

# Racial Differences in Cardiovascular Outcomes after Cardiovascular Surgery

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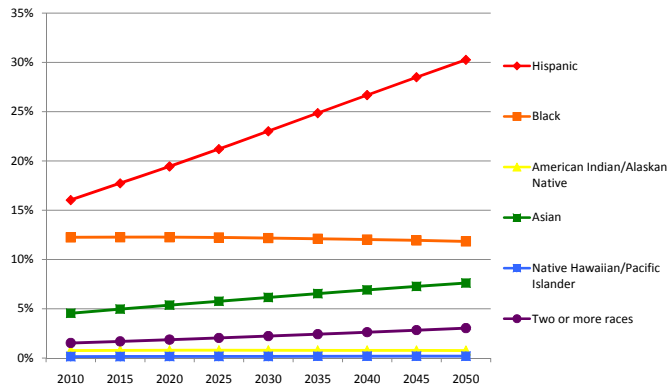


## Outline

- Demographics
- Risk factors for atherosclerosis
- Comorbidities
- Patient preferences
- Disparities in diagnosis and referral
- Disparities in treatment
- Disparities in outcomes



## Minority Population Projections (US)

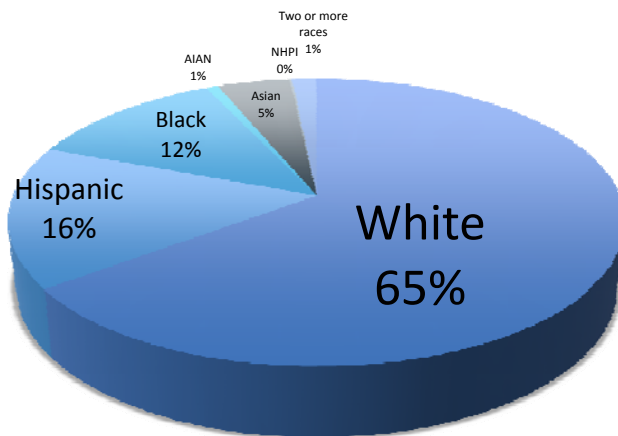


Adapted from U.S. Census Bureau,

<http://www.census.gov/population/www/projections/summarytables.html>

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## 2010 Populations (US)

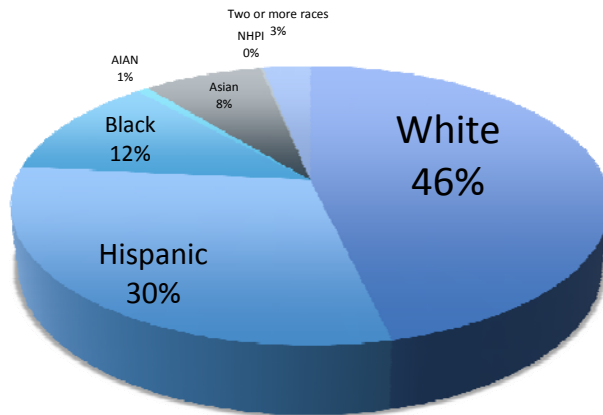


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<http://www.census.gov/population/www/projections/summarytables.html>

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## 2050 Population Projections (US)

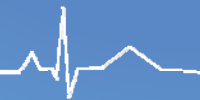


Adapted from U.S. Census Bureau,

<http://www.census.gov/population/www/projections/summarytables.html>

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## Pathophysiologic differences



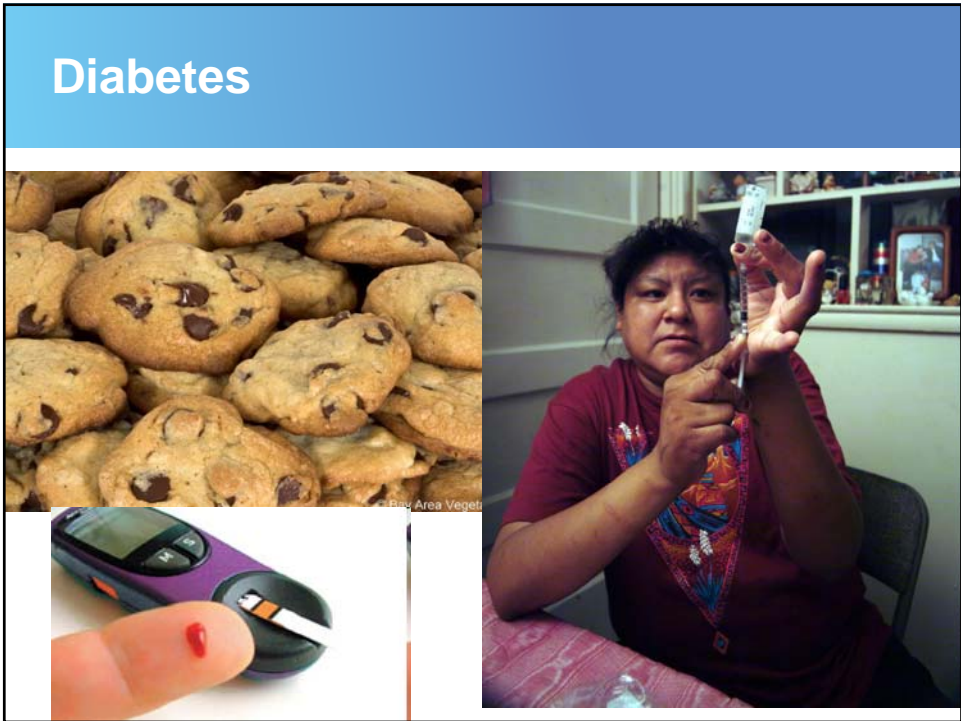
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## How did we get there?



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## Urbanization

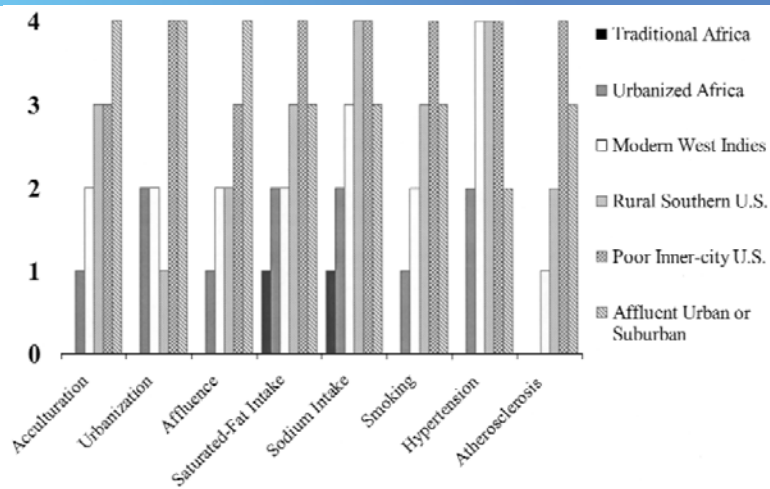


Harlem USA



Durban, South Africa

## Gillum hypothesis - urbanization



J Nucl Cardiol. 2001 Sep-Oct;8(5):626-9

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# Predicting PAD

Journal of the American College of Cardiology  
 © 2006 by the American College of Cardiology Foundation  
 Published by Elsevier Inc.

Vol. 48, No. 6, 2006  
 ISSN 0735-1097/06/\$32.00  
 doi:10.1016/j.jacc.2006.05.049

## The Effect of Novel Cardiovascular Risk Factors on the Ethnic-Specific Odds for Peripheral Arterial Disease in the Multi-Ethnic Study of Atherosclerosis (MESA)

Matthew A. Allison, MD, MPH,\* Michael H. Criqui, MD, MPH,\* Robyn L. McClelland, PhD,† JoAnn M. Scott, MS,† Mary M. McDermott, MD,‡ Kiang Liu, PhD,‡ Aaron R. Folsom, MD,§ Alain G. Bertoni, MD,|| A. Richey Sharrett, MD, DRPH,¶ Shunichi Homma, MD,# Sujata Kori, MD\*\*  
*San Diego and Anaheim, California; Seattle, Washington; Chicago, Illinois; Minneapolis/St. Paul, Minnesota; Winston-Salem, North Carolina; Baltimore, Maryland; and New York, New York*



# Predicting PAD

### Model #2

Age (1 yr)	1.09	1.07–1.11
Gender (male)	0.95	0.73–1.23
Ethnicity		
Non-Hispanic white	1.00	—
Chinese	0.39	0.22–0.69
African American	1.67	1.23–2.26
Hispanic	0.49	0.32–0.76
Diabetes mellitus	2.12	1.57–2.87
Smoking	3.42	2.48–4.73
Hypertension	1.63	1.22–2.18
Dyslipidemia	1.58	1.22–2.05
Body mass index	0.97	0.94–0.99
Education*	0.74	0.55–0.98
Income†	0.75	0.56–1.01

J Am Coll Cardiol. 2006 Sep 19;48(6):1190-7



## Blacks have more traditional and “novel” risks

**Table 2.** Age- and Sex-Adjusted Means and Proportions of Risk Factors by Ethnic Group

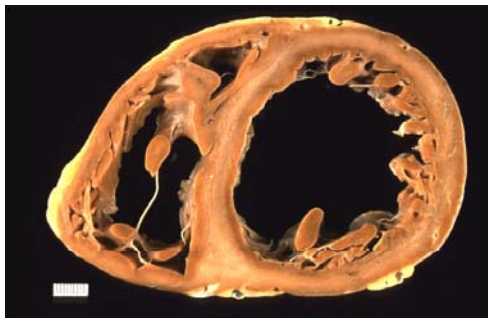
	African American (n = 1,863)	Chinese (n = 798)	Hispanic (n = 1,464)	Non-Hispanic White* (n = 2,528)
<b>Traditional risk factors</b>				
Body mass index (kg/m <sup>2</sup> )	30.1†	24.0†	29.4†	27.8
Current smoking (%)	17.0†	5.0†	12.0	10.8
Diabetes (%)	19.1†	14.5†	19.3†	6.7
Dyslipidemia (%)	29.4†	32.0	38.3†	34.3
Hypertension (%)	59.5†	35.5	41.6†	36.0
Education‡ (%)	69.2†	59.4†	33.1†	79.3
Gross income ≥\$25,000 (%)	65.3†	50.1†	47.5†	84.2
<b>Novel risk factors</b>				
<i>Chlamydia pneumoniae</i> titer positive (%)	81.4†	86.0†	75.6†	69.1
C-reactive protein (mg/l)	4.8†	1.9†	4.2†	3.4
D-dimer (μg/ml)	0.45†	0.27†	0.38	0.35
Factor VIII (%)	177.8†	157.6	162.9†	156.5
Fibrinogen (mg/dl)	360.6†	329.6	360.6†	334.4
Homocysteine (μmol/l)	9.7†	8.9†	9.1	9.3
Interleukin-6 (pg/ml)	1.7†	1.1†	1.7†	1.5
Plasmin-antiplasmin (nmol/l)	5.2†	4.1†	4.7	4.7
von Willebrand factor (%)	160.0†	142.9	142.0	137.1

\*Reference group; †p value <0.05 compared with non-Hispanic white; ‡Greater than high school.

J Am Coll Cardiol. 2006 Sep 19;48(6):1190-7

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## CHF



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# Congestive Heart Failure

## *The* NEW ENGLAND JOURNAL *of* MEDICINE

ESTABLISHED IN 1812

NOVEMBER 11, 2004

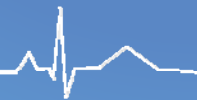
VOL. 351 NO. 20

### Combination of Isosorbide Dinitrate and Hydralazine in Blacks with Heart Failure

Anne L. Taylor, M.D., Susan Ziesche, R.N., Clyde Yancy, M.D., Peter Carson, M.D., Ralph D'Agostino, Jr., Ph.D.,  
Keith Ferdinand, M.D., Malcolm Taylor, M.D., Kirkwood Adams, M.D., Michael Sabolinski, M.D.,  
Manuel Worcel, M.D., and Jay N. Cohn, M.D., for the African-American Heart Failure Trial Investigators\*

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## Disparities in diagnosis and referral



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Special Article

THE EFFECT OF RACE AND SEX ON PHYSICIANS' RECOMMENDATIONS  
FOR CARDIAC CATHETERIZATION

KEVIN A. SCHULMAN, M.D., JESSE A. BERLIN, Sc.D., WILLIAM HARLESS, Ph.D., JON F. KERNER, Ph.D.,  
SHYRL SISTRUNK, M.D., BERNARD J. GERSH, M.B., Ch.B., D.Phil., ROSS DUBÉ, CHRISTOPHER K. TALEGHANI, M.D.,  
JENNIFER E. BURKE, M.A., M.S., SANKEY WILLIAMS, M.D., JOHN M. EISENBERG, M.D.,  
AND JOSÉ J. ESCARCE, M.D., Ph.D.

- **Logistic-regression analysis**
  - **Women** (OR=0.60; 95% CI=0.4-0.9; P=0.02)
  - **Blacks** (OR=0.60; 95% CI=, 0.4-0.9; P=0.02)
    - ...were less likely to be referred for cardiac catheterization than men and whites, respectively.

N Engl J Med. 1999 Feb 25;340(8):618-26

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## Why might this be?

- **Racism?**
- **Blacks less likely to agree to the procedure if offered?**
- **Blacks with chest pain less likely to have CAD amenable to revascularization?**
  - More hypertensive heart disease
- **Blacks have worse outcomes?**
  - Procedure less beneficial
  - Implications for “report cards”?

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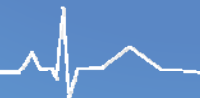
## Wallace Russell Jenkins Sr.



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## Evaluating health disparities

- ◆ Structure
- ◆ Process
- ◆ Outcome



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## Examples of disparities

- **Structure**
  - Blacks, Hispanics more likely referred to low volume hospitals
- **Process**
  - Blacks less likely to get cardiac cath for ACS
- **Outcomes**
  - Death, major complications

## Disparities in structure?

## Low volume hospitals

- **Blacks and Hispanics more likely to use low-volume hospitals**
- **This does not fully explain increased risk-adjusted mortality after CABG, CEA, AAA**
- **“Additional research is needed to determine why black patients have increased mortality after cardiovascular procedures and how these mortality rates can be reduced.”**

J Am Coll Cardiol. 2006 Jan 17;47(2):417-24

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## Low-quality surgeons?

- **Hispanics undergoing isolated CABG in Massachusetts were more likely to be operated on by cardiac surgeons with higher risk-standardized mortality rates than by surgeons with lower rates**

Am J Cardiol. 2009 Jun 15;103(12):1682

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## SES a driving force behind disparity?

- Low SES patients have higher rates of adjusted mortality after CABG, AVR, MVR, but not lung resection.
- Within hospitals, only minimal differences.
- Largely attributable to hospitals where patients receive care.

Med Care. 2008 Sep;46(9):893-9.

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## Disparities in processes?

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## PCI for ACS

- **Nonwhites less likely to have primary PCI for STEMI**
- **But when they do, outcomes are similar**

J Interv Cardiol. 2007 Jun;20(3):182-7

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## Care processes after ACS

ARTICLE

Annals of Internal Medicine

### Factors Associated With Racial Differences in Myocardial Infarction Outcomes

John A. Spertus, MD, MPH; Phillip G. Jones, MS; Frederick A. Masoudi, MD, MSPH; John S. Rumsfeld, MD, PhD; and Harlan M. Krumholz, MD, SM\*

Ann Intern Med. 2009;150:314-324.

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## Quality of care after ACS

Characteristic	White Patients (n = 1335)	Black Patients (n = 514)	P Value
<b>Quality of care†</b>			
Aspirin within 24 hours, n (%)	1270 (97.3)	479 (96.2)	0.21
β-Blocker within 24 hours, n (%)	1139 (93.7)	406 (89.8)	0.006
Acute reperfusion§, n (%)	527 (74.9)	79 (46.2)	<0.001
Aspirin at discharge, n (%)	1237 (95.3)	434 (89.7)	<0.001
β-Blocker at discharge, n (%)	1188 (93.3)	403 (88.4)	<0.001
ACE inhibitor or angiotensin-receptor blocker for left ventricular systolic dysfunction at discharge, n (%)	303 (90.4)	121 (81.8)	0.007
Smoking cessation counseling, n (%)	352 (76.5)	122 (58.1)	<0.001
Mean eligible quality-of-care indicators (SD), n	5.3 (1.3)	4.8 (1.3)	<0.001
Mean eligible quality-of-care indicators received (SD), %	89.4 (15.0)	83.6 (20.4)	<0.001
<b>Other discharge medications</b>			
Statin, n (%)	1110 (83.1)	371 (72.2)	<0.001
Thienopyridine, n (%)	1002 (75.1)	249 (48.4)	<0.001
Diuretic, n (%)	237 (17.8)	150 (29.2)	<0.001
Nitrate, n (%)	352 (26.4)	192 (37.4)	<0.001

*Ann Intern Med.* 2009;150:314-324.

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## Mitral valve surgery

- **Black MV surgery patients:**
  - Younger
  - More comorbidites
    - DM
    - CRF
    - Endocarditis
    - CHF
    - Rheumatic
  - Fewer valvuloplasties

*Ann Thorac Surg.* 2008 Jan;85(1):89-93.

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## Delays in defibrillation

### The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812

JANUARY 3, 2008

VOL. 358 NO. 1

#### Delayed Time to Defibrillation after In-Hospital Cardiac Arrest

Paul S. Chan, M.D., Harlan M. Krumholz, M.D., Graham Nichol, M.D., M.P.H.,  
Brahmajee K. Nallamothu, M.D., M.P.H., and the American Heart Association  
National Registry of Cardiopulmonary Resuscitation Investigators\*

N Engl J Med 2008;358:9-17.

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## Delays in defibrillation

- 6789 patients with VF or pulseless VT
- Delayed defibrillation in 30.1%
- Predictors of delay:
  - Black race
  - Noncardiac admitting diagnosis
  - Hospital < 250 beds
  - Unmonitored hospital unit
  - Off-hours

N Engl J Med 2008;358:9-17.

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## Delays in defibrillation

- Delayed defibrillation was associated with a significantly lower probability of surviving to hospital discharge

N Engl J Med 2008;358:9-17.

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## Disparities in outcomes?

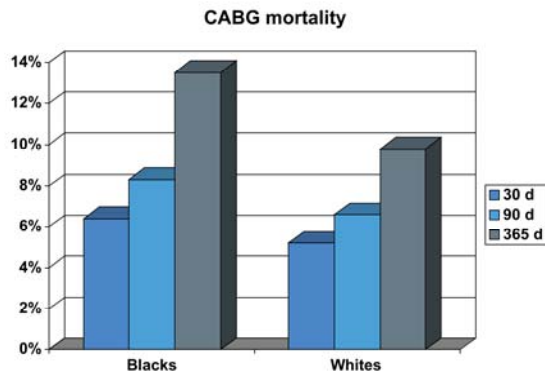
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## Short- and long-term differences

### Cardiovascular Surgery

#### Patient and Hospital Differences Underlying Racial Variation in Outcomes After Coronary Artery Bypass Graft Surgery

Suma H. Konety, MD, MS; Mary S. Vaughan Sarrazin, PhD; Gary E. Rosenthal, MD



Circulation. 2005;111(10):1210-6

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## CABG mortality

- Blacks more likely to have surgery at low-volume and/or high-mortality hospitals
- Black men fare worse than black women
- A lot (but not all!) of the difference goes away when one accounts for patient and hospital factors

Circulation. 2005

Circulation. 2005;111(10):1210-6

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## Do surgeons learn on Black patients?

- **Blacks more likely to get OPCAB by surgeons inexperienced in the technique!**

J Health Serv Res Policy. 2007 Jan;12(1):31-5.

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## Congenital surgery

- **Black and Hispanic congenital heart surgery have higher mortality**
- **Not due to insurance differences**
- **Disparities vary by region of the country**

Pediatr Cardiol. 2006 May-Jun;27(3):321-8.

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## Percutaneous coronary intervention

- **After DES placement, Blacks have more:**
  - MACE
  - death
  - Q wave MI
  - revascularization
  - stent thrombosis.
- **This goes away after multivariable analysis using income.**

Am J Cardiol. 2009 Mar 1;103(5):653-8.

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## What if differences persist?

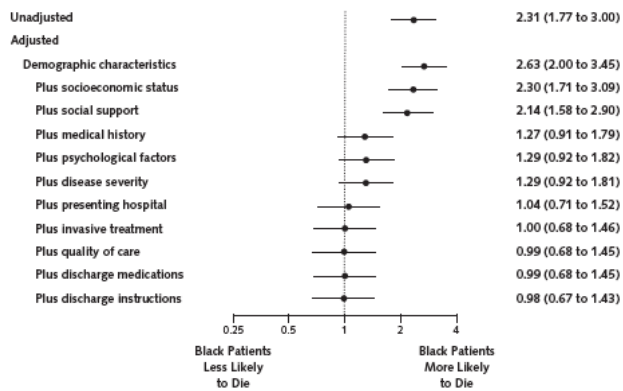
Even after risk-adjustment for SES,  
comorbidities?

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# Risk adjust to “remove” disparities

Figure. Racial differences in post-myocardial infarction outcomes.

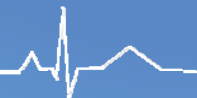
A. Mortality Hazard Ratios (95% CI)



*Ann Intern Med.* 2009;150:314-324.



## Would public reporting of outcome data have made a difference?



## Report cards and disparities

- It has generally been assumed that report cards have the potential to improve racial and ethnic disparities in healthcare quality
- However, the release of New York's CABG report card was associated with a significant increase in racial and ethnic disparities in CABG use in New York compared with other states

Circulation. 2005 Mar 15;111(10):1257-63.

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## How can disparities be reduced?

- Cultural competence for physicians?
- Application of genetic testing (refining "race") to target therapy?
- Removing barriers to access to high-volume, high-quality practices?
- Report cards to improve quality across-the-board?
- **Research**

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## Interventions to reduce disparities?

- **Collection of racial data**

- Recent IOM report asking for “granularity”

- Mexican-American vs. Puerto Rican
- Language competence
- <http://www.rwjf.org/qualityequality/product.jsp?id=48048>

- Specific focus on improving structure, process

- RWJ “Expecting success toolkit”
- [http://www.rwjf.org/pr/product.jsp?id=28433&orig\\_url=/E-NeVolu-41.html](http://www.rwjf.org/pr/product.jsp?id=28433&orig_url=/E-NeVolu-41.html)



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*Ann Intern Med.* 2009;150:314-324.



## Expecting success toolkit - examples

- Reducing Door-to-Balloon Time Through 'Code Heart'
- Universal Patient Discharge Instructions
- Consolidating Discharge and Prescription Forms for Heart Failure Patients
- Improving Staff Compliance with CMS Performance Measures Through Weekly Chart Review
- Improving Success of Smoking Cessation Counseling for Heart Patients
- Comprehensive Cardiology Admission Order Set to Improve Provider Compliance With Core Measures

<http://www.rwjf.org/pr/product.jsp?id=29635>

## Conclusions

- **Racial disparities exist in cardiac care and perioperative care**
- **Need to distinguish from socioeconomic and comorbidity differences**
- **Focus on measurement and quality improvement may reduce disparities**