CLINICAL OUTCOMES

Measuring clinical outcomes is not only useful to clinicians, but provides a way to monitor the impact of services provided to patients. Organizations in the following studies, using Care Innovations' Remote Patient Management (RPM) system, saw vast improvement in their clinical outcomes. The organizations included Sutter Health, GE Aviation, Alberta Health Services, and the American Heart Association, to name a few. Patients in these studies suffered from chronic diseases, including diabetes, chronic heart failure and COPD. The outcomes included less hospitalizations, decreased morbidity rates and improved quality of life.

ST. VINCENT

Study

Reducing Hospital Readmissions via Remote Patient Management

Study Description

- St. Vincent implemented a remote care management program and utilized the Care Innovations® Guide platform to facilitate care delivered in the home.
- St. Vincent had a goal of reducing hospital readmissions for patients with congestive heart failure (CHF) and chronic obstructive pulmonary disease (COPD) in an effort to help them stay out of the hospital, away from the emergency room, and reduce the frequency of readmission. A total of 142 patients were recruited for the trial.

Results

The key outcomes included:

- Readmissions in the intervention group were reduced by 64% compared to the study control group 2 readmissions in intervention group; 7 readmissions in control group, statistical significance p=.04.
- Patient Activation Measurement (PAM) levels of engagement were 18% higher for the intervention group. This is important because patients with higher PAM levels have 21% lower health care costs than patients with the lowest PAM levels, even after controlling for demographics and condition severity.

Testimonial

The biggest individual success story from the project, according to the Principal Investigator, Dr. Snell, involved a woman in her early 50s with nine chronic conditions and 11 total admissions in 2011, which cost roughly $156,000 that year. Over a seven-month span participating in the project, the woman did not return to the hospital once.

Publication

Published on FierceHealthIT (http://www.fiercehealthit.com) 2012

UNIVERSITY OF MISSISSIPPI MEDICAL CENTER DIABETES TELEHEALTH NETWORK

Study

Improving type 2 diabetes self-management: remote monitoring technology facilitates patient engagement

Study Description

This study was designed to measure the impact of connecting rural diabetics to chronic care managers utilizing a remote care management solution. The Mississippi Telehealth Network was established to demonstrate the effectiveness and cost savings of providing diabetes management in the home, with the ultimate goal of obtaining legislation that would reimburse for this intervention.

Results

A total of 100 patients completed the study. There was a 1.7% average reduction in HbA1C for the intervention group. There were zero hospitalizations and emergency department visits during the time the patients were in the monitoring program. Health session compliance was 83%; medication compliance improved to 96%; 9 patients were diagnosed with retinopathy as a result of the intensive monitoring program; and 71 patients in the study lost weight. The estimated mileage saved from patients not having to come into the clinics for care was 9,454. The total cost savings for Medicaid for this population was $339,184. Mississippi amended the Medicaid rules and regulations to further support telehealth as a result of this study. Mississippi was the first state to pay a transmission fee for telemedicine and Medicaid reimbursement has now been introduced based on the results of this study.

Publication

Poster Presentation: Henderson, K., 2015, How Mississippi is Leading the Way in Innovation.

SUTTER HEALTH INTEGRATED DIABETES EDUCATION NETWORK

Study

Improving type 2 diabetes self-management: remote monitoring technology facilitates patient engagement

Study Description

This randomized control study was designed to specifically include all structured SMBG (self-monitoring of blood glucose) elements. The purpose of the study was to evaluate the effectiveness of a telehealth intervention combining structured self-monitoring of blood glucose and nurse care coordination to improve outcomes in persons with type 2 diabetes, noninsulin-treated.

Specifically the researcher compared the effectiveness of a 12-week remote monitoring intervention with paired testing to usual care in individuals with elevated A1C. The primary aim was to compare mean change in A1C, the secondary aim was to compare mean change in self-management behaviors, self-efficacy, and diabetes knowledge.

The intervention group received the nurse care coordination the same as the usual care. In addition, they received a one-time training and education session on structured SMBG, specifically paired testing and setting small behavior change goals. They also had training on how to use the Guide tablet. On a DAILY basis, they received education FROM the Guide focusing on the AADE 7 self-care behaviors and rotated through an 84-day course, which was the same for everyone. Topics included healthy eating, monitoring, preventing complications etc. In addition, the participants uploaded their glucose data TO the Guide and data was transmitted to a research portal. There were WEEKLY virtual visits through secure messaging using the Sutter MHO PHR. These visits consisted of asynchronous feedback on their paired glucose testing values that were automated along with individualized feedback from the team. MONTHLY there were telephone calls with the disease management nurses where they reviewed the past month paired testing data, virtual visit feedback and then assisted with goal setting, behavior change, and if needed discussed medication and treatment changes.

Results

- The difference between the Intervention group and Control at 6 months was statistically significant, the Intervention group rate of change in A1C was greater than control.
- A change in medication was significantly associated with A1C level.
- The number of paired glucose tests was not statistically significant on change in A1C but there was a trend toward improvement.

Publication

Greenwood DA, Blozis SA, Young HM, Nesbitt TS, Quinn CC. Overcoming Clinical Inertia: A Randomized Clinical Trial of a Telehealth Remote Monitoring Intervention Using Paired Glucose Testing in Adults With Type 2 Diabetes. J Med Internet Res 2015;17(7):e178

PROVIDENCE

Study

Providence Observational Telehealth Trial Administered by Clinical Pharmacists

Study Description

This was a 30 patient observational study managed by clinical pharmacists at Providence Medical Center in Portland, Oregon. The duration of the monitoring period was 4 months. The primary endpoint was change in HbA1c. Secondary endpoints included patient adherence, knowledge of chronic condition, improved glucose control, patient satisfaction and clinician satisfaction. Patient inclusion criteria was type II diabetics with HbA1c levels > 8%. The Providence Institutional Review Board approved this study.

Results

Reduction in HbA1c Levels

The mean A1C at baseline for the 28 study participants was 9.8% (SD 2.08). The mean A1C decreased to 8.5% (SD 2.20) at study end. This was a statistically significant reduction (Δ= -1.3%, p=0.001).

The percent of participants with an A1C > 9% (poor control) decreased from 50% to 29%, and 21% achieved the American Diabetes Association A1C goal of < 7%. In contrast to the study participants, the mean A1C increased for the 17 patients who consented but did not participate in the study (Δ= 0.1%).

Improved Control of Blood Glucose Levels

Analysing the trends based on the collected data found the mean blood glucose values decreased significantly over the 16-week study period from 178 mg/dl (SD 67) at week one to 163 mg/dl (SD 64) at week 16 (p=0.0002). The median and standard deviation values demonstrated similar trends. In addition, percentages of blood glucose values between 70-180 mg/dl increased over the 16-week period from 50% to 70%, while incidence of hypoglycemia remained low.

Improve compliance with the American Diabetes Association Guidelines for Diabetes Care

A key indication of improved blood glucose control is determined by the patient's compliance with the American Diabetes Association (ADA) guidelines for blood glucose values. The ADA's lower control limit is 70 mg/dl and the upper limit is 130 mg/dl before meals. Compliance increased from 27% in week 1 to almost 37% in week 17.

Publication

Klug, C., Bonin, K., Bultemeier, N., Rozenfeld, Y. Stuckman Vasquez, Johnson, M. & Cheitlin Cherry, J. (2011). Integrating Telehealth Technology Into A Clinical Pharmacy Telephonic Diabetes Management Program. Journal of Diabetes Science and Technology; 5(5): 1238-1245.

ADVANCED TELEHEALTH SOLUTIONS: GE AVIATION

Study

GE Aviation Telehealth Study for Patients with Diabetes Mellitus

Study Description

Advanced Telehealth Solutions (ATHS) began a study in conjunction with GE Aviation to monitor and educate individuals with a diagnosis of Diabetes Mellitus utilizing the Intel Gigabyte monitor. The primary objective of the study was to reduce HgbA1c levels.

Secondary objectives included increasing participant's knowledge of Diabetes management, decrease the overall cost of care and increase medication compliance. Participants were asked to test their vital signs and their blood glucose levels a minimum of one time per week. Each week the participants received diabetic education. Every three months they were asked to complete the diabetes knowledge test. In addition, the participants HgbA1c was obtained at the beginning of the study and every six months for the duration of the study. A satisfaction survey was also conducted at 3 months and again at completion of the study.

Results

- HbA1c: There were a total of 83 Participants enrolled in the program.
- 75 Participants (90%) submitted an initial A1c
- 8 Participants (10%) did not submit an initial or subsequent A1c and declined participation
- Average Beginning A1c: 9.47

- Average Ending A1c: 6.89 (Decrease of 37%)
- Average A1c of Participants on the Program 1 year: 8.6
- Average A1c of Participants on the Program 2 years: 6.8 (Decrease of 26%)

BLOOD GLUCOSE

YEAR ONE	YEAR TWO
32% of Participants increased the frequency they checked their blood glucose to at least daily year one of the program	34% of the Participants increased the frequency they checked their blood glucose to at least daily year two of the program
32% of the total Participants decreased their average blood glucose readings by 24 points year one of the program	51% of the total participants decreased their average blood glucose readings by 23 points year two of the program

BLOOD PRESSURE

YEAR ONE	YEAR TWO
52% decrease in Systolic B/P for Participants year one of the program	59% decrease in Systolic B/P for Participants year two of the program
34% decrease in Diastolic B/P for Participants year one of the program	63% decrease in Diastolic B/P for Participants year two of the program

WEIGHT

- 18% of Participants lost greater than 5% of their body weight averaging a 20 lb. weight loss
- 37% of Participants lost less than 5% of their body weight averaging a 5 lb. weight loss
- Average weight loss of Participants on the program year one was 5% of their body weight
- Average weight loss of Participants on the program year two was 5% of their body weight

DIABETIC KNOWLEDGE TEST

- 64 of 83 Participants (77%) took the DKT at least once
- 19 of 83 Participants (23%) did not take the DKT
- The average beginning DKT score was 16.6%
- The average ending DKT score was 18.4% (6.7% increase)

SATISFACTION SURVEY

The training I received prepared me to use the equipment	91% Agree / Strongly Agree
If I had any concerns, my Telehealth nurse was available to help me.	97% Agree / Strongly Agree
My Telehealth nurse is aware of my health needs	100% Agree / Strongly Agree
I feel this program has improved my ability to manage my health care needs	97% Agree / Strongly Agree
I am happy my employer provided this program as an added benefit	97% Agree / Strongly Agree
Overall, I am satisfied with the Health Guide	100% Agree / Strongly Agree

Participant Testimonials

- A1c decreased to 6.2 and Participant lost 30 lbs. during the program. Participant was able to decrease the dosage of their blood pressure medication, had a change in attitude toward their Diabetes and had an understanding that daily monitoring was very beneficial and desired that the Diabetes program would continue.
- A1c decreased to 7.0 and Participant found it helpful to have someone available to ask questions and receive support.

Publication

GE Aviation Telehealth Study for Patients with Diabetes Mellitus; Final Report, December 2013.

ALBERTA HEALTH SERVICES

Study

My Home Health: A Virtual Care Management Pilot Program for Self-Management of Congestive Heart Failure

Study Description

The Ivey International Centre for Health Innovation at the Ivey Business School, the Institute of Health Economics, and GE Healthcare collaborated with the Government of Alberta via Alberta Health Services (AHS) to conduct research exploring innovative models in which costs and healthcare challenges could be addressed through a virtual care management (VCM) model. The objective of the project was to explore the effectiveness of a remote monitoring model for patients with

congestive heart failure. The intervention was for a duration of 6 months, with a continued followed up for another 6 months after the intervention was completed.

Results

A total of 103 patients completed the 12 months study. This study found that the VCM program has the potential to improve patient, caregiver, and provider experiences of care, improve self-reported health outcomes over a relatively short 6-month period, and potentially reduce health system costs in the CHF population.

The researchers reported the following key results:

POPULATION HEALTH RESULTS

- The population health impact was not limited to the duration of the program. Patients reported that one of the primary benefits of the VCM program was establishing a routine. Even after the program had ended, 79% of participants indicated that they were still using at least one element from the VCM program in their regular routine.
- Compared to the baseline, health related quality of life of patients increased at 6 months but decreased at 1 year, 6 months after enrolment in the VCM program was discontinued. This decrease in health status from 6 to 12 months may be due to the removal of the VCM after the first 6 months.

PATIENT EXPERIENCES OF CARE RESULTS

- Patients believed that the VCM program yielded better patient care and health outcomes. In particular, patients felt more secure in having a healthcare professional readily available for any questions, more confident that any potentially dangerous health scenarios would be caught, and more certain that unnecessary or conflicting medications would be corrected.
- Patients felt that the technology was easy to use in the program. 86% of participants indicated that using the VCM was somewhat to not difficult.
- Patient ratings of the VCM were very positive, with 89% of participants indicating they would “probably” or “definitely” recommend the program to others, and 77% rating the program 8-10 on a 10 point scale (where 10 is most positive).
- Positive patient perceptions of the VCM program were long-lasting. At the 12-month mark, 6 months after the VCM program had ended, 89% of patients would still recommend to others.
- Participants’ responses to surveys demonstrated that the VCM program is more effective to, and valued by, participants with specific demographics. In particular, participants who had a more basic computer proficiency rated the program higher than those with more advanced proficiency. Similarly, individuals over the age of 64 were more likely to rate the program higher than those under 64.

CAREGIVER EXPERIENCES OF CARE RESULTS

- Caregiver participants indicated that the VCM program reduced their caregiver burden. By empowering patients to self-manage more than they had in the past, many of the tasks that once had to be completed by caregivers could now be completed by the patient. The emotional burden was also reduced, as caregivers felt reassured that they were no longer “alone” in managing care, and had the support of regular monitoring and communication with health providers. corrected.
- Caregivers felt that the VCM program improved their awareness and knowledge surrounding CHF management. Both the

educational modules and regular conversations with the VCM nurse were highlighted as key beneficial resources for patient and caregiver education.

PROVIDER EXPERIENCES OF CARE RESULTS

- Providers indicated that upon implementation of the VCM, their workload increased due to the extra patient education required to introduce them to the VCM. However, they also highlighted that this diminished over time, and ultimately resulted in a decreased workflow. Much of this decrease is due to the VCM program's ability to catch clinical problems as early as they present, so that less time-consuming preventative measures can be implemented immediately, avoiding major complications.
- Providers suggested that patient compliance increased as a result of the program, as patients were empowered to take responsibility for their own health.

PER CAPITA COSTS RESULTS

- After enrollment in the VCM program, patients used less health services resulting in reductions in health care costs.
- Majority of the reductions occurred in the period from 0 to 6 months after enrolment in the VCM program when the intervention was going on.
- Reductions in hospital admissions accounted for most of the reductions in health care costs.

Publication

Home Health: A Virtual Care Management Pilot Program for Self-Management of Congestive Heart Failure. Final Report. Ivey International Centre for Health Innovation and Institute of Health Economics, Edmonton, Alberta. February 2016.

AMERICAN HEART ASSOCIATION

Study

An Observational Study of Deployment of American Heart Association Heart Failure Protocols and Educational Content Within the Intel® Health Guide System Post Discharge.

Study Description

- This was a single center, unblinded, non-randomized feasibility study of tele monitoring with embedded patient education. The University Hospitals Home Care Services program is a large home care agency in Ohio and was chosen for the study and was the source of referrals.
- This nurse-driven program was available to Medicare recipients who were discharged home and met eligibly criteria for home care services.
- The Institutional Review Board of the University Hospitals Case Western Medical Center approved the study. The purpose of this study was to examine short-term (60-day) health-related quality of life and re-hospitalization after implementation of the Care Innovations® Guide deployed with the American Heart Association guideline-based heart failure protocols for monitoring and managing clinical status, symptoms and delivery of relevant patient education to enhance patients' understanding of and management of heart failure.

- Utility was defined as days of activity and interaction of the patient with the monitor / days of actual monitoring possible.
- Adherence was defined as the percent of actual completed sessions from the number of scheduled sessions. Re-hospitalization data were acquired directly from patients or caregivers and primary care physicians.

Results

Improved Quality of Life

Health status was assessed by the Kansas City Cardiomyopathy Questionnaire (KCCQ) pre and post monitoring periods. The KCCQ is a 23-item, self-administered instrument that quantifies physical function, symptoms (frequency, severity and recent change), social function, self-efficacy and knowledge, and quality of life. The Care Innovations® Guide, when used by a clinician to deliver a heart failure program, improved health related quality of life, as evidenced by Kansas City Cardiomyopathy Questionnaire clinical scores increased significantly from 49±25 at baseline to 63±26 at 60 days (p=0.039).

Relationship of Compliance and Utility with Re-hospitalization

There was a statistically significant association noted between utility, adherence, and rate of re-hospitalization. Using generalized estimating equations, greater utility (days with activity per monitored days) but not adherence (completing scheduled sessions) scores were correlated with improvements in health status by KCCQ Clinical Summary score (p=0.013) and Overall Summary score (p=0.0056). Less patient utility and adherence were associated with re-hospitalization. Median adherence and utility for those not re-hospitalized (97.2% and 96.9%, respectively) were greater than for those re-hospitalized (67.4% and 82.2%: p=0.013, p=0.006, respectively).

Publication

Piña, I.L., Albert, N.M., Fonarow, G.C., Catha, G., Wayte, P., Plank, T., Bruckman, D., Holmes, P., & Kikano, G. (2011) An Observational Study of Deployment of American Heart Association Heart Failure Protocols and Educational Content Within the Intel® Health Guide System Post Discharge. In Press.