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Author(s): Kate R. Lorig, Philip Ritter, Anita L. Stewart, David S. Sobel, Byron William Brown, Jr., Albert Bandura, Virginia M. Gonzalez, Diana D. Laurent, Halsted R. Holman

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## Chronic Disease Self-Management Program 2-Year Health Status and Health Care Utilization Outcomes

KATE R. LORIG, DRPH,\* PHILIP RITTER, PHD,\* ANITA L. STEWART, PHD,† DAVID S. SOBEL, MD,‡  
BYRON WILLIAM BROWN, JR., PHD,\* ALBERT BANDURA, PHD,§ VIRGINIA M. GONZALEZ, MPH,\*  
DIANA D. LAURENT, MPH,\* AND HALSTED R. HOLMAN, MD\*

**OBJECTIVES.** To assess the 1- and 2-year health status, health care utilization and self-efficacy outcomes for the Chronic Disease Self-Management Program (CDSMP). The major hypothesis is that during the 2-year period CDSMP participants will experience improvements or less deterioration than expected in health status and reductions in health care utilization.

**DESIGN.** Longitudinal design as follow-up to a randomized trial.

**SETTING.** Community.

**PARTICIPANTS.** Eight hundred thirty-one participants 40 years and older with heart disease, lung disease, stroke, or arthritis participated in the CDSMP. At 1- and 2-year intervals respectively 82% and 76% of eligible participants completed data.

**MAIN OUTCOME MEASURES.** Health status (self-rated health, disability, social/role activi-

ties limitations, energy/fatigue, and health distress), health care utilization (ER/outpatient visits, times hospitalized, and days in hospital), and perceived self-efficacy were measured.

**MAIN RESULTS.** Compared with baseline for each of the 2 years, ER/outpatient visits and health distress were reduced ( $P < 0.05$ ). Self-efficacy improved ( $P < 0.05$ ). The rate of increase is that which is expected in 1 year. There were no other significant changes.

**CONCLUSIONS.** A low-cost program for promoting health self-management can improve elements of health status while reducing health care costs in populations with diverse chronic diseases.

**Key words:** Chronic disease; self-management; patient education; utilization; costs; savings. (*Med Care* 2001;39:1217-1223)

Chronic disease is the principal cause of disability, the major reason for seeking health care, and accounts for 70% of all health care expenditures.<sup>1</sup> Although the aging population has contributed to these increases, the prevalence of chronic disease has risen in virtually every age group.<sup>2,3</sup>

There have been major advances in the medical and surgical care of chronic disease, but little has been done to enable patients to manage chronic diseases during the long term. Patients must cope with discomfort and disability, and follow treatment regularly. In addition, they have to modify

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\*From the Stanford University School of Medicine, Stanford, California.

†From the University of California, San Francisco, and the Institute for Health & Aging, San Francisco, California.

‡From the Kaiser Permanente Northern California, Oakland, California.

§From the Department of Psychology, Stanford University, Stanford, California.

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Address correspondence and reprints requests to: Kate Lorig, DrPH, Stanford Patient Education Research Center, 1000 Welch Road, Suite 204, Palo Alto, CA 94304.

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behaviors to minimize undesirable outcomes, adjust their social and work lives to accommodate their symptoms and functional limitations, and deal with the emotional consequences.<sup>4</sup>

The community-based, peer-led, Chronic Disease Self-Management Program (CDSMP) was designed to help patients with chronic disease develop these self-management skills. In a previous article, we reported the effectiveness of the CDSMP as evaluated in a randomized 6-month trial.<sup>5</sup> Compared with wait list controls, patients who received the intervention (a 7-week group program, 2½ hours weekly): improved their health behaviors (exercise, cognitive symptom management, and communication with physicians); improved self-rated health and participation in social/role activities; reduced disability, fatigue, and distress over their health; and had significantly fewer hospitalizations and fewer days in the hospital (all  $P < 0.05$ ). When the original wait-list control subjects received the CDSMP, their 6-month improvements in health status, and reductions in health care utilization matched those who were originally treatment participants.

This article presents the 1- and 2-year outcomes for participants in the original CDSMP study. Specifically, the article:

1. Describes CDSMP participants' changes from baseline (time of commencement of the 6-week CDSMP) in health care utilization, health status, and self-efficacy for managing disease.

2. Examines the extent to which initial levels of self-efficacy and changes in self-efficacy are associated with improvements in utilization.

3. Describes the cost of the intervention and potential savings due to changes in health care utilization.

The major study hypothesis is that for 2-year follow-up, participants will experience improvements or less than expected deterioration in health status and lower health care utilization. This study combines the findings from subjects initially randomized to the CDSMP and the control group who later received the CDSMP. We examine two longitudinal overlapping cohorts, at 1 and 2 years after beginning the CDSMP.

## Materials and Methods

### Subjects

Persons 40 years or older with heart disease, lung disease, stroke, or arthritis were recruited

during a 4½-year period to participate in the 6-month randomized CDSMP study. Those in active treatment for cancer or with cognitive impairment were excluded. Participants were recruited from the community by public service announcements, talks to community groups, and notices in clinics. They completed institutional informed consent forms and were mailed questionnaires. A total of 1,140 subjects entered the 6-month randomized portion of the study.<sup>5</sup> After returning the questionnaires, they were randomized to receive the CDSMP immediately or 6 months later. After 6 months, wait-listed controls were offered the CDSMP. Seventy-two percent of the control group participated in the CDSMP. All subjects who participated in at least one session (mean attendance 5.7 out of 7 sessions) of the CDSMP and completed the 1-year questionnaire are included in the present study. Data were collected immediately before entering the CDSMP, at 6 months, and at 1 and 2 years. Six-month data for all subjects in the randomized trial are reported elsewhere.<sup>5</sup>

Data collection ended 4½ years after the first group entered the study. Participants who entered the study after the first 30 months could not complete 2-year data and those entering after 36 months could not complete 1-year data. Therefore, only 831 subjects in the randomized study were eligible for the follow-up study.

### Intervention

The CDSMP, which is based on the generic principles of the Arthritis Self-Management Program, was taught at community sites, such as senior centers, churches, and medical centers.<sup>6</sup> Each program had 10 to 15 participants of mixed ages and diagnoses, including family members if they wished to attend. A pair of peer leaders who had received 20 hours of training taught the CDSMP, using a detailed teaching manual.<sup>7</sup> Seventy-one percent of the leaders had one or more chronic diseases. The program was provided in 7 weekly sessions of 2½-hours duration.

Content included: adoption of exercise programs; use of cognitive symptom management techniques, such as guided relaxation and distraction; nutritional change; fatigue and sleep management; use of medications and community resources; managing the emotions of fear, anger and depression; training in communication with health

professionals and others; health-related problem-solving; and decision making. The program content has been published in *Living a Healthy Life with Chronic Conditions*, which served as a guide for participants.<sup>8</sup> Each participant received a copy. The implementation of the program was based on self-efficacy theory, which has been shown to be a common pathway through which psychosocial programs affect health outcomes.<sup>9</sup> The program incorporated modeling and social strategies known to enhance a sense of personal efficacy. These include guided mastery of skills through weekly action plans and feedback of progress, modeling of self-management behaviors and problem solving strategies, reinterpretation of symptoms, social persuasion through group support and guidance for individual self-management efforts. The implementation of the program is documented in a detailed protocol, *Chronic Disease Self-Management Leader's Manual*.<sup>7</sup>

### Outcome Measures

Three categories of outcomes were assessed: health status, health services utilization, and perceived self-efficacy to manage different aspects of one's health and functioning. All data were collected by previously tested, mailed questionnaires. Data collection was completely independent of the intervention and conducted by persons who did not know the subjects. Health measures included the self-rated health scale used in the National Health Interview Survey<sup>10</sup> and a modified version of the Health Assessment Questionnaire (HAQ) physical disability scale.<sup>11,12</sup> The energy/fatigue scale was from the long-form Medical Outcomes Study (MOS) measures.<sup>5</sup> The health distress scale was a slightly modified version of the MOS health distress scale;<sup>13</sup> it assesses the amount of time one feels distressed about health (eg, discouraged, worried, fearful, frustrated by health problems). The social/role activity limitation scale was developed and tested for this study to determine role function.<sup>14</sup> Descriptions of the measures and their psychometric properties are presented elsewhere.<sup>14</sup>

Three types of health care utilization were assessed during the prior 6 months: visits to physicians, including visits to the emergency room (ER); number of hospitalizations; and number of nights spent in a hospital during the past 6 months. Self-reported data for 200 subjects who were HMO members were validated against computer-

ized medical records. Self-reported outpatient physician visits including ER visits correlated well with visits recorded in the computerized medical record ( $r = 0.70$ ). For days in the hospital, medical records data correlated even more highly with patient self-report ( $r = 0.83$ ). Reporting discrepancies were similar over time, lessening concern that reporting errors of utilization biased study results.<sup>15</sup>

The self-efficacy measure combined two scales that had been developed and validated for the CDSMP.<sup>14</sup> The scale measures perceived adaptability to manage different aspects of chronic disease, such as pain and fatigue, and had a Cronbach's  $\alpha$  coefficient of 0.89.

The self-efficacy scale was increased in sensitivity after the first of 4 recruiting years. Hence, the number of participants who completed the revised self-efficacy scale is less than those who completed the other measures.

### Analysis

Using  $t$  tests, we tested for differences in baseline demographics, health status, utilization, and self-efficacy variables between those who were eligible for only 1 year and those who were eligible for 2 years. For three dichotomous variables (gender, non-Hispanic whites, and married), contingency tables ( $\chi^2$ ) were used.

Within each overlapping cohort (ie, all those eligible to complete 1 year, and all eligible to complete 2 years),  $t$  tests were used to compare the baseline characteristics of those completing the study with those of noncompleters. Matched-pair  $t$  tests were used to test for changes in health status, utilization, and self-efficacy between baseline and 1 or 2 years later.

We explored the extent to which initial levels and 6-month changes in self-efficacy predict subsequent health care utilization. To maintain sufficient statistical power, we performed a series of multiple regressions only for the 1-year data. To determine the effects of self-efficacy on outpatient utilization, we predicted 1-year levels of utilization as a function of both baseline levels of self-efficacy and changes in self-efficacy during the first 6 months controlling for baseline utilization. We controlled for age, gender, education, ethnicity (non-Hispanic white vs. others), and marital status (married or not).

TABLE 1. Distribution of Eligible Subjects

	Cohort, Eligible for . . .	
	1-Year (%)	2-Year (%)
Subjects enrolled	831	699
Complete data	683 (82)	533 (76)
Too ill to complete	44 (5)	60 (9)
Requested to leave study	6 (1)	8 (1)
Unknown (did not return questionnaire or subject not located)	98 (12)	98 (14)

Note: All numbers apply only to each column, but the cohorts are overlapping. There were also 18 people who died who would have been eligible for the 1-year cohort and 40 people who died would have been eligible for the 2-year cohort.

## Results

### Subjects

Table 1 shows the sample size and disposition of subjects. The two-nonoverlapping cohorts did not differ significantly at baseline in demographic characteristics, health status, or health care utilization.

Table 2 shows the comparison of the baseline characteristics of noncompleters (dropouts) to

those who completed questionnaires within each overlapping cohort, excluding subjects who died. Eighty-two percent ( $n = 683$ ) of the eligible subjects completed the 1-year study. Seventy-six percent ( $n = 533$ ) of the eligible subjects completed the 2-year study.

Noncompleters did not differ significantly from completers in baseline utilization or demographics except for education ( $P < 0.01$ ) in the 2-year cohort. Baseline self-efficacy was lower for noncompleters at year 1, but not year 2. For all health status variables, noncompleters had worse baseline scores than completers.

### Longitudinal Outcomes

Compared with their baseline status, participants showed significant reduction in health distress, increases in perceived self-efficacy, and made fewer visits to physicians/ERs at each follow-up period. Self-rated health and energy/fatigue were also marginally improved at the second-year assessment. An increase in disability was observed at 1 year. There were no significant changes in the other variables (Tables 3 and 4). It is interesting to note that there was no significant deterioration between 1 and 2 years.

TABLE 2. Baseline Scores for Completing and Non-Completing Subjects for Those Eligible at 1 and 2 Years

	Eligible for 1 Year		Eligible for 2 Years	
	Completers	Non-Completers	Completers	Non-Completers
N	683	148	533	166
Age (years)	65.3 (10.6)	63.7 (11.3)	64.8 (10.6)	64.9 (11.3)
Gender (% male)	34.6	33.8	31.5	36.1
Married (%)	55.8	50.0	54.0	51.2
Non-Hispanic White (%)	90.8	86.5	91.2	87.3
Education (years)	15.0 (2.9)	15.1 (3.3)	14.8 (2.9)	15.6 (3.2) <sup>†</sup>
MD & ER visits in past 6 months	5.86 (5.8)	5.95 (4.7)	5.65 (5.3)	5.89 (5.4)
Days in hospital in past 6 months	0.98 (3.7)	1.47 (5.9)	1.05 (4.1)	1.19 (4.9)
Times hospitalized in past 6 months	0.21 (0.61)	0.24 (0.60)	0.22 (0.64)	0.19 (0.56)
Self-rated health (1-5, ↓ = better)	3.33 (0.88)	3.57 (0.92) <sup>‡</sup>	3.28 (0.87)	3.45 (0.96)*
Disability (0-3, ↓ = better)	0.81 (0.59)	0.94 (0.66) <sup>†</sup>	0.80 (0.59)	0.94 (0.63)*
Social/role activity limitation (0-3, ↓ = better)	1.75 (1.1)	2.09 (1.1) <sup>†</sup>	1.72 (1.1)	1.99 (1.1) <sup>†</sup>
Energy/fatigue (0-5, ↑ = better)	2.19 (1.1)	1.86 (0.99) <sup>‡</sup>	2.20 (1.1)	2.01 (1.1)*
Health distress (0-5, ↓ = better)	2.06 (1.2)	2.44 (1.2) <sup>†</sup>	2.04 (1.2)	2.31 (1.2) <sup>†</sup>
Self-efficacy (1-10, ↑ = better)	6.03 (2.1)	5.20 (2.3) <sup>‡</sup>	6.03 (2.1)	5.61 (2.4)

Note: Numbers in table are mean (SD) unless otherwise indicated. This table does not include subjects who died.

\* $P < 0.05$ , <sup>†</sup> $P < 0.01$ , <sup>‡</sup> $P < 0.001$ .

TABLE 3. Baseline, 1-Year, and 1-Year Changes in Health Services Utilization, Health Status, and Self-Efficacy (Mean and SD)

	Baseline	1 Year	Change, Baseline to 1 Year	Significance <i>P</i> *
MD & ER visits (number of visits past 6 months)	5.86 (5.80)	5.17 (5.26)	-0.689 (6.51)	0.006
Times hospitalized (past 6 months)	0.205 (0.615)	0.194 (0.745)	-0.012 (0.914)	0.737
Days in hospital (past 6 months)	0.984 (3.69)	0.874 (3.15)	-0.111 (4.69)	0.535
Self-rated health (1-5, ↓ = better)	3.33 (0.875)	3.29 (0.901)	-0.031 (0.725)	0.268
Disability (0-3, ↓ = better)	0.810 (0.591)	0.845 (0.659)	0.035 (0.412)	0.025
Social/role activities limitations (0-4, ↓ = better)	1.75 (1.07)	1.75 (1.13)	0.0002 (0.986)	0.995
Energy/fatigue (0-5, ↑ = better)	2.19 (1.08)	2.24 (1.10)	0.045 (0.846)	0.165
Health distress (0-5, ↓ = better)	2.06 (1.18)	1.85 (1.14)	-0.199 (0.997)	0.0001
Self-efficacy manage chronic disease (1-10, ↑ = better)	6.03 (2.08)	6.32 (2.12)	0.310 (1.67)	0.0001

N = 683, N for Self-Efficacy = 430.

Fewer subjects received the self-efficacy questions (see text).

\*Matched pair *t* test for significance of change from baseline to 1 year.

### Self-Efficacy

Health care utilization (physician and ER visits combined) declined at 1 and 2 years. Therefore, we explored the relation between self-efficacy and outpatient utilization as previously described in the section on analysis. All analyses controlled for the baseline value of the dependent variable.

Reduced utilization at 1 year was associated with the higher the level of self-efficacy at baseline ( $P < 0.0001$ ) and the greater the 6-month improvement in self-efficacy ( $P = 0.0203$ ), the lower the health care utilization at 1 year

### Discussion

The findings of the study suggest that a low-cost 7-week self-management program reduces health distress and results in fewer outpatient visits. Of particular significance is the evidence that participants, who had a mean of 2.2 chronic conditions and increased disability, did not show deterioration in any other health state variables as one would otherwise expect during a 2-year period. Neither were there significant increases in number of hospitalizations or days in the hospital. These findings, of course, must be interpreted with caution because of possible drop out bias. Although there were few differences in baseline demographic characteristics and health care utilization variables, noncompleters

were somewhat worse off than completers on all health status variables. They also attended fewer sessions of the CDSMP than did the completers.

Of special significance is the evidence that, despite disease worsening in physical disability during the first year, the participants maintained or improved all other aspects of their health status and reduced outpatient utilization. Even in the face of increasing disability, their activity and role functions did not decline. We found a similar pattern in our previous study of arthritis self-management during a 4-year period.<sup>16</sup> Despite increased disability, patients' pain remained below baseline, their self-efficacy increased, and their outpatient visits declined substantially.

Because we lacked a control group, and to place the findings of this study in perspective, we examined longitudinal data from several studies of patients with similar chronic diseases who did not participate in an intervention. An 8-year study involving University of Pennsylvania alumni (with and without chronic conditions, mean age 74 at the end of the study) found that HAQ disability scores increased approximately 0.025 per year.<sup>17</sup> This yearly increase is similar to that found by Leveille et al<sup>18</sup> who studied an intervention (including the CDSMP) for chronically ill older adults in a Seattle senior center. The HAQ disability score increased by 0.03 during 1 year in the nonintervention control group in Leveille's study.<sup>18</sup> The increases in disability shown by the subjects in the present study (mean 0.02/y) are

TABLE 4. Baseline, 2-Year, and 2-Year Changes in Health Services Utilization, Health Status, and Self-Efficacy (Mean and SD)

	Baseline	2-Year	Change, Baseline to 2-Year	Significance P*
MD & ER visits (# of visits past 6 months)	5.65 (5.33)	5.09 (5.17)	-0.564 (6.22)	0.036
Times hospitalized (past 6 months)	0.215 (0.643)	0.250 (0.956)	0.034 (1.03)	0.45
Days in hospital (past 6 months)	1.05 (4.14)	1.31 (5.61)	0.256 (6.67)	0.377
Self-rated health (1-5, ↓ = better)	3.28 (0.870)	3.22 (0.956)	-0.060 (0.761)	0.068
Disability (0-3, ↓ = better)	0.803 (0.592)	0.826 (0.656)	0.026 (0.443)	0.178
Social/role activities limitations (0-4, ↓ = better)	1.72 (1.07)	1.69 (1.20)	-0.031 (1.12)	0.516
Energy/fatigue (0-5, ↑ = better)	2.20 (1.08)	2.28 (1.09)	0.077 (0.912)	0.054
Health distress (0-5, ↓ = better)	2.04 (1.15)	1.75 (1.15)	-0.290 (1.02)	0.0001
Self-efficacy manage chronic disease (1-10, ↑ = better)	6.03 (2.10)	6.25 (2.21)	0.270 (1.78)	0.009

N = 533, N for Self-Efficacy = 299.

Fewer subjects received the self-efficacy questions (see text).

\*Matched pair *t* test for significance of change from baseline to 2-years.

comparable to those observed in similar older, chronically ill populations.

Of further interest are the observed patterns of health care utilization. In the Leveille et al<sup>18</sup> study, the control subjects increased their combined emergency department and outpatient visits by 1.23 visits a year. If this were extrapolated to 2 years one might expect a 2.5 visit *increase* over baseline compared with the 2.5 total visit decrease during 2 years demonstrated by the CDSMP subjects. With regard to the role of self-efficacy in reducing health distress and health outpatient visits, both baseline and improvement in perceived self-efficacy were accompanied by 1-year reductions in health care utilization.

## Cost Implications

**Changes in Emergency Room and Physician Visits.** During each year, participants made fewer visits to ERs and physicians despite some increase in disability. The total reduction during 2 years was approximately 2.5 visits per participant. For cost estimates, we assumed that none of the reduced visits were ER visits and a Medicare reimbursement rate for a return visit was approximately \$40. Thus, at a minimum, the savings in reduced outpatient visits were \$100 per participant. In actuality, the savings were probably greater because this analysis assumes that without the CDSMP, visit

rates would have remained unchanged. However, evidence from other studies previously discussed, indicates that the visit rate would increase. In addition, Medicare reimbursement does not represent the actual cost of the visit, which is \$70 to \$90. Thus, the actual decreased visits and savings-per-visit is probably much higher than used in the above conservative estimate.

**Changes in Hospitalization.** The participants in this study, who served as control subjects in the original study, increased their hospital days by 0.34 days during their 6-month control period, whereas those who received the self-management program reduced their stays by 0.15 days for a total difference of 0.49 days during the first 6 months of the original study. Assuming that a day of hospitalization costs \$1,000, the reduction in hospitalization during the first 6 months can be extrapolated to 0.49 days which represents approximately \$490 less utilization per participant than at baseline. Hospitalization days remained below baseline levels during the second 6 months of this study and were not significantly increased at 2 years when compared with baseline.

**Costs Versus Savings.** In conservative terms, the two-year saving due to reduced hospital days and outpatient visits is approximately \$590 per participant (\$490 in hospitalization and \$100 in outpatient visits). The CDSMP costs between \$70 and \$200 per participant, depending on economies

of scale. Therefore, the actual 2-year savings per participant were between \$390 and \$520.

## Conclusion

The self-management program produced significant improvements in health distress and reductions in ambulatory health care utilization each year during a 2-year period. In addition, participants' perceived self-efficacy to manage their health conditions improved during 2 years. There was no significant deterioration in other aspects of health status except for disability which, when compared with other studies, appears to have increased at an expected rate. ER and outpatient visits declined significantly during 2 years, with no increase in hospitalizations or hospital days. Increased perceived self-efficacy was associated with future reductions in outpatient visits.

These results, combined with the earlier 6-month trial results, suggest that tertiary prevention applied to those with chronic diseases may be a low-cost means of improving elements of health status while reducing health care costs. The CDSMP is currently being implemented by many health care organizations in the United States as well as abroad. (For dissemination sites see [www.Stanford.edu/group/perc/](http://www.Stanford.edu/group/perc/))

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