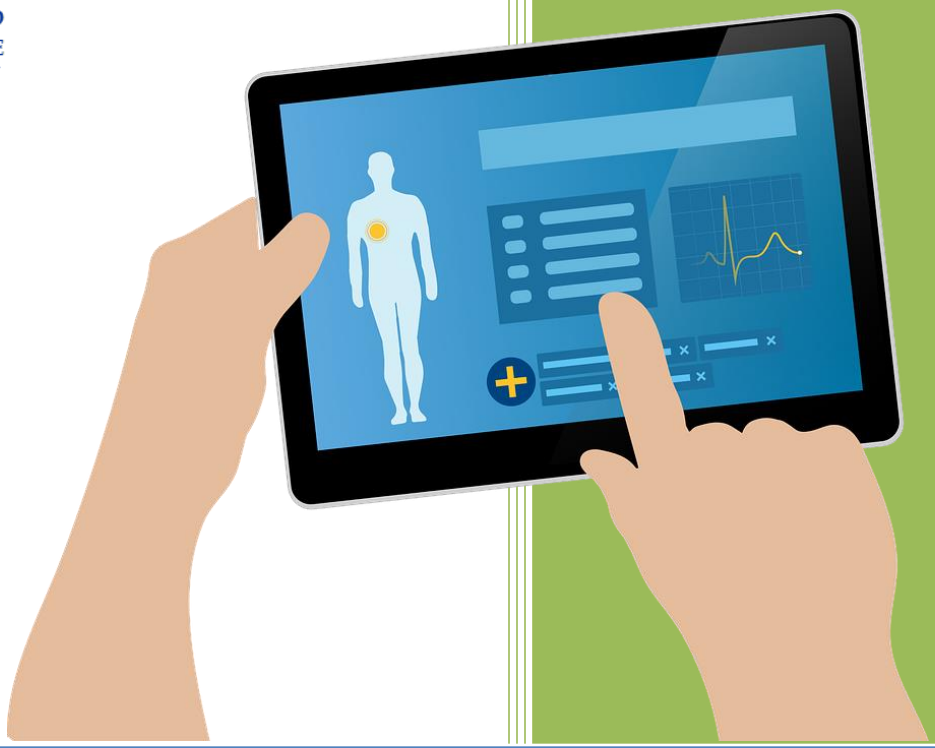
MARYLAND HEALTH CARE COMMISSION



Remote Patient Monitoring Telehealth Grants

Brief and Final Reports

March 2017

Participating Grantees:

Crisfield Clinic, LLC

Lorien Health Systems

Union Hospital of Cecil County

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Introduction

In June 2015, the Maryland Health Care Commission (MHCC) awarded telehealth[1] grants (herein referred to as "telehealth projects" or "projects") to three organizations to assess the impact of remote patient monitoring (RPM) on reducing hospital encounters, improving patient care, and decreasing health care costs. RPM is considered to be the use of digital technologies that collects health information from a patient in one location and electronically transmits that information to a health care provider (provider) in a different location for assessment and recommendations.[2] The three projects explored the effect of RPM on patient populations with varying health conditions and in different settings. As new models of patient care begin to emerge, RPM is considered to be a way to improve clinical outcomes while decreasing costs by enabling providers to proactively manage patient health conditions as they occur.[3] This report provides information on the grantees' implementation of RPM and lessons learned from their telehealth projects.

Background

The Maryland Health Quality and Cost Council (Council) established the Telemedicine Task Force (Task Force) in 2010 to develop a plan for a comprehensive statewide telemedicine system of care. In 2013, the General Assembly enacted legislation requiring MHCC, in conjunction with the Council, to study the use of telehealth. The Task Force final report in 2014 outlined 10 telehealth use cases that could be implemented to demonstrate value of telehealth.[4] The MHCC began awarding telehealth grants in 2014. As of February 2017, MHCC has awarded over $450K in grants to 11 organizations over five rounds.[5] Grant recipients were required to meet established financial match requirements.

About the Telehealth Projects

The round two telehealth awardees included: Crisfield Clinic, LLC (Crisfield); Lorien Health Systems (Lorien); and Union Hospital of Cecil County (UHCC). The MHCC awarded a combined total of $80K to the grantees over an 18-month period and required a 2:1 financial match. Crisfield, a rural family practice clinic in Somerset County, used mobile devices to help middle school and high school aged patients manage chronic health conditions, including asthma, diabetes, obesity, and behavioral health issues. Lorien, a skilled nursing facility and residential service agency, used

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[1] The terms telehealth and telemedicine are often used interchangeably, however, in general terms telemedicine is limited to clinical services and is defined, in Maryland law, as the use of interactive audio, video, or other telecommunications or electronic technology by a licensed health care provider to deliver health care services. See Md. Code Ann., Health-General § 15-105.2(b)(1)(iii). Telehealth is defined more broadly and can include non-clinical services such as patient education. More information is available here: chironhealth.com/blog/telemedicine-vs-telehealth-whats-the-difference/.

[2] Center for Connected Health Policy, *Remote Patient Monitoring*, Accessed February 2017. Available at: www.cchpca.org/remote-patient-monitoring.

[3] Care Innovations, *What Are the Benefits of Remote Patient Monitoring (RPM) for Patients?*, November 2016. Available at: populationhealthinsights.careinnovations.com/h/i/277286637-what-are-the-benefits-of-remote-patient-monitoring-rpm-for-patients.

[4] MHCC, *Maryland Telemedicine Task Force Final Report*, October 2014. Available at: mhcc.maryland.gov/mhcc/pages/home/workgroups/documents/tlmd/tlmd_ttf_rpt_102014.pdf.

[5] See Appendix B for a list of all grantees and a brief description of the telehealth projects funded by MHCC.

telemonitoring technology to provide 24/7 access to care among patients that were discharged from the skilled nursing facility to home with chronic heart failure, hypertension, and uncontrolled diabetes. UHCC used mobile tablets and peripheral devices[6] to monitor patients with chronic health conditions post discharge to reduce prevention quality indicators (PQI).[7] The round two projects shared a common goal of reducing hospital encounters using telehealth. Grantees were required to use a nationally certified electronic health record (EHR) and services of the State-Designated Health Information Exchange (HIE), the Chesapeake Regional Information System for our Patients (CRISP).[8, 9]

For the most part, grantees were successful in achieving key project goals at the conclusion of their projects. Lorien patients had fewer readmissions as compared to their readmission rate prior to the project. Lorien demonstrated a reduction in A1C values or participants with uncontrolled diabetes.[10] Crisfield's patients were successfully managed and avoided preventable emergency department encounters. Crisfield was able to show an improvement in the health of their patients and an increase in activity level throughout the project. UHCC patients had fewer readmissions as compared to other hospital patients. UHCC participants also had a lower 30-day readmission rate. All projects reported high levels of patient satisfaction.[11]

[6] Peripheral devices consist of equipment used as part of RPM to conduct specific clinical examinations or collect certain vitals.

[7] Prevention Quality Indicators (PQIs) are a set of measures that can be used with hospital inpatient discharge data to identify quality of care for "ambulatory care sensitive conditions." These are conditions for which good outpatient care can potentially prevent the need for hospitalization or for which early intervention can prevent complications or more severe disease. More information is available here: www.qualityindicators.ahrq.gov/modules/pqi_resources.aspx.

[8] An EHR is a digital version of a patient's paper chart. EHRs are real-time, patient-centered records that make information available instantly and securely to authorized users. The Office of the National Coordinator for Health Information Technology Health IT Certification Program ensures that health IT conforms to the standards and certification criteria adopted by the Secretary of Health and Human Services. For more information, visit: www.healthit.gov/policy-researchers-implementers/about-onc-health-it-certification-program.

[9] In 2009, CRISP was designated as Maryland's statewide HIE by MHCC. HIEs enable health care providers to transfer data through electronic networks among disparate health information systems. Information available through an HIE typically includes laboratory results, radiology reports, discharge summaries, consultation notes, history and physical notes, operative notes, and secure clinical messaging and referrals. More information about CRISP services is available here: crisphealth.org/services/.

[10] Hemoglobin A1c is used to measure blood glucose concentration. More information available at: www.medicinenet.com/script/main/art.asp?articlekey=17048.

[11] The reported outcomes are not based on scientific methods and are only observational.

Project Implementation

Patient Engagement

RPM requires patients to use technology to send their provider certain medical information and receive information about their condition.[12] Patient engagement is a fundamental driver in empowering patients to become active participants in their health care. Patients must feel comfortable using RPM technology to increase the likelihood of improved outcomes.[13] In general, learning how to use the technology can be overwhelming for some patients or caregivers. Studies show that introducing RPM by a trusted provider increases patient engagement.[14] In addition, meaningfully engaged families using RPM can influence patient acceptance.[15]

Project Activities

The approach taken by grantees to build patient awareness and comfort in using RPM technology varied. Lorien introduced residents and their family members to RPM technology by setting up demonstrations in their rehabilitation room so they could be familiarized with the technology prior to discharge. Lorien and UHCC went into patients' homes to educate them and their families about the technology, and would return to trouble shoot any technical issues. Crisfield introduced RPM technology to pediatric patients and their parents during an office visit. As part of the office visit, staff worked with patients and their families to install the application on their mobile device and provide guidance in using the technology. Crisfield staff followed up with patients to ensure they were using the technology, and provided additional training to patients and their parents during monthly office visits. UHCC introduced patients to RPM technology as part of their discharge planning process. Staff developed RPM protocols to engage patients at bedside prior to discharge. UHCC staff also telephoned patients if alerts received from the technology indicated they were not using the technology (e.g., not taking daily vitals). Lorien and UHCC provided additional training to patients on using peripheral devices (e.g., an electronic blood pressure cuff) through on-demand videos.

Lessons Learned

Continued education and support is required to ensure patients can effectively use RPM technology. Structured training that takes into account the clinical and technical aspects of RPM can improve patient compliance. Nursing home and hospital patients are less likely to decline RPM participation when they are engaged prior to discharge. RPM technology that incorporates social activities increases the likelihood that patients will consistently use the device. RPM is more impactful when patient monitoring occurs 24/7. School-aged children present unique challenges around participation in RPM programs. Continual participation is largely based on the parents' level of

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[12] Patients may be required to take vital signs using the technology or complete assessment questions regarding their health.

[13] The Commonwealth Fund, *Case Studies n Telehealth Adoption*, January 2013. Available at: www.commonwealthfund.org/~/media/files/publications/case-study/2013/jan/1654_broderick_telehealth_adoption_synthesis.pdf.

[14] LeadingAge Center for Aging Services Technologies (CAST), *Telehealth and Remote Patient Monitoring (RPM): Provider Case Studies 2013*, Available at: www.leadingage.org/sites/default/files/2013_CAST_Telehealth_and_Remote_Patient_Monitoring_%28RPM%29_Case_Studies_0.pdf.

[15] Computers in Human Behavior, *Remote patient monitoring acceptance trends among older adults residing in a frontier state. March 2015*, Available at: www.sciencedirect.com/science/article/pii/S0747563214006517.

commitment to the program. When parents remain actively involved, keep monthly appointments, and provide participation reinforcement, children experience better outcomes. Not all patients are well-suited to benefit from RPM. When identifying patients that might benefit from RPM, program adherence screening criteria needs to be considered.

Project Objectives and Measures

Establishing objectives and measures for each telehealth project occurred during the development phase. Selecting appropriate objectives and measures is significant in assessing the value of RPM on patient outcomes. SMART objectives are those that are Specific, Measurable, Attainable, Relevant, and Time-bound.[16] These objectives help define aspects of a project that should be monitored at certain intervals to determine progress towards meeting the objectives. Collecting and monitoring specific data allows project teams to make adjustments to protocols and processes.[17]

Project Activities

Lorien worked with patients diagnosed with hypertension and assessed if they maintained or improved their risk classification score.[18] They used information collected daily through a blood pressure peripheral device. Crisfield assessed patients' baseline on certain health indicators (e.g., A1C, rescue inhaler use, weight, etc.) and measured improvement over time. One of their objectives was to decrease baseline rescue inhaler use by 50 percent among asthma patients. UHCC focused on reducing 30-day readmission rates of patients with chronic conditions and frequent hospital encounters. Information pertaining to readmissions was collected using the CRISP Encounter Notification Service[19]; care managers assessed patient data through a dashboard.[20]

Grantees modified their protocols during the project period to ensure progress in achieving defined goals. Lorien's clinical team met weekly to review patient progress and adjust protocols as necessary when a participating patient had an avoidable hospital encounter. Crisfield implemented monthly office visits with participating patients to address patient data uploading challenges from their mobile devices. UHCC used performance information to modify their participation period from 30 to 60-days enabling patients to more effectively incorporate RPM technology into their daily routines.

Lessons Learned

Defining only clinical objectives and measures is not sufficient in designing an RPM project. Determining the impact of RPM on workflows, communications, provider and patient satisfaction,

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[16] More information about SMART is available at: www.kean.edu/sites/default/files/u7/SMART%20Objectives.pdf.

[17] National Archives and Records Administration E-Gov Electronic Records Management Initiative, *Recommended Practice: Developing and Implementing an Enterprise-wide Electronic Records Management (ERM) Proof of Concept Pilot*, March 2016. Available at: www.archives.gov/files/records-mgmt/pdf/pilot-guidance.pdf.

[18] Classification scores where based on the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC7).

[19] Encounter notification services sends real-time alerts to providers when one of their patients has had an encounter with hospital.

[20] RPM dashboards displayed key clinical and other information to the provider or care manager in a format that allow them a view of all patients being monitored.

and care coordination is equally important. Project performance goals were clinically-based and most participants' conditions either improved slightly or remained the same. Somewhat related, grantees reported an increase in participant awareness of their health and a willingness to become more engaged. In addition, a team approach to assessing RPM data is important to making timely adjustments to protocols.

Internet Connectivity

The Internet provides alternative ways to treat patients and is increasingly becoming part of the health care delivery process. It enables consumers to become more engaged in health care decision-making and supports providers in alternative care delivery models.[21] While RPM technology facilitates gathering and sending of health-related information to providers in real-time, it also stores information during a patient encounter. RPM technology relies on widely available Internet service. Generally speaking, most of the nation has some sort of access to the Internet.[22] Statewide, about 94 percent of Marylanders have access to Internet services, 25mbps or faster, and 99 percent have access to mobile broadband service.[23]

Project Activities

Grantees use of the Internet to monitor chronic health conditions represents evolving and dynamic changes in health care. Lorien installed cellular hotspots or Wi-Fi boosters at a patient's home to ensure Internet availability and signal strength. Crisfield utilized mobile devices that recorded patient data on the device. This information was downloaded to Crisfield's EHR during the patient encounter. UHCC assessed patients' Internet capability at the time the technology was installed in their home; signal strength and reliability was deemed sufficient for all participants.

Lessons Learned

The RPM patient selection process needs to include an assessment of Internet availability and reliability at a patient's home. Testing Internet speed and performance at different times will help inform criteria around patient selection. RPM programs need to consider options for patient monitoring when Internet connectivity challenges emerge. The absence of data collection during Internet outages hinders providers' ability to make clinical decisions remotely. Staff alerts when patient connectivity is lost is essential to monitoring patients and restoring Internet services. Better understanding of RPM data is needed to provide enhanced alerts and tailored recommendations to patients.

Technology Selection

Selecting the right technology is especially critical for RPM projects that often involve patients with specific needs.[24] RPM technology that is user friendly (i.e., easy to use) is more likely to be incorporated into a patient's daily routine.[25] This enhances the likelihood of achieving defined

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[21] Alternative care delivery models are those that emphasize quality of services and improved health outcomes; these models usually employ some form of a pay-for-performance system.
[22] According to the 2015 Broadband Progress report, issued by the Federal Communications Commission, approximately 83 percent of Americans have access to broadband Internet. For more information at: www.fcc.gov/reports-research/reports/broadband-progress-reports/2015-broadband-progress-report.
[23] According to BROADBANDNOW. Available at: broadbandnow.com/Maryland.
[24] Telehealth Resource Centers, Selecting the Right Technology for Your Telehealth Program, December 2011. Available at: hrsa.connectsolutions.com/p50219897/?launcher=false&fcsContent=true&pbMode=normal.
[25] Journal of Telemedicine and Telecare, *A systematic review of the literature on home monitoring for patients with heart failure*, July 2006. Available at: journals.sagepub.com/doi/abs/10.1258/135763306777889109.

project goals with effectiveness, efficiency, and patient and provider satisfaction. RPM acceptance is influenced by patients' attitudes toward the technology. Patients are more likely to embrace technology if they feel a sense of ownership and self-efficacy when using it.[26] Usability and acceptance of RPM technology can vary depending on the patient population and are key factors of success.[27]

Project Activities

RPM is increasingly viewed as a vital aspect to improving patient outcomes and quality of care for patients with chronic health conditions. The RPM technology used by grantees differed, and selections were based on defined project goals. Lorien identified five primary requirements in choosing RPM technology, one of which was ease of use.[28] Lorien selected a vendor that was easy to use for their senior population, including size appropriate graphics for an elderly population. Crisfield selected wearable solutions supported by Bluetooth technology that connected to a mobile device for ease of use by a pediatric population. During the initial phase of the project, Crisfield also implemented text messaging.[29] UHCC selected technology that integrated with its existing infrastructure. Peripheral devices used in the project were Bluetooth enabled and pre-configured to sync with a mobile tablet.[30]

Lessons Learned

RPM is more accepted by providers when implemented as an integral part of care delivery, as opposed to standalone technology. Intuitive provider dashboards based on select key performance indicators can help accelerate care delivery. Evaluating RPM requires prioritizing specific technology attributes in terms of current and future requirements. A thorough understanding of project requirements is essential in order to inform the selection of RPM technologies. Key elements in selecting RPM technology include video conferencing capabilities, integration of information into an EHR, support for clinical workflows, and inclusion of reporting and data analytics.

Patient/Care Manager Relationship

Greater access to care and reduced costs are necessary to meet the needs of new and evolving care delivery models.[31] Relationships may be the key as it is often reported in patient surveys that patients prioritize the interpersonal attributes of their providers and their individual relationships

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[26] Journal of Telemedicine and Telecare, *Determinants of successful telemedicine implementations: a literature study*, April 2007. Available at: journals.sagepub.com/doi/pdf/10.1258/135763307781644951.
[27] Ibid.
[28] The five included: 1) ease of use; 2) connectivity; 3) comprehensiveness; 4) flexibility; and 5) socialization ability.
[29] The text messaging software was subsequently discontinued due to privacy and security concerns, as the messages where not encrypted.
[30] For example, weight measurements collected by the scale were automatically sent via Blue-tooth to the tablet.
[31] Stewards of Change, *Improving Health, Human Services and Education Outcomes and Reducing Poverty*, Accessed on February 2017. Available at: stewardsofchange.com/learningcenter/documents/THOUGHT_LEADERS/Improving%20HHS%20Education%20Outcomes.pdf.

with providers above all else.[32] Thus, the patient-provider relationship is important and can impact health outcomes.[33] In treating patients with chronic conditions, care managers are becoming the main point of contact in coordinating patient care.[34] RPM is more likely to succeed in managing patient conditions when coupled with a care manager that has a strong rapport with their patients.[35, 36, 37]

Project Activities

Relationships are considered a keystone of care delivery and the medium used to guide decision-making. Lorien met with potential RPM participants within two-days of admission to their skilled nursing facility. They began the relationship building process with patients and their families in advance of discharge and were available 24/7 post-discharge. Crisfield relied on its existing relationships with patients and families to enhance care delivery through RPM. Relationship building occurred during office visits and in follow up telephone calls with patients and their families. UHCC developed an approach specific to each patient's condition during their in-patient stay at the hospital. Relationship building began with patients and their families prior to discharge, and once discharged, through follow up telephone activities.

Lessons Learned

Relationship building between the patient and provider is important to developing trust and it cannot be overstated.[38] Trust is one of the central features of a patient and provider relationship and is necessary in order to encourage patients to embrace RPM. Most patients have some exposure to using technology in some aspects of their daily lives. Gaining their trust to use it in care delivery depends largely on the provider's level of comfort with technology and their relationship with the patient. Providers need to understand how to use RPM technology prior to encouraging its use. When patients see providers struggling to use the technology, it can cause uncertainty in patients about its value in the delivery of their care. Relationship building requires action that needs to be initiated and sustained by the provider. It is through relationship building that patients become willing to accept RPM as a way to achieve better outcomes.

Project Sustainability

As a condition of award, grantees were required to develop RPM projects that could be sustainable at the conclusion of the grant. While there is generally a belief in the value of using technology in

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[32] Journal of the American College of Cardiology, *The Relationship Between Level of Adherence to Automatic Wireless Remote Monitoring and Survival in Pacemaker and Defibrillator Patients*, January 2015. Available at: www.ncbi.nlm.nih.gov/pubmed/25983008.
[33] Harvard Business Review, *Strong patient-Provider Relationships Drive Healthier Outcomes,* October 2015. Available at: hbr.org/2015/10/strong-patient-provider-relationships-drive-healthier-outcomes.
[34] Edward H. Wagner, *The role of patient care teams in chronic disease management,* February 2000. Available at: www.ncbi.nlm.nih.gov/pmc/articles/PMC1117605/.
[35] California Quality Collaborative, *Complex Care Management Toolkit*, April 2012. Available at: www.calquality.org/storage/documents/CQC_ComplexCaremanagement_toolkit_final.pdf.
[36] Journal of the American Medical Association, *Patient self-management of chronic disease in primary care*, November 2002. Available at: www.ncbi.nlm.nih.gov/pubmed/12435261?dopt=Abstract.
[37] Telemedicine Journal & E-Health, *The Current State of Telemonitoring: A Comment on the Literature*, February 2005. Available at: www.ncbi.nlm.nih.gov/pubmed/15785222.
[38] LeadingAge Center for Aging Services Technologies (CAST), *Telehealth and Remote Patient Monitoring (RPM): Provider Case Studies 2013*, 2014. Available at: www.leadingage.org/sites/default/files/2014_Telehealth_Case_Studies_Combined.pdf.

care delivery, oftentimes these initiatives fail during the operational phase.[39] Five major categories influence sustainability, including: technology, acceptance, financing, organization (e.g., work practices), and policy/legislation.[40] To ensure sustainability, projects that use technology, such as RPM, must be designed in a way that address these categories at different phases of project maturity.[41, 42]

Grantees believe the impact of their projects on patient outcomes and cost warrants continuation. Lorien plans to fund their program through a self-pay option for patients. Crisfield expects to fund their program through billable services to Maryland Medicaid and commercial payors.[43] UHCC intends to fund the program through its operational budget and will expand it under the Health Services Cost Review Commission's Regional Transformation Grant program.[44]

Limitations

Grantees deployed RPM differently, which minimizes the ability to complete a comparison of the findings across projects. The number of project participants makes it difficult to generalize the findings to other RPM initiatives.[45] Findings were self-reported by the grantees and not reviewed by a third party.

Remarks

Grantees demonstrated that RPM is a potentially viable way to improve care delivery and patient outcomes. More than 100 million people suffer from at least one chronic health condition nationwide. These conditions, such as heart disease, diabetes, and obesity are among the most costly and preventable health problems.[46] RMP offers a way to achieve the triple aim of reducing the cost of health care, improving the health of populations, and improving the patient experience.[47]

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[39] International Journal of Medical Informatics, *Patient care information systems and health care work: a sociotechnical approach*, August 1999. Available at: www.ncbi.nlm.nih.gov/pubmed/10530825.
[40] Journal of Telemedicine and Telecare, *Determinants of successful telemedicine implementations: a literature study*, April 2007. Available at: journals.sagepub.com/doi/pdf/10.1258/135763307781644951.
[41] Ibid.
[42] Implementation Science, *Characteristics of successfully implemented telemedical applications*, November 2006. Available at: implementationscience.biomedcentral.com/articles/10.1186/1748-5908-2-25.
[43] See Appendix D, E and F for more information about reimbursable services.
[44] The Department of Health and Mental Hygiene and Health Services Cost Review Commission held a competitive application process to establish Regional Partnerships for Health System Transformation to collaborate on analytics, target services based on patient and population needs, and plan and develop care coordination and population health improvement approaches. Regional partnership awardee summaries are available at:
dhmh.maryland.gov/innovations/Documents/summariesofsuccessfulregionalplanninggrantbidders.pdf.
[45] Smaller sample sizes are often used when first investigating a hypothesis, using smaller sample sizes helps to avoid unnecessary resource expenditures until an association is seen. European Respiratory Journal, *Small studies: strengths and limitations*, 2008. Available at: erj.ersjournals.com/content/32/5/1141.
[46] Centers for Disease Control and Prevention, *Chronic Disease Overview,* Accessed February 2017. Available at: www.cdc.gov/chronicdisease/overview/.
[47] A framework developed by the Institute for Healthcare Improvement that describes an approach to optimizing health system performance. More information is available at:
www.ihi.org/Engage/Initiatives/TripleAim/Pages/default.aspx.

Lessons learned from these projects will benefit other RMP initiatives statewide by building upon processes that worked and in addressing leading challenges identified by the grantees.

The MHCC applauds Crisfield, Lorien, and UHCC for all the hard work they put into their telehealth projects. If Maryland is to succeed in meeting the demands of health care reform and the All-Payer Model, providers need to consider adopting non-traditional approaches to care delivery.[48] RPM can help avoid unnecessary ED visits and readmissions and enable patients to visit with a provider without increasing the provider's workload.[49, 50] RPM should be considered by providers statewide as alternative care delivery models continue to emerge.

[48] The All-Payer Model is an agreement between the State of Maryland and the Federal Government to modernize Maryland's unique all-payer rate-setting system for hospital services and achieve better care, better health, and lower costs. More information available at: www.hscrc.maryland.gov/hscrc-stakeholders.cfm.

[49] Taylor Mallory Holland, *Insights, Healthy at Home: The Economic Benefits of Remote Patient Monitoring*, 2016. Available at: insights.samsung.com/2016/02/05/healthy-at-home-the-economic-benefits-of-remote-patient-monitoring/.

[50] Healthable, *Advantages of Remote Patient Monitoring in Healthcare Systems*, August 2016. Available at: www.healthable.org/advantages-of-remote-patient-monitoring-in-healthcare-systems/.

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The MHCC acknowledges the work of the round two grantees and thanks them for their efforts to implement and assess the value of telehealth in care delivery. The commitment demonstrated by grantees over the 18-month project period is laudable. The MHCC appreciates the contributions of stakeholders that have provided recommendations to ensure the ongoing success of telehealth projects in the State.

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Telehealth Grantees Final Reports

The following section includes the final reports of the three grantees: (1) Crisfield Clinic, LLC.; (2) Lorien Health Systems; and (3) Union Hospital of Cecil County. The reports detail the project and findings unique to each grantee. Please note, original report page numbers are maintained for reference purposes.

Crisfield Clinic

Remote Patient Monitoring (RPM) Telehealth Project

Final Report

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Introduction

The Crisfield Clinic developed the School Telemedicine Chronic Care Management Program as a way to help the children in the community who struggle with chronic conditions. Crisfield is located in Somerset County, which does not have a single school-based health center, hospital clinic or mobile clinic within its boundaries. The county is listed as a "target community" by the Delaware/Maryland USDA Rural Development office. Crisfield is located in the southernmost area of the county and its residents are even more removed from services than those that live in the more northern areas of the county. The service area is located 155 miles and almost three hours from the closest urban areas - Baltimore/Washington, Wilmington/Philadelphia, and Norfolk/Hampton Roads. Distance and population density are two major factors in residents' ability to seek specialty care and the area's ability to attract more specialists to relocate and serve the community locally. Crisfield is a small town with the highest ranking of health issues in Maryland. Somerset County ranks last - 24 out of 24 counties - for obesity prevalence, heart disease mortality, population percentage living in poverty, and affordability of doctors' visits. In general, residents in the area have low income and education levels coupled with high rates of chronic disease. This program is important because there is such a great need in this community to help the youth to get healthy and to get them to actually care about their health. This project uses technology as a means of communicating information about the student's health and progress throughout the program.

SOMOS Inc. partners with CircleLink Health Systems to remotely monitor biometrics as input by the community health worker. Care Plan Manager is the system that CircleLink has provided for this use. Care Plan Manager allows the provider and chronic care managers the ability to add new patients, input and edit past medical history, create, edit, and print a care plan, manually input patient observations, as well as create and print a patient progress report. We are also able to send out daily health reminders and advice to our participants in an effort to encourage them to continue reaching for their goals.

Technology Infrastructure

The Chronic Care Management Program targeted school age children who suffer from childhood obesity, asthma, depression and other mental health conditions. The purpose and goal of this program was to improve coordinated care for students who have been diagnosed with asthma, diabetes, childhood obesity, and behavioral health issues. Expected outcomes were improvement in clinical data indicators for the specific disease measure, reduction in lost school/work days and reduction in emergency department visits, and improvement in patient's self-perception of their health from the beginning of the program.

The program used patient remote monitor equipment to keep up with the progression of the patients. These monitors included Fitbits®, peak flow meters, and Bluetooth enabled scales. Each of these devices was synced to cellular devices and/or the computer. Instead of having to manually import information, the data was electronically sent to each device when prompted to do so. The data showed how the patient was progressing on a month to month basis and the program was able to make changes and recommendations to patients' care plans based on the data that was

documented. The Fitbit® was chosen because of its capabilities. It shows how many miles/steps the patients were taking in a day. It was an incentive for the children to get up and moving. The students enjoyed watching their numbers increase and they were able to challenge friends and family members as well. There is a cellular application (app) that syncs with the Fitbit. In this app, students were able to record exercise routines, food intake, diet plans, etc. This served as a journal as well, so they did not have to write down data on paper and risk losing it. All information input was kept in the app and saved.

The peak flow meter was used by asthmatics to keep track of spirometry for each student. The peak flow meter was chosen because it was the best way to keep a record of how well the child was functioning with their medication. The students had directions to blow into the meter three times a week. Students kept track of how they were feeling each time they took the test. Looking at the numbers helped to see how well they were working. If the numbers were continuously low, that showed that the medication was not working well and it possibly needed to be changed. The peak flow meter also saved all readings automatically so, again, there was no reason to write anything down and risk losing it. The Bluetooth scales were primarily chosen for that purpose as well. Not everyone likes to check their weight, and it is disliked even more by having to broadcast it to everyone. With the Bluetooth enabled scales, the weights are saved automatically.

CircleLink Health was the electronic health record used for this program. When patients came in for a visit, their information was input into the CircleLink system by the community health worker. CircleLink provided a means of having 24/7 monitoring of each health condition. If there were any abnormal readings, the program was designed to notify the community health worker of this reading. The community health worker would then notify the student and, with the help of the provider, adjust the care plan as needed. In the midst of the program, CircleLink expressed an issue with privacy concerns. They were not encrypting text messages and worried about private information getting sent to the wrong person if someone happened to change a phone number. This issue did not get resolved. Given this dilemma, CircleLink was no longer able to provide the services detailed above and the role of the community health worker changed. Instead of the community health worker relying on CircleLink to keep tabs on the health of the student, it was now his/her job to contact the students to keep tabs on them. Students were also able to reach the community health worker 24 hours per day by cell phone and email with any concerns. The community health worker would then notify the provider and decide how to proceed with the student. The community health worker would also refer students to specialists upon the request of the provider. The community health worker would arrange all appointments with the specialists to accommodate the student. All information needed for this appointment was given to the specialist via fax only after a release of health information was signed by the parent/guardian of the student.

Project Implementation Process

The target population was originally students at Carter G. Woodson Elementary School and Crisfield Academy and High School who have one or more of the following conditions: asthma, childhood obesity, or mental health conditions, such as depression and ADHD. Unfortunately, we ran into student access issues within the public school system, so we used our own patients and students from the community within the same age range.

There are three scenarios by which patients may enroll in the program. The first scenario involves the referral of a teacher or school nurse who has prior knowledge of the student having one or more of the conditions listed above. The referring adult then notified the school nurse, who will set up a consultation with the Crisfield Clinic. The second scenario is when the patient is already a patient of the Crisfield Clinic, the provider has knowledge of the patient having one of the conditions listed above and is also attending Crisfield Academy and High School or Carter G. Woodson Elementary School. The provider then consulted with the patient and his/her parents to gain consent for enrollment. The third scenario is a response to advertising, brochures, and social media announcements for the program. Advertisements, brochures, and social media announcements for the program informed the patient to call the Crisfield Clinic's LAN line and ask to consult with a practitioner to enroll in the school-based telemedicine deployment program.

After the patient consultation, the Crisfield Clinic, with the parent's consent, enrolled the patient in the program. The enrollment included a fifteen-minute education class to inform and give the patient access to the program and any mHealth devices that pertain to that patient's condition. The project director then assigned the patient a Care Plan Manager team to monitor the patient's self-reporting and maintain contact with the patient. The Care Plan Manager leader recorded the baseline values for social/behavioral and clinical data, created a care plan, and educated the patient on the care plan. It was the patient's responsibility to follow the care plan to the best of their ability, and the Care Plan Manager team's responsibility to encourage and assist the patient in following the care plan. Each month, the students would be given an appointment to meet with the provider and community health worker. This way, they were given the same time and attention as the patients not participating in the program that came into the office.

For children with childhood obesity, they were given a Fitbit and a Bluetooth enabled scale. With these devices, students were asked to track their weight progress and food intake. The Fitbit became the incentive that was used to get the students excited about the program. The Fitbit offered many features, including keeping track of steps taken, miles walked, caloric intake, etc. All of this information was essential to the weight loss process. The Fitbit had an in-app feature that allowed students to keep a log of what they were eating. The Bluetooth enabled scale was used to keep track of weight loss and gain. Each morning, the students were asked to weigh themselves after using the restroom. The scale automatically saved the weight on the application in their phone. At each visit, the community health worker reviewed the weights and food journals with the students and their parents. The community health worker would then make recommendations based on how well the student was doing. A new plan was then made and the students would work on the new plan for the next month.

The asthma patients were given a peak flow meter. The purpose of the peak flow meter is to monitor lung capacity in an effort to prevent asthma attacks or other symptoms related to asthma. By monitoring this, the meter is able to detect changes in breathing which could possibly lead to an asthma attack. The students were asked to do a test on the peak flow meter every other day and, if possible, when they were wheezing or out of breath. The peak flow meter has a built in memory so that the tests are saved. At each monthly visit, the community health worker looked through the data captured by the meter to check breathing patterns. If there was a drastic change, the provider would be notified immediately. Sometimes, medication would have to be changed. In each case, the

student would be asked questions to make sure that the changes were not coming from something that we could have prevented without medication intervention. We encouraged our asthmatics to still get out and play, but not to overexert themselves. Information packets were given out to educate parents on the risk factors of asthma and what signs to look for if they felt something was wrong with their child.

Mental health patients, such as those with depression and ADHD, were given a Fitbit. Many of the students diagnosed with depression were shy about having this condition, so giving them a Fitbit boosted their confidence a little and they were more open to trying the program and talking to the care plan team. Most of our ADHD children were younger, so they were not so hard to convince. The Fitbit gave them something to look forward to, as many of them found friends on the app, and were able to challenge them in different fitness areas. This gave the children that participated in the program a positive outlook about the program. They were engaging more with other children. Each month, the students were measured on a scale from 1-10 to determine how their past month had gone. The community health worker engaged in conversation each month with these students and their parents to see how they had been doing and how they had been getting along the past month. The community health worker also made sure that the students had been taking their medication and seeing their therapists regularly. If a problem arose, the community health worker would then contact the appropriate specialist and they were able to address the problem appropriately.

Assessment Approach

At the initial visit, a baseline was set for each student. For asthmatics, the first peak flow tests they did in the office was their baseline. They were told to blow into the meter three times. Each test is measured by the three blows. The best of the three is the baseline. The goal is to remain in range of the baseline with the prescribed medication. If the reading stayed around the same, then the medicine prescribed was working. If the readings decreased, then the provider was notified and the medicine was changed or increased.

For the obese children, their weight and height were measured at their first visit. This is the baseline. The BMI was then calculated. Each child was asked how much weight he or she wanted to lose and what types of exercise and dieting he or she was comfortable with trying. A care plan was developed for them to follow. They were asked to weigh themselves each morning after their first bathroom use. The Bluetooth enabled scale automatically sent the reading to the cellular device. They were also asked to keep a food journal so that they could monitor their diet. At each visit, the journal was reviewed by the community health worker and recommendations were given to the family on ways to try to eat healthier. In the office, the weight and height were measured each month, and BMI is determined.

For the children diagnosed with a mental health disorder, the provider assessed them at first initial visit. There were some students who were depressed, and some with ADHD. After the provider assessment, the community health worker worked with families to come up with activities for their child to do. Whether it was going outside to play off some energy or sitting inside to read a book, each student and their parent had to agree on the plan. At each monthly visit, students discussed

what activities they had been doing and how it was making them feel. A scale was used to determine their tolerance at each visit. If the child was becoming worse, they were referred out to see a specialist. There are a couple of facilities close by that the children were able to go to. Some of them were already established with the facilities and some were not. Close relationships are formed with each facility in an effort to work together to better the quality of life for the students. When students were referred to outside sources, they were sometimes set up to do a telemedicine visit through the B-HIPP Behavioral Health Division. This was easier and faster than having the youth wait for openings locally. They had an initial visit and the doctors made recommendations to the provider on what to do for the student next.

Specific measures were chosen for each of the chronic care issues. It was believed that these measures were the best way to see if the program was working for each student. The goal for this project was for the students to understand the value and importance of good health. The students were taught how and why their conditions affected them the way they did. They were also taught how they could manage the condition, with the help of their parents, and keep the condition under control. Another goal of this project was to determine if, by showing and telling the student how important it was to take care of their chronic care issues, that would affect the way they took care of themselves. These goals were developed by the provider and care management team in an effort to see if this approach would work for future youth projects that were being planned in the organization.

Assessment Limitations

The limitations included not being able to access students in the public school system, so that limited the ability to recruit students. There were some problems finding students who fit the description of a couple of the chronic conditions originally being sought for the program, including smoking and diabetes. These conditions ended up being taken out of the pilot. There were a few months that it was difficult to get in contact with students to be able to collect the data that was needed. Sometimes their phones would be disconnected or parents failed to respond to messages left by the project team.

Results of Telehealth Intervention

The telehealth intervention has positively affected patient outcomes. Before, the students did not care much or even understand their conditions. Change is not easy and these students have surpassed expectations. These children are now aware of their conditions. They see that it is important to be healthy and to take care of themselves. Some of them were embarrassed because they had to take medicine and their friends did not have to. Others were shy because they were obese. They have been completing the activities outlined in their care plan and reaching their goals.

Giving them a piece of equipment that they could use to keep track of their progress was the best idea. They felt like they had something to work towards. This was not all about work either, it became fun for them to be able to get out and work out with their friends. They were able to challenge themselves to be better than they were before. Children with asthma that had been afraid of playing sports have been able to play. They were afraid that they would not be able to catch their

breath if they played too hard but just knowing that their breathing was fine and their levels were normal, they became a little less shy and decided to try to run just a little bit. Then, a little bit became more. These students have broken their own boundaries. A little motivation is all that was needed for them to get out and get moving. Most of our obese patients have lost some weight. Our mental health students have a better quality of life, just from being able to have fun and not letting the stereotypes about their conditions hinder them from living. Families have formed bonds from interacting together and doing activities together.

The Crisfield Clinic is planning on continuing the program even after the grant is over. There have been so many ups and downs to this pilot, but the good has always outweighed the bad. The staff at the Crisfield Clinic watched these students laugh, cry, and be angry throughout this program. We also watched these students fight and push through to continuously do what some have said they could not do. There have been successes and failures, but the children who have continued to be in this program have been dedicated to accomplishing what they set out to do. There is still a long road ahead of us and we are looking forward to helping even more students accomplish their goals.

Project Implementation Challenges

When implementing a new project, challenges are bound to arise. There was a slow start in the beginning trying to enroll children into the program. The program was originally supposed to take off in the school system but access to students was not granted by the State of Maryland for this project. It was more difficult than expected to convince parents that their children should be in this program and why. Some parents believed that even though their children were obese, they were still healthy. They did not seem interested in getting to their healthiest self. Once the children were in the program, getting them to take it seriously was another issue. Better incentives may have been helpful with getting them engaged with the program. There was a problem syncing some of the devices to phones at one point. Therefore, we were not be able to keep an automated track of the data through mhealth devices. The data was kept manually by the students and was therefore less reliable and subject to human error.

The students were very excited to take the devices home and begin their journey with this program. There was never a challenge getting the students to use the devices. Some of the younger children did not like to blow into the peak flow meter, but they did it. After a few times, they were completely comfortable with it. There was a challenge keeping up with children with ADHD and keeping track of how well they were doing. Their good days and bad days ranged widely. Luckily, it was only for a short time and once the parents were used to the program and knowing what to expect, it seemed to go smoothly.

It was a challenge to get the students to follow the protocols in the beginning. The asthmatics were not using the peak flow meter. They were asked to use the meter every other day and when they were feeling bad. They were also requested to keep a record of how they were feeling each time they used the meter. They did not want to record their activities or use the meter when they were feeling bad. The obese children did not want to keep a journal of their foods. Some of the children were not exercising as requested in their care plan. The community health worker reinforced with

each student how important participation would be from them and their families. Eventually, each student begin doing what they needed to do to attain their goals.

Some of the students did not have internet access at home. The data was stored in the tracking device and when the students came in for their appointments, they were able to use the internet in the building to connect the tracking device to their cellular devices. Once connected, all the data would then sync from their tracking devices to their cellular devices. There was one incident where the Fitbit did not sync to a cellular device. In this situation, the student was able to use their tablet to connect their Fitbit. No other problems arose from syncing the devices.

Each of the students in this program was a patient of the Crisfield Clinic. Since this facility was the primary care facility for each patient, it was easy to give care where it was needed. When the student was sick, it was easy for him or her to get an appointment and not have to go to the emergency room. When a referral was needed, the community health worker was there to make specialists appointments for the students. The students and parents were very good with keeping appointments to see specialists and their primary care provider. There is not a large pool of specialty providers in this community, so the students we referred may have had to wait a month or two to get in to see them.

Lessons Learned

There were many lessons learned on this project. The biggest lesson is to always have a backup plan. The unexpected can happen at any time. Originally, the schools were the target for this pilot. That did not go as planned, so that led us to us to begin recruiting students from outside sources and in our own facility. It was difficult to get any participation in the beginning.

We learned that tracking devices are not compatible with all cellular devices. Some of the devices did not sync properly. Other devices, such as tablets, had to be used to sync the devices. All of the students were savvy when it came to the use of technology. Each student went through a fifteen-minute education class with the community health worker on how to use each device. If any problems arose in the program with the devices, they were to bring the devices back and the Community Health worker would fix or replace the device. Parents were also given the same training along with the child just to familiarize themselves with the technology and how it was to be used. Most children used their parents' cellular devices for the program, so showing the parents how the devices worked was essential.

It was very important that the children had a relationship with their care plan manager. It was key for them to know that they had someone in their corner that they could talk to and not have to worry about being judged. Most of the students were comfortable with the community health worker. They openly discussed challenges, fears, accomplishments, etc. with the community health worker. It was essential that not only the children had this relationship, but that the parents did as well.

Another lesson learned was the parents' participation was critical for success for the children. At first, the program focused more on getting the children enrolled so that our numbers would rise. It was very quickly evident that we had to have the parents involved in order achieve results. Parents

were given lessons on what kinds of foods were healthy for their children, why it was important to not smoke around them, the importance of getting their medication on time, etc. They were involved in every aspect of this program with their child. Some parents even began joining their children as they walked and exercised. This program created bonds between parent and child. It gave some of the children something to look forward to. They gained self-esteem knowing that they can do whatever they put their mind to. These children became proud of themselves for all the hard work they put into this program.

Every student is different and has to be treated as such. At each appointment, we talked with each student to see what their goal was and how serious they were about it. We had to use different approaches with each student simply because they are all different. There were students who wanted to be in the program and completely ready to commit and there were students who may have needed a little encouragement to try it.

Cost Effectiveness & Sustainability

The integration of mHealth devices and remote patient monitoring with telehealth consultations creates a billable service currently reimbursable by Medicaid as well as most other Maryland commercial health plans. The mHealth devices are anticipated to be self-sustaining with the current regulations for reimbursement for chronic disease management monitoring as well as the proposed regulations for reimbursement of remote patient monitoring devices. This design simply matches resources with needs without increasing expenses for any of the partners. The inherent sustainability in the project design will ensure that the project serves the community for many years.

The Crisfield Clinic will provide a self-sustaining resource for healthcare to children of the county and will integrate the principles of the patient centered medical home approach to address not only acute issues but also to work toward prevention, care management and health promotion. Providing mobile health devices to students targeted to their chronic condition will engage the student and their parents in the management of their health care, connect them to chronic care case managers, and provide them with educational resources to better manage their health. The barriers of lack of transportation and access to care will be removed resulting in measurable outcomes of increased time at school, less truancy/days loss for health-related concerns, higher rates of developmental screening adherence, and higher testing scores for the school population concurrent with improved health status.

Closing

The Crisfield Clinic was very appreciative to have been given this opportunity. It was a struggle in the beginning, but once the program got underway, the children were excited about it. They learned so much about themselves throughout this journey; some good, some bad. It has been worth the struggle to see so much progress from such a young community. The use of mhealth devices with our program gave the students a sense of self confidence. They worked very hard to keep up with the journals and weight progress. They used the peak flow meters and took their medications as prescribed. They are very much aware now of how big of a role their health plays in

their lives. The students want to be healthy. This is a bright beginning for the Crisfield Clinic, as we are eager to continue this journey for as long as we are needed in this community.

Lorien Health Systems

Remote Patient Monitoring (RPM) Telehealth Project

Final Report

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Introduction

Reducing the cost of health care, improving outcomes, and improving overall population health are the three dimensions of the triple aim approach to optimizing health system performance. Identifying and eliminating unnecessary care in the system can have a positive impact on each arm of the triple aim. Specifically, reducing hospital admission rates for patients with chronic conditions included in the hospital Prevention Quality Indicators is critical to both quality of care improvements and controlling health care spending.

Lorien Health System, through its Lorien at Home (a Residential Service Agency) program, partnered with GrandCare Systems (technology provider, also known as GC Systems) to join care management services with telehealth monitoring and communication technology in order to eliminate unnecessary hospital admissions and re-admissions post discharge from the skilled nursing facility (SNF). The Lorien at Home RN Care Coaches utilized the technology hardware and new clinical information to proactively case manage clients in the community with chronic conditions and directed the appropriate and timely health care interventions in the most clinically appropriate and often least costly setting. Three specific PQI diagnoses were targeted for this project to include chronic heart failure, hypertension and uncontrolled diabetes.

The Lorien at Home program was established at Lorien Mays Chapel, a 93 bed SNF in Timonium, Maryland. The program identified qualifying short-term stay skilled nursing residents that returned to the community to support their transition home and ongoing needs with tele-monitoring and care management services. Twenty-two residents of the over 300 community discharges from Lorien Mays Chapel were selected and received services with lengths of stay ranging from two to eighteen months.

After the client was identified and a care plan was established, GC Systems technologies were installed in the client's home to allow for real time remote patient monitoring of required vital signs, physiological monitoring, video conferencing, care schedule coordination, and call response. The new tools provided critical information to the Lorien Care Coaches to alert when a client was outside of prescribed ranges and was at risk for a hospital admission. With the combined disease specific protocols and monitoring information, the RN Care Coach was able to intervene and assist with access to needed care. The use of GC System technology increased our ability to receive continuous real time monitoring and improved care coordination and resulted in fewer admissions to the hospital.

Technology Infrastructure

The heart of the GC System is a large touchscreen in the home, which provides the individual with social communications, instructions, reminders, medication prompts, and web-based entertainment. Lorien staff installed the equipment in the client's home and connected to existing wireless internet access or utilized a cellular hotpot device. Optional wireless activity sensors,

environmental sensors, and digital health devices selected for the individual application during the assessment were paired by the Lorien team during the installation. These devices were used to notify designated caregivers by phone, email, or text if wellness readings fell out of parameters.

Lorien caregivers access the system by logging in to the online Care Portal. Caregivers log onto the Care Portal from any internet-connected device with their username and password. Caregivers can add Tasks, Calendar Events, Reminders, Medications, Personalized Content, and Communications to the touchscreen. Lorien caregivers also utilized video connections to place or answer calls to and from clients to provide support and education.

The Lorien team assessed several Remote Patient Monitoring systems before selecting GC Systems as the technology provider. The product evaluation process focused on five primary requirements. (1) Connectivity: the GC System is always powered on and connected to the internet. The provider is alerted immediately to take action if connectivity is interrupted for any reason. (2) Ease of Use: for the client, the GC System does not require a username or password, the touchscreen view is customized to his/her level of ability, the icons and print are large and easy to read. (3) Comprehensive: the GC System includes many options for RPM devices from health readings to environmental and activity tools. (4) Flexibility: the GC System allows the client to receive equipment that is designed to meet the goals of his/her individual care plan. Flexibility also applies to the management of the alerts that can be pushed to care providers through a customizable combination of text messages, e-mails, or phone calls. (5) Beyond Vital Signs: the GC System includes socialization tools facilitating client's access to information, resources, and their families through secure messaging, video calls, and sharing of pictures and videos.

In order to complete a comprehensive home assessment, the Lorien at Home RN Care Coaches accessed Point Click Care (PCC), Lorien Mays Chapel's electronic medical record, to obtain the most recent information on skilled nursing and hospital admissions and stays. Lorien at Home staff also utilized eRSP, a home care operations system, to document and update plans of care and other components of the medical record. The GC System also was utilized to collect, store, analyze, and report health reading and alert data.

Especially useful in assuring that Lorien at Home RN Care Coaches maintained current and accurate awareness of health care utilization, Lorien worked with the Chesapeake Regional Information System for our Patients (CRISP)that is the regional health information exchange (HIE) for Maryland. To further enhance the ability to successfully care manage clients and create an optimal plan of care, Lorien clinicians utilized the CRISP query portal to complete assessment tools and understand the client's health care utilization patterns. Lorien clinicians also received real time information when clients accessed health care services through the CRISP Encounter Notification Service (ENS).

Prepared with information from CRISP, PCC, and the in-person home assessment, the RN Care Coaches were able to design a patient-centered plan of care. From the plan, each GC System configuration and installation was customized to fit the client's needs. As the needs changed over time, both the care plan and the system were adjusted. Adjustments included changing alert parameters, adding or deleting specific health and activity monitoring devices, and adding

educational and socialization resources. The GC System allowed our RN Care Coaches to support our clients efficiently and address a greater range of needs and approaches. The system integrated what could be three different solutions for activity monitoring, another for health concerns, and a third for family connectivity.

Project Implementation Process

Upon notification of the grant award, Lorien began implementation of the project plan inclusive of established objectives for clinical protocols, workflow development, system training for providers, and client/caregiver educations. A project team was established, including clinical, operational and technology team members from Lorien at Home, Lorien Health Systems and GC Systems. The project team co-developed the goals and timelines and proceeded to meet on a weekly basis both in-person and via video calls to address the workplan deliverables.

Name	Title	Organization
Jim Hummer	Project Manager, VP	Lorien Health Systems
Brian Bluedorn	Technical Consultant, CIO	Lorien Health Systems
Susan Carroll	Clinical Consultant, VP, RN	Lorien at Home
Tracy Carroll	Director of Operations	Lorien at Home
Charlie Hillman	CEO and Founder	GrandCare Systems

The team began by addressing the need for clinical protocols for the three selected chronic diseases of CHF, hypertension, and uncontrolled diabetes. With a full understanding of all of the capabilities of both the remote patient monitoring equipment and the Lorien at Home RN Care Coaches, the team developed disease specific protocols, including objectives, assessment, tele-monitoring equipment, follow-up plan, and expected outcomes. The common objective was to reduce hospital readmissions related to complications from the specific chronic disease. The assessment addressed eliminating or minimizing risk factors, self-care education, identifying care partners and collaboration with the client's primary care physician. Tele-monitoring equipment was designated for each condition. Multiple clients had more than one of the three selected chronic conditions and received corresponding equipment as detailed below.

Tele-Monitoring Equipment

Chronic Condition	GC System	Blood Pressure Cuff	Weight Scale	Glucometer
Hypertension	Yes	Yes		
CHF	Yes	Yes	Yes	
Uncontrolled Diabetes	Yes			Yes

Following the assessment, a follow-up schedule was established with a minimum of weekly check-in video calls and a reassessment every 45 days. All clients received 24/7 monitoring of health readings, receiving video and telephone calls from the RN Care Coach when readings were out of established parameters. The client's primary care physicians and/or appropriate specialists were consulted in establishing health reading ranges for each of the monitored measures.

Workflow integration addressed the incorporation of the Lorien at Home RPM program into the existing admission and discharge planning process at the Mays Chapel SNF. A Lorien at Home Care Coach participated in SNF individual patient care plan and utilization review meetings to identify potential clients and begin introducing them to the program as a possible component of their return to home discharge plan. A GC System was also placed in the rehabilitation department and incorporated into therapy sessions for individuals needing occupational therapy support administering their own tele-monitoring device readings, or speech therapy for cognitive support in basic navigation of the GC System screens and icons.

Early introduction to the program while patients were residing at the SNF was specifically designed to increase acceptance and participant willingness and to reduce the learning curve when the program started in the home. Upon discharge, the Lorien at Home team finalized the in-home assessment and completed the installation and training of all equipment and services. The RN Care Coaches monitored compliance to established reading schedules through continuous monitoring and weekly connections with all clients.

The Lorien at Home team and members of the SNF interdisciplinary team received an introduction to the Tele-Monitoring equipment and follow-up in-services as the program began and clients started to enroll. The Lorien at Home team attended in-person training at the GC offices and were also provided a help line and needed support with any technology questions. The team also reached out to and provided specific program information to clients' primary care physicians.

To engage SNF clients and their families, information on the program was placed in the SNF admission packet. A Lorien at Home Care Coach met with potential clients within their first few days of the SNF stay. A GC System was available on a portable cart and was taken to client rooms for an in-person hands-on demonstration of the program. Once enrolled, client and family education began in advance of discharge. Post discharge and after equipment installation in the home, Care

Coaches provided in-person and remote support to clients and family members as questions occurred. In addition to this one-on-one support, a weekly educational tip was distributed to all participants to continually provide education and reinforce training of specific features of the GC System.

Assessment Approach

The telehealth program was designed to reduce hospital admissions and readmissions of clients with specific chronic conditions. To assess the program, a thirty-day readmission rate was tracked and calculated through the use of information from CRISP and PCC. CRISP information was also utilized to obtain a LACE index score for each client when admitted to the program. The LACE index incorporates information on recent hospital stays, acuity upon admission, comorbidities, and emergency department visits in order to predict the risk of unplanned readmission within 30 days after hospital discharge.[1] Additional assessment measures were incorporated to assess the status and trending of client specific chronic conditions to identify and address risk factors.

Baseline data was collected from client medical histories through interviews, primary care physicians, and review of CRISP data. The most recent and historical A1C lab values were obtained on uncontrolled diabetic clients to establish a baseline. Through the course of the program new A1C lab values were obtained a minimum of quarterly for each client to measure increases or decreases to baseline. Daily blood glucose readings were monitored and addressed by the RN Care Coach.

Clients with chronic heart failure were assessed and scored upon admission and monthly, based upon the New York Heart Association Functional Classification.[2] Client symptoms, both reported and observed, resulted in a classification score to measure improvements or declines in functional abilities to baseline. Daily blood pressures and weights were monitored and addressed by the RN Care Coach. Hypertensive clients were assessed upon admission and monthly to establish classification scores based on the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC7).[3] Daily blood pressure readings were monitored and addressed by the RN Care Coach.

The project team agreed that through the use of combined tele-monitoring and care coaching, the majority of the clients would maintain or improve upon their admission measurement for the specific chronic conditions. The team also expected a lower hospital readmission rate and emergency department visit rate for the program's clients.

Finally, to measure client satisfaction, the Care Coaches administered two surveys. The Lorien at Home Client Satisfaction Survey assessed overall client satisfaction with services provided. The Lorien at Home Technology Survey that was based on the Extended Technology Acceptance Model focused on client's feedback relating to the telehealth equipment.[4] Each survey was distributed and collected upon discharge from the program or during the course of the program for longer lengths of stay.

Assessment Limitations

One significant limitation of the project was the small sample size. The program utilized fifteen GC Systems and provided services to a total of 22clients over the eighteen month assessment period. With the smaller number of clients, one occurrence of a clinical measure had a significant impact on the measurement calculations. Although we were caring for clients with chronic conditions included in hospital Prevention Quality Indicators (PQIs), we were unable to compare our small sample to PQI data. Additionally, the program is primarily designed to be a long-term intervention to assist clients with aging safely in their homes. Although several clients were on the program for an extended period of time, a larger sample size and longer lengths of enrollment on the program would provide valuable additional data for analysis.

Results of Telehealth Intervention

A total of 22 clients were enrolled in the program and were provided services in their private homes. The length of stay (LOS) on the program ranged for 60 days to the entire length of the project period, eighteen months. The clients were comprised of 15 females and 7 males with an average age of 83.6 years. The average LACE score for clients was 12.0. LACE scores equal to or greater than 9 indicate a high risk of readmission to acute care. Regarding the three focus chronic conditions, 7 clients had an existing diagnosis of uncontrolled diabetes, 11 had chronic heart failure, and all 22 were diagnosed with hypertension. The average number of chronic conditions for each client was four of the 15 chronic diagnoses included in the CMS Chronic Conditions Among Medicare Beneficiaries Chartbook.[5] Through CRISP, clients' primary care physicians and client/family interviews, staff were able to account for the number of acute care admissions in the 12 months prior to admission into the telehealth program for an average of 2.3 per client.

Client Information

Number of Clients	Female	Male	Average Age	Lace	Clients with Diabetes	Clients with CHF	Clients with Hypertension	Average Chronic Conditions per client	Average Number of Acute Admissions in 12 months prior to program
22	15	7	83.6	12	7	11	22	4	2.3

The telehealth project collected client-specific clinical measurements and hospital activity through the use of an initial RN assessment, every 45 days re-assessments, and communication with clients' primary care physician and family members and through the use of CRISP. Upon the initial assessment, individual client baselines were established in order to compare and track ongoing clinical and utilization measurements.

Uncontrolled Diabetes

To evaluate the seven clients with uncontrolled diabetes, the client's latest A1C lab value was obtained as well as available medical history. An individual client baseline was established and compared to ongoing A1C results. Each client received RN Care Coaching as well as telehealth tools to obtain blood glucose readings as directed. The results were instantly communicated to the RN Care Coach, who would take action depending on the results. Seven clients were on the program with an average LOS of 10.3 months.

> *For 10 months of the average 10.3 month LOS (97%), clients were able to maintain and/or improve their A1C lab values.*
>
> *For 5.4 months of the average 10.3 month LOS (52.8%), clients not only maintained their baseline but had A1C values below their baseline, demonstrating improvements.*

Congestive Heart Failure

A total of eleven clients with the diagnosis of CHF received RN Care Coaching and telehealth tools inclusive of a blood pressure cuff and weight scale. Parameters were established for both readings for individual clients based on medical history. The RN Care Coach was immediately alerted and responded when a reading was outside of expected ranges. Each of the clients was evaluated and scored by the RN Care Coach in the Classes of Heart Failure (NYHA) to establish a baseline. The clients were re-assessed each month to obtain an updated classification score. Eleven clients were on the program with an average LOS of 7.9 months

> *For 7.6 months of the average 7.9 month LOS (96.5%), clients maintained or improved upon their baseline classification score.*

One client increased their classification score for a two month period and later returned to baseline. A second client's classification increased as they transitioned to hospice services and off of the telehealth program.

Hypertension

The third clinical goal measured clients with the diagnosis of hypertension. These clients received telehealth tools inclusive of a blood pressure cuff. The RN Care Coach established BP alert ranges as well as scored the client upon initial assessment and review of medical history based on the four classifications for blood pressure as defined by JNC7. There were 22 clients with hypertension on the program with an average LOS of 9.8 months

> *For 8.2 months of the average 9.8 month LOS (84%), clients were able to maintain or improve upon their classification score.*
>
> *For 3.1 months of the average 9.8 month LOS (32%), clients improved upon their baseline blood pressure scores.*

For the clients scoring declines, four declined and then returned to baseline. Five clients declined and have not returned to baseline, including two clients that transitioned to hospice services.

Hospital Activity

All clients in the program were monitored for acute care admissions during and after their time on the telehealth program. During the course of the program, no clients were readmitted to acute care within 30 days of discharge for a condition related to the telehealth monitored diagnoses of diabetes, CHF, or hypertension.

The related-cause 30-day readmission rate was 0%.

A total of two clients experienced hospital admissions while on the program related to their telehealth diagnosis beyond 30 days. One client on the program experienced a 30-day acute readmission for a condition unrelated to their telehealth diagnosis.

The all-cause 30-day readmission rate was 4.5%.

The Centers for Medicare and Medicaid Services (CMS) data provides the most recent unadjusted Medicare hospital readmission rates for Maryland in CY 2015 at 15.95%.

In total, 22 clients were on the telehealth program with an average LOS of 9.8 months and experienced 17 acute care admissions. The average hospital admission rate was 0.95 admissions per year per client compared to the baseline average of 2.27 per year per client.

Acute Admissions Rates

	Prior to Telehealth Program	On Telehealth Program
Number of Clients	22	22
Number of Acute Admissions	50	17
Measurement Period – months	12.0	9.8
Annualized factor	0%	81%
Acute Admission Rate Per Year Per Client	2.27	0.95
		58% decline

Following are examples of the RPM program client experiences that assisted in reducing the acute care admission rate for clients on the program.

Prevented likely hospital encounter by monitoring readings

A client with a primary diagnosis of diabetes was being cared for by his son while his wife was away on vacation. RN Care Coach alerted to blood glucose reading of 560 and promptly contacted the family. Son responded that he had forgotten to check the reading or give insulin to the client.

Insulin was immediately provided. Nurse confirmed client was not experiencing symptoms of hyperglycemia and confirmed that blood glucose returned to normal parameters.

Prevented likely hospital encounter by collaborating with PCP

A client was on the program for primary diagnosis of hypertension. RN Care Coach received several alert notifications for low blood pressure (BP) and assessed increase in dizziness and weakness in this client who lives alone. RN communicated with the PCP and faxed recent monitor readings. The PCP altered BP medication dosing with immediate improvement in client's symptoms.

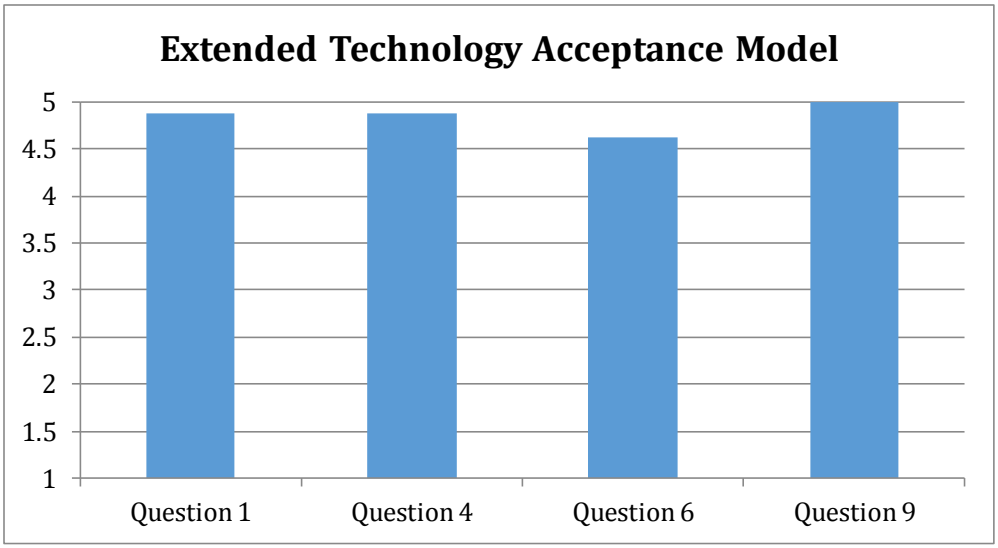
Prevented likely hospital encounter with on-call home visit

A client with a primary diagnosis of CHF and COPD began to experience increasing symptoms of shortness of breath and anxiety. RN Care Manager noted changes in monitor readings and scheduled a home visit immediately. Nurse provided client education including reinforcement of deep breathing, repositioned client, and made calls to the PCP and pulmonologist with adjustments made to oxygen and medication dosing. Client's breathing improved significantly and she did not seek treatment in the emergency department.

In order to assess client and caregiver satisfaction, two surveys were administered after 60 and 120 days on the program. A Lorien at Home Client Satisfaction Survey was administered and results collected for all clients on the program. Utilizing a scale of 1-5, overall client and caregiver satisfaction and recommendation scores were measured.

Question 16.	Overall, how satisfied are you with the services provided?	4.780
Question 21.	Would you recommend Lorien at Home to others?	5.000

To further and specifically access the technology features of the program, a second survey was administered based on the Extended Technology Acceptance Model.[4] Utilizing a scale of 1-5, clients provided the following feedback on select questions:



Question 1.	I intend to use the system.	4.875
Question 4.	Using the system improves my health.	4.875
Question 6.	I find it easy to get the system to do what I want it to do.	4.625
Question 9.	I have no difficulty telling others about the benefits of the system.	5.000

Other benefits of the program include socialization features allowing clients to communicate with family members and friends through secure messaging. Access is also provided to social media websites such as Facebook. Games, music, photos, and videos are also all accessible and specifically assigned based on client preferences to address possible client depression.

Other anticipated longer-term impacts for the target population and broader community include RPM program support allowing clients to successfully reside in their private residences. The home support program can delay or eliminate not only hospital admissions, but also possible needs for assisted living or nursing home care resulting in cost savings to the clients and entitlement programs.

Project Implementation Challenges

The implementation of the project encountered several challenges which did require adjustments to original plans. However, the Lorien at Home team had prior experience and a working knowledge of the GC equipment and program. This experience reduced implementation challenges as staff were able to anticipate issues and set realistic client installation goals for the launch of the program. Additionally, members of the Lorien team attended a three-day training course at the GC office for additional in-depth training on all features and aspects of the program.

One anticipated challenge of the program was the client's acceptance of technology in their home. Several clients did have reservations about their ability to operate the equipment and comply with self-administered wellness reading instructions. The more time spent introducing and demonstrating the equipment prior to the home installation led to significantly higher acceptance and engagement by the client and the caregivers. For most clients, the introduction and education took place with clients and family members during their SNF stay.

The GC System performs best with a broadband Ethernet or Wi-Fi connection. Several client homes did not have internet service, which required the installation of cellular hotspots. In several cases that required cellular hotspots due to the lack of an internet service provider, cellular connectivity signal strength impeded the use of video calls and periodically created challenges with automated program updates. Additionally, clients did not always have information on their internet service provider passwords and codes, which on occasion, resulted in more challenging and lengthier set up times than anticipated.

Workflow processes and protocols initially in place with the start of the program had to be adjusted and expanded upon as our client volume increased and lessons were learned from the initial clients started on the program. For example, RPM alerts can be received through text message, e-mail, or telephone. The protocol and call tree for how to manage the type of RPM alert and which method to utilize to direct the alert to the on-call RN Care Coach and how to effectively escalate the alert notifications required several adjustments to find the most effective and efficient model.

A second example of protocol adjustments for the program included establishing effective RPM notification ranges for the different wellness readings. RN Care Coaches were initially inundated with alerts for new clients until parameters were more effectively set and managed as they learned the clients' patterns and were able to provide education, both remotely and in-person, and how to take proper readings in order to receive accurate and actionable results for clients and their caregivers when applicable.

The Lorien at Home team worked to engage the client's community primary care physician with varied success. The team provided information on the overall program process and goals and also sought guidance with setting health reading ranges based on specific client history. Several PCPs and physician specialists were receptive to receiving calls from the RN Care Coach upon implementation and on-going as the client's condition changed and/or health issues occurred. Overall, primary care engagement and acceptance was sporadic based on the provider's willingness to understand and accept the role and relationship of the RN Care Coach, the RPM program, and their patient.

The utilization of CRISP was an implementation challenge and later a significant success. Initial CRISP access and set up was time consuming and required multiple follow up conversations as well as establishing a system to provide RN Care Coaches access to the query portal and the ability to

receive ENS alerts for clients on the program. Several of the clients' PCPs did not participate with CRISP, thus preventing a compressive view of the client's history.

Lessons Learned

The experience with program implementation emphasized the need to have sufficient planning and resources related to initial client engagement. The length of time needed to ensure clients' effective use of technology was aided by introducing the telehealth equipment and program early and on multiple occasions during a client's SNF stay prior to discharge home. The program was incorporated into the discharge planning process with the interdisciplinary team at the SNF. After several introductions and initial education, clients and caregivers were able to gain a comfort level and acceptance of the technology. Once in the home, continuous encouragement and education was often necessary to keep clients engaged with the equipment and using the wellness devices.

As the program can be configured to be active for a client who is able to independently interact with the technology and self-administer wellness devices, the system can also be passive for the client and allow a caregiver or family member the ability to assist with wellness readings and interact with all features provided. Initial and repetitive education for clients and their caregivers regarding benefits and functionality of the RPM system was critical. Caregiver and family involvement from the very beginning helped to ensure acceptance and use of the technology and, ultimately, the success of the program.

The program also emphasized the value of the relationship between client and RN Care Coach. The technology enabled the RN Care Coach and client to successfully manage his or her wellness remotely; however, it was the relationship and trust that developed between the two that helped solidify a sense of security in living independently at home. The design of the program assured a consistent assignment of Care Coach to client to support a rapport between the individuals. When viewed as a resource, the RN Care Coaches would be alerted to or consulted with additional health concerns or questions that may have not been picked up by a wellness reading, but were identified through a video call observation.

The significant value of real-time alerts and subsequent interventions was continually reinforced. Numerous examples of the clinician's opportunity to effectively manage and intervene in a client's care prior to an acute change that could have resulted in an emergency department or hospital admission were captured. In order to manage and respond to real-time alerts 24 hours per day, 7 days per week, 365 days per year, the program required full-time and on-call RN Care Coaches that were familiar with their clients on the program and able to effectively engage and respond to client needs. Communication between RN Care Coaches was supported by a weekly utilization review meeting and on-call shift reports for all activity. All staff had access to the Grand Care system to review past well readings and to conduct video assessments. Access to the clients EMR was also provided to all staff assisting with the management and intervention of client care.

An additional lesson learned was to assure that back up supplies and tools were readily available during home installations in order to prevent delays or extend the needed time in the home. On occasion, a wellness device would not pair through the Bluetooth connection which then required the vendor's helpdesk to correct the issue. Having additional devices on hand allowed the installation to continue. Proactively obtaining information on the client's ISP, including usernames, passwords and Wi-Fi codes, also assisted with the installation. In homes that lacked internet service, the installer would bring cellular hotspots from multiple carriers in order to access which device acquired and maintained the strongest signal. Cellular booster antennas were also available as needed to again ensure all features of the system would function properly.

Cost Effectiveness

The RPM program as described in this report, including equipment, licensing fees, supplies and staff costs for installation, assessments, 24/7 alert monitoring and response costs approximately $300 per month per client, or $3,600 annually. Additional costs can also be incurred for required in-person RN visits as determined to be clinically necessary or requested. The cost also does not include fees for internet access at the client's home.

The program has demonstrated a reduction in the all-cause 30 day readmission rate to 4.5% for all clients on the program, as compared to the state average of 15.95%. For the 22 clients on the program, there were 2.5 fewer readmissions. Using the average Medicare cost of an acute care admission of $10,352, the program savings were $25,880 for readmissions as compared to the cost of the program for the 22 clients at $300 per month or $6,600.[6]

Clients on the program also reduced their average annual hospital admission rate from 2.27 to 0.95 per year, or a reduction of 58%. Using the same average cost of a Medicare admission, the savings for this group was 36 fewer acute admissions for a total of $372,672 as compared to the cost to provide the service to 22 clients for 215 months at $300 per month totaling $64,500.

Beyond the financial benefits, the program demonstrated the ability to keep the clients in their homes by coordinating the support of the RN Care Coach, caregivers, family members, PCPs, and other physician specialists to avoid acute care admissions. Care Coaches also collaborated with home health providers and DME providers to assure that available benefits were accessed for needed equipment and services. Clients were provided more options to access service in an often lower cost of care setting and in experiencing fewer transports to receive health care services.

Sustainability

Upon conclusion of the grant period, several of the clients continued on the program, paying privately for the monthly services. In addition to continued recruitment efforts under a private fee for service model, Lorien at Home is also engaged in another RPM grant and is in the application process for a third grant opportunity. Lorien at Home also secured a contract for the RPM program with a managed care organization to provide service to targeted clients living at home and managing multiple chronic conditions.

The cost savings achieved by this grant demonstrate that an effective RPM program inclusive of 24/7 support is an effective and efficient model and support service. The program can improve quality and decrease costs by allowing clients to age in place in their private homes. With coordinated efforts from client insurance carriers, clients engaged in the RPM program could also be directly admitted to SNFs for nursing and rehabilitation care without first requiring a hospital stay when Care Coaches identify a change in condition requiring continual services and observation.

Closing

The success of the RPM program was supported by the client engagement partnership with the Lorien Mays Chapel interdisciplinary team to effectively identify appropriate candidates. Building upon this partnership, RN Care Coaches were able to establish relationships with clients and caregivers during the introduction and educational client meetings at the SNF. As the program progressed and clients were monitored and supported in the home setting, the Care Coach relationships continued to strengthen.

Clients consistently expressed the importance of the relationship with the RN Care Coach and their ability to support clients remotely as making a significant difference in their ability to successfully remain in their homes. Care Coaches consistently responded that the information obtained from the wellness readings and additional technology tools allowed the Care Coach to provide an elevated level of support remotely 24/7. The program successfully achieved its goal of integrating technology and care to better serve our clients.

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Appendix A: CHF Protocol

Definition: Clients with congestive heart failure are at risk for complications related to congestive heart failure and have an increased risk for hospital readmission related to these complications.
Symptoms of CHF include: dyspnea, orthopnea, cough, edema, and changes in vital signs- BP, HR, RR; rales or "crackles" in the lungs, peripheral edema, and ascites.

Objective: To reduce hospital readmissions related to CHF through the use of telehealth monitoring

Assessment:

1. Initial health history to include assessment of baseline, symptoms, lung assessment, medications, mobility, deconditioned status, cognition and psychosocial support system.
2. Sensory impairments: vision, hearing

Care Strategies

1. Eliminate or minimize risk factors:
    a. Medication reconciliation/monitor medication use/provide medication reminders
    b. Daily weights
    c. Blood pressure monitoring as indicated
    d. Fluid restriction (as appropriate)
    e. Use sensory aids as appropriate
    f. Regulate bowel/bladder function
    g. Smoking cessation
2. Provide self-care education with maintenance and management strategies
    a. Activity recommendations
    b. Assess fall status and safety of environment
    c. Emphasize purpose and importance of daily weights
    d. Maximize ability
    e. Communicate clearly; provide explanations
    f. Dietician referral if needed
3. Identify care partners
    a. Foster care support of family/friends
    b. Assess willingness and ability of care partner to assist with self-care; dietary (sodium restriction); daily weight, symptom recognition and medical follow-up
4. Collaborate with PCP to monitor and manage symptoms

Telemonitoring equipment: Lorien Link, blood pressure cuff, weight scale
Follow-up:

1. Weekly nurse follow-up via phone or home visit
2. RN will monitor readings through telehealth system and contact client/family as needed
3. Reassess every 3 months or sooner if indicated

Expected Outcomes:

1. Early identification of worsening CHF symptoms
2. Decrease hospital readmissions for CHF
3. Increase client quality of life

Resources:
http://www.guideline.gov/content.aspx?id=43926
American Heart Association= http://www.heart.org
Disclaimer: For the purposes of the grant, Lorien at Home will assess and develop a care plan based on the diagnosis of CHF, however, we will also employee a holistic approach to our care keeping other comorbid conditions in mind that could contribute to re-hospitalization and decline in status.

Appendix B: Hypertension Protocol

Definition: Complications from uncontrolled hypertension include stroke and heart attack. Clients with uncontrolled diabetes are at risk for hospital readmission related to these complications.

Objective: To reduce hospital readmissions related to complications from uncontrolled hypertension.

Assessment:

1. Initial health history to include assessment of baseline, symptoms, mobility, cognition and psychosocial support system.
2. Sensory impairments: vision
3. Daily habits (recent sodium intake, fluids)

Care Strategies:

1. Eliminate or minimize risk factors:
    a. Medication reconciliation/monitor medication use/provide medication reminders
    b. Daily blood pressure monitoring
    c. Fluid restriction (as appropriate)
    d. Use sensory aids as appropriate
    e. Regulate bowel/bladder function
    f. Smoking cessation
    g. Eliminate or reduce alcohol intake
    h. Encourage weight loss
2. Provide self-care education with maintenance and management strategies
    a. Activity recommendations
    b. Assess fall status and safety of environment
    c. Emphasize purpose and importance of daily blood pressure monitoring
    d. Maximize ability
    e. Communicate clearly; provide explanations
    f. Encourage heart healthy diet
3. Identify care partners
    a. Foster care support of family/friends
    b. Assess willingness and ability of care partner to assist with self-care; heart healthy diet; daily blood pressure monitoring, symptom recognition and medical follow-up
4. Collaborate with PCP to monitor and manage symptoms

Telemonitoring Equipment: Lorien Link, blood pressure cuff

Follow-up:

1. Weekly nurse follow-up via phone or home visit
2. RN will monitor readings through telehealth system and contact client as needed
3. Reassess every 3 months or sooner if indicated

Expected Outcomes:

1. Improved blood pressure control through collaboration with PCP and the above interventions
2. Improved client/family knowledge related to symptoms and symptom management
3. Reduced readmission rate for complications from uncontrolled hypertension

Resources:
http://www.heart.org
Disclaimer: For the purposes of the grant, Lorien at Home will assess and develop a care plan based on the diagnosis of CHF, however, we will also employee a holistic approach to our care keeping other comorbid conditions in mind that could contribute to re-hospitalization and decline in status.

Appendix C: Uncontrolled Diabetes Protocol

Definition: Clients with uncontrolled diabetes are at risk for complications related to diabetes leading to hospital readmissions.

Objective: To prevent hospital re-admissions due to uncontrolled diabetes.

Assessment:

1. Initial health history to include assessment of baseline, symptoms, medications, mobility, deconditioned status, cognition and psychosocial support system.
2. Sensory impairments: vision, hearing
3. Daily habits

Care Strategies:

1. Eliminate or minimize risk factors:
    a. Medication reconciliation/monitor medication use/provide medication reminders
    b. Daily blood sugar monitoring
    c. Blood pressure monitoring as indicated
    d. Eliminate or reduce alcohol intake
    e. Smoking cessation
    f. Encourage weight loss as appropriate
2. Provide self-care education with maintenance and management strategies
    a. Activity recommendations
    b. Assess fall status and safety of environment
    c. Emphasize purpose and importance of daily blood sugar monitoring and taking medications
    d. Encourage twice weekly foot checks
    e. Maximize ability
    f. Communicate clearly; provide explanations
    g. Encourage a healthy diet –dietician referral if needed
3. Identify care partners
    a. Foster care support of family/friends
    b. Assess willingness and ability of care partner to assist with self-care; healthy diet, exercise, daily blood sugar monitoring, symptom recognition and medical follow-up
4. Collaborate with PCP to monitor and manage symptoms

Telemonitoring equipment: Lorien Link, glucometer

Follow-up:

1. Weekly nurse follow-up via phone or home visit
2. RN will monitor readings through telehealth system and contact client as needed
3. Reassess every 3 months or sooner if indicated

Expected Outcomes:

1. Improved control of blood sugars
2. Decreased complications related to uncontrolled diabetes
3. Decreased hospital re-admissions related to diabetes complications

Resources:
http://www.diabetes.org
Disclaimer: For the purposes of the grant, Lorien at Home will assess and develop a care plan based on the diagnosis of Uncontrolled Diabetes, however, we will also employee a holistic approach to our care keeping other comorbid conditions in mind that could contribute to re-hospitalization and decline in status.

Appendix D: Lorien at Home Client Satisfaction Survey

1. Are you the person being cared for or a family member/friend?
□ Client Receiving Services □ Family Member/Friend □ Name (Optional)

2. Did you get hourly services?
□ Yes □ No

Lorien Select Hourly Care
3. I am satisfied with the quality of care received.
□ Strongly Agree □ Agree □ Neutral □ Disagree □ Strongly Disagree

4. The caregiver had the knowledge & skills needed to help you.
□ Strongly Agree □ Agree □ Neutral □ Disagree □ Strongly Disagree

5. The caregivers arrived at the scheduled time.
□ Strongly Agree □ Agree □ Neutral □ Disagree □ Strongly Disagree

6. The services helped to improve your quality of life.
□ Strongly Agree □ Agree □ Neutral □ Disagree □ Strongly Disagree

7. Did you use telehealth services? (Lorien Link)
□ Yes □ No

Living Lorien Telehealth
8. The Lorien at Home Nurses responded to alerts in a timely manner.
□ Strongly Agree □ Agree □ Neutral □ Disagree □ Strongly Disagree

9. The Lorien Link Touch Screen performed as expected.
□ Strongly Agree □ Agree □ Neutral □ Disagree □ Strongly Disagree

10. The Touch Screen product met your requirements and expectations.
□ Strongly Agree □ Agree □ Neutral □ Disagree □ Strongly Disagree

11. What features on the Touch Screen did you find most useful? Check all that apply (list).

□ News
□ Today's Schedule
□ Videos
□ Messages
□ Caller ID
□ Calendar
□ Photos
□ Letters
□ Games
□ Websites
□ Music Programs
□ Medication
□ Medication Instructions
□ Caregiving
□ Wellness
□ Diabetes Information
□ Diabetes Assessment
□ Heart Health Assessment

Appendix E: Technology Survey[1]

Instructions: Consider each item separately and rate each item independently to all others. Circle the rating that indicates the extent to which you agree with each statement. Please do not skip any rating. If you do not know about a particular area, please circle N/A.

5 = Strongly Agree	4 = Generally Agree	3= Neutral (acceptable)	2= Generally Disagree	1 = Strongly Disagree	N/A

A. Intention to Use

1. Assuming that I have access to the system, I intend to use it.

5 4 3 2 1 N/A

B. Perceived Usefulness:

2. Using the Lorien at Home system saves time and makes it easier to take care of myself.

5 4 3 2 1 N/A

3. Using the system enhances my ability to interact with others.

5 4 3 2 1 N/A

4. Using Lorien at Home improves my health.

5 4 3 2 1 N/A

C. Perceived Ease of Use

5. I find the system to be easy to use.

5 4 3 2 1 N/A

6. I find it easy to get the system to do what I want it to do.

5 4 3 2 1 N/A

D. Subjective Norm

7. People who are important to me think I should use the system.

5 4 3 2 1 N/A

E. Output Quality

8. The quality of information I get from the system is high.

5 4 3 2 1 N/A

9. I have no difficulty telling others about the benefits of the system.

5 4 3 2 1 N/A

10. The benefits of the system are apparent to me.

5 4 3 2 1 N/A

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Union Hospital of Cecil County

Remote Patient Monitoring (RPM) Telehealth Project

Final Report

Table of Contents

Introduction

Union Hospital of Cecil County (UHCC) implemented a telehealth program (program) to assess the impact of telehealth on Prevention Quality Indicators (PQIs) and readmissions in an effort to maximize community/population health. UHCC monitored utilization of the Chesapeake Regional Information System for our Patients (CRISP) Electronic Notification Services (ENS) and query and reporting service portals.

Over the course of the grant, the UHCC care management team worked with AT&T and its remote patient monitoring (RPM) Software as a Service (SaaS) partner, Vivify, to enroll 57 patients in the program. Vivify provided initial and ongoing training to UHCC staff; assisted in the creation of reports; troubleshot and resolved technical issues; and provided guidance related to program optimization. AT&T hosted the RPM software in a compliant data center; served as the primary contact for program enhancements; procured additional kits and replacement parts as needed; directed development activities; managed data usage; coordinated software release updates; and facilitated kit logistics. Both vendors actively participated in MHCC grant program review activities.[1]

Patients were selected based upon clinical and utilization indicators. The clinical indicators included chronic conditions such as congestive heart failure (CHF), chronic obstructive pulmonary disease (COPD), hypertension (HTN), and/or diabetes mellitus (DM). Other clinical indicators included the presence of a wound; risk of poor medication compliance; and other conditions as determined by the UHCC care management team. The utilization indicators considered were frequent emergent care as demonstrated by emergency department (ED) usage; unscheduled physician office visits; three or more hospitalizations/year; recent stay(s) at a comprehensive care facility (CCF); and/or complicated medication regimen/schedule. Patients meeting such criteria who refused to participate were excluded from the program.

All 57 patients invited to participate in the program by the UHCC care management team met one or more clinical and utilization indicators. Among this patient population were 23 patients diagnosed with CHF and 34 with COPD. There were 27 male and 30 female participants whose ages ranged from 28 to 94 years old; the average age was 68. None of the 57 patients had the presence of a wound. The patient diagnosis profile was consistent with that of UHCC's high-utilizer report. Patients with the most frequent hospitalizations, ED visits, and unscheduled physician office visits were those individuals with COPD and/or CHF. The length of time patients remained on the program ranged from less than 30 days to 180 days.[2]

Technology Infrastructure

UHCC's technology infrastructure requirements were simplicity in ease of use for both case managers and patients; Bluetooth enabled; comprehensive device connectivity; cloud-based; web-based access; availability of clinical alerts; video conferencing; embedded multimedia health coaching tools; templated disease/condition-specific care plans; high availability; high reliability; secure transmission and storage of data; 24/7 support; electronic health record and health

[1] The RPM solution configuration can be found in Appendix A; and the data center compliance information is in Appendix B.
[2] Please see Appendix C for more detailed data.

information exchange interoperability; single sign-on capability; process and outcome reporting; ongoing vendor partnership/collaboration; and cost effectiveness.

The AT&T RPM SaaS offering—Vivify—was selected as the vendor partner as it met all of UHCC's technology infrastructure requirements. The Vivify kits include a Bluetooth enabled pulse oximeter, blood pressure monitor, scale, and in-home Samsung interactive tablet. All data from these devices was automatically populated to the caregiver portal. Glucometer data manually entered by the patient was also available for review by case managers. Additional capabilities include:

- Vitals Monitoring
    - Near real-time collection and secure transmission of data from connected personal health devices: blood pressure, weight scale, and pulse oximeter.
- Caregiver Portal
    - Web-based solution that included tools for healthcare providers to manage large patient populations, including the ability to customize care plans on an individual patient basis.
- Clinical Engine
    - Provides useful information on chronic disease and post-acute care plans, including the ability to customize care plans on an individual patient basis, including configurable alert parameters and analytics.
- Patient Portal on Android Tablet
    - Health Surveys
        - Interactive patient health status surveys, driven by individual care plans, including configurable alert parameters.
    - Health Education
        - Push of health educational materials, including pre-recorded videos, driven by individual care plans.
    - Video Conferencing
        - Video conferencing between caregivers and patients, for purposes of near real-time health assessments, as needed, to augment automated monitoring features.

UHCC care managers instructed patients and families on how to use these technologies, such as responding to the tablet-based survey questions, viewing instructional videos, and contacting care managers using the tablet. Additionally, care managers contacted the patients upon discharge home by telephone or video conference to reinforce instructions outlined in their care plans.

Care managers were encouraged to use the CRISP query portal to obtain non-UHCC information about patients participating in the program and to utilize the ENS to track patient readmissions and/or ED visits in a timely manner.

Project Implementation Process

The Union Hospital care management team offered patients (and family members) who met the selection criteria the opportunity to participate in the program. Patients or their designee were asked to review and sign a participation consent form. The following considerations regarding informed consent were upheld: written informed consent was obtained from the patient or designee before deployment of AT&T's RPM SaaS telehealth equipment; signed consent forms are

maintained and retrievable in the patient's EHR; patients may terminate the use of telehealth at any time without fear of loss of care from UHCC; patient privacy was maintained at all times; and UHCC's Protected Health Information (PHI) policies were enforced.

AT&T and Vivify taught the UHCC care management team how to on-board program patients, monitor patient data, establish clinical alerts, create plans, run reports, maintain and clean equipment, order supplies, and trouble shoot issues. In addition, they provided ongoing education about any solution upgrades, participated in program reporting calls/meetings, and gave recommendations on how to optimize use of the telehealth technology.

The UHCC care management team provided all education about the program and the equipment to participating patients. Additionally, the patient tablets contained instructional videos about data entry and equipment use. One case manager was assigned the telehealth program as her primary area of responsibility.

Patients who participated in the program had their data monitored using in-home electronic touch-screen tablets (Samsung 10.1 Tab 2 LTE with AT&T wireless connection) provided by AT& T's RPM SaaS solution. Patient data monitored included: blood pressure, heart rate, weight, pulse oximetry, and blood glucose levels. The tablets not only transmitted data to a care manager, but also provided health education to the patient. Data transmitted was stored in the cloud-based system managed by Vivify Health, AT&T's RPM partner. The UHCC care management team and participating primary care providers were able to access patient data through the caregiver portal dashboard. This dashboard provided visual alerts related to abnormal physiological data and overdue vital sign monitoring and/or survey responses. Such alerts triggered the case managers to contact the patient via a telephone and/or video conferencing.

Individual patient care plans were developed for each patient by the UHCC care management team. These plans were tailored to a patient's medical condition and included equipment to be deployed, monitoring frequency, and interventions. For example, patients with CHF were instructed to weigh themselves daily. The case managers were alerted if there was a five percent increase in the patient's weight from one day to the next. The physiological data most pertinent for those patients with COPD included respiratory rate and pulse oximetry value. Case managers were alerted when a patient's pulse oximetry level was less than 90 percent. These alerts resulted in the case managers contacting the patient's primary care provide for medication and/or oxygen administration adjustments thereby minimizing the need for the patient be seen in the ED or a physician's office.

Assessment Approach

Metrics were selected to assess the impact of the program on population health and utilization of CRISP services. The following measures were evaluated: the number of chronic PQIs for UHCC as reported by the quarterly CRISP Potentially Avoidable Utilization (PAU) report; the percentage of telehealth patients readmitted within 30 days of program completion; CRISP utilization as measured by query portal use and ENS notifications; and patient satisfaction.

Thirty-day readmission and PQI data were selected in an attempt to gauge the impact of telehealth on population health. CRISP utilization statistics were captured to evaluate if a telehealth program increased clinicians' use of the query portal and ENS notifications. Patient satisfaction with the telehealth initiative was an important measure of success; if patients did not like the concept or feel comfortable using the technology, it would be a challenge to impact the population health metrics.

Assessment Limitations

PQI measures were challenging to gather. The CRISP PAU reports contain PQI data. The information was made available on a monthly to quarterly basis. The column headers in early reports were coded; the actual PQI was not apparent. This made identification of the PQI and related tabulation challenging. More recent versions of the PAU reports contained more clearly described PQI definitions. The total number of calendar year (CY) quarter PQIs was used as a measure of success. Upon further exploration it became apparent that tracking PQIs associated with CHF (PQI 08) and COPD (PQI 05) was more appropriate.[3] Lack of recording of real-time patient status in the RPM system by the care managers negatively impacted the ability to create reports without manually verifying the data for accuracy. This resulted in the need for additional administrative oversight and time.

Results of Telehealth Intervention

Implementation of the telehealth program had the following impact: the percentage of telehealth program patients readmitted within 30 days of program completion was less than the overall hospital readmission rate[4]; CRISP query portal utilization increased[5]; CRISP ENS notifications were used with more frequency[6]; the total number of chronic PQIs as reported by the PAU report did not meet the pre-implementation goal; however, CY 16 YTD metrics of PQIs 05 and 08 do meet this goal[7]; patients expressed overall satisfaction with the program and would recommend it to others.[8]

Project Implementation Challenges

Key challenges related to technology infrastructure and project implementation process included: kit management, especially as it related to kit return; ongoing patient compliance with their care plan; case management team telehealth application data field completion; updating the status of patients in the telehealth application; inability to run reports from the telehealth application independently during the initial months of the program; the need to return kits in order to upgrade the telehealth application software during the first three months of the program; sporadic engagement of medical stakeholders; the challenge in accurately reporting PQIs; and the time to provide administrative oversight of the program was underestimated.

Lessons Learned

Key lessons learned related to UHCC's technology infrastructure and project implementation process included: patients needed to be in the program for at least 60 days in order to more effectively incorporate the technology in their daily routines; patients in the program less than 30 days had a higher readmission incidence; patients began to understand how to minimize the impact of their medical condition through monitoring their vital signs and weight; the caregiver portal provided the transition of care case managers with almost real-time information about the patients,

[3] Both data sets are provided in Appendix F.
[4] See Appendix D.
[5] See Appendix E.
[6] See Appendix E.
[7] See Appendix F.
[8] See Appendix G.

allowing them to contact the patient and primary care givers in a timely manner; the utilization of Bluetooth enabled kitted devices resulted in a more efficient on-boarding process; successful administration of the program could have benefited by having at least three full time staff; managers need to support staff in the administration and management of the telehealth program; ongoing vendor support is critical to the success of the program; accurate and complete data entry, especially patient status from program initiation, is important; ongoing staff training and reinforcement of learning is critical to the success of the program; investment in the kit logistics service could save valuable staff time; and dedicated focus and oversight of the program by management and the care management team is required to sustain use of telehealth and to demonstrate its impact.

Cost Effectiveness

There were 44 potential 30 day readmissions avoided as a result of this program. The average PAU cost is $7000. UHCC spent $60,000 to implement and manage the program. The potential avoidable utilization cost as a result of this program is $248,000 [$7000x44-$60,000]. In addition, it can be argued that participation in the program helped patients gain valuable information about how to manage their medical condition(s). This may be particularly true for patients with COPD as only nine of them were readmitted to the hospital after the program completion.[9]

Sustainability

UHCC will continue to use telehealth as a transition of care tool. The cost of kits and data usage have been included in ongoing operational expenses. One full-time transition of care manager has been assigned to onboard, monitor, and care for patients in the telehealth program. UHCC has plans to expand use of telehealth in its palliative care program, the ED, skilled nursing facilities, behavioral health, and the Health Services Cost Review Commission (HSCRC) Regional Transformational Grant program.

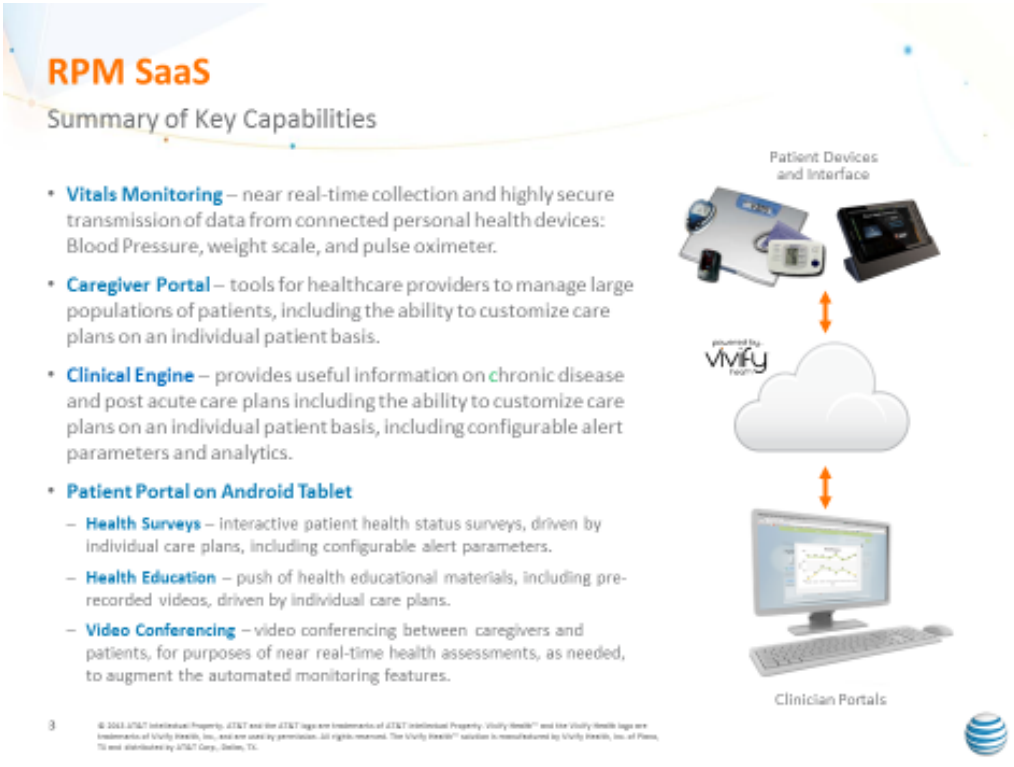
Closing

UHCC's experience with this telehealth program was positive, as evidenced by the achievement of its clinical and program goals. The lessons learned were valuable and will be incorporated in future program development. There is an organizational recognition of program value and a commitment to its sustainability. Going forward, more focus will be placed upon engaging physicians as active program participants. Additional organizational structure and explicit accountability will be implemented to support program staff, monitor progress, evaluate impact, and refine processes. Correlational data statistics and other analytics will be applied to gain insight into the effect of telehealth on specific patient populations and medical conditions. In additional to physiological and hospital data collection, health literacy will be assessed pre, peri, and post-program implementation. Such information will be used to inform the development of other community programs designed to address population health.

[9] See Appendix D.

Appendix A


RPM SaaS Offer
Collect
Transmit & Engage
Store & Manage
Report & Use
Connected Devices*
• Nonin Pulse Oximeter
• A&D Blood Pressure
• A&D Weight Scale
*Customer Provided
In Home Tablet Gateway
• Samsung 10.1" Tab 2 – LTE - Available through AT&T Wireless
CMP Service Option
• Enables manual entry of patient data to caregiver
Patient Interface
• AT&T branded or white labeled
• A variety of multimedia health coaching and education tools
Cloud Based Solution
• Powered by Vivify Health application
• Video conferencing capability supported by Ericsson
Web Access for HC Professionals
• AT&T Branded or white labeled
• Caregiver Dashboard
• Assign/Provision
• Care Plan Authoring
RPM Customers
Electronic Health Record
• Integration provided by AT&T mHealth Platform - or Integration Engine
Patient facing
Provider facing
2


RPM SaaS
Summary of Key Capabilities
• Vitals Monitoring – near real-time collection and highly secure transmission of data from connected personal health devices: Blood Pressure, weight scale, and pulse oximeter.
• Caregiver Portal – tools for healthcare providers to manage large populations of patients, including the ability to customize care plans on an individual patient basis.
• Clinical Engine – provides useful information on chronic disease and post acute care plans including the ability to customize care plans on an individual patient basis, including configurable alert parameters and analytics.
• Patient Portal on Android Tablet
– Health Surveys – interactive patient health status surveys, driven by individual care plans, including configurable alert parameters.
– Health Education – push of health educational materials, including pre-recorded videos, driven by individual care plans.
– Video Conferencing – video conferencing between caregivers and patients, for purposes of near real-time health assessments, as needed, to augment the automated monitoring features.
Patient Devices and Interface
Clinician Portals
3

Appendix B

AT&T Remote Patient Monitoring Software as a Service (AT&T RPM SaaS)

Security Frequently Asked Questions (FAQ)

1 Security and Privacy:

1.1 Does the AT&T RPM SAAS use a third party data center?

No.

1.2 Where do the application and data reside?

The production application and data reside at Ericsson Inc. 6300 Legacy Dr. Plano, Texas 75024 USA

1.3 What kind of database is used to store the data?

The solution utilizes commercially available relational database.

1.4 Define how the data is secured and kept confidential/private.

Physical security

Data is stored in the Ericsson Data Center 2, located in Plano Texas, which is a level 4 data center. The data center has been reviewed through SOC 2 audit.

Physical entry is through man-trap through physical/guards and through electronic entry.

Access to DC2 is restricted to authorized personnel through the use of both a card key and access PIN that is coded to a specific card key. The correct PIN and card key must be used in combination to enter secured areas. The data center Manager or the Director of Operations grants access to all data centers.

The DC2 revolving door is displayed at all times on a 42" monitor in the command center. Hard anti-pass back is utilized. Those observed attempting to hand their badge back or letting others in are detained by security personnel, physically escorted from DC2, and their access to DC2 is revoked immediately and not reinstated until after their manager talks to the offender and re-approves their access.
After entry through the DC2 revolving door, there is another door with a badge reader that can be secured in the event the revolving door is out of commission.

Security sensor alarms are centrally monitored and activated in the event a door remains open longer than 30 seconds, and authentication to gain access and to leave is based on a badge/badge reader. All badge access reports are centrally managed via DSX and are retained for a minimum of 2 years.

Electronic security

AES encryption (128bit key) is used to protect PHI information at rest.

Ericsson has deployed firewall policies and IDS controls to provide an environment sufficient to protect the security of the system and its essential business data.

During platform turn up open and unused OS network ports are closed and unused services disabled then evaluated during application installation, administrator accounts are renamed (as applicable), database server security policies are implemented and platforms which require access to external networks are placed behind a DMZ secured with intrusion-detection systems and firewalls.

Security vulnerabilities are exposed during scans using industry-standard software. Scans are performed on a scheduled quarterly basis and after major updates.

Security when the data is in motion

All ePHI in transit is encrypted:

Caregiver Portal related: HTTPS (SSL 3.0 / TLS 1.0)
Signature algorithm: sha1RSA
Asymmetric Public Key length: 2048 bits
Symmetric encryption key length: 256 bits

Video Call related:

TLS (1024 asymmetric key, 128 symmetric key) is used to protect the signaling.
SRTP (128bits symmetric key) is used to protect the media plane.

1.5 How is one client's data isolated/separated from other client's data?

Patients' medical information (e.g. questionnaire responses and medical sensor readings) will be encrypted and stored in a separate database which cannot be accessed by other AT&T customers

1.6 What are AT&T RPM SaaS's practices to detect and follow up on possible inappropriate access to client's files and programs?

Ericsson has deployed firewall policies and IDS controls to provide an environment sufficient to protect the security of the system and its essential business data. The data in motion is secured with SSL, TLS and SRTP.

The IDS to an IPS system is capable of identifying, monitoring and reporting on security breaches and incidents.

In the instance a security incident has been detected, the Security Incident policy will be followed and the Ericsson Security Officer will be notified.

1.7 Does the AT&T RPM SAAS have an internal audit department?

Yes.

1.8 What provisions does AT&T RPM SAAS require that would allow client's internal auditors to evaluate internal controls surrounding the application and data center's physical security, backup/recovery procedures, disaster/recovery procedures, security monitoring and limits on access to client information?

None. Ericsson does not have a contractual relationship with AT&T's customers and therefore, does not support the client's internal auditors' evaluation.

Ericsson does support SSAE16 SOC 1 and SSAE16 SOC 2 Type 2 audits by independent outside audit firms.

Ericsson contractually is obligated to allow AT&T to request internal audits.

1.9 Has AT&T RPM SaaS had an internal control assessment of information systems performed by your Certified Public Accountant?

Ericsson has participated in SOC 2 audit, and will make the summary page available.

2 Disaster Recovery/ Business Continuity:

2.1 How does AT&T RPM SaaS ensure the application runs reliably and is always accessible?

The datacenter is supported by two commercial feeds from separate power sub-stations, two dedicated redundant UPS systems (true A and B AC power) are deployed with dedicated battery back-up.

These are backed up by dedicated local diesel generator with ample fuel reserve and on-call refueling capability. All systems are tested annually and preventative maintenance performed quarterly. The solution platforms have redundant modules, external storage hard drives are running in an n+4 configuration, spare hardware is on hand and equipment is maintained under support agreements.

Ericsson uses best in class techniques to provide higher availability of the application, eliminate single point of failure, continuous monitoring of servers ensuring auto restart if a failure of a server may occur and database mirroring to support automatic failover.

2.2 What types of system maintenance does AT&T RPM SaaS perform?

Regular scheduled system maintenance and health checks for the data center are performed. This includes server administration activities (maintaining logs, backups, software correction patches/updates, etc.), platform performance monitoring/optimization, hardware and software implementation support and system configuration updates.

2.3 Describe the backup process.

2.3.1 What type of backup process do you implement?

The backup process covers all aspects of the solution. Ericsson uses Veritas NetBackUp software to enable the backup functionality. Application and database incremental backups are taken daily and full backups taken weekly. Complete system backups are also taken occasionally after a major change in the solution. Local data center incremental and full backup are also

taken at a scheduled interval. All backup archives are stored locally and replicated to a remote facility for redundancy.

2.3.2 Where are backups stored?

All backups are stored at Ericsson data center in Plano, TX. In addition, a remote facility is used to replicate the backup archives for redundancy purposes.

2.4 How often are data files and programs sent off-site and how far away is the off-site location?

Backup data is replicated to an Ericsson data center, which is located greater than 1000 miles away. Backups are sent to remote location as soon as the backup process is completed.

2.5 Describe downtime history in the last 12 month

2.5.1 How many times have systems gone down in the last 12 months?

The solution has not experienced unscheduled downtime in the past 12 months.

2.5.2 What were the reasons for the downtime?

The system has experienced scheduled downtime, planned as part of regular software upgrades of the application and network components.

2.5.3 How long did it take to recover?

n/a

2.5.4 What steps were implemented to prevent similar situations?

n/a

2.6 How long would it take to perform a full system recovery?

Recovery time is dependent on the extent and nature of the loss.

2.7 Describe current network processes and procedures for disaster recovery

The Ericsson RPM Service Disaster Recovery Plan is well documented, approved and tested. This document outlines a checklist of steps to be followed, roles and responsibilities and contact information.

2.7.1 Application/Database Server Disk failure?

Application/Database Server Disk Failure will be handled per Ericsson RPM Disaster Recovery Plan. The application and database are currently running in a RAID5 + 4 spare disk configuration.

2.7.2 Application/Database Full System failure?

Application/Database Full System failure will be handled per Ericsson RPM Disaster Recovery Plan. Continuous monitoring and availability features of the solution ensures auto restart and system recovery.

2.8 What arrangements have been made for disaster recovery at a hot site or another location?

Activation of Ericsson RPM service at another location is addressed per the Ericsson RPM Disaster Recovery Plan.

2.9 What levels and areas of insurance coverage are provided (liability, errors and omissions, etc)?

These conditions are stated in the Master Agreement between the vendor (Ericsson), and AT&T.

3 Application Controls:

3.1 Is AT&T RPM SaaS using contract programmers and other sub-contractors and if yes, what percentage of contracting programming is done versus in-house programmers?

Yes. The Caregiver Portal and Mobile Patient Application are the products of the manufacturer, Vivify Health. Ericsson provides several platforms for this service and industry proven OS, database and applications. The percentage of contracted programming cannot be provided at this time.

3.2 What procedures are in place for controlling program changes?

All access to the production system is controlled and the introduction of changes are tracked and approved via an Ericsson change management process.

3.3 How are program changes and new programs tested?

Testing of new loads requires the successful execution of four validation stages:

1) The manufacturer is responsible for completing nodal testing and limited inter-operability testing before releasing the software to Ericsson for testing
2) Ericsson completes testing of the new software in a lab environment which was established to closely resemble the production network.
3) Once lab testing is completed the software is introduced into a test environment in production where Ericsson validates lab results; the load is released to AT&T CTO for testing
4) AT&T CTO is responsible for testing the new software in the production test environment before releasing the load for introduction to customer environments

3.4 Is there a software package in place to control program changes?

Ericsson does not deploy a software package but uses a combination of well-defined processes to perform life cycle management of the solution. All program changes are analyzed and evaluated per the process defined in answer 3.3

3.5 Is there an approval process in place before a program can be moved into production?

Yes. A change management process is in place and followed for any changes to the production environment.

4 General Information:

4.1 How many clients does AT&T RPM SaaS have?

AT&T does not disclose information on customers.

4.2 Will the contract define how service level performance will be determined and measured?

The MSA (Master Service Agreement) contains service level performance requirements.

4.3 Will the contract define AT&T RPM SaaS's responsibilities in regards to data privacy and data integrity?

Yes, it is integrated with the Master Service Agreement.

4.4 Does AT&T RPM SaaS have a transition plan in the event it closes its doors?

Yes, it is part of the Master Service Agreement.

4.5 Will AT&T RPM SaaS agree to pay any wind-down costs that a client may incur as a result of termination of ASP services?

Please refer to the terms of the Master Service Agreement.

4.6 If RPM SaaS services are terminated, would the client receive the source code and if not, will AT&T RPM SaaS agree to escrow the source code?

Please refer to the terms of the Master Service Agreement.

Appendix C

Patient Demographics

Total number of participants: 57

Gender (#)

Male	27
Female	30

Age Range: 28 to 94

Average age: 64 years old

Diagnosis (#)

COPD	34
CHF	23

Length of time on program (#)

Days in program	**CHF patients**	**COPD patients**
Less than 30	9	9
30	2	16
31 to 60	4	4
61 to 90	1	1
91 to 120	4	2
121 to 150	2	1
151 to 180	1	1

Appendix D

Readmissions:

	# of patients
No readmissions after program completion	32
Within 30 days of program completion	13
31 to 60 days of program completion	0
61 to 90 days of program completion	1
91 to 120 days of program completion	0
121 to 150 days of program completion	2
151 to 180 days of program completion	9

Readmissions by diagnosis (#):

Readmission timing	**COPD patients**	**CHF patients**
No readmissions after program completion	**25**	**7**
Within 30 days of program completion	**4**	**9**
31 to 60 days of program completion	**0**	**0**
61 to 90 days of program completion	**1**	**2**
91 to 120 days of program completion	**0**	**0**
121 to 150 days of program completion	**1**	**1**
151 to 180 days of program completion	**3**	**4**

30 day Readmissions vs. Days on the program:

Days in program	**# of patients readmitted**
Less than 30	**6**
30	**1**
31 to 60	**2**
61 to 90	**0**
91 to 120	**2**
121 to 150	**2**
151 to 180	**0**
Days on program	**0**

Readmission Rate:

30 Day Telehealth Patients*	**30 Day Hospital Patients**
0.02%	10.94%

*** Numerator=the numerator is the number of readmission visit discharges in the month in review; Denominator=the denominator is the number of discharges in the month in review. For July 2015 to November 2016 there were 13 30 day readmissions for the telehealth patients and 74829 discharges (13/74829=.02%)**

Appendix E

CRISP Portal Utilization (#)

Pre-program implementation	Post-program implementation
317	463

CRISP ENS Notifications (#)

Pre-program implementation	Post-program implementation
80	143

Appendix F

PQIs

Average # of Chronic Disease PQIs/CY Quarter

CY13	86
CY14	129
CY15	152
CY16(3 Quarters)	145
Project goal	100

PQI 05 COPD and PQI 08 CHF by CY

CY	**PQI 05**	**PQI 08**
13	188	100
14	284	140
15	268	144
16 YTD	182	106

Average # of PQI 05 and 08 /CY Quarter

CY	**PQI 05**	**PQI 08**	**Total**
13	47	25	72
14	71	35	106
15	67	36	103
16 YTD	61	35	96
Project Goal			100

Appendix G

Patient Satisfaction

There were 15 patients who responded to a nine question satisfaction survey.

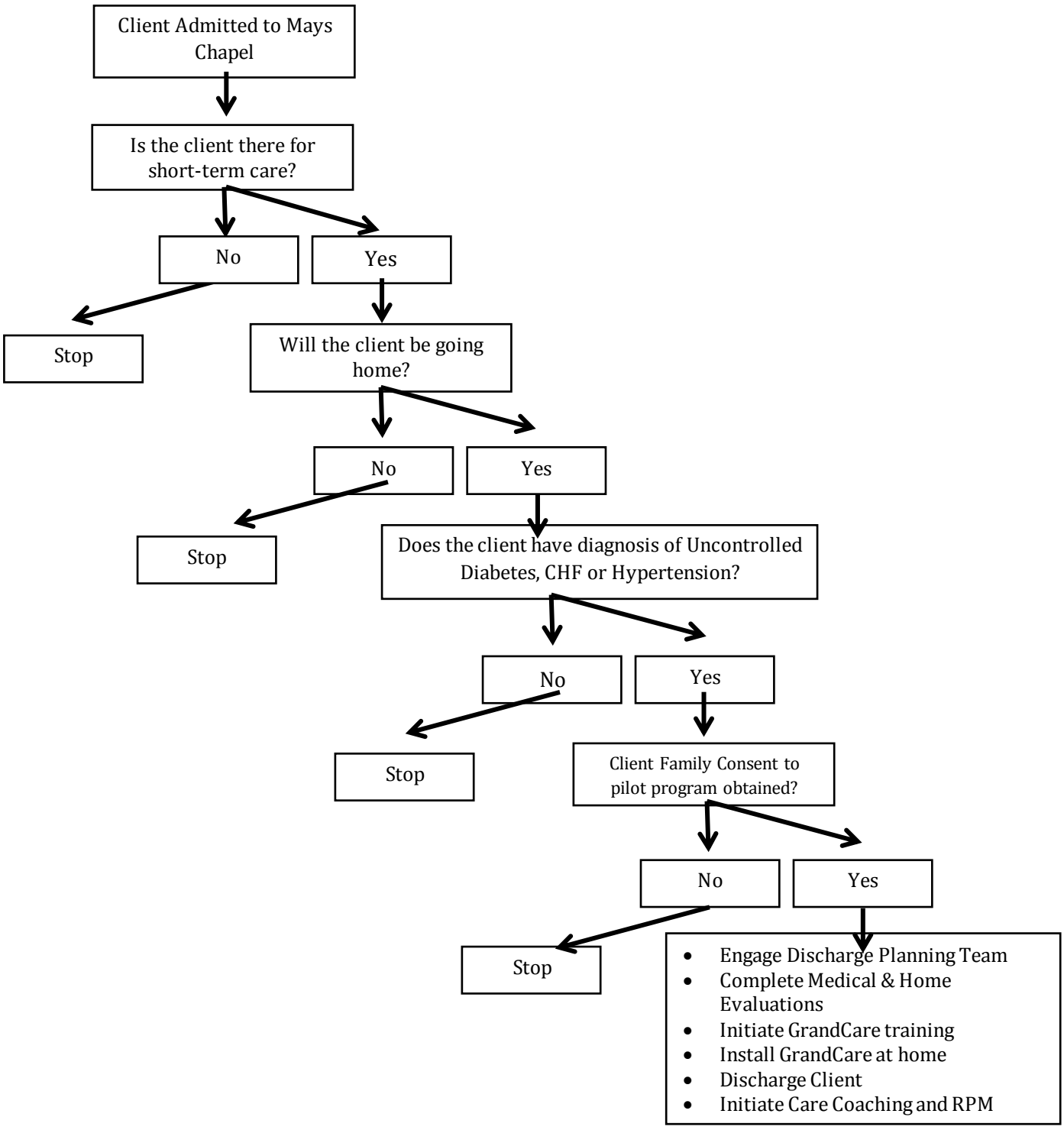
Response rate=26%

Responses	Number
Strongly agree	65
Agree	51
Neither agree or disagree	19
Disagree	0
Strongly disagree	0

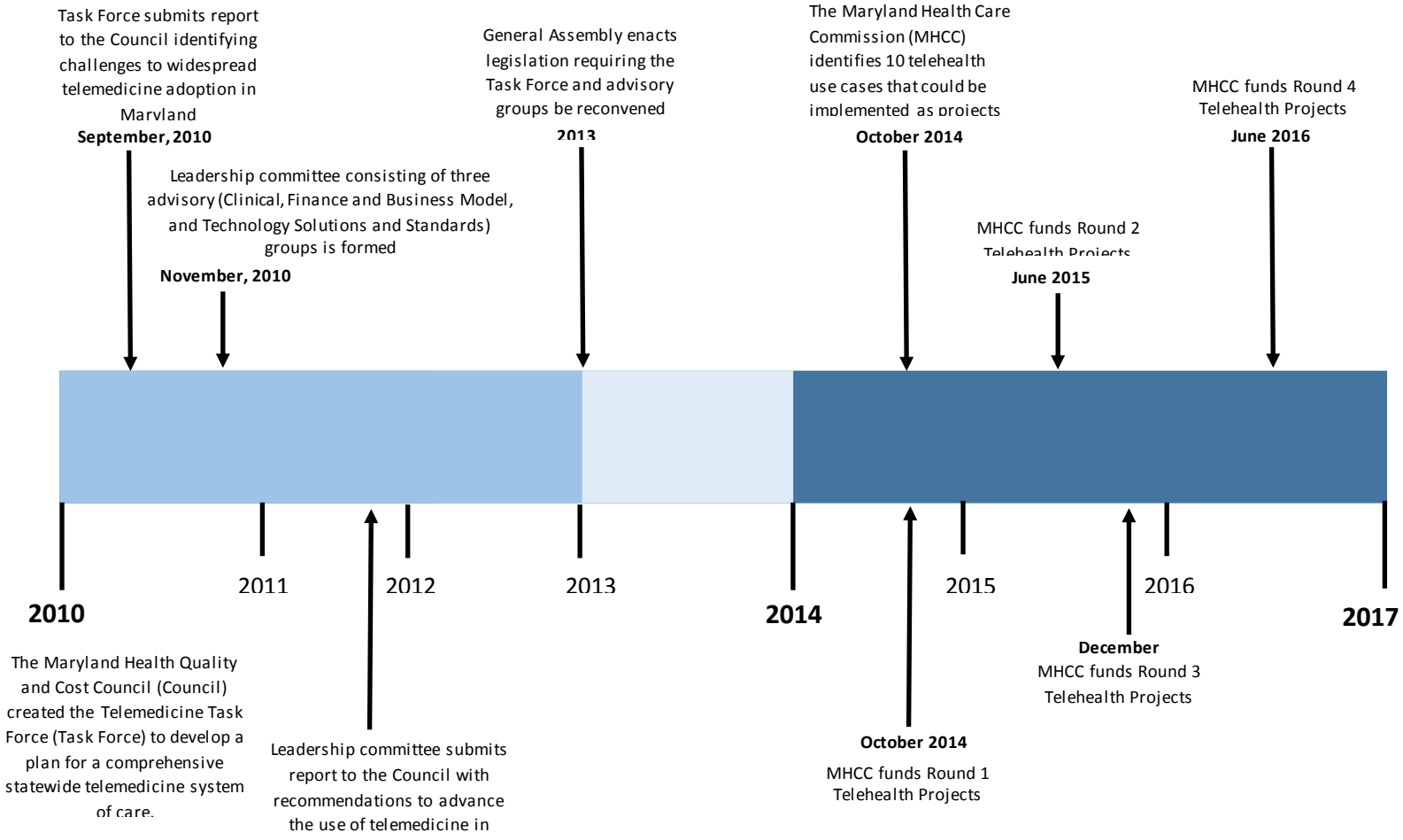
Questions with neither agree or disagree responses:

Response	# of patients
The videos used in the remote monitoring program were easy to understand.	4
Using the remote monitoring program was comparable to having a nurse come to my home.	3
Tablet was easy to use	3
I was able to better manage my health by using the remote monitoring program.	2
Devices were easy to use	2
It did not take me long each day to do my daily VS	1
It did not take me long each day to do my daily questions	1
I would recommend RPM to others	1
The blood pressure, weight scale, and pulse oximeter equipment were easy to use.	1
I was trained very well on using the equipment	1

Appendix F: Client Selection Flow Chart[2]



Appendix A: MHCC Telehealth Initiatives Timeline



Appendix B: Telehealth Projects

	Name	*Use Case*	*MHCC funding $*	*Match $*	*Start Date*	*End Date*
Round 1	Atlantic General Hospital (Worcester County)	Video consultations between the Emergency Department (ED) and Berlin Nursing and Rehabilitation Center (BNRC) to reduce ED visits and hospital admissions of patients residing in a long term care facility (LTC).	$30,000	$87,922	10/30/14	10/30/15
	Dimensions Healthcare System (Prince George's County)	Laurel Regional Hospital and Prince Georges Hospital use mobile tablets to conduct video consultations with patients residing at two LTCs, Sanctuary of Holy Cross and Patuxent River Health and Rehabilitation Center to reduce unnecessary hospital transfers.	$30,000	$42,316	10/30/14	10/30/15
	University of Maryland Upper Chesapeake Health (Harford County)	Remote telemedicine examinations and consultations between hospital and a fully equipped exam room and lab located at the Lorien, Bel Air facility. Technology provides EKG monitoring, sonogram and multiple cameras.	$27,888	$45,633	10/30/14	10/30/15
Round 2	Crisfield Clinic, LLC (Somerset County)	Rural health clinic provides mobile devices for middle school and high school aged patients to assist children in managing chronic conditions including asthma, diabetes, childhood obesity, and behavioral health issues.	$20,000	$93,983	6/1/15	11/30/16
	Lorien Health Systems (Baltimore & Harford County)	Skilled nursing facility and residential service agency uses devices installed in patients' home to monitor chronic conditions including uncontrolled diabetes, congestive heart failure, and hypertension and providing clinical support to improve care and avoid hospital admissions.	$30,000	$63,600	6/1/15	11/30/16
	Union Hospital of Cecil County (Cecil County)	Hospital provides chronic care patients with mobile tablets and peripheral devices to capture blood pressure, pulse, and weight and provide patient education to facilitate patient monitoring.	$30,000	$60,000	6/1/15	11/30/16
Round 3	Associated Black Charities (Dorchester & Caroline County)	Community association that assists minority and rural communities with navigating the health care system will utilize mobile tablets to facilitate primary care and behavioral health video consultations with a licensed nurse care coordinator from Choptank Community Health System.	$30,000	$90,000	12/1/15	5/30/17

	Gerald Family Care, LLC (Prince George's County)	Patient Centered Medical Home practice will implement telehealth video consultations and image sharing services between patients at three family practice locations and Dimensions Health System specialists providing gastroenterology, orthopedics, neurology, and behavioral health services.	$30,000	$66,726	12/1/15	5/30/17
	Union Hospital of Cecil County (Cecil County)	Builds upon the original grant proving chronic care patients with mobile tablets and peripheral devices to capture blood pressure, pulse, weight, and glucose levels to facilitate patient monitoring will support data sharing with primary care and Emergency Department providers.	$30,000	$60,000	12/1/15	5/30/17
Round 4	MedPeds, LLC (MedPeds)	MedPeds, a family medicine practice, will be using a mobile device application with patients to facilitate 24/7 video-based telemedicine with MedPeds providers, make appointments, and access electronic health records with the goal of increasing patient access to primary care providers and improving outcomes for diabetic patients.	$61,154	$122,309	6/1/16	11/30/17
	Gilchrist Greater Living (Gilchrist)	Gilchrist, a comprehensive primary care geriatric medical practice, will be providing senior patients with in-home telehealth monitoring devices to support case management and early intervention for chronically ill patients with the goal of reducing hospital admissions.	$56,000	$112,289	6/1/16	11/30/17
Round 5	University of Maryland Shore Regional Health (UMSRH)	UMSRH will implement telehealth to provide palliative care services to patients within University of Maryland Shore Medical Center at Chestertown (UMSMC-C) and Shore Nursing and Rehabilitation Center at Chestertown with the goal of increasing access to palliative care services and reducing hospital encounters. UMSRH will also implement telehealth to increase access to emergency department psychiatric services at both UMSMC-C and Shore Regional Emergency Center at Queen Anne's and inpatient psychiatric consultations at UMSMC-C.	$75,149	$150,303	1/31/17	7/31/18

Appendix C: Md. Code Ann., Insurance § 15–139

Code of Maryland

Article – Insurance

§15–139.

(a) (1) In this section, "telemedicine" means, as it relates to the delivery of health care services, the use of interactive audio, video, or other telecommunications or electronic technology by a licensed health care provider to deliver a health care service within the scope of practice of the health care provider at a site other than the site at which the patient is located.

(2) "Telemedicine" does not include:

(i) an audio–only telephone conversation between a health care provider and a patient;

(ii) an electronic mail message between a health care provider and a patient; or

(iii) a facsimile transmission between a health care provider and a patient.

(b) This section applies to:

(1) insurers and nonprofit health service plans that provide hospital, medical, or surgical benefits to individuals or groups on an expense–incurred basis under health insurance policies or contracts that are issued or delivered in the State; and ·

(2) health maintenance organizations that provide hospital, medical, or surgical benefits to individuals or groups under contracts that are issued or delivered in the State.

(c) An entity subject to this section:

(1) shall provide coverage under a health insurance policy or contract for health care services appropriately delivered through telemedicine; and

(2) may not exclude from coverage a health care service solely because it is provided through telemedicine and is not provided through an in–person consultation or contact between a health care provider and a patient.

(d) An entity subject to this section:

(1) shall reimburse a health care provider for the diagnosis, consultation, and treatment of an insured patient for a health care service covered under a health insurance policy or contract that can be appropriately provided through telemedicine;

(2) is not required to:

(i) reimburse a health care provider for a health care service delivered in person or through telemedicine that is not a covered benefit under the health insurance policy or contract; or

(ii) reimburse a health care provider who is not a covered provider under the health insurance policy or contract; and

(3) (i) may impose a deductible, copayment, or coinsurance amount on benefits for health care services that are delivered either through an in–person consultation or through telemedicine;

(ii) may impose an annual dollar maximum as permitted by federal law; and

(iii) may not impose a lifetime dollar maximum.

(e) An entity subject to this section may undertake utilization review, including preauthorization, to determine the appropriateness of any health care service whether the service is delivered through an in–person consultation or through telemedicine if the appropriateness of the health care service is determined in the same manner.

(f) A health insurance policy or contract may not distinguish between patients in rural or urban locations in providing coverage under the policy or contract for health care services delivered through telemedicine.

(g) A decision by an entity subject to this section not to provide coverage for telemedicine in accordance with this section constitutes an adverse decision, as defined in § 15–10A–01 of this title, if the decision is based on a finding that telemedicine is not medically necessary, appropriate, or efficient.

Appendix D: Reimbursable Medicare Telemedicine Services

CMS released the below fact sheet on telehealth reimbursable services in the Medicare Fee-for-Service program. Available at: https://www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-MLN/MLNProducts/downloads/TelehealthSrvcsfctsht.pdf.

DEPARTMENT OF HEALTH AND HUMAN SERVICES
Centers for Medicare & Medicaid Services

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Telehealth Services

RURAL HEALTH SERIES

Please note: The information in this publication applies only to the Medicare Fee-For-Service Program (also known as Original Medicare).

The Hyperlink Table, at the end of this document, provides the complete URL for each hyperlink.

Learn about these calendar year (CY) 2017 Medicare telehealth services topics:

- Originating sites
- Distant site practitioners
- Telehealth services
- Billing and payment for professional services furnished via telehealth
- Billing and payment for the originating site facility fee
- Resources
- Lists of helpful websites and Regional Office Rural Health Coordinators

When "you" is used in this publication, we are referring to physicians or practitioners at the distant site.

Medicare pays for a limited number of Part B services furnished by a physician or practitioner to an eligible beneficiary via a telecommunications system. For eligible telehealth services, the use of a telecommunications system substitutes for an in-person encounter.

ICN 901705 November 2016

ORIGINATING SITES

An originating site is the location of an eligible Medicare beneficiary at the time the service furnished via a telecommunications system occurs. Medicare beneficiaries are eligible for telehealth services only if they are presented from an originating site located in:

- A county outside of a Metropolitan Statistical Area (MSA)
- A rural Health Professional Shortage Area (HPSA) located in a rural census tract

The Health Resources and Services Administration (HRSA) determines HPSAs, and the Census Bureau determines MSAs. You can access HRSA's Medicare Telehealth Payment Eligibility Analyzer to determine a potential originating site's eligibility for Medicare telehealth payment.

Entities that participate in a Federal telemedicine demonstration project approved by (or receiving funding from) the Secretary of the U.S. Department of Health & Human Services as of December 31, 2000, qualify as originating sites regardless of geographic location.

Each CY, the geographic eligibility of an originating site is established based on the status of the area as of December 31st of the prior CY. Such eligibility continues for the full CY.

The originating sites authorized by law are:

- The offices of physicians or practitioners
- Hospitals
- Critical Access Hospitals (CAHs)
- Rural Health Clinics
- Federally Qualified Health Centers
- Hospital-based or CAH-based Renal Dialysis Centers (including satellites)
- Skilled Nursing Facilities (SNFs)
- Community Mental Health Centers (CMHCs)

Note: Independent Renal Dialysis Facilities are not eligible originating sites.

DISTANT SITE PRACTITIONERS

Practitioners at the distant site who may furnish and receive payment for covered telehealth services (subject to State law) are:

- Physicians.
- Nurse practitioners (NPs).
- Physician assistants (PAs).
- Nurse-midwives.
- Clinical nurse specialists (CNSs).
- Certified registered nurse anesthetists.
- Clinical psychologists (CPs) and clinical social workers (CSWs). CPs and CSWs cannot bill for psychiatric diagnostic interview examinations with medical services or medical evaluation and management services under Medicare. These practitioners may not bill or receive payment for Current Procedural Terminology (CPT) codes 90792, 90833, 90836, and 90838.
- Registered dietitians or nutrition professionals.

TELEHEALTH SERVICES

As a condition of payment, you must use an interactive audio and video telecommunications system that permits real-time communication between you, at the distant site, and the beneficiary, at the originating site. Asynchronous "store and forward" technology is permitted only in Federal telemedicine demonstration programs in Alaska or Hawaii.

This table provides the CY 2017 list of Medicare telehealth services.

CY 2017 Medicare Telehealth Services

Service	HCPCS/CPT Code
Telehealth consultations, emergency department or initial inpatient	HCPCS codes G0425–G0427
Follow-up inpatient telehealth consultations furnished to beneficiaries in hospitals or SNFs	HCPCS codes G0406–G0408
Office or other outpatient visits	CPT codes 99201–99215
Subsequent hospital care services, with the limitation of 1 telehealth visit every 3 days	CPT codes 99231–99233
Subsequent nursing facility care services, with the limitation of 1 telehealth visit every 30 days	CPT codes 99307–99310
Individual and group kidney disease education services	HCPCS codes G0420 and G0421
Individual and group diabetes self-management training services, with a minimum of 1 hour of in-person instruction to be furnished in the initial year training period to ensure effective injection training	HCPCS codes G0108 and G0109
Individual and group health and behavior assessment and intervention	CPT codes 96150–96154
Individual psychotherapy	CPT codes 90832–90834 and 90836–90838
Telehealth Pharmacologic Management	HCPCS code G0459
Psychiatric diagnostic interview examination	CPT codes 90791 and 90792
End-Stage Renal Disease (ESRD)-related services included in the monthly capitation payment	CPT codes 90951, 90952, 90954, 90955, 90957, 90958, 90960, and 90961
End-Stage Renal Disease (ESRD)-related services for home dialysis per full month, for patients younger than 2 years of age to include monitoring for the adequacy of nutrition, assessment of growth and development, and counseling of parents	CPT code 90963
End-Stage Renal Disease (ESRD)-related services for home dialysis per full month, for patients 2-11 years of age to include monitoring for the adequacy of nutrition, assessment of growth and development, and counseling of parents	CPT code 90964
End-Stage Renal Disease (ESRD)-related services for home dialysis per full month, for patients 12-19 years of age to include monitoring for the adequacy of nutrition, assessment of growth and development, and counseling of parents	CPT code 90965

CY 2017 Medicare Telehealth Services (cont.)

Service	HCPCS/CPT Code
End-Stage Renal Disease (ESRD)-related services for home dialysis per full month, for patients 20 years of age and older	CPT code 90966
End-Stage Renal Disease (ESRD)-related services for dialysis less than a full month of service, per day; for patients younger than 2 years of age (effective for services furnished on and after January 1, 2017)	CPT code 90967
End-Stage Renal Disease (ESRD)-related services for dialysis less than a full month of service, per day; for patients 2-11 years of age (effective for services furnished on and after January 1, 2017)	CPT code 90968
End-Stage Renal Disease (ESRD)-related services for dialysis less than a full month of service, per day; for patients 12-19 years of age (effective for services furnished on and after January 1, 2017)	CPT code 90969
End-Stage Renal Disease (ESRD)-related services for dialysis less than a full month of service, per day; for patients 20 years of age and older (effective for services furnished on and after January 1, 2017)	CPT code 90970
Individual and group medical nutrition therapy	HCPCS code G0270 and CPT codes 97802–97804
Neurobehavioral status examination	CPT code 96116
Smoking cessation services	HCPCS codes G0436 and G0437 and CPT codes 99406 and 99407
Alcohol and/or substance (other than tobacco) abuse structured assessment and intervention services	HCPCS codes G0396 and G0397
Annual alcohol misuse screening, 15 minutes	HCPCS code G0442
Brief face-to-face behavioral counseling for alcohol misuse, 15 minutes	HCPCS code G0443
Annual depression screening, 15 minutes	HCPCS code G0444
High-intensity behavioral counseling to prevent sexually transmitted infection; face-to-face, individual, includes: education, skills training and guidance on how to change sexual behavior; performed semi-annually, 30 minutes	HCPCS code G0445
Annual, face-to-face intensive behavioral therapy for cardiovascular disease, individual, 15 minutes	HCPCS code G0446
Face-to-face behavioral counseling for obesity, 15 minutes	HCPCS code G0447
Transitional care management services with moderate medical decision complexity (face-to-face visit within 14 days of discharge)	CPT code 99495

CY 2017 Medicare Telehealth Services (cont.)

Service	HCPCS/CPT Code
Transitional care management services with high medical decision complexity (face-to-face visit within 7 days of discharge)	CPT code 99496
Advance Care Planning, 30 minutes (effective for services furnished on and after January 1, 2017)	CPT code 99497
Advance Care Planning, additional 30 minutes (effective for services furnished on and after January 1, 2017)	CPT code 99498
Psychoanalysis	CPT code 90845
Family psychotherapy (without the patient present)	CPT code 90846
Family psychotherapy (conjoint psychotherapy) (with patient present)	CPT code 90847
Prolonged service in the office or other outpatient setting requiring direct patient contact beyond the usual service; first hour	CPT code 99354
Prolonged service in the office or other outpatient setting requiring direct patient contact beyond the usual service; each additional 30 minutes	CPT code 99355
Prolonged service in the inpatient or observation setting requiring unit/floor time beyond the usual service; first hour (list separately in addition to code for inpatient evaluation and management service)	CPT code 99356
Prolonged service in the inpatient or observation setting requiring unit/floor time beyond the usual service; each additional 30 minutes (list separately in addition to code for prolonged service)	CPT code 99357
Annual Wellness Visit, includes a personalized prevention plan of service (PPPS) first visit	HCPCS code G0438
Annual Wellness Visit, includes a personalized prevention plan of service (PPPS) subsequent visit	HCPCS code G0439
Telehealth Consultation, Critical Care, initial, physicians typically spend 60 minutes communicating with the patient and providers via telehealth (effective for services furnished on and after January 1, 2017)	HCPCS code G0508
Telehealth Consultation, Critical Care, subsequent, physicians typically spend 50 minutes communicating with the patient and providers via telehealth (effective for services furnished on and after January 1, 2017)	HCPCS code G0509

For ESRD-related services, a physician, NP, PA, or CNS must furnish at least one "hands on" visit (not telehealth) each month to examine the vascular access site.

BILLING AND PAYMENT FOR PROFESSIONAL SERVICES FURNISHED VIA TELEHEALTH

Submit claims for telehealth services using the appropriate CPT or HCPCS code for the professional service along with the telehealth modifier GT, "via interactive audio and video telecommunications systems" (for example, 99201 GT). By coding and billing the GT modifier with a covered telehealth procedure code, you are certifying that the beneficiary was present at an eligible originating site when you furnished the telehealth service. By coding and billing the GT modifier with a covered ESRD-related service telehealth code, you are certifying that you furnished one "hands on" visit per month to examine the vascular access site.

For Federal telemedicine demonstration programs in Alaska or Hawaii, submit claims using the appropriate CPT or HCPCS code for the professional service along with the telehealth modifier GQ if you performed telehealth services "via an asynchronous telecommunications system" (for example, 99201 GQ). By coding and billing the GQ modifier, you are certifying that the asynchronous medical file was collected and transmitted to you at the distant site from a Federal telemedicine demonstration project conducted in Alaska or Hawaii.

For services furnished on or after January 1, 2017, to indicate that the billed service was furnished as a telehealth service from a distant site, submit claims for telehealth services using Place of Service (POS) 02: Telehealth: The location where health services and health related services are provided or received, through telehealth telecommunication technology.

You should bill the Medicare Administrative Contractor (MAC) for covered telehealth services. Medicare pays you the appropriate amount under the Medicare Physician Fee Schedule (PFS) for telehealth services. When you are located in a CAH and reassigned your billing rights to a CAH that elected the Optional Payment Method, the CAH bills the MAC for telehealth services, and the payment amount is 80 percent of the Medicare PFS for telehealth services.

BILLING AND PAYMENT FOR THE ORIGINATING SITE FACILITY FEE

Originating sites are paid an originating site facility fee for telehealth services as described by HCPCS code Q3014. Bill the MAC for the originating site facility fee, which is a separately billable Part B payment.

Note: When a CMHC serves as an originating site, the originating site facility fee does not count toward the number of services used to determine payment for partial hospitalization services.

RESOURCES

This table provides telehealth services resource information.

Telehealth Services Resources

For More Information About...	Resource
Telehealth Services	CMS.gov/Medicare/Medicare-General-Information/Telehealth Chapter 15 of the Medicare Benefit Policy Manual (Publication 100-02) Chapter 12 of the Medicare Claims Processing Manual (Publication 100-04)
Physician Bonuses	CMS.gov/Medicare/Medicare-Fee-for-Service-Payment/HPSAPSAPhysicianBonuses Health Professional Shortage Area Physician Bonus Program
All Available MLN Products	MLN Catalog
Provider-Specific Medicare Information	MLN Guided Pathways: Provider Specific Medicare Resources
Medicare Information for Beneficiaries	Medicare.gov

Hyperlink Table

Embedded Hyperlink	Complete URL
Medicare Telehealth Payment Eligibility Analyzer	https://datawarehouse.hrsa.gov/tools/analyzers/geo/Telehealth.aspx
Medicare Benefit Policy Manual	https://www.cms.gov/Regulations-and-Guidance/Guidance/Manuals/Downloads/bp102c15.pdf
Medicare Claims Processing Manual	https://www.cms.gov/Regulations-and-Guidance/Guidance/Manuals/Downloads/clm104c12.pdf
Health Professional Shortage Area Physician Bonus Program	https://www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-MLN/MLNProducts/Downloads/HPSAfctsht.pdf
MLN Catalog	https://www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-MLN/MLNProducts/Downloads/MLNCatalog.pdf
MLN Guided Pathways: Provider Specific Medicare Resources	https://www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-MLN/MLNEdWebGuide/Downloads/Guided_Pathways_Provider_Specific_Booklet.pdf

HELPFUL WEBSITES

American Hospital Association Rural Health Care
http://www.aha.org/advocacy-issues/rural

Critical Access Hospitals Center
https://www.cms.gov/Center/Provider-Type/Critical-Access-Hospitals-Center.html

Disproportionate Share Hospitals
https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/AcuteInpatientPPS/dsh.html

Federally Qualified Health Centers Center
https://www.cms.gov/Center/Provider-Type/Federally-Qualified-Health-Centers-FQHC-Center.html

Health Resources and Services Administration
https://www.hrsa.gov

Hospital Center
https://www.cms.gov/Center/Provider-Type/Hospital-Center.html

Medicare Learning Network®
http://go.cms.gov/MLNGenInfo

National Association of Community Health Centers
http://nachc.org

National Association of Rural Health Clinics
http://narhc.org

National Rural Health Association
https://www.ruralhealthweb.org

Rural Health Clinics Center
https://www.cms.gov/Center/Provider-Type/Rural-Health-Clinics-Center.html

Rural Health Information Hub
https://www.ruralhealthinfo.org

Swing Bed Providers
https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/SNFPPS/SwingBed.html

Telehealth
https://www.cms.gov/Medicare/Medicare-General-Information/Telehealth

U.S. Census Bureau
http://www.census.gov

REGIONAL OFFICE RURAL HEALTH COORDINATORS

To find contact information for CMS Regional Office Rural Health Coordinators who provide technical, policy, and operational assistance on rural health issues, refer to CMS.gov/Outreach-and-Education/Outreach/OpenDoorForums/Downloads/CMSRuralHealthCoordinators.pdf.

Check out CMS on:

Appendix E: Telehealth Maryland Medical Assistance Policy

The information below is regarding the Maryland Medical Assistance Program telemedicine reimbursement policy. For complete information on the telemedicine service model, provider and participant eligibility, covered services and reimbursement, and for online access to the Telehealth Provider Manual at:
mmcp.dhmh.maryland.gov/Documents/Telehealth%20Program%20Manual%205.3.16.pdf.

Maryland Medical Assistance Program Telemedicine Reimbursement

Effective October 1, 2014, the Maryland Medical Assistance Program began to reimburse approved providers for services rendered to Program participants via telemedicine statewide. Telehealth participants may be enrolled in the fee-for-service (FFS) program or a HealthChoice managed care organization (MCO). Telehealth providers must be enrolled in the Maryland Medical Assistance Program, and register as an originating or distant site via an online form before rendering telehealth services.

Reimbursement

Per COMAR 10.09.02.04, providers may only bill for services that they or their employees perform. Providers may not bill on behalf of their telehealth partner.

Registered telehealth providers will submit claims in the same manner the provider uses for in-person services (i.e., paper CMS 1500 forms or 837 electronic submissions).

Professional services rendered via telehealth are reimbursed the same as in-person services and on a fee-for-service basis.

Registered originating site providers
Registered originating site providers may bill for the following:

- The telehealth transmission fee code Q3014; or
- If a Maryland-based hospital, the telemedicine revenue code 0780; or
- If an out-of-state hospital, the telehealth transmission fee code Q3014.

Registered distant site providers

As explained above, telehealth services must be provided through two-way audio-visual technology assisted communication with an approved originating site where the participant is physically located. Registered distant site providers must bill and account for teleheath services using the "-GT" modifier.

Reimbursement Limitations
The Program will not reimburse telehealth providers for the following reasons:

- When technical difficulties prevent the delivery of part or all of the telehealth session;
- Consultation that occurs during ambulance transport;
- Services that require in-person evaluation or cannot be reasonably delivered via telehealth;
- Distant site providers billing the transmission fee or facility fee;
- Use of telehealth services for home health monitoring;

- Use of "store-and-forward" service delivery models;
- Telecommunication between providers without the participant present;
- An audio-only telephone conversation between a provider and participant;
- An electronic mail message between a provider and participant;
- A facsimile transmission between a provider and participant;
- A telephone conversation, electronic mail message, or facsimile transmission between the originating and distant site providers; or
- Claims submitted by the originating site on behalf of the telehealth distant site provider and vice versa.

Providers Registration

Every Telehealth provider must complete an on-line registration. To register as a telehealth distant or originating site provider, please visit https://mmcp.dhmh.maryland.gov/Pages/telehealth.aspx. Scroll down and select either: distant site provider registration form if you are registering as a distant site provider or originating site provider registration form if you are registering as an originating site provider.

To complete the registration process, you will need:

- Your Maryland Medical Assistance provider number;
- Your National Provider Identification (NPI) number; and
- An email account to receive for communications from the Telehealth team.

After Medicaid verifies your registration information, you will receive a confirmation email. Until Medicaid confirms your registration, providers should not bill for telehealth services.

If you have any questions, you may email dhmh.telemedicineinfo@maryland.gov.

Appendix F: Md. Code Ann., Health General §15–105

Code of Maryland

Article - Health - General

§15–105.2.

(a) The Program shall reimburse health care providers in accordance with the requirements of Title 19, Subtitle 1, Part IV of this article.

(b) (1) (i) In this subsection the following words have the meanings indicated.

(ii) "Health care provider" means a person who is licensed, certified, or otherwise authorized under the Health Occupations Article to provide health care in the ordinary course of business or practice of a profession or in an approved education or training program.

(iii) 1. "Telemedicine" means, as it relates to the delivery of health care services, the use of interactive audio, video, or other telecommunications or electronic technology:

A. By a health care provider to deliver a health care service that is within the scope of practice of the health care provider at a site other than the site at which the patient is located; and

B. That enables the patient to see and interact with the health care provider at the time the health care service is provided to the patient.

2. "Telemedicine" does not include:

A. An audio–only telephone conversation between a health care provider and a patient;

B. An electronic mail message between a health care provider and a patient; or

C. A facsimile transmission between a health care provider and a patient.

(2) To the extent authorized by federal law or regulation, the provisions of § 15–139(c) through (f) of the Insurance Article relating to coverage of and reimbursement for health care services delivered through telemedicine shall apply to the Program and managed care organizations in the same manner they apply to carriers.

(3) Subject to the limitations of the State budget and to the extent authorized by federal law or regulation, the Department may authorize coverage of and reimbursement for health care services that are delivered through store and forward technology or remote patient monitoring.

(4) The Department may specify by regulation the types of health care providers eligible to receive reimbursement for health care services provided to Program recipients under this subsection.

(5) The Department shall adopt regulations to carry out this subsection.

§15–106.

(a) (1) In cooperation with the professional organizations whose members provide health care under the Program, the Secretary shall establish a system of review for all health care that is provided.

(2) The review shall include a study of the quality of care and the proper use of the services by the Program recipient or the provider.

(b) A member of an appointed committee of any of these professional organizations or an appointed member of a committee of a medical staff of a licensed hospital shall have the immunity from liability described under § 5-628 of the Courts and Judicial Proceedings Article.

Appendix G: Summary of Telehealth Implementation Considerations

The chart below summarizes key telehealth implementing considerations identified in this brief. Many of the considerations help to support patient acceptability of telehealth and continued patient engagement in a telehealth program. Considerations are grouped by categories, such as patient engagement, clinical measures, technology, etc.

TELEHEALTH IMPLEMENTATION CONSIDERATIONS				
Patient Engagement	**Clinical Measures**	**Connectivity/ Internet**	**Technology Selection**	**Patient/Caregiver Relationship**
• Introduce patients to the technology prior to discharge or while in the office to increase acceptability • Include patient's family members in the engagement/education process • Provide ongoing education and technical support to patients to ensure continued engagement and use of the technology in their home • Implement on-demand videos to educate patients about proper use of any peripheral devices	• Early identification of project objectives • Objectives should be specific, measurable, attainable, relevant, and time-bound • On-going monitoring of progress towards objectives • Data collected to monitor progress should be automated as much as possible and be captured at a frequency that will allow ongoing assessment of progress • Adjustments to project processes and protocols should be made early when processes towards objectives are not being realized	• Assess connectivity within designed project area prior to deployment • Ensure back-up connectivity options or adjustments such as boosters or hotspots when needed • Implement inclusionary criteria regarding patient's connectivity to ensure continued engagement and participation (e.g., require that patients be connected to WiFi vs 3G when conducting a video call)	• Assess technology against defined criteria aligned with the project's and organization's goals • Select technology that is targeted to meet the needs of the specific patient population that will use it • Customize provider dashboards and interfaces to optimize technology use and increase provider satisfaction and continued engagement	• Ensure patient has a trusted single point of contact for technical and clinical issues • Patients may be more willing to use telehealth when used in partnership with a trusted care manager • Third party clinical support for patient monitoring may negatively impact patient trust and engagement

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