Introduction

What is Telemonitoring?

Telemonitoring is the use of telecommunication devices, placed in the patient’s home, that take vital signs and relay the information back to the home health agency.

When readings are outside the parameters set by the physician, an immediate home intervention takes place to address the patient’s needs.

Telemonitoring is different than telehealth (telemedicine) which generally refers to the use of video conferencing, often by physicians, to provide diagnostic information.

*I have no financial relationship with a commercial entity producing the healthcare-related products and/or services relevant to the content I am presenting.* Peter Cobb
Simple but Effective
Telemonitoring Defined

Telemonitoring allows the agencies to collect vital patient data and to transmit the data to nurses and to the patients’ physicians for daily review. It asks a series of evaluative health-related questions tailored to meet each patient’s unique ailment and quickens the response time when action is needed.

Telemonitoring data, available as-needed, gives physicians and discharge planners confidence that they can safely discharge their high risk patients to the home.
Patient-centered

- **Patient-centered** - Through this state-of-the-art technology, patients and their family members are directly involved in the home healthcare process on a day-to-day basis. The program provides the patients with a greater feeling of connectivity to the agencies and the security of knowing their health is being monitoring seven days a week.

- In addition to tracking and measuring their recovery progress, telemonitoring also helps them follow the doctor’s recommended suggestions about diet, exercise and medication with greater ease.
Sample Questions

- Are you experiencing more difficulty breathing today than compared to a normal day?
- Are you having pain?
- Have you had any chest pain?
- Do you have severe heartburn today?
- Have you developed a cough?
- Has your wound changed size and or color?
- Have you noticed a change in the drainage of your wound?
- Are you having trouble with urination?
- Have you had blurred vision today?
- Are you having difficulty swallowing?
- Have you had to use your oxygen in the last day?
Health Care Reform

Telemonitoring is consistent with the triple aim of health care reform and is one of many tools home care agencies use to improve health outcomes, enhance the patient experience and reduce the cost of health care for Vermonters.

Lowers Costs (Fewer and shorter hospitalizations – some patients avoid hospitalization altogether and some patients are admitted sooner than their counterparts without telemonitoring, thereby resulting in reduced length of stay.)

Fosters Higher Quality Care (Problems are discovered earlier.)

Increases Patient Satisfaction (Empowers patients to manage their care.)
Nursing Shortage - Initially, most telemonitoring programs were intended as a response to the nursing shortage. It soon became evident, however, that there were other, far-reaching benefits to telemonitoring, including improved clinical outcomes of monitored patients, decreased re-hospitalization rates, and cost savings for the agencies.
When To Use Telemonitoring

Telemonitoring is most useful for patients with:

- Congestive Heart Fail (CHF)
- Chronic Obstructive Pulmonary Disease (COPD)
- Following Cardiac Surgery
- Hypertension
VT Patient Profile

Average Daily Patients Census Using Telemitors (Jan. 2014) - 222 Patients with Telemitors (22,000+ Total Patients)

- 53% Congestive Heart Failure
- 23% Chronic Obstructive Pulmonary Disease (COPD)
- 6% Hypertension
- 6% Following Cardiac Surgery
- 18% Other
Easy to Use
Benefits of Telemonitoring

- Early detection
- Earlier intervention
- Reduces hospitalization and rehospitalization rates for high-risk patients
- Supports healthy lifestyles
- Empowers patients
- Improves quality of care
- Provides better coordination between agency, patient and physician
One nurse can monitor several dozen patients
Proven Results

DATA from Central Vermont Home Health and Hospice

- National Home Care Rehospitalization Rate - 16%
- Rehospitalization Rate for CVHHH Patients using Telemonitors - 8%
- CVHHH Rehospitalization Rate for Patients with COPD using Telemonitors - 4%
- Average Cost Per Patient Using Telemonitors/Per Episode - $880
- Average Cost Per Adjusted Hospital Stay in Vermont (2013) - $11,908
- Average Cost for One Day in a Vermont Hospital - $1,659

FROM CVHHH Report – “It is reasonable to expect that CHF and COPD hospitalization rates would be higher than the national hospitalization rate since these patients are fragile, chronic, and high risk.”
Telemonitoring and CHF

National Average hospital readmission rate 16% - 21013 (for all diseases)

- All patients with telemonitors - 8%
- Congestive Heart Failure with telemonitors - 9%
- Medicare patients/telemonitors - 7%
- COPD/telemonitors - 4%

Central Vermont Home Health and Hospice - Hospital Readmission Rate
Proven Results

Rehospitalization Rates for the Rutland Area VNA and Hospice (5/12 - 5/13)

- All Patients: 9.75%
- Non CHF Patients Using Telemonitors: 8.7%
- Congestive Heart Failure Patients Using Telemonitors: 2.75%
The VNA of Chittenden and Grand Isle Counties provided services to a patient with COPD from July 2013 to December 2013. From July through November the patient was admitted to the hospital four times. In November, a telemonitor was provided. Since then there have been no hospitalizations for this patient. (Assuming each hospitalization costs the state an average of $12,000 per admission the total costs for hospital services was $48,000.)
The largest VNA in northern Illinois, the Visiting Nurses Association of Rockford, expanded access to its remote patient monitoring (RPM) services to previously non-qualified, high-risk CHF patients.

Within a year of Heart & Vascular Program implementation, the readmission rates at the Rockford Memorial Hospital had dropped from 25 percent to 17 percent.
Telemonitoring and CHF

VNA of Rockford, Illinois – Hospital Readmission Rate
Not Just Machines

- Make the first visit within 24 hours of hospital discharge
- Make 2nd skilled nursing visits or at least 1 visit and 1 phone call within 48 hours of hospital discharge
- Use telemonitoring
- Perform head to toe assessment and begin assessing a person’s health literacy
- Clinicians employ motivational interviewing in establishing goals of care
- Reconcile medications
- Red flags: teaching the patient important signs and symptoms and when to contact their provider
- Ensure MD follow up appointment is scheduled and access to transportation within 7-14 days of hospitalizations
This telemonitored patient is a 56 year old woman with a primary homecare diagnosis of end-stage COPD (chronic obstructive pulmonary disease) and is oxygen dependent. She has secondary diagnoses of anxiety and depression. She is on a waiting list for a lung transplant. She started on telemonitoring on 9/27/13 after a hospitalization for COPD exacerbation and acute bronchitis. Her program consists of her measuring her own oxygen saturation and pulse. She is called by a nurse on a daily basis, in addition to scheduled visits by a nurse two times per week. She received extensive instructions on her medications and signs and symptoms of decompensation that warrant a phone call to the agency (or to her physician).
In December, the Bennington, VT agency admitted a 73 year old man with a primary diagnosis of COPD. The patient had been in the hospital Emergency Department just prior to homecare admission and had 3 inpatient hospital stays since July 2013 for COPD/respiratory related illness. Telemonitoring was initiated for this patient on 12/23/13. Based on telemonitoring data received on 12/30/13, a call was placed to the patient and, after review of the data and speaking to the patient, an RN visit was made. The nurse contacted the doctor with this information who requested to see the patient in the physician’s office and new treatments were ordered. It is very likely that this patient would have gone back to the ER, but that was avoided because the home care staff recognized that the telemonitoring results necessitated a call to the patient, an RN visit, and timely follow up by the physician.
Stories from Telemonitoring

B., a 75 year old widow and patient of the Lamoille Home Health Agency, had been using a telemonitor for the past year. She had not had any rehospitalizations or emergency room visits since the monitor went into her home, prior to that she was seen 3-4 times a year in the emergency room for shortness of breath. She has a history of congestive heart failure and has frequent exacerbations of her disease. With the monitor, the Lamoille agency was able to see weight gain and increases in her blood pressure, which prompted a phone call to the patient and then a home visit when needed. Having a nurse go to B.’s home and then calling the physician with this data has enabled the physician to make medication changes that have allowed B. to stay at home. B. tells the Lamoille staff frequently that she likes knowing someone is watching out for her each day and states “it’s like having a nurse live with you!”
On 10/15/13 during the routine telehealth call, the patient reported increased respiratory symptoms. The telehealth nurse reported this to the patient’s home care nurse and the nurse saw the pt. for an unscheduled visit. After the nurse’s assessment and communication with the MD, the patient was started on medications to treat an exacerbation of COPD, all on the same day. A hospitalization was likely averted (certainly this saved an ER visit, which was the patient’s prior pattern). This scenario has repeated itself 3 times since then – each time telehealth detected signs/symptoms of decompensation and this led to patient having treatment changes to address the problem. The patient has not been hospitalized since telehealth started. She is much more involved in taking ownership of her healthcare since this started.
One telemonitored patient of the Addison agency is a 55 year old woman who has the following medical diagnoses: CHF, COPD, HTN, obesity, sleep apnea, and lumbar compression fractures. She is dually eligible for both Medicaid and Medicare. She was admitted to the agency on July of 2011 and started telemonitoring on 9/20/2011. She measures her blood pressure, pulse, weight, and oxygen saturation on a daily basis and our telemonitoring nurse calls her daily. She has had one hospitalization since that time, for pneumonia. She has had periodic exacerbation of symptoms but these have been managed by the interventions which started with collaboration with the telemonitoring nurse, the field nurse and the physician. This program has greatly increased the patient’s involvement in the management of her health care.
Telemonitoring Studies

Impact of Home-Based Monitoring on the Care of Patients with Congestive Heart Failure

*Home Health Care Management & Practice*, October 2006, Volume 18, Number 6
Authors: Myers, Grant, Lugn, Holbertand, Kvedar.

Summary: “Daily home care telemonitoring reduced the frequency of home nursing visits, provided costs savings and was associated with improved self-perceived quality of life.”

Scaling Telehealth Programs: Lessons from Early Adopters

*The Commonwealth Fund* pub, 1654, Vol. 1
Authors: Broderick and Lindman

Summary: The article is a summary of three telemonitoring programs: The Veterans Health Administration, Partners HealthCare, and Centura Health and Home. The conclusion of the three programs is: “Remote patient monitoring (RPM) – like home telehealth and telemonitoring – can help improve coordination, improve patients’ experience of care, and reduce hospital admissions and costs.” According to the article, in order for a telemonitoring program to be successful the home care agency must: Promote culture of openness and preparedness; use a multidisciplinary team-based approach; establish leadership support; minimizing barriers to enrollment, like costs; and include nonstandard measures, like patient experience and staff satisfaction, in program evaluations.
Telemonitoring Studies

Effects of Intensified care for Heart Failure Patients by Telemonitoring
Authors: Zuccda, Haver, Neikrich and Rauchhaus

Summary: This document is a summary of a telemonitoring study. The article is posted at: www.mendeley.com.

The study compared 415 patients with heart failure who when discharged from the hospital received telemonitoring services compared to 1755 patients with similar conditions who did not receive telemonitoring services. According to the study the hospital admissions and hospital days per year “were significantly lower in the intervention group (those who received telemonitoring). Hospital costs for one year were significantly lower (by 75% in the intervention group compared to the control group. Initial findings of this analysis using, routine data, suggests that telemedical care and telemonitoring in heart failure may improve morbidity and thereby quality of life while saving hospitalization costs.”

Examples of Research Outcomes – Telemedicine’s Impact of Healthcare Costs and Quality
American Telemedicine Association, April 2013

Summary - This article, which is from the trade journal of the American Telemedicine Association, is a summary of about two dozen studies of telemonitoring program, all of which showed similar, positive results – better care and lower costs to the system.
Telemonitoring Studies

Telehome and Remote Monitoring: Ann Outcomes Overview

The Advanced Medical Technology Association
Authors: Stachura, and Khasanshina

Summary: This is a report prepared by the Medical College of Georgia for the Advanced Medical Technology Association. “Telehomecare and remote monitoring are increasingly recognized as valuable tools for enhancing care quality in chronic disease management…. The results of studies to date are promising and show clear value in remote monitoring and telehomecare. But they also point to technology, infrastructure, access and reimbursement issues that must be addressed for maximal care quality improvement and cost savings.”

Telemedicine Recommendation
Report prepared for the Maryland Quality and Cost Council
Authors: Bass, Steffen

Summary: This is a report on telemedicine (video conferencing) rather than telemonitoring. The results of this study are consistent with the results for the various studies on telemonitoring – offsite monitoring health services improve health care delivery. “Effective use of telemedicine can increase access to health care, reduce health disparities and create efficiencies in health care delivery…. Telemedicine can bridge the gaps of distance and health care delivery.”
Telemonitoring Studies

Home Telehealth Improves Clinical Outcomes at Lower Cost for Home Healthcare

Authors: Finkelstein, Speedie

Summary: What is included here is an abstract from a study on telemedicine and home health care. The results are consistent with the studies cited above. “This study has demonstrated that virtual visits between a skilled home healthcare nurse and chronically ill patients at home can improve patient outcome at lower costs than traditional skilled face-to-face home healthcare visits.”

Cost Comparison Between Telemonitoring and Usual Care of Heart Failure: A Systematic Review

Telemedicine and e-Health, Vol 14m No 7, September 2008 – Emily Seto, P. Eng, M.Sc

Summary – This article is a summary of several studies. “All the studies found cost reductions form telemonitoring compared to usual care, which ranged form 1.6% and 68.3%”
Telemonitoring Studies

*Telehome and Remote Monitoring: An Outcomes Overview*

The Advanced Medical Technology Association

Authors: Stachura, and Khasanshina

Summary: This is a report prepared by the Medical College of Georgia for the Advanced Medical Technology Association. “Telehomecare and remote monitoring are increasingly recognized as valuable tools for enhancing care quality in chronic disease management….The results of studies to date are promising and show clear value in remote monitoring and telehomecare. But they also point to technology, infrastructure, access and reimbursement issues that must be addressed for maximal care quality improvement and cost savings.”
Not all studies have shown positive results.

**The Impact of Remote Patient Monitoring (Telehealth) upon Medicare Beneficiaries with Heart Failure** *Telemedicine and e-Health*, March 2012, Vol. 18, No 2

Authors: Pekmezaris, Pecinka, Lesserm Swiderski, Younker

“Conclusion: RPM, when utilized in conjunction with a robust management protocol, was not found to significantly differ from live nursing visits in the management of CHF in home care. Shorter hospitalization times and lower associated cost may be due to earlier identification of exacerbation. These trends indicate the need for further study.”

**Cost Factors in Implementing Telemonitoring Programs in Rural Home Health Agencies** *Home Health Nurse*, 2001 June 29

Authors: Hansen, Golbecfk, Noblitt, Pinsonneaultm Christner

Summary – “Cost analysis did not demonstrate economic benefit of telemonitoring in rural communities. Savings likely to be realized through improved clinical outcomes and decreased resource use and costs.” Diagnoses not mentioned
Home telemonitoring for chronic disease management: an economic assessment.  
*Inter J Technol Assess Health Care*, 2013 April 29

Authors: Pare, Poba-Nzaou, Sicotte

Summary: Increases in the number of home visits by nurse seen even with use of telemonitoring. “Additional assessment should be conducted to confirm the cost-effectiveness of this model of care delivery”
Challenges

- Purchase Costs - Initial cost for purchase/lease of the monitors.
- Support Fees - Ongoing monthly cost of licensing, connectivity and maintenance.
- Service Limits - The need for ongoing telemonitoring after the patient is no longer eligible for Medicare reimbursement.
- HIE - Availability of patient data across the continuum of care.
  
  Interfacing telehealth data to Home Health Systems/VHIE -
  
  Patient demographics, physicians, contacts, vital readings

Interface challenges & costs

Various Home Health Vendors
EHR/Telemonitoring Interface

- **Lamoille Home Health**: “The addition of the interface has greatly increased the productivity and efficiency of our staff and has eliminated the potential for clerical errors. Prior to the interface all data collected by the telemonitors had to be manually entered into our EMR software. This increased the possibility of clerical error and was time consuming.”

- **Caledonia Home Health**: “The tele-monitoring interface with our EMR has significantly improved the effectiveness of our tele-monitoring program. The staff visiting patients in their home now have instant access to the tele-monitoring results on their portable laptops and can identify trends or problems much quicker. This allows the staff to provide more efficient education to the patient in managing their condition and symptoms.”

- **VNA VNH**: “This interface has provided a great resource for our staff, and even more importantly has played an important role in the overall improvement of health in our population.”
Links of Interest

Website Links to articles in support of telemonitoring

Home telehealth improves clinical outcomes at lower cost for home healthcare.  


The center’s Connected Cardiac Care Program has enrolled more than 1,200 patients since its introduction in 2006 and has experienced an approximate 50 percent reduction in heart failure hospital readmission rates overall for enrolled patients. The center estimates the program has generated total cost savings of more than $10 million since 2006. Human factors and social processes have been important in successfully introducing telehealth technology solutions into workflow and patient care. Technology has also had a positive impact on patient activation and engagement in self-care, helping to demonstrate to providers that this new program supports behavior changes that lead to improved care and quality outcomes”. Available on-line at:

http://www.commonwealthfund.org/Publications/Case-Studies/2013/Jan/Telehealth-Partners.aspx


http://www.commonwealthfund.org/~/media/Files/Publications/Case%20Study/2013/Jan/1654_Broderick_telehealth_adoption_synthesis.pdf

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