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Who Utilizes Post-cardiac Event Rehabilitative Services? Comparative Statistics from Medicare's Lifestyle Modification Program Demonstration (LMPD)

Session 4030.0, November 6, APHA

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*This analysis is supported in part by contract 500-95-0060 T.O. 2 from the Centers for Medicare & Medicaid Services to Brandeis University. Project Officer: Armen Thoumaian, Ph.D. and by the Schneider Institutes for Health Policy, The Heller School, Brandeis University, Stanley S. Wallack, Executive Director

Program models in LMPD: 12 month long, hospital-based, outpatient treatment programs

1. **Dr. Dean Ornish Program for Reversing Heart Disease**

2. **Benson-Henry Mind/Body Medical Institute's Cardiac Wellness Program**

Program modalities

- Nutrition
- Exercise
- Stress Management
- Psychosocial support
- Usual care

The Medicare Lifestyle Modification Demonstration Program

- **Congress permitted each program to enroll up to 1800 Medicare beneficiaries with heart disease**
- **Program enrollment began October 1999 and continued through February 2006**

Hypothesis: Lifestyle modification programs are cost effective in the prevention of ongoing cardiac morbidity and premature mortality

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

Methods

- **Patient Survey**
- **Medical Records**
- **Medicare Claims data**
- **Organizational 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)

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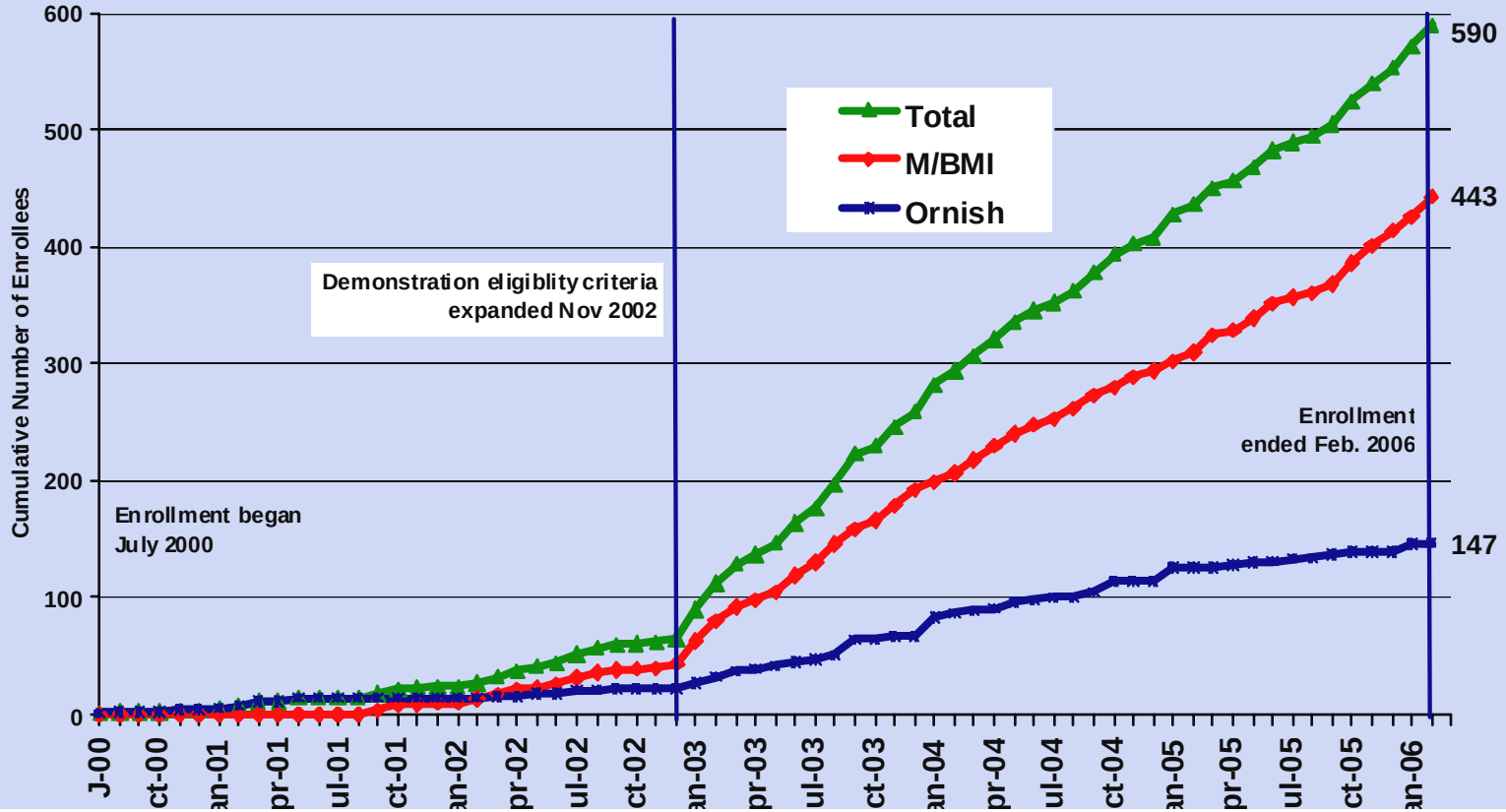
Cumulative Enrollment over Study

LA	M/BMI	TOTAL

Figure 1. Cumulative Enrollment in Medicare Lifestyle Demonstration by Program



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: Lifestyle (*n=349*)	Control WithCR (*n=360*)	Control No CR (*n=292*)	Statistical significance [a]: 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

Comparative analysis of process measures

Characteristics	Lifestyle (*n=349*)	Control WithCR (*n=360*)	Control No CR (*n=292*)	Lifestyle Vs. WithCR	Lifestyle Vs. NoCR	WithCR Vs. NoCR
Sees heart specialist/cardiologist	**88.2**	**84.6**	**78.3**	**NS**	***	*

All the values are in percentage. Fisher Exact test results are reported, statistical significance of each pairwise comparison: * indicates P<.05, ** indicates P<.01, *** indicates P<.001, and NS indicates the difference is not statistically significant.

Characteristics	Mean			T-Test		
	Lifestyle	Control W/CR	Control NoCR	Lifestyle-WithCR	Lifestyle-NoCR	WithCR-NoCR
Number of approaches tried for lifestyle change (0 to 21)	**6.48**	**4.56**	**3.37**	***	***	***
Number of activities done to relieve stress (0 to 9)	**4.00**	**2.86**	**2.58**	***	***	*
How often followed special diet/meal plan (0 to 4)	**3.27**	**2.86**	**2.76**	***	***	NS
Hours a week followed moderate recreation activities (scale 0=0 to 4=10 hours)	**1.72**	**1.35**	**1.06**	***	***	**
Hours a week followed heavy recreation activities (scale 0=0 to 4=10 hours)	**0.74**	**0.41**	**0.28**	***	***	*

Mean values are reported, statistical significance of each pairwise comparison: * indicates P<.05, ** indicates P<.01, *** indicates P<.001, and NS indicates the difference is not statistically significant.

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

- **Two-thirds of LMPD participants are male, 19 out of 20 are white, and average BMI is 28. These findings do not vary significantly for controls**
- **Participants are significantly more likely to have a bachelor's degree, live with a spouse, be a homeowner, have never smoked, and not be currently hypertensive**
- **In general, intervention and control patients match well 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 comparable more to LMPD participants than non-CR utilizers**
- **Current, claims-based risk-adjustment methodologies do not adequately match intervention and control patients**

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%

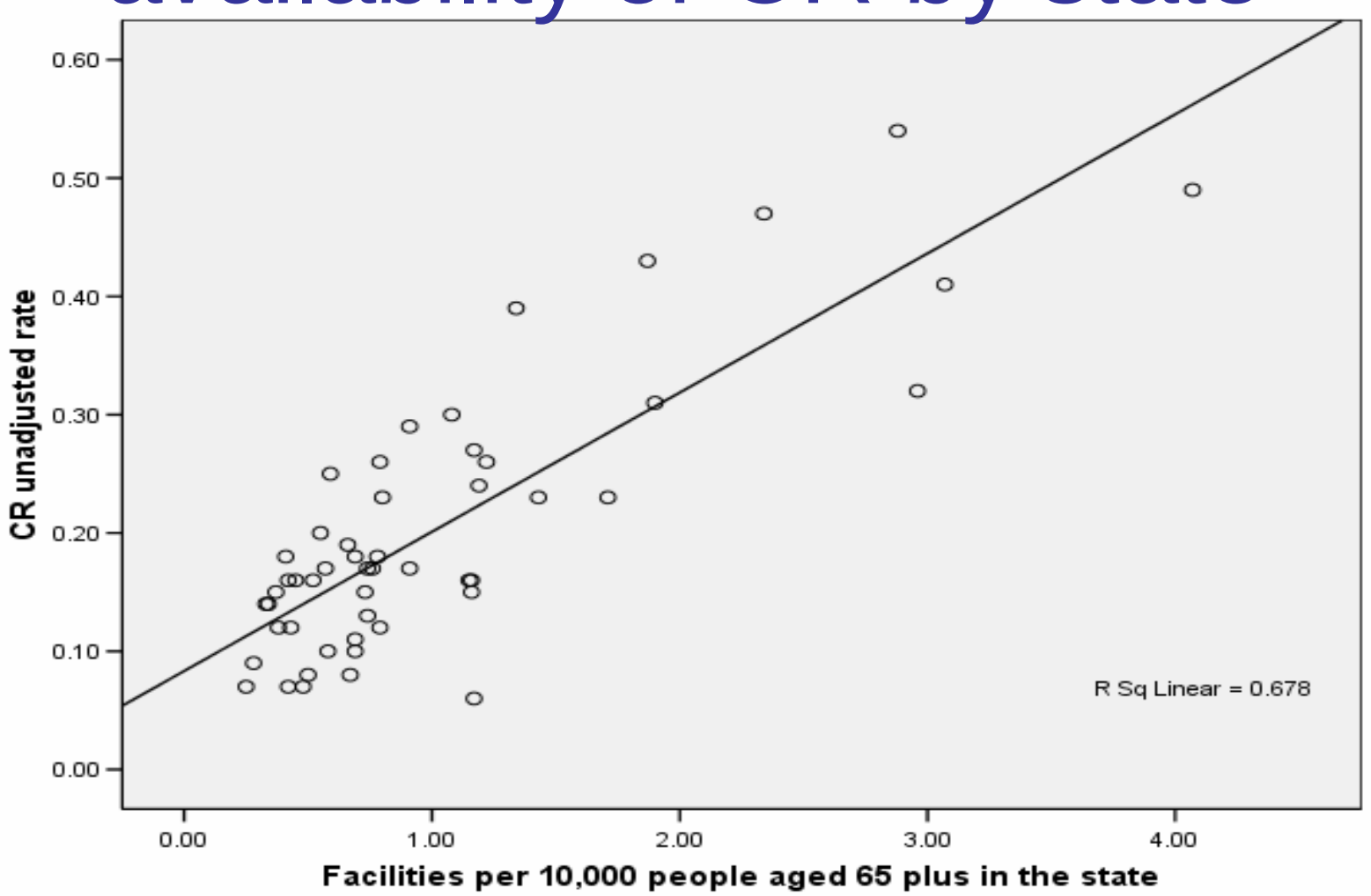
CR use by distance to nearest CR facility

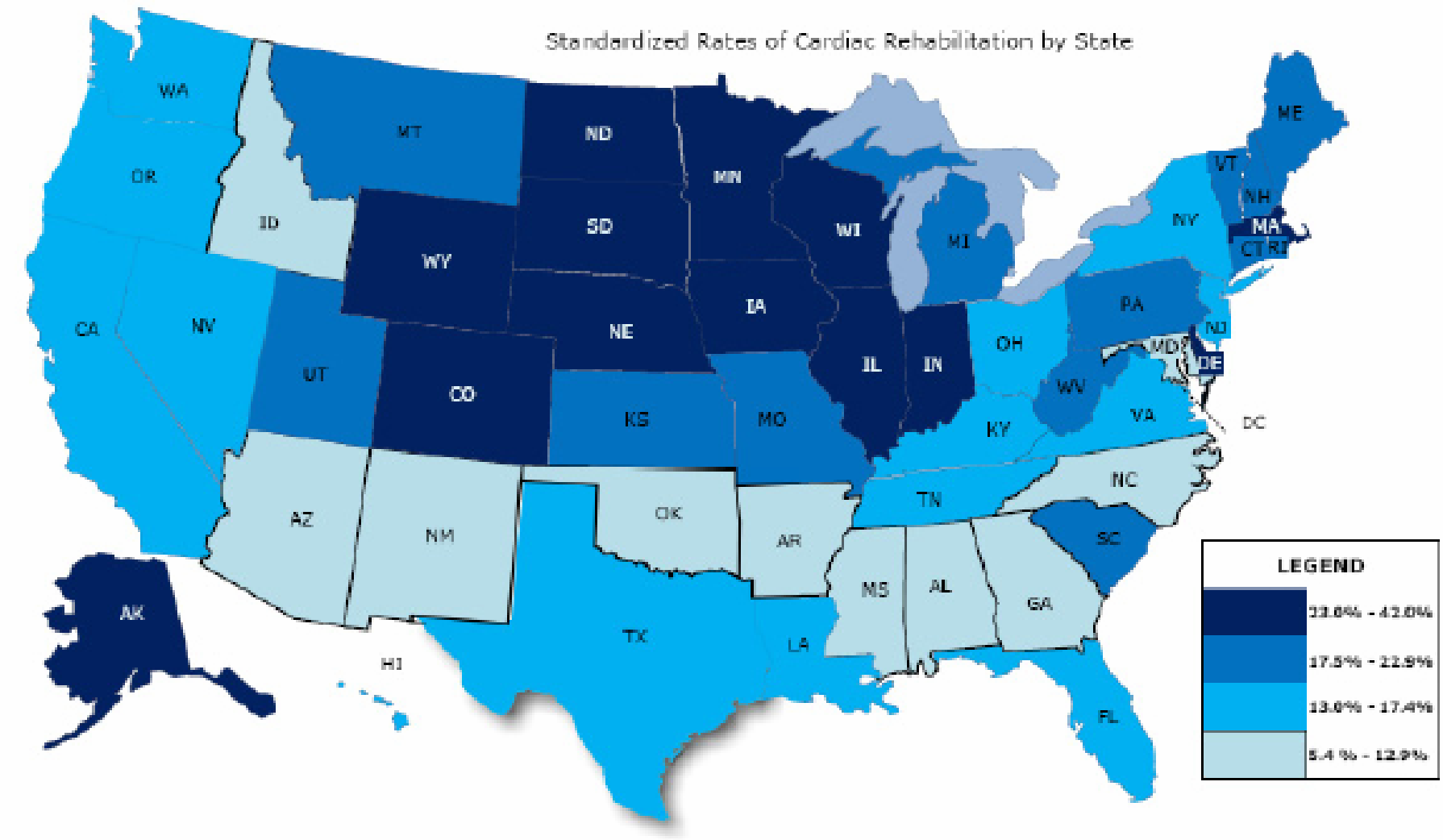
Quintile	Distance in miles: mean and (range)	Crude CR rate	Adjusted Odds Ratios and (95% CI)
1	0.96 (0.3 - 1.63)	24.25%	**1** Reference group
2	2.38 (1.64 - 3.24)	21.68%	0.93 0.89-0.97
3	4.61 (3.25 - 6.50)	19.54%	0.78 0.74-0.81
4	10.17 (6.51 - 14.92)	18.78%	0.58 0.55-0.61
5	31.83 (14.93 - 231)	9.25%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





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

Discussion and Policy Implications

- **Lifestyle modification, including CR, has been shown to be effective in reducing morbidity and improving quality of life in chronic illnesses such as diabetes**
- **Yet, lifestyle modification interventions are under-utilized**
- **Further, utilization reveals disparities by race, ethnicity and gender**

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**

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
- Research on patient incentives to improve utilization of services have used health promotion and prevention interventions based on psychological and ssociological theory

Challenge

- Primary prevention addresses risk factors before disease occurs (prepathogenesis), e.g. nutrition, exercise, stress, substance use
- Lifestyle modification involves addressing these risk factors AFTER pathogenesis, and AFTER cardiac event has occurred

Challenge (contd)

- Who should pay for post-event prevention?
- Where in the health care system should it occur?
- Financial compensation alone does not suffice, should quality measures be instituted?

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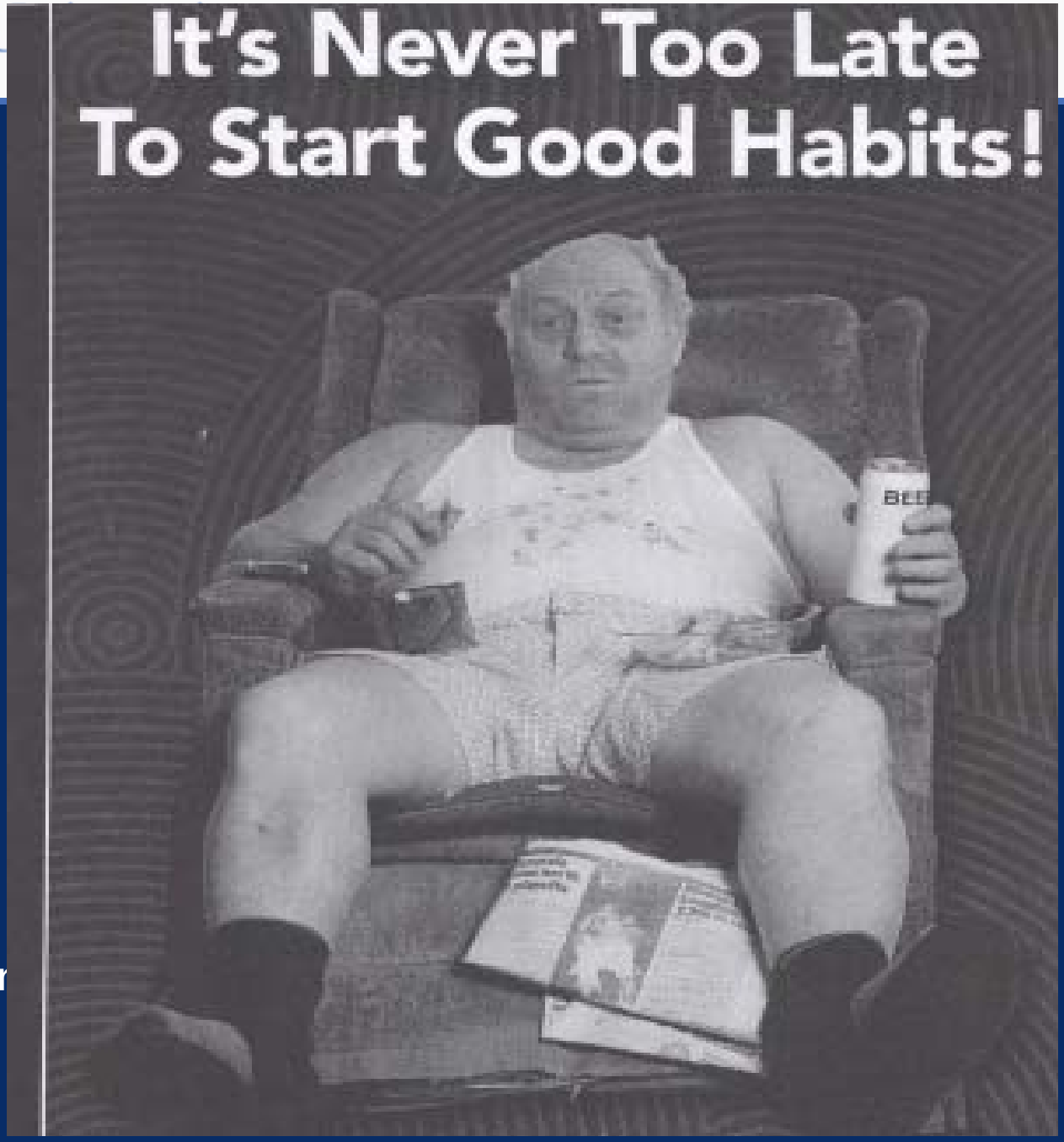

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