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# How to Predict Outcomes of PCI or CABG ?

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# Risk Scores: What's the point?

## Advantages

Prognostic: predict outcomes

Assist in providing individualized treatment

Help physicians and patients choose the most appropriate therapy

## Disadvantages

Time consuming

Not user-friendly

Lack predictive power

Too many models

## Ideal Risk Score

Easy to use at the bedside or in the cath-lab

Reproducible

Uses data routinely available before the procedure

Accurate

# Which Score?



Northern New England score

Logistic EuroScore

Parsonette score

NCDR CathPCI score

ACEF score

STS score

Global risk score

Mayo clinic risk score

Clinical Syntax score

Texas heart institute risk score

New York PCI risk score

Residual Syntax score

Duke Jeopardy score

Syntax score

Approach lesion score

New Risk  
Classification  
score

EuroScore II

Myocardial jeopardy score

New York CABG risk index

Additive EuroScore

Functional Syntax score

# Traditional Classification

## Clinical

## Anatomical



ACEF  
Parsonette score  
EuroScore  
EuroScore 2  
STS score

ACC/AHA Classification  
Syntax score  
Residual Syntax score

# Clinical Scores



## EuroScore (additive, logistic, II)

17 clinical variables

Derived from 20,000 consecutive patients from 128 hospitals in 8 European countries

Independent predictor of MACCE with LMS and MV PCI

## ACEF Score

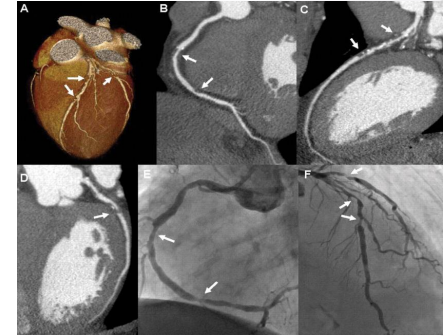
3 variables—age, creatinine, ejection fraction

$ACEF = [Age/EF (\%)] + [1 \text{ (if creatinine } > 2\text{mg=dL)}]$

Performance equivalent to EuroScore



# Anatomical Scores



## ACC/AHA lesion classification system

11 angiographic variables

Lesions classified as: A, B1, B2, C

Predictive of PCI success

Prognostic of outcomes pre-DES

Conflicting data in DES era

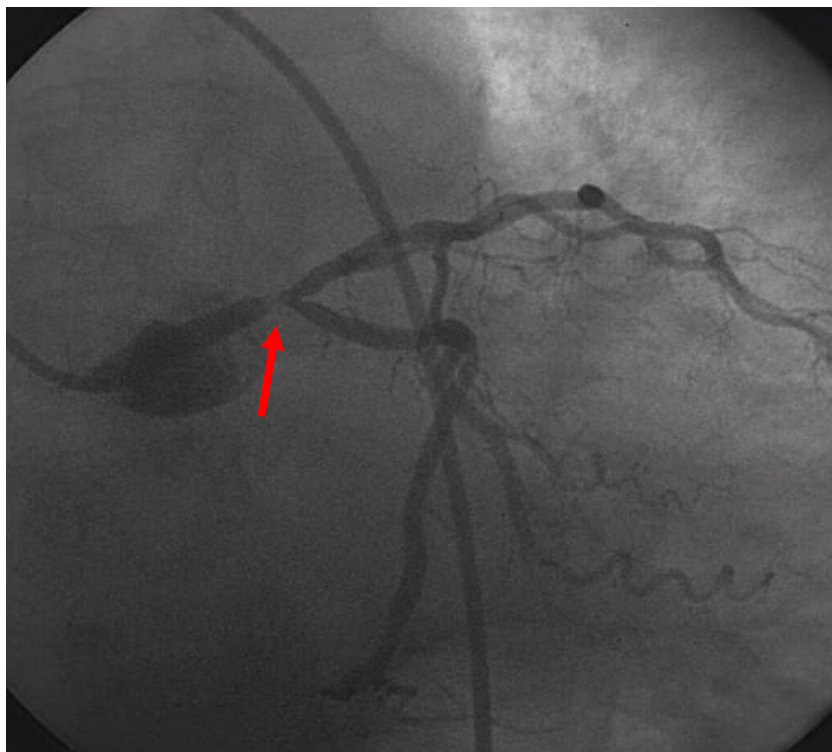
## Syntax Score

Anatomical variables: bifurcation, CTO, thrombus, calcium...

Calculated using dedicated software: weighs lesion & location factors

PCI: predicts MACE in multivessel & LM

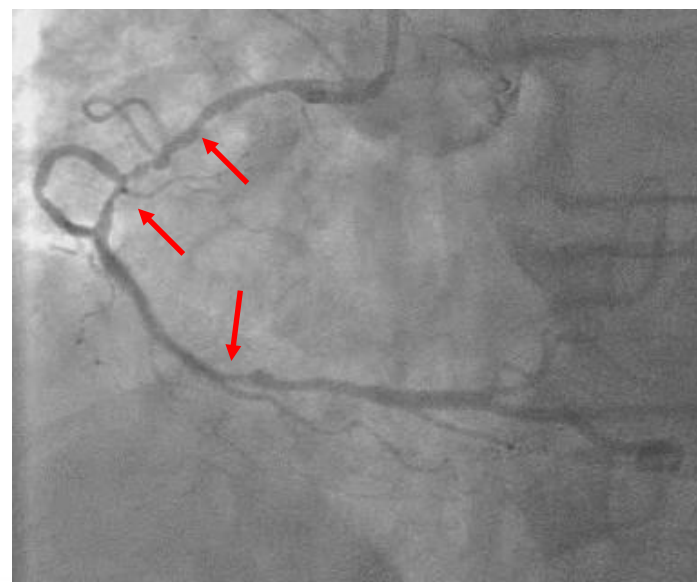
CABG: no predictive value



**Euroscore = 4**  
**SYNTAX Score = 13**



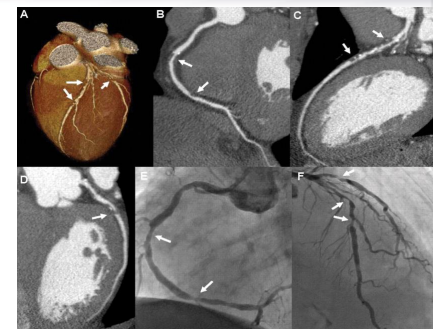
**SYNTAX Score = 41**  
**Euroscore = 6**







## Fusion of clinical and anatomical variables



ACEF score (clinical) compared to Syntax score in the LEADERS population

**ACEF score superior as a predictor of cardiac death and MI**

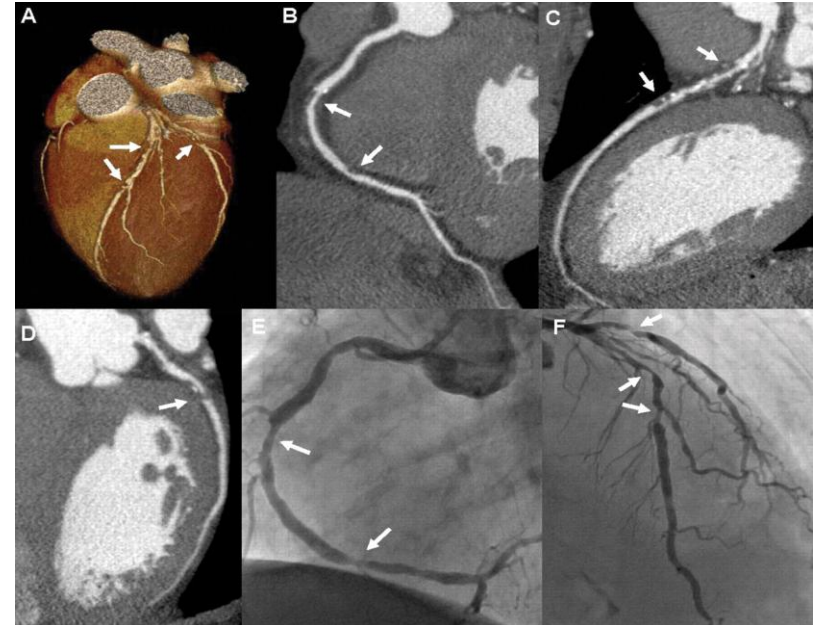
**Syntax score superior as a predictor of MACE and repeat revascularization.**

Anatomical **and** clinical variables are necessary for optimal risk evaluation

## Clinical



## Anatomical

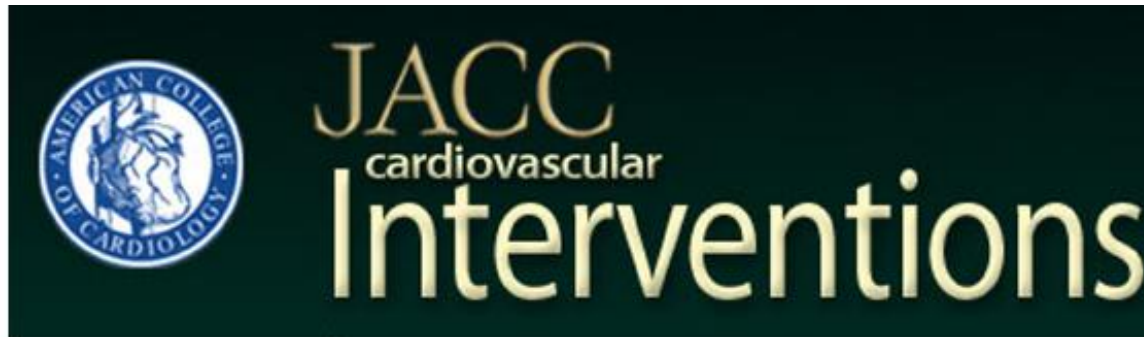


## Combined Risk Scores

Clinical Syntax score

Global Risk score

New Risk Classification score



**Global Risk Classification and Clinical SYNTAX (Synergy between Percutaneous Coronary Intervention with TAXUS and Cardiac Surgery) Score in Patients Undergoing Percutaneous or Surgical Left Main Revascularization**  
Davide Capodanno, Anna Caggegi, Marco Miano, Glauco Cincotta, Fabio Dipasqua, Giuseppe Giacchi, Piera Capranzano, Gianpaolo Ussia, Maria Elena Di Salvo, Alessio La Manna, and Corrado Tamburino  
*J. Am. Coll. Cardiol. Intv.* 2011;4;287-297

In LM patients undergoing PCI, combined scores improve the discrimination accuracy of clinical or angiographic stand-alone tools

# Global Risk Score (GRS)

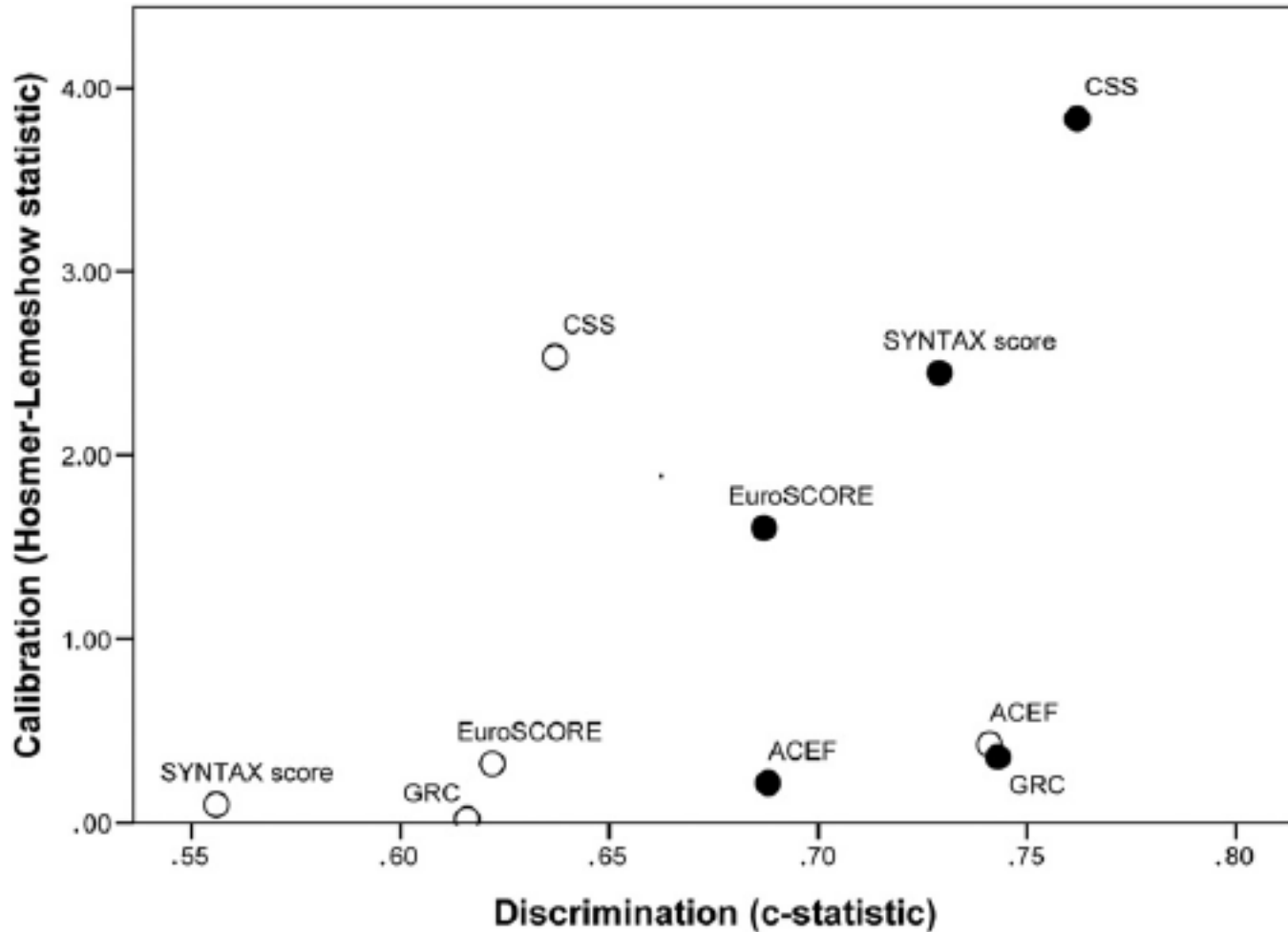
Integrates Syntax + EuroScore (additive)

EuroSCORE	SYNTAX Score		
	≤22	23-32	≥33
0-2	LOW	LOW	INT
3-5	LOW	LOW	INT
≥6	INT	INT	HIGH

**LOW:** SYNTAX Score <33 & EuroSCORE <6  
**INT:** SYNTAX Score <33 & EuroSCORE ≥6  
 OR EuroSCORE <6 & SYNTAX Score ≥33  
**HIGH:** SYNTAX Score ≥33 & EuroSCORE ≥6

**Conclusion:** Incorporation of clinical risk factors and comorbidities into existing estimation systems refines their prognostic ability and guide clinical decisions

# Global Risk Score (GRS)



**GRC approaches the ideal model for LM PCI**

## Clinical Syntax Score

### Syntax score + modified ACEF score

(modified ACEF score: age/EF+1 point for every 10 ml/min reduction in creatinine clearance <60 ml/min/1.73 m<sup>2</sup> (max 6 points).

ARTS II: Clinical SYNTAX was superior to Syntax or ACEF scores alone for predicting MACCE in high-risk groups.

Unable to discriminate events in low- and intermediate-risk groups.





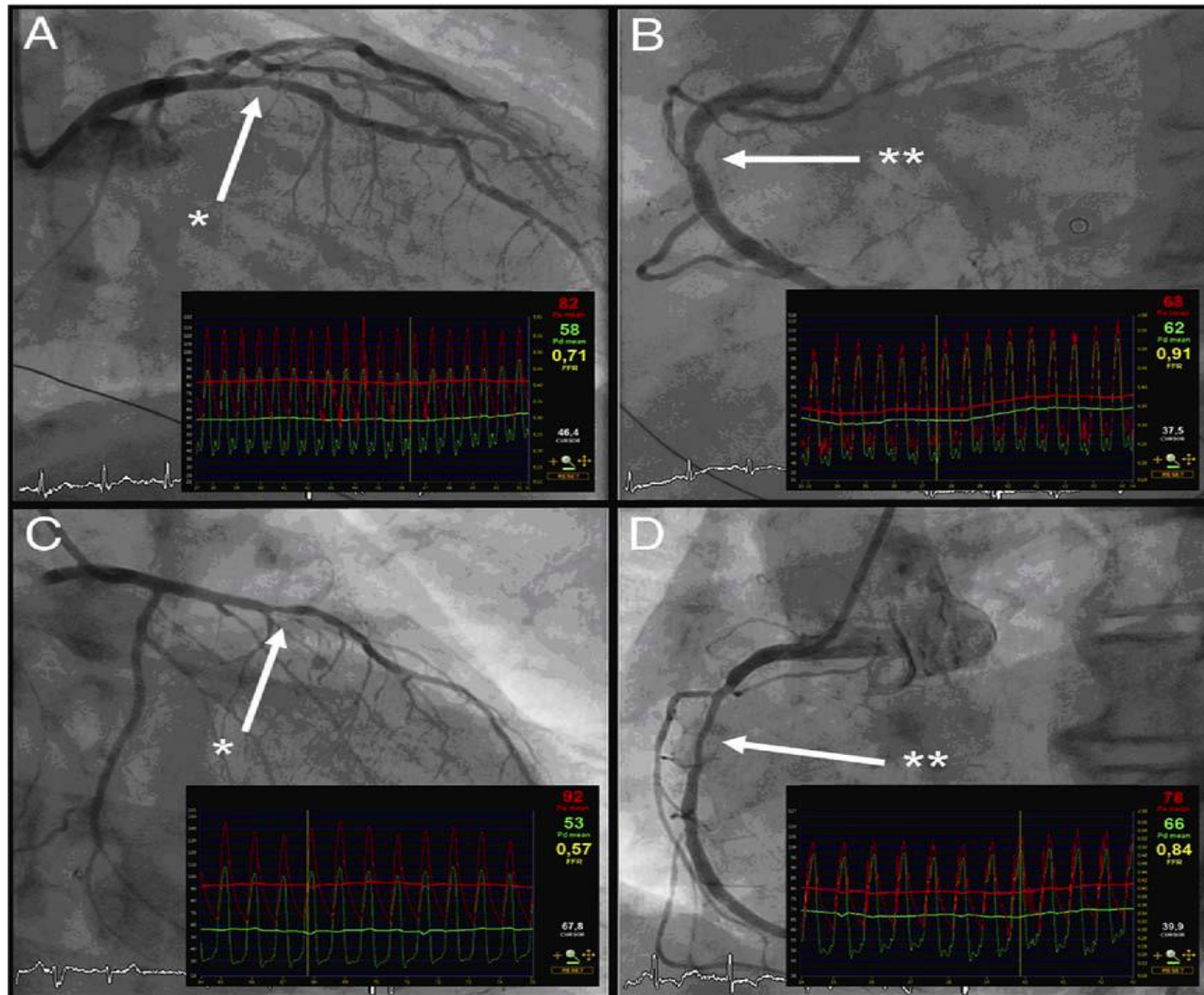
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Clinical Syntax score uses fewer data to achieve similar discrimination but with poorer calibration than the Global Risk score

# An Emerging Model

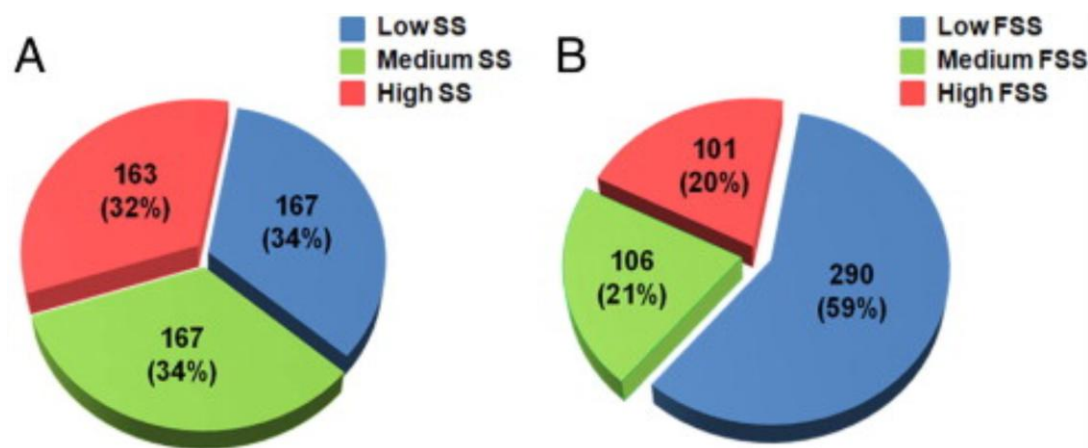
The Functional Syntax Score

# Functional Syntax Score

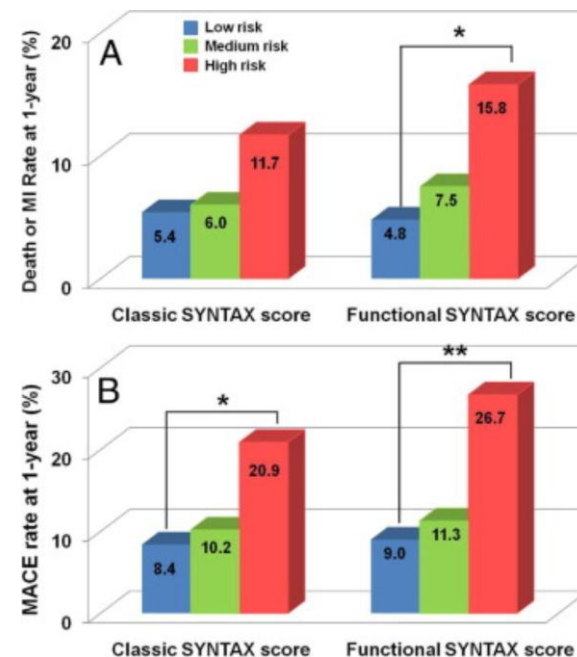


# Functional SYNTAX Score for Risk Assessment in Multivessel Coronary Artery Disease

Chang-Wook Nam, MD, PhD,\*† Fabio Mangiacapra, MD,‡ Robert Entjes, MD,§ In-Sung Chung, MD, PhD,† Jan-Willem Sels, MD,§ Pim A. L. Tonino, MD, PhD,§ Bernard De Bruyne, MD, PhD,‡ Nico H. J. Pijls, MD, PhD,§ William F. Fearon, MD,\* on behalf of the FAME Study Investigators



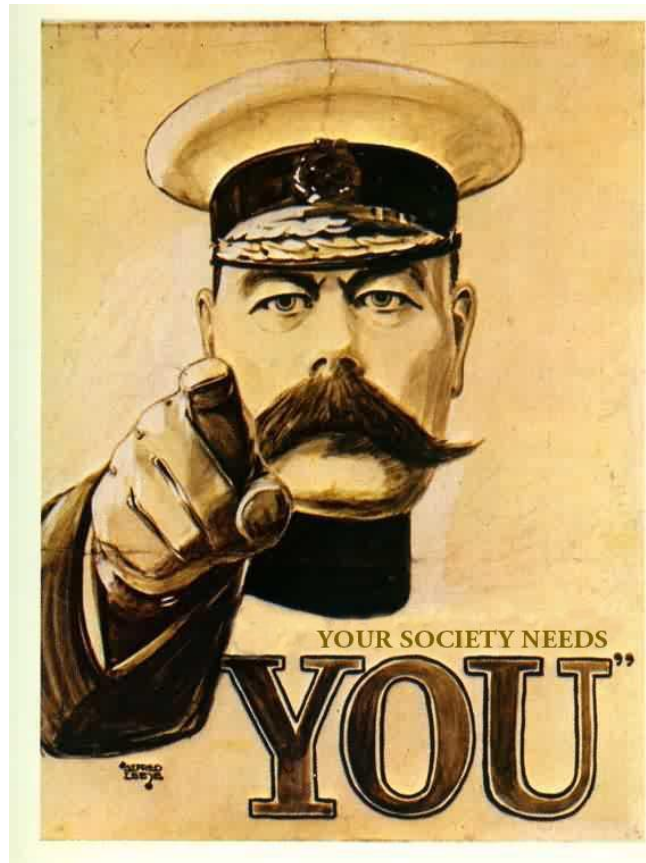
Decreases the number of higher-risk patients



Improved discrimination of risk for adverse events

**However, NO risk model  
addresses the single most  
important factor in  
determining patient  
outcome.....**

# The Most Important Variable





## Conclusions

- Detailed anatomical and clinical assessment is required for risk prediction in patients with multivessel disease
- Optimal risk estimation and classification are best achieved by integrating clinical, angiographic and functional data
- User-friendly bedside models not currently available
- Emerging noninvasive functional Syntax score calculation has the potential to improve these processes
- Risk scores help, but cannot replace good clinical judgement and operator skill

# I hope that you are less confused

## Thanks for your attention



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