worse with exertion, better with nitroglycerin.
Non reproducible, No radiation, No diaphoresis
Worse with Inspiration

High sensitivity troponin negative at 0h + 6h
EKG No changes
BMI 40

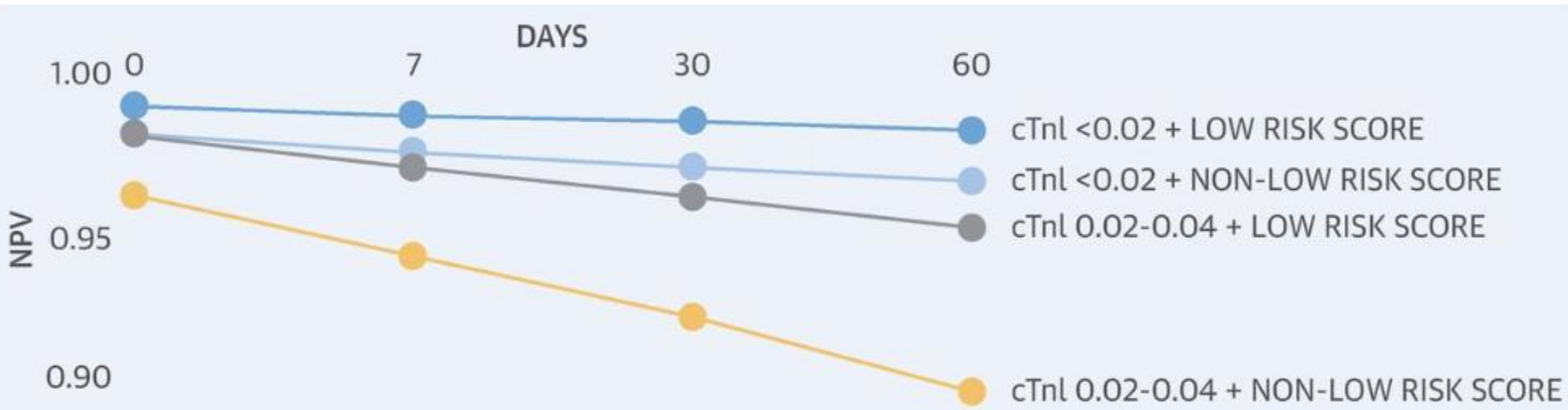
What prediction scores?

CENTRAL ILLUSTRATION: Performance of the EDACS Versus Modified HEART Score Among Emergency Department Patients With Chest Pain

EDACS & mHEART perform similarly in terms of NPV



EDACS categorizes more patients as low risk



Lower troponin cut-off to define low risk is superior

(Mark et al. 2018, JACC)

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What prediction scores?

HEART = 4
Intermediate

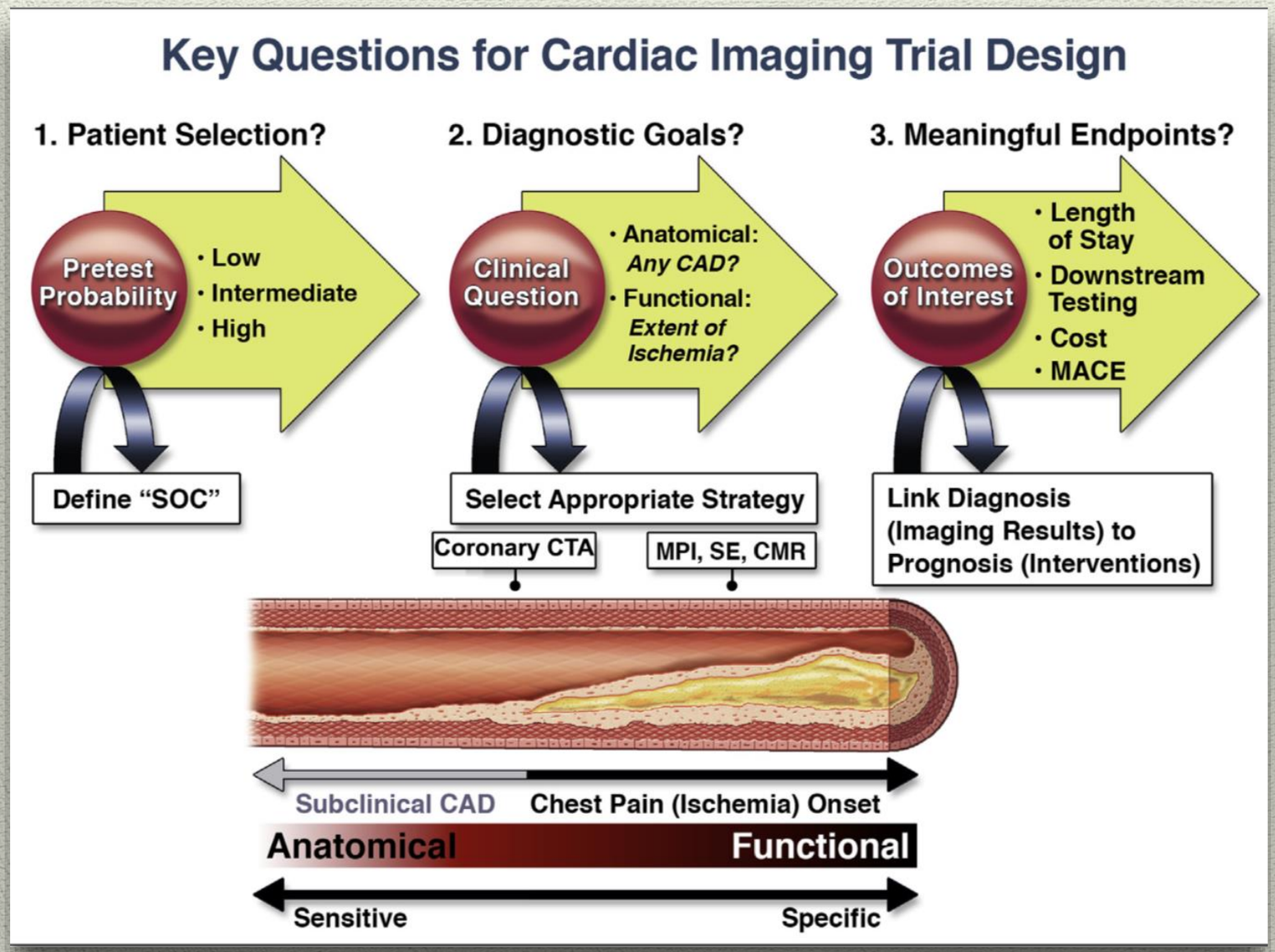
EDACS = 2
Low

Out with the Old: Coronary CTA

No Difference

$300 Less

54% Reduction in time to diagnosis

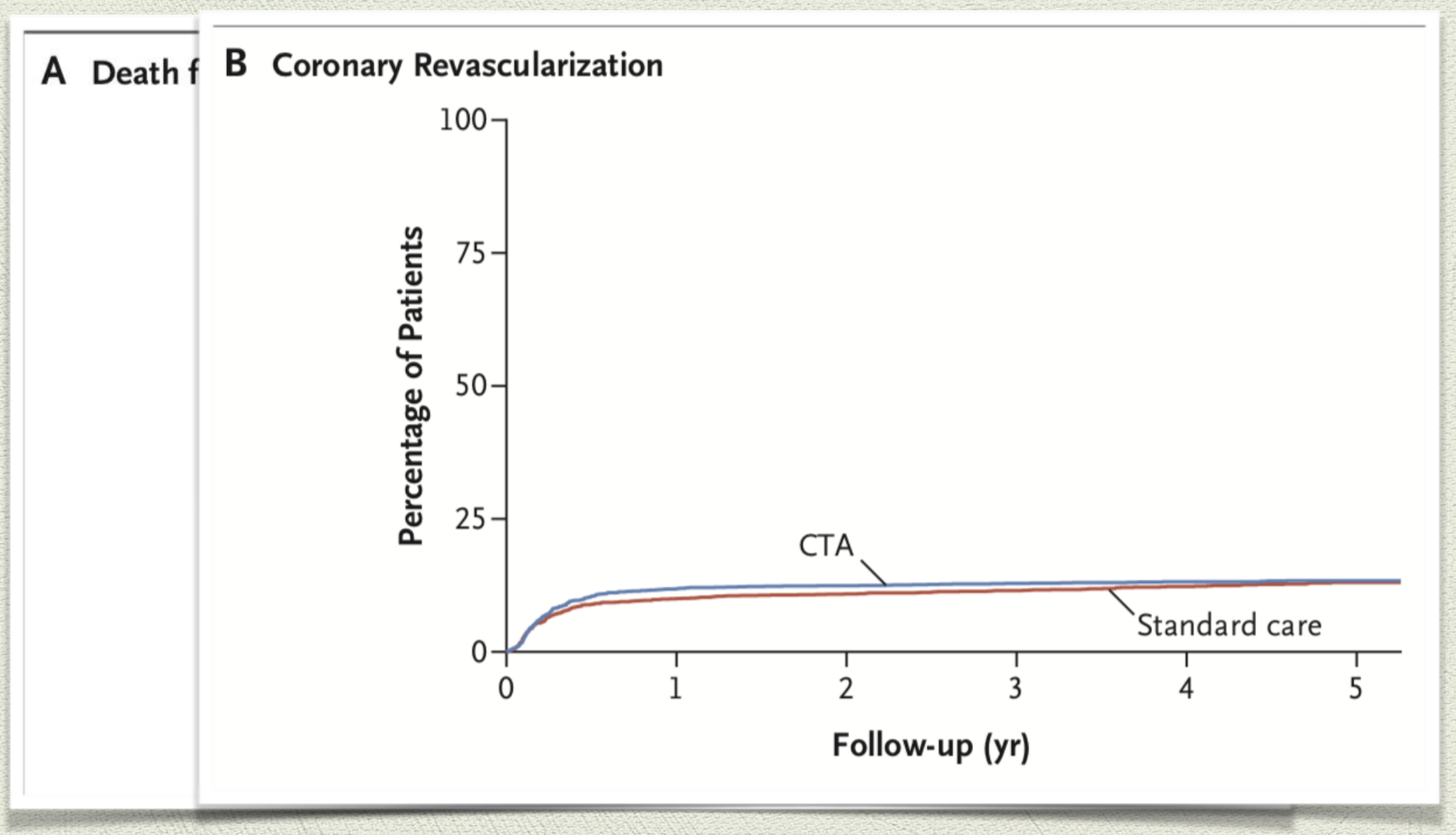


(Bhatt et al. 2017, JACC)

August 2018: Cardiac Imaging

A SCOT-HART Trial - 5 years

- CTA vs Standard Care for **Stable Chest Pain**



(Newby et al. 2018, NEJM)

September 2018:
CTA vs Stress Echo

No history of CAD
Negative Troponin
Resolution of chest pain

	CTA	Stress Echo	P value
Hospitalization	19%	**11%**	0.026
LOS	58h	**34h**	0.002

No difference in outcomes

(Levsky et al. 2018, JACC)

December 2017:
Shared Decision Making

Shared Decision Making or Usual Care
CTA or Stress

- No significant difference:
  - # ED visits
  - Imaging studies
  - Procedures

- SDM = 125.6 few tests/ 100 patients

(Shaffer et al. 2017)

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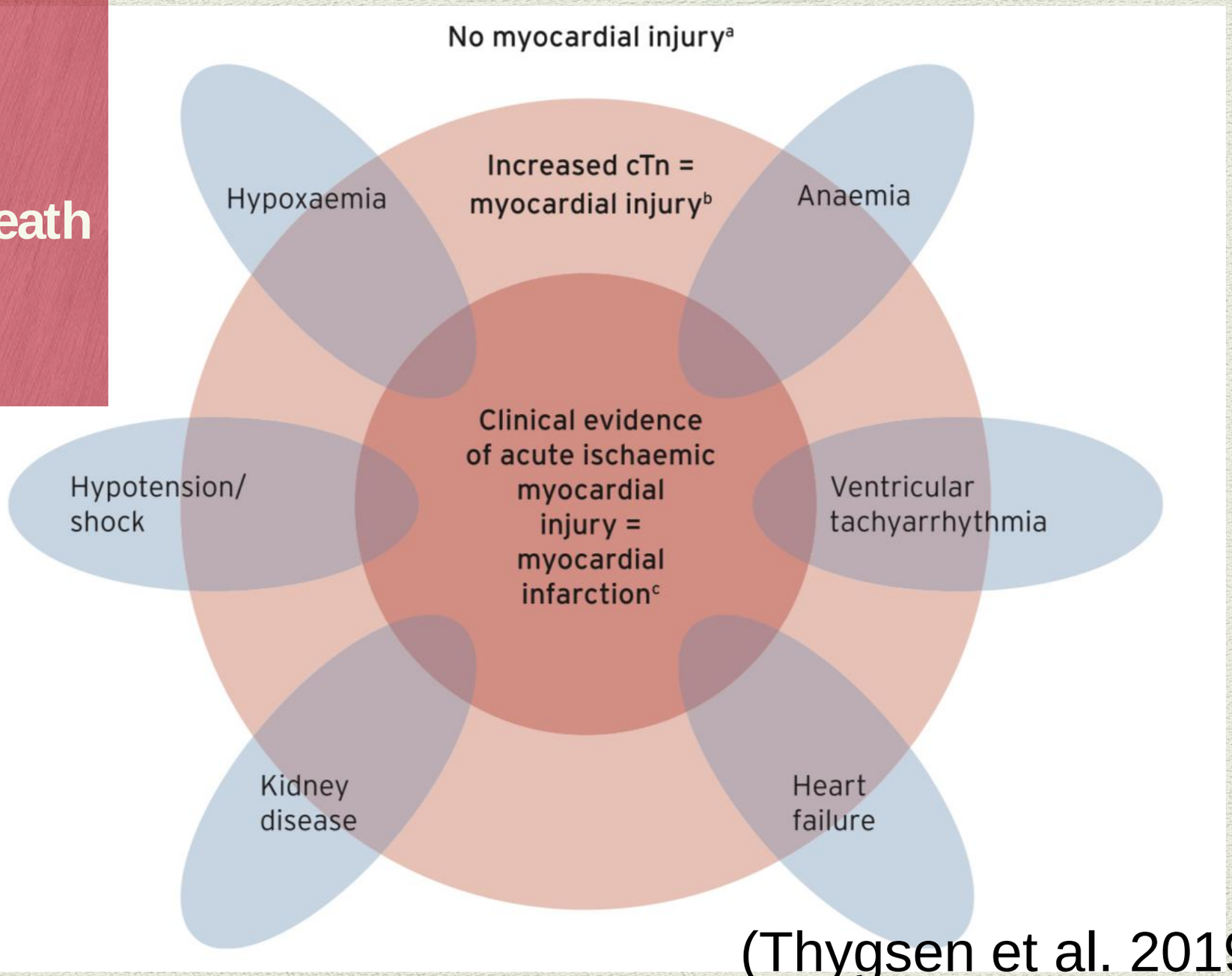
EKG No changes
BMI 40

Positive at 12 hours
BP 212/115
Is this an Type II NSTEMI?

August 2018:
4th Universal MI Definition Revision

5 TYPES NSTEMI

1. **Ischemic**
2. **Demand**
3. **Sudden Cardiac Death**
4. **PCI**
5. **CABG**



(Thygsen et al. 2019)

Criteria for type 2 MI

Detection of a rise and/or fall of cTn values with at least one value above the 99th percentile URL, and evidence of an imbalance between myocardial oxygen supply and demand unrelated to coronary thrombosis, requiring at least one of the following:

- Symptoms of acute myocardial ischaemia;
- New ischaemic ECG changes;
- Development of pathological Q waves;
- Imaging evidence of new loss of viable myocardium or new regional wall motion abnormality in a pattern consistent with an ischaemic aetiology.

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Positive at 12 hours
BP 212/115
Is this an Type II NSTEMI?

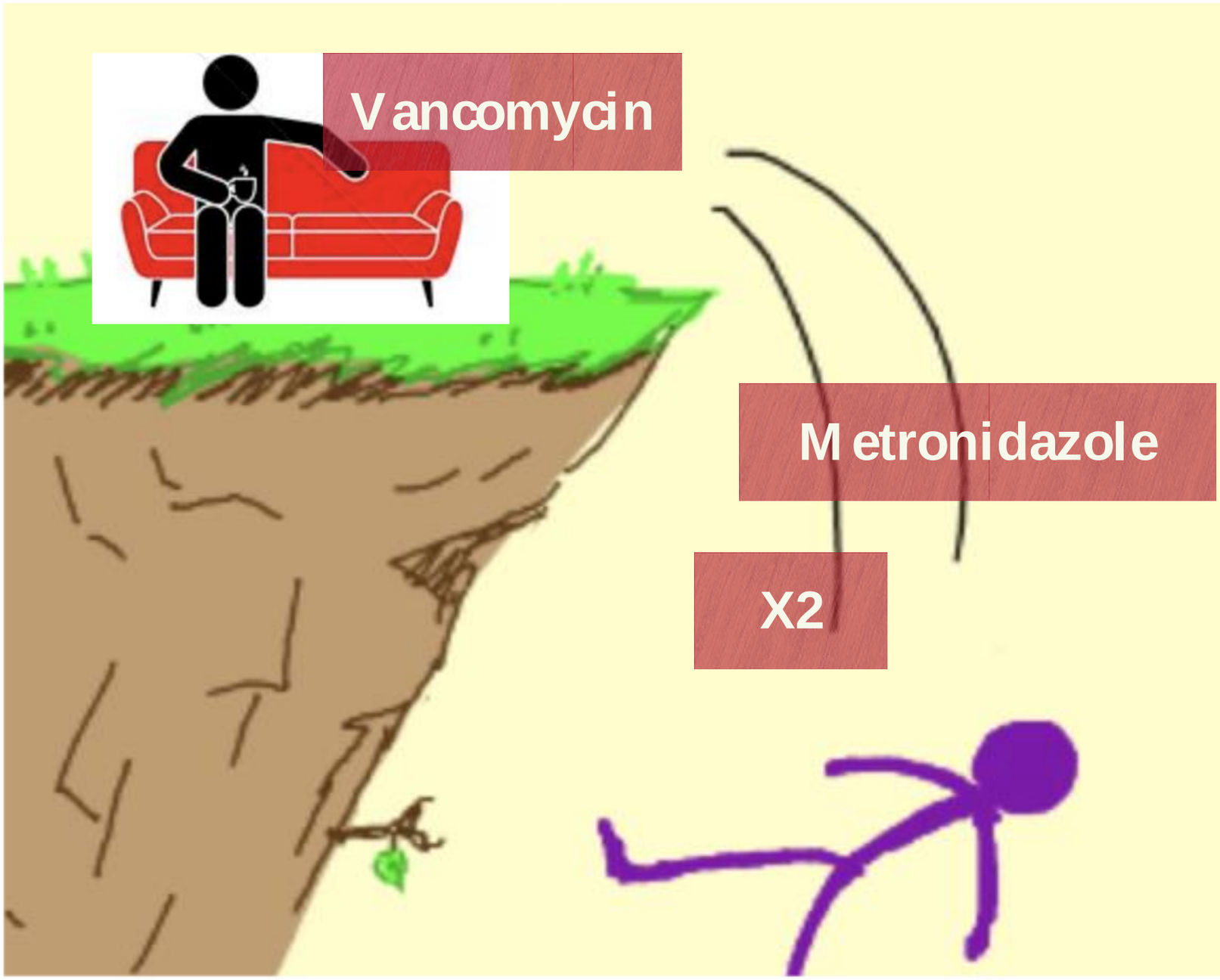
YES: SYMPTOMS

Chest Pain Review

- Could consider **EDACS** if HEART intermediate
- Still on the fence about Coronary CTA rule out
- Type II NSTEMI now has **new criteria**!

Clostridium Difficile

2018 C. Diff Guidelines



IDSA 2017 Update

	Treatment
Non Severe Initial	**Vanc 125 po QID x 10** FDX 200 po BID x10
Severe Initial	Same
Fulminant Initial	Vanc 500 po QID (Consider Rectal) + Flagyl IV
1st Recurrence	**Vanc taper 2-8 weeks** **FDX (if van 1st)**
2nd Recurrence	Vanc Taper FDX Fecal Transplant

Severe:
WBC >15,000 OR Serum Cr >1.5

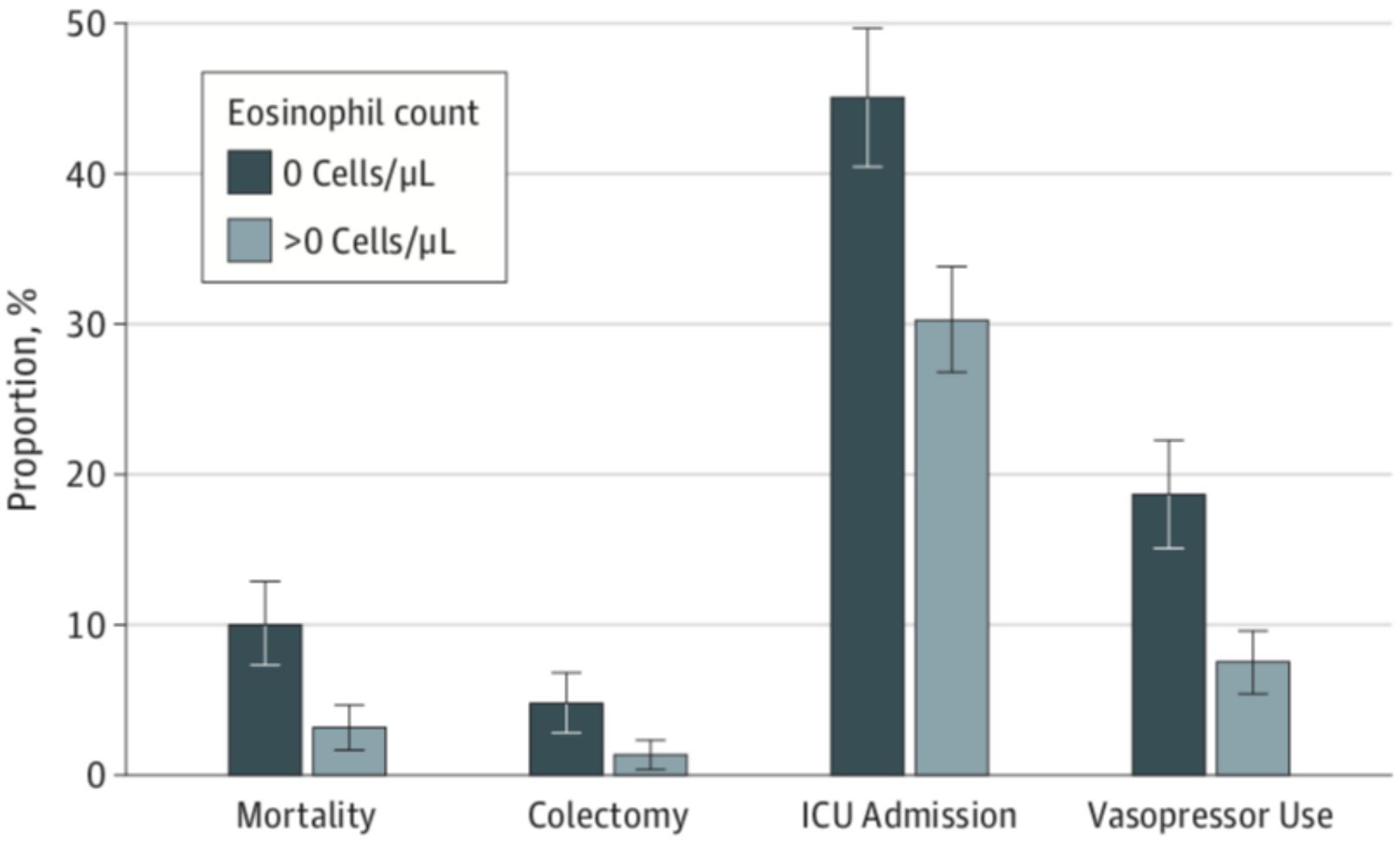
Fulminant:
Hypotension, Shock, Ileus, or Megacolon

(McDonald et al. 2018, IDSA Guideline)

2018: Eosinophil Prediction

WBC >15K had no significance

Figure. Comparisons of Primary and Secondary Outcomes Between the Eosinophil Count Groups



(Kulaylet et al. 2018, JAMA Surgery)

PatientlyWaiting.....

Community Acquired Pneumonia

Questions?

Credits

Bhatt, D. L., & Taqueti, V. R. (2017). Out With the Old Rule-Out: Raising the Bar for Acute Chest Pain Evaluation With Randomized Trials of Cardiac Imaging. *JACC Cardiovasc Imaging, 10*(3), 350-353. doi:10.1016/j.jcmg.2016.12.008

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Credits

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