

## **Appendix B.2**

### **Of the**

## **Evaluation of Lifestyle Modification and Cardiac Rehabilitation in Medicare Beneficiaries\***

### **SYSTEM LEVEL FACTORS AND USE OF CARDIAC REHABILITATION\*\***

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## **INTRODUCTION**

Despite the benefits of cardiac rehabilitation and recommendations for its use by clinical guidelines,<sup>1-3</sup> recent estimates suggest that only 10% to 20% of eligible candidates in the United States currently use formal CR services,<sup>4,5</sup> a rate of utilization that has remained relatively unchanged for almost 2 decades.<sup>6</sup> Research examining this trend indicates great inconsistencies in physician referral practices, including lower physician referral rates as well as patient enrollment rates, for certain demographic groups such as women, seniors, and non-whites.<sup>8-11</sup> Additionally, low levels of patient social support and a patient's low sense of self-motivation and self-efficacy all dampen the likelihood that a referred patient enrolls in CR services.<sup>9,12</sup> Whether a patient enrolls in CR is additionally influenced by the strength of a physician's endorsement and communication with patients in this regard.<sup>9,13</sup> Factors related to the health care delivery system may also undermine CR referral and use, including inadequate third-party reimbursement for CR services and poor coordination among providers serving cardiac patients.<sup>14,15</sup>

In this study, we explored the relationship between system-level factors and CR use. We hypothesized that system-level factors, including characteristics of CR facilities and characteristics of the delivery systems in which they operate, vary across region and by extension may offer important insight about how to address the underutilization of this service. Our findings are preliminary but provide an innovative and potentially useful framework for understanding CR underuse.

## **METHODS**

An examination of how system-level factors affect CR use requires detailed knowledge of how CR facilities operate. It also requires an understanding of the environment within which they operate, including how contextual factors such as the political and cultural climate mediate CR facility components and performance. The primary study objective was to develop a more complete model for studying CR underutilization and to create an analytic framework for future research. Under these conditions, a case study methodology with CR facilities as the unit of analysis is the most efficacious approach.<sup>16,17</sup>

### **Study Sites**

To gather the most useful information from case studies, we deliberately sought to identify states at the extremes of CR use, as well as CR facilities within those states at extremes of use. To select CR facilities, we followed a 4-step process. First, based on the 1997 rates of CR use among Medicare beneficiaries aged 65 plus,<sup>6</sup> we selected the 6 highest CR use states (Iowa, Minnesota, Nebraska, North Dakota, South Dakota and Wisconsin) and 6 of the 8 lowest CR-use states (Arkansas, Georgia, Idaho, Hawaii, New Mexico, Maryland, Mississippi, Oklahoma). See

Figure 1. Among the eight lowest states, we excluded Hawaii and New Mexico because both states did not have at least two eligible hospitals. We defined eligible hospitals as those above the median in number of Medicare patients with coronary-related hospitalizations and with a minimum of 100 Medicare patients with coronary-related hospitalizations. Second, within each state, we restricted our study to eligible hospitals to ensure an adequate denominator for assessing utilization rates. Third, we identified hospitals with CR facilities and sorted them based on the percentage of CR eligible Medicare patients in 1997 who received CR within a year after discharge and selected the 2 highest and 2 lowest CR-use hospitals in each state.

Given the small number of qualifying hospitals in South and North Dakota, we combined both states together and considered them as a single state. In addition, given the small number of qualifying hospitals in Idaho and Maryland, we sampled 3 hospitals in each of these states. This approach produced a final sampling frame of 42 CR facilities. In an effort to get state-wide perspectives on CR use, we additionally identified the CR Association in each of our study states. Two states share an association (South and North Dakota), so this added 11 CR Associations to our final sampling frame.<sup>18</sup>

Among CR Facilities, the target respondent was the program director and among CR Associations, the president. The target respondent of each agency was contacted by mail and followed up by telephone to explain the study, solicit participation, and schedule phone interviews. We offered an incentive payment of \$150 to encourage participation. This strategy yielded a sample of 22 respondents (a 42% response rate). Of these, 16 were Program Directors of CR facilities (8 located in high states and 8 located in low states) and 6 were Presidents of CR Associations (3 representing high states and 3 representing low states). All but 2 of the study states (Idaho and Maryland) are represented in the final study sample. See Table 1.

### **Data Collection and Analysis**

Using technology diffusion theory, we created semi-structured interview guides to ensure data comparability across sites and states. Technology diffusion theory hypothesizes that the utilization of any given health care technology is driven by characteristics of the technology, characteristics of provider organizations responsible for making the technology available to patients, and characteristics of the larger delivery system that might mediate provider behavior.<sup>19</sup> We applied a modified form of this framework, hypothesizing that CR use is a function of characteristics of CR facilities (systems and structures) and characteristics of the delivery systems in which they operates (hospitals, other CR facilities, payers). We specified questions within these domains based on our own work evaluating other lifestyle modification programs,<sup>20</sup> the CR literature, and consultations with experts in the field. Our final CR facility interview guide

contained 12 questions and our final CR Association guide 11 questions. Specific interview questions focused on CR facility referral mechanisms, services, capacity, and relationships to hospitals and other CR facilities.

We completed the interviews during the fall 2006. All interviews were conducted by the first and third author, both experienced qualitative researchers. The interviews were transcribed into Microsoft Word files, and a process of manual coding and analysis was used to search and retrieve related segments, key themes, and sub-themes. The first author completed the initial coding, while the third author reviewed for consistency and completeness. Where differences were observed, we went back to the interview notes and in some cases clarified or collected new data from a study site.

## **RESULTS**

Qualitative analysis of the interview resulted in the emergence of 4 themes. In Table 2 and below, we report on these themes and what we consider to be system level factors potentially common to high performing CR facilities and high rates of CR use state-wide.

### **1. Referral Systems**

Participation in CR is dependent on a referral from a physician, often based on advice from other health care team members.<sup>20</sup> We found that CR facilities in high and low states vary on 2 aspects related to the referral process: where in the referral process CR staff intervene (advising patients, referring providers, or both) and the mechanisms they rely on to trigger this intervention (standards orders or CR staff assessment). In some instances, we found facilities that take little or no active role in facilitating referrals, an approach slightly more common among CR facilities in low states (2 of 8), compared to CR facilities in high states (1 of 8). More usual were CR facilities that actively seek out referrals either by advising physicians to issue a referral (CR facilities in high states reported this approach more often), encouraging patients to ask their physicians about CR (CR facilities in low states reported this approach more often), or both (as many CR facilities in high and low states reported this approach). In all cases, respondents reported that the goal is to intervene before the patient is discharged from the hospital. Most CR facilities believe that once a patient is settled at home and resumes pre-cardiac event routines, it is more difficult to convince them to enroll in CR.

Where CR facilities in high and low states differed more substantially was in the mechanisms used to identify CR eligible patients and/or their referring physicians. At one end of the spectrum are CR facilities that use electronic patient records, standard orders, or some other systematic, non-manual method to identify *all* CR eligible patients and prompt staff to meet with the patient

and/or follow-up with their referring physician. CR facilities in high states relied on these types of automated systems more often (4 of 8) compared to CR facilities in low states (2 of 8). It was more common for CR facilities in low states to report that CR staff “keep an eye out” for CR eligible patients or are in some way responsible for deciding who is and is not CR eligible (true for 4 of 8) compared to CR facilities in high states (3 of 8).

## **2. Relationship to Hospital and Hospital Physicians**

Although our study was limited to hospital-based CR facilities, the degree of integration these facilities experience within their hospital differed. One measure of integration related to where a CR facility is located in relationship to the hospital and hospital physicians. We found that CR facilities in high states were more often located in the hospital (6 of 8) compared to CR facilities in low states, which were more often located off the main site of the hospital (5 of 8). CR facilities that operated in or near the cardiac wing of a hospital, and had CR nurses present and available on the hospital floor, viewed these conditions as helping them to build key relationships with the physician community, which in turn helped to facilitate referrals.

Another related measure of integration is whether or not a CR facility additionally provides inpatient CR service for the hospital (ie, Phase I CR). Phase I CR, which generally consists of early inpatient ambulation identification of risk factors, and educational interventions,<sup>21</sup> was more often provided by CR facilities in high states (7 of 8) compared CR facilities in low states (3 of 8). In these cases, respondents described several key advantages that were gained by the providing Phase I CR including a chance to interact with the CR eligible patients before discharge, a chance to build relationships with cardiac physicians, and a chance to provide continuity between inpatient and outpatient CR services (in some cases, it is even the same nurses that are providing the 2 phases of CR).

## **3. Relationship to other CR Facilities**

Our respondents universally reported that a patient’s proximity to a CR facility was a key predictor of CR enrollment, and the literature supports this.<sup>5</sup> At the same time, not all cardiac patients discharged from a hospital lived near its CR facility. As such, CR facilities faced a choice of focusing outreach and enrollment efforts on those patients that live nearby (and are therefore more likely to enroll in their facility) or focusing efforts on *all* CR eligible patients and facilitating referrals for some to a facility that is more convenient, if such a facility exists. In this regard, we found that CR facilities located in high states more often operated as part of a virtual network of CR facilities, assuming responsibility for facilitating referrals to other CR facilities as well as their own (true for 5 of 8 compared to 3 of 8 in low states). The feasibility of such an approach was conditioned on the presence of other CR facilities and if present, the capacity to cultivate

relationships with these other CR facilities. Among the CR facilities that operated with such a networked approach, all were located in States with a relatively large supply of CR facilities<sup>14</sup> and several pointed to their state CR association as a key mechanism for fostering relationships with other CR facilities via annual meetings and list serves.

#### **4. Capacity**

Like any service, the availability of service slots sets the limits of CR utilization rates. CR facilities in high states tended, on average, to operate at capacity (7 of 8 compared to 4 of 8 in low states), as opposed to routinely having many appointments left unfilled. At the same time, no facility reported having a waiting list. In fact, respondents consistently told us that maintaining a waiting list for CR services was “not an option.” A CR eligible patient who must wait to receive services was understood by most CR facility directors as a CR eligible patient who is more likely to decide not to enroll in a CR program. It is, therefore, imperative for a CR facility to have the capacity to meet the present demand for their services, or to have the ability to expand service slots when faced with increased demand. On this dimension, CR facilities in high states more often reported some form of expansion, typically in response to Medicare’s recent expansion of CR eligibility criteria (4 of 8 compared to 2 of 8 in low states).

Fixed capacity constraints derive largely from the physical space in which a CR facility operates. Among our sample, most operated three days a week (Monday, Wednesday, and Friday), offering from 3 to 12 sessions per day. Most CR facilities scheduled patients for a specific session (usually a one hour block of time) and regulated the number of patients in a particular session to the number of treadmills. The typical facility had space for 8 to 12 treadmills (and by extension 8 to 12 patients per session). Among the 7 CR facilities that reported recently expanding capacity, expansion took several forms: operating sessions on more days of the week (2 facilities), adding more sessions on already standard days (1 facility), relocating to a larger space (2 facilities), or adding a satellite site (1 facility).

## **DISCUSSION**

CR is an efficacious treatment technology but utilization is low. This exploratory study aimed at developing a policy useful framework for understanding how to study this problem. CR utilization rates are a function of 2 sequential processes: a physician’s decision to refer and a patient’s decision to follow through on the referral by enrolling in a CR program. Evidence indicates that CR utilization rates vary enormously from state to state and within states, from hospital to hospital. The rationale underlying this research was that this variation may reflect variations in key system-level variables, especially with respect to how referrals and enrollment are managed among

differing hospitals. A number of organizational factors emerged. These include the degree of automation and assertiveness around securing CR referrals, the level of integration of CR within the hospital setting and physician community, and the relationship to other CR facilities.

The study is limited and the findings only indicative. Our study focused on hospital-based CR facilities and therefore some of the identified themes may not generalize to free-standing facilities and community-based programs. Additionally, our site selection was based on 1997 Medicare rates. While this limits the certainty of identified associations, findings from a recent study by the Center for Disease Control and Prevention (CDC) of heart attack patients in 21 states suggests that Medicare rates are a reasonable proxy for CR use among all populations and that the relative rate of CR use across states has remained relatively unchanged since 1997.<sup>6</sup> Four of our 6 low study states were included in the CDC study. Of these, 3 (Oklahoma, Arkansas, and Mississippi) remained in the lowest quartile of states ranked by CR use and the fourth (Georgia) was the lowest state in the second quartile. Three of our 6 high states were included in this same study and all 3 (Nebraska, North Dakota and Minnesota) remained in the highest quartile.

Finally, our data yield relatively detailed information about systems and processes but can not demonstrate statistical relationships between these systems and processes and CR utilization. However our findings do suggest the factors that need to be examined to develop such relationships. These, in our interviews, took several forms including information based systems to bring the need for referrals before physicians at critical junctures and active interventions by CR staff to identify candidates and make their need salient to physicians and to the patients themselves. It also means CR facility presence in a hospital, which provides increased opportunities for CR staff to interface with physicians and CR eligible patients, and strong inter-organizational linkages among CR programs to facilitate referrals for patients who reside in distant locations.

Our interviews additionally suggest that CR may be a supply driven phenomenon. In some instances CR facilities were operating at or near capacity, with little obvious ability to expand. As waiting lists are not a practical option, the capacity of CR programs may present a short-term absolute limitation of utilization rates and referral rates. We speculate that some CR facilities work within their capacity constraints by managing patient referrals. Because many CR facilities described a referral system that was largely dependent on some level of intervention by CR staff, the flow of CR referrals is, within limits, controllable. In this sense, referral systems that depend on CR staff to encourage either CR eligible patients, or provider, or both, can regulate these actions depending on available capacity. At least 2 facilities, when asked about the level of outreach they do, replied that when their census goes down, they “drum up” more referrals and

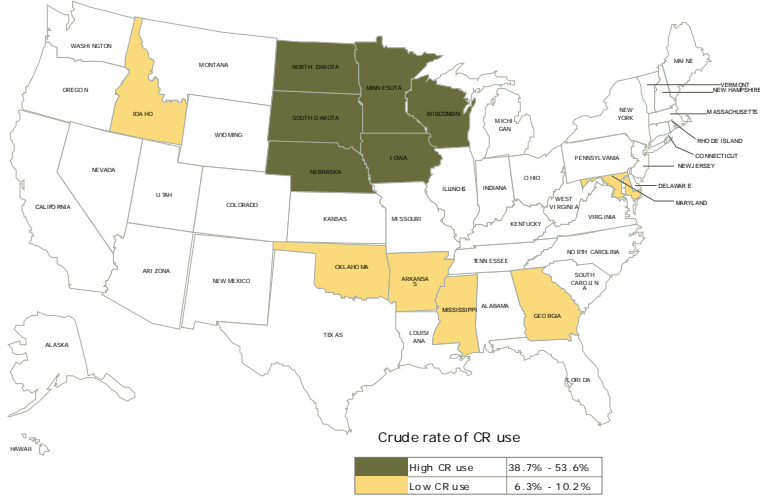
when their facility is at or close to capacity, they pull back on these efforts. In effect they manage demand to match supply. In sum, this work suggests directions for future research but also directions for future interventions.

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**Figure 1. States selected for study**



**Table 1. Sample of CR facilities and CR state associations by overall State CR use\***

<b>Type of State</b>	<b>Facilities</b>		<b>Associations</b>	
	Sampled	Responded	Sampled	Responded
<b>High CR use</b>				
Iowa	4	3	1	0
Minnesota	4	1	1	1
Nebraska	4	2	1	0
North &				
South Dakota	4	2	1	1
Wisconsin	4	0	1	1
<b>Low CR use</b>				
Arkansas	4	4	1	1
Georgia	4	2	1	1
Idaho	3	0	1	0
Maryland	3	0	1	0
Mississippi	4	1	1	0
Oklahoma	4	1	1	1
<b>Total</b>	42	16	11	6

\* High and low CR use based on crude 1997 Medicare state rates.<sup>4</sup>

**Table 2. Key Themes**

	<b>Type of State</b>	
	High CR use (n=8)	Low CR use (n=8)
<b>1. Referral process</b>		
a. CR team intervenes with		
Physician and patient	3	3
Patient only	2	3
Physician only	2	0
No intervention	1	2
Total	8	8
b. Level of inclusiveness		
Use of systematic non- manual protocol	4	2
Informal system using only CR staff	3	4
None	1	2
Total	8	8
<b>2. Relationship to hospital</b>		
a. Location of CR Facility		
In hospital	6	3
Off site	2	5
Total	8	8
b. Operate Phase 1 CR		
Yes	7	3
No	1	5
Total	8	8
<b>3. Relationship to other CR facilities</b>		
a. Refer to other CR facilities		
Yes	5	3
No	3	5
Total	8	8
<b>4. Capacity</b>		
a. Typical operating status		
Usually at capacity	7	4
Usually under-capacity	1	4
Total	8	8
b. Ability to or evidence of expansion		
Yes	4	2
No	4	6
Total	8	8