

An Innovative Approach To Reducing Medical Care Utilization and Expenditures

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Abstract

In a retrospective study, we assessed the impact on medical utilization and expenditures of a multicomponent prevention program, the Maharishi Vedic Approach to HealthSM (MVAH). We compared archival data from Blue Cross/Blue Shield Iowa for MVAH (n = 693) with statewide norms for 1985 through 1995 (n = 600,000) and with a demographically matched control group (n = 4,148) for 1990, 1991, 1994, and 1995. We found that the 4-year total medical expenditures per person in the MVAH group were 59% and 57% lower than those in the norm and control groups, respectively; the 11-year mean was 63% lower than the norm. The MVAH group had lower utilization and expenditures across all age groups and for all disease categories. Hospital admission rates in the control group were 11.4 times higher than those in the MVAH group for cardiovascular disease, 3.3 times higher for cancer, and 6.7 times higher for mental health and substance abuse. The greatest savings were seen among MVAH patients older than age 45, who had 88% fewer total patient days compared with control patients. Our results confirm previous research supporting the effectiveness of MVAH for preventing disease. Our evaluation suggests that MVAH can be safely used as a cost-effective treatment regimen in the managed care setting.

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The United States spends more on medical services than any other country, yet among industrialized nations it has some of the worst health outcomes (eg, for life expectancy at birth, the United States ranks 20th for males and 18th for females).¹ Studies suggest that 50% of the deaths² and 70% of the diseases³ in the United States are caused by un-

healthy lifestyle habits, such as smoking, alcohol abuse, and improper diet. Managed care and government policy makers are faced with a quandary—trying to decrease medical costs caused mainly by lifestyle choices while maintaining personal freedom.

Unconventional medicine may help resolve this dilemma. A recent national survey found that one third of Americans choose a nonallopathic approach to treating common health problems.⁴ In addition, the National Institutes of Health has recommended studying existing groups that have been using natural medicine over a substantial period of time.⁵ Along these lines, our study focuses on the Maharishi Vedic Approach to HealthSM (MVAH),* a comprehensive program of natural medicine that implements Ayurveda according to the ancient texts. Developed by Maharishi Mahesh Yogi in collaboration with leading physicians, MVAH is a prevention-oriented system designed to maintain optimal health by restoring balance in the physiology.⁶⁻⁹ The MVAH system offers noninvasive diagnostic techniques and prescribes specific daily and seasonal behavioral and dietary routines to strengthen the immune system and the homeostatic mechanisms. It makes use of an extensive materia medica describing the therapeutic use of medicinal plants. It includes antioxidant strategies, mind-body integration strategies, and techniques for strengthening the immune, cardiovascular, and digestive systems. The MVAH emphasizes the role of the environment in maintaining optimal individual and social health and thus even includes systems of music, architecture, and city planning.¹⁰

The most widely researched MVAH methodology is the Transcendental Meditation[®] (TM[®]) program, which is highly effective for reducing stress and acti-

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vating the restorative mechanisms of the body.⁶⁻⁸ Orme-Johnson¹¹ provided direct evidence that the TM technique improves general health in a 5-year study of health insurance statistics for 2,000 practitioners. He reported that when compared with normative data or with demographically similar control subjects, persons practicing this technique used 50% fewer inpatient and outpatient medical services. Evidence also suggests that the TM technique reduces medical costs. Herron et al¹² evaluated the impact of TM practice on the medical expenses of 677 French Canadians and found that medical costs were decreased by 5% to 7% annually. Herron et al¹³ also reported that the TM technique was more cost-effective than medication in treating hypertension. Our current study extends this research to persons using other aspects of MVAH in addition to TM.

... METHODS ...

To analyze the impact of MVAH on medical utilization and expenditures, we compared data from persons using the MVAH program with those from a norm group and a control group. Data for the MVAH and control groups were obtained from archival health insurance annual reports provided by Blue Cross/Blue Shield of Iowa (BC/BS). Data for the norm group were obtained from BC/BS reports on statewide normative data. The BC/BS reports contained: (1) medical utilization data by inpatient/outpatient status and disease categories; and (2) aggregate amounts BC/BS paid annually for its clients' medical treatment during an 11-year period (1985 to 1995).

The MVAH group consisted of faculty and staff members of the Maharishi University of Management in Fairfield, Iowa, and their dependents. During the 11-year study period, the group size ranged from 417 persons in 1985 to 701 in 1995. The university population participates in many of the modalities of MVAH, which include twice-daily practice of the TM and TM-Sidhi program (an advanced aspect of the TM program), daily yoga and breathing exercises, herbal dietary supplements, and recommendations for diet and daily routine specific to the season and the individual's health needs. In addition, two to three times a year many persons participate in an extensive physiologic purification program.⁶⁻⁸

The norm group consisted of approximately 600,000 Iowans enrolled in BC/BS. Data from this group for all 11 years (1985 to 1995) were compared with those for the MVAH group to assess consistency and reliability of the results.

To control for education level and profession, aggregate data on faculty members and their covered dependents from 18 other private colleges in Iowa for 1990 and 1991 and from 12 private colleges for 1994 and 1995 were supplied by Blue Cross/Blue Shield of Iowa Actuarial Services. We obtained only 4 years of data for the control group because of budgetary constraints and lack of available data for some years. These four years were representative of both the MVAH and the norm groups. The control group size was approximately 5,000 persons in 1990 and 1991, 3,282 in 1994, and 3,311 in 1995, with a mean aggregate group size of 4,148 for the 4 years. The mean size of the MVAH group during these 4 years was 693 persons.

The mean age, sex, median coinsurance levels, and median deductible amounts were similar for all three groups (Table 1). However, because the available age distributions were somewhat different, we adjusted the data to control for this difference.

Table 1. Characteristics of the Norm, Control, and Maharishi Vedic Approach to Health (MVAH) Groups

	Norm	Control	MVAH
Mean Age (yr)	32.5	34.9	34.0
Percent Female	51.4	53.7	50.5
Coinsurance*	80/20	90/10	90/10
Deductible*	\$100	\$100	\$50
Age Distribution†			
<20	32%	26%	27%
20-34	21%	19%	5%
35-44	19%	21%	36%
45-54	14%	19%	29%
55-64	11%	12%	3%
65+	3%	3%	1%
Total	100%	100%	100%

*Median.

†Mean of 1994 and 1995.

Adjustment for Age Distribution

Rates of medical utilization and expenditures were available for all three groups in each of six different age categories (<20, 20-34, 35-44, 45-54, 55-64, 65+) for 1994 and 1995. The utilization for the control and norm groups for each outcome (eg, inpatient days per 1,000 persons, outpatient days per 1,000 persons, and hospital expenditures per person) was adjusted to reflect the age distribution of the MVAH

group shown in Table 1. We used the following formula to adjust data from the norm and control groups: $X_i = \sum p_j r_j$, where X_i is the age-adjusted utilization summed across all age categories for each medical outcome measure i for the norm or control groups, p_j is the proportion of persons in the MVAH group for age category j , and r_j is the outcome measure for the norm or control groups for each age category j . This adjustment was made for both 1994 and 1995, then applied to the remaining years of the study.

Because the number of persons in the MVAH group was too small to make meaningful comparisons in each of the age categories, we analyzed the data in two broad age categories, <45 and 45+. This gave the MVAH group a mean of 476 persons in the <45 category and 226 in the 45+ category. There were more than 1,000 persons in each category in the norm and control groups. The data in these two broad age categories were age-adjusted according to the formula described above.

Age adjustments were estimated for the years for which breakdowns by age distribution were unavailable (ie, 1985-1990, 1992, and 1993 for the norm group; 1990 and 1991 for the control group) by using the mean age-adjustment factors from 1994 and 1995. This procedure had the effect of decreasing the norm and control groups, respectively, by 15% and 17.8% for patient days per 1,000 persons, by 3.4% and 0.6% for outpatient visits per 1,000 persons, and by 9.9% and 13.2% for hospital expenditures per person. These age adjustments could be expected to provide reasonable estimates because the age distributions of all three groups were stable over the 11-year period of the study.

Type of Medical Services

We compared the MVAH group with the control and norm groups according to four types of service:

surgical, medical, obstetric, and mental health and substance abuse. These data were available for 4 years (1990, 1991, 1994, and 1995). The age-adjustment factors for total utilization and expenditures were applied to the medical, surgical, and mental health and substance abuse categories. Obstetric utilization was not age adjusted because all groups had approximately the same percentage of women aged 20 to 44 years.

Diagnostic Categories

We also analyzed data by 18 disease categories organized by organ systems. This is the standard reporting procedure used by BC/BS. Mean hospital admissions per 1,000 persons for all available years are reported, which includes 8 years of data for the MVAH group (1985-1989, 1991, 1994, 1995), 7 years of data for the norm group (1985-1989, 1994, 1995), and 3 years of data for control group (1991, 1994, 1995). Data are missing because some years BC/BS did not report the data by diagnostic category. Some of the recent missing data were provided by special request, but data from other years were unavailable. Since the number of persons in the MVAH group was relatively small, all available years of data were used to maximize the reliability of the results.

Age adjustment for data in each diagnostic category was made by applying the global correction to all categories; this procedure reduced the observed admissions per 1,000 persons by 15.8% in the norm group and 13.3% in the control group.

... RESULTS ...

Across all age categories, the MVAH group had fewer patient days per 1,000 persons and less inpatient and outpatient expenditures per 1,000 persons; this was also true for the two broad age categories of <45 and 45+ years. For persons younger than age 45,

Table 2. Mean Annual Age-Adjusted Hospital Inpatient and Outpatient Utilization and Expenditures by Age for the Norm, Control, and Maharishi Vedic Approach to Health (MVAH) Groups for 1994 and 1995

		Norm	Control	MVAH	% Diff. (MVAH vs Norm)	% Diff. (MVAH vs Control)	Ratio (Norm/ MVAH)	Ratio (Control/ MVAH)
Hospital Patient Days/1,000	<45	197	176	109	-45	-38	1.8	1.6
	45+	350	271	33	-91	-88	10.6	8.2
	Total	246	205	86	-65	-58	2.9	2.4
Outpatient Visits/1,000	<45	414	498	196	-53	-61	2.1	2.5
	45+	554	516	234	-58	-55	2.4	2.2
	Total	459	505	207	-55	-59	2.2	2.4
Hospital Expenditures/Person*	<45	434	459	183	-58	-60	2.4	2.5
	45+	822	661	104	-87	-84	7.9	6.4

*Hospital expenditures are inpatient plus outpatient hospital expenditures, in 1995 dollars.

the hospital patient days per 1,000 persons in the MVAH group were 45% and 38% lower than that in the norm and control groups, respectively (Table 2). Among persons age 45 or older, hospital patient days per 1,000 persons in the MVAH group were 91% and 88% lower than that in the norm and control groups,

respectively (Table 2). Outpatient visits per 1,000 persons were 53% and 61% lower in the MVAH group than in the norm and control groups, respectively, for persons younger than age 45 and 58% and 55% lower for persons age 45 or older (Table 2). Hospital inpatient and outpatient expenditures were 58% and 60%

Table 3. Yearly Rates of Hospital Patient Days, Outpatient Hospital Visits, Total Medical Expenditures, Percent Differences, and Ratios for the Norm, Control, and Maharishi Vedic Approach to Health (MVAH) Groups

	Year	Norm*	Control*	MVAH*	% Diff † (MVAH vs Norm)	% Diff † (MVAH vs Control)	Ratio† (Norm/ MVAH)	Ratio† (Control/ MVAH)
Hospital Patient Days/1,000	1985	471	—	108	-73	—	3.7	—
	1986	455	—	118	-69	—	3.3	—
	1987	463	—	103	-74	—	3.8	—
	1988	475	—	54	-87	—	7.5	—
	1989	472	—	85	-79	—	4.7	—
	1990	465	509	125	-68	-70	3.2	3.3
	1991	402	416	84	-75	-75	4.1	4.1
	1992	381	—	57	-82	—	5.7	—
	1993	339	—	103	-64	—	2.8	—
	1994	302	258	104	-59	-51	2.5	2.0
	1995	277	241	68	-71	-66	3.5	2.9
	Mean '85-95	409	—	92	-74	—	3.8	—
	Mean '90, 91, 94, 95	362	356	95	-69	-67	3.2	3.1
Outpatient Visits/1,000	1985	309	—	113	-62	—	2.6	—
	1986	321	—	120	-61	—	2.6	—
	1987	342	—	163	-51	—	2.0	—
	1988	381	—	204	-45	—	1.8	—
	1989	412	—	194	-51	—	2.1	—
	1990	465	331	184	-59	-44	2.4	1.8
	1991	460	374	178	-60	-52	2.5	2.1
	1992	476	—	221	-52	—	2.1	—
	1993	471	—	219	-52	—	2.1	—
	1994	480	497	200	-57	-60	2.3	2.5
	1995	471	518	214	-53	-58	2.1	2.4
	Mean '85-95	417	—	182.7	-55	—	2.2	—
	Mean '90, 91, 94, 95	469	430	194.0	-57	-55	2.3	2.2
Total Medical Expenditures per Person (1995 Dollars)‡	1985	1,898	—	527	-69	—	3.2	—
	1986	1,593	—	561	-61	—	2.6	—
	1987	1,500	—	491	-64	—	2.8	—
	1988	1,577	—	434	-69	—	3.3	—
	1989	1,601	—	503	-65	—	2.9	—
	1990	1,673	1,651	614	-59	-57	2.5	2.3
	1991	1,558	1,497	570	-59	-56	2.5	2.3
	1992	1,582	—	513	-64	—	2.8	—
	1993	1,552	—	565	-60	—	2.5	—
	1994	1,537	1,557	610	-56	-55	2.3	2.2
	1995	1,533	1,588	533	-61	-61	2.6	2.6
	Mean '85-95	1,600	—	538	-63	—	2.7	—
	Mean '90, 91, 94, 95	1,575	1,573	582	-59	-57	2.4	2.3

*These data are the observed values, not adjusted for age. Control group data were available only for 1990, 1991, 1994, and 1995.

†These percentages were age adjusted to provide a conservative estimate.

‡Total expenditures are the total of all Blue Cross/Blue Shield charges, including inpatient and outpatient hospital charges, physicians' fees, procedures, x-ray films, laboratory work, etc.

lower in the MVAH group than in the control and norm groups for persons younger than age 45 and 87% and 84% lower for persons age 45 or older.

Four- and 11-Year Comparisons

As shown in Table 3, the results were consistent across all years. Using the sign test, under the null hypothesis of no difference between the groups each year, the two-tailed probability of observing lower levels for all 11 years is 2×0.5^{11} or $P = 0.001$.

Hospital Admissions and Length of Stay

The lower number of patient days per 1,000 persons in the MVAH group resulted from a combination of both a lower hospital admission rate and fewer days spent in the hospital. The age-adjusted 11-year mean hospital admissions per 1,000 persons was 57% less in the MVAH group compared with the norm group (29 versus 68). The 11-year mean length of stay in the hospital was 3.2 days in the MVAH group compared with 5.1 days in the norm group. For the 4 years of comparison with the control group, the age-adjusted mean admissions per 1,000 persons were 63 for the norm group, 59 for the control group, and 27 for the MVAH group. The mean length of stay was 4.8 days for the norm group, 5.0 for control group, and 3.6 for the MVAH group. Compared with the MVAH group, the rates of hospital admissions for the norm and control groups were 2.4 and 2.2 times higher, respectively.

Professional services, including physician consultations, laboratory work, x-ray films, pharmacy services, ambulance, and medical equipment, for the MVAH group were consistently lower than those for the norm and control groups for all years.

Pathologic Versus Obstetric Utilization

To distinguish pathologic from non-pathologic use of the hospital, use for diseases was separated from use for normal childbirth. The age-adjusted 11-year mean patient days per 1,000 persons for diseases (non-obstetric) was 80% lower in the MVAH group than in the norm group.

The mean rate of childbirth over the 11-year period from 1985 to 1995 for the MVAH group was

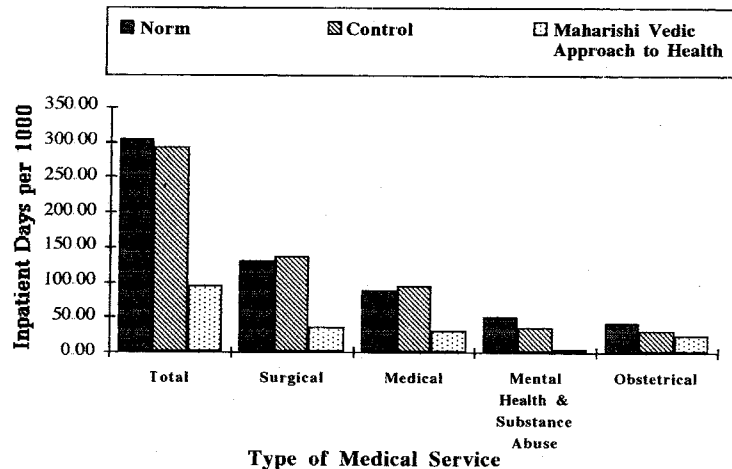


Figure 1. Age adjusted hospital inpatient utilization by type of service for statewide normative data (Norm), the Control group of other colleges in Iowa, and the Maharishi Vedic Approach to Health group (means of four years—1990, 1991, 1994, 1995)

slightly but not significantly lower than that for the norm group: 14.5 births per year in the MVAH group compared with 15.6 in the norm group. Persons in the MVAH group spent a mean of 2.2 days in the hospital for childbirth compared with 3.1 days for the norm group.

For the 4 years of comparison with the control group, hospital admissions per 1,000 persons for childbirth were 14.8 for the norm group, 12.5 for the control group, and 11.0 for the MVAH group. For the MVAH group, only 74% of the hospital patient days were for illness, compared with 91% for the control group and 88% for the norm group.

Utilization by Type of Service

For all types of medical services, the MVAH group had fewer patient days per 1,000 persons than did the control and norm groups (Figure 1). Patient days per 1,000 persons in the MVAH group were 91% and 86% lower than in the norm and control groups, respectively, for mental health and substance abuse, 72% and 74% lower for surgical, 66% and 68% lower for medical, and 42% and 22% lower for obstetric.

Outpatient hospital visits per 1,000 persons in the MVAH group were 94% and 95% lower for mental health and substance abuse, 50% and 54% lower for surgical, 59% and 54% lower for medical, and 10% and 10% lower for obstetric services compared with the norm and control groups, respectively. Moreover, total inpatient and outpatient hospital expenditures in the MVAH group were 92% and 89% lower for mental

health and substance abuse, 69% and 71% lower for surgical, 51% and 49% lower for medical, 42% and 21% lower for obstetric, and 57% and 51% lower for x-ray film and laboratory work compared with the norm and control groups, respectively.

Diagnostic Categories of Disease

The different diagnostic categories, ranked in descending order by their normative expense, are shown in Table 4. Hospital admission rates in the MVAH group were lower than those in the norm group for all disease categories and lower than those in the control group in 16 of the 17 categories. Using the sign test, under the null hypothesis of no difference between the groups for each disease, the two-tailed probability of observing lower levels for all 17 diseases is $P = 0.000015$, and the probability of 16 out of 17 is $P = 0.0002$. In the one category (blood/spleen) in which admissions were lower in the control group than the MVAH group, the difference was not substantial (0.08 fewer admissions per 1,000 persons). This was the smallest absolute difference of all disease categories.

The category with the highest normative costs was heart/vessel, which includes hypertension, coronary heart disease, heart attack, stroke, aneurysm, angina, and heart failure. Cardiovascular diseases are expensive because of their high prevalence and high charges per admission. Age-adjusted admissions per 1,000 persons for heart/vessel in the norm and control groups were 10.7 and 11.4 times higher, respectively, compared with the MVAH group.

Admissions per 1,000 persons for diseases of the digestive system, the second most expensive category, were 2.8 times higher in the norm group and 1.9 times higher in the control group compared with the MVAH group.

The third most expensive category is benign/cancerous tumors, which includes non-tumorous cancers such as leukemia, lymphoma, and Hodgkin's disease. Admissions per 1,000 persons were 3.3 times higher in both the norm and control groups, compared with the MVAH group. Admissions per 1,000 persons for injuries/poisonings, the fourth most expensive category, were 3.1 and 1.7 times higher in the norm and

Table 4. Hospital Admissions by Treatment Category for the Norm, Control, and Maharishi Vedic Approach to Health (MVAH) Groups

Treatment Categories	Normative Costs per 1,000*	Hospital Admissions/1,000			Ratio† (Norm/MVAH)	Ratio† (Control/MVAH)	% Diff (MVAH vs Norm)	% Diff ‡ (TM only vs Norm)
		Norm	Control	MVAH				
Heart/Vessel	\$96,223	8.41	8.70	0.66	10.69	11.40	-92	-87
Digestive	\$56,924	8.93	6.00	2.73	2.76	1.91	-69	-49
Benign/Cancerous Tumors	\$53,727	4.93	4.90	1.28	3.25	3.34	-74	-55
Injuries/Poisonings	\$48,216	6.30	3.40	1.70	3.12	1.74	-73	-63
Mental Health & Substance Abuse	\$43,956	5.41	3.30	0.43	10.63	6.68	-92	-31
Bones/Muscles/Ligaments	\$37,864	4.54	4.20	0.25	15.28	14.58	-94	-68
Nose/Throat/Lung	\$36,698	7.98	4.30	0.88	7.68	4.26	-89	-73
Genital/Urinary	\$34,136	5.92	5.70	3.41	1.46	1.45	-42	-37
Symptoms with Unknown Cause	\$19,366	4.23	2.20	0.68	5.27	2.83	-84	-76
Nerves/Eyes/Ears	\$14,274	2.18	1.40	0.53	3.50	2.31	-76	-87
Other	\$12,131	1.67	0.40	0.00	—	—	-100	-91
Virus/Bacterial Infections	\$11,365	1.83	1.80	0.13	12.31	12.50	-93	-30
Glands/Metabolism/Immune System	\$10,894	1.65	2.10	0.13	11.12	14.58	-92	-65
Birth Defects	\$9,071	0.89	1.10	0.00	—	—	-100	-51
Perinatal	\$8,131	0.41	0.60	0.13	2.74	4.17	-69	-65
Skin/Nails/Hair	\$5,253	0.88	0.60	0.13	5.96	4.17	-86	-80
Blood/Spleen	\$4,191	0.47	0.20	0.28	1.43	0.63	-41	-33
Total	\$502,419	66.63	50.90	13.30	4.22	3.32	-80	-67

*Normative costs/1,000 are in 1995 dollars. They are the statewide normative hospital costs from Blue Cross of Iowa for all available data, which was for 1985-1989, 1994, and 1995.

†Age adjusted.

‡Data on transcendental meditation (TM)-only subjects from previous study of 2,000 meditators over 5 years.¹¹

control groups, respectively, than in the MVAH group.

The fifth most expensive category is mental health and substance abuse, which includes all mental and behavioral disorders, alcohol abuse, and drug abuse. Admissions per 1,000 persons were 10.6 times higher in the norm group and 6.7 times higher in the control group compared with the MVAH group.

The last two columns in Table 4 compare data from the MVAH group with that from a TM-only group from a previous study.¹¹ Hospital admission rates were lower in the MVAH group than the TM-only group in 16 of the 17 diagnostic categories. In particular, admissions per 1,000 persons for infectious diseases were 93% lower in the MVAH group compared with the norm group but only 30% lower in the TM-only group compared with the norm group. Total hospital admissions per 1,000 persons for disease were 80% lower in the MVAH group but only 67% lower in the TM-only group compared with the norm group.

... DISCUSSION AND CONCLUSION ...

The rates of medical utilization and expenditures in the MVAH group were substantially lower than those for the control and norm groups over all years, on all outcome measures, in all age groups, and for all disease categories. The greatest reductions in medical utilization and expenditures were seen for hospitalizations and among older persons in the MVAH group. For example, the MVAH group spent 58% and 65% fewer days in the hospital compared with the control group and norm groups, respectively. For persons age 45 or older, the number of hospital days in the MVAH group was 88% and 91% lower than that in the control and norm groups, respectively. These results are consistent with previous research suggesting the substantial impact of the TM program on aging, as indicated by lower biologic age,^{14,15} lower blood pressure,^{16,17} and improved mental health, physical health status, and longevity.¹⁷

A similar pattern of relatively greater benefit for older persons was found in previous research on health insurance statistics for a group practicing the TM program without other aspects of MVAH.¹¹ In our current study, patient days per 1,000 persons for those age 45+ in the MVAH group were 91% lower than that for the norm group, compared with 68% lower for persons in the TM program in the previous study. In addition, compared with the previous TM-only study, MVAH produced greater reductions in hospital admission rates compared with the norm group in 16 of 17 disease categories. Thus the other strategies in-

cluded in MVAH, in addition to the TM program, may have an impact in reducing hospitalization for serious illnesses.

We controlled for a number of factors that influence medical utilization. All groups had similar sex distributions, deductibles, and coinsurance levels; all were from the same geographic location (Iowa). The patients' being in the same geographic location controlled for local patterns of medical practice, cost structure, and climatic influences on health. Since all groups were covered by the same carrier, Blue Cross/Blue Shield of Iowa, they all had the same limits on what the carrier would pay for specific services. The fairly low deductible amounts and coinsurance levels of the MVAH group would tend to encourage medical utilization rather than discourage it. In addition, we controlled for long-term trends in medical utilization and costs by making comparisons among groups over the same years.

The use of archival insurance data ensured objectivity and accuracy and provided a 100% response rate. Education level and profession were controlled by comparing the MVAH university population with a control group from colleges in the same state. Our overall conclusions were not changed when the control and norm groups were age adjusted to be equivalent to that of the MVAH group.

The effect of MVAH was not merely a shift from inpatient to outpatient utilization, because outpatient utilization was also reduced by more than 50%. The results do not appear to be due to an attitude bias against conventional medicine, because non-pathologic (obstetric) utilization was normal in the MVAH group. The reduction in conventional medical utilization apparently does not represent a shift to alternative medicine, which is not covered by Blue Cross/Blue Shield. Alternative medicine is used to supplement conventional medicine, not replace it.⁴ Alternative medicine generally is used for minor, chronic health problems, such as headaches, insomnia, chronic pain, and general stress⁴; we found reductions for all major diseases, not only minor problems. The MVAH system was used by the experimental group primarily as a prevention program, not as a substitute for conventional medicine.

One important factor not controlled for was consumption of drugs, alcohol, and tobacco, because the MVAH group is virtually drug, alcohol, and tobacco free, whereas the control group was not. This non-equivalence of the control group could be viewed as a confounding factor. However, a wide range of evidence suggests that TM practice reduces drug, alcohol, and tobacco consumption. Even though TM

requires no change in lifestyle, six randomized studies and meta-analyses indicate that it reduces substance abuse.¹⁸ In addition, evidence suggests that the TM program normalizes abnormal neuroendocrine mechanisms responsible for substance abuse.¹⁹ These studies indicate that reduced substance abuse in the MVAH group is not a confounding factor but rather is a factor that mediates the observed reductions in medical utilization and expenditures. It appears that TM practice, and perhaps other aspects of MVAH, reduce the use of drugs, alcohol, and tobacco, and that these reductions contribute to improved health.

Other meta-analyses have shown that the TM program is highly effective in decreasing trait anxiety²⁰ and increasing global mental health (self-actualization).²¹ This suggests that the low rates of medical utilization for mental health and substance abuse observed in the MVAH group are a result of TM rather than self-selection. The estimated combined impact on all-cause mortality of eliminating consumption of alcohol and tobacco is approximately 25%,² far less than the effects observed in our study.

Another difference between the MVAH and control groups is diet. The MVAH system advises against eating red meat, and most persons in the MVAH group follow a lactovegetarian diet. The effects of a vegetarian diet on health do not appear to be as broad as those found in our study.²² The magnitude of the effect of a vegetarian diet on medical utilization is generally much less, between 15% and 20%,²³⁻²⁵ than that found in our study. One large study²⁵ illustrating the specific effects of a vegetarian diet found an 18% reduction in total mortality in male vegetarians but no significant effect in female vegetarians compared with the general population. In addition, the researchers found that the reduced mortality in men was almost entirely due to a decreased incidence of cardiovascular disease.

Studies of Seventh-Day Adventists provide a comparison for the MVAH group for the combination of vegetarian diet and abstinence from tobacco, alcohol, and drugs. Although direct comparisons of Seventh-Day Adventists with our MVAH group are tentative without controlling for demographic and measurement factors, the annual rates of surgeries and hospitalization reported in the literature for vegetarian, non-smoking, and non-alcohol-consuming Seventh-Day Adventists are more than twice as high as for the MVAH group.²⁵

The MVAH program emphasizes true primary prevention through health promotion and early detection and correction of imbalances before they progress to disease.⁶⁻⁸ The herbal compounds prescribed by the MVAH system exhibit antioxidant, cardioprotective,

antineoplastic, immunomodulatory, and neurophysiologic effects. These herbal preparations also decrease the toxic effects of chemotherapy and toluene. The physiologic purification programs of MVAH have been shown to reduce cardiovascular risk factors and improve overall physical and mental well-being.⁸

These studies suggest that the TM program induces a psychophysiological balance. In a balanced psychophysiology, lifestyles spontaneously become health-supporting, instead of life-damaging.^{26,27} A meta-analysis of 32 studies²⁸ found that the TM technique reduces somatic arousal to a greater extent than ordinary rest, providing the optimal condition for the body's homeostatic mechanisms to reduce stress and restore balance. This meta-analysis also found that outside of meditation, meditators have lower resting levels of heart rate, respiration rate, and plasma lactate, as well as greater autonomic stability than control subjects, indicating greater baseline efficiency. From this deeply rested, stable baseline the autonomic system responds to challenges more rapidly and fully, and recovers more quickly afterward.²⁹ The many health-related effects of the TM program can be seen as a direct result of the reduction in stress that takes place during meditation. Studies show decreased anxiety,²⁰ normalization of neuroendocrine processes,¹⁹ decreased hypertension^{16,17} and hypercholesterolemia,³⁰ increased exercise tolerance in patients with angina pectoris,³¹ and general improvements in health.^{11,32} Because of increased systemic balance, the individual becomes better able to make healthy lifestyle choices, as indicated by decreased drug, alcohol, and tobacco consumption^{18,33} and more healthful dietary preferences.

However, because the MVAH group are all faculty, staff, and family members of Maharishi University of Management, they represent a committed group of TM practitioners. Research has demonstrated the importance of social support for promoting health.³⁴⁻³⁶ Would the results be as robust in a sample of MVAH participants scattered in the general community or in samples randomly assigned to the MVAH program? Randomized trials and meta-analyses on components of the MVAH program suggest that the results are robust. However, the effects of the MVAH program as a whole on the general population are a question for further research.

If this system of medicine is to be relevant to managed care, the American public must be open to trying it. A national survey found that 82% of Americans polled specifically about MVAH expressed interest in the TM technique and MVAH if these methods were shown to be effective and could help cut insur-

ance costs; 56.5% of those surveyed wanted more information to improve public awareness, 47.9% wanted to see more funding and research to better understand the techniques, and 42.3% wanted to include reimbursement for these techniques in Medicare, Medicaid, and private health plans.³⁷ In addition, more than 2 million Americans have learned the TM technique. Thus the American public appears to be interested in MVAH, which our study, together with previous research, indicates is an effective means of preventive medicine.

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... REFERENCES ...

1. Schieber GJ, Poullier J-P, Greenwald LM. Health systems performance in OECD countries, 1980-1992. *Health Aff* 1994;3:100-112.
2. McGinnis J, Foege W. Actual causes of death in the United States. *JAMA* 1993;270:2207-2212.
3. US Department of Health and Human Services. *Healthy People 2000: National Health Promotion and Disease Prevention Objectives*. DHHS Publication No. (PHS) 91-50212. Washington, DC: Government Printing Office; 1991.
4. Eisenberg DM, Kesler R, Foster C, et al. Unconventional medicine in the United States: Prevalence, cost, and patterns of use. *N Engl J Med* 1993;328:246-252.
5. NIH Workshop on Alternative Medicine. *Alternative Medicine: Expanding Medical Horizons. A Report to the National Institutes of Health on Alternative Medical Systems and Practices in the United States*. Chantilly, VA: Government Printing Office; 1992.
6. Sharma H. Maharishi Ayur-Veda. In: Micozzi MS, ed. *Fundamentals of Complementary and Alternative Medicine*. New York, NY: Churchill Livingstone; 1996:243-257.
7. Sharma H. Maharishi Ayur-Veda: An ancient program in a modern world. *Alternat Complement Ther* 1995;1:364-372.
8. Sharma H, Alexander CN. Maharishi Ayur-Veda: Research review, part I. *Complement Med Int* 1996;3(1):20-28.
9. Sharma H, Alexander CN. Maharishi Ayur-Veda: Research review, part II. *Complement Med Int* 1996;3(2):16-28.
10. Nader T. *Human Physiology—Expression of the Veda and the Vedic Literature: Modern Science and Ancient Vedic Science Discover the Fabrics of Immortality in the Human Physiology*. Vlodrop, Netherlands: Maharishi Vedic University Press; 1995.
11. Orme-Johnson DW. Medical care utilization and the transcendental meditation program. *Psychosom Med* 1987;49:493-507.
12. Herron RE, Hillis SL, Mandarino JV, Orme-Johnson DW, Walton KG. The impact of the transcendental meditation program on government payments to physicians in Quebec. *Am J Health Promot* 1996;10:208-216.
13. Herron RE, Schneider RH, Mandarino JV, Alexander CN, Walton KG. Cost-effective hypertension management: Comparison of drug therapies with an alternative program. *Am J Man Care* 1996;2:427-437.
14. Wallace RK, Dillbeck M, Jacobe E, Harrington B. The effects of the transcendental meditation and TM-Sidhi program on the aging process. *Int J Neurosci* 1982;16:53-58.
15. Glaser JL, Brind JL, Vogelmann JH, et al. Elevated serum dehydroepiandrosterone sulfate levels in practitioners of the transcendental meditation (TM) and TM-Sidhi program. *J Behav Med* 1992;15:327-341.
16. Schneider RH, Staggers F, Alexander CN, et al. A randomized controlled trial of stress reduction for hypertension in older African Americans. *Hypertension* 1995;26:820-827.
17. Alexander CN, Langer EJ, Newman RI, Chandler HM, Davies JL. Transcendental meditation, mindfulness, and longevity: An experimental study with the elderly. *J Pers Soc Psychol* 1989;57:950-964.
18. Alexander CN, Robinson P, Rainforth M. Treating and preventing alcohol, nicotine, and drug abuse through transcendental meditation: A review and statistical meta-analysis. *Alcohol Treat Q* 1994;11:13-87.
19. Walton KG, Levitsky D. A neuroendocrine mechanism for the reduction of drug use and addictions by transcendental meditation. *Alcohol Treat Q* 1994;11:89-117.
20. Eppley KR, Abrams A, Shear J. Differential effects of relaxation techniques on trait anxiety: A meta-analysis. *J Clin Psychol* 1989;45:957-974.
21. Alexander CN, Rainforth MV, Gelderloos P. Transcendental meditation, self-actualization, & psychological health: A conceptual overview & statistical meta-analysis. *J Soc Behav Pers* 1991;6:189-247.
22. Dwyer JT. Health aspects of vegetarian diets. *Am J Clin Nutr* 1988;48:712-738.
23. Thorogood M, Mann J, Appley P, McPherson K. Risk of death from cancer and ischaemic heart disease in meat and non-meat eaters. *Br Med J* 1995;308:1667-1671.
24. Knutsen SF. Lifestyle and the use of health services. *Am J Clin Nutr* 1994;59(suppl):1171S-1175S.
25. Fønnebo V. The healthy Seventh-Day Adventist lifestyle: What is the Norwegian experience? *Am J Clin Nutr* 1994;59(suppl):1124S-1129S.
26. Wallace RK. Physiological effects of transcendental meditation. *Science* 1970;167:1751-1754.
27. Wallace RK. *The Neurophysiology of Enlightenment*. Fairfield, IA: MIU Press; 1986.
28. Dillbeck MC, Orme-Johnson DW. Physiological differences between transcendental meditation and rest. *Am Psychol* 1987;42:879-881.
29. Orme-Johnson DW. Autonomic stability and transcendental meditation. *Psychosom Med*. 1973;35:341-349.
30. Cooper MJ, Aygen MM. Transcendental meditation in the management of hypercholesterolemia. *J Human Stress* 1979;5:24-27.
31. Zammara JW, Schneider RH, Besseghini I, et al. Usefulness of the transcendental meditation program in the treatment of patients with coronary artery disease. *Am J Cardiol* 1996;77:867-870.
32. Alexander CN, Robinson P, Orme-Johnson DW, Schneider R, Walton K. The effects of transcendental medi-

tation compared to other methods of relaxation and meditation in reducing risk factors, morbidity, and mortality. *Homeostasis* 1993;35:243-264.

33. O'Connell DF, Alexander CN, eds. *Self-Recovery: Treating Addictions Using Transcendental Meditation and Maharishi Ayur-Veda*. New York, NY: Hawthorne Press; 1994.

34. Breslow L. Social ecological strategies for promoting healthy lifestyles. *Am J Health Promot* 1996;10:253-257.

35. Stokols D, Allen J, Bellingham RL. The social ecology of health promotion: Implications for research and practice. *Am J Health Promot* 1996;10:247-251.

36. Eriksen W. The role of social support in the pathogenesis of coronary heart disease. A literature review. *Fam Pract* 1994;11:201-209.

37. *Alternative Treatments*. Edison, NJ: Bruskin and Goldring Research; 1992.