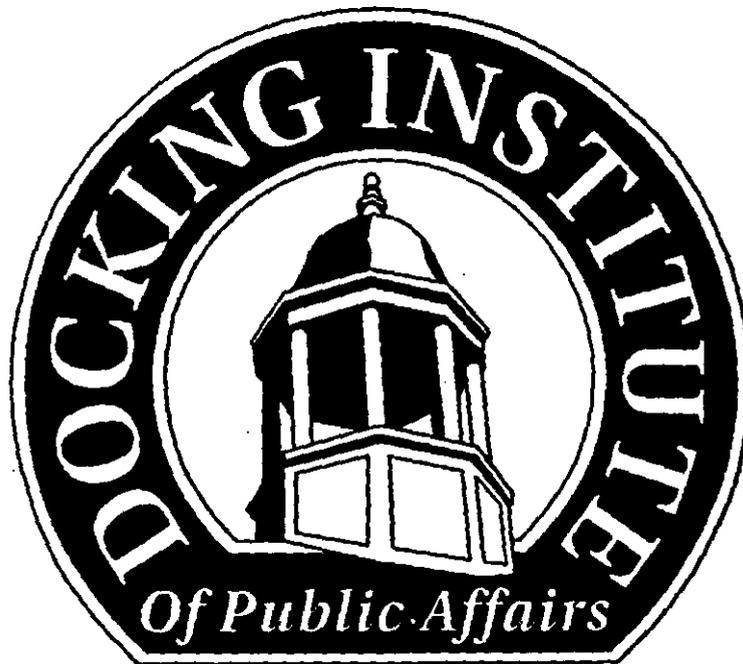


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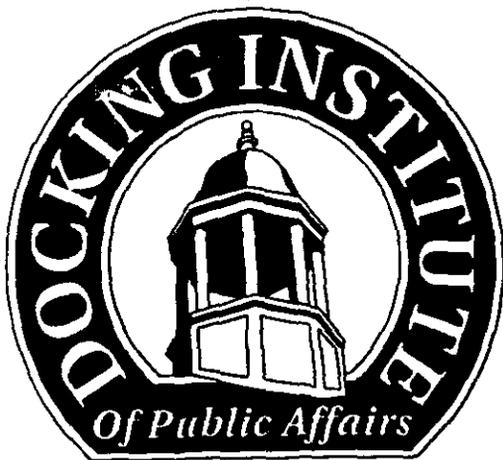
**Evaluation Study of the Hays Medical
Center Vital Signs In-Home Tele-Monitoring
System Intervention for Chronic Obstructive
Pulmonary Disease and Congestive Heart
Failure Patients**



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Hays, Kansas 67601**

**This evaluation study was funded by U.S. Department of Commerce
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The staff of the Docking Institute of Public Affairs and its University Center for Survey Research are dedicated to serving the people of Kansas and surrounding states.

If you have questions or comments, and/or need assistance, please do not hesitate to contact our staff.

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Evaluation Study of the Hays Medical Center Vital Signs In-Home Tele-Monitoring System Intervention for Chronic Obstructive Pulmonary Disease and Congestive Heart Failure Patients

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Executive Summary

The Docking Institute of Public Affairs conducted a multi-method evaluation research study of an NTIA funded telemedicine project. The project's primary goal was to test the effectiveness of a new technology configuration and application to reduce post-hospital complications and readmissions of recently dismissed, high-risk hospital patients. For this project, high-risk patients are those with chronic pulmonary obstructive disease and/or congestive heart failure (COPD/CHF). The patients chosen for the study were judged "moderately" ill. That is, patients with "mild" or "severe" COPD/CHF were excluded from the study. The general health pattern for patients with chronic obstructive pulmonary disease (COPD/CHF) is that there is an overall decline in health as the disease progresses. Patients being treated for this condition and living within a twenty-mile radius of a regional hospital in a very rural area of a Great Plains state, Kansas, were randomly assigned to a treatment group and a control group. The "treatment" in this project was the use of an in-home Health Monitoring System (HMS). The project began during March, 2001 and continued through July, 2002.

Three primary project outcomes were assessed:

Outcome 1: Reduce the health costs of high risk and/or medically fragile, recently dismissed hospital patients.

Result: Non doctor-related targeted (COPD/CHF related) and total health care costs were lower among the treatment group than among the control group on average. In addition, costs among the treatment group were higher at the baseline of the study than at the end of the study. However, results with regard to doctor costs were mixed when comparing the treatment group to the control group and the baseline to the study period data. Higher clinic (doctor) costs may be a positive result. Outcome 1 was partially achieved given these findings.

Outcome 2: Reduce the rates of hospital readmission for high-risk patients with a chronic disease.

Result: Rates of hospitalization among the treatment group were lower than that of the control group. Furthermore, rates of hospitalization among the treatment group remained the same between the baseline period and the study period, while the rates of hospitalization among the control group increased between these two time periods. Outcome 2 was achieved.

Outcome 3: Enhance the quality of life of high risk and/or medically fragile patients with chronic disease.

Result: Structured and unstructured interviews with patients in the study reveal higher perceived quality of life among the treatment group members due to their involvement in the study. Satisfaction with overall health care was higher among treatment group members than among control group members. Furthermore, satisfaction with overall health care increased among the treatment group patients over the course of the study. Vital statistics data show no decrease in health among the treatment group members during the study period, and this may be interpreted as enhancing the quality of life among a group of patients with a chronic health condition. Outcome 3 was achieved.

In addition to the above stated project outcomes, other aspects of the project were assessed, including, whether the daily collection of vital statistics data through the in-home monitoring system could predict acute COPD and/or CHF related episodes, the project costs per patient, and unanticipated quality of life consequences for treatment group patients.

Section One
Daily Patient Data for the Treatment Group

Introduction

The purpose of this study was to determine the efficacy and cost efficiency of in-home monitoring of patients with chronic obstructive pulmonary disease. The general health pattern for patients with chronic obstructive pulmonary disease (COPD/CHF) is that there is an overall decline in health as the disease progresses. Thus, our first hypothesis was that the home monitoring system (HMS) would facilitate earlier intervention and so postpone or slow this overall decline in health. The second hypothesis was that acute incidents of COPD/CHF are preceded by predictable changes or patterns in either vital statistics or patient well-being data. The third hypothesis is that in-home monitoring of COPD/CHF patients is cost efficient. That is, that the benefits of the HMS are greater than the costs.

Methodology

Because of the small sample size our methodology is quite simple and our results are tentative. Sophisticated statistical methods have limited value with sample sizes under 25. We follow the general approach suggested by Tukey in Exploratory Data Analysis. All of the time specific data for each Treatment patient is graphed on a single timeline. The purposes of this graphical approach are to get a feel for the data and to observe any potential relationships between one event and another.

Table 1.1 – Classification of Study Participants

	Selected	Withdrew	Died	Studied
Treatment	29	4	2	23
Control	17	0	1	16

Patients with CPOD in a small western Kansas community were recruited to participate in the HMS study. Patients were randomly assigned to either the Treatment or Control group. But, an insufficient number of patients were recruited to balance the sizes of the Treatment and Control groups and at the same time utilize all the monitoring equipment that was available for the study. Thus, the decision was made to utilize all the monitoring equipment despite the fact that the Treatment group is almost 50 percent larger than the Control group. However, in numbers the difference is only seven individuals.

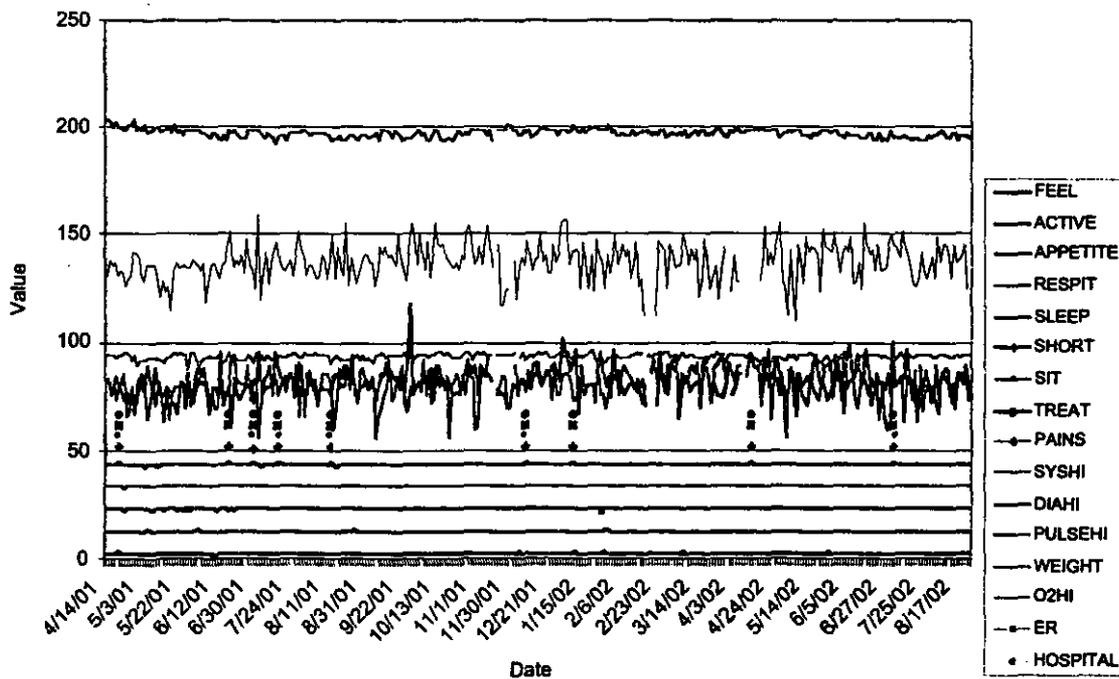
Data

Daily patient data for the treatment group were collected on regular business days from the time the patient joined the study until the completion of the study. The completion dates for the treatment group patients were spread over a couple of weeks due to the time required to collect the in-home monitoring system equipment from each patient's home. The data were collected both by machine and by human interaction. The machine data were transmitted to Hays Medical Center computers by ordinary telephone lines. Each patient was also contacted by one of two staff persons each day by telephone to answer a short subjective questionnaire about the patient's general state of health. A 1 to 5 scale was used for each question for ease of understanding by the patients. The questionnaire is located in Appendix IV. The staff person entered the patient's responses into a computer database at the time of the telephone interview.

Results

Neither the vital statistics nor the patient well-being data were predictive of acute incidents of COPD/CHF. Given the data that were collected it is clear that the HMS does not increase the prediction of acute incidents for COPD/CHF patients. (Some of the monitoring equipment did not perform satisfactorily and its use was discontinued during the study.) However, the treatment group showed no measurable decline in the level of health during the study period. This suggests that there may be some benefits associated with the use of the HMS for COPD/CHF patients. The data analysis for the Treatment group patients is presented in the following graphs.

Graph 1.1 – T1 Composite Data



Graph 1.1 shows the vital statistics, well-being data, and medical chart events during the study period for treatment group patient 1 (T1). Composite data charts were constructed for each of the patients in the treatment group. The

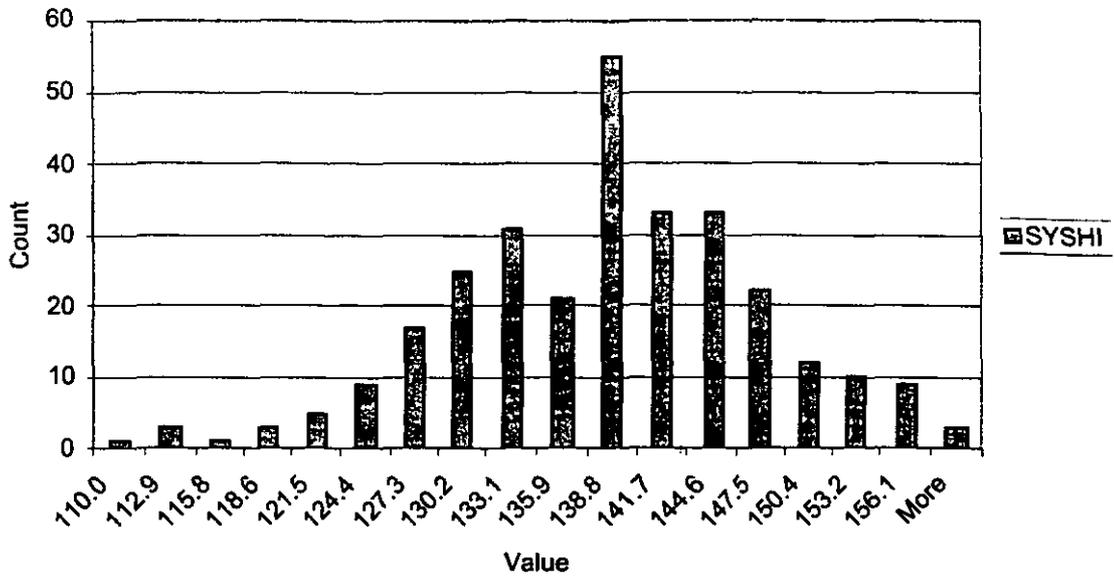
vital statistics data values are the recorded values. The well-being data was transformed to separate the responses to the questions. Because the same 1 to 5 scale was used for each question the responses would have graphed on top of each other. The transformation was accomplished by simply adding a constant to each response. In much the same way the medical chart events were assigned arbitrary values for purposes of graphical presentation.

Table 1.2 – Statistical Measurements for T1

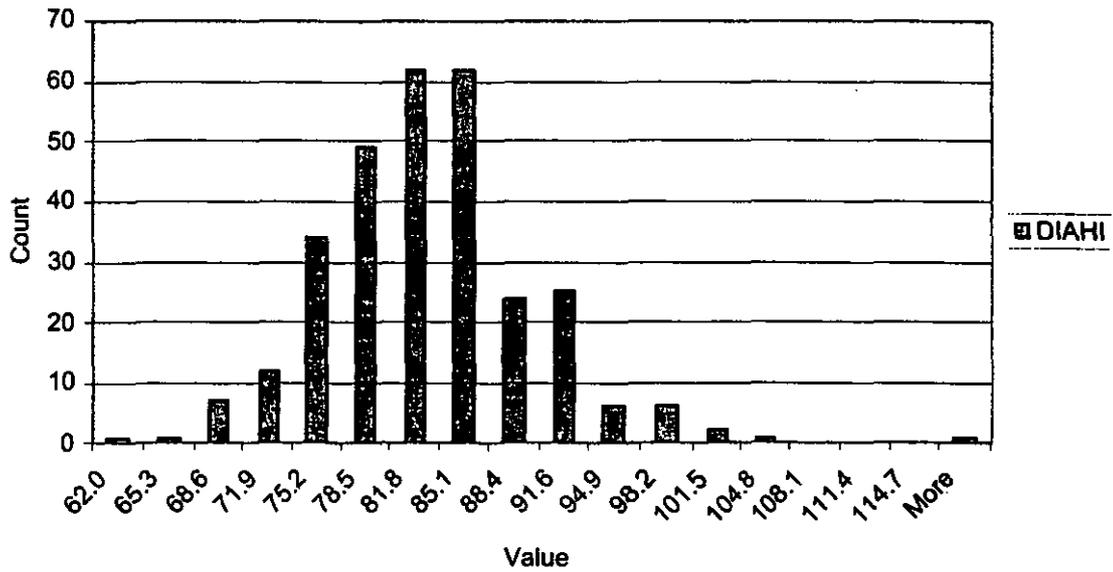
<i>MEASURE</i>	<i>SYSHI</i>	<i>DIAHI</i>	<i>PULSEHI</i>	<i>WEIGHT</i>	<i>O2HI</i>
Mean	137.0887	80.9386	80.6087	197.0132	93.4233
Standard Error	0.5232	0.4105	0.4727	0.1088	0.0689
Median	137	81	82	197	94
Mode	136	76	84	198	94
Standard Deviation	8.9561	7.0266	8.1741	1.8907	1.1926
Sample Variance	80.2113	49.3729	66.8162	3.5746	1.4222
Kurtosis	0.1982	2.3821	0.4280	0.1442	2.6920
Skewness	-0.1876	0.6655	-0.6392	0.2540	-0.8532
Range	49	56	41	11	10
Minimum	110	62	56	192	87
Maximum	159	118	97	203	97

Table 1.2 shows the simple statistical parameters for the machine-collected vital statistics data. SYSHI is the measured systolic blood pressure. DIAHI is the measured diastolic blood pressure. PULSEHI is the measured pulse rate. WEIGHT is the measured weight. And, O2HI is the measured blood oxygen level. The distributions are essentially normal, bell-shaped distributions, although for some variables there is minimal skewness. The blood pressure and pulse readings showed greater variability than the weight and O2 readings. It seems likely that some of the outliers are erroneous readings. However, except for weight readings, these outliers were not deleted. The individual variable distributions are shown in Graphs 1.2 through 1.6.

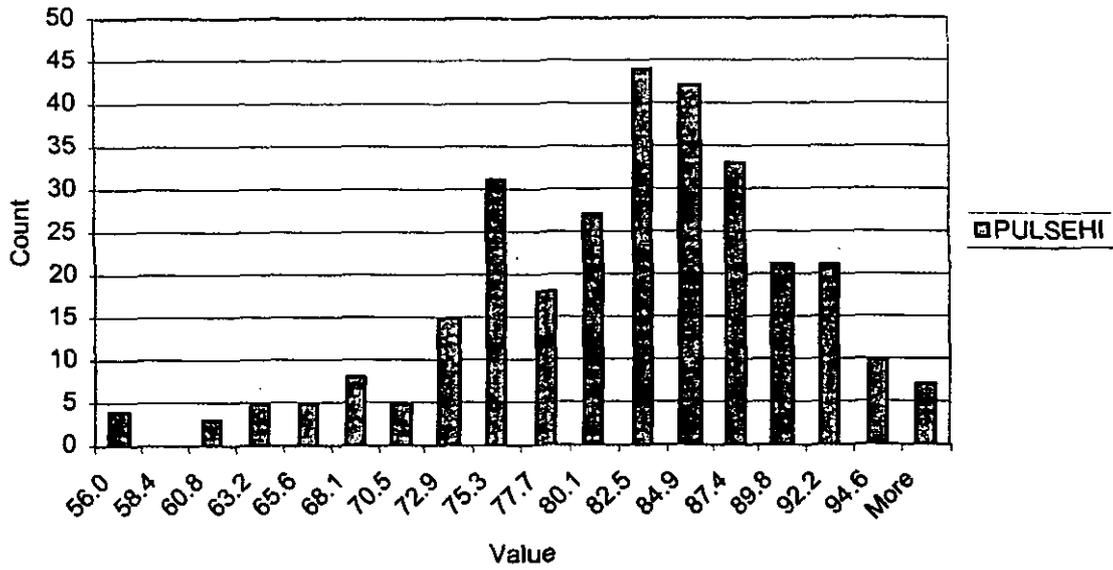
Graph 1.2 – Distribution of Systolic Readings for T1



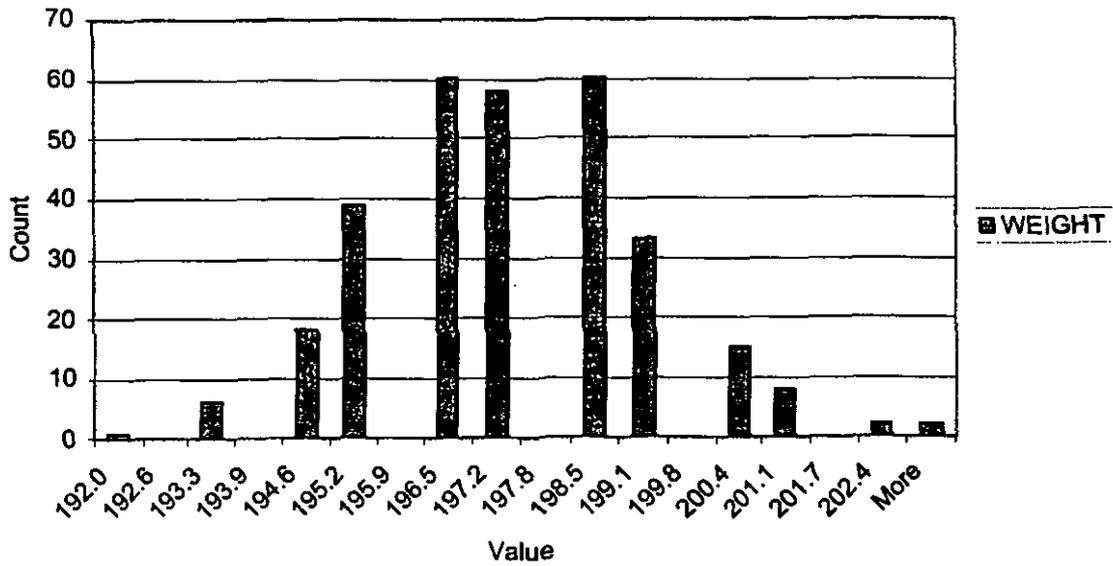
Graph 1.3 – Distribution of Diastolic Readings for T1



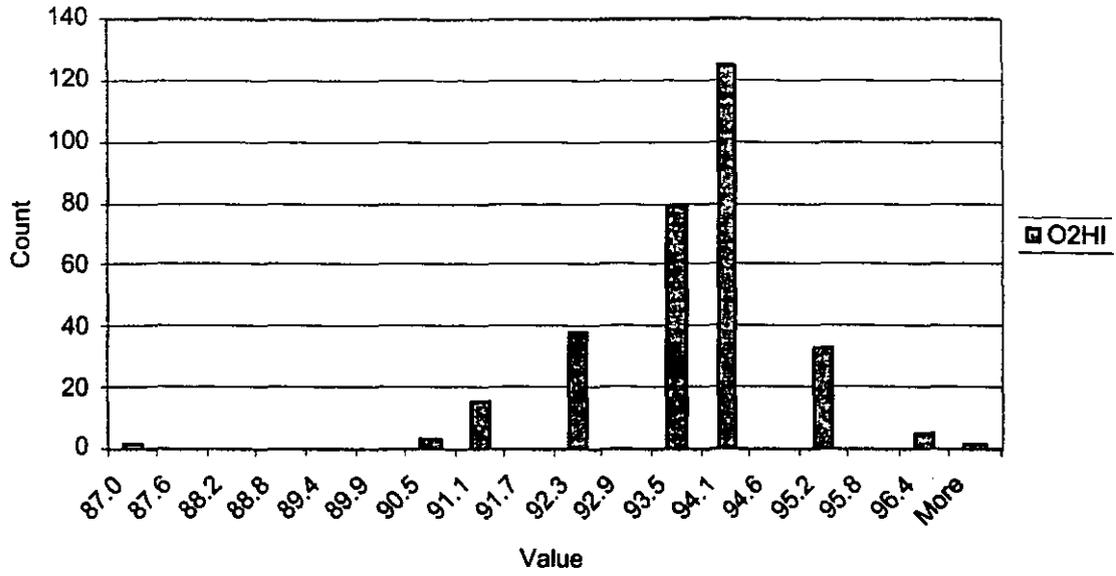
Graph 1.4 – Distribution of Pulse Readings for T1



Graph 1.5 – Distribution of Weight Readings for T1

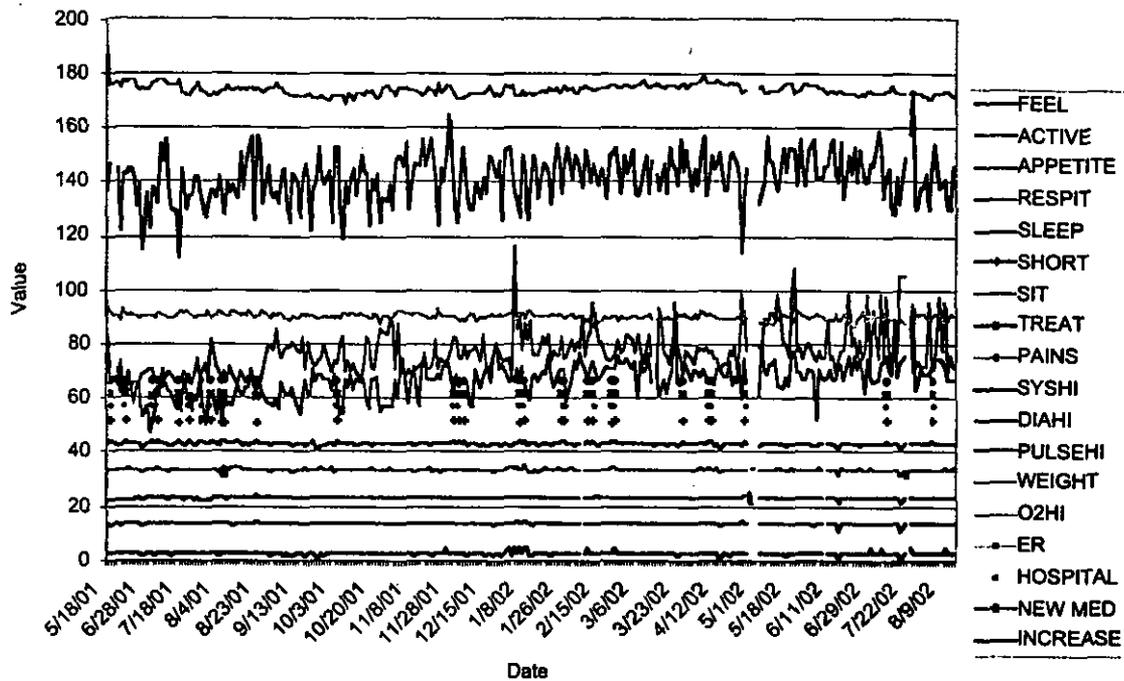


Graph 1.6 – Distribution of O2 Readings for T1



The following graphs (1.7 through 1.138) and tables present the data associated with the remaining treatment group patients (T2 through T23). Except for minor differences in values, the patterns of the variables for each treatment group patient are remarkably similar to those of the other treatment group patients.

Graph 1.7 – T2 Composite Data



Section Two

Monitoring Costs

The distortions caused by the third party pay system in the healthcare industry make it difficult to determine the true costs and benefits of different avenues of treatment. In this section we lay out the costs that were incurred in operating the HMS grant with twenty-three patients in the treatment group. The vast majority of these individuals believe that the costs incurred were very beneficial.¹ However, the eligibility of these expenses from the perspective of the third party payers is not assured.

In this study the equipment costs were the vital statistics monitoring equipment in the patients' homes and the computer equipment in the central office. These fixed costs averaged \$4,129 on a per patient basis over the eighteen-month study period. The useful life of the equipment was not determined, but it seems reasonable that the equipment would last about five years. Again, we must stress that if the equipment is rented and reused then the cost is likely to be reduced. However, if the patient purchases the equipment and it is not reused, then the total cost is assigned to a single user. Of course, the third option of an initial rental period followed by a purchase would produce yet another cost for the equipment.

The other major costs associated with the HMS equipment are the labor costs associated with the monitoring technicians and the network analyst. Labor costs vary by the skill level associated with the individual and the job and by the particular labor market location. Our study was located in an isolated labor market with a large population of university students. It is quite likely that our labor costs are less than those in more metropolitan communities. The project used one full time equivalent monitoring technician. And, after the initial set-up

¹ See the patient comments section of the exit interviews in Section 4.

phase a quarter time network analyst was employed. Table 2.1 shows the monthly costs associated with these individuals.

Table 2.1, Labor Costs per Month

Classification	Total Positions	Wages	Benefits	Total
Monitoring Technicians	1 FTE	\$1,686	\$254	\$1,940
Network Analyst	.25 FTE	\$623	\$160	\$783
Total Labor Costs		\$2,309	\$414	\$2,723

There were no telecommunications costs for this project because the telephone calls to transmit the vital statistics data to the central office were local calls. However, some minor travel costs were associated with maintaining the equipment in the patients' homes. These travel costs averaged less than \$70 per month.

In summary, the fixed costs per patient associated with the HMS of COPD/CHF are the machine costs of \$4,129. The variable costs per month are \$2,793 for twenty-three patients (\$121 per patient). Table 2.2 shows the fixed costs, variable costs, and total costs on a per patient basis assuming that the patient uses the equipment for three years.

Table 2.2, Costs per Patient

Costs	Three Years	One Year	Per Month ²
Fixed Costs	\$4,129	\$4,129	\$115
Variable Costs	\$4,372	\$1,452	\$121
Total Costs	\$8,501	\$5,581	\$236

In order for this approach to COPD/CHF treatment to be cost-benefit efficient the benefits need only exceed either \$8,501 in a three-year period or

² Fixed costs of \$115 per month are an accounting allocation. The cost of the equipment is \$4,129 per patient regardless of how long the equipment is used by the patient.

\$236 per month on a per patient basis. In the next chapter that examines hospital costs and physician costs the results show that the average benefits that arise from reduced costs in these areas exceed the cost of the HMS.

Section Three

Analysis of the Home Monitoring Study Quantitative Data

Introduction

The analysis in this section focuses on two groups of patients, the treatment group and the control group over two 17-month time periods, a pre-study period and the study period. There are three variables of interest; hospital costs, hospital visits and days, and doctor costs and visits. Although the sample size is quite small the results indicate that treatment group patients during the study period had lower costs and fewer and shorter visits when compared with the pre-study period and with the control group.

Data

The data collected for this study represent three broad measurable quantitative areas of impact: 1) Hospital Costs, 2) Hospital Visits and Hospital Days, and 3) Doctor Costs and Visits. Within these three areas the data is divided into those costs and visits related to COPD/CHF, and those costs and visits associated with *all* medical conditions. Those costs/visits associated only with the focus conditions are labeled in the data sets as "Targeted."

Data was collected on both treatment and control group patients. The patients were randomly assigned to either the treatment or control group from a population of chronic patients. There were 17 patients in the control group and 24 patients in the treatment group.

The study period lasted 17 months. Data was collected for the study period and for the 17 months prior to the study. This yields two time periods of data for each set of costs/visits, the "Study Period" and "Pre-study Period."

Methodology

Due to the small sample size the most useful comparative tool between the two groups is to compare averages. However, since these were rather small groups there is a problem with outliers skewing the average. It was determined that the most accurate picture would be provided comparing the averages of those patients that actually incurred costs or visits. Some patients in each group had no costs or visits. These zero values negatively skew the average. Similarly, a very large cost for a single patient can exert a positive skew to the average. Therefore, one table for hospital costs makes a further adjustment by removing the largest value (patient cost) from each group before averaging.

There are at least three useful ways to use this quantitative data to determine whether the study results of home monitoring were positive and significant:

1. Compare the costs/visits of the study group vs. control group.
2. Compare the study period costs/visits vs. the pre-study costs/visits.
3. Compare the degree of change between the sets or groups when they move in the same direction.

Results

Hospital Costs

In all comparisons the resulting hospital costs of the treatment group display a positive study effect. Home monitoring reduces hospital costs (see Tables 3.1 and 3.2 for data that inform the hospital costs analysis). During the study period, the treatment group's targeted costs were \$3,096 less than (or 87% of) the control group's targeted costs. If the largest outlier data are removed from both groups the difference climbs to \$4,316. The treatment group's total medical costs were \$10,338 less than (or 68% of) the control group's total medical costs during the study period.

These study period results are buttressed by noting that during the pre-study period the treatment group's costs are significantly higher (246% higher for targeted costs, and 140% higher for total costs) than the control group's.

The study also shows positive results from a time-series perspective. Targeted costs were \$15,943 less (66%) and total costs were \$5,336 less (81%) when the 17 months of the study period are compared with the prior 17 months (pre-study period). If the groups are adjusted by removing the highest values, the targeted costs difference amounts to \$9,890, while total costs equal \$3,455. The costs for the control group were actually much higher during the study period compared to the pre-study period (161% higher for targeted costs and 165% for total costs).

Table 3.1 – Hospital Costs

<u>Treatment Group</u>					
<u>Patient</u>	<u>StudyPeriodTargetCosts</u>	<u>StudyPeriodTotalCosts</u>	<u>PreStudyTargetCosts</u>	<u>PreStudyTotalCosts</u>	
T01	\$1,283	\$3,677		\$41	
T02	\$6,877	\$6,877	\$7,672	\$9,086	
T03				\$674	
T04		\$1,454	\$367	\$367	
T05	\$2,323	\$2,323	\$7,135	\$7,502	
T06	\$1,868	\$2,028		\$1,234	
T07	\$1,951	\$1,951	\$27,656	\$27,656	
T08	\$112,626	\$158,475	\$82,319	\$82,319	
T09	\$38,617	\$38,617	\$176,301	\$176,491	
T10	\$5,039	\$5,039			
T11	\$10,833	\$13,528	\$10,145	\$10,145	
T12					
T13	\$7,614	\$7,614			
T14		\$4,396			
T15	\$62,721	\$64,735	\$495	\$2,298	
T16	\$13,452	\$13,452	\$2,751	\$2,955	
T17		\$9,260		\$1,111	
T18			\$138,469	\$138,469	
T19	\$5,240	\$17,198	\$10,448	\$11,065	
T21		\$2,083		\$5,345	
T22	\$11,032	\$12,309	\$22,463	\$22,835	
DT1	\$41,039	\$41,039			
DT2		\$42,938	\$557	\$557	
<i>Avg. by Entry</i>	\$21,501	\$22,450	\$37,444	\$27,786	
<i>Avg. of Group</i>	\$13,438	\$18,708	\$20,282	\$20,840	
<i>Adjusted Avg.</i>	\$13,993	\$14,526	\$23,883	\$17,981	
<u>Control Group</u>					
C01	\$47,265	\$85,848	\$6,176	\$6,176	
C02	\$34,015	\$34,015	\$26,362	\$28,965	
C03	\$27,439	\$32,421	\$2,140	\$10,326	
C04		\$13,591	\$8,439	\$14,771	
C05	\$62,884	\$62,884	\$28,838	\$28,898	
C06		\$15,347	\$14,344	\$49,148	
C07	\$2,693	\$6,269	\$32,520	\$55,149	
C08	\$72	\$38,377	\$28,747	\$30,581	
C09					
C10			\$12,617	\$13,728	
C11		\$5,583			
C12	\$43,213	\$119,333	\$13,231	\$18,323	
C13		\$2,330		\$956	
C14	\$26,402	\$26,515	\$2,096	\$2,770	
C15			\$320	\$320	
C16	\$1,623	\$2,097	\$24,851	\$24,851	
CD1	\$363	\$14,416	\$12,757	\$12,757	
<i>Avg. by Entry</i>	\$24,597	\$32,788	\$15,246	\$19,848	
<i>Avg. of Group</i>	\$14,469	\$27,002	\$12,555	\$17,513	
<i>Adjusted Avg.</i>	\$18,309	\$24,264	\$12,923	\$16,171	

Table 3.2 – Hospital Cost Comparisons

Hospital Costs - Study Period

	<u>Treatment Group</u>	<u>Control Group</u>	<u>Difference</u>	<u>% Treatment/Control</u>
Target Costs	\$13,993	\$18,309	(\$4,316)	76%
Total Costs	\$14,526	\$24,264	(\$9,738)	60%

Hospital Costs - Pre Study Period

	<u>Treatment Group</u>	<u>Control Group</u>	<u>Difference</u>	<u>% Treatment/Control</u>
Target Costs	\$23,883	\$12,923	\$10,960	185%
Total Costs	\$17,981	\$16,171	\$1,810	111%

Hospital Costs - Treatment Group

	<u>Study Period</u>	<u>Pre Study Period</u>	<u>Difference</u>	<u>% Study/PreStudy</u>
Target Costs	\$13,993	\$23,883	(\$9,890)	59%
Total Costs	\$14,526	\$17,981	(\$3,455)	81%

Hospital Costs - Control Group

	<u>Study Period</u>	<u>Pre Study Period</u>	<u>Difference</u>	<u>% Study/PreStudy</u>
Target Costs	\$18,309	\$12,923	\$5,386	142%
Total Costs	\$24,264	\$16,171	\$8,093	150%

Table 3.2 compares the adjusted average hospital costs of those subjects who incurred costs. The average is adjusted by removing the costs of the subject who incurred the highest costs. The removal of this outlier provides a more accurate indication of average costs.

Hospital Visits and Days

The measured effects of home monitoring were predominately positive as measured by hospital visits and days in the hospital (see Table 3.3). On average, for those needing hospitalization related to COPD/CHF, the typical treatment patient had one less hospital visit, and spent four fewer days in the hospital than the average control group patient. The average treatment group patient had one less visit and spent nine fewer days in the hospital than the average control group patient when the comparison is total (all) medical problems.

During the pre-study period the treatment group had an equal number of hospital visits and spent two more days on average for targeted problems than the control group. Additionally, the treatment group had two more visits and two more hospital days than the control group for all medical reasons during the pre-study period. This may bolster the implied benefits of the treatment group having lower visits/days during the study period.

The treatment group, on average, visited the hospital the same number of times related to target problems during home monitoring study period as during the prior 17 months. However, they spent four less days in the hospital during the study period. Treatment group subjects visited the hospital for all ("Total") reasons, on average, one more time during home monitoring study period than in the preceding period. On average they spent the same number of days in the hospital during both periods.

The control group exhibited reversed patterns compared to the study groups' patterns. For the control group the study period visits and days were higher than in the pre-study period for targeted problems, while all ("Total") visits/days were higher during the study period.

Although the treatment group worsened in one of four quantifiable measures from the pre-study period to the study period and remained constant in two others, the control group worsened in three of four measures and remained constant in only the last. Thus, a comparison of the treatment group with the control group over time shows that the treatment group fared better than the control group. The control group showed greater use of hospital treatment than the treatment group.

Table 3.3 – Hospital Visits/Days

<u>Patient</u>	<u>StudyTarget</u>			<u>StudyTotal</u>	<u>PreStudyTarget</u>			<u>PreStudy</u> <u>Total</u>
	<u>Days</u>	<u>Visits</u>	<u>Days</u>		<u>Visits</u>	<u>Days</u>	<u>Visits</u>	
T01	1	1	1	3			1	1
T02	1	3	1	3	2	5	3	4
T03							1	1
T04			1	1	1	1	1	1
T05	1	1	1	1	1	4	3	6
T06	6	7	8	9			1	4
T07	2	2	2	2	4	21	4	21
T08	5	25	14	74	6	30	6	30
T09	3	4	3	4	10	51	11	52
T10	8	9	8	9				
T11	2	9	4	11	2	8	2	8
T12								
T13	1	6	1	6				
T14			3	3				
T15	4	18	5	19	1	1	1	3
T16	2	8	2	8	3	3	4	4
T17			2	5			1	1
T18								
T19	3	3	7	12	1	8	1	9
T20					7	29	7	29
T21			5	6			7	10
T22	2	4	3	5	4	12	5	13
TD1	3	31	3	31				
TD2			2	14	1	1	1	1
<i>Avg. by Entry</i>	3	9	4	11	3	13	3	11
<i>Avg. of Group</i>	2	5	3	9	2	7	3	8
Control Group								
C01	6	32	12	55	2	4	2	4
C02	1	12	1	12	3	14	4	16
C03	1	3	4	6	1	1	6	7
C04			6	20	1	6	3	14
C05	4	43	4	43	6	22	7	23
C06			2	10	1	9	5	19
C07	2	2	6	6	2	15	5	28
C08	1	1	3	22	4	19	7	22
C09								
C10					4	12	7	15
C11			6	6				
C12	12	19	13	52	7	10	12	16
C13			2	2			1	1
C14	8	19	9	20	2	2	3	3
C15					1	1	1	1
C16	1	1	2	3	12	26	17	26
CD1	1	1	5	19	2	7	2	7
<i>Avg. by Entry</i>	4	13	5	20	3	11	5	13
<i>Avg. of Group</i>	2	8	4	16	3	9	5	12

Doctor Costs and Visits

The benefits of home monitoring as measured by doctor costs and visits are generally positive (see Table 3.4). During monitoring, the average treatment group patient spent slightly more (\$56) on targeted problem related doctor costs and visited their doctor two more times than the control patient. However, they spent \$1,152 less than the unmonitored control patient and visited the doctor three fewer times related to total health problems during that same period.

In the 17 months prior to home monitoring the treatment group had already established a lower average level of doctor costs and visits than control group subjects. They spent \$130 less (84%) and had 4 fewer visits during the pre-study period related to the targeted problems. They spent \$215 less (78%) and had 5 fewer visits related to all medical conditions. This may indicate a "predisposition" among the treatment group for less doctoring than the control group.

However, when the treatment group is compared over the two time periods the treatment group shows positive study effects again. For those targeted health problems, the treatment group's average costs dropped \$129 (15%) and had one fewer doctor visits during the study period compared to the pre-study period. For total costs they spent \$87 less (11%) and had one less doctor visit.

The control group's targeted doctor costs and visits dropped more than the treatment group between periods. The control group's targeted doctor costs dropped \$313 (38%), while the number of doctor visits decreased by seven. These results conflict with the doctor costs/visit benefit claims reported for the treatment group. Also, note that total doctor costs and visits for the control group increased by \$132 (13%), while visits decreased by three from the pre-study period to the study period. These results seem to weaken the claim of positive

results from using the HMS with COPD/CHF patients. However, it is just as likely that these results come from the small sample size associated with the current study. Further study with larger sample sizes is needed.

Table 3.4 – Doctor Costs and Visits

<u>Patients</u>	<u>Target Study Period</u>		<u>Total Study Period</u>		<u>Target PreStudy Period</u>		<u>Total PreStudy Period</u>	
	<u>Dollars</u>	<u>Visits</u>	<u>Dollars</u>	<u>Visits</u>	<u>Dollars</u>	<u>Visits</u>	<u>Dollars</u>	<u>Visits</u>
<u>Treatment Group</u>								
T01	\$210	4	\$465	6	\$143	3	\$279	7
T02	\$530	6	\$530	6	\$725	10	\$725	10
T03	\$180	3	\$240	4	\$145	2	\$371	8
T04	\$178	4	\$513	8	\$170	3	\$225	3
T05	\$188	3	\$188	3	\$355	5	\$355	5
T06	\$250	4	\$250	4	\$115	2	\$115	2
T07	\$30	1	\$138	4	\$580	6	\$1,181	14
T08	\$770	7	\$770	7	\$2,755	23	\$2,805	24
T09	\$715	13	\$715	13	\$3,005	25	\$3,005	25
T10	\$460	8	\$518	9	\$115	2	\$131	4
T11	\$603	5	\$1,068	9	\$1,125	13	\$1,125	13
T12	\$215	5	\$283	7	\$913	13	\$1,834	19
T13	\$500	7	\$500	7	\$170	4	\$205	5
T14	\$120	2	\$520	9	\$250	5	\$250	6
T15	\$1,910	17	\$1,910	17	\$295	5	\$295	5
T16	\$935	13	\$935	13	\$260	5	\$260	5
T17	\$340	6	\$340	6	\$75	2	\$550	7
T18	\$3,060	34	\$3,060	34	\$510	7	\$799	14
T19	\$0	0	\$200	1	\$235	5	\$235	5
T20	\$510	7	\$510	7	\$2,273	20	\$2,273	20
T21	\$120	2	\$120	2	\$150	3	\$150	3
T22	\$418	7	\$418	7	\$1,375	19	\$1,375	19
T23	\$220	4	\$1,010	10	\$875	13	\$955	16
TD1	\$1,470	16	\$1,470	16	\$320	7	\$336	8
TD2	\$60	1	\$1,280	9	\$285	6	\$285	6
<i>Avg. of Entries</i>	\$583	7	\$718	9	\$689	8	\$805	10
<i>Avg. of Group</i>	\$560	7	\$718	9	\$689	8	\$805	10
<u>Control Group</u>								
C01	\$840	8	\$1,620	17	\$225	3	\$225	3
C02	\$1,625	12	\$1,625	12	\$1,443	18	\$1,958	23
C03	\$210	3	\$510	5	\$193	4	\$193	4
C04	\$240	4	\$1,404	7	\$250	5	\$963	13
C05	\$2,300	20	\$3,818	37	\$2,315	30	\$2,315	30
C06	\$30	1	\$310	6	\$1,125	14	\$1,133	15
C07	\$200	3	\$870	12	\$573	8	\$607	11
C08	\$120	2	\$1,115	9	\$1,755	20	\$1,755	20
C09	\$40	1	\$160	3	\$200	4	\$200	4
C10	\$300	5	\$720	13	\$1,175	19	\$1,698	23
C11	\$190	2	\$1,045	10	\$315	5	\$323	5
C12	\$250	4	\$3,418	38	\$1,295	23	\$1,828	39
C13	\$0	0	\$40	1	\$468	8	\$468	8
C14	\$1,230	10	\$1,455	15	\$355	8	\$355	8
C15	\$0	0	\$204	3	\$615	8	\$615	8
C16	\$0	0	\$85	2	\$595	14	\$1,520	17
CD1	\$1,020	14	\$1,191	20	\$1,020	14	\$1,191	20
<i>Avg. of Entries</i>	\$614	6	\$1,152	12	\$819	12	\$1,020	15
<i>Avg. of Group</i>	\$506	5	\$1,152	12	\$819	12	\$1,020	15

Section Four

Patient and Staff Surveys

Introduction

This section of the report describes the methodology and results of telephone surveying of treatment group and control group members, and of personal interviews with treatment group members and Home Monitoring System staff members.

Telephone Survey Methodology

During the month of September 2001, the Docking Institute's University Center for Survey Research interviewed 24 Home Monitoring System (HMS) users (also referred to as the "treatment group") and 15 traditional health care users (the "control group") about the health care they receive. A follow-up survey was conducted during the month of July 2002 with 22 HMS users and 12 traditional health care users³. The surveys were conducted using state of the art phone survey methodology with specially selected interviewers.

Prior to each survey period, a letter was mailed to each control group member and treatment group member asking for his or her participation in the research project (see Section 4: Appendix I for sample copy of the letter).

Telephone Survey Instruments

The survey instrument used for the HMS users contained 10 survey items, while the survey instrument for the traditional care users contained 8 survey

³ Two members of the treatment group and one member of the control group passed away during the course of the project. One additional member of the control group did not wish to participate in the second round of telephone interviews.

items. The Docking Institute constructed survey items to assess patient attitudes toward and experiences with the HMS. In addition, items were constructed to compare the treatment and control groups on self-health assessment and satisfaction with health care services.

Personal Interviews

In addition to the phone surveys, Docking researchers personally interviewed many of the members of the treatment group and HMS staff. Personal interviewing took place at various times during the study period, including an end-of-project reception for all participants held September 20, 2002.

Report of Findings

The findings reported here are from the telephone surveys and personal interviews. The findings are categorized under the following heading areas: Satisfaction with Medical Care Received, Satisfaction with the Home Monitoring System, Comfort Level, Component Ease of Use, Staff Responsiveness and Willingness to Help, and Ownership of Health.

Overall Satisfaction with Medical Care

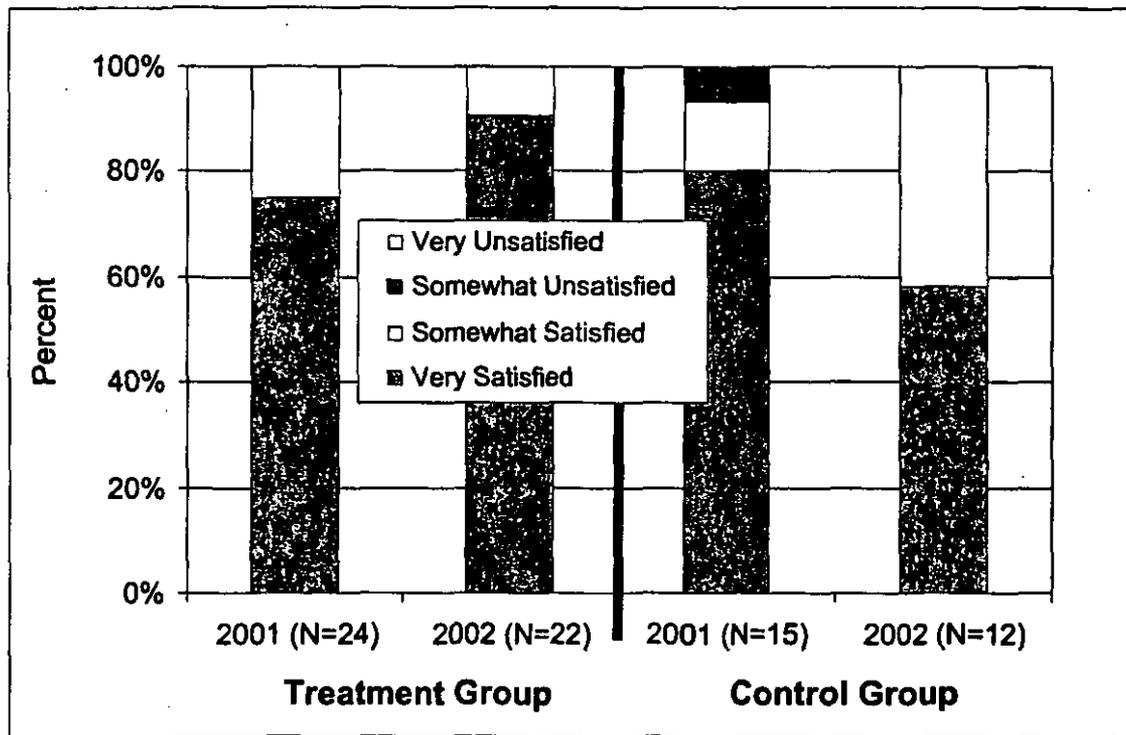
Home Monitoring System users and traditional care users were asked to indicate how satisfied they were with the overall medical care they were receiving. Response options ranged from "Very Satisfied," to "Somewhat Satisfied," to "Somewhat Unsatisfied," to Very Unsatisfied."

As seen in Figure 4.1 (next page), most of the individuals in the treatment group and in the control group were "very satisfied" with the care they were receiving. The blue sections of the stacked columns suggest that about 75% of

the HMS users considered themselves “very satisfied” with their overall health care during the first survey period in 2001, while 80% of the traditional care users considered themselves “very satisfied” with their overall health care during the same survey period.

Generally, members of the treatment group were somewhat more likely to indicate that they were “very satisfied” with the care received than the members of the control group. In addition, treatment group members reporting that they were “very satisfied” increased from about 75% in 2001 to over 90% in 2002, while the opposite trend occurred for the control group.

Figure 4.1: Satisfaction with Overall Care (Treatment and Control Groups)



During phone interviews, members from both groups volunteered responses suggesting overall satisfaction with their medical care. For example, during a phone interview, a male control group member said,

"I am very happy with the care that I am receiving since I moved up to Hays. My doctor is top notch and so are the nurses. They really know what they are doing."

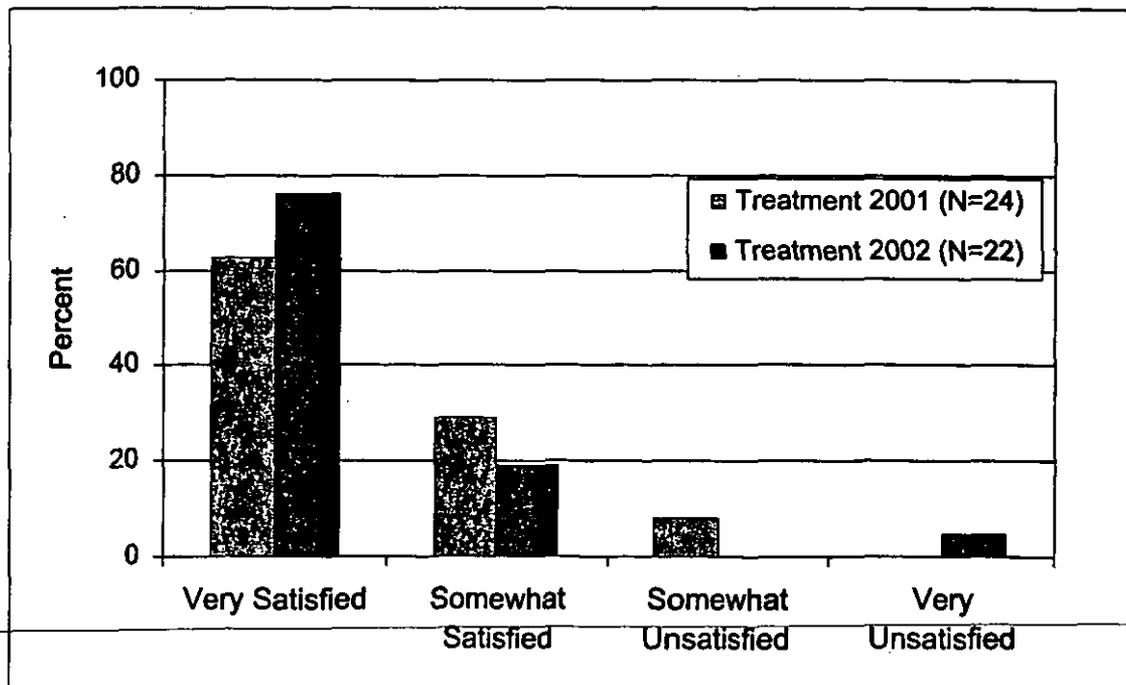
Treatment group members provided similar sentiments about the overall medical care. One female said during an in-person interview:

"I feel really lucky to have such good care, especially in a town the size of Hays. I have lived in bigger cities, but did not have as good of [medical] care as we have here."

Overall Satisfaction with Home Monitoring System

Treatment group members were asked about their satisfaction with the Home Monitoring System, and were provided with response options ranging from "Very Satisfied" to "Very Unsatisfied." Figure 4.2 shows that almost all of the treatment group members were "very satisfied" or "somewhat satisfied" with the HMS.

Figure 4.2: Satisfaction with HMS (Treatment Group Only)



In addition, satisfaction with the HMS increased with time as slightly more than 60% were “very satisfied” at the beginning of the project, but about 75% indicated that they were “very satisfied” with the system during the follow-up phone interview.

During in-person interviews, treatment group members also suggested overall satisfaction with the system. A sampling of comments includes:

From a male participant – “While it has a few bugs, it could be developed into a winning thing.”

From a female participant – “I really like it, and I will miss it when it is gone.”

From a male participant – “I don’t just like using it, I REALLY like using it!”

From a female participant – “I feel very fortunate to have been selected for this study. Having the unit in my home has been very comforting. I wish that other older members of the community could have one in their homes too. I think it could potentially save lives, and certainly gives me a sense of comfort to know that my medical condition is being monitored daily.”

HMS staff members also suggested satisfaction with the system on the part of patients. One staff member said,

“We could see that most of the patients really enjoyed having the systems in their homes, and knowing what their vital signs were on a daily basis.”

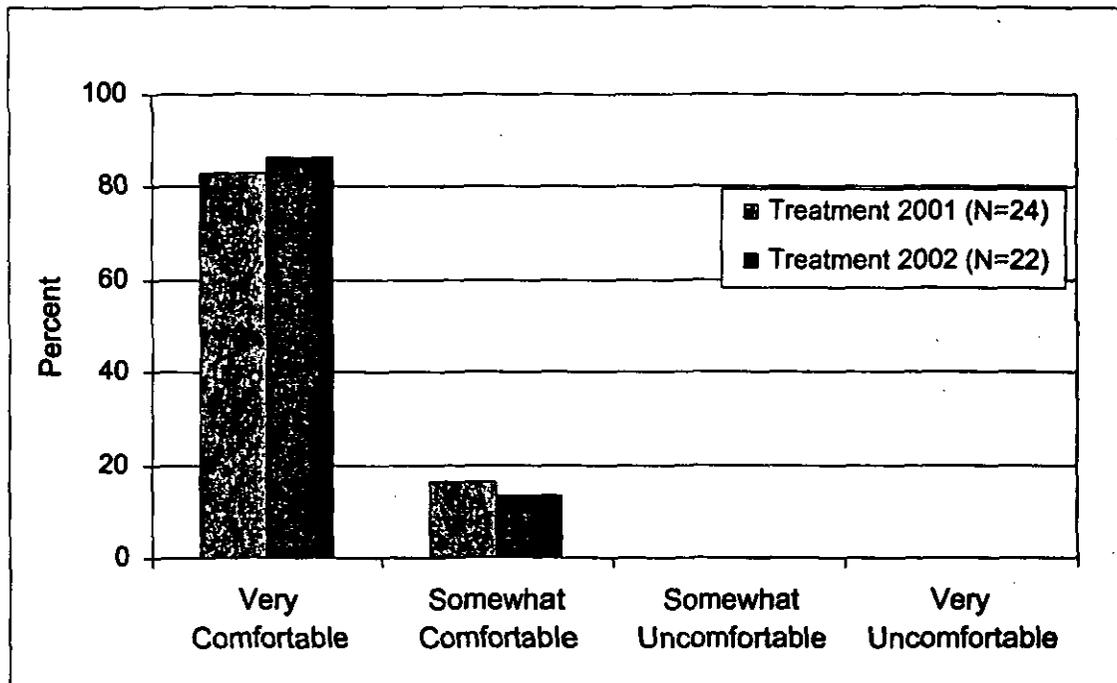
Another staff member added,

“We have two patients that still have the equipment in their homes and don’t want to give it up. That should tell you something! We had a lot of disappointed patients when they were told that we were picking up the equipment. It makes them feel better knowing their vital signs are being watched.”

Overall Comfort Level with Home Monitoring System

Treatment group members were asked to indicate their overall comfort level with the system. Response options ranged from "Very Comfortable" to "Somewhat Comfortable" to "Somewhat Uncomfortable" to "Very Uncomfortable." Figure 4.3 shows that most users were "very comfortable" with using the system, and that none of the users were "uncomfortable" at all with using the system. Importantly, comfort levels seemed to increase with time, as more members of the treatment group indicated that they were "very comfortable" in 2002 than in 2001.

Figure 4.3: Overall Comfort Level (Treatment Group Only)



During in-person interviews, HMS users and staff members also suggested that treatment group members were comfortable with the system. Comments from users included:

From a male participant – "They really explained how to use the equipment, and it was really simple."

From a male participant – "I really liked using the equipment. It was no problem at all once I got used to it."

HMS staff members commented:

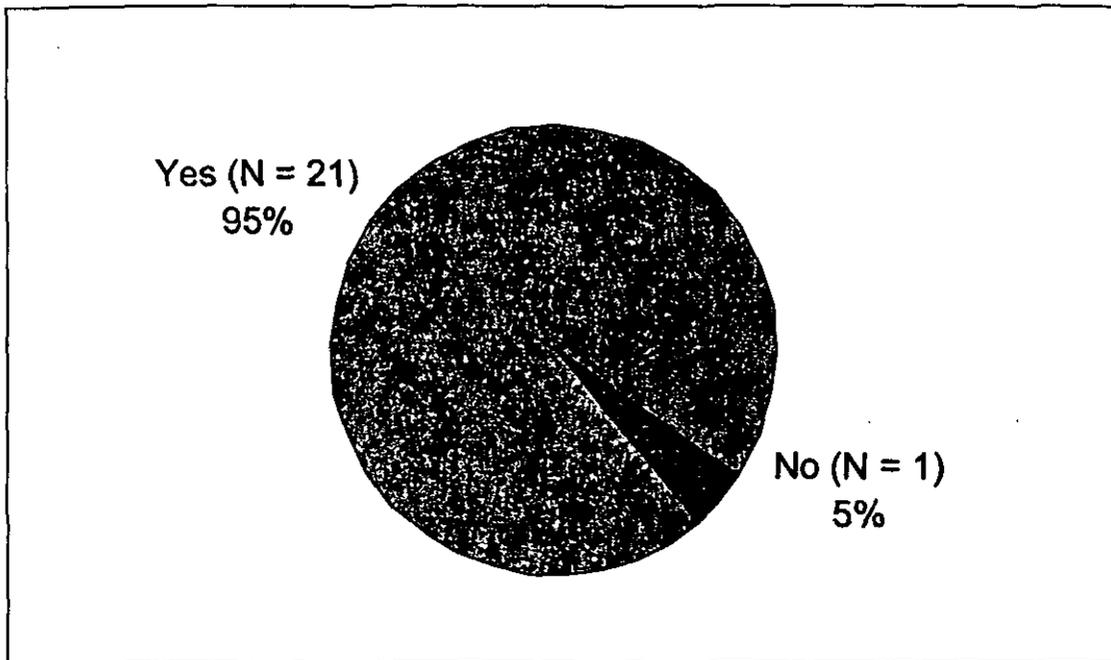
"The equipment was fairly simple to explain to the patients. They picked up on how to use the equipment rather quickly and they seemed comfortable with it."

"Most of the equipment didn't require much attention, and most problem could be resolved over the phone."

"I was surprised at first at how well the patients did with the machines. Some of them have personal computers and were comfortable with the technology, generally."

In addition, treatment group members were asked if they recommend the system to other family members and/or friends. At the end of the study, almost all said that they would recommend the HMS to others (see Figure 4.4).

Figure 4.4: Recommend System to Others (Treatment Group Only)



During in-person interviews, treatment group members also recommended the HMS to other people with similar health conditions. A sample of comments include:

From a female participant – “I wish that other older members of the community could have one in their homes too.”

From a female participant – “I know a lady at my church who could really use a one.”

From a female participant – “Yes, it is really nice to have the monitor and to have the calls from Kay and Sarah. I think other people would like to have the monitor in their homes if they could. I think that would be a good idea.”

From a male participant – “It’s really great. I feel much better having it there. I recommend one for everyone that is in the same kind of condition as me. It is really nice to be able to check yourself out during the day without having to run to the doctor every time you are feeling a little run down.”

Component Ease-of-Use

HMS users were also asked to indicate how easy or difficult they felt that the various components of the HMS system were to use. The main components include a blood pressure cuff, an oximetry device, a weight scale, and a spirometry device. Each component was read, and respondents were asked to indicate if the component was “Very Easy” to use, “Somewhat Easy” to use, “Somewhat Difficult” to use, or “Very Difficult” to use.

Figures 4.5, 4.6, and 4.7 (beginning on next page) show that most users found all of the components “very easy” to use. All of the respondents indicated that the weight scale was “very easy” to use, and those responses are not shown in a figure.

Figure 4.5: Component Ease of Use -- Blood Pressure Cuff (Treatment Group Only)

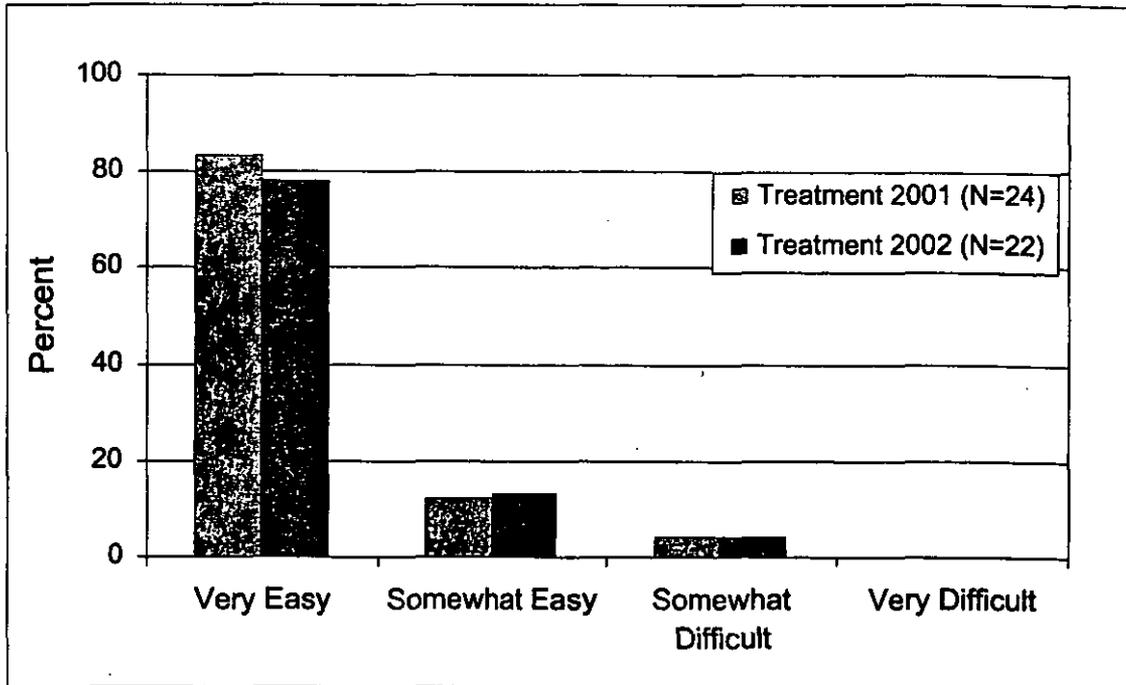


Figure 4.6: Component Ease of Use -- Oximetry Device (Treatment Group Only)

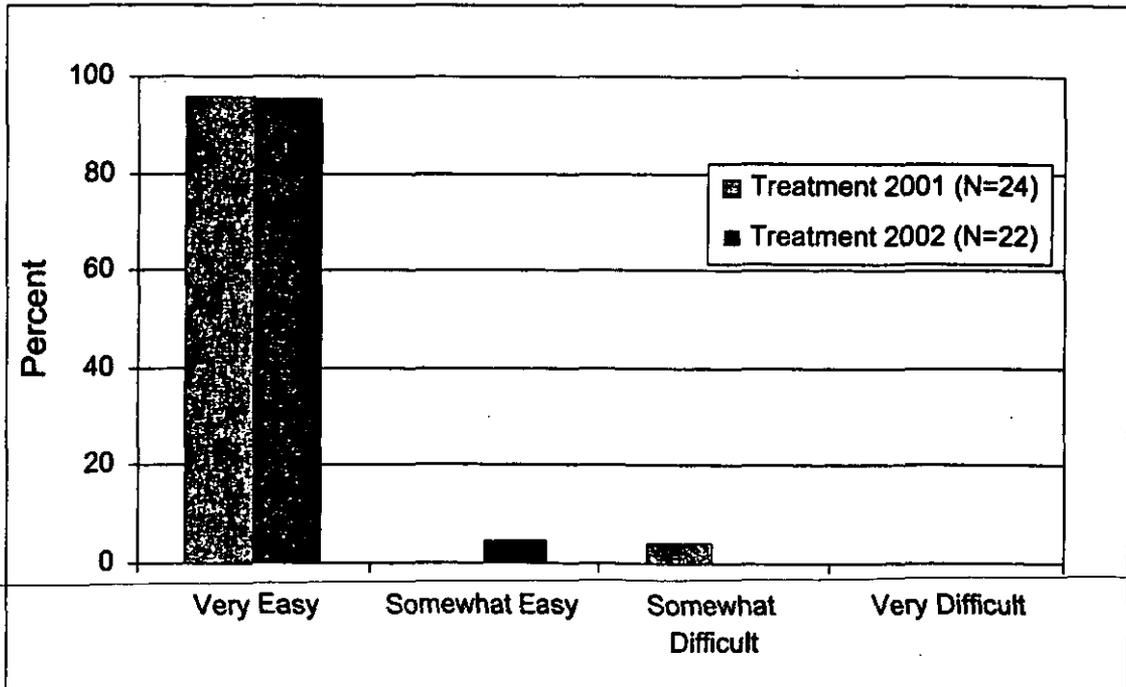
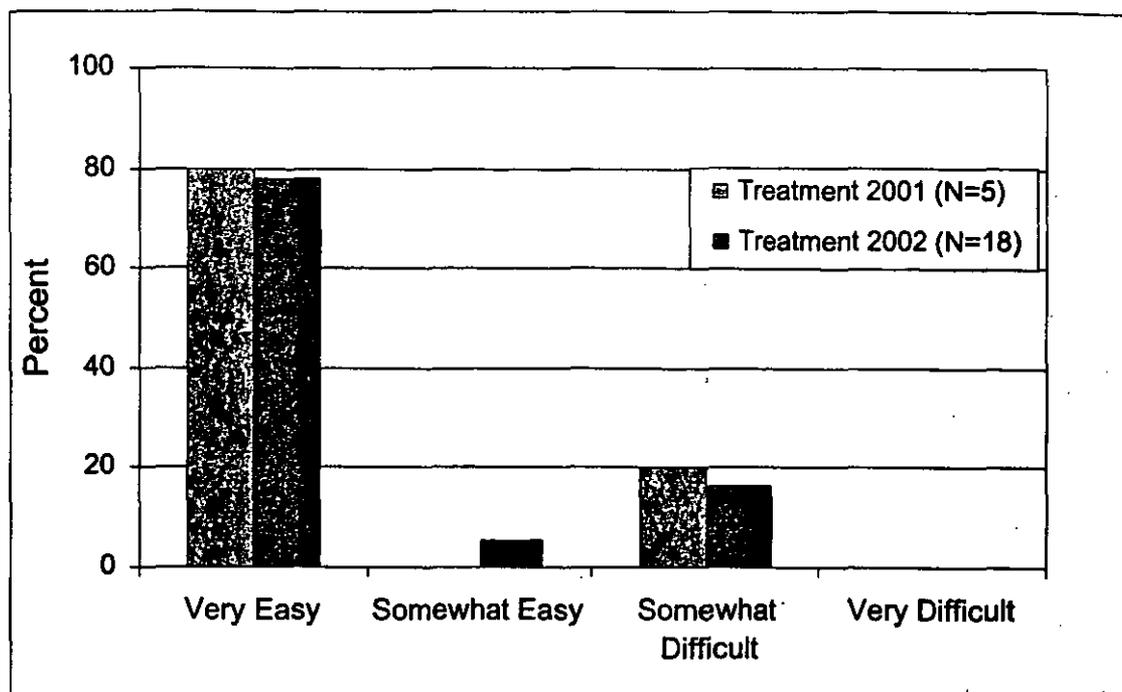


Figure 4.7: Component Ease of Use -- Spirometry Device (Treatment Group Only)



While most members of the treatment group found the majority of the components "very easy to use," the spirometry device was the most problematic. While the health conditions of some members of the treatment group did not warrant the use of the spirometry device, the low number of users during the initial phone survey (see Treatment 2002 (N=5) in Figure 4.7) is due primarily to the spirometry device not working properly during that time frame.

During in-person interviews, comments like "the spirometry device just didn't want to work" were common. A male commented that it "broke so many times, but the staff were really fast at fixing it." A female said, "I do not understand what the spirometry readings mean and they seem to change all the time," suggesting either a misunderstanding on the part of the patient or a defective component.

Concerning the blood pressure cuff, two participants suggested that it was "somewhat difficult" to use. A male said the he had to "lean up against the wall to put it on himself," suggesting that either additional user training and/or self-standing cuff might be in order for such a patient. Another male said, "I don't think it works right. It always reads like my blood pressure is about to explode."

HMS staff members also commented on the equipment. One member reported, "this system's weight scale seemed to work better than some of the other units we looked at. Plus, [the manufacturer] supplied larger and smaller size blood pressure cuffs for different sized patients." However, another staff member said, "I think the support system from the manufacturer was very poor. When we sent them equipment that was defective, it took forever to get it back."

Staff Responsiveness and Willingness to Help

To assess how the patients perceived the responsiveness and helpfulness of medical staff members, a number of questions were asked to address these issues. These included how fast phone calls were returned to patients, overall experience with HMS staff members, and whether traditional care users felt they could "see a provider right away" if needed.

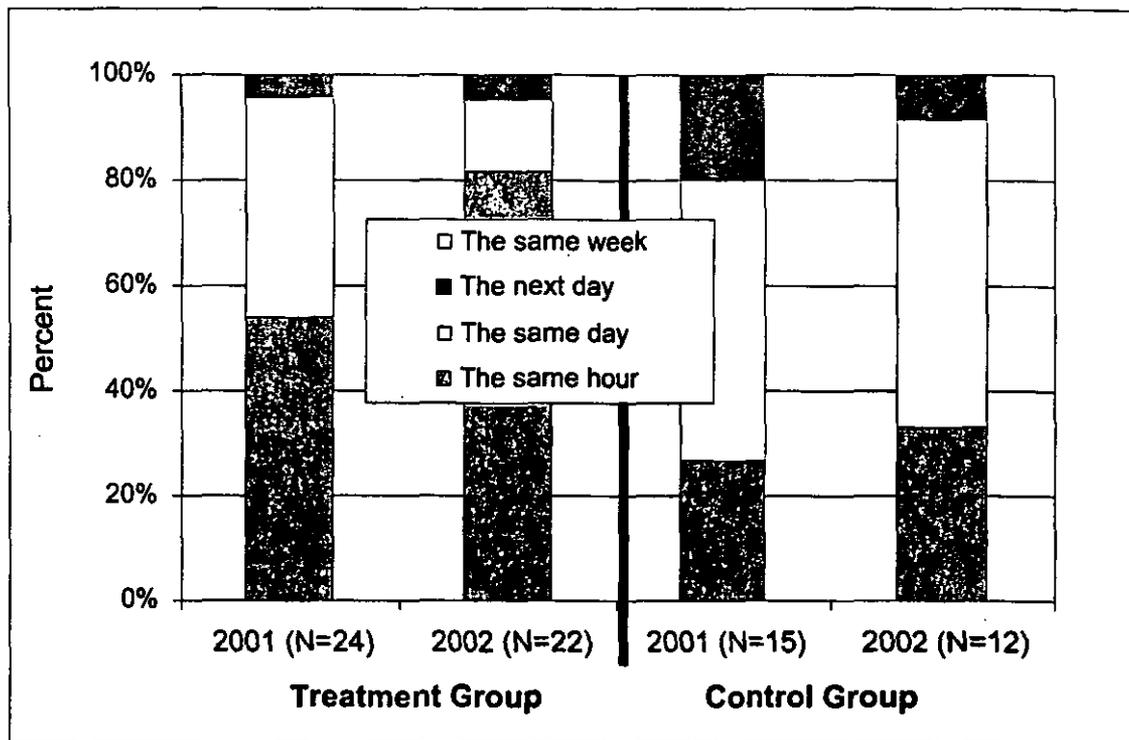
Members of the treatment group and the control group were asked to indicate how long it usually took for a telephone call to be returned from medical staff members when requested. Response options included "within the same hour," "within the same day," "within the next day," "within the same week," and "longer than a week."

Figure 4.8 (next page), suggests that most respondents from both groups find that phone calls are returned very quickly from medical staff members. The blue sections of the stacked columns suggest that about 55% of the HMS users

reported their phone calls returned within the same hour, while 25% of the traditional care users reported the same during the same survey period.

At least 80% of the members of both groups (and during both survey periods) suggested that their phone calls were returned during the same day, while none of the participants from either group indicated waiting for a returned call longer than one day. This level of "customer service" might contribute to the high level of overall satisfaction presented in Figure 4.1. Additionally, the quicker response from HMS staff members suggests beneficial consequences for having nursing staff members dedicated to servicing telephone inquiries.

Figure 4.8: Phone Calls Returned (Treatment and Control Groups)



Many members of the treatment group volunteered open-ended responses to this survey question. Most suggested that contact from HMS staff members was consistent, comforting, and proactive. The comment “Kay and Sarah call us everyday to see how we are doing, so we don’t need to call them” or something similar was common. In addition, during in-person interviews phrases like “if they didn’t call us, we would call them” and “if I didn’t get a call in the morning, I would call [Sarah or Kay] to make sure she was alright” were common. These responses suggest that treatment group members enjoyed and became accustomed to the daily contact afforded them by the project. During personal interviews, HMS staff members suggest the same:

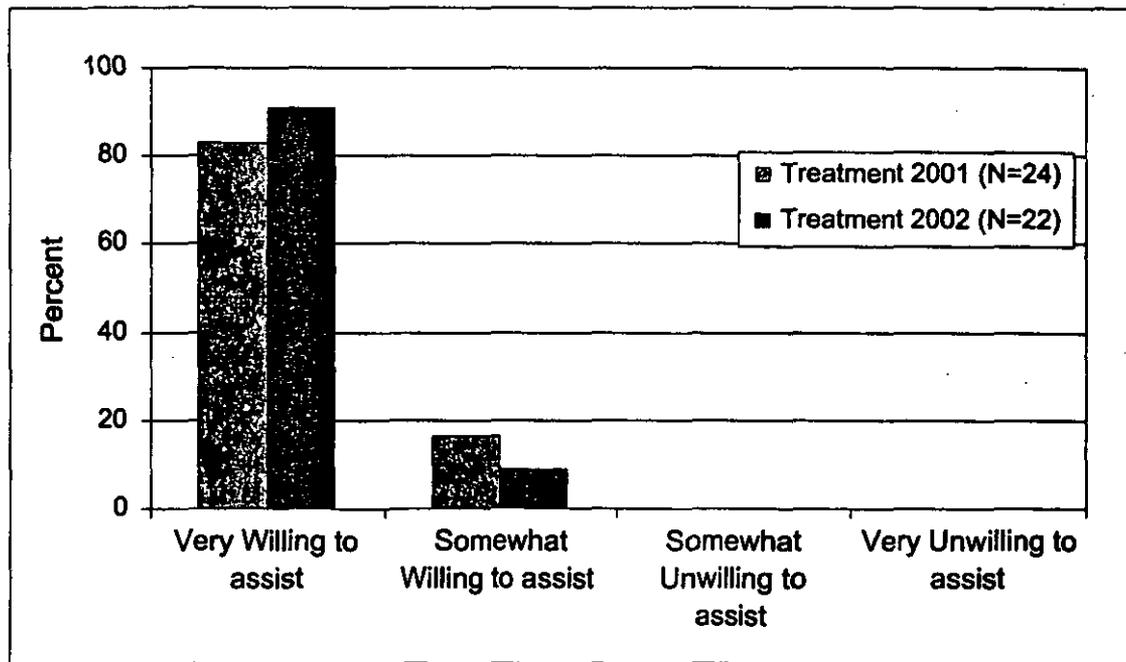
“I think we had a very good support system for the patients. They knew that they could call us and we could talk them through almost any problem. Most [of the patients] really seemed to love talking to us. They were not only our patients but became our friends.”

“When one of our first patients passed away during the project, Sarah and I went to the funeral. The family told us

that he enjoyed participating in the program and felt his contribution was very important. His wife also told us that he looked forward to his daily calls from his "girlfriends." We made some good friends here."

To further assess the treatment group's opinions about the responsiveness of HMS staff members, HMS users were asked to indicate how willing HMS staff members were to assist patients. Response options ranged from "when you call, you feel that staff members are very willing to assist you," ". . . somewhat willing to assist you," ". . . somewhat unwilling to assist you," to ". . . very unwilling to assist you." Figure 4.9 shows that most of the treatment group members indicate that they feel that staff members are "very willing" to assist them.

Figure 4.9: Experience with HMS Staff (Treatment Group Only)



Through personal interviews, the same theme emerged. One female treatment-group member said:

"They would do anything to help us. No matter when we called, they were always friendly and helpful. I know that I

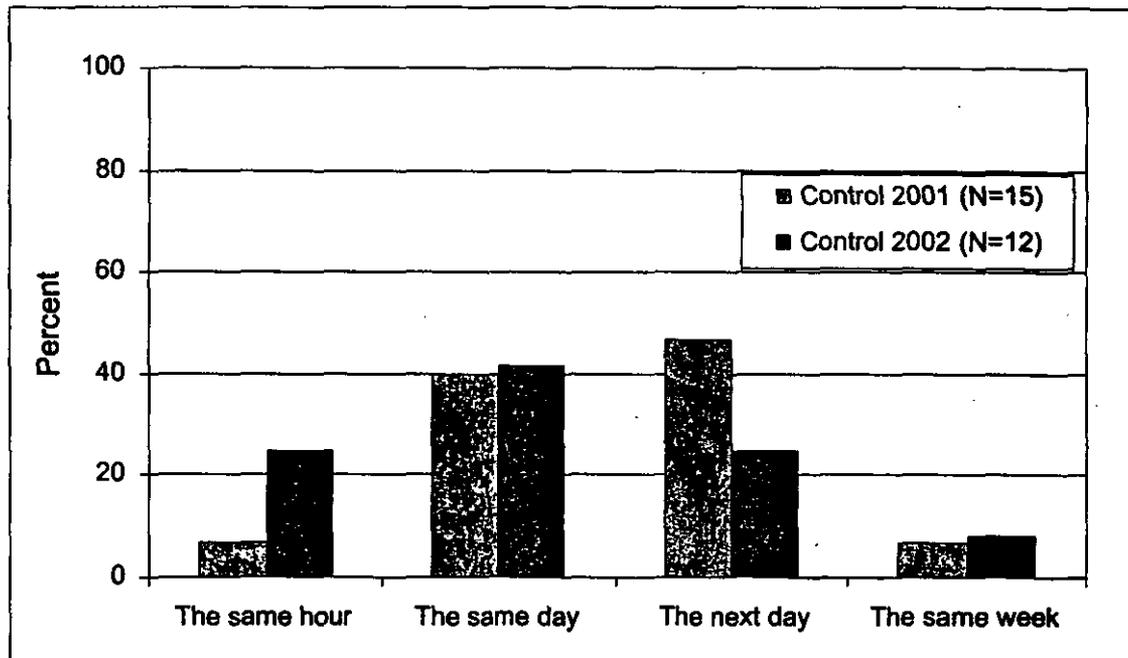
would not have wanted to continue to be part of the program without Kay and Sarah on the other end of the phone.”

Another added:

“Not only were they always helpful on the phone, but one of them would come out to the house to fix a problem at the drop of a hat. Dennis made a trip out to my house many times to fix something or other, and he was very nice too.”

Concerning the responsiveness and helpfulness of traditional care provider staff, control group members were asked during the telephone surveys if they felt they were "able to see someone right away or at least within the next hour," "...the same day," "...the next day," or "...the same week." Figure 4.10, shows that most of the members of the control group felt that they are able to see their provider quickly.

Figure 4.10: See Provider Right Away (Control Group Only)



These findings suggest that traditional care providers in the Hays area are very responsive to their patients, and this suggestion is supported by the data provided in Figure 4.11 (next page). It is not known at this time, however, if the HMS could have reduced the need for some control group members to visit their care providers. Data from treatment group member interviews suggest that the HMS did provide a level of patient confidence:

From a male participant – "I have a nurse that visits me daily to help out. She looks at the daily information in the morning to see how I am doing. I think this is really smart!"

From a female participant – “I have a hard time getting to doctor’s office sometimes because I don’t drive. I like that the information is sent in every day.”

Figure 4.11: Satisfaction with Doctor's Appointments (Control Group Only)

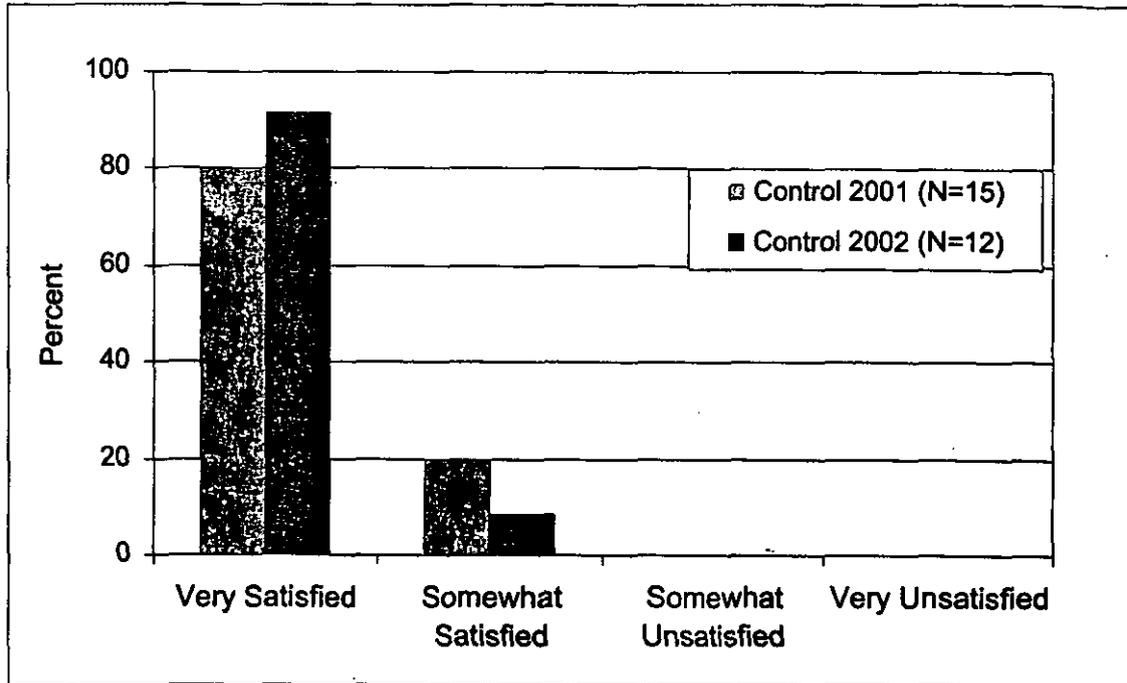


Figure 4.11 suggests that control group members are generally very satisfied with their appointments. This supports the finding presented about overall care in Figure 4.1. A few control group members voluntarily suggested that, while they "really like Dr. X⁴" or are "very satisfied with the care received from Dr. Y²" they desired to "not go in for so many appointments because it was often very hard to get in."

⁴ For purposes of anonymity, physician names were not included.

Ownership of Health

An unplanned outcome of this research project was the discovery that treatment group members generally felt that the HMS gave them a strong sense of control over their medical care. Many volunteered responses during the structured telephone interviews that indicated that the HMS provided a feeling of security. These comments illustrate this point:

From a female participant – “It could be a real life-saver to people. I know that I worry less now that the machine is taking my vital signs every day.

From a female participant – “I like knowing that they [the HMS staff] are looking out for me. I know that if the monitor tells them that something is wrong, they will give me a call to check up on me.”

From a male participant – “Sometimes when I will wake up in the morning and know that something isn’t right, I know that the machine will send the information to the girls. And when they call, we will talk about it. If they think it is serious enough, they will talk to a doctor about it. I really like knowing they are there.”

From a male participant – “I was in the hospital a month ago because of the home monitoring system. It was recording that my heartbeat was too fast. I found out later that it was an ‘arterial flutter’ or something like that. If it wouldn’t have been for the system, I don’t know what would have happened. I probably wouldn’t be here talking to you!”

During in-person interviews some treatment group members even suggested that the HMS provided them with regular access to health care, heretofore unavailable to them. Examples include:

From a female participant – “I live a bit of a drive away from Hays, and it is often hard for me to get into town. You see, I don’t drive anymore, and I don’t want to be a bother to [daughter’s name]. She lives in [town name] and has her own family, and is very busy with her own children. So, when I was selected to be part of this study, I was glad. Now [physician’s name] can get my information without me having

to go in. And when Kay or Sarah call, I feel like a real patient.”

From a male participant – “I still get around pretty good, but I know this could really help some other people. I think that linking the doctor and older people in smaller towns is a good idea. I know that sometimes is difficult enough for me to make it in [to an appointment] sometimes. I don’t know how some do it. The Home Monitoring System just might be the way to link people up with their doctors.”

Finally, at the September 20, 2002 reception, quite a few (about seven) members of the treatment group mentioned that being part of the HMS study gave them a new appreciation for their health care, and that they could take a more active role in managing their own health care. For example:

From a male participant – “One thing I noticed was that after the machine would take my readings, I would get out and take a walk if the weather was good. I would usually hang around the house more, but since I saw my readings everyday, I thought I should try to improve them.”

From a male participant – “Me too. Plus I want to see if Sarah would notice if my readings changed!”

From a male participant – “Plus [wife’s name] wouldn’t let me eat so much. [She would say] ‘Kay and Sarah will know!’”

From a female participant – “I also found myself watching what I eat a bit more. And getting out more. I felt that I should get out of the house more too. I would check the unit to make sure that I was doing OK before going out. Before being part of this project, I would usually feel too nervous about going out, even to the store. But now I feel that I should get out more, and that I can.”

Conclusion

From analysis of survey results and the personal interview, it is concluded that members of both the control group and treatment group are satisfied with the medical care that they receive. However, while both groups showed high levels of satisfaction with their overall health care, the treatment group's satisfaction increased over the study period, and the control group's satisfaction declined. In addition, the Home Monitoring System finds overwhelming support from users. The system seems to be very easy to use for most patients, and the HMS staff is very responsive (and proactive) when addressing patient concerns.

An additional important finding of this research project is that treatment group members enjoyed and benefited from the daily personal contact with HMS staff members. While it is beyond the scope of the current research to exam this further, it would seem that the personal daily telephone contacts and periodic personal visits afforded the treatment group with needed social interaction and stimulation.

Another important finding of this research project was the strong sense of health ownership that the HMS provided to treatment group members. This was not accounted for at the design stage of this research project, but during the telephone surveys and in-person interviews, many treatment group members expressed a sense that the HMS instilled in them feelings of security, independence, and health ownership.

Appendix I: HMS Letter

September 6, 2001

Dear Hays Medical Center Home Monitoring participant:

Each person receiving this letter is involved with the Home Monitoring Grant at Hays Medical Center. Some of you have equipment in your homes and are called daily by either Sarah or Kay; others have no equipment but have agreed to be called about your progress from time to time. It is very important for us to understand your satisfaction with Hays Medical Center, your doctor, and the Home Monitoring Grant project.

The Docking Institute of Public Affairs is performing the research survey at Fort Hays State University in cooperation with Hays Medical Center. Your assistance in this study is very important. In order for us to make accurate assessments about the care that we provide, we ask you to participate in this research project.

Docking Institute interviewers will telephone you in about a week. The survey should last approximately three minutes, and you will be asked questions regarding Hays Medical Center and the Home Monitoring System if you have one in your home.

Please be assured of complete confidentiality. Your name will not appear anywhere on the survey, and once your survey is complete your phone number will be removed from the list of interviewees. The Docking Institute will collect and analyze the data, and deliver a report to HMC. Neither Hays Medical Center nor your doctor will see the individual results of the survey. When the study is complete, the report will be made available on the Docking Institute's web site (www.fhsu.edu/docking).

If you have any questions about this survey, please call Mike Walker at (785) 628-5563 or Dr. Joe Aistrup at (785) 628-4189 at the Docking Institute. Thank you for your assistance in this important study.

Kay and Sarah
Hays Medical Center
Home Monitoring Grant Project

Appendix II: Home Monitoring System User Survey

Hello, my name is (YOUR FIRST NAME). I am calling from Fort Hays State University on behalf of the Hays Medical Center to ask you a few questions about your satisfaction with your home-monitoring system. May I ask you a few questions?

My first question deals with your satisfaction with the OVERALL medical care you are receiving. Do you feel that you are Very Satisfied, Somewhat Satisfied, Somewhat Unsatisfied, or Very Unsatisfied with your overall care?

- [Q1] 1 VERY SATISFIED
2 SOMEWHAT SATISFIED
3 SOMEWHAT UNSATISFIED
4 VERY UNSATISFIED
8 Don't Know
9 No Answer

Now, turning to your home-monitoring system specifically, are you Very Satisfied, Somewhat Satisfied, Somewhat Unsatisfied, or Very Unsatisfied with your home-monitoring system?

- [Q2] 1 VERY SATISFIED
2 SOMEWHAT SATISFIED
3 SOMEWHAT UNSATISFIED
4 VERY UNSATISFIED
8 Don't Know
9 No Answer

I understand that there are four basic parts to the home-monitoring system: the blood pressure cuff, the oximetry device, the weight scale, and the spirometry device. I will read each component again and ask you if it is Very Easy, Somewhat Easy, Somewhat Difficult, or Very Difficult to use?

[Q3a] the blood pressure cuff

- 1 VERY EASY
2 SOMEWHAT EASY
3 SOMEWHAT DIFFICULT
4 VERY DIFFICULT
8 Don't Know
9 No Answer

[Q3b] the oximetry device [the cylinder that you put your finger into]

- 1 VERY EASY
- 2 SOMEWHAT EASY
- 3 SOMEWHAT DIFFICULT
- 4 VERY DIFFICULT
- 8 Don't Know
- 9 No Answer

[Q3c] the weight scale

- 1 VERY EASY
- 2 SOMEWHAT EASY
- 3 SOMEWHAT DIFFICULT
- 4 VERY DIFFICULT
- 8 Don't Know
- 9 No Answer

[Q3d] the spirometry device [the tube that you blow into]

- 1 VERY EASY
- 2 SOMEWHAT EASY
- 3 SOMEWHAT DIFFICULT
- 4 VERY DIFFICULT
- 8 Don't Know
- 9 No Answer

Thinking about your OVERALL COMFORT LEVEL with using your home-monitoring system, are you Very Comfortable, Somewhat Comfortable, Somewhat Uncomfortable, or Very Uncomfortable, with using the system?

- [Q4]
- 1 VERY COMFORTABLE
 - 2 SOMEWHAT COMFORTABLE
 - 3 SOMEWHAT UNCOMFORTABLE
 - 4 VERY UNCOMFORTABLE
 - 8 Don't Know
 - 9 No Answer

When you need to reach someone to help you with the system, are you are able to SPEAK with someone RIGHT AWAY or at least within a few minutes?

-
- [Q5a]
- 1 YES
 - 2 NO
 - 8 Don't Know
 - 9 No Answer

Is your telephone call returned within:

[Q5b] [READ THE RESPONSES]

- 1 the same hour?
- 2 the same day?
- 3 the next day?
- 4 the same week?
- 5 longer than a week?
- 8 Don't Know
- 9 No Answer

Thinking about when you speak with a staff member about the system, which of the following statements best describes your experience:

- [Q6] 1 when you call, you feel that the staff members are very willing to assist you.
- 2 the staff members are somewhat willing to assist you.
 - 3 the staff members are somewhat unwilling to assist you.
 - 4 the staff members are very unwilling to assist you.
 - 8 Don't Know
 - 9 No Answer

Would you recommend a home-monitoring system to friends and relatives?

- [Q7] 1 YES
- 2 NO
 - 8 Don't Know
 - 9 No Answer

[Q8] Is there else anything that you would like to mention about your care?

[Q9] Was the respondent male or female?

[Q10] Date survey completed

Okay, that's all the questions I have. Thank you very much for your time. [HANG UP]

Appendix III: Traditional Health Care User Survey

Hello, my name is (YOUR FIRST NAME). I am calling from Fort Hays State University on behalf of the Hays Medical Center to ask you a few questions about your satisfaction with your medical care. May I ask you a few questions?

My first question deals with your satisfaction with the OVERALL medical care you are receiving. Do you feel that you are Very Satisfied, Somewhat Satisfied, Somewhat Unsatisfied, or Very Unsatisfied with your overall care?

- [Q1] 1 VERY SATISFIED
2 SOMEWHAT SATISFIED
3 SOMEWHAT UNSATISFIED
4 VERY UNSATISFIED
8 Don't Know
9 No Answer

I understand that you see your health care provider on a regular basis to monitor your medical condition. Would you say that you are Very Satisfied, Somewhat Satisfied, Somewhat Unsatisfied, or Very Unsatisfied with you doctor appointments?

- [Q2] 1 VERY SATISFIED
2 SOMEWHAT SATISFIED
3 SOMEWHAT UNSATISFIED
4 VERY UNSATISFIED
8 Don't Know
9 No Answer

When thinking about the timing of these appointments, would you say you are seeing your provider MORE OFTEN than you need to, LESS OFTEN than you need to, or OFTEN ENOUGH to monitor your condition?

- [Q3] 1 MORE OFTEN THAN NEEDED
2 LESS OFTEN THAN NEEDED
3 OFTEN ENOUGH
8 Don't Know
9 No Answer

OK, please think about the times when you need to SPEAK to your provider right away because of a medical problem.

When you call are you able to speak to your provider right away or at least within a few minutes?

- [Q4a] 1 YES
2 NO
8 Don't Know
9 No Answer

Is your telephone call usually returned:

[Q4b] [READ ALL RESPONSES]

- 1 the same hour?
- 2 the same day?
- 3 the next day?
- 4 the same week?
- 5 longer than a week?
- 8 Don't Know
- 9 No Answer

Please think about the times when you need to SEE your provider right away because of a medical problem, and not during a scheduled appointment.

Can you usually make an appointment to SEE your provider right away or at least within an hour?

- [Q5a] 1 YES
2 NO
8 Don't Know
9 No Answer

Can you see the provider:

[Q5b] [READ ALL RESPONSES]

- 1 the next hour?
- 2 the same day?
- 3 the next day?
- 4 the same week?
- 5 longer than a week?
- 8 Don't Know
- 9 No Answer

[Q6] Is there else anything that you would like to mention about your care?

Okay, that's all the questions I have. Thank you very much for your time. [HANG UP]

[Q7] Was the respondent male or female?

[Q8] Date survey completed

Appendix IV: Patient Data – Alpha Form

This form is for patient

Date: _____ Enter Date: _____

Time: _____ Enter Time: _____

Last Name: _____

First Name: _____

Social Security Number: _____

Patient Number: _____

Attending Physician: _____

Is the patient available? _____ 1. yes 2. no

If no: Why unavailable? _____ 1. Gone 2. Hospital - CHF, COPD
3. Hospital - Other 4. Dropped out
5. Deceased 6. Nursing Home 7. Other

If no: Date beginning: _____

Call Patient now: Phone Number: _____

Q1. ___ How do you feel today?

Excellent	Average	Poor	Can't Determine
1 2	3 4 5	9	

Q2. ___ What is your activity level today?

Excellent	Average	Poor	Can't Determine
1 2	3 4 5	9	

Q3. ___ How is your appetite today?

Excellent	Average	Poor	Can't Determine
1 2	3 4 5	9	

Q4. ___ How is your respiratory effort today?

Excellent	Average	Poor	Can't Determine
1 2	3 4 5	9	

Q5. ___ How did you sleep last night?

Excellent	Average	Poor	Can't Determine
1 2	3 4	5	9

If below average:

Q5a. ___ Did you wake up short of breath?

- 1. yes
- 2. no

Q5b. ___ Did you have to sit by the side of the bed?

- 1. yes
- 2. no

Q5c. ___ Did you take any extra treatments?

- 1. yes
- 2. no

Q5d. ___ Do you have any new chest pains or discomfort?

- 1. yes
- 2. no

Blood Pressure Data

Spirometer Data

Systolic ___

PEFR ___

Diastolic ___

FVC ___

Pulse Rate ___

FEV1 ___

MMEF ___

Weight: ___

Oximeter

O2 Saturation ___

Did the tech contact attending physician office? ___ 1. yes 2. no

Initials ___