Brandeis University

Under-utilization of Cardiac Lifestyle Modification Services by Medicare Beneficiaries: Implications for Racial/Ethnic Minorities

Sarita Bhalotra, MD, PhD; Deborah Gurwich,PhD, MS; Donald Shepard,PhD, Jose Suaya, MD, PhD, Moaven Razavi, MS

bhalotra@brandeis.edu 781 736 3960

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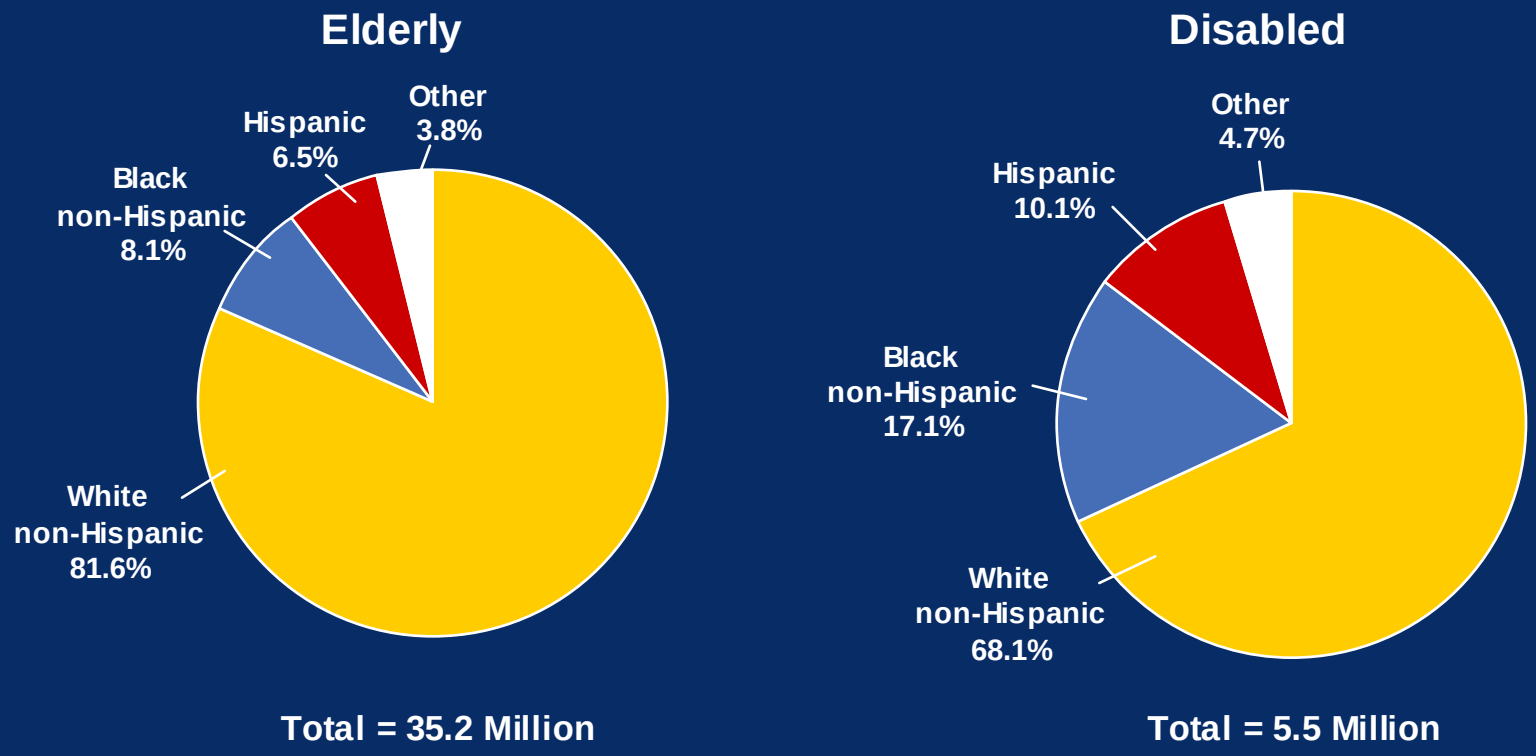
Race/Ethnicity Distribution of Medicare Beneficiaries, 2000

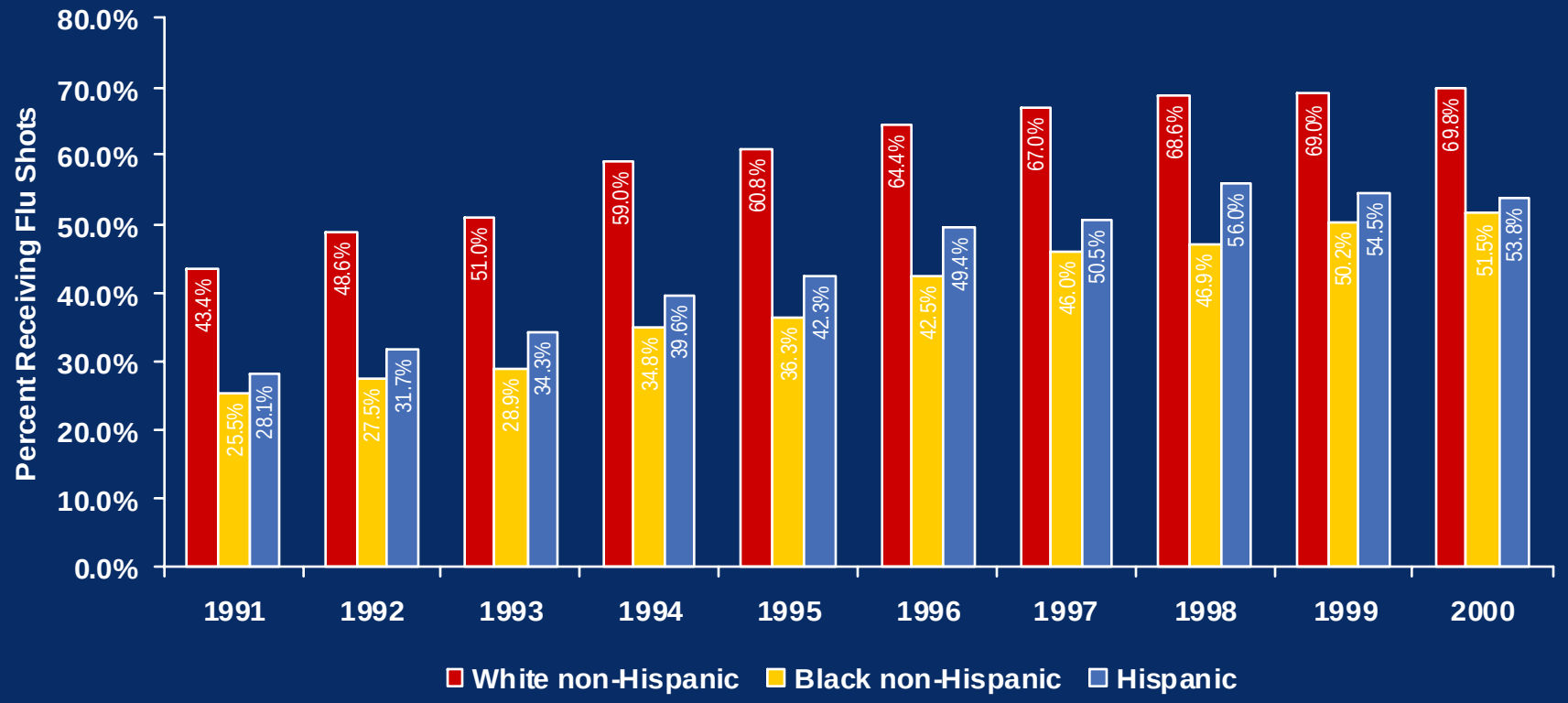
Minority beneficiaries are disproportionately represented among the disabled.



Source: CMS, Office of Research, Development, and Information: Data from the Medicare Current Beneficiary Survey (MCBS) 2000 Access to Care Files.

Medicare Beneficiaries Who Received Flu Shots, by Race

Utilization of flu shots was higher for white non-Hispanic beneficiaries than other racial groups, but rates for all groups increased over the decade.



Note: Data reflect beneficiaries who report receiving flu shots. MCBS survey includes fee-for-service and managed care enrollees as well as aged and disabled beneficiaries. Does not include beneficiaries in facility care.

Source: CMS, Office of Research, Development, and Information: Data from Medicare Current Beneficiary Survey (MCBS) 1991-2000 Access to Care Files.

Cardiac Rehabilitation (CR)

- Medically supervised intervention recognized to reduce morbidity and mortality in cardiac patients
- Goal of CR: improve physiological and psychological functioning

Factors associated with utilization

- **Patient: enabling, predisposing, need factors (Anderson)**
- **Provider: knowledge, attitudes, beliefs (KAB typology); peers**
- **System: market, regulatory environment**
- **Organization: technical, cultural, political sub-systems (Tichy)**

Medicare's Lifestyle Modification Program Demonstration (LMPD)

12-month-long, hospital-based, outpatient treatment programs

- similar to CR but more intensive
- similar eligibility criteria compared to CR
- two program models:

Interventions:

1. **Dr. Dean Ornish Program for Reversing Heart Disease**
2. **Benson-Henry Mind/Body Medical Institute's Cardiac Wellness Program**
3. **As compared to: Standard Cardiac Rehabilitation**

The Lifestyle Modification Program Demonstration

- **Congress permitted each program to enroll up to 1800 Medicare beneficiaries with heart disease**
- **Program enrollment began October 1999 and continued through February 2006**
- **Very low enrollment led to further analyses, including of cardiac rehabilitation (CR)**

Hypothesis: Lifestyle modification programs are cost effective for secondary prevention of cardiac morbidity

Design: Retrospective study of clinical and cost outcomes, concurrent study of process (implementation)

Methods

- **Patient Survey**
- **Medical Records**
- **Medicare Claims data**
- **Case study**

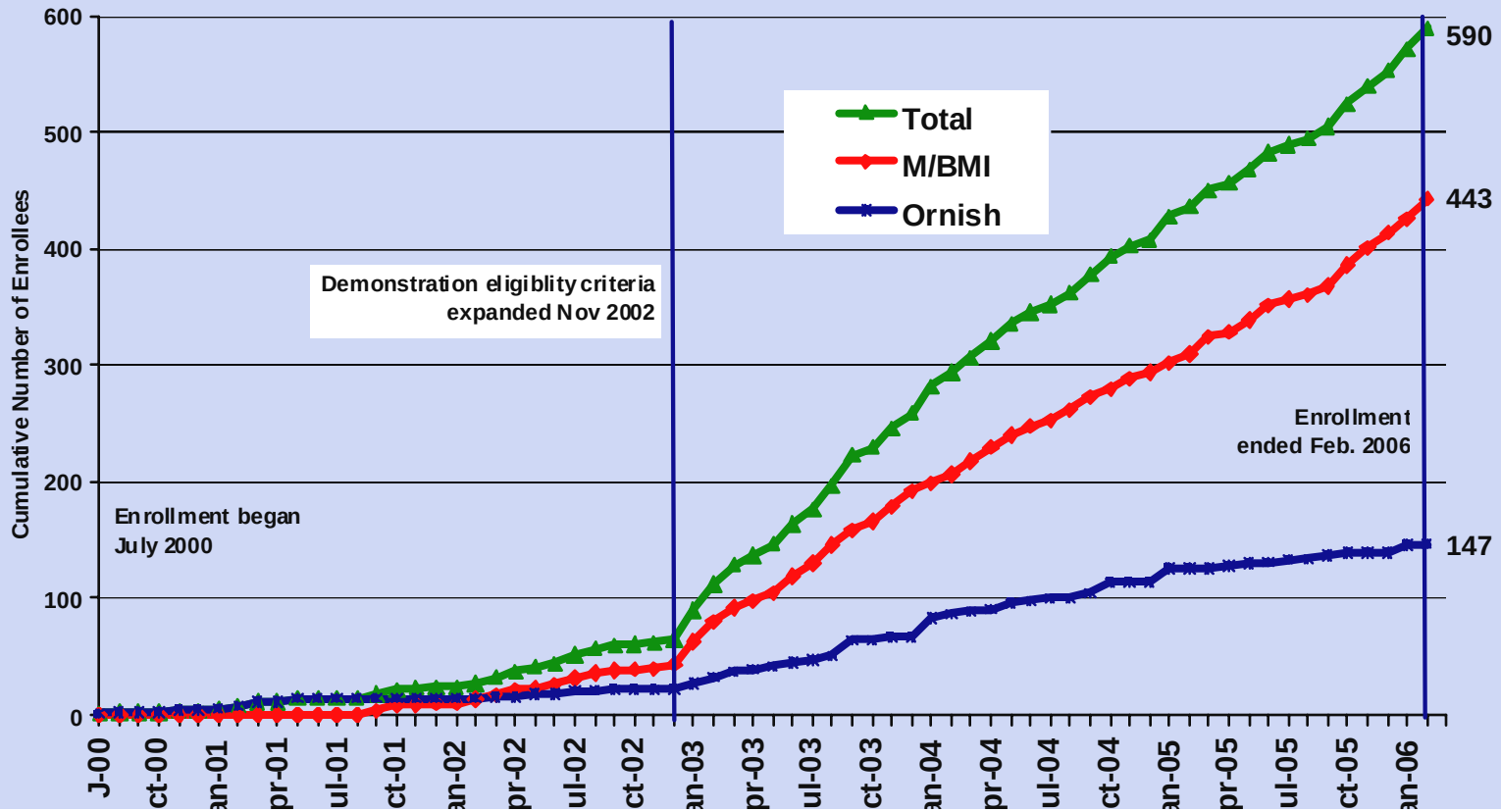
Eligibility: Four Clinical Cardiac Diagnoses

1) Stable Angina
2) Acute Myocardial Infarction (AMI)
3) Coronary Artery Bypass Graft(CABG)
4) Percutaneous Transluminal Coronary Angioplasty (PTCA)

Cumulative Enrollment over Study

LA M/BMI TOTAL

Figure 1. Cumulative Enrollment in Medicare Lifestyle Demonstration by Program



The Brandeis CR study (Suaya et al, Circulation, October 2007)

Measured national use of CR (Any outpatient (Phase II) CR session within one year after discharge (Current Procedure Terminology codes 93797 and 93798)

- **Identified major predictors of use**
- **Evaluated CR impact on survival**

Study Population

- Medicare beneficiaries
- Aged 65 and older
- Hospitalization in 1997 for acute myocardial infarction (MI) or coronary artery bypass graft surgery (CABG)
  - based on principal discharge diagnosis code for AMI (410.xx) or a procedure code for CABG (36.1x)

Descriptive Statistics

Characteristic	Number of patients	% of cohort	Crude rate of any CR use (%)
Entire cohort	267,427	100%	18.7%
Sociodemographic characteristics of patients			
Gender and age group			
Males (overall)	149,383	55.9%	**22.1%**
65-74 years	84,089	31.4%	26.6%
75-84 years	54,012	20.2%	18.6%
85 plus	11,282	4.2%	4.6%
Females (overall)	118,044	44.1%	**14.3%**
65-74 years	47,908	17.9%	21.7%
75-84 years	49,122	18.4%	12.4%
85 plus	21,014	7.9%	2.1%
Race			
Whites	245,504	91.8%	19.6%
Non-Whites	21,923	8.2%	7.8%
Medicaid at discharge			
No	238,315	89.1%	20.3%
Yes	29,112	10.9%	5.2%

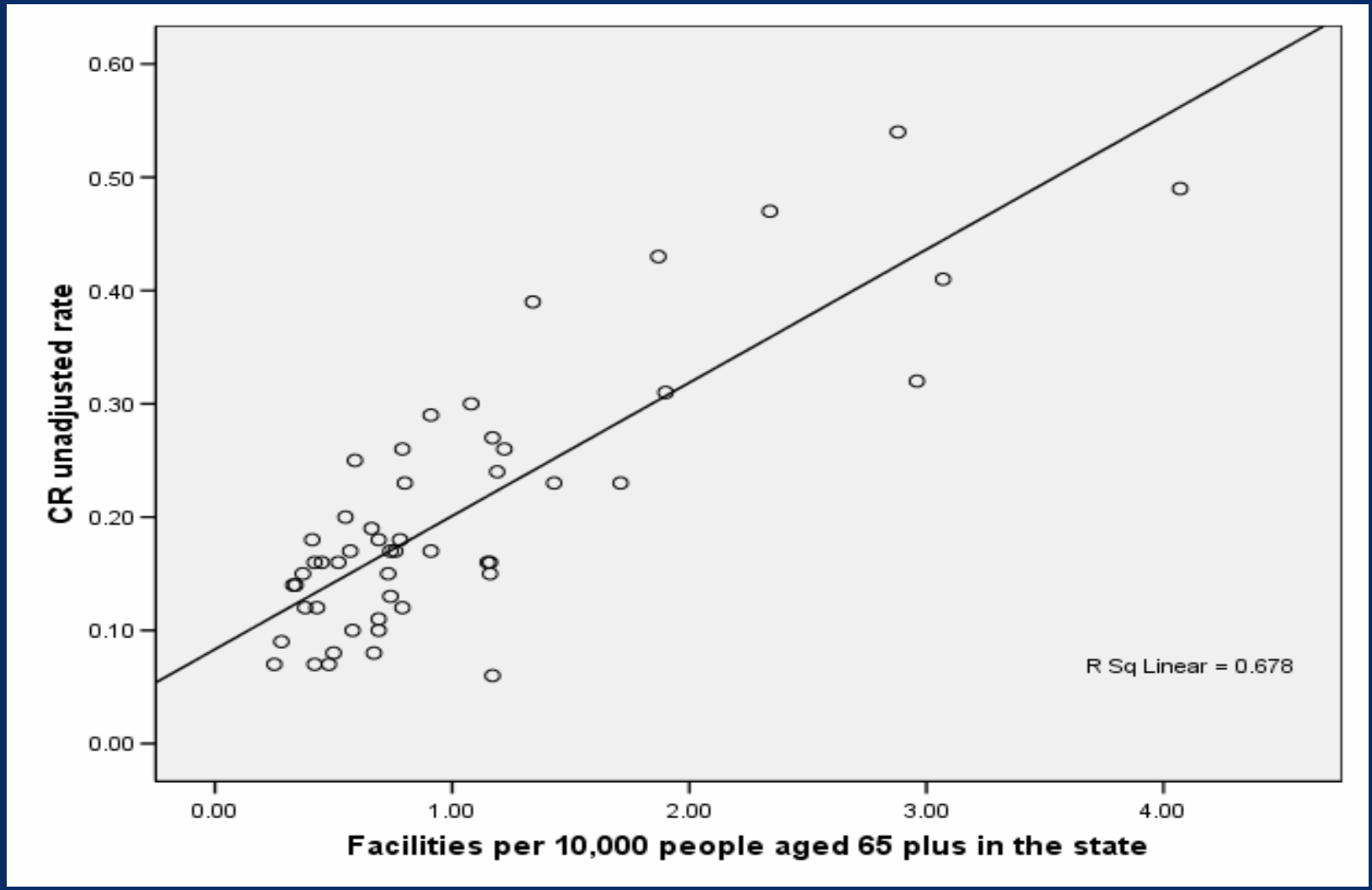
CR use by distance to nearest CR facility

Quintile	Distance in miles: mean and (range)	Crude CR rate	Adjusted Odds Ratios and (95% CI)
1	0.96 (0.3 - 1.63)	24.25%	**1** Reference group
2	2.38 (1.64 - 3.24)	21.68%	0.93 0.89-0.97
3	4.61 (3.25 - 6.50)	19.54%	0.78 0.74-0.81
4	10.17 (6.51 - 14.92)	18.78%	0.58 0.55-0.61
5	31.83 (14.93 - 231)	9.25%	**0.29** 0.27-0.31

Zip code analysis

Characteristic*	Adjusted Odds Ratio	Lower 95% CI	Upper 95% CI
Income			
Unknown	0.84	0.53	1.32
Quintile one	0.81	0.76	0.87
Quintile two	0.87	0.83	0.92
Quintile three	0.91	0.87	0.96
Quintile four	0.95	0.91	0.99
Quintile five (highest)	1.00	Reference group	

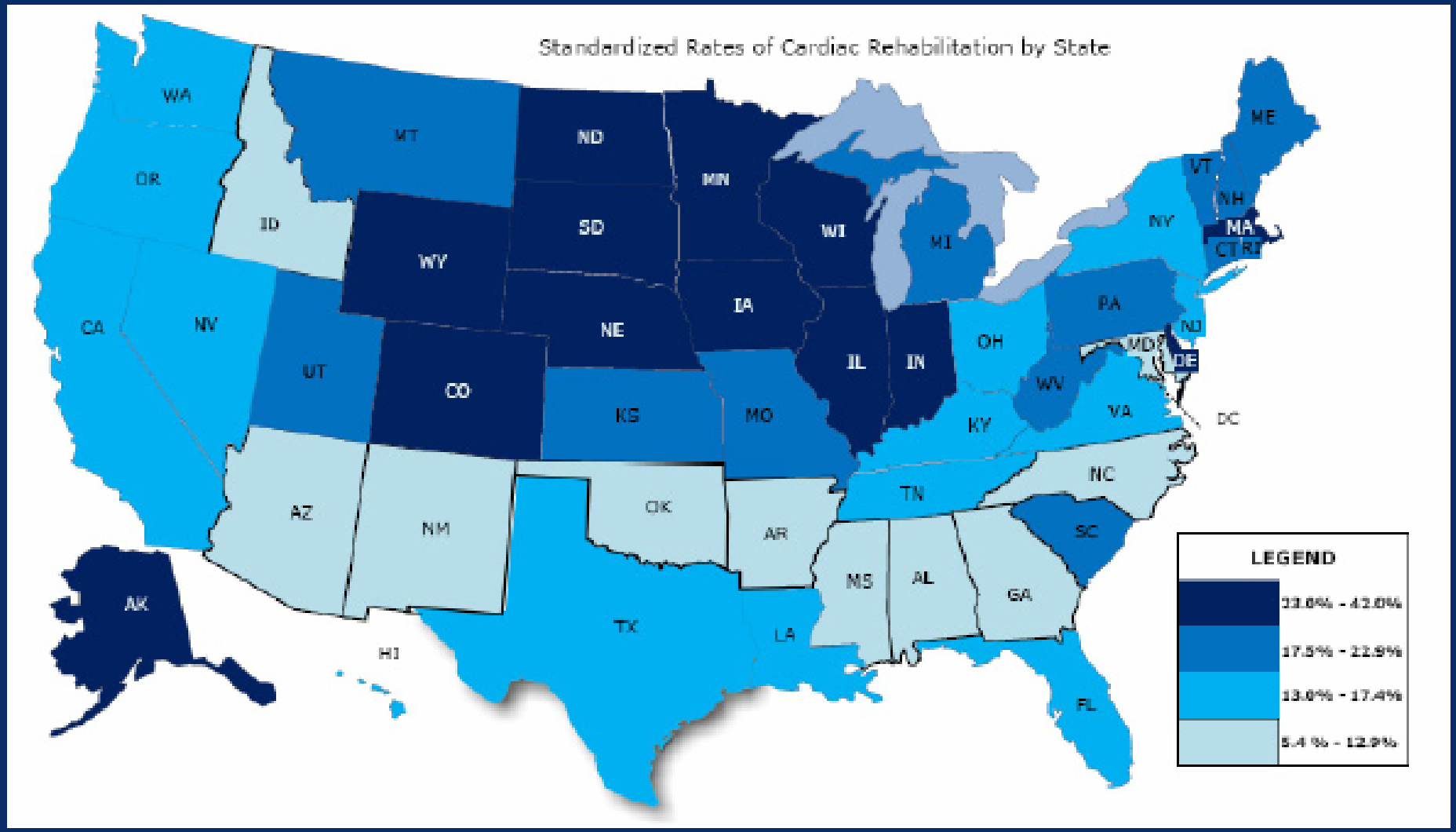
Association between use and availability of CR by state



- CR used by 14% AMI and 31% CABG patients
- Timing of initiation: Overall: mean 54.6 (SD 53.4), Q1=21 days, median =42 days after hospital discharge
- Earlier median initiation ($p<0.001$) among
  - Whites (6 days) than People of Color
  - Males (4 days) than Females

- In a cohort of 70,400 matched pairs, overall 5-year survival rates were 83.7% for CR users and 75.4% for non-CR users

- This absolute 8.3 percentage-point difference in survival rates between the cohorts corresponded to a **34%** reduction in the five-year mortality rates of CR users compared with non-CR users
- (Suaya et al, Draft, not for quotation)



Use rates were more than four-fold higher in North Central states than in Southern states.

CR Study Methods

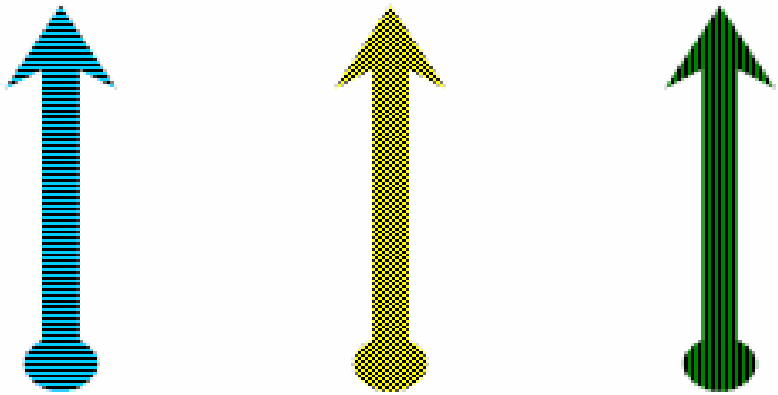
- Semi-structured questionnaire
- Directors of CR Programs
- Six low-utilization (average: 4%) and high-utilization (average:31%)states each
- Four sites in each State; AACVPR representative in each State (overlap of personnel)
- Final sample: 51 sites

Methods (continued)

- Response rate: 47% (n=24; 13 low-utilization, 11 high-utilization states)
- Monetary incentive provided for purchase of CR supplies
- Questions focused on organization: “MIT’s organizational learning history” approach
- Transcription, qualitative theme identification

Figure 1:

Tichy's 3 Strands of Strategic Rope[1]:



Technical Strand: *The financial, technological, and production resources available to an organization.*

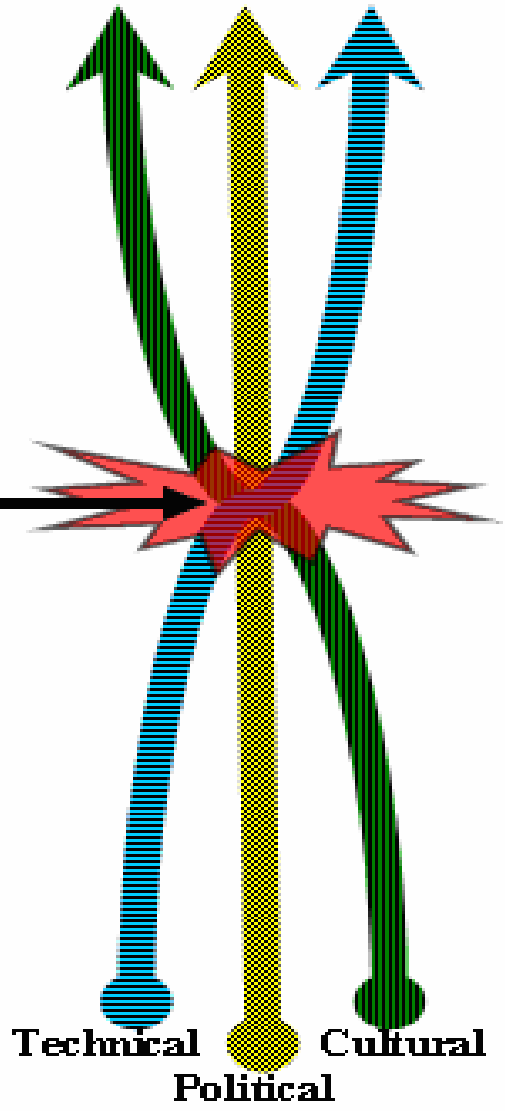
Political Strand: *The distribution of power and resources within an organization.*

Cultural Strand: *The values, beliefs, and objectives shared by organization members.*

[1]Tichy, N.M. *Managing Strategic Change: Technical, Political, and Cultural Dynamics.* New York: Wiley. 1983

Figure 2:

Tichy's Strategic Rope Model[1]:
The 3 strands converging symbolizes the intertwinement of the Technical, Political, and Cultural systems within an organization. Alignment of the 3 systems is the organization's strategic aim or management goal. Organizational changes must take into account these 3 systems, as well as the importance of their being aligned.



Implications:

- CR requires coordinating and facilitating access across multiple service sites, taking into account ***patient***, ***provider***, and ***system*** factors

- Organizations appear to play a central role in utilization of CR by performing this function

Implications:

- The growing burden of chronic illness and the need for post-event prevention (PEP) make it important to understand how organizational factors influence utilization of interventions such as CR
- This exploratory study provides the basis for a systematic assessment to evaluate approaches and improve uptake of such interventions
- It provides a rationale for Medicare and other insurers to expand the use of preventive services

LMPD Beneficiary Survey

- **Baseline (n=470), Year One (n=349) and Year Two (n=258) follow-up on intervention group**
- **Year One (n=652; 360 with CR; 292 without CR) and Year Two (n=449) on matched control group from Medicare claims data using DxCG methodology**

Survey Elements

- **Health**
- **Clinical Status**
- **Family History**
- **Lifestyle, including diet, exercise, and substance use**
- **Medications**
- **Knowledge about health and cardiac conditions**

Survey Elements, continued

- **Satisfaction with care**
- **Self-efficacy**
- **Social support**
- **Perceived stress**
- **Hostility**
- **Living Arrangements**

Theoretical Framework

- **Using the Anderson model* to frame findings**

*Anderson R & Davidson P. (2001). Improving access to care in America: Individual and contextural indications. In Anderson R, Rice T, and Kominski G, Eds. *Changing the US Health Care System: Key Issues in Health Services Policy and Management.* San Francisco, CA, Jossey-Bass, Inc.

Theoretical Framework, continued

- **Utilization of health services as a function of:**
  - **Predisposing factors: age, gender, marital status, education, employment**
  - **Enabling factors: wealth, income, healthcare financing**

Theoretical Framework, continued

- **Need factors: evaluated need**
- **Hypothesis: Controlling for need factors, utilization of lifestyle modification benefits will vary by predisposing and enabling factors**

Matching Variables

Characteristics	Mean or Percentage (Stdv) Lifestyle (*n=349*)	Control WithCR (*n=360*)	Control No CR (*n=292*)	Standardized differences* LifeStyle Vs. WithCR	LifeStyle Vs. NoCR	WithCR Vs. NoCR
Age (mean years)	72.91 (5.11)	73.36 (6.04)	72.90 (5.15)	-8.04%	0.13%	8.13%
Male (%)	65.62 (0.48)	69.08 (0.46)	66.09 (0.47)	-7.38%	-1.00%	6.38%
Qualifying events						
MI (%)	15.47 (0.36)	20.00 (0.40)	15.41 (0.36)	-11.86%	0.17%	12.03%
CABG (%)	25.79 (0.44)	25.56 (0.44)	26.71 (0.44)	0.53%	-2.10%	-2.63%
PCI/Stent (%)	32.38 (0.47)	35.56 (0.48)	35.96 (0.48)	-6.70%	-7.54%	-0.84%
Stable angina (%)	16.05 (0.37)	18.89 (0.39)	21.92 (0.41)	-7.48%	-14.99%	-7.51%

* None of the standardized differences are statistically significant

Univariate Statistics for Selected Variables

Characteristics	Mean or Percentage			Statistical significance [a]		
	Lifestyle (*n=349*)	Control WithCR (*n=360*)	Control No CR (*n=292*)	LifeStyle Vs. WithCR	LifeStyle Vs. NoCR	WithCR Vs. NoCR
Enabling						
Years of education (6 to 18 years)	14.11	13.60	12.68	*	***	***
Education level: Bachelor and above (%)	38.1	32.2	22.3	NS	***	**
Live with spouse (%)	74.2	76.4	66.8	NS	*	**
Home owner (%)	86.0	88.0	79.8	NS	*	**
Race: Non-Hispanic White (%)	95.4	92.8	92.5	NS	NS	NS
Need						
BMI (last year, mean)	28.03	27.98	28.33	NS	NS	NS
BMI greater than 25 (last year, %)	75.1	74.7	74.3	NS	NS	NS
High blood pressure (%)						
Never had high BP	24.5	28.9	18.9			
Previously had high BP	65.6	57.3	62.9	NS	**	**
Currently have high BP	9.8	13.7	18.2			

* Statistical comparison: * indicates P<.05, ** indicates P<.01, *** indicates P<.001, and NS indicates the

Univariate Statistics for Selected Variables, con't

Characteristics	Mean or Percentage			Statistical significance [a]		
	Lifestyle (*n=349*)	Control WithCR (*n=360*)	Control No CR (*n=292*)	LifeStyle Vs. WithCR	LifeStyle Vs. NoCR	WithCR Vs. NoCR
		Need				
High cholesterol (%)						
Never had high cholesterol	**16.6**	**20.7**	**19.2**			
Previously had high cholesterol	**63.3**	**50.7**	**49.8**	**	**	NS
Currently have high cholesterol	**20.1**	**28.5**	**31.0**			
Had high triglycerides history (%)	**52.9**	**43.7**	**45.4**	*	NS	NS
Number of risk factors: blood pressure, cholesterol & triglyceride	**2.02**	**1.86**	**1.99**	*	NS	NS
		Predisposing				
Family member died of heart disease (%)	**68.8**	**62.2**	**57.2**	NS	**	NS
Smoking history (%)						
Never smoked	**44.3**	**35.2**	**31.8**			
Previously smoked	**54.5**	**62.2**	**57.7**	*	***	***
Current smoker	**1.2**	**2.6**	**10.5**			

* Statistical significance of each pairwise comparison: * indicates P<.05, ** indicates P<.01, *** indicates P<.001, and

Ordered Logit Model Estimates and Odds Ratios (n = 996)*

Parameter	Estimate	p-Value	Odds Ratio Estimates		
			Point Estimate	95% Confidence Limits	
Intercept 3 (LS vs. W/CR & No CR)	-2.51	<.0001			
Intercept 2 (LS & W/CR vs. No CR)	-0.92	0.012			
Enabling					
Years of education (6 to 18 years)	0.11	<.0001	1.11	1.07	1.16
Home ownership	0.19	0.269	1.21	0.87	1.68
Live with spouse	0.15	0.338	1.16	0.86	1.56
Live with other family mems./relatives	-0.05	0.837	0.96	0.62	1.48
NonWhite	-0.10	0.681	0.90	0.55	1.47
Insurance for medications	0.12	0.389	1.13	0.85	1.50
Need					
BMI over 25 (at baseline)	0.12	0.396	1.13	0.86	1.48
Number of risk factors (BP, Chol, Trig)	-0.01	0.920	0.99	0.88	1.13
Predisposing					
Key death history	0.33	0.007	1.39	1.09	1.77
Ever smoked	-0.38	0.002	0.69	0.54	0.87

*The reference category is Control No CR; therefore the odds ratios of assignment in two other groups of

Comparison of Lifestyle to no CR

	Lifestyle %	No CR %
Never smoked	44.7	32.2
Current smoker	1.2	10.6
BMI not overweight	39.6	28.4
Chest pain last 4 weeks	14.4	23.9
Family history died of CAD	68.7	56.1
Never had high BP	24.5	18.9
Currently have high BP	9.8	18.2
Never had high cholesterol	16.6	19.2
Currently have high cholesterol	20.1	31.0

Findings: LMPD participants

- **Two-thirds are male, 19 out of 20 are white, and average BMI is 28**
- **Significantly more likely to have a bachelor's degree, live with a spouse, be a homeowner, have never smoked, and not be currently hypertensive**
- **Match well with controls on need factors (e.g. qualifying event)**

Findings, continued

- **Intervention patients and control patients differ markedly on predisposing and enabling factors (e.g. never smoked, education, home ownership)**
- **In general, CR utilizers are more similar to LMPD participants than non-CR utilizers**
- **Current, claims-based risk-adjustment methodologies do not adequately match intervention and control patients**

Discussion and Policy Implications

- **Lifestyle modification, including CR, is effective in reducing morbidity and improving quality of life in chronic illnesses**
- **Lifestyle modification interventions are under-utilized**
- **Disparities in utilization by race, ethnicity and gender are present**

Policy Implications, continued

- **Health services research has usually addressed access and quality based on need factors**
- **This study controlled for need factors, and revealed differences in predisposing and enabling factors**

Policy Implications, continued

- **Predisposing and enabling factors such as those identified in this study are outside the purview of the healthcare system and should be addressed at a societal level for a long-term solution**
- **More research is needed in order to develop strategies to enable and predispose patients in the short-term in order to increase uptake and retention**

Conclusions

- **Many factors associated with utilization of cardiac rehabilitative services appear to be outside the control of the healthcare system.**
- **"The Paradox of Technology" is that beneficial interventions increase disparities due to differential uptake.**
- **This suggests that additional efforts and customized approaches will need to be made in order to influence delivery system and practice options for *enhancing referrals*, *encouraging recruitment*, and *promoting retention* and access to care for underutilizing and underserved populations**

Next Steps

- Research has centered on financial interventions to organizations and providers to improve utilization, based on economic theory
- Studies such as these reveal patient factors to be very significant
- In order to address the “paradoxical” impact of technology on disparities, interventions may need to be targeted to improve utilization of services.

Table 2. Univariate statistics for selected variables

Characteristics	Mean or Percentage			Statistical significance [a]		
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