

TeleHomeCare

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Final Evaluation Report

Conducted by:
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TeleHomecare Project

Final Report

October 1, 1997 to June 30, 2000

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Part B: Formal Project Evaluation

I. Introduction

The increasing use of telecommunications in health care is well documented. But surprisingly little is known about its diffusion into home care, the fastest growing sector of the health care industry. Through the joint efforts of The Pennsylvania State University (Penn State), the Visiting Nurse Association of Greater Philadelphia (VNAGP) and American TeleCare, Inc., this demonstration project tested an innovative technology that enables the interaction of voice, video, and data using ordinary telephone lines. The addition of a stethoscope, sphygmomanometer, and glucometer permits assessment of vital functions, frequent monitoring of patients, and early intervention to prevent adverse events such as hospitalization.

The goal of the TeleHomecare Project was to demonstrate and evaluate the use of this technology in the provision of home healthcare services. The TeleHomecare Project targeted elderly persons with diabetes, living in Philadelphia, PA. The project began on October 1, 1997, and ended on June 30, 2000. Specific **program objectives** were to:

- improve homebound diabetics' health status and quality of life;
- reduce the costs associated with health care provided to homebound diabetics;
- increase patient satisfaction with home health service delivery; and
- extend telehomecare technology to other underserved populations.

A complete description of the TeleHomecare Project, including major accomplishments and lessons learned, is found in *Part A: TeleHomecare Project Final Report*.

II. Project Evaluation

A. Research Design

This project was designed as a field experiment. The sample consisted of diabetic patients who were discharged from the hospital with a referral to the VNAGP. Patients were randomly assigned to either the intervention group or to a control group by the VNAGP Intake Coordinator. Skilled nursing visits were provided to both groups, but patients in the intervention group also received video visits. Data were collected on admission (baseline) and 60 days after admission. This research design, which incorporates randomization of subjects, pre/post-testing, and longitudinal measurements, promotes a high degree of validity and minimizes biases attributable to patient selection, history, and attrition. Specific objectives focused on patient outcomes, to determine if any differences were the result of the telehomecare intervention.

B. Procedures and Sample

Clinical activities began in January 1998, with the development of patient protocols and criteria for eligibility. A three-day training session was held in February 1998, at the VNAGP headquarters in Philadelphia. After pilot testing and trial runs, patient selection and study protocol activities began in March 1998. Because the glucometer interface was not available

until the end of the second year of the project (September 1999), a no-cost extension was used to evaluate the effectiveness of the glucometer-enhanced equipment.

The first phase of the study began March 1, 1998 and ended September 30, 1999. Phase I patients are those who received telehomecare services without the glucometer interface, and patients in the control group. The final sample for Phase I consists of 181 patients: 91 in the intervention group and 90 in the control group. Approximately 40 patients refused to participate or withdrew from the study. The second phase of the project began October 1, 1999, and ended March 2000. Thirty-one patients were enrolled during Phase II, with 20 in the intervention group and 11 in the control group. Phase II patients received telehomecare via the upgraded model (with the glucometer). Formal evaluation of the project focused on data collected and analyzed during Phase I. A limited evaluation was conducted during Phase II; these results are described separately (see Section III E, p. 8).

Statistical analysis was conducted to identify possible differences between patients in the intervention group and patients in the control group. Independent sample t-tests indicated no significant differences between groups for age or years of education. Chi-square analysis found no statistical difference between groups for gender, marital status, or race. We concluded from these tests that the two groups were equivalent (nonbiased) with regard to age, education, gender, marital status, and race. Table B1 illustrates demographic information about the Phase I patient sample. [Note: In this and subsequent tables, sample size may not match the final sample size of 181 as cases with missing data were excluded from analysis.]

We note that data collection took more resources than initially expected and we experienced some difficulty obtaining data from external sources. We were unable to obtain Medicare Claims Data from the Health Care Financing Administration (HCFA) as originally planned, requiring us to contact all hospitals and physicians' offices utilized by patients in the study. Responses from these sources were not optimal (less than 30% of medical offices responded and approximately 18% of hospitals sent us the appropriate information). Additionally, we planned to use glucose values (Hgb A1C) as outcomes but were unable to obtain test results for many patients, either because the physician refused to order the test, or because the lab was unable to collect the sample in the time frame requested. The end result of these problems with data collection was that our sample size was reduced for some of the analyses.

C. Measures and Data Collection

Measures of health status included activities of daily living (ADLs), instrumental activities of daily living (IADLs), quality of life, knowledge and self-management of diabetes, and discharge status. After review of clinical health status measures, we selected the OASIS data collection tool¹ to measure ADLs, IADLs, and discharge status. Developed by the Colorado Center for

¹ Attachment A: OASIS Items

Health Policy and Services Research², this tool was mandated by HCFA for use by all home health agencies that participate in the Medicare program. Demographic data and severity of illness measures were also obtained with the OASIS instrument to use as control variables.

Discharge status was measured by the home health nurse at the time of the patient's discharge from home health services. Two items in the OASIS instrument were used. The first question: "Where is the patient after discharge from your agency?" has three response categories: "remained in the community," "transferred to a noninstitutional hospice," or "unknown because the patient moved to a geographic location not served by this agency." If the patient was hospitalized or transferred to another institutional setting, the second question indicated the destination: hospital, rehab facility, nursing home, or hospice.

Patient outcomes specific to diabetes knowledge and self-management behaviors were assessed with a diabetes clinical pathway³, developed by the VNAGP and modified for use in this study. The home health nurse rated patient knowledge (12 items) and self-management behaviors (8 items) on admission and at discharge. Responses for each item ranged from 1–3, with 3 being the highest score.

Quality of life measures assessed general physical and psychological well-being. After an extensive literature review, the SF-36 Health Survey⁴, developed by John Ware, Ph.D. and colleagues⁵ at the New England Medical Center, was selected to measure quality of life. The 36 items in the survey measure the patient's perspective of functional status and well-being. The survey has been used extensively in the U.S. in a variety of populations, including the elderly. Its psychometric properties have been widely tested and validated, including the use of the survey in telephone interviews.

Overall ratings of service quality and satisfaction with nursing services were evaluated with a patient satisfaction instrument⁶ designed by the Principal Investigator specifically for home health patients. The survey, containing 27 items in a Likert format, was modified for this study. Patients' comments about the telehomecare system were also collected and summarized.

To measure costs, we collected data on use of home health services, hospitalizations, and medical office visits. This information was obtained from VNAGP billing records, medical records received from primary care physicians, and hospital discharge summaries. We also measured direct and indirect costs associated with use of the telehomecare system.

² Shaughnessy, P. W., & Crisler, K. S. (1995). *Outcome-based quality improvement*. Denver, CO: Colorado Center for Health Policy and Services Research.

³ Attachment B: Diabetes Clinical Pathway

⁴ See Attachment C: SF-36

⁵ Ware, J. E. (1997), *SF-36 Health Survey: Manual & interpretation guide*. Boston, MA: New England Medical Center.

⁶ Attachment D: Patient Satisfaction Survey

D. Phase I Results

Objective 1: Improve Health Status and Quality of Life

Clinical outcomes for patients who received the telehomecare intervention were compared to clinical outcomes for traditional home health patients. Analysis of changes in ADLs and IADLs, using general linear model (GLM) Repeated Measure Analysis, showed overall improvements from admission to discharge, but no differences between the intervention group and the control group. Table B2 shows the descriptive statistics for selected items from the OASIS data set, including ADL and IADL measures.

Discharge status of patients in the intervention group was compared to discharge status of patients in the control group, using Chi-square analysis. As illustrated in Table B3, patients in the video group were more likely to be discharged from the home health agency; 63.2% of telehomecare patients were discharged with no further care vs. 40% of patients in the control group. Control patients were more likely to be hospitalized; 28% of control group patients were hospitalized during the 60-day period, as compared to 10% of patients in the video group. These differences were statistically significant ($p < .05$).

Analysis of **diabetes knowledge and self-management**, using clinical pathway scores, shows significant differences between the groups. The two groups had equivalent knowledge scores on admission ($x=24.5$), but the video group improved more. The average knowledge score for telehomecare patients at discharge was 45.06, vs. 42.24 for control group patients. This difference, while it is encouraging, was not statistically significant. But the scores for self-management of diabetes showed significant differences ($p < .01$). The video group improved, from an average score of 20.93 on admission to 36.70 at discharge (compared to a change of 19.82 on admission to 31.78 at discharge for control group patients). Table B4 shows the descriptive statistics for each rated measure in the diabetes clinical pathway, on admission and at discharge. We used GLM Repeated Measures Analysis to calculate differences between groups for each of the rated measures. These results are presented in Table B5.

Analysis of **quality of life** measures (SF-36 scores) did not show statistically significant differences between the two groups. Table B6 illustrates descriptive results of the SF-36 items. Using GLM Repeated Measures Analysis, we calculated changes within groups and differences between groups for each of the rated measures. Results indicate that time was significant for each dimension, indicating that both groups improved significantly over time. The interaction between time and group was not significant, indicating that the groups 'behaved' similarly. Finally, there was no significant group effect for any of the dimensions. Thus, while both the video group and the control group improved over time, neither group improved significantly more than the other. Table B7 shows the results of the GLM Repeated Measures test between groups.

Objective 2: Reduce Costs Associated with Health Care Provided to Homebound Diabetics

Telehomecare Costs. Telehomecare patients received, on average, nine video visits per episode of care. Labor costs associated with the video visits averaged \$63.70 per patient, per episode. We calculated the labor costs associated with RN care, using the Bureau of Labor's most recent figures on average hourly wage for registered nurses in the Philadelphia metropolitan area (\$22.18). The difference in total RN labor costs between groups—\$393.70 for telehomecare patients vs. \$312.42 for control group patients—was significant ($p = 0.001$). In addition to RN costs for direct patient care, additional labor costs were associated with time spent installing and removing the equipment from patients' homes, and time spent by the home health nurses in training and in meetings. Additionally, there were costs related to the administration of the project, such as case management and patient tracking. These costs, \$76.33 per patient, were distributed evenly to both the video group and the control group.

We monitored the length and frequency of all video visits to determine the costs incurred as a result of unsuccessful video visits. On average, almost 25% of the video visits were unsuccessful (with this percentage declining as the nurses gained proficiency and as technical problems were resolved). A total cost of \$1,226.00 for unsuccessful video visits was calculated using the amount of clinician time related to this activity and the Bureau of Labor wage rate. This cost was added to the direct cost of the telehomecare intervention.

The costs of the telehomecare units and related peripherals (blood pressure cuffs, cameras) were also included in the direct cost of the telehomecare intervention. In addition to the telehomecare units and peripherals, the agency purchased a backup drive for data security purposes and a printer so that progress notes from video encounters could be added to the patient's medical record. Cellular telephones were necessary for stethoscope sound transmission for the first generation telehomecare units. Subsequent units did not require cellular phones; however, there were costs associated with upgrading to the newer models. In addition to computer equipment and accessories, the home health agency purchased luggage carts and plastic bins to facilitate transportation and reduce the risk of theft. All equipment costs were discounted over a five-year period (the estimated life of the equipment).

The total direct cost per telehomecare patient was \$1,231.63. A specific cost breakdown for each of these components can be found in Table B9. After the inclusion of general administrative expenses, our results showed that an episode of care for patients in the telehomecare group (traditional visits + video visits) costs approximately \$1,700 per patient per episode, versus \$390 for patients receiving traditional services only (see Table B8).

Cost-Effectiveness Analysis. Cost-effectiveness analysis evaluated the impact of costs in relation to other health-related outcomes. Several statistical procedures were used to analyze these differences between the telehomecare intervention and traditional home health nursing visits. First, we analyzed data on utilization of health care services. The number of RN home visits and hours of RN care were compared. We conducted independent sample t-tests for equality of means for RN care between the intervention group and the control group and found significant differences. Both the total number of RN visits and the total hours of RN care were higher for

patients in the intervention group. We expected this result, as telehomecare was used to supplement care, rather than substitute for traditional home visits. The number of RN home visits and the duration of RN home visits revealed no statistical difference between the control and intervention groups, indicating that the differences in the number of encounters were due to the addition of video visits in the intervention group. See Table B9. We found no statistical difference between the intervention group and the control group, for either the number of home visits or the duration of home visits involving non-RN professionals, thus eliminating the possibility of confounding results due to services provided by non-RNs.

We also collected data on hospitalizations and medical office visits. Because the sample contained many cases with missing data, we conducted tests of differences between means using imputed values of the sample mean. As illustrated in Table B8, patients in the intervention group visited their physicians more frequently than patients in the control group. But, more importantly, patients in the intervention group had fewer ER visits than control group patients. This finding has significant implications. Telehomecare may offer a means for home health nurses to intervene before patients reach an acute stage of illness that requires them to seek emergency measures. Additionally, timely interventions via video visits can provide reassurance to patients and family, reducing unnecessary trips to the emergency department.

We believe that telehomecare is a cost-effective method of delivering home health services. We base this conclusion on several factors. First, when considering the full array of healthcare utilization costs, including the significantly decreased numbers of rehospitalizations and use of the emergency department, our results suggest that telehomecare can actually result in substantial savings. The average hospitalization cost for a diabetes stay without complications (DRG 49) for a Medicare patient in an urban area was \$9,703 in 1997. Using our data, we estimated hospitalization costs to be \$97,030 for telehomecare patients and \$213,466 for control group patients. Re-computing the average cost per patient episode results in \$2,768 for the telehomecare patients and \$2,900 for control group patients, a savings of \$132 per patient per episode. This is a conservative estimate since most patients in our study had one or more comorbidities, which would result in higher hospitalization costs and therefore greater savings.

Second, we note that video visits were used to supplement care, rather than to substitute for traditional home care visits; thus, it is not surprising that the telehomecare group incurred greater costs. The next step in this line of inquiry is to investigate substitution effects on total costs. As video visits are substituted for home visits, the cost of telehomecare will be balanced more favorably with the cost of home visits.

Third, the market is responding to environmental forces such as competition and cost-containment initiatives by introducing new, improved products at lower costs. Buyers (home health agencies) will ultimately benefit from these competitive pressures.

Last, we believe that the learning curve associated with the use of telehomecare will level off as these technologies become more prevalent in the home health industry. This will result in more experienced end-users who require less computer training and can work more efficiently.

Objective 3: Increase Patient Satisfaction with Home Health Services

Overall ratings of service quality and satisfaction with nursing services were evaluated, again comparing the telehomecare patients to traditional patients. Results showed that all of the patients in this study were very satisfied with the quality of care that they received from the home health care agency. A patient who responded 'strongly agree' to every question would have a maximum score of 135. The means for both groups indicate that individuals, regardless of group, were highly satisfied with care. This may indicate that patients do not perceive any lessening of quality in the provision of video visits. These results are shown in Table B10.

We also used qualitative methods, such as open-ended questions during the patient interviews, to explore patient reactions to the technology. In general, patient response was very positive. The following are examples of patient comments:

- "The machine seems to remind me to take care of my diabetes better."
- "Using the stuff (the blood pressure cuff, the stethoscope) makes me feel like I understand better what the doctor is doing when I go for my check-up."
- "Learning to use a real computer made me proud of myself."
- "I figured out on my own that I was getting sicker by checking my blood pressure with the machine."
- "The nurse could tell by using the machine that my wife needed to go to the hospital right away."
- "I really liked having this machine and I think it helped me get better faster. How much would it cost for me to buy one?"

Objective 4: Extend Telehomecare Technology to Other Underserved Populations

As a first step in extending telehomecare technology, we focused on efforts to disseminate information about the project. Several methods of dissemination were used, including a brochure, a website, television spots, and newspaper interviews. Numerous presentations were made to professional groups and the general public. A summary of the presentations and exhibits that were made by project staff is found in Part A. Additionally, we have published articles about the project in several professional journals, reaching a variety of audiences.

Dansky, K., Palmer, L., Shea, D., & Bowles, K. Cost analysis of TeleHomecare. Submitted to *Telemedicine Journal*.

Bowles, K., & Dansky, K. Teaching self-management of diabetes via tele-video. Submitted to *Home Health Care Nurse*.

Dansky, K., Bowles, K., & Britt, T. (1999). Nurses' responses to telemedicine in home health care. *Journal of Healthcare Information Management*, 13(4), 27-38.

Dansky, K., Bowles, K., & Palmer, L. (1999). How TeleHomecare affects patients. *Caring* (August), 10-14.

A highlight of our dissemination efforts was the conference, *Telecommunications in Home Health Care*, that we held in State College on June 7, 1999. At the conference, nationally known leaders discussed state-of-the art technologies, and nurses and managers offered first-hand information about applications. THAP Director, Steven Downs, was the keynote speaker. The conference drew over 100 home health executives, government officials with health policy or rural health responsibilities, and healthcare industry administrators interested in exploring technology-based opportunities to improve home healthcare services.

The VNAGP has continued operations of the telehomecare program with diabetic patients and has extended the program to patients with congestive heart failure. They also plan to explore projects that will extend this technology to isolated, homebound, and under-served persons in the Southeastern Pennsylvania region. Telehomecare would provide a cost-effective method for frequent access, support, and intervention with these vulnerable populations. The project is intended to serve as a model for reducing costs and improving the quality and accessibility of home health care. Replication of the telehomecare model by other organizations will extend further this technology to underserved populations.

E. Phase II Results

We conducted a limited evaluation of Phase II to determine how the addition of the glucometer interface influenced patient outcomes. We used two items from the OASIS data set. The first item—*Patient is compliant all or most of the time with medications as prescribed by a physician*—was rated by the home health nurse. Responses to this item ranged from 1 (always compliant) to 3 (compliant less than 80% of time). The second item—*How would you rate your overall health at the present time?*—was asked by the nurse and rated by the patient. Responses to this question ranged from 1 (Excellent) to 5 (Poor). Thus, lower values for both items indicate better scores. We analyzed the scores at admission and at discharge, using Repeated Measures, Analysis of Variance (ANOVA).

Results indicate that patients in the video group had lower scores (indicating greater improvement) for both items at discharge, but the differences between groups were not statistically significant. The descriptive statistics for the two items are shown in Table B11. Results of this analysis suggest that the addition of the glucometer interface has a positive influence on patient outcomes. However, the small sample size precludes more definitive analysis.

IV. Conclusions

The reports that describe this project (*Part A: Final Project Report*) and its results (*Part B: Formal Project Evaluation*) do not adequately capture the depth and breadth of our experience. We have learned far more than we can describe in these pages and are grateful to be part of the discovery process. Despite the numerous challenges that we faced, we are encouraged by our findings and advocate the continued exploration of telehomecare applications.

A major finding of our study is that patients like telehomecare technology and appear to benefit from it. Our experience indicates that elderly patients should not be stereotyped as being “computer-phobic.” With practice and encouragement, very frail and elderly individuals can use this equipment effectively. Patients benefit in many ways. Through mastery of the equipment, patients become empowered to take control of routine health activities, such as checking blood pressure and blood glucose levels. Social isolation is reduced through the video interactions. Most important, perhaps, are the improvements in health status and the prevention of adverse events such as hospitalization. As the use of telehomecare increases there is much to learn about its impact on patients. Further research is needed on the types of patients who respond well to telehomecare. Evaluating the impact of this technology on patients is a critical step for determining the most appropriate and efficacious use of telehomecare technology.

Our analysis of costs shows that telehomecare imposes additional costs to the home health agency but these costs may be offset by the potential for fewer home visits. Further study is needed to determine the effect of telehomecare when substituted for in-person visits. Under a prospective payment system, the home health agency can provide more encounters while reducing the costs incurred from traditional home visits. Furthermore, our results show that total costs per patient per episode, including hospitalization, are lower for the telehomecare patients than for the control group patients. This finding should encourage use of telehomecare technology.

Telehomecare is a cutting-edge technology that can help solve some of the most pressing healthcare problems in our society. Telehomecare can improve access to care in a variety of settings and has the potential to reduce the total costs of care. Furthermore, because this technology uses ordinary telephone lines, it has the potential to minimize the “Digital Divide” faced by persons with limited access to telecommunications. We present our findings with the hope that they will be used by home health executives, government officials with health policy or rural health responsibilities, and healthcare industry administrators interested in exploring technology-based opportunities to improve healthcare services.

Table B1
Patient Demographic Information

	Control Group (n=90)		Video Group (n=84)	
	Mean	Std. Dev.	Mean	Std. Dev.
Age	74.01	9.09	75.11	9.13
Years Education	10.24	2.48	10.78	3.34

	Control Group	Video Group
	%	%
Gender		
Male	26.7	28.6
Female	73.3	71.4
Marital Status		
Married	26.7	29.2
Widowed	48.0	51.4
Other	25.3	19.4
Race		
White	26.7	38.2
Black	69.3	56.6
Hispanic	2.7	3.9
Other	1.3	1.3

Table B2
Descriptive Statistics for Selected OASIS Items

Item Description & Scale	Control Group (n=57)		Video Group (n=61)	
	Mean	Std. Dev.	Mean	Std. Dev.
Cognitive Functioning	0.456	0.734	0.279	0.551
0 = alert/oriented				
1 = requires prompting				
2 = requires assistance in specific situations				
3 = requires considerable assistance in routine situations				
4 = totally dependent				
Anxious	0.145	0.356	0.393	0.613
0 = none of the time				
1 = less often than daily				
2 = daily, but not constantly				
Grooming	0.456	0.888	0.583	0.926
0 = able to groom self unaided				
1 = grooming utensils must be placed within reach				
2 = someone must assist patient				
3 = patient depends entirely on someone else				
4 = unknown				
Dressing Upper Body	0.403	0.820	0.600	1.011
0 = able to dress without assistance				
1 = able to dress unassisted if clothing is laid out				
2 = someone must help patient put on upper body clothing				
3 = patient depends entirely on another person to dress				
Ambulation and Locomotion	0.859	0.854	0.883	0.940
0 = able to walk independently				
1 = requires a device or assistance on stairs or uneven surfaces				
2 = able to walk only with assistance or supervision				
3 = chairfast, but able to wheel self				
4 = chairfast, unable to wheel self				
Feeding	0.158	0.368	0.164	0.373
0 = able to feed self independently				
1 = able to feed self, but requires some assistance				
Planning and Preparing Light Meals	0.544	0.825	0.389	0.719
0 = able to plan or prepare light meals				
1 = unable to prepare meals on a regular basis				
2 = unable to prepare any meals or reheat delivered meals				
Ability to Use Telephone	0.280	1.03	0.262	0.772
0 = able to dial numbers, answer phone				
1 = able to use specially adapted phone				
2 = has difficulty placing calls				
3 = limited ability to answer phone or carry on conversation				
4 = unable to answer phone but can listen with equipment				
5 = totally unable to use the phone				

Table B3
Discharge Status

	Control Group (n=85)	Video Group (n=87)
	%	%
Discharged to Home *	40.0	63.2
Re-certified for Home Health Care	23.5	24.1
Admitted to Hospital *	28.2	10.3
Other	8.2	2.3

*Chi-square analysis indicates significance at 0.05 level

Table B4
Diabetes Clinical Pathway: Descriptive Statistics

	Control Group (n=57)		Video Group (n=67)	
	Mean	Std. Dev.	Mean	Std. Dev.
Diabetes Knowledge (admission)	24.51	6.47	24.53	6.57
Diabetes Knowledge (discharge)	42.24	7.79	45.06	8.22
Self-Management (admission)	19.82	5.72	20.93	5.86
Self-Management (discharge)	31.78	6.60	36.70	6.52

Table B5
Diabetes Clinical Pathway: GLM Repeated Measures (Adjusted)
(n=124)

	F value	Significance
Diabetes Knowledge		
Within Subjects		
Time	494.43	0.000
Time x Group	1.52	0.220
Between Subjects		
Group	2.26	0.136
Diabetes Self-Management		
Within Subjects		
Time	415.17	0.000
Time x Group	3.77	0.055
Between Subjects		
Group	10.402	0.002

Table B6
SF-36: Descriptive Statistics

	Range	Mean (admission)	Std. Dev. (admission)	Mean (discharge)	Std. Dev. (discharge)
Control Group (n=77)					
Activity Level Score	10–42	21.57	6.85	23.92	6.24
Depression Score	10–46	30.69	8.73	32.42	9.00
General Health Score*	14–22	20.37	4.68	19.75	4.42
IADL/ADL Score	10–30	15.34	4.19	15.79	3.87
Pain Score*	2–8	6.54	2.50	5.84	2.17
Video Group (n=79)					
Activity Level Score	10–42	22.66	6.53	24.89	6.25
Depression Score	10–46	32.68	8.00	33.79	8.33
General Health Score	14–22	19.45	5.00	18.85	4.54
IADL/ADL Score	10–30	15.04	4.29	15.11	4.28
Pain Score	2–8	6.10	2.42	5.58	2.07

* Reverse Scored

Table B7
SF-36: Analysis of Differences Between Groups
(n=156)

	F value	Significance
Activity Level Score	0.92	0.34
Depression Score	1.79	0.18
General Health Score	1.08	0.30
IADL/ADL Score	0.80	0.37
Pain Score	1.07	0.30

**Table B8
Project Costs for TeleHomecare Group**

	Cost	
Staff Time: Direct Patient Care		
Traditional visits	28,408.50	
Completed video visits	5,792.40	
Unsuccessful video visits	1,226.00	
Staff Time: Indirect Patient Care		
Equipment installation and removal	15,139.13	
Equipment maintenance	12,648.30	
Training and meetings	4,970.56	
TeleHomecare Units, Equipment, and Upgrades		
ATI units	59,895.80	*****
Camera lens	17.83	
ATI blood pressure cuffs	16.50	*
ATI equipment upgrade	12,096.99	
Backup drive and printer	1,334.33	
Cellular phone	2,742.50	
Luggage cart	48.39	
Miscellaneous (insurance, supplies)	1942.12	
Total Direct Costs	146,279.70	
Administrative Costs	6,869.70	
Total Cost for TeleHomecare	\$153,149.40	

*discounted cost

Total Cost of Care per Patient per Episode

Control Group (n=81)		Video Group (N=90)	
Mean	Standard Deviation	Mean	Standard Deviation
\$388.75	\$144.28	\$1701.66	\$171.78

**Table B9
Health Services Utilization**

	Control Group (n = 82)		Video Group (n = 86)	
	Mean	Std. Dev.	Mean	Std. Dev.
Home Health Care Services				
Days of care	48.44	13.57	50.60	12.22
Number of RN home visits	17.56	7.59	18.80	7.50
Number of RN visits ** (home and video combined)	17.56	7.59	24.28	10.05
Hours of RN care ** (traditional and video visits combined)	14.11	6.47	18.00	7.70
Physician Visits				
Number of office visits *	0.97	0.86	1.45	1.42
Imputed w/sample mean *	1.11	0.56	1/30	0.87
Imputed w/group mean **	0.97	0.54	1.45	0.86
ER Visits				
Number of ER visits *	0.26	0.44	0.09	0.29
Imputed w/sample mean	0.44	0.32	0.38	0.29
Imputed w/group mean **	0.26	0.28	0.09	0.18
Specialist Visits				
Number of visits	0.69	1.23	0.42	0.29
Imputed w/sample mean	0.39	0.82	0.27	0.50
Imputed w/group mean **	0.69	0.76	0.42	0.48

*significant at 0.10 level, **significant at 0.05 level

Table B10
Patient Satisfaction with Home Health Services
Individual Items and Summary Scores

	Control Group (n = 86)		Video Group (n = 86)	
	Mean	Std. Dev.	Mean	Std. Dev.
I received the number of visits I was told I would	4.83	0.38	4.78	0.42
I was informed a nurse was on call 24 hours/day	4.83	0.38	4.78	0.42
I was told how I could reach the on-call nurse	4.71	0.46	4.66	0.48
My nurse treated me with dignity and respect	4.71	0.46	4.73	0.45
My nurse explained procedures that were performed	4.83	0.38	4.78	0.42
My nurse kept me updated on my progress	4.60	0.49	4.62	0.49
My nurse helped me feel less nervous about my condition	4.83	0.38	4.78	0.42
My nurse answered my medical questions patiently	4.83	0.38	4.78	0.42
My nurse clearly explained my medical instructions	4.83	0.38	4.78	0.42
My nurse seemed to have knowledge and expertise	4.83	0.38	4.78	0.42
My nurse explained my condition in terms I understood	4.71	0.46	4.66	0.48
My nurse communicated effectively with my family	4.83	0.38	4.78	0.42
My nurse spent enough time with me	4.83	0.38	4.78	0.42
My nurse gave clear instructions	4.83	0.38	4.78	0.42
The reason I was discharged was clearly explained	4.83	0.38	4.78	0.42
The services provided by my nurse helped me to manage my illness better	4.71	0.46	4.66	0.48
The services provided by my nurse helped me get better more quickly	4.71	0.46	4.66	0.48
The staff treated me according to special cultural needs	4.71	0.46	4.66	0.48
The staff who visited me were clean	4.71	0.46	4.66	0.48
The staff who visited me were on time	4.71	0.46	4.66	0.48
The staff who visited me were in a hurry	1.57	1.11	1.67	1.19
Home visits were scheduled at a convenient time	4.60	0.49	4.62	0.49
I feel I was discharged too soon from the HHA	1.57	1.11	1.67	1.19
I would be willing to use this HHA again	4.71	0.46	4.73	0.45
I would recommend this HHA to my friends	4.71	0.46	4.73	0.45
Overall satisfaction with the HHA	4.66	0.49	4.67	0.47
Overall satisfaction with quality of care	4.83	0.38	4.78	0.42
Sum of satisfaction scores	127.73	11.15	127.02	12.29

Table B11
Phase II—Analysis of Differences between Groups for Selected OASIS Items

	Control Group (n=9)		Video Group (n=20)	
	Mean	Std. Dev.	Mean	Std. Dev.
Compliant all or most of the time with medications (admission)	1.63 (n = 8)	.74	2.15 (n = 20)	.88
Compliant all or most of the time with medications (discharge)	1.50 (n = 6)	.55	1.45 (n = 20)	.60
Self-rated assessment of overall health (admission)	3.89 (n = 9)	.60	3.94 (n = 18)	.42
Self-rated assessment of overall health (discharge)	3.50 (n = 6)	.84	3.21 (n = 19)	1.03

Attachments

Attachment A: Oasis Items

Attachment B: Diabetes Clinical Pathway

Attachment C: SF-36

Attachment D: Patient Satisfaction Survey

Attachment E: Two Articles

Attachment A

Oasis Items

OASIS DATA ITEMS

- **(M0490) When is the patient dyspneic or noticeably Short of Breath?**
 - 0—Never, patient is not short of breath.
 - 1—When walking more than 20 feet, climbing stairs.
 - 2—With moderate exertion (e.g., while dressing, using commode or bedpan, walking distances less than 20 feet).
 - 3—With minimal exertion (e.g., while eating, talking or performing other ADLs) or with agitation.
 - 4—At rest (during day or night).

- **(M0500) Respiratory Treatments utilized at home: (Mark all that apply)**
 - 1—Oxygen (intermittent or continuous)
 - 2—Ventilator (continually or at night)
 - 3—Continuous positive airway pressure
 - 4—None of the above

- **(M0240) Severity Index**
 - 0—Asymptomatic, no treatment needed at this time
 - 1—Symptoms well controlled with current therapy
 - 2—Symptoms controlled with difficulty; patient needs ongoing monitoring
 - 3—Symptoms poorly controlled; patient needs frequent adjustment
 - 4—Symptoms poorly controlled; history of rehospitalization

Attachment B
Diabetes Clinical Pathway

DIABETES CLINICAL PATHWAY: Patient Outcomes

Patient Name _____

Stat # _____

Admission _____	Recertification _____	Discharge _____
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Knowledge of diabetes						
Patient verbalizes:	1 - not able to answer any questions				Weight	Multiply number x weight
	2 - understands basic facts (what, how, when, etc.)					
	3 - able to provide additional details					
	NA - not able to assess					
	<i>Circle one number per item:</i>					
Basic pathophysiology of diabetes	1	2	3	NA	x2	
Signs and sx of hypoglycemia	1	2	3	NA	x2	
Prevention/treatment of hypoglycemia	1	2	3	NA	x2	
Signs and sx of hyperglycemia	1	2	3	NA	x2	
Prevention/treatment of hyperglycemia	1	2	3	NA	x2	
Prevention/treatment of complications:					x2	
Foot	1	2	3	NA	x1	
Eye	1	2	3	NA	x1	
Kidney	1	2	3	NA	x1	
Heart	1	2	3	NA	x1	
Nutrition guidelines	1	2	3	NA	x2	
Use of community resources	1	2	3	NA	x1	
<i>Knowledge of diabetes: Total Score</i>						

Self-Management Skills						
Patient demonstrates this behavior:	1 - no, rarely/never exhibits behavior				Weight	Multiply number x weight
	2 - yes, usually exhibits behavior but with occasional errors					
	3 - yes, always exhibits this behavior with few/no errors					
	NA- not able to assess					
	<i>Circle one number per item:</i>					
Follows prescribed diet	1	2	3	NA	x2	
Follows sick day guidelines	1	2	3	NA	x1	
Correctly administers insulin	1	2	3	NA	x2	
Correctly monitors blood glucose levels	1	2	3	NA	x2	
Maintains a log of insulin and blood glucose levels	1	2	3	NA	x2	
Follows individualized exercise program	1	2	3	NA	x1	
Indicates when to notify health care professional	1	2	3	NA	x2	
Demonstrates proper foot care	1	2	3	NA	x2	
<i>Self-Management Skills: Total Score</i>						

VN Signature _____ Date _____

Attachment C

SF-36

SF-36 Telephone Interview

Patient Name _____

ID # _____

Date of Interview _____ Admission _____ Discharge _____

These first questions are about your health now and your current daily activities. Please try to answer every question as accurately as you can.

Q1 In general would you say your health is . . .

1. excellent
2. very good
3. good
4. fair
5. poor

Q2 Compared to 1 year ago, how would you rate your health in general now? Would you say it is . . .

1. much better now than one year ago
2. somewhat better now than one year ago
3. about the same as one year ago
4. somewhat worse now than one year ago
5. much worse now than one year ago

Now I'm going to read a list of activities that you might do during a typical day. As I read each item, please tell me if your health now limits you a lot, limits you a little, or does not limit you at all in these activities.

Q3 First, vigorous activities, such as running, lifting heavy objects, participating in strenuous sports. Does your health now . . .

1. limit you a lot
2. limit you a little
3. not limit you at all

Q4 ... moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf. Does your health now . . .

1. limit you a lot
2. limit you a little
3. not limit you at all

Q5 ... lifting or carrying groceries. Does your health now . . .

1. limit you a lot
2. limit you a little
3. not limit you at all

Q6 ... climbing several flights of stairs. Does your health now . . .

1. limit you a lot
2. limit you a little
3. not limit you at all

- Q7 ... climbing one flight of stairs. Does your health now ...**
1. limit you a lot
 2. limit you a little
 3. not limit you at all
- Q8 ... bending, kneeling, or stooping. Does your health now ...**
1. limit you a lot
 2. limit you a little
 3. not limit you at all
- Q9 ... walking more than a mile. Does your health now ...**
1. limit you a lot
 2. limit you a little
 3. not limit you at all
- Q10 ... walking several blocks. Does your health now ...**
1. limit you a lot
 2. limit you a little
 3. not limit you at all
- Q11 ... walking one block. Does your health now ...**
1. limit you a lot
 2. limit you a little
 3. not limit you at all
- Q12 ... bathing or dressing yourself. Does your health now ...**
1. limit you a lot
 2. limit you a little
 3. not limit you at all

The following four questions ask you about your physical health and your daily activities.

- Q13 During the past 4 weeks, have you had to cut down the amount of time you spent on work or other regular daily activities as a result of your physical health?**
1. Yes
 2. No
- Q14 During the past 4 weeks, have you accomplished less than you would like as a result of your physical health?**
1. Yes
 2. No
- Q15 During the past 4 weeks, were you limited in the kind of work or other activities you could do as a result of your physical health?**
1. Yes
 2. No
- Q16 During the past 4 weeks, have you had difficulty performing work or other activities as a result of your physical health, for example, it took extra effort?**
1. Yes
 2. No

The following three questions ask about your emotions and your daily activities:

Q17 During the past 4 weeks, have you cut down the amount of time you spent on work or regular daily activities as a result of any emotional problems, such as feeling depressed or anxious?

1. Yes
2. No

Q18 During the past 4 weeks, have you accomplished less than you would like as a result of any emotional problems, such as feeling depressed or anxious?

1. Yes
2. No

Q19 During the past 4 weeks, did you not do work or other regular daily activities as carefully as usual as a result of any emotional problems, such as feeling depressed or anxious?

1. Yes
2. No

Q20 During the past 4 weeks, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbors, or groups? Has it interefered . . .

1. not at all
2. slightly
3. moderately
4. quite a bit
5. or extremely

Q21 During the past 4 weeks, how much did pain interfere with your normal work, including both work outside the home and housework)? Did it interfere . . .

1. not at all
2. slightly
3. moderately
4. quite a bit
5. or extremely

Q22 How much bodily pain have you had during the past 4 weeks? Have you had . . .

1. none
2. very mild
3. mild
4. moderate
5. severe
6. very severe

Q23 During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities like visiting with friends, relatives? Has it interefered . . .

1. all of the time
2. most of the time
3. some of the time
4. a little of the time
5. or none of the time

The next questions are about how you feel and how things have been with you during the past 4 weeks.

As I read each statement, please give me the one answer that comes closest to the way you have been feeling; is it all of the time, most of the time, a good bit of the time, some of the time, a little of the time, or none of the time?

Q24 How much of the time during the past 4 weeks . . . did you feel full of pep? Read categories.

1. all of the time
2. most of the time
3. a good bit of the time
4. some of the time
5. a little of the time
6. or none of the time

Q25 How much of the time during the past 4 weeks . . . have you been a very nervous person?

Read categories.

1. all of the time
2. most of the time
3. a good bit of the time
4. some of the time
5. a little of the time
6. or none of the time

Q26 How much of the time during the past 4 weeks . . . have you felt so down in the dumps that nothing could cheer you up? Read categories.

1. all of the time
2. most of the time
3. a good bit of the time
4. some of the time
5. a little of the time
6. or none of the time

Q27 How much of the time during the past 4 weeks . . . have you felt calm and peaceful? Read categories.

1. all of the time
2. most of the time
3. a good bit of the time
4. some of the time
5. a little of the time
6. or none of the time

Q28 How much of the time during the past 4 weeks . . . did you have a lot of energy? Read categories.

1. all of the time
2. most of the time
3. a good bit of the time
4. some of the time
5. a little of the time
6. or none of the time

- Q29** How much of the time during the past 4 weeks . . . have you felt downhearted and blue? Read categories.
1. all of the time
 2. most of the time
 3. a good bit of the time
 4. some of the time
 5. a little of the time
 6. or none of the time

- Q30** How much of the time during the past 4 weeks . . . did you feel worn out? Read categories.
1. all of the time
 2. most of the time
 3. a good bit of the time
 4. some of the time
 5. a little of the time
 6. or none of the time

- Q31** How much of the time during the past 4 weeks . . . have you been a happy person? Read categories.
1. all of the time
 2. most of the time
 3. a good bit of the time
 4. some of the time
 5. a little of the time
 6. or none of the time

- Q32** How much of the time during the past 4 weeks . . . did you feel tired? Read categories.
1. all of the time
 2. most of the time
 3. a good bit of the time
 4. some of the time
 5. a little of the time
 6. or none of the time

These next questions are about your health and health-related matters.

Now I'm going to read a list of statements. After each one, please tell me if it is definitely true, mostly true, mostly false, or definitely false. If you don't know, just tell me.

- Q33** I seem to get sick a little easier than other people. Would you say that's . . . Read categories.
1. definitely true
 2. mostly true
 3. don't know
 4. mostly false
 5. definitely false
- Q34** I am as healthy as anybody I know. Would you say that's . . . Read categories.
1. definitely true
 2. mostly true
 3. don't know
 4. mostly false
 5. definitely false

Q35 I expect my health to get worse. Would you say that's . . . Read categories.

1. definitely true
2. mostly true
3. don't know
4. mostly false
5. definitely false

Q36 My health is excellent. Would you say that's . . . Read categories.

1. definitely true
2. mostly true
3. don't know
4. mostly false
5. definitely false

Attachment D
Patient Satisfaction Survey

Patient Satisfaction Telephone Survey

Patient Name _____ ID _____ Date _____

Whose opinions are reflected in this survey?

_____ Patient _____ Other (Relationship _____)

Instructions for Interview:

Read the italicized/bold text to the patient exactly as written. Ask the person to choose a response from the list provided. If there is any uncertainty, choose the "neutral" response.

Start here >>> ***I will read statements about your home health services. After each statement, I would like you to tell me whether you agree, disagree, or have no opinion for each statement.***

You have 5 choices - they are: agree, strongly agree, disagree, strongly disagree, neutral (don't feel one way or the other). If a question does not apply to you, please tell me.

Are you ready? (Wait for response. If no further questions or concerns, continue.)
First, I will ask about SCHEDULING AND ARRANGEMENTS.

After each statement, ask if the person would like to hear the list of choices. If "yes", read responses:
agree, strongly agree, disagree, strongly disagree, neutral

		strongly disagree	disagree	neutral	agree	strongly agree
1	<i>The first home visit was scheduled at a convenient time.</i>	1	2	3	4	5
2	<i>In general, I received the same number of visits each week that I was told I would receive.</i>	1	2	3	4	5
3	<i>I was informed that there was a nurse on call 24 hours a day for emergencies.</i>	1	2	3	4	5
4	<i>I was told how I could reach the on call nurse.</i>	1	2	3	4	5

Next, I will ask you to agree or disagree with statements about the NURSES.

After each statement, ask if the person would like to hear the list of choices. If "yes", read responses: **agree, strongly agree, disagree, strongly disagree, neutral**

	<i>My nurse: (repeat at the beginning of each statement)</i>	strongly disagree	Disagree	neutral	Agree	strongly agree
5	<i>... treated me with dignity and respect.</i>	1	2	3	4	5
6	<i>... explained the procedures that were performed.</i>	1	2	3	4	5
7	<i>... kept me updated on my progress.</i>	1	2	3	4	5
8	<i>... helped me feel less nervous about my medical condition.</i>	1	2	3	4	5
9	<i>... answered my medical questions patiently.</i>	1	2	3	4	5
10	<i>... clearly explained my medication instructions.</i>	1	2	3	4	5
11	<i>... seemed to have knowledge and expertise about my medical condition.</i>	1	2	3	4	5
12	<i>... explained my condition in terms that I understood.</i>	1	2	3	4	5
13	<i>... communicated effectively with my family.</i>	1	2	3	4	5
14	<i>... spent enough time with me.</i>	1	2	3	4	5
15	<i>... gave me clear instructions on how to care for myself after discharge from the home health agency.</i>	1	2	3	4	5

16 **Overall, how satisfied were you with the quality of the care you received from your nurse(s)? Please give me a number from "1" to "10", with "1" being "Extremely Dissatisfied", and "10" being "Extremely Satisfied".**

- 1 2 3 4 5 6 7 8 9 10

Last, I will ask you GENERAL statements about your home health care:

After each statement, ask if the person would like to hear the list of choices. If "yes", read responses: **agree, strongly agree, disagree, strongly disagree, neutral**

		strongly disagree	Disagree	neutral	Agree	strongly agree
17	<i>I feel that I was discharged too soon from the home health agency.</i>	1	2	3	4	5
18	<i>The reason why I was being discharged was clearly explained to me.</i>	1	2	3	4	5
19	<i>The services of this home health agency helped me to manage my illness better.</i>	1	2	3	4	5
20	<i>The health care services I received from the home health agency helped me get better more quickly than I otherwise would have.</i>	1	2	3	4	5
21	<i>The staff treated me according to any special cultural needs or requests I had.</i>	1	2	3	4	5
22	<i>The staff who visited me were clean.</i>	1	2	3	4	5
23	<i>The staff who visited me were on time.</i>	1	2	3	4	5
24	<i>The staff who visited me seemed to be in a hurry.</i>	1	2	3	4	5
25	<i>I would willingly use this home health agency again if I needed home health services.</i>	1	2	3	4	5
26	<i>I would recommend this home health agency to family and friends.</i>	1	2	3	4	5

27 Overall, how satisfied were you with the quality of the care you received from the home health agency? Please give me a number from "1" to "10", with "1" being "Extremely Dissatisfied", and "10" being "Extremely Satisfied".

1 2 3 4 5 6 7 8 9 10