Beware the Negative Stress Test: Postoperative Cardiac Events May Be More Prevalent Than Anticipated

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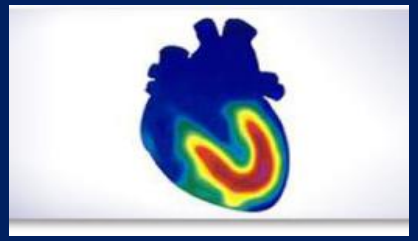
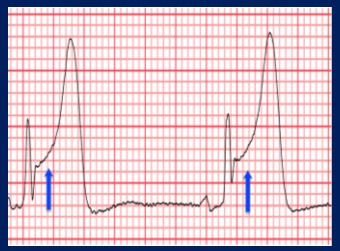
PACIFIC NORTHWEST ENDOVASCULAR CONFERENCE





Dartmouth-Hitchcock HEART & VASCULAR CENTER

DISCLOSURE

David H. Stone, MD

- **No relevant financial relationship reported**

Preoperative Stress Testing

- Patients are often selected for stress testing prior to vascular surgery

Preoperative Stress Testing

Can J Cardiol. 2017 Feb;33(2):279-282. doi: 10.1016/j.cjca.2016.07.590. Epub 2016 Aug 1.

Temporal Trends in the Utilization of Noninvasive Diagnostic Tests for Coronary Artery Disease in Ontario Betwe

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Abstract

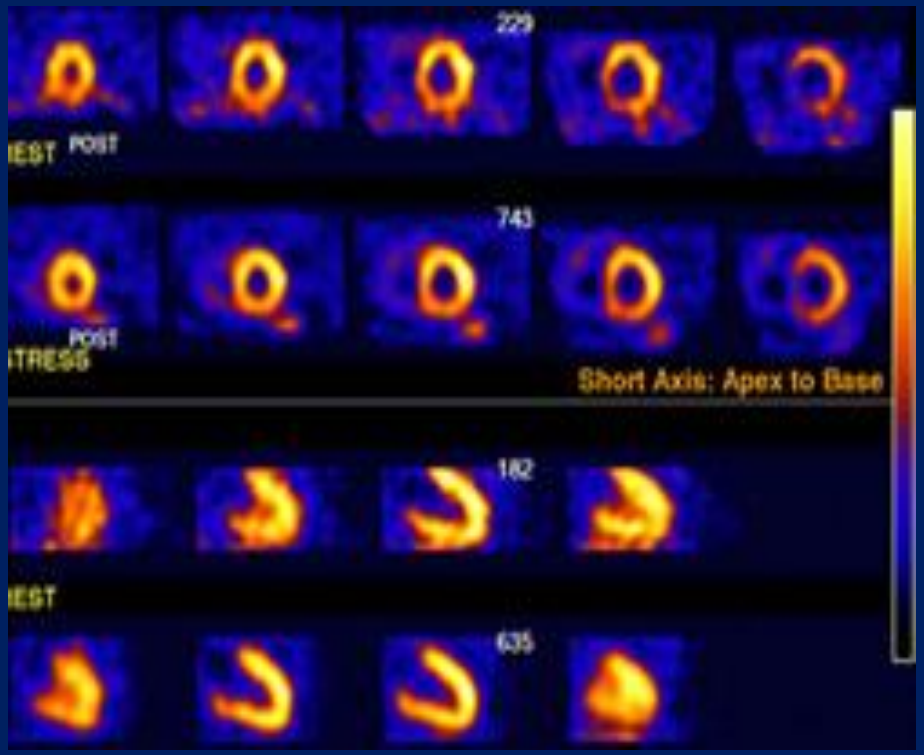
The proliferation o wever, contemporary pop ase are not known. Our object A), myocardial perfusi erformed a population-based 2014. Annual utilization rates of gression model was used to vasive diagnostic tests th to 21.6/1000 adult population (n dult population (mean creased over time, the combined nual reduction of 1.1%; P < 0.001). declined over our study period. Furthermore, the overall test utilization rate also declined over time. We believe our findings are encouraging from a health policy perspective. Nonetheless, rising utilization rates for CCTA and stress echocardiography will need to be monitored in the future.

- Stress test utilization varies by region, gender, institution
- Utilization has increased over time
- No consensus what is the actual predictive value
- Huge Cost

Are Negative Stress Tests Reassuring?

- It is unknown how results compare between:
  - Patients with a negative preoperative stress test
  - Patients who proceed directly to surgery without a stress test
- A negative test is widely perceived by many to be reassuring

Preoperative Stress Testing



There is little evidence to document whether widespread utilization of stress testing and negative results can reduce perioperative cardiac events in high risk patients

Research Opportunity:

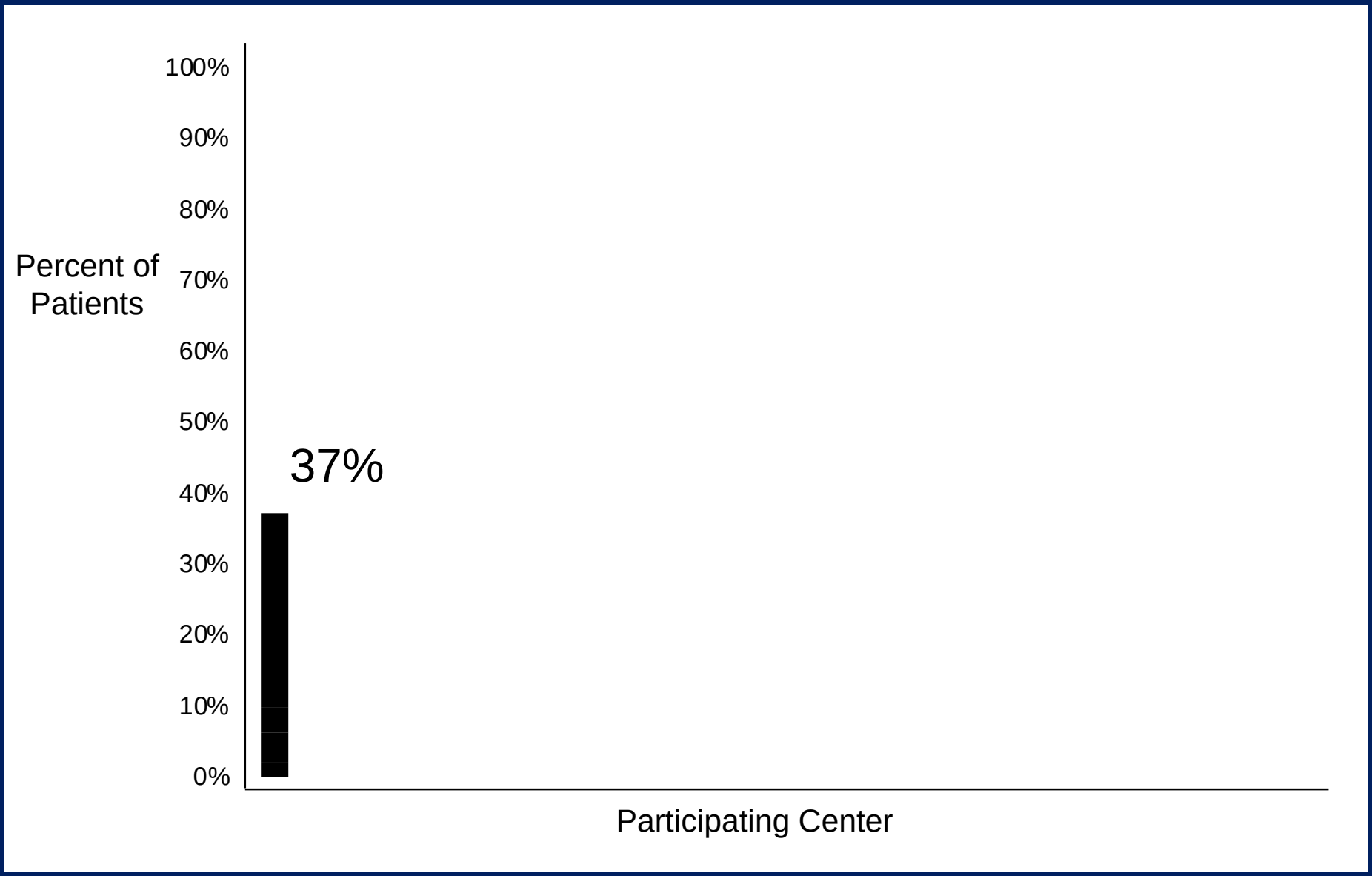
To compare the incidence of postoperative cardiac events among patients with negative stress tests versus those who did not have a stress test

Data Source

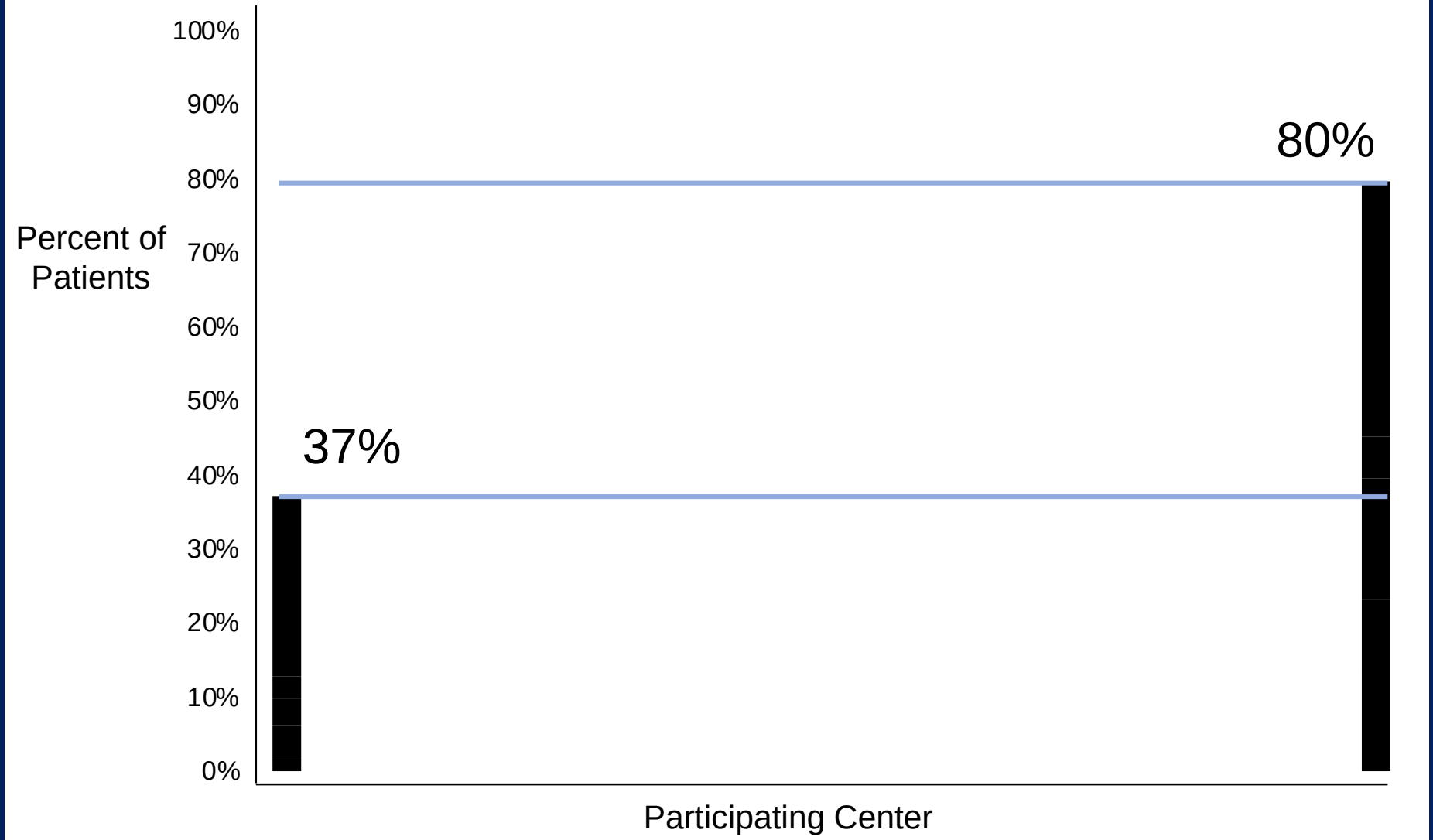
- Vascular Study Group of New England 2003-2017
  - Endovascular AAA repair
  - Infra-inguinal bypass
  - Carotid endarterectomy
  - Open AAA repair
  - Supra-inguinal bypass
- Primary outcome: a composite of in-hospital postoperative myocardial infarction, heart failure exacerbation, dysrhythmia, or death

Vascular Study Group of New England

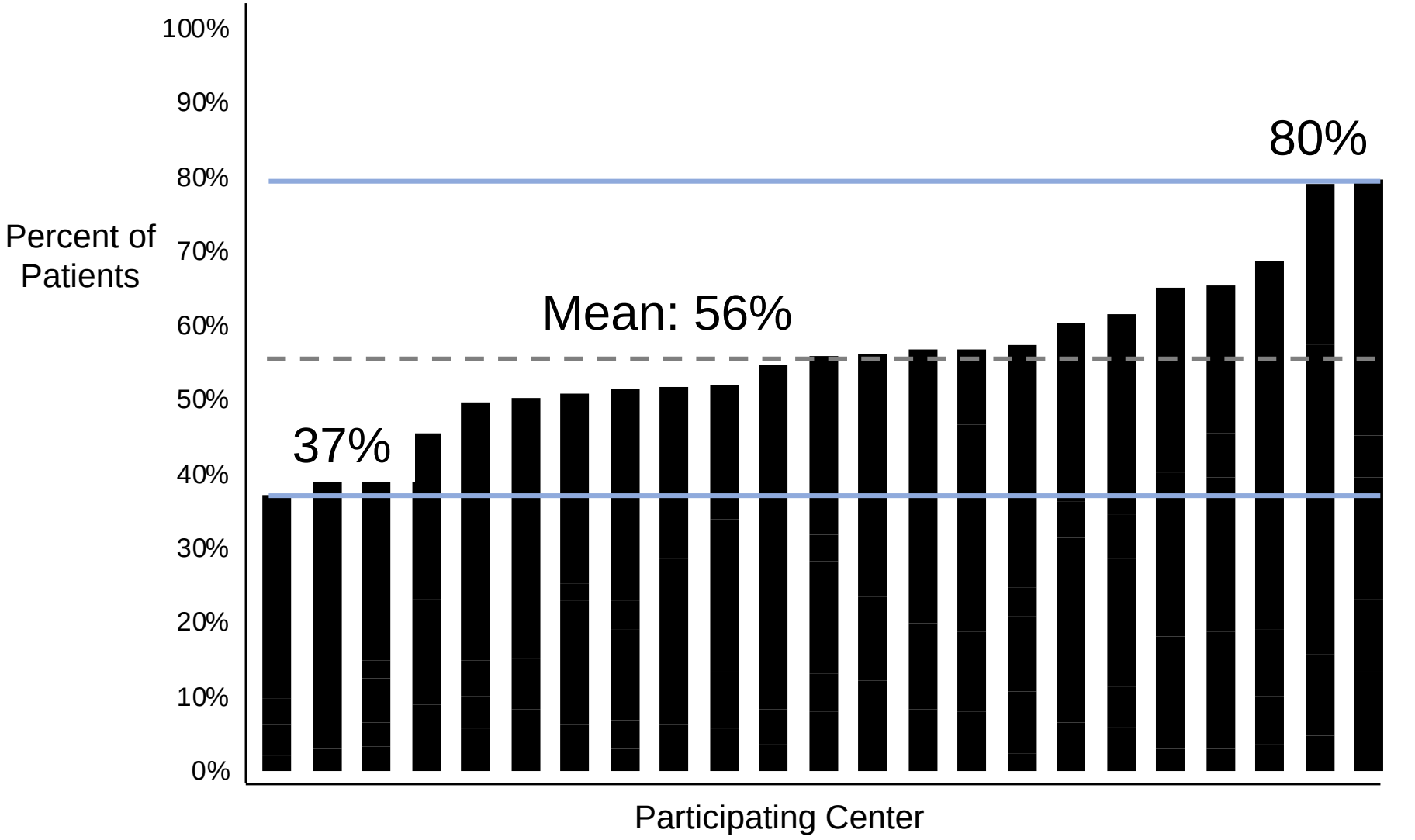
Stress Test Utilization



Stress Test Utilization



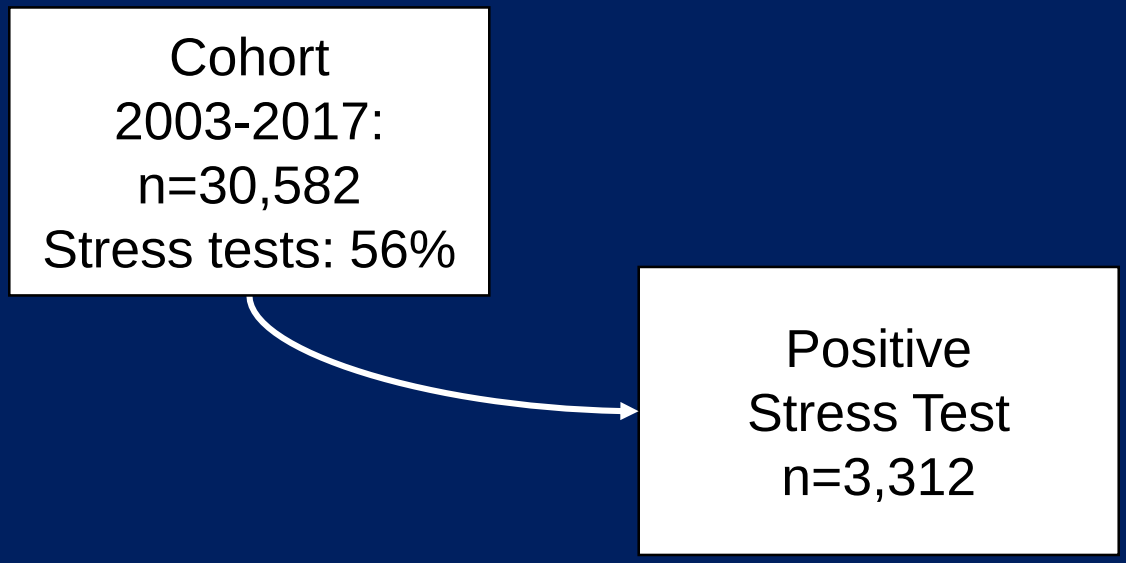
Stress Test Utilization



Cohort Creation

Cohort
2003-2017:
n=30,582

Cohort Creation



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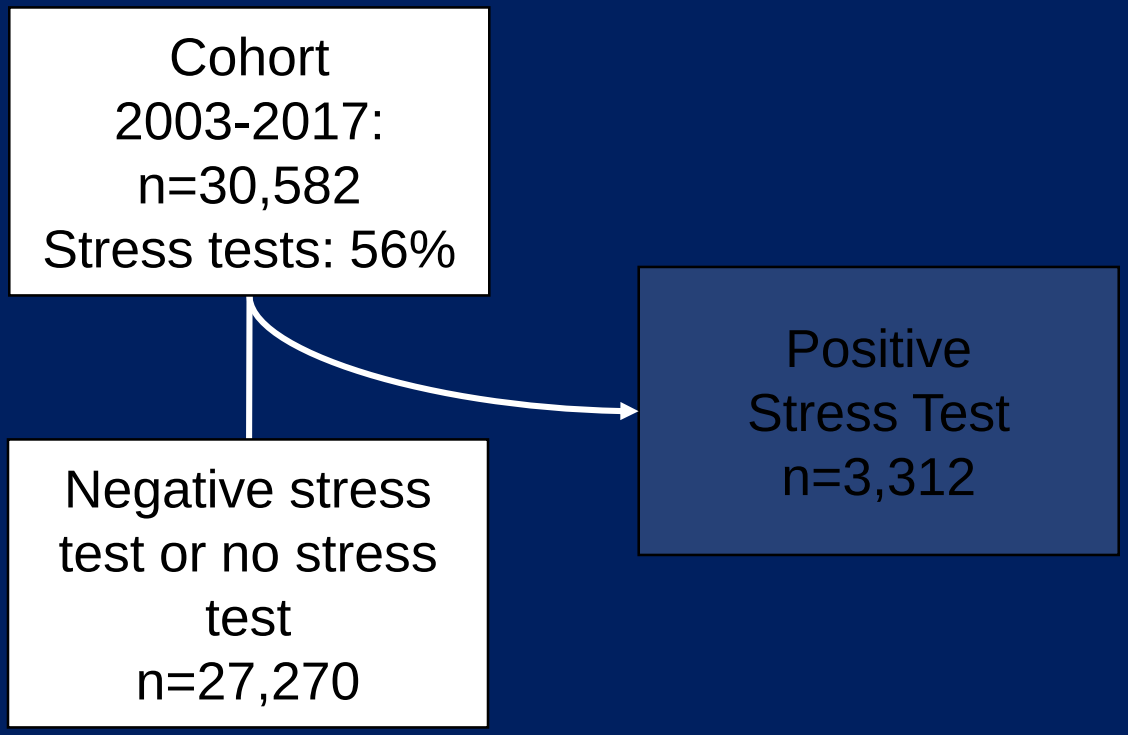

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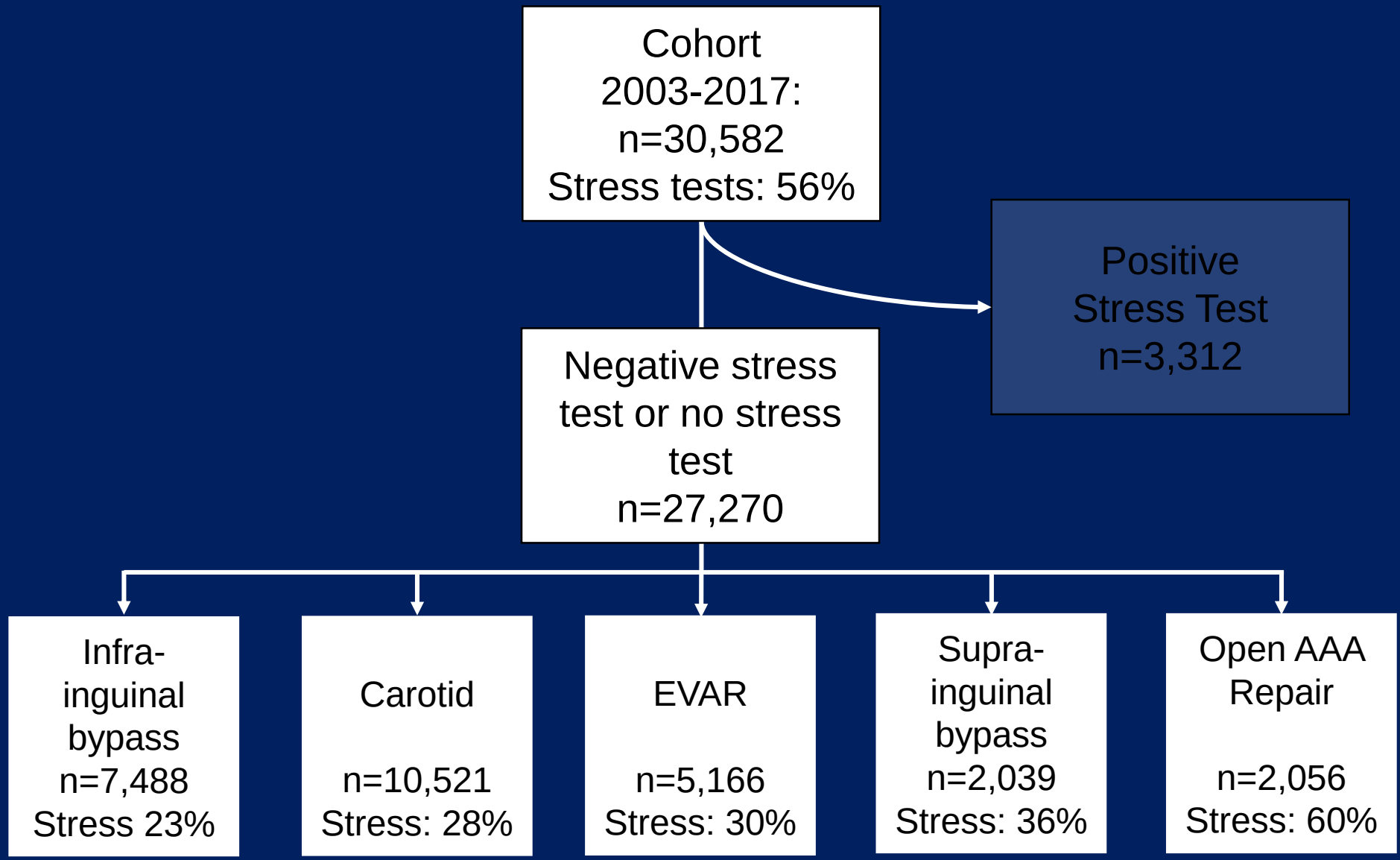

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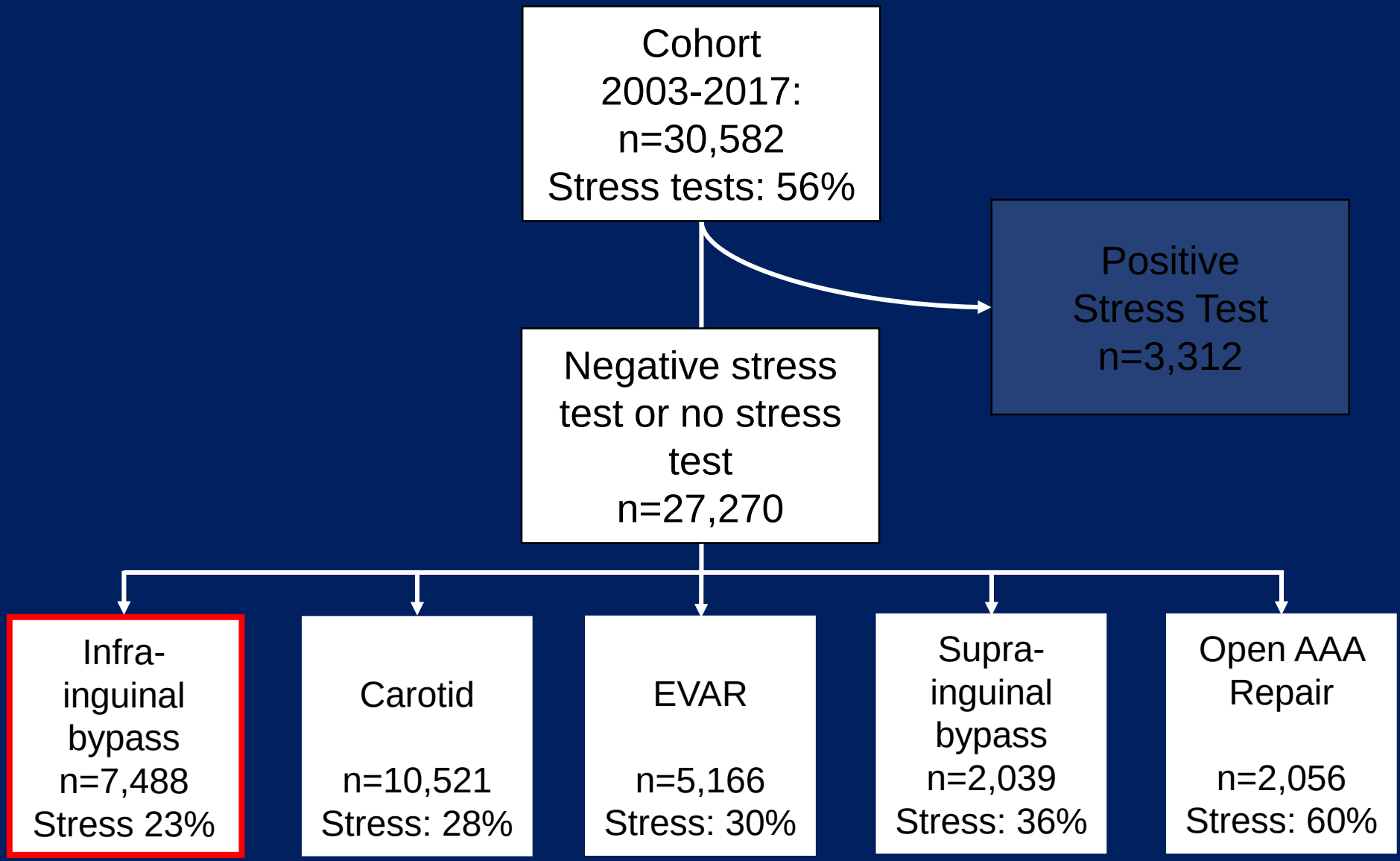

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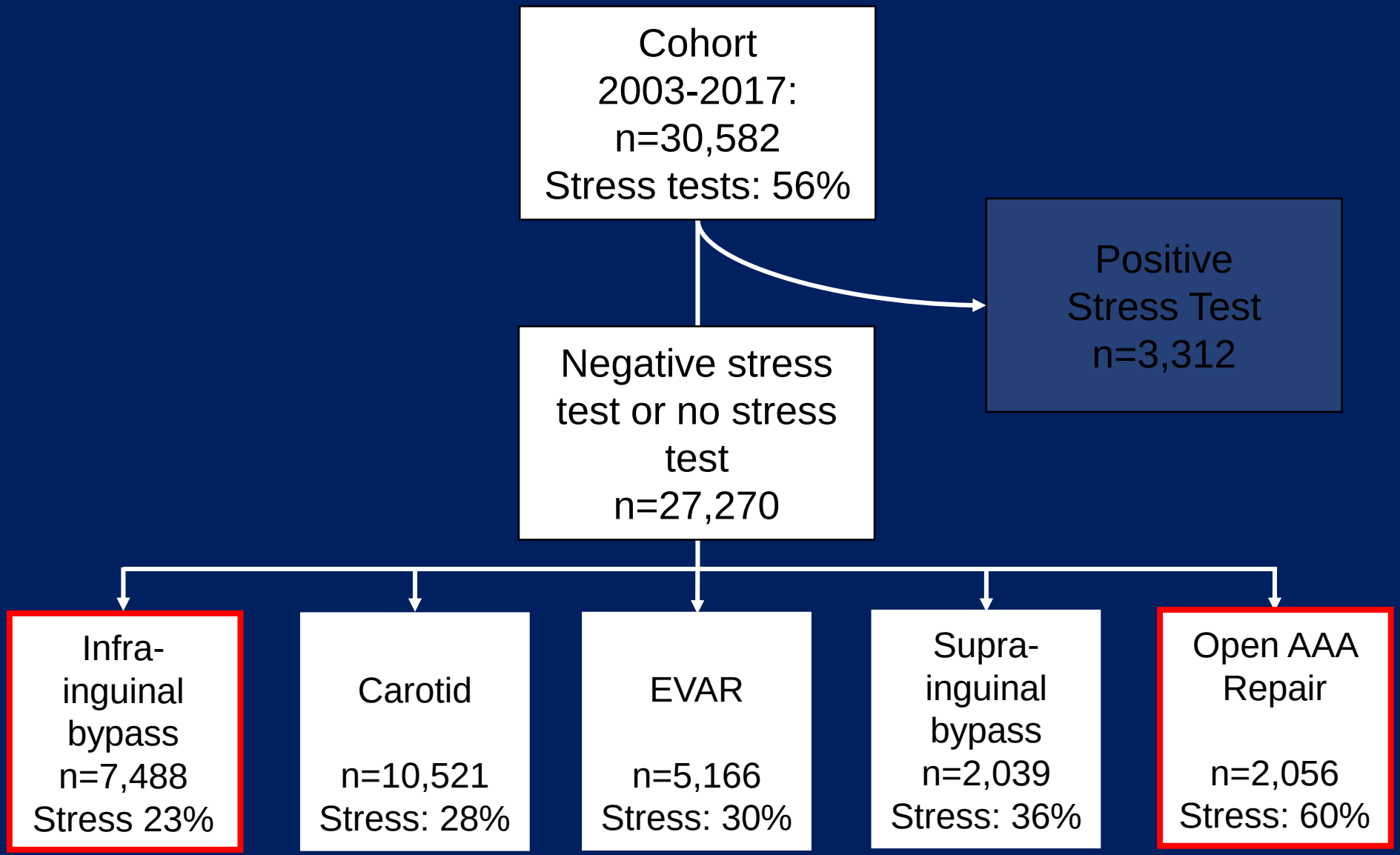
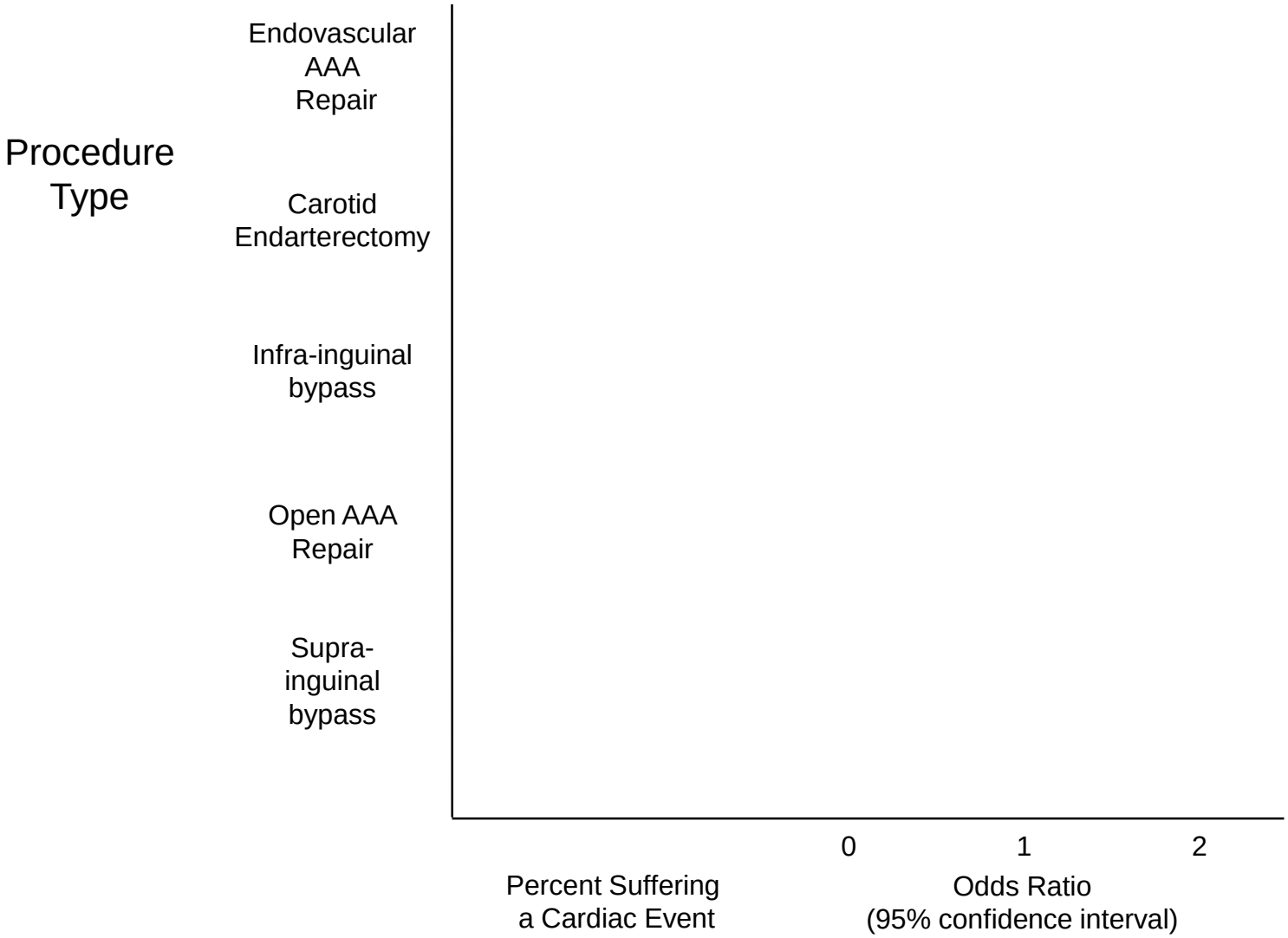


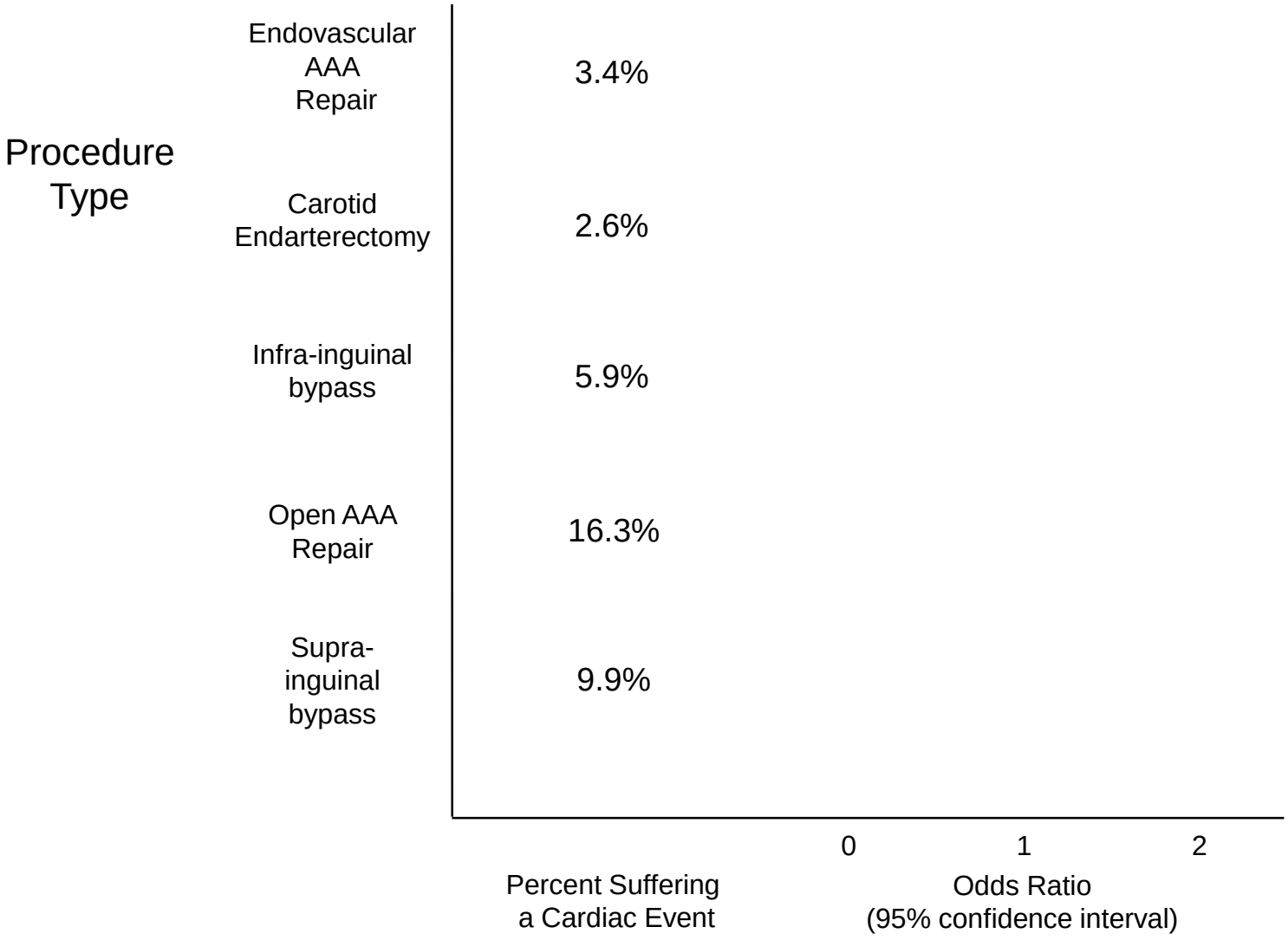
Risk Factors/Comorbidities:

Variable	Negative Stress Test	No Stress Test	p
	n=1,744	n=5,744	
Mean Age (SD)	67 (10)	67 (11)	0.73
Male	67%	69%	0.18
Heart Attack	21%	22%	0.27
Symptomatic Heart Failure	4%	4%	0.17
Kidney Disease	7%	7%	0.89
Smoking History	88%	86%	0.02
Prior Leg Bypass	26%	29%	0.01
Diabetes	46%	47%	0.75

Cardiac Events



Cardiac Events



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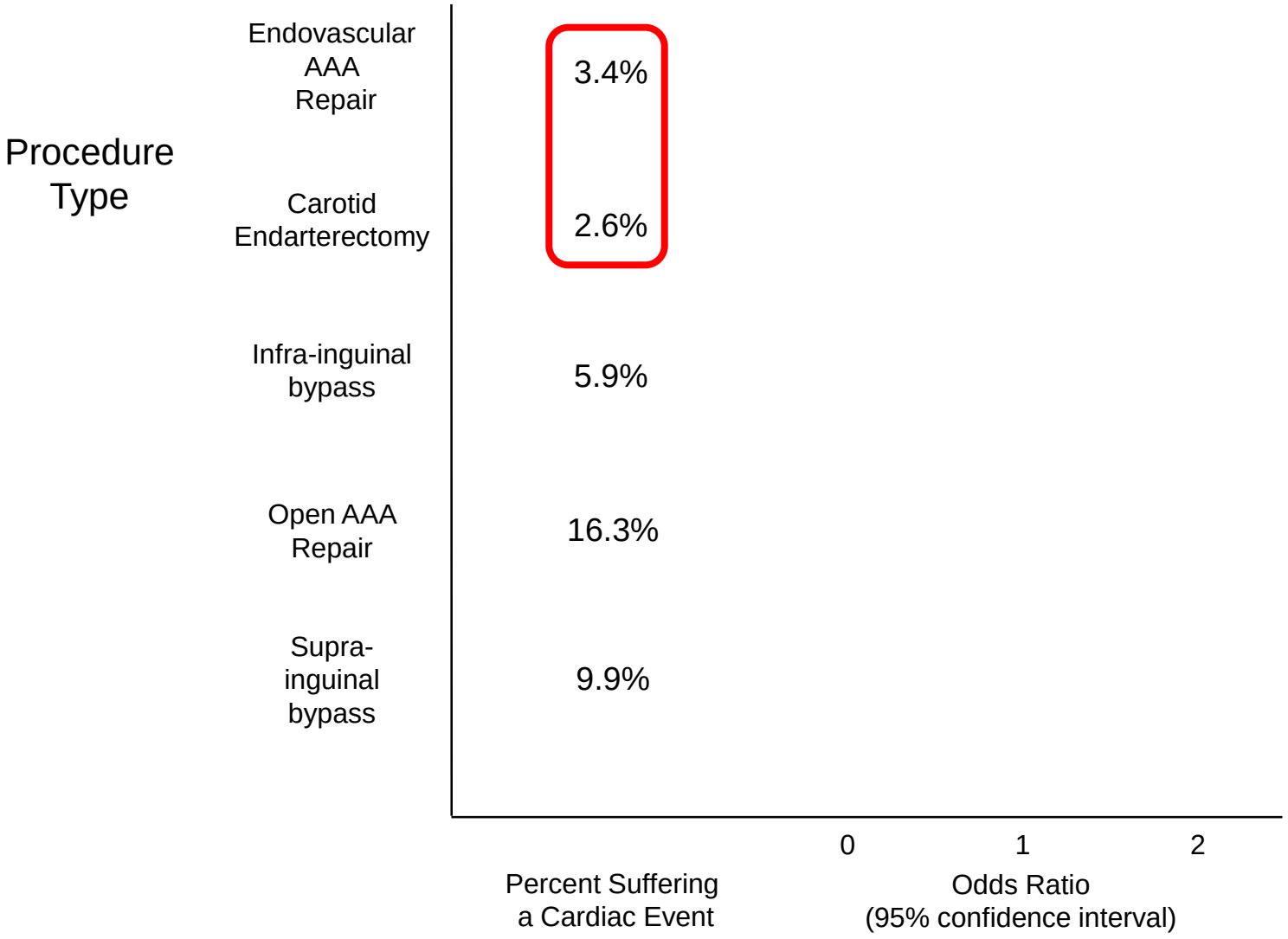

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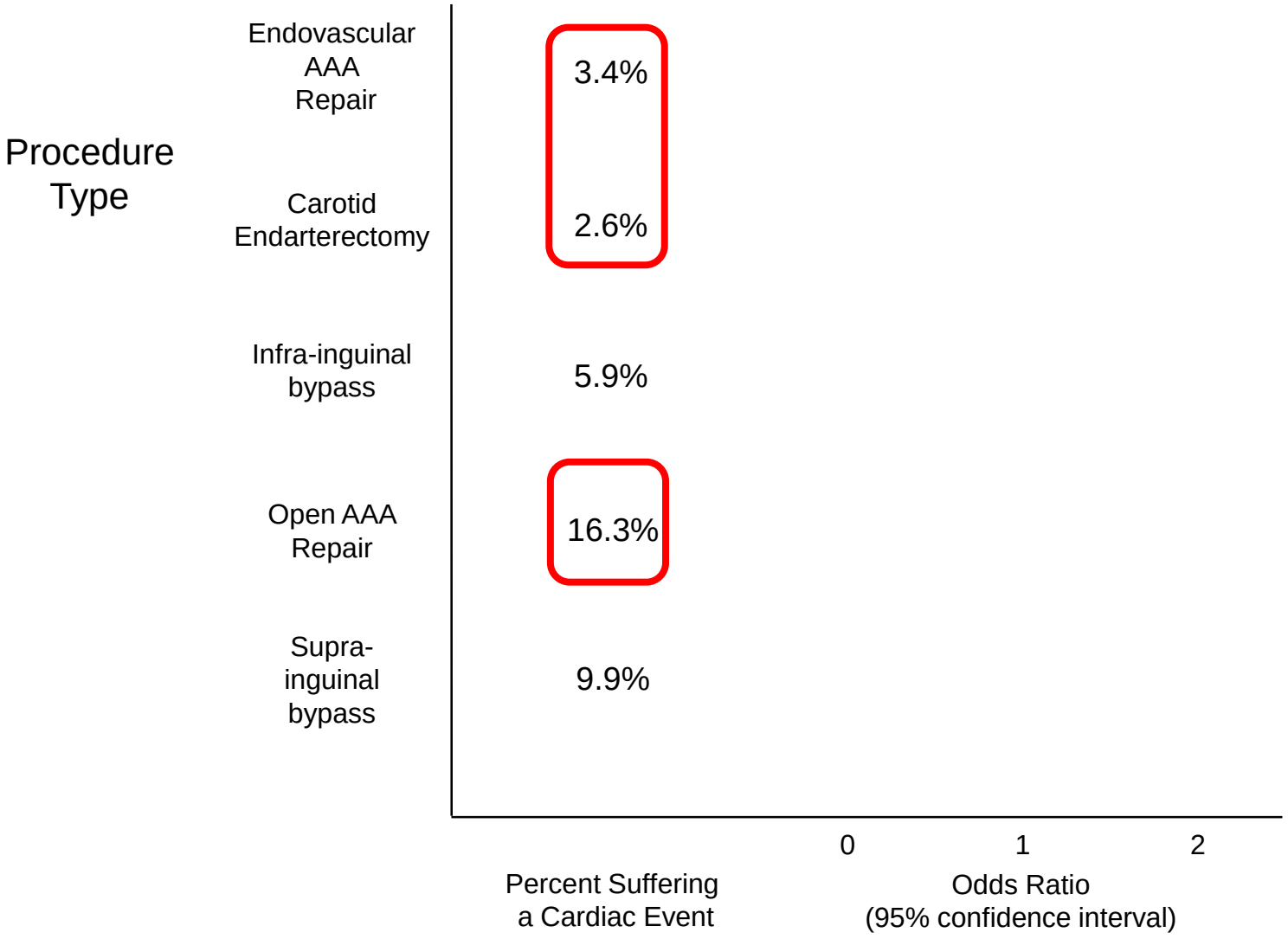

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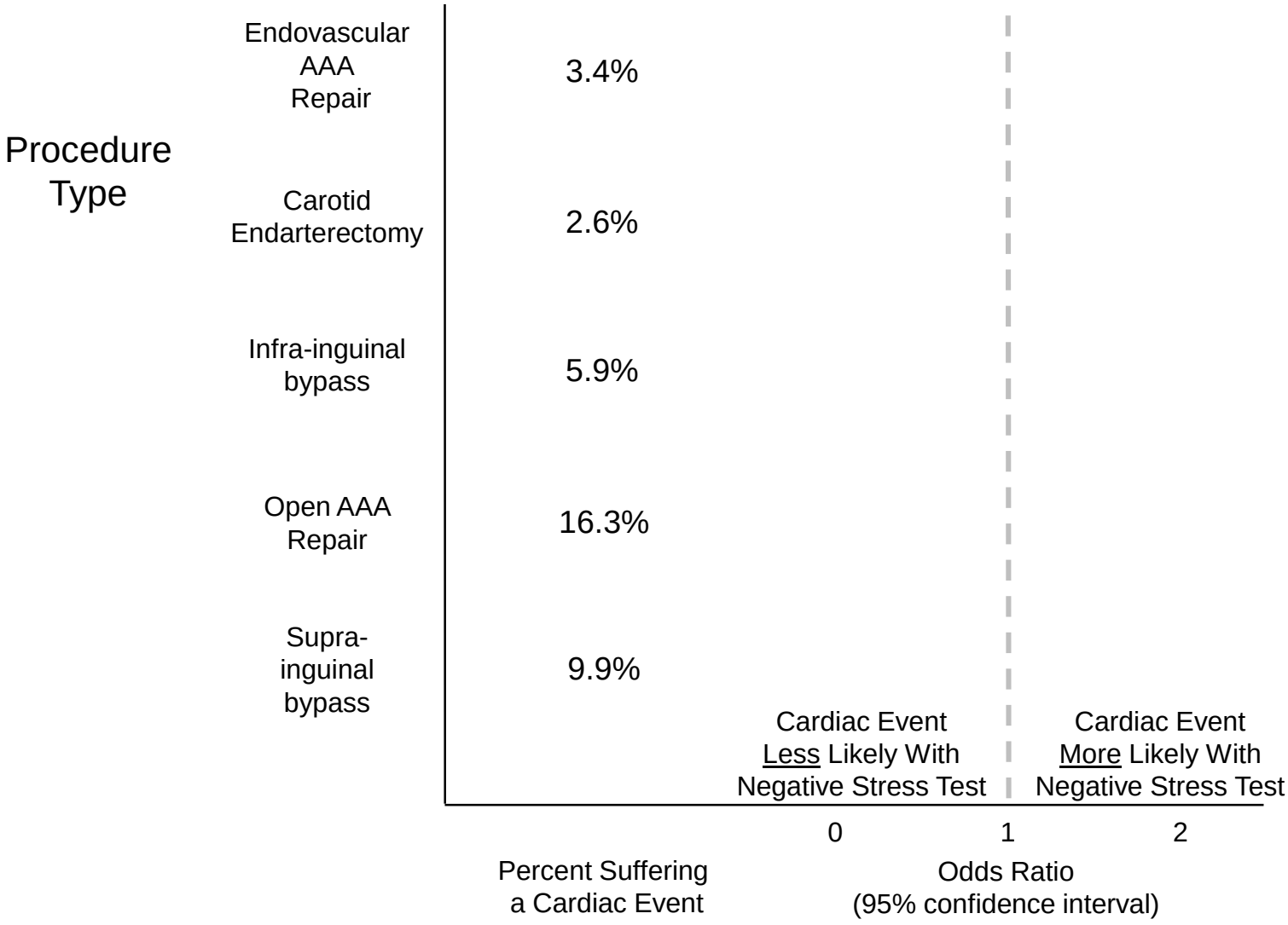
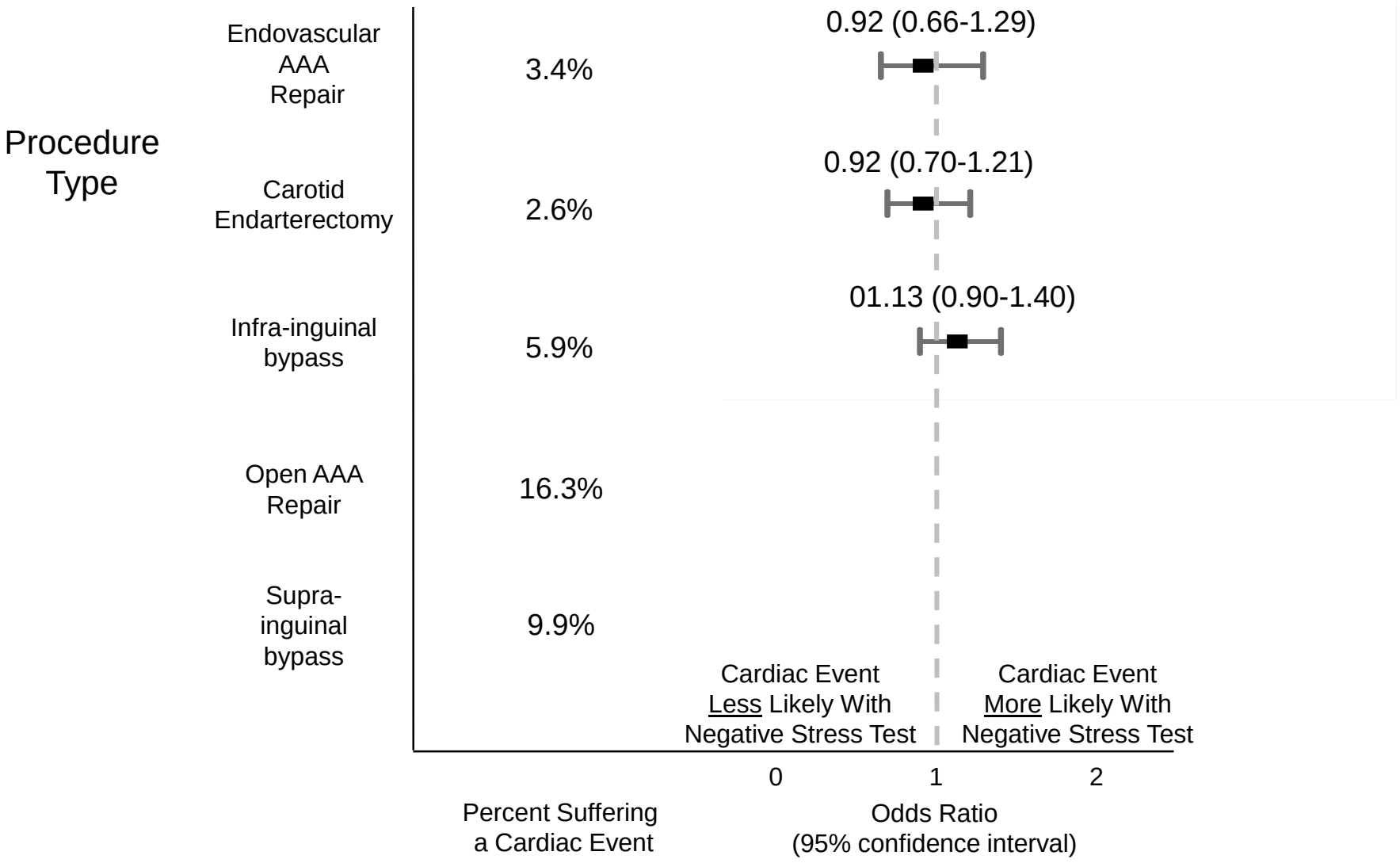
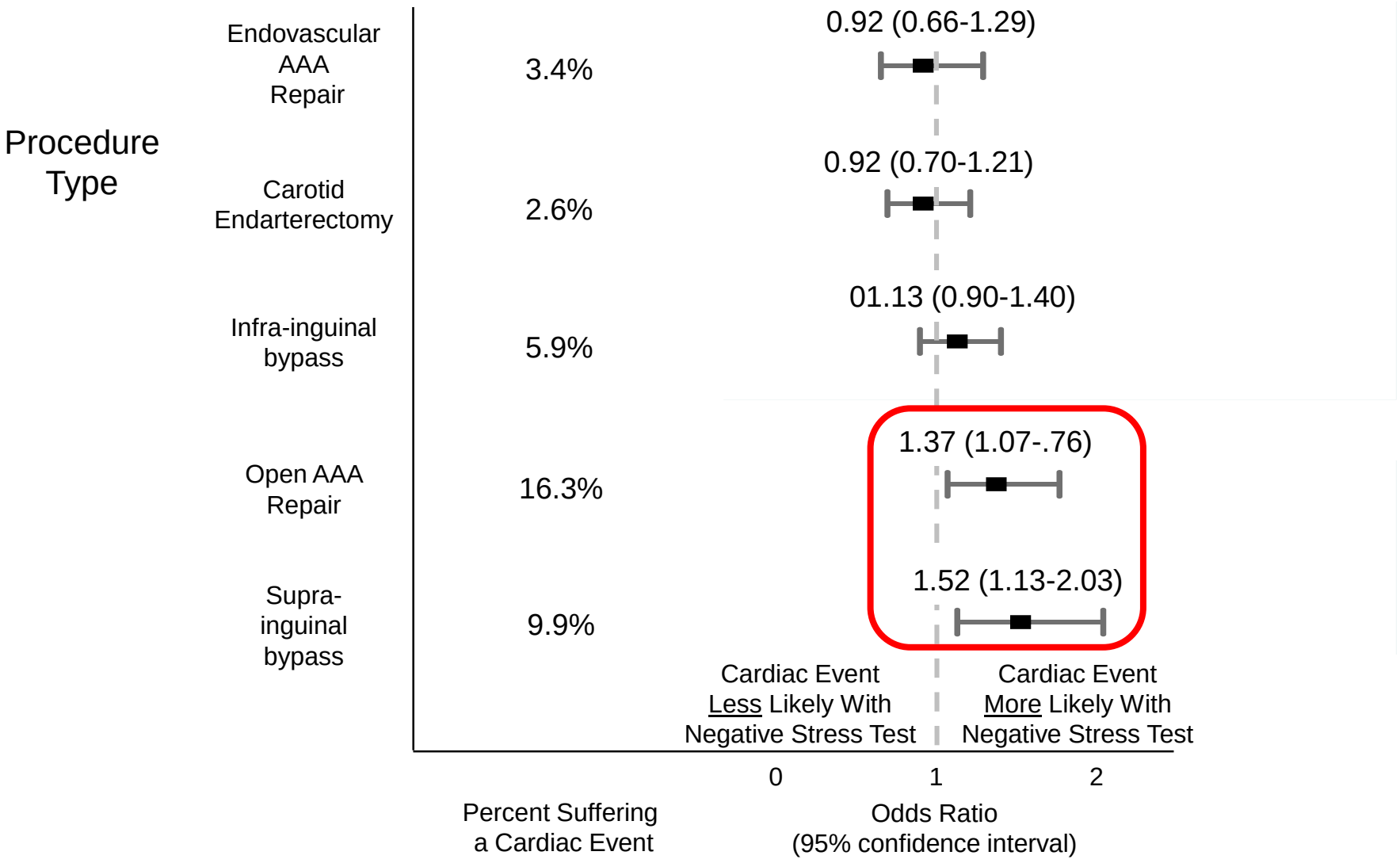


Cardiac Events



Cardiac Events



Limitations

- Those who underwent stress testing but did not undergo surgery are not represented in the dataset
- The reason for stress testing prior to vascular surgery remains unknown

Conclusions

- Preoperative stress testing varies more than 2-fold across centers in New England

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- Preoperative stress testing varies more than 2-fold across centers in New England
- Overall, patients with a negative stress test had a similar rate of cardiac complications compared to those who did not undergo stress testing
- Among large magnitude procedures, patients with a negative preoperative stress test paradoxically had a higher likelihood of cardiac complications

Implications

- Surgeons and perioperative teams must remain wary of cardiac events, especially in the setting of major vascular procedures
- Future quality improvement efforts should focus on enhancing dissemination and adherence to guidelines for risk-aligned use of stress tests prior to vascular surgery
- There may be an opportunity to reduce costly testing prior to lower magnitude procedures where predictive value of testing was lower.

Thank you