

Biomarker Based Strategies for Exclusion of Acute MI: A U.S. Perspective

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Populations Undergoing Troponin Testing Differ around the World

How does patient selection for testing affect diagnostic performance of hs-cTn?

What might happen with 99th percentile ULN

| MI probability | Positive tests with standard assay (per 1000 patients) | Positive tests with hs assay | Additional positive tests meeting MI definition | Additional positive tests not meeting MI definition |
|----------------|--|------------------------------|---|---|
| 17% | 199 | 328 | 21 | 108 |
| 10% | 146 | 275 | 12 | 117 |
| 5% | 108 | 237 | 8 | 121 |
| 3% | 93 | 222 | 3 | 126 |

de Lemos, J.A., D.A. Morrow, and C.R. deFilippi, *Highly sensitive troponin assays and the cardiology community: a love/hate relationship?* Clin Chem, 2011. **57**(6): p. 826-9.

Implementation Strategy

Leadership Team

Laboratory Medicine
Emergency Medicine
Hospitalists
Cardiology
Administration

Protocol Development

Develop hs-cTn algorithm
Start with published data
Consider risk stratification
Develop processes for
Comprehensive education
Secondary testing
Plan for \uparrow cTn not from MI
Consultation guidelines

Careful implementation

Beta testing of algorithm
Created order sets
Provided clinical support

Monitor outcomes

Safety
Efficacy
Secondary Testing
Cost



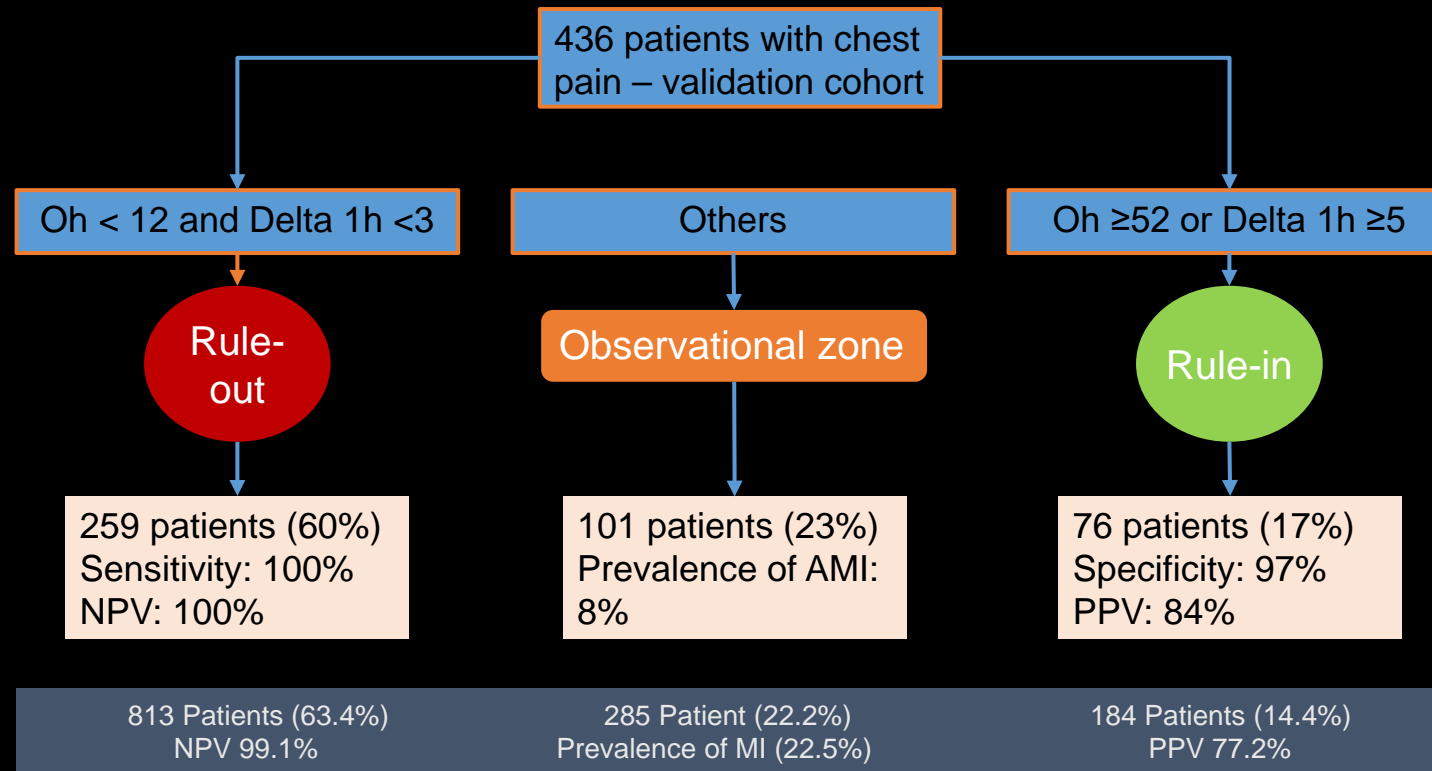
0 hour Rule Out

| Author, year | hs-cTnT threshold | N | % < LLD | Sensitivity (%) | NPV (%) |
|-----------------------------------|-------------------|------|---------|-----------------|---------|
| Body R. JACC 2011 | <3 ng/L | 703 | 28% | 100 | 100 |
| McRae A. Ann Emerg Med 2017 | <6 ng/L | 7130 | 42% | 99.8 | 99.9 |

Pros: Immediate R/O in low risk patients, validated

Cons: Applies to only 25-30% of patients, Not suitable for early presenters

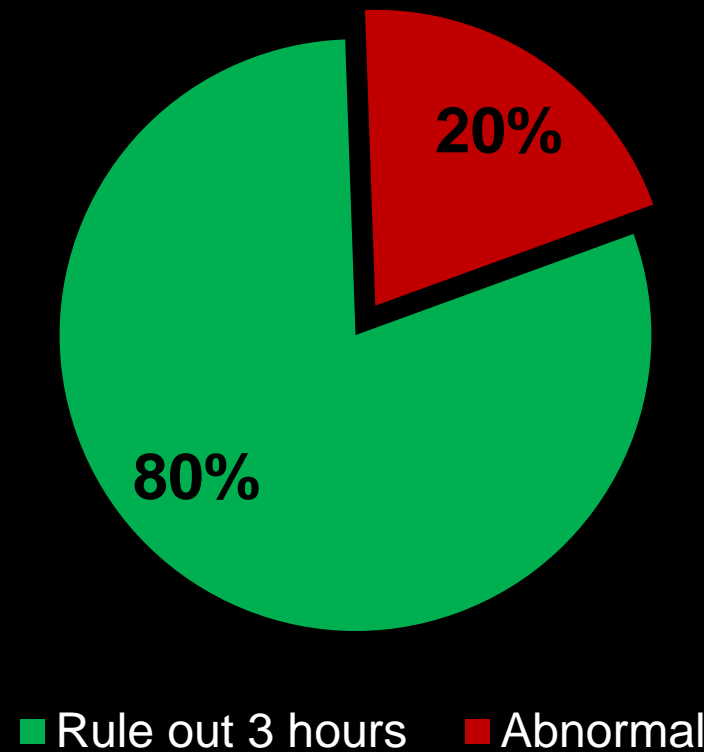
1-hour rule out with hs-cTnT



Trop T-hs ≥ 52 ng/L at any time is abnormal

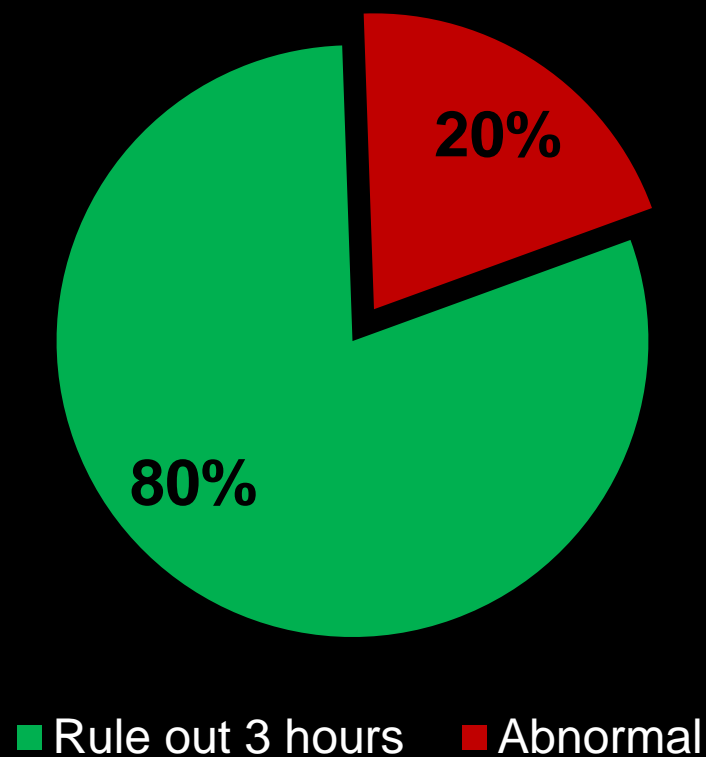
High-sensitivity Troponin Rule Out MI Protocol Rapidly Rules out Patients in Small Pilot Study

Conventional Troponin T Protocol

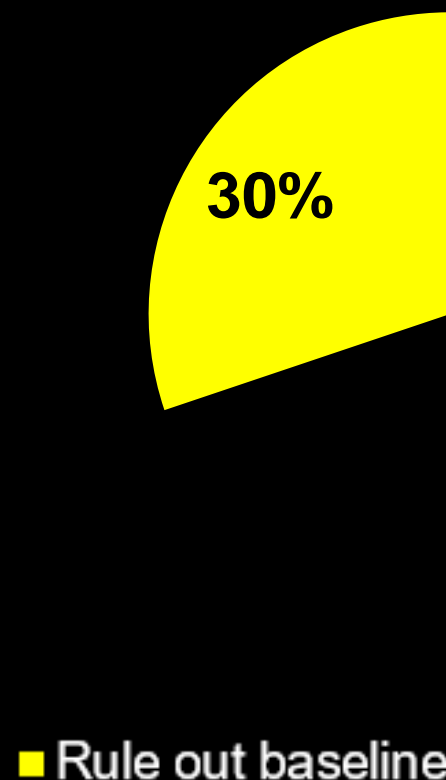


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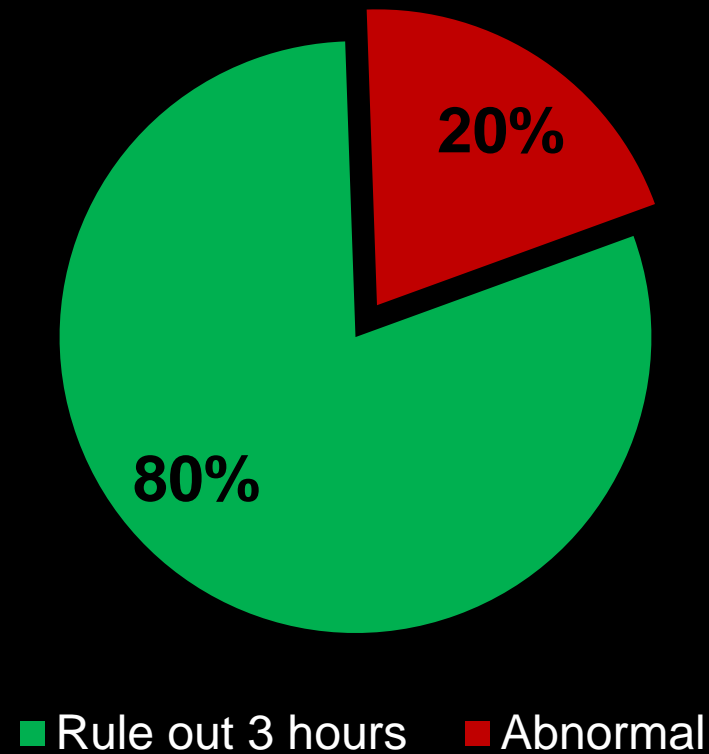


High-Sensitivity Troponin T Protocol

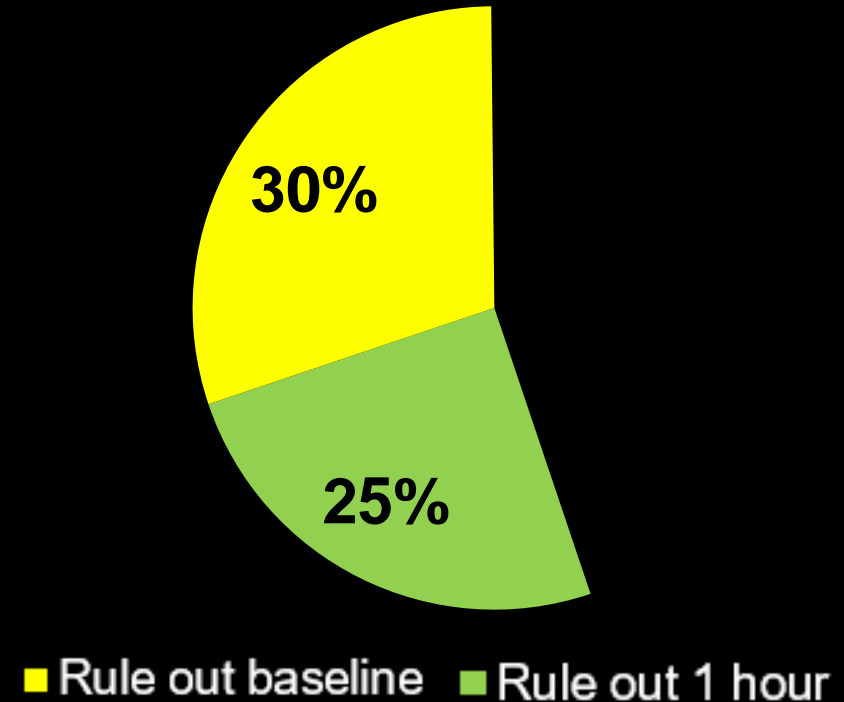


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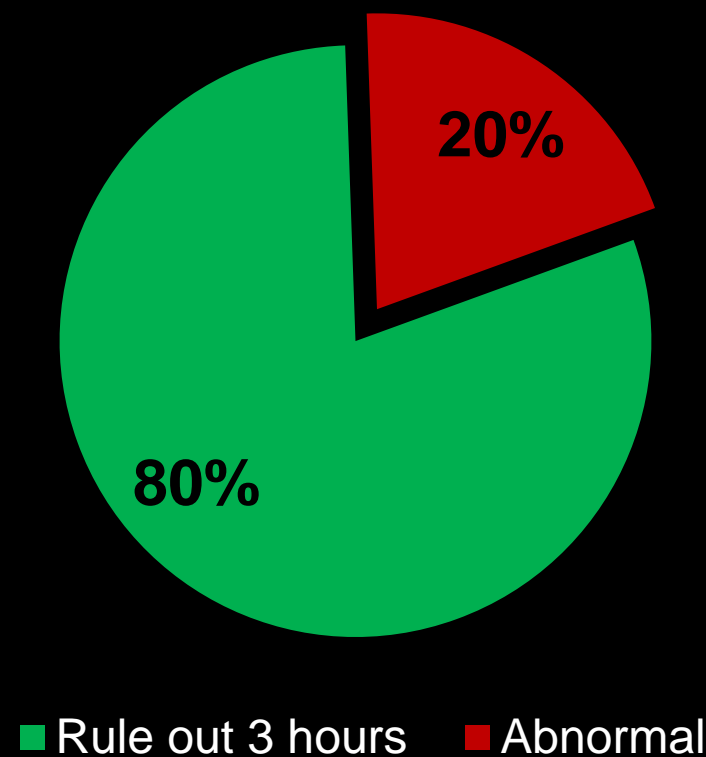


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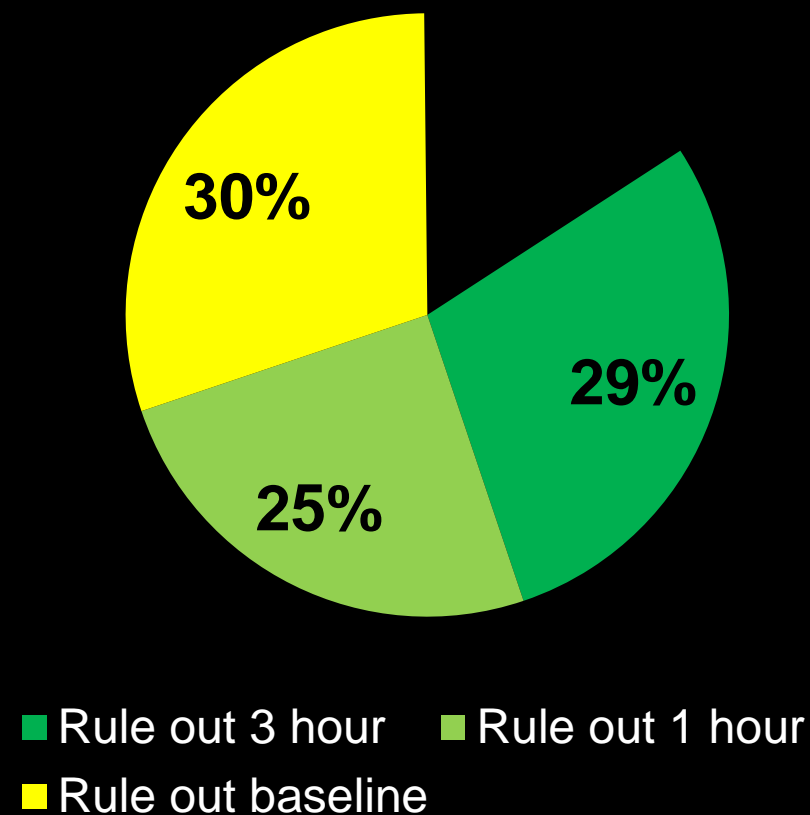


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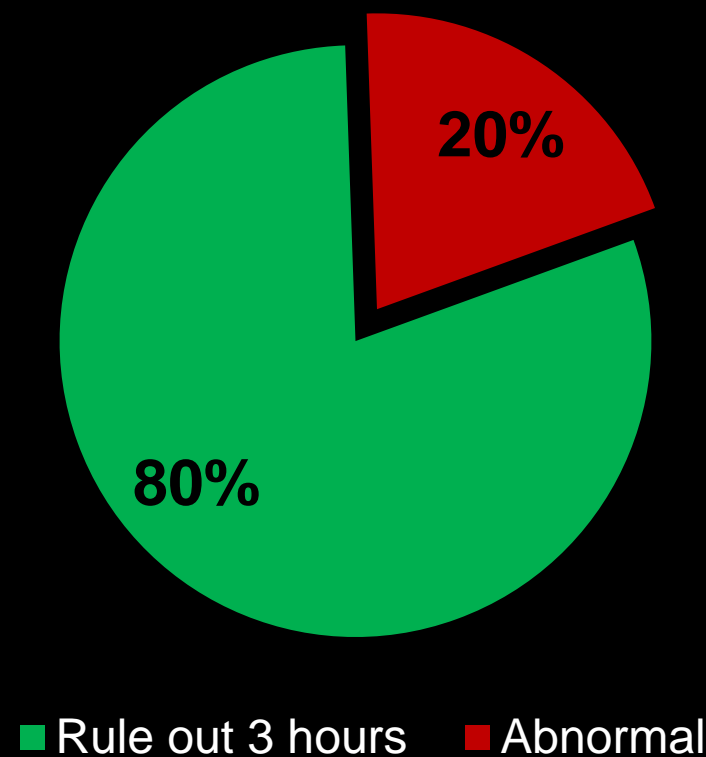


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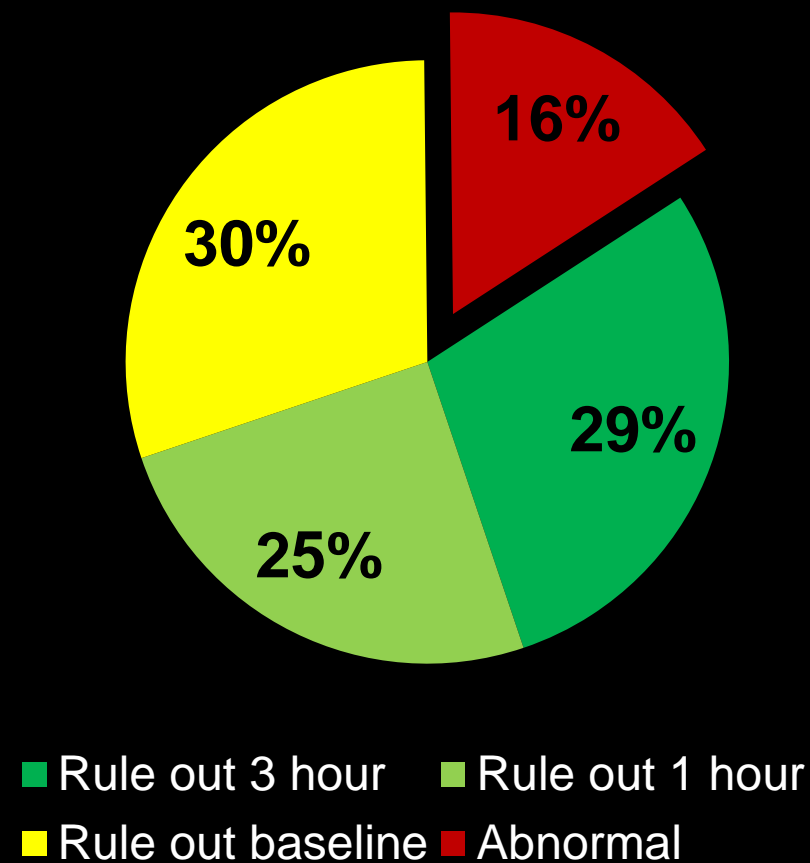


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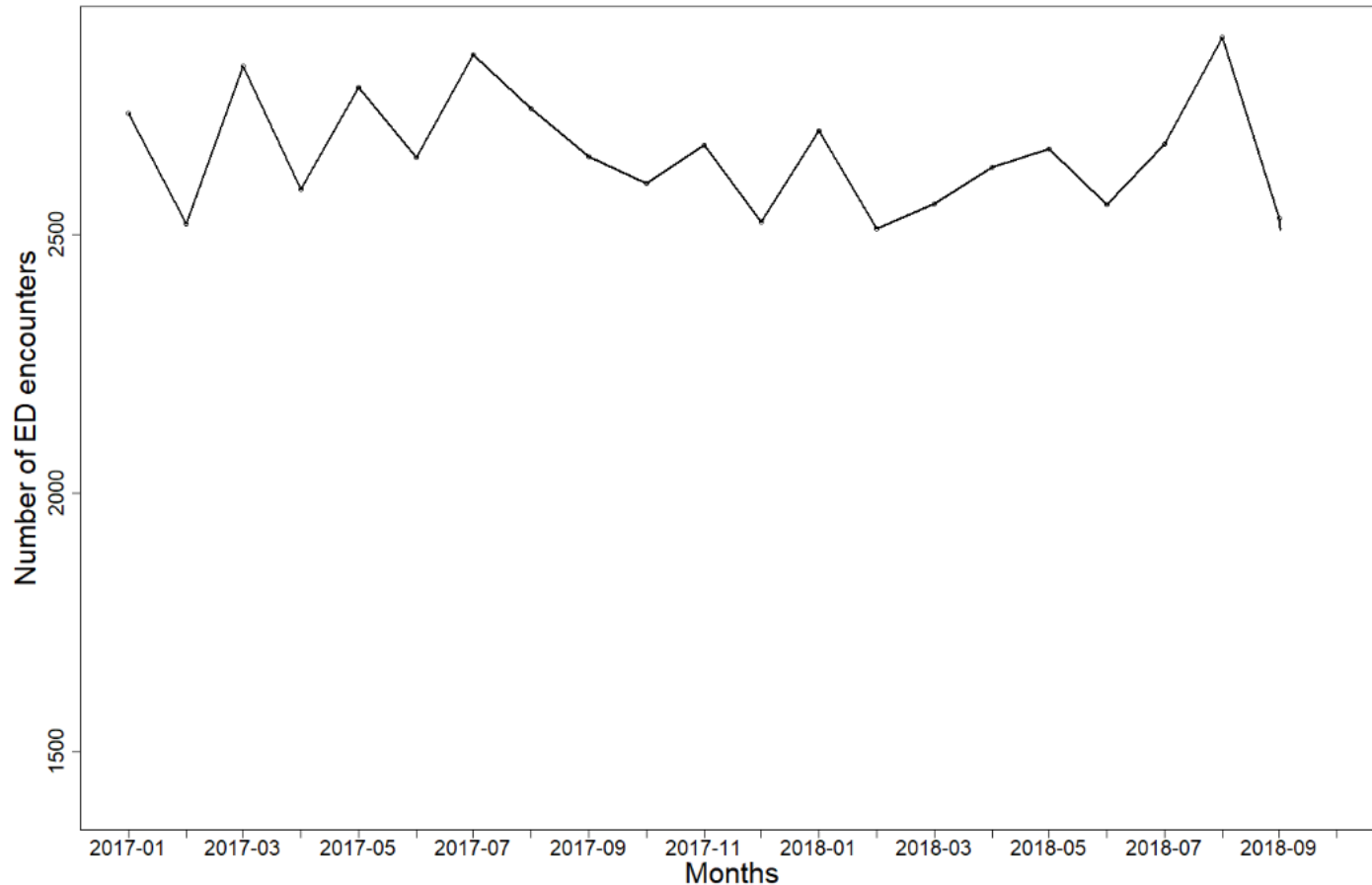
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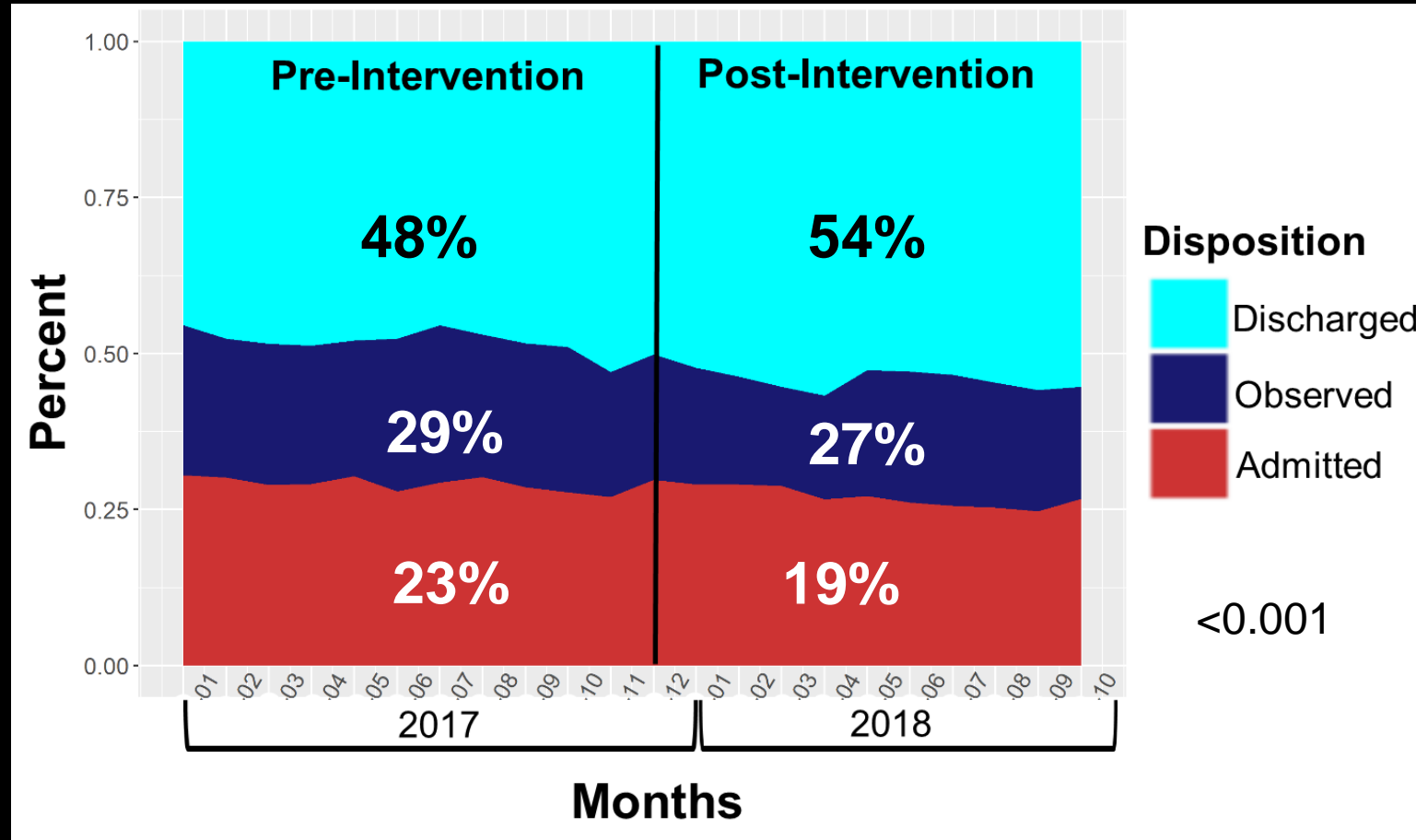


High rates of Cardiac Testing in Urban Safety Net Emergency Department

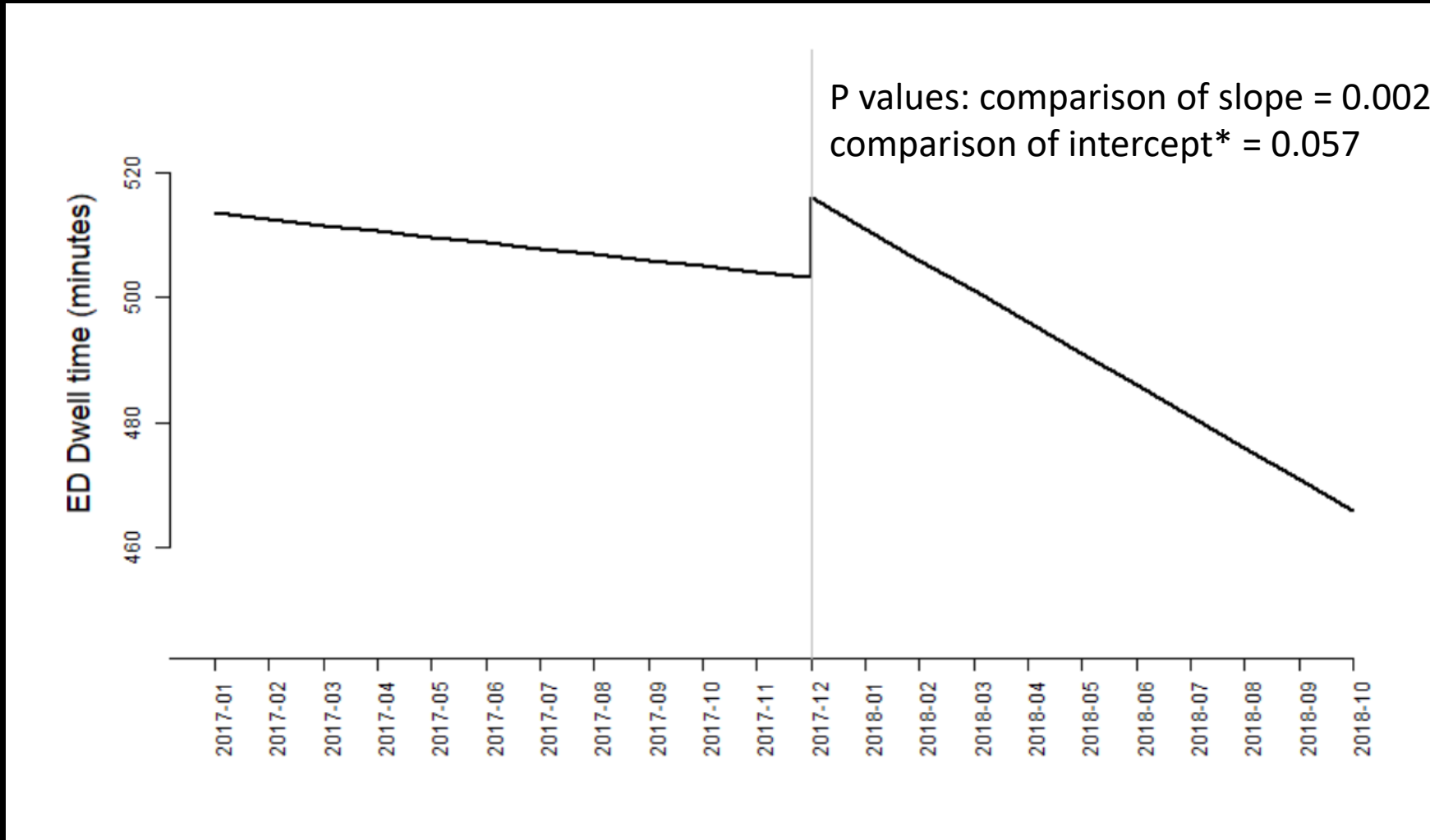


Mean of 2,603.5 encounters/month
With ECG and troponin obtained

Proportion of encounters resulting in ED discharge, vs. observation vs. admission



ED Dwell Times Declined More Rapidly After Implementation



* P value for comparison of intercept testing compared the end of the pre and beginning of the post implementation periods

Lessons Learned

- 99th URL will lower the PPV for MI in the US population
 - Potential for over-utilization of cardiac testing and costs
- Rapid 0/1/3 hour can potentially mitigate this issue by ruling out and risk stratifying a large portion
 - Additional safety data are needed
- Effects on resource utilization will vary based on the strategy implemented and the characteristics of the health system