jurisdictional snapshot

REMOTE PATIENT MONITORING: A JURISDICTIONAL SCAN

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A scan of health policies and practices implemented outside Newfoundland and Labrador

Newfoundland & Labrador Centre for APPLIED HEALTH RESEARCH
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To support our Health System Partners, CHRSP has produced this Snapshot Report of health care practices, processes, and protocols inside and outside of Canada. This report is designed to inform decision-makers about the healthcare landscape across jurisdictions, particularly with respect to practice variation and policy initiatives. It will also help guide topic selection for other CHRSP products, such as our Evidence in Context Reports and Rapid Evidence Reports.

1. About *Snapshot* Reports

In 2016, the NL Centre for Applied Health Research (NLCAHR), under its Contextualized Health Research Synthesis Program (CHRSP), introduced *Snapshot Reports* to provide rapid decision support for stakeholders in the Newfoundland and Labrador health system.

Snapshot Reports provide a brief scan of health policies, practices or models and a summary of established or emerging interventions that have been carried out on the issue in question in jurisdictions outside Newfoundland and Labrador (NL). This new format was developed in response to demand from our health system stakeholders for timely information about policies/practices/models in other jurisdictions that might be suitable for adaptation within the NL context. *Snapshot Reports* are prepared in response to specific requests from CHRSP's health system stakeholders on topics identified by the health system as being of immediate interest. The results of a given *Snapshot Report* may provide all the information required or it may indicate that further study is needed, possibly in the form of a CHRSP *Evidence in Context Report* or *Rapid Evidence Report.*

Snapshot Reports are not intended to be a comprehensive or exhaustive evaluation of the practice or policy under study; rather, they offer a brief overview that includes:

- an executive summary;
- the research objective that clearly states the policy or practice under consideration;
- the focus and scope of the report;
- a summary of key descriptive findings;
- a table listing the practices/policies/models identified in other jurisdictions, with web links to each where available; and
- an appendix containing more detailed information.

Given the limitations of this approach, *Snapshot Reports* should not be construed as a recommendation for or against the use of any particular healthcare intervention or policy.

2. Executive Summary

Topic: Upon request from senior health system decision makers in Newfoundland and Labrador, members of the CHRSP research team at NLCAHR have completed a jurisdictional scan of Canadian provinces and selected international jurisdictions to uncover how other regions integrate remote patient monitoring (RPM) into existing models of care for individuals with chronic disease or complex care challenges. The information gathered for this *Snapshot Report* is intended to help inform the implementation and evaluation of remote patient monitoring for those living with chronic disease in remote and rural NL.

Study Approach: For this study, we searched publicly-available websites, including those of provincial and territorial governments and from several international jurisdictions' telehealth agencies, to identify remote patient monitoring initiatives or programs for people with chronic disease.

Key Findings:
Our jurisdictional scan uncovered 22 RPM initiatives or programs that have been active within the past five years. In Appendix B of this report, we also include 24 RPM pilot studies or ongoing research projects and five other RPM services or products not explicitly linked to a health system. The noteworthy features of the programs and services in this report include:

- **Service users**: Most of the RPM programs we found were either targeted generally towards people with chronic disease or designed specifically for patients with specific conditions, such as chronic obstructive pulmonary disease, chronic heart failure, or diabetes.
- **Delivery-model components**: RPM programs are typically aimed at improving understanding or promoting home-based self-management of various (mostly chronic) health conditions through technology and education. Most programs provide a tablet and biometric devices that the patient must learn to use. Patients submit health data that is reviewed by a healthcare professional (usually a nurse) in consultation with the patient's primary care physician. We also found examples in which RPM involved collaboration among healthcare professionals or delivery across more than one healthcare service, but these features vary from program to program.
- **Partners involved**: Canadian RPM examples typically involve partnerships that include a health authority and some combination of acute, home health, residential care, or community services.
- **Patient or health system outcomes:** Most of the information on patient and system outcomes indicates improvements in patient outcomes and reductions in acute-care utilization among people who are remotely monitored.
- **Cost:** When information about cost was available, the cost measures reported included: cost avoidance, cost of staff time, cost to implement, net gain, average cost per patient, or operational costs and noted either annual savings or savings in general.

3. Background & Research Objective

Newfoundland and Labrador has a geographically-dispersed population that poses challenges to service delivery across the healthcare system, especially for our aging population living in rural and remote areas of the province. In an effort to improve patient outcomes for those in rural and remote areas, the Government of Newfoundland and Labrador plans to expand the use of the *Health at Home* program that uses remote patient monitoring (RPM) technology, to serve an additional 1,200 patients from across the province (1,2).

The main objective of this *Snapshot Report* is to find out how other jurisdictions have integrated either home-based or personal care home-based RPM into existing models of care to ensure the continuity of care and to improve patient outcomes for individuals with chronic disease(s) or complex care challenges.

The information gathered in this report is intended to help inform decision makers about how RPM has been implemented elsewhere and to support their deliberations about options for the implementation and evaluation of RPM models administered to those living with chronic disease in remote and rural areas of Newfoundland and Labrador.

4. Focus and Scope of this report

The focus of this report was to explore how other jurisdictions have implemented remote patient monitoring (RPM) into existing models of care to ensure continuity and improved patient outcomes for those individuals with chronic disease(s) or complex care challenges. The report provides a summary for decision makers by outlining a variety of programs available in other jurisdictions but it is not a comprehensive or exhaustive list of RPM initiatives implemented across Canada or within other jurisdictions. Below, we outline the search parameters, discuss the search strategy, and provide an overview of the findings.

Search Parameters

Table 1 outlines the parameters of our search—criteria that were refined in consultation with health system partners at the Newfoundland and Labrador Department of Health and Community Services and with professionals at Eastern Health who have been developing and evaluating RPM strategies in the province.

Table 1: Search Parameters, Inclusion and Exclusion Criteria

Parameter	Inclusion criteria	Exclusion criteria

Population	• Adults with chronic disease in general
	• Adults with particular conditions:
	  • Chronic Heart Failure
	  • Diabetes
	  • Chronic Obstructive Pulmonary Disease
		• Non-chronic diseases
		• Cancer

Focus of Remote Patient Monitoring Program or Initiative	• Ambulatory care approach • Where technology is the main point of connection	• Where technology is not the main point of connection
Settings where RPM is implemented	• At home • Personal Care Homes	• Other settings
Jurisdictions	• Canada • USA and several other International examples: Netherlands, UK, Nordic Countries, Australia, Caribbean, Mexico	• Limited to the most pertinent jurisdictions
Timeframe	• Initiatives from past 5 years or programs that are currently active	• Over 5 years since the program was stopped or completed

Search Strategy

Our search involved online searches using key terms related to telehealth, remote patient monitoring (RPM), home health and chronic disease to locate information from publicly-available websites, including the websites of provincial and territorial governments and organizations that involve telehealth or RPM (e.g., Canada Infoway, CADTH). Our goal was to identify RPM programs and initiatives for those with chronic disease living at home or in personal care homes. Programs that did not relate to chronic disease were excluded. We used data extraction tables (Appendix A) to identify key features of the programs we found. Our online search yielded information about 22 RPM initiatives or programs.

We also explored publicly-available information from several international jurisdictions with a focus on the United States. Although we searched, we did not find any relevant, publically-available information from the Caribbean or from Mexico. Quick searches of other international jurisdictions were completed for the United Kingdom, Nordic countries, Australia and the Netherlands but were by no means comprehensive. We identified eight RPM initiatives/programs from the United States, one from Australia and one from Denmark that we include in the summary tables below. We also took note of a number of pilot studies or ongoing research projects as well as a number of RPM services or products that are not obviously linked to a health system. These can be found in Appendix B.

5. Summary of Key Findings

Across Canada and other international jurisdictions, various remote patient monitoring (RPM) initiatives or programs are used to monitor patients with chronic conditions in a home setting. While online information about RPM programs is more readily available for some jurisdictions or programs than others, overall, we found similar components among RPM programs that focus on chronic disease(s). Key themes from the initiatives or programs described in this report, are highlighted below:

Service-User Eligibility for RPM

We found that RPM programs are aimed at various service users, including:

- patients with one chronic condition (e.g., COPD),
- patients with a selection of specific chronic conditions (e.g., COPD and heart failure),
- patients with a variety of non-specified chronic conditions (e.g., chronic illness in general), or
- patients with a minimum number of chronic conditions (e.g., more than 5 chronic conditions).

We found that the most commonly-represented conditions were chronic obstructive pulmonary disease, heart failure and diabetes. Many programs require a provider referral and others require the patient to have a diagnosis of the specified chronic disease(s), or to be at a certain stage, or to have experienced certain adverse events.

Delivery Model Components

- ***Duration:*** Many programs do not specify a maximum duration for RPM programs but, for those that do, the duration ranges between one to six months. Programs or initiatives that are intended for more than one condition generally do not specify the timeframe, likely because this is dependent on the condition being managed.

- ***Training:*** Patients usually receive some kind of training about how to use the technology associated with a program. Sometimes a technician sets up the equipment in the patient's home; sometimes a nurse helps train patients to use biometric devices; sometimes a user manual is provided that explains how to use the technology. In Ontario, a Telehome Monitoring Program for advanced heart failure involves a different approach. For this program, patients learn how to use monitoring devices before they return home from the hospital after an adverse event caused by their condition.

- ***Monitoring Methods:*** Once patients are set up with the applicable technology, the majority of programs require that patients take physiological measurements at a pre-set frequency (e.g., daily or biweekly) and answer health-related questions or submit a daily log of health-related activities. In most instances, an educational component also helps patients learn more about their health condition and how they can manage it, either through sessions with a nurse or by providing information on a tablet, website, or app. RPM programs for chronic conditions are chiefly aimed at helping patients improve self-management and knowledge of their health and condition. The range of physiological parameters measured by patients at home include:
    - blood pressure,
    - weight,
    - oxygen levels,
    - heart rate,
    - glucose levels, and
    - temperature.

- ***Technologies:*** The technologies used to monitor patients depend on the condition(s) involved and the focus of the program. Most often patients are given devices that measure condition-specific physiological parameters. They are also given a way to transmit that information (e.g., home monitor, computer, tablet, smart phone, website, phone line) to a healthcare professional. Often, the device that transmits the patient data is separate from the device that measures a given health parameter. In some cases, patient data is transmitted through a monitoring device to a call center or centralized database where a healthcare professional accesses patient data. In other cases, patients use a web portal, website or app, messaging devices, phone or internet connections to transmit health information. In a few cases, interactive 2-way-video or videophones are used to connect patients and providers directly.

  The devices available to patients to measure or track physiological parameters include:
    - blood pressure monitors,
    - weight scales,
    - glucometers,
    - pulse oximeters,
    - pedometers,
    - tablets,
    - pocket ECGs,
    - online apps (accessed through computer, smart phone or tablet),
    - digital cameras,
    - Bluetooth biometric devices and weight scales.

In many cases, patients receive education on how to better manage their condition(s) by way of resources that are uploaded to their device or available online through a website or app or directly through sessions with a healthcare provider. Devices may also provide a way for patients to track or transmit health symptom information to their care providers.

- ***Platforms:*** In Canada, some RPM programs use Telus Health's *Remote Patient Monitoring Solution* as their platform. Users of the Telus platform include the Home Health Monitoring Program (British Columbia), the Telehomecare Expansion (Ontario) and Telehomecare Program (Quebec). Other platforms used outside of Canada include *Vital Net and Devices,* the *Health Recovery Solutions Telehealth Platform*, *Philips Lifeline* and *IdealLife Platform.* Some of the more comprehensive systems use algorithms to help determine which device is most suitable or cost-effective for each patient or to activate a signal to warn of unsafe readings (e.g., Kaiser Permanente's Remote Glucose Monitoring and the Veteran's Health Administration's Care Coordination/Home Telehealth Program).

- ***Healthcare Service Providers:*** The healthcare service providers involved within RPM programs vary. Well-established programs or those that serve multiple conditions tend to involve more health service providers. Program focused on a particular condition are more likely to list only a few care providers. At a minimum, care is typically provided by a nurse (e.g., registered nurse, licensed practical nurse, nurse practitioner, or nurse case manager) who is the patient's main point of contact and who coordinates the program or consults with a physician. Some programs specify that these nurses have training or expertise in the condition being monitored (e.g., the Virtual Cardiac Rehabilitation Program in B.C. employs cardiac-trained nurses). In a few cases, a trained coordinator is the main point of contact for any questions or difficulties that a patient encounters. The nurse or coordinator is usually responsible for reviewing patient data, managing patient alerts, and liaising with physicians or care providers about any alerts or changes in care plans. For COPD programs, a respiratory therapist usually takes on this role.

  Other healthcare providers listed for some more broadly-focused or extensive monitoring programs include: dieticians, exercise specialists, community paramedics, occupational therapists, physical therapists, social workers, health coaches, pharmacists and home health aides. A unique Canadian example to note in Ontario is the Community Paramedicine Remote Patient Monitoring Program. This program has linked community paramedics with physicians to keep patients with chronic illness safe at home through coordinated care.

- ***Communication with Healthcare Professionals:*** Nurses keep in contact with patients in a number of ways that can be more or less direct, either by communicating with patients at regularly scheduled intervals or by request. Contact occurs for the following reasons: to provide education, to increase self-management and knowledge of a health condition, to review information with patients about their health, vital signs or care plan, or to answer patients' questions about their health or self-management. In the direct approaches, nurses are available by phone. Otherwise, this communication can take place by text messaging, messaging service or automated phone calls. A physician is usually contacted by the nurse when there are any concerns or changes to the patient's condition, possible medication adjustments, or general updates or reporting. In more interactive versions, video conferencing is available with a nurse, physician or specialist as part of the program.

- ***Continuity of Care:*** The online materials we found for most RPM programs did not provide much detail about how continuity of care is assured. However, it is clear that the majority of programs aim to increase patients' overall understanding and management of their conditions through some educational component. Most programs also involve a primary care provider who is consulted throughout the program to help adjust or advise on a patient's care plan; at the very least, the physician receives regular updates and/or a final report on a patient's health. For the programs that identify a fixed duration, patients are usually discharged to their primary care provider or handed over to other services upon completion of the program.

- ***Models of Care Delivery:*** We noted that some RPM programs list specific models of care while others do not.

  Canadian examples of care delivery models included:
  - a community-based service model (Home Health Monitoring Program, B.C.);
  - a planned chronic disease management care model using the Stanford Model for Chronic Disease Self-Management (Telehomecare Expansion Project, ON); and
  - a client and family-centered model based on a New Zealand model of care (Extra-Mural Program, NB).

  International examples included:
  - Group Health's Chronic Care Model (Care Coordination/Home Telehealth Program, USA); and
  - two instances of integrated care models (Kaiser Permanenete's Remote Glucose Monitoring, USA; Telecare North Program, Denmark).

Partners Involved

In Canada, RPM typically involves partnerships among health authorities and some combination of acute, home health, residential care or community care services. In some cases, partnerships include universities that had studied RPM pilot programs at their early stages or are conducting research on current initiatives. Another partner, *Canada Health Infoway* has partnered with a number of provinces to help fund or provide support for RPM programs or initiatives. Canadian programs with different partnership configurations include the *Remote Access to Care Technology* (Re-ACT) from Ontario and the *Extra-Mural Program* from New Brunswick. Support for the ReACT program is through a partnership with the North Simcoe Muskoka Community Care Access Centre and We Care Home Health Services. In New Brunswick, the Government recently announced that the Extra Mural Program (EMP) service and Ambulance New Brunswick (ANB) will merge into a single public-service entity. The New Brunswick Department of Health will be responsible for the overall direction of the EMP and Medavie Health Services will manage the operations of the merged services.

In the United States, most examples involved nonprofit health systems or integrated healthcare systems that partner with a tele-monitoring service provider. We also found an example of an accountable care organization[1] in the United States called UCLA Health that provides RPM and telehealth programs including chronic disease monitoring and cardiac telehealth post-surgical recovery monitoring.

Patient or System Outcomes

When possible, we used evaluation materials or pilot study references to generate the information about patient or health system outcomes in the summary tables below; however, not all program materials provided this information. In some cases, *potential* patient or system improvements are indicated rather than verified outcomes. The majority of programs that indicate patient and system outcomes do claim numerous improvements. The range of beneficial outcomes listed include:

- improvements in self–management,
- improved knowledge about patient conditions,
- increased exercise capacity,
- improved diet and cholesterol levels,
- improved health measurements over time,
- more confidence to stay at home,
- patient satisfaction with the program, and
- improved quality of life.

The most consistently-reported benefit for patients is improvement in patients' knowledge of their health condition and self-management of their health.

Reported health system outcomes include:

- reductions in acute care length of stay,
- reduced 911 calls,
- reduced emergency department transport across paramedic services,

- reduced hospital admissions and readmissions,
- reduced acute-care utilization, and
- reduced emergency department visits.

[1] According to Lewis et al. 2013 (3), "An accountable care organization (ACO) is a group of providers collectively held responsible for the overall cost and quality of care for a defined patient population."

Cost

Available information about RPM costs varied with the most reliable information being from specific program evaluations. The types of cost savings reported include:

- cost avoidance,
- cost of staff time,
- cost to implement,
- net gain,
- average cost per patient,
- operational costs, and
- savings per year or overall.

References to available program evaluations can be found in the summary tables (page 13) or in Appendix A. (page 36).

6. Summary Tables

The tables on the following pages summarize key components of the RPM programs or initiatives located in our search and are organized geographically by jurisdiction. For programs of interest to decision makers, Appendix A provides detailed data extraction, in-depth information about each RPM program/initiative, including pertinent references and detail about patient and health system outcomes and program evaluations. Appendix B contains information on several RPM pilot studies, programs and services, and additional RPM products from Canada and other international jurisdictions that were not included in the summary tables.

The following information is captured in the summary tables:

- the name of the program and its jurisdiction
- an overview of the delivery model for the program or initiative
- the type of patient that qualifies for the program
- the health service providers working in the program
- partners involved in the program
- any patient or system outcomes highlighted in program materials; and
- information about program costs, where available.

List of Summary Tables- Canada:

List of Summary Tables - USA, Australia, and Denmark:

TABLE 1: BreatheWELL/ COPD Program (British Columbia)

About the Program:

BreatheWELL/COPD (BW/COPD) services began in 2011, in the communities of Burnaby, New Westminster, Surrey, Langley, and Chilliwack, BC.
The intent of the service is to improve self-management skills of people living with a diagnosis of COPD with a view to preventing hospitalization. (4)

Service Users/ Eligibility	Delivery Model	Service Providers	Partners Involved	Patient or System Outcomes	Cost
• Diagnosis of COPD • Possibly requires primary care provider referral or self-referral to service • residential care provider can enroll care residents in consultation with physician • There were discrepancies in the available information about enrollment	• Respiratory Therapist (RT) visits clients in their homes to coach self-management skills related to COPD including education on prescribed medications, identification of signs and symptoms, and management of COPD exacerbations. • Client goals are set to identify strategies for the management of activities of daily living, diet, and exercise. • Patient meets with Physician and/or specialists to discuss established self-management goals = care plan. • If required, a technician installs in-home telehealth monitoring technology that tracks vital measurements, such as blood pressure, pulse and oxygen levels, and provides health education. • Once clients are able to recognize an exacerbation of COPD and start their "flare-up plan", they receive scheduled 6-month RT follow-up. • Health professionals, RTs and RNs, identify clients for discharge from program and handover to other services.	• Team based approach: • Primary Care Provider • Respiratory Therapist • Registered Nurse • Technician to install monitoring equipment, as required.	• A result of Fraser Health collaboration between acute care, home healthcare (HH), residential care (RC), and community respiratory services (CRS). • Currently delivered in two components: 1) Community Based Services; 2) Residential Care Services • Integrating Breathewell/COPD Services with existing resources in HH, RC, and CRS will minimize service duplications; achieve cost-effectiveness while offering a support for all levels of COPD acuity and ensuring sustainability.	• Clients report improved perceptions of self-care and health and health systems report reductions in length of stay, admissions and readmissions by 23% in participating communities.	• Not found

TABLE 2: Home Health Monitoring Program (British Columbia)

About the Program:

Home Health Monitoring (HHM) is a free service for Island Health residents that allows clients to manage their conditions from their own homes, improve their knowledge of their chronic disease, and manage their own health. Island Health initiated a home tele-monitoring pilot for the heart failure (HF) population in 2009. In 2013, Island Health partnered with BC's HHM provincial initiative to implement a standardized HHM service for clients living with heart failure through the Home and Community Care program. In August 2016, the HHM Expansion (HHME) project began by expanding the service to the HF population throughout all of Island Health, and in November 2016 the service expanded to include clients with chronic obstructive pulmonary disease (COPD) as well. (5)

Service User/Eligibility	Delivery Model	Service Providers	Partners Involved	Patient or System Outcomes	Cost
• Heart failure or COPD patients can be self-referred or consent to be referred by a healthcare professional (family doctor, emergency room physician, hospital liaison in acute care.) • The HHM Clinician in a client's region assesses eligibility after referral.	• Service duration is approx. 12 weeks • A blood pressure monitor, weigh scale, pulse oximeter, pedometer (for COPD clients only) and education binder are provided by Telus Health RPM solution (may be replaced soon). • Using RPM application on tablet provided, the patient answers questions to evaluate daily health and uses a blood pressure monitor, a weight scale, a pulse oximeter and a pedometer (for COPD clients only) to capture vital signs. • HHM Nurse uses TELUS Health's Remote Patient Monitoring solution to monitor and look for changes in patient's measurements Mon-Fri, contacts client regularly to review results and answer questions, reports and communicates concerns to patient's physician.	• Hospital Liaison (acute care nurse) supports the discharge process for clients back into the community and is a source of referrals for patients to HHM • Trained HHM Clinician (nurse) monitors clients in the HHM program using the TELUS RPM application) • Physician	• Island Health Authority and BC's Home Health Monitoring provincial initiative partnered to implement a standardized HHM service for clients living with HF through the Home and Community Care program. • Prior to the Home Health Monitoring Expansion (HHME) Project, the HHM HF service operated in Greater Victoria, Ladysmith, Nanaimo, Port Alberni and Oceanside.	From evaluation • 92% Client Satisfaction with HHM (n=72); Perceived (78%, n=72) and Actual (81% n=291) • Reduction in ED Visits; • Actual Reduction in Length of Stay (94%, n=291) and Acute Care Utilization (92%, n=291); • $3,252.10 per Client Cost Avoidance at 365 Days Post-HHM (n=150); and • Low (4%) Referral Rates from Large Sites (RJH/VGH and NRGH).	Cost avoidance from evaluation • $1,569,910 from 92% less inpatient admissions, and 94% less inpatient days in the 90 days post-HHM period • $3,252 per client 365 days post-HHM - a total cost avoidance of $487,815 for the 150 clients included in the estimate

TABLE 3: Virtual Cardiac Rehabilitation Program (British Columbia)

About the Program:

The Virtual Cardiac Rehabilitation Program (vCRP) uses an online interface to mimic the existing outpatient cardiac rehabilitation programs currently in use at hospitals across BC. As a result of the success of the vCRP trial, British Columbia's Fraser Health Authority (FHA) is collaborating with vCRP research team to implement the program alongside existing hospital-based cardiac rehabilitation programs (CRPs) in the region. The vCRP has evolved from a research intervention to an integrated program in healthcare practice. Based on the results from the implementation research accompanying the delivery of the program in the two FHA hospitals, the hope is to expand the program across the rest of the FHA and eventually, all over British Columbia. (6–8)

Service User/Eligibility	Delivery Model	Service Providers	Partners Involved	Patient or System Outcomes	Cost
• Ischemic heart disease patients	• Uses an online interface to mimic the existing outpatient cardiac rehabilitation programs currently in use at hospitals across BC (original was 4 month program). • All patients receive a heart rate monitor, blood pressure monitor and access to the vCRP website. They monitor heart rate during their exercise sessions and upload this data to the website for weekly review sessions with their assigned care provider. The vCRP program also allows patients to track blood pressure and glucose levels and offers one-on-one chat sessions with a cardiac-trained nurse, dietitian and exercise specialist, as well as peer-support group chat sessions. Upon completion of the four-month program, patients are discharged into the care of their primary care physician.	• Cardiac-trained nurse • Dietitian • Exercise specialist • Peer support group • Discharged to primary care physician	• Members from the Fraser Health Authority (FHA) Cardiac Services Program are partnering with the BCATPR to implement and test the vCRP across the FHA region. • FHA collaborated with vCRP research team from Simon Fraser University that conducted the original research on the program to implement the program in 2017 alongside existing hospital-based cardiac rehabilitation programs in the region. • Funding for the implementation of this program is provided by a CIHR Knowledge-to-Action Grant.	Pilot research found: • improvement in exercise capacity, diet and cholesterol levels, • fewer hospital visits among patients in the program, • greater awareness of and motivation for managing their health conditions and improving lifestyle, • improvement in health measurements over time, • increased confidence when interacting with healthcare professionals, • main barrier is computer literacy.	Pilot research found: • Staff time required to administer the program was lower than in-person care, at 8 hours ($435) per participant.

TABLE 4: Community Paramedicine Remote Patient Monitoring (Ontario)

About the Program:

The Community Paramedicine Remote Patient Monitoring Program (CPRPM) is an initiative of Community Paramedics across Ontario to keep patients with chronic illness, such as congestive heart failure (CHF) and chronic obstructive pulmonary disease (COPD), safe at home and out of the hospital. Through a partnership with Future Health Services, this free program is designed to improve quality of life, as well as to improve communication amongst health care providers to deliver the highest quality of coordinated care. (9)

Service User/Eligibility	Delivery Model	Service Providers	Partners Involved	Patient or System Outcomes	Cost
• Have CHF and/or COPD, • May have a comorbidity of diabetes or hypertension • Satisfy one of the following conditions indicative of patient acuity: Level 0: At least one hospitalization in the last 12 months (41%) 1; Level 1: At least 2 ED visits (measured by EMS transports) in the last 12 months (15%); Level 2: At least 3 911 calls in the last 12 months (44%).	• Target program duration = 6 months • Community Paramedic sets up the patient's home with devices to take daily biometric readings (e.g. weight scale, blood pressure monitor, heart rate monitor, glucometer) and a POD that connects these devices in real time (management platform called IdealLife®). • If the recording goes outside of the threshold set, an alert will be generated and Community Paramedic will review the patient's current health status and make an appropriate response. • When a change in threshold is required, paramedics are encouraged to call the patient's physician and have the physician set an individualized alert threshold. • Providers and patients trained using guidelines and protocols established by an independent Clinical Advisory Committee (CAC) with clinical specialist representation.	• Community Paramedics • Primary Care Physicians • Could also include: Pharmacist and/or other care providers (e.g., Respiratory therapist)	• Funded by Canada Health Infoway, Future Health Services (FHS) manages all aspects of the program, including onboarding Emergency Medical Services (EMSs), supporting EMS services in recruiting and on-boarding patients, conducting in-depth analytics on patient data, and communicating results to policy makers and funding partners in the broader healthcare community. • FHS is a wholly owned subsidiary of the South Central Community Development Corporation (SCCDC) that provides tele-home monitoring services to chronically ill patients in Southern Ontario.	• Average 911 call reduction was 26% • ED transport reduction was 31% across paramedic services • Program decreased 460 ED transports resulting in an estimate of 299 avoided hospital admissions and 2,123 avoided hospital days • Actual reduction of 467 ED visits (26%) • 170 hospital admissions (32%) were avoided	• Cost to implement = $189/month, includes the cost of equipment ($75/mon.) plus a cost category created for this evaluation called Paramedic Client Time estimated at $114/mon. • Total savings of $331,576 attributable to EMS Services • Using the cost of $189/patient/month and assuming patients participate according to the 6 month target, the ROI to the overall health system is 541%. For each $1 invested, there is a net $5 savings to the health system.

TABLE 5: Remote Access to Care Technology (Ontario)

About the Program:

Using wireless technology, Re-ACT© (Remote Access to Care Technology) connects seniors living with chronic disease(s) to a Registered Nurse who monitors their vital signs remotely and encourages medication compliance, while providing assessment of vital signs, information about managing their chronic condition and adjustments to their care plan. A goal of the Re-ACT© program is to help individuals develop skills for healthy living and managing their chronic condition. The program emphasizes the individual and family's role in their healthcare and encourages them to be an integral member of their healthcare team. It also engages them in decision making, goal setting, care planning and provides access to education programs and health information. Started in Ontario but nationally linked, with over 50 locations across Canada.

Service User/Eligibility	Delivery Model	Service Providers	Partners Involved	Patient or System Outcomes	Cost
• Seniors living with chronic diseases	• Re-ACT uses wireless technology and monitoring devices to remotely connect seniors to a Registered Nurse (RN), who can then monitor, assess, and manage their chronic condition(s) and corresponding care plans. • Patients are trained to use their monitoring device daily to check vital signs (blood pressure, pulse, blood glucose, weight, blood oxygen) and the data is subsequently stored on a secure server where results are then populated and categorized on a risk alert scale (normal to high) for RN and physician review. • Access to education programs and health information for seniors.	• Registered Nurse • Physician • Family	• Operating out of We Care's Monitoring Centre in Barrie, Ontario, the Re-ACT program is supported by a partnership with the North Simcoe Muskoka Community Care Access Centre (NSM CCAC) and We Care Home Health Services. • We Care Home Health Services is proud to be part of CBI Health Group, the largest network of integrated community healthcare services in Canada.	• In a three-year period, We Care reported that 80% of clients are confident that they will be able to stay at home longer than before beginning Re-ACT • 88% reported being very satisfied with the program (We Care, 2011). • The Re-ACT technology has proven to increase healthy aging at home initiatives, and overall quality of life for clients living at home with chronic conditions.	• Cost Service starting at $199.00/month

TABLE 6: Telehomecare Expansion Project (Ontario)

About the Program:

The Telehomecare (THC) Expansion Project is an initiative undertaken by the Ontario Telemedicine Network (OTN) to leverage the experience of the THC Pilot Project into a province-wide network that enables patients and THC nurses to monitor patient progress remotely using selected medical monitoring devices connected to OTN's network infrastructure.

In 2010 the OTN decided to expand to a LHIN-wide (Local Health Integration Network, equivalent to a regional health authority) THC service delivery model that would expand access to all health care providers across Ontario following the success of 2007's THC Pilot Project. (10)

Service User/Eligibility	Delivery Model	Service Providers	Partners Involved	Patient or System Outcomes	Cost
• Patients over age 18 • Residing in Onario • Living with COPD or CHF • Who have had frequent ER visits or hospital admissions in the past year due to their conditions • Who are capable of learning and understanding instruction or have assistance from a care provider and • Who live in a residential setting with access to a functional telephone line.	• 3-6 month program • Primary care provider refers patient. • Technician installs home monitoring equipment (loaned to the user) including a computer tablet that measures blood pressure, oxygen, and weight - daily. • The program uses home phone line for a brief period each day at the time of user's convenience. • Specially-trained registered nurses or respiratory therapists provide weekly health coaching by telephone. • Patients use simple, home-based technology to measure blood pressure, oxygen and weight and to answer simple questions about how they are feeling. • THC Nurse and patient's healthcare provider connect regularly to talk about progress. • Discharge summary provided to primary care provider who will continue to support care plan upon program completion.	• THC Nurse trained in chronic diseases or a respiratory therapist • Healthcare provider and other members of patient's care team (i.e. specialists)	• Co-funded by the Ontario Ministry of Health & LTC (MOHLTC) and Canada Health Infoway. • LHINs lead the program in each of their regions. • LHINs select host organizations to deliver the nursing services and provide the patient equipment. • Host organizations may be hospitals, Community Care Access Centres or Family Health Teams. • OTN provides program design and oversight as well as implementation and support services, manages the technology, maintains an expert clinical advisory committee and certifies clinicians to deliver THC.	Patient • significant decrease in hospitalizations, length of stay and improved patient satisfaction and self-management abilities Health System (examples from different sites) • 37%-48% reduction in emergency department visits • 44%-57% reduction in hospital admissions • 70% inpatient reduction 6 months after THC discharge, • 53% reduction in emergency department visits after THC discharge • 4% reduction in length of hospital stay 6 months after THC discharge	• According to Canada Health Infoway, the expansion project remained within the planning budget of $691,500 • Implementation is currently under budget at $4,709,275. • The expansion project has an estimated cost avoidance of approximately $7000 per CHF patient per year. • THC Expansion Project receives 75% of its funding from Canada Health Infoway and the remaining 25% from the MOHLTC

TABLE 7: Telehome Monitoring Program (Ontario)

About the Program:

The Heart Institute's (HI) Telehome Monitoring Program (THM) is a nurse-run, intensive, post-discharge home health program designed to improve patient outcomes and reduce hospital readmissions. It is part of the Telehealth Programs run by the Cardiac Telehealth department.

Service User/Eligibility	Delivery Model	Service Providers	Partners Involved	Patient or System Outcomes	Cost
• Patients with advanced heart failure and some patients with pulmonary artery hypertension or who have undergone complex surgery • Patients determined to be in need of the extensive daily follow-up are referred to the program before discharge from the Heart Institute.	• All patients receive home monitoring equipment and training before discharge: a scale, an automated blood pressure cuff a pocket ECG (optional), a home monitor that transmits vital signs and other pertinent data to a central station manned by expert cardiac nurses at the Heart Institute (HI). • At home, patients use the equipment to transmit their vital signs and weight by regular phone line or cellular connection. • A nurse at the HI reviews the data daily, contacts the patients as needed for further assessment, and alerts HI physician if safe levels in any of the parameters are breached. • Patients' diets and medications can be adjusted as needed. • Patients' primary physicians and families are kept informed of the monitoring results and of any required changes in medications. Patients stay in the TMP from 1-4 months after discharge. Some patients who require longer follow-up are transitioned to an automated calling or interactive voice response system, with calls from the system every 2 weeks.	• Nurse • Primary physician	• With support from the Champlain LHIN, the Heart Institute has deployed monitoring equipment to most of the community hospitals. • This allows identification of patients and training to be done locally, with follow-up by the THM nursing staff in collaboration with community physicians.	• Reduced hospital readmission of heart failure patients by 54%	• Saving up to $20,000 in healthcare costs for every patient diverted from an emergency room visit or hospital stay

TABLE 8: Telehomecare Program (Quebec)

About the Program:

The Jardins-Roussillon Health and Social Services Centre (JRHC) was established in 2004, serving an area south-west of Montreal with a population of over 192,000, JRHC has deployed a home telemonitoring solution to serve patients with chronic conditions, such as CHF, COPD and diabetes. (Since 2015 JRHC has merged with CISSS Monteregie-Ouest. It is not clear if this continued.) (11) (12)

Service User/Eligibility	Delivery Model	Service Providers	Partners Involved	Patient or System Outcomes	Cost
• Elderly clients with CF, hypertension, uncontrolled diabetes, COPD	• Patient receives 1 hour training by a nurse at initial meeting on how to document and submit various health parameters (blood pressure, weight, etc.) using a touchscreen device (programmed with a personalized monitoring protocol) with an integrated modem for the electronic submission of clinical data. • Nursing case managers consult the data on a regularly monitoring the patient's medical condition and compliance with their individually prescribed care plan. • Built-in alerts are automatically generated and pushed out to both the patient and the case manager when the submitted data strays outside predefined thresholds, allowing for proactive detection of decompensation and early intervention. • The program is designed to empower patients to manage their illness by reinforcing the relationship between their health status and their daily activities.	• Nursing case managers	• Service Régional de Soins à Domicile and Le Centre de Santé et de Services Sociaux Jardins-Roussillon (CSSS Jardins-Roussillon) manage the program • JRHC RPM program in Quebec clearly indicates that the interventions associated with the program are complimentary to the patient's course of care – there is a need for RPM to be integrated into patient care, but the program is not designed to replace existing care pathways by adding to and potentially duplicating service offerings.	• Significant reduction in the number of hospitalizations and ER visits as well as shorter hospital stays.	• Economic assessment of the program (using health system point of view in 2013) resulted in significant savings, a net gain of 41 percent. • The operating cost and the costs associated with the technology represented 38 % of the home telemonitoring program's total costs. • The telehomecare program (per period) cost a total of $171,309 representing an average cost of $1,803 per patient.

TABLE 9: Telehealth Coordination Center Health Monitoring Services (Quebec)

About the Program:

The Telehealth Coordination Center (CHUM) serves all health facilities located on the territory of the Integrated University Health Network of the University of Montréal (RUIS U de M). This is equivalent to supporting the deployment of telehealth in 13 facilities in 6 health regions in Quebec. However, second-line technology and operational support is being done in close collaboration with the Telehealth Coordinating Committee (TCC) at the McGill University Health Center (MUHC), which has been mandated by the Department of Health and Social Services (HSS) to deliver the technology operational management.
Link: https://telesantechum.ca/cartable-tsd

Service User/Eligibility	Delivery Model	Service Providers	Partners Involved	Patient or System Outcomes	Cost
• Telehomecare services are aimed at clients with one or more complex and / or chronic conditions whose ongoing monitoring helps to maintain and / or stabilize their state of health.	• Health monitoring services are accessed via an online app or a dedicated app installed on patient's computer, tablet, or smart phone (for the online app). • As needed, a tablet (iPad) can be provided for a set period of time to be used exclusively by patients to access telehomecare. • A healthcare professional or appointed case worker explains how to access the service from the device. • Healthcare professionals analyze patient responses and determine the appropriate treatment for each health condition. • Based on patient-specific needs, the assigned healthcare professional may contact other healthcare professionals, as needed to adjust care or treatment plans. • Patients complete an end-of-service form indicating why telecare was discontinued e.g., whether care objectives were met.	• Healthcare professional or case worker assigned to each patient • Other healthcare professionals, as needed	• In 2015, the Department of Health and Social Services set up a new governance of telehealth services to be harmonized across all institutions of Quebec Health • 4 Telehealth Coordinating Committees (TCC) affiliated with the university hospitals have been created • Each health facility appoints persons responsible for coordinating the activities of Telehealth specific to their points of service. These "clinical and technological pilots in telehealth" work closely with TCCs and are responsible for supporting the development of Telehealth services.	Advantages • Regular follow-up by a multidisciplinary team of health professionals • Customer approach focused on self-management • Potential decrease in complications and number of emergency visits • Intelligent, computerized and interactive technology • Secure communications and confidential information	• Not found

TABLE 10: Extra-Mural Program (New Brunswick)

About the Program:

The New Brunswick Extra-Mural Program (EMP), known as the "hospital without walls' is the provincial home healthcare program that provides healthcare services to New Brunswick residents of all ages, in their homes (personal residence, special care home, nursing home). Note: Patient Monitoring is a part of this program but the exact components for monitoring are unclear as the result of recent changes to the organization of the service in January 2018.

Service User/Eligibility	Delivery Model	Service Providers	Partners Involved	Patient or System Outcomes	Cost
• All New Brunswick residents with a valid NB Medicare card (or in the process of receiving a card) are eligible to receive EMP services, as long as healthcare needs can be met safely in the home.	• The EMP interdisciplinary team provides home healthcare services that range from health education in chronic disease management—diabetes, chronic obstructive pulmonary disease— to more complex medical needs such as post-surgery recovery, stroke recovery, medication management, dementia, and end-of-life care. • The EMP team works with the patient and their family to connect them with the community resources necessary to continue living at home, such as assistive equipment, (i.e., wheelchair, bath bench etc.). • The EMP Home Oxygen Program consists of acute oxygen services and long term oxygen services for seniors. Chronic care (one of a number of services) • Helps people suffering from chronic health problems with professional services to allow them to stay at home, avoid or delay admission to a health care facility, and maintain their health.	Overall EMP providers: • Physician or NP, RNs, LPNs • Registered dietitians • RTs; OTs, PTs • Speech-language pathologists • Rehabilitation assistants • Social workers. Chronic disease-specific: • Nurses help patient monitor health, assist with understanding medications and provide education and treatment for health issues. • RTs help assess breathing and provide education, monitoring and symptom support if for those with COPD/lung issues.	• EMP is a publically-funded provincial program whose services are delivered by Extra-Mural/Ambulance New Brunswick Inc. • The Department of Health is responsible for the overall direction of the EMP. • Medavie Health Services NB (MHSNB) and the NB government created a partnership to integrate EMP services and Ambulance NB into a single public-service entity. • Effective January 1, 2108, MHSNB will manage operations, including delivery of care for EMP in addition to Ambulance NB. • The NB Department of Health will continue to plan, fund and monitor the services by setting standards and performance expectations.	Can help patients who: • need monitoring and managing a chronic disease, • are experiencing multiple hospitalizations and/or ED visits, • are experiencing falls, • are on multiple medications and require direction, • have post-surgical care needs, • have difficulties with daily activities, • have family and caregivers who need help • require info to organize healthcare needs and find services in the community s to support living safely at home, • require end-of-life care at home.	• EMP services are publicly- funded and provided by the staff of the Extra-Mural Program. • Payment to Medavie is contingent upon certain performance targets being met, such as more patients being served by extramural, decreased emergency room visits by extramural patients, and decreased wait times between referral to extramural and service delivery.

TABLE 11: Remote Patient Monitoring Program (Prince Edward Island)

About the Program:

The purpose of the Health PEIs Remote Patient Monitoring Program is to support care delivery through the integration of digital technology solutions for patients with heart failure and to offer delivery of healthcare outside conventional care settings (i.e. in the patient's home). Approximately 1.5 years after deployment, the program was extended to include patients with chronic obstructive pulmonary disease (COPD). (13)

Service User/Eligibility	Delivery Model	Service Providers	Partners Involved	Patient or System Outcomes	Cost
• Offered to individuals diagnosed with heart failure (HF) or COPD • Patient referrals are received from family physicians, primary care Nurse Practitioners or physicians in a hospital setting. • RPM nurses are responsible for ensuring referred patients meet program inclusion criteria.	• Eligible patients attend an appointment with RPM nurse and receive RPM kit, training on how to use RPM equipment and technology and general education about the program. • 2 RPM nurses, each with 0.5 FTE, are dedicated to the RPM nursing role. • Patients are monitored remotely via monitoring equipment and technology in their RPM kits. • HF and COPD symptoms and vitals are monitored using a blood pressure cuff, weight scale and pulse oximeter. • The RPM technology allows clinical information to be transmitted to healthcare providers through an existing analog phone line, Wi-Fi, or 3G/4G network. • The HF RPM program runs for 12 weeks • The COPD program runs for 8 weeks. • The COPD program is shorter due to pre-existing COPD care already available in PEI.	• RPM nurses interact with patients for support, advice and coordination of necessary resources. • Relevant self-management education is provided to patients through their interactions with the RPM nurses. • Family physicians and nurse practitioners receive regular letters with monitoring trends for their RPM patients.	• RPM system integrated with the existing Health PEI Clinical Information System (CIS). • Within CIS, the program is listed on applicable order sets and if selected, generates a referral to the RPM program. • Health PEI • Health Infoway	Acute-care resource utilization (ACRU) • RPM program reduced all ACRU measures except average LOS. • Both admissions and readmissions saw a dramatic decrease of 80% and 100% respectively post-program. Clinical Efficacy • Increase in knowledge of the disease condition as well as an increase in general self-management. • Quality of life improved for COPD and heart patients.	• Funding to establish the Remote Patient Monitoring program for congestive heart failure on Prince Edward Island was provided through a partnership with Canada Health Infoway.

TABLE 12: Supporting Health. At Home: Remote Patient Monitoring Program (Newfoundland and Labrador)

About the Program:

Supporting Health At Home Remote Patient Monitoring (RPM) is a free at-home monitoring program available to patients in the Eastern Health region who live with COPD, heart failure and diabetes. (14)

Service User/Eligibility	Delivery Model	Service Providers	Partners Involved	Patient or System Outcomes	Cost
• A clinical diagnosis of Heart Failure, COPD, Diabetes	• Patients are given small computer tablet and home monitoring equipment, which they will be trained to use (equipment may include a blood pressure monitor, weight scale and a device to measure oxygen levels). • Patient inputs the results from the home monitoring equipment into the tablet. • Registered Nurses monitor transmitted patient data as displayed on multiple dashboards. • Alerts are triggered when data falls outside of the acceptable range for a particular patient. • RN contacts the patient to follow-up on alerts triggered. • Enrolled patients will receive a minimum of two health coaching sessions via telephone with their assigned nurse. • Patient's physician will be notified of their patient's enrollment in the RPM program • RPM nurse will refer a patient to their Primary Care Physician if a patient issue cannot be resolved within their nursing scope of practice. • Summary reports are sent to physician on a monthly basis/on request and upon patient's completion of program.	• Registered Nurse • Primary Care Physician	For initial startup: • *Overall Medical Direction:* Dr. Pat Parfrey • *Heart Failure Content Contributors:* HF clinic Nurse Practitioners, Drs. Connors, Sussex, and Hayley, Heart and Stroke Foundation • *COPD Content Contributors:* Pulmonary Rehabilitation PT and RT, Drs. Azher and Vidyasankar, Lung Association • *Diabetes Content Contributors:* Diabetes Clinic -DNE, RD, and NP, Canadian Diabetes Association	From evaluation • Patients' quality of life (QoL) and perceived health ratings improved immediately after program participation, as did their knowledge of, and perceived ability to, manage their conditions. • Perceived activity limitations decreased after participation in the program. • With the exception of perceived gains in knowledge, subjective measures returned to near-baseline levels when assessed at 4-month follow-up	From evaluation • Preliminary financial estimates suggest the program could be self-sustaining given yearly operational costs • More thorough assessment needed. • Startup cost RPM program within Eastern Health was approximately $1,169,008, with annual operational costs estimated to be similar $1,066,016. • Operational Costs include the cost of cellular connectivity ($36,000), software renewal ($170,000), asset management ($230,000), kit replacement as required ($1000/kit), and human resources ($630,016).

TABLE 13: Care Coordination/Home Telehealth (USA)

About the Program:

Within the Veteran's Health Administration (VHA), the Office of Telehealth Services offers veterans a program called Care Coordination/Home Telehealth (CCHT) to provide routine non-institutional care and targeted care management and case management services to veterans with diabetes, congestive heart failure, hypertension, post-traumatic stress disorder, and other conditions. The program uses remote monitoring devices in veterans' homes to communicate health status and to capture and transmit biometric data that are monitored remotely by care coordinators. (15), (16)

Service User/Eligibility	Delivery Model	Service Providers	Partners Involved	Patient or System Outcomes	Cost
• Veterans with diabetes, congestive heart failure, hypertension, post-traumatic stress disorder, and other conditions.	• Chronic Care Model serves as the conceptual framework for CCHT. • Care coordinator selects appropriate home health technology using an algorithm based on a patient's needs, the complexity of the disease or condition, and the individual's ability to use technology. • The algorithm helps determine which CCHT device (videophone, messaging device, biometric device, digital camera, or telemonitoring device) is most suitable and cost-effective for each patient's use. • Care coordinator gives the patient and caregiver the required training for the device of choice. • Coordinator reviews monitoring data and provides active care or case management. • Each patient is classified on the basis of his or her risk level, assessed daily according to preset thresholds, with alerts if any significant changes arise in the patient's symptoms or behavior that require intervention and management.	• CCHT programs are available at 140 VHA medical centers • Dedicated National training center • Care coordinators (nurse or social worker) • Physicians, Specialists in radiology, dermatology and retinopathy as needed	• Care Coordination/Home Telehealth was developed by the VHA to respond to the rising number of elderly veterans with chronic care needs and reduce their use of institutional care and its associated high costs. Group Health's Chronic Care Model serves as the conceptual framework for CCHT and has helped move toward the goal of making the patient's home into the preferred place of care where possible and appropriate. • Today CCHT programs are available at 140 VHA medical centers.	• Studies that compared data from the year before entering the program and six months post enrollment show a 25 percent reduction in bed days of care, a 20 percent reduction in number of admissions, and a mean satisfaction score rating of 86 percent. • Decreases in health resource utilization were largest in highly rural (50.1%) and urban (29.2%) areas, for mental health-related conditions, and for patients with multiple conditions. Patients' acceptance of CCHT was high, with only 10 percent declining services.	• The cost for CCHT ($1,600 per patient per year) compared favorably with the direct cost of VHA's home-based primary care services ($13,121 per patient per year) and market nursing home care rates (an average of $77,745 per patient per year).

TABLE 14: Center for Telehealth (USA)

About the Program:

University of Mississippi Medical Center's (UMMC), Center for Telehealth Remote Patient Monitoring Component: When a primary care physician makes a referral for remote patient monitoring, their patient enrolls in a four- to six-month program tailored to a specific chronic illness. UMMC specialists educate the patient about their condition and how to improve their health, and a trained clinician regularly checks on their progress. Over time, the patient masters the skills to monitor and manage the illness on their own.

Service User/Eligibility	Delivery Model	Service Providers	Partners Involved	Patient or System Outcomes	Cost
• This program requires a provider referral. • Chronic illnesses: e.g., diabetes, high blood pressure, heart disease, COPD	• 4-6 month program tailored to a specific chronic illness. UMMC specialists educate the patient about their condition and how to improve their health, and a trained clinician regularly checks on their progress. • RPM includes a tablet assigned to the patient, enabling him or her to connect with and upload data from a variety of home-based devices, and equipped with a video conferencing link to care managers at UMMC. • Center for Telehealth staff collect data from the patient every day, and use that information to create a personalized care plan. RPM services e.g., monitoring, daily health sessions, personalized interventions, automatic notification of potential issues medication therapy management ongoing care coordination with primary care providers. • Over time, the patient masters the skills to monitor and manage the illness on their own and usually covered by the patient's insurance or Medicaid plan with referral.	• Primary care physician • UMMC specialist • UMMC Care manager • Telehealth staff • Telemedicine systems used to connect to customers: Cisco, SnapMD, eCareManager, Health Harmony	• UMMC Center for Telehealth now provides over 35 telehealth specialty services to 200+ non-affiliated sites in Mississippi. • Initial program funding came from the Bower Foundation and the Mississippi State Department of Health. • In 2017 the Center was designated as one of two *Telehealth Centers of Excellence* by the Health Resources and Services Administration, receiving $600,000 funding for the initial year. • This designation allows the Center to serve as a national clearinghouse for telehealth research and resources.	• Shown to help patients better manage their blood sugar and blood pressure, learn more about how to control their conditions, and reduce the number of times they had to go to the hospital for those conditions.	• It is estimated that the State of Mississippi will save approximately $189 million each year with the use of remote patient monitoring.

TABLE 15: Banner iCare™ (USA)

About the Program:

Banner iCare™ is a high-touch, high-tech in-home care delivery model that includes providers, technology and a highly collaborative care process to treat Banner Health Network members with complex, chronic illnesses. Through the use of a tablet-like device, patients interact directly with their health team – primary care physician, pharmacist, nurse and health coach – to track and address any medical concerns. (Banner Health is a nonprofit healthcare system).

Service User/Eligibility	Delivery Model	Service Providers	Partners Involved	Patient or System Outcomes	Cost
• Multiple chronic diseases: must have at least 5 chronic health conditions	• The Philips-supplied hardware includes an android tablet, custom software and a range of biometric sensors for blood pressure, oxygen saturation, weight, and heart rate measurements. • Also included is *Philips Lifeline* — a personal emergency response device with automatic fall detection. Telehealth and RPM System • Type Store and Forward: Biometric Remote Patient Monitoring, Real-Time Biometric Remote Patient Monitoring, Real-Time Interactive Two-Way Video • Single-User/Patient Home Base Unit	• The program matches patients with multi-disciplinary care teams that include health coaches, nurses, social workers, pharmacists and primary care "intensivists" in a way that delivers near-instant access for patients to an entire care team.	• Banner Health implemented the program as Standard of Care. • While most patients were Medicare eligible, no reimbursement was sought from Centres for Medicare Services. • Banner covered the costs of the telehealth program including telehealth equipment hardware and software costs. • Combining team-based continuous care with remote delivery is a key part of the success.	• 45% reduction in hospitalizations. • Coordinated care is hard to achieve without the right technology, and without a culture that encourages and instills this care delivery paradigm. • Consumer-grade telehealth is not suited for delivering care for this population.	• 32% reduction in acute and long-term care costs.

TABLE 16: Home Telemonitoring Program (USA)

About the Program:

With innovative telemonitoring technology, MedStar Visiting Nurse Association (VNA) can monitor patients' vital signs and symptoms remotely to identify abnormal readings and address negative symptoms or health concerns before they turn into medical emergencies. The remote monitoring program aims to keep patients healing safely and comfortably in their own homes by addressing the main reasons that patients are often readmitted to the hospital or sent to the emergency room, including: not taking medications, poor diet, inadequate family support and lack of understanding about their health conditions.

Service User/Eligibility	Delivery Model	Service Providers	Partners Involved	Patient or System Outcomes	Cost
• High-risk patient populations: congestive heart failure, chronic obstructive pulmonary disease (COPD), or diabetes.	• Patients are provided with a 4G Samsung customized tablet that has educational videos, medication reminders, and comes with Bluetooth biometric devices such as a: blood pressure monitor, scale, pulse oximeter so that patients take and record vital signs on a daily basis. • Data is automatically transmitted to their homecare nurse and used to help the home healthcare team and the patient's physician adjust the treatment plan if needed. • Patients can use phone call or text message through the tablet to communicate to healthcare team/ nurse. • Health Recovery Solutions telehealth platform allows for seamless communication between the clinician and the patient. The patient can communicate with his/her nurse through text messaging or phone call from the tablet. • Likewise, the clinician can contact the patient through the HRS Clinician Connect web portal and smartphone application.	• Home healthcare team (nurses, therapists, social workers and home health aides) • Physicians	• MedStar VNA, which serves patients across Maryland, D.C. and Northern Virginia, has partnered with Health Recovery Solutions (HRS) to provide high-risk patients with in-home telemonitoring services. • MedStar VNA is a nonprofit, Joint Commission-accredited, in-home healthcare provider that offers skilled nursing and rehabilitation for homebound, disabled and chronically ill patients in the Maryland, D.C. and Northern Virginia region. • Health Recovery Solutions (HRS) supplies healthcare providers with the most advanced patient monitoring devices.	• 71% reduction in repeat admissions to the hospital • Improved utilization by 50% • Increased care engagement by 24 minutes/day	• $1.9M (USD) savings for insurance payers

TABLE 17: Remote Monitoring Telemedicine (USA)

About the Program:

Remote Monitoring Telemedicine at University of Pittsburg Medical Center (UPMC) provides in-home telehealth equipment to promote proactive patient self-care, monitoring patients' key measures, providing patients with access to guidance about their health issues, and enabling physicians to follow their patients' health.

Service User/Eligibility	Delivery Model	Service Providers	Partners Involved	Patient or System Outcomes	Cost
• Diagnosis of heart failure. • Admitted to the hospital with risk of readmission. • Provider (PCP or cardiologist) feels the patient would benefit. • The health kit is available to adults 18 and older. • Average age of Heart Failure health kit users is 75. • In the process of expanding to as many as four other conditions as of Feb 2018.	Telemedicine Heart Failure health kit • Patient is provided with a tablet device for 90 days that wirelessly transmits information to the call center such as daily blood pressure, oxygen levels, heart rate, and weight. Patients can contact the call center by phone or by two-way video via the tablet. • Educational video shows the patient how to use the tablet and its associated tools • Call center nurses can contact the patient to ask follow-up questions based on care plan question responses to confirm information. • Nurses can respond to questions based on the physician's orders or forward the patient's questions or concerns to their physician. • Vivify platform provides the call center portal, equipment monitoring, reporting features, EHR integration and equipment delivery.	• Nurses • Physician • Caregivers log in to the Vivify portal and monitor alerts, bio-parameters and patient survey question responses to triage and guide virtual care. They also do live video visits with patients. Their documentation in Vivify flows back into UPMC electronic health records.	• An integrated healthcare provider and insurer, UPMC offers remote patient monitoring strategies • UPMC also focuses on refining its operational model so that it selects the right patients, puts them through an appropriate care pathway, and then integrates all of its other resources, including analytics, operations and finances. • The remote monitoring and telehealth vendor Vivify Health platform allows UPMC to collect key biometric data - such as weight and blood pressure, along with answers to triage questions - from at-home patients on a daily basis.	• Reductions in all-cause readmission rates. • Statistically-significant decrease in observation status utilization for congestive heart failure patients. • 30-day readmissions rates for CHF patients in the program drop to 12%, compared to an average readmission rate of 21% for CHF patients at UPMC *not* enrolled in the remote monitoring program, and the national readmission rate average of 25% for CHF patients.	• UPMC, through its UPMC Enterprises venture capital arm, is an investor in Vivify • UPMC provided the startup with $10 million (USD) as part of a recent $17 million (USD) financing round.

TABLE 18: Remote Patient Monitoring Programs (USA)

About the Program:

The University of California Los Angeles (UCLA) Remote Patient Monitoring Programs allow patients and their healthcare providers to manage patient health from home. These technologies help patients avoid emergency room visits and hospital admissions.

Service User/Eligibility	Delivery Model	Service Providers	Partners Involved	Patient or System Outcomes	Cost
• Patients with chronic disease • Patients recovering from heart surgery	Cardiac Telehealth Program: • Patients are equipped with video teleconferencing technology and paired with a Nurse Practitioner who places video calls at defined intervals, depending on a patient's level of risk, to do a visual check of recovery. • Patients are equipped upon discharge with a pre-programmed mobile device that includes a Bluetooth weight scale, pulse oximeter and heart-rate monitor. • The device helps patients know what medications they should be taking and when, as well as providing verbal and visual reminders to regularly log their physiological information so that the healthcare team can ensure they are progressing appropriately. Chronic Disease Monitoring: • Mobile devices and video visits provide healthcare specialists with real-time information about patient health that is used to take action before problems worsen.	• Physician • Care team • Nursing staff	• The UCLA Health Accountable Care Organization (ACO) has been recognized in the Becker's Hospital Review list of "100 Accountable Care Organizations to Know," featuring the most advanced ACOs in the country. • UCLA is currently participating in: CMS Medicare Shared Savings Plan, Anthem Blue Cross PPO Enhanced Care Coordination, Cigna Collaborative Accountable Care and Health Net Blue & Gold ACO.	Cardiac Telehealth • The program significantly lowers a patient's risk of being readmitted to the hospital with post-surgical complications.	• Not found

TABLE 19: Remote Glucose Monitoring (USA)

About the Program:

Remote Glucose Monitoring, Kaiser Permanente was launched by the Southern California Permanente Medical Group in February 2017 to revolutionize the way diabetes is being monitored and treated.

Service User/Eligibility	Delivery Model	Service Providers	Partners Involved	Patient or System Outcomes	Cost
• Kaiser Permanente members with Type 2 Diabetes	• Kaiser Permanente provides Bluetooth®-enabled glucose meters that make it easy for patients from any location to stick their finger and have the readings automatically synced to their mobile phone. On the backend, Kaiser Permanente has developed a way for the glucose readings to be remotely pushed to patients' electronic medical records from their phones. The patient's physician is notified when the patient's glucose level is high so that the care team can take corrective action. • The organization is working to create advanced algorithms that will use data to predict which patients are likely to be flagged with unsafe glucose levels so preventive intervention can take place sooner.	• KPSC's multidisciplinary teams include physicians, physician assistants, pharmacists, registered nurse practitioners, registered nurse (RN) care managers, office-based RNs, licensed vocations nurses, health educators, and others as needed.	• In partnership with Kaiser Foundation Health Plans and Kaiser Foundation Hospitals, the Permanente Medical Groups and physicians in Permanente Medicine advocate for person-centered, high-quality care that embraces the latest innovations in medicine and is supported by an integrated care delivery model.	• Remote Glucose Monitoring has proved beneficial for underserved populations who find it difficult to receive care because of the lack of reliable transportation, concern over unpaid time away from work, and family obligations.	• Not found

TABLE 20: Connected Cardiac Care Program (USA)

About the Program:

Connected Cardiac Care Program is a 4-month home telemonitoring and education program designed to improve self-management in heart failure patients at risk for hospitalization within the Partners HealthCare network of hospitals founded by Brigham and Women's Hospital and Massachusetts General Hospital. (17)

Service User/Eligibility	Delivery Model	Service Providers	Partners Involved	Patient or System Outcomes	Cost

• Heart failure patients at risk for hospitalization within the Partners HealthCare network of hospitals.	• ViTel Net and devices(approved by the Food and Drug Administration):
	  ○ a UA 767PC Turtle 400 monitor,
	  ○ a Life-Source digital weight scale,
	  ○ an A&D blood pressure cuff and meter, and
	  ○ a BCI pulse oximeter device (UC-321PBT).
	• Patients are trained to monitor relevant physiologic parameters (blood pressure, heart rate, weight, and blood oxygen saturation) and answer questions daily on heart failure/related symptoms on a touch-screen computer.
	• Data are transferred to a remote monitoring database and reviewed by telemonitoring nurses.
	• Participants also receive structured biweekly telephone-based education sessions over an 8-week period.
	• When remote monitoring nurses observe that measurements fall outside the set baseline range customized for each participant, or at the onset of new symptoms, participants receive unscheduled education about appropriate intervention protocols.
		• Telemonitoring nurses
		• Physicians
		• Staff includes nurses, rehabilitation therapists, social workers and home health aides – works as a team to coordinate each individual's care.
			• Partners HealthCare at Home is part of Partners HealthCare (an integrated health system).
			• Partners HealthCare at Home and the Spaulding Rehabilitation Network constitute the non-acute care services division of Partners HealthCare.
			• The first 200 home monitors were installed in patient homes in less than two weeks. Partners HealthCare utilized its own network of installers as a key asset in establishing monitoring services in patients' homes and providing the training needed to ensure both clinical and patient adoption.
			• Partners HealthCare selected Philips as its telemonitoring partner.
				From 2015 Evaluation:
				• 50% reduction in readmission rates for enrolled patients
				• Lower hospitalization and mortality rates, for up to 90 days and 120 days after discharge
				• Although mortality rates increased in the remote monitoring group after program completion, the overall effect was still beneficial compared to controls over the one-year follow up.
					• Since 2006, PHH has served 1,200 heart failure patients through this program. Having realized a 50% reduction in readmission rates for enrolled patients, the program has yielded an estimated savings of $10 million (USD) in healthcare costs.

TABLE 21: My Health Clinic at Home (Australia)

About the Program:

My Health Clinic at Home (MHCAH) provides touchscreen computers and measuring devices to 200 seniors, enabling them to test and record their own vital signs while maintaining regular contact with a health team via face-to-face consultations using a computer and a video camera.

Service User/Eligibility	Delivery Model	Service Providers	Partners Involved	Patient or System Outcomes	Cost
• Residents in South East Sydney who are over 65, and Aboriginal or Torres Strait Islanders over 50, who have a chronic health condition • Patients pay $10 a week to use the service.	• Clients are provided with a touch-screen computer and measuring devices to record their vital signs (blood pressure, oxygen levels and blood sugars) each day. • Results are transmitted securely to a specially-trained Telehealth Registered Nurse for review. • Clients can discuss results with their Telehealth Registered Nurse via a videoconference or telephone call on any weekday. The MHCAH service includes: • MHCAH small touch screen computer, • Vital signs monitoring equipment, • Training on how to use the equipment and ongoing help, • Daily (weekday) remote monitoring by a telehealth registered nurse, • Self-management education and support from a telehealth registered nurse, • In-home video conferencing to the telehealth nurse and possibly a GP and other health professionals.	• Telehealth registered nurse • GP or other health professionals as needed	• Aged care not-for-profit Feros Care was given Commonwealth funding to expand to other regions (past pilot sites) • The cutting edge service is under the umbrella of Home and Community Care (HACC), a federal government program funded through the Department of Social Services. • The My Health Clinic At Home (MHCAH) telehealth service was developed by award winning not for profit aged care provider, Feros Care, and funded by the federal government.	• Not found	• Patients pay $10 a week to use the service.

TABLE 22: TeleCare North (Denmark)

About the Program:

A Danish trial, named TeleCare North, was launched in the North Denmark Region in January 2012. The trial aimed to develop and implement a telehealthcare system, Telekit, for patients suffering from COPD. Building on the positive results for COPD patients, the offer of home monitoring will now be expanded to include heart failure patients as well. A trial for heart failure patients is underway. (22,23)

Service User/Eligibility	Delivery Model	Service Providers	Partners Involved	Patient or System Outcomes	Cost
• Severe or very severe COPD	• Telekit system is installed by a technician in the patients' home (Samsung Galaxy tablet, a fingertip pulse oximeter, blood pressure monitor, a precision health scale a tablet pen, and a user guide). • It features two apps: OpenTele (records respiratory symptoms and collects vital signs, has message function) and a supportive app. • Twice a week, the patient tests blood pressure, pulse rate, saturation and weight with equipment connected via Bluetooth to a tablet and a user-friendly telehealth app. • The patient also responds to health-related questions about breathing difficulties and coughing. • The results are immediately transmitted through mobile broadband, and healthcare professionals may take action at any given time if necessary. • Public health portal allows patient, nurse and GP to see patient data	• District Nurses • GPs	• Integrated Care model – a collaborative effort between the regional authority, its hospitals, GPs and 11 municipalities. • The project has established new cross-sector roles and procedures to support the region-wide implementation of home monitoring using a new integrated care model which allows the concept to be expanded to other patient groups. • The technical solution is based on a flexible open-source telehealth platform which makes it possible to expand the home monitoring concept to other patient groups and to integrate new devices and technologies.	Patient improvements: • disease control, confidence and self-management • better equipped for dialogue with healthcare professionals • for those with severe COPD, telehealth has increased rehabilitation activities by 9% and improved quality of life • the number and length of hospitalizations were reduced by 11% and 20% • 61.7% experienced improved control of their disease • 71.7% experienced improved security	• Patients with severe COPD are likely to be the most cost-effective group. • More likely to be cost-effective for patients < 60 yrs. than for older COPD patients • Existing resource patterns of patients and variations in delivery-site practices might have a strong influence on cost-effectiveness, possibly stronger than the included health or sociodemographic sources of heterogeneity • The reduced costs are around 7000 DKK annually per patient

Appendix A:

Detailed Data Extraction Tables

This section contains more detailed information on the programs listed in the nine Summary Tables. Associated web links are included, where available. Most of the information is taken directly and quoted verbatim from websites and reports associated with the programs.

CANADA

British Columbia

Data Extraction for Summary Table 1 **Program Name**	BreatheWell/COPD Services
Jurisdiction	• Fraser Health , British Columbia
Condition(s)	• COPD
Brief Description of program/RPM initiative	• Community respiratory therapists provide in-home education and assessment to help individuals gain more control over COPD (chronic obstructive pulmonary disease). Services include home visits by a respiratory therapist, and include coaching and education on your flare up plan with suggestions on improving daily activities. Your doctor will receive the assessment and recommendations once your visit is completed. • When appropriate, a technician installs in-home Telehealth monitoring technology to help patients manage and understand their condition by tracking vital measurements, such as blood pressure, pulse and oxygen levels, and providing health education.

Patient Eligibility	There seems to be some discrepancy in the available information about this so it may vary by site:
	• diagnosis of COPD
	• A physician referral is not required; individuals living with COPD in Fraser Health may refer themselves to this service. Referral is made to BW/COPD through Community Respiratory Services by phone or fax
	• In Residential Care, staff enroll and provide care of residents with COPD in consultation with the Primary Care Provider.
	• Primary Care Providers are invited to refer patients who:
	  ○ Live with a diagnosis of COPD
	  ○ Reside in Fraser Health

Delivery Model	• The service involves a team based approach including the Primary Care Provider and Respiratory Therapist, (RT). The RT visits the client in their homes to provide coaching of self-management skills related to COPD including education on the use of prescribed medications, identification of the signs and symptoms and management of COPD exacerbations. Client goals are set to identify strategies for the management of activities of daily living, diet, and exercise • The client is encouraged to arrange an appointment with their Primary Care Provider to discuss their goals of self-management, including a flare-up plan. Clients receive services based on their individual needs. Once the client is able to recognize an exacerbation of COPD and start their flare up plan they receive 6 month follow-ups from the RT. • Primary Care Providers are asked to support their patients by: - o Providing prescriptions for COPD exacerbations and maintenance, in consultation with BW/COPD RT o Endorse Residential Care COPD pre-printed orders or individualized COPD medication orders From Fraser Health patient brochure o HOME VISITS by a nurse and respiratory therapist, who work with you and your family doctor to develop a care plan. They coordinate all of the services you need, including services you are already receiving plus new ones that will benefit your situation. • COACHING AND EDUCATION to help you learn what to do to stay in control of your COPD condition, remain stable and prevent flare-ups that often lead to hospitalization • AN ACTION PLAN to deal with flare-ups should they occur • PARTNERSHIPS WITH YOUR FAMILY DOCTOR and specialists • RESPIRATORY THERAPISTS to give advice if you need it and provide help if you are showing symptoms of a flare-up • A MONITORING SYSTEM, should you need it, that will help you managed and understand your condition by tracking your measurements (blood pressure, weight and oxygen levels) • Your doctor will receive the assessment and recommendations once your visit is completed From Home Care Knowledge Network PPT presentation from 2013(3) o The GP's play a key role in building partnerships across the community. This includes: They build partnerships with: o BreatheWELL patients: Post -hospital discharge (Community Services, Action Plan); Clients enrolled in BreatheWELL at Home Program (urgent visits after exacerbation, Action Plan, feedback to program); Other Clients with acute visits (BreatheWELL at Home); General patient population (Spirometry testing if no diagnosis). o Care Phase 1 Active Intervention o In phase 1, health professionals, RTs and RNs: • Promote symptom recognition • Coach correct inhaler technique • Encourage consultation with GP to establish Flare-up Plan • Assess and support other conditions or diseases • Refer to other key Home Health and Community resources o Phase 2: Self –Management o In phase 2, health professionals, RTs and RNs: • Screen for acute needs "flare-up" and ability of client to manage health issues • Identify learning needs and teach goal-setting skills • Coach conversations related to chronic and acute health needs • Refer to internal and external services • Follow up on new or existing issues identified by the telemonitoring nurses o Phase 3: Discharge o In phase 3, health professionals, RTs and RNs, identify clients for discharge from program and handover to other services.

	○ They identify patients who are: • Able to self-manage their COPD, i.e. they meet these criteria: Client identifies strategies to manage acute and chronic conditions (i.e proper use of inhalers) Client consistently able to identify need for flare up -plan (i.e. signs and symptoms) Client initiates plan independently • Not able to self -manage due to significant cognitive issues • Not interested in participating in self -management activities
Partners Involved	Home Care Knowledge Network PPT presentation from 2013(24) references the background to this program as the following: ○ Health Services Purchasing Organization provided patient-focused funding for community programs for the first time ○ Initiative of Integrated Primary and Community Care started to decrease acute care utilization and capacity issues ○ Divisions of Family Practice: created to link all community GPs ○ See this presentation for an organizational chart of the players involved with the setup of this program (24) ○ BreatheWELL/Chronic Obstructive Pulmonary Disease (BW/COPD) is a result of Fraser Health (FH) collaboration between acute, home health(HH), residential care (RC), and community respiratory services (CRS)
Patient or system outcomes	• Home Care Knowledge Network PPT presentation from 2013(24) references an Evaluation of this program from 2011-2012 gave the following information about client indicators: ○ Quality of Life measured by CAT: pre-upon enrollment = 18.78(m); post-after enrollment = 17.97(m) ○ Self-management measured by PAM survey: pre-upon enrollment= 56.3067(m) Level 3; post-after enrollment = 57.7500(m) Level 3 ○ Satisfaction with telemonitoring equipment: pre-upon enrollment = survey (scale 1-4)=N/A; post-after enrollment = 3.5, 3-agree
Cost	• None found
Evaluation or references	• Implementation plan: Fraser Health, 2015 BreatheWELL/COPD Services Condensed Implementation Plan (4)
Related Web links	• https://www.fraserhealth.ca/Service-Directory/Services/home-and-community-care/breathewell-copd-services#.W32LQI-cGUk • http://sswr.fetchbc.ca/assets/BWCOPDInformation.pdf • https://www.fraserhealth.ca/Service-Directory/Services/home-and-community-care/breathewell-copd-services#.W32LQI-cGUk • http://www.cdnhomecare.ca/media.php?mid=3276
Data Extraction for Summary Table 2 **Program Name**	Home Health Monitoring Program
Jurisdiction	• Vancouver Island, British Columbia
Condition(s)	• CHF, COPD
Brief Description of program/RPM initiative	• Home Health Monitoring (HHM) is a service free to Island Health residents that allows clients to manage their condition from the comfort of their own home and improve their knowledge of their chronic disease, as well as their ability to manage their own health. Island Health initiated a home tele-monitoring pilot for the heart failure (HF) population in 2009. In 2013, Island Health partnered with BC's HHM provincial initiative to implement a standardized HHM service for clients living with heart failure through the Home and Community Care program. In August 2016, the HHM Expansion (HHME) project began by expanding the service to the HF population throughout all of Island Health, and in November 2016 the service expanded to include clients with chronic obstructive pulmonary disease (COPD) as well.

	• The purpose of the Island Health HHME Project is to enhance the existing community-based HHM service model to increase service effectiveness, efficiency, and capacity to manage high-risk clients in the community, who live with HF or COPD. • The HHME Project expanded on the previous state of the HHM program by adding the COPD monitoring protocol to all geographies at Island Health and expanding the HF protocol from geographies 2 and 4 to include all four geographies.
Patient Eligibility	• self-referred or give consent to be referred through a health care professional • HHM Clinician in a potential client's region will assess their eligibility after the referral is received
Delivery Model	• There are many approaches to providing HHM. At Island Health, the HHM service duration is approximately 12 weeks and enables clients to learn how to manage their health condition, monitor their symptoms, record key measurements each day, and share this information electronically with their monitoring care team. HHM nurses use TELUS Health's Remote Patient Monitoring (RPM) solution to monitor clients during regular business hours. They also respond to HHM system alerts and collaborate with clients to them, reinforce self-management and related action plans, and communicate client progress and treatment with primary care providers. Patients can be self-referred or give consent to be referred through a health care professional, such as their general practitioner, an emergency room physician, or a hospital liaison. The HHM Clinician in a potential client's region will assess their eligibility after the referral is received. The HHM program at Island Health uses a blood pressure monitor, a weight scale, a pulse oximeter and a pedometer (for COPD clients only) to capture vital signs. Every day, clients answer a few questions using the RPM application on the tablet provided to them. This includes prompts and instructions to gather their vital signs. Once the questions are completed, the data is sent to the HHM Clinician located in the client's region, and they monitor this data Monday to Friday. The HHM Clinician looks for changes in the client's measurements and contacts the client regularly to review their results and answer their questions. The clinician sends reports and communicates concerns to the client's physician. Tools for patients • Blood Pressure Monitor, Weight Scale, Pulse Oximeter, Pedometer, Education Binder, Daily Log, Access to a nurse Monday to Friday Patient tasks • complete daily measurements such as blood pressure, weight or oxygen level • answer a few questions to help me evaluate my chronic disease daily • results and responses are sent to the Home Health Monitoring nurse
Partners Involved	• In 2013, Island Health partnered with BC's HHM provincial initiative to implement a standardized HHM service for clients living with heart failure through the Home and Community Care program.
Patient or system outcomes	• 92% Client Satisfaction with HHM (n=72); • Perceived (78%, n=72) and Actual (81% n=291) Reduction in ED Visits; • Actual Reduction in Length of Stay (94%, n=291) and Acute Care Utilization (92%, n=291); • $3,252.10 per Client Cost Avoidance at 365 Days Post-HHM (n=150); and • Low (4%) Referral Rates from Large Sites (RJH/VGH and NRGH). • Most of the survey respondents (92%) indicated high to moderate satisfaction with the program, and 92% also indicated their likeliness to recommend the program as definitely or probably.
Cost	Acute Care Utilization and Cost Avoidance of Expansion • The acute care utilization found 81% less emergency department visits when comparing the 90 days pre-HHM to the 90 days post-HHM for 291 clients. There were 92% less inpatient admissions, and 94% less inpatient days in the 90 days post-HHM period. This reduction in acute care utilization at Island Health equaled a cost avoidance of $1,569,910.

	The percent reduction in acute care utilization seen within Island Health are similar to what was found in a review of the William Osler Health System, part of the Ontario Telehealth Network which the Island Health HHM program was adapted from8. Even after applying the estimated costs of delivering the service, these results still show cost avoidance of $3,252 per client 365 days post-HHM - a total cost avoidance of $487,815 for the 150 clients included in the estimate. A review of the COPD and HF admissions to acute care at the two largest sites in Island Health compared to their rates of referral showed low program uptake. The HHM team and clinicians are continuously working to build engagement and knowledge around HHM in the clinical community, and these efforts should be continued to promote program use and expand the positive results found within this evaluation.
Evaluation or references	• Island Health, 2018, Evaluation of the Home Health Monitoring Expansion Project (5)
Related Web links	• https://www.islandhealth.ca/our-services/home-home-care-services/home-health-monitoring • http://www.viha.ca/NR/rdonlyres/E19A4DF5-061C-4A18-A0A6-1E1AD9D48D7B/0/chs_hhm_brochure.pdf
Data Extraction for Summary Table 3 **Program Name**	Virtual Cardiac Rehabilitation Program (vCRP)
Jurisdiction	• British Columbia
Condition(s)	• Ischemic heart disease
Brief Description of program/RPM initiative	• The Virtual Cardiac Rehabilitation Program (vCRP) uses an online interface to mimic the existing outpatient cardiac rehabilitation programs currently in use at hospitals across BC. As a result of the success of the vCRP trial, British Columbia's Fraser Health Authority is collaborating with our research team to implement the program alongside existing hospital-based cardiac rehabilitation programs (CRPs) in the region (see below). • The original vCRP study tracked a group of ischemic heart disease patients who used the vCRP website over a four-month period in place of a face-to-face cardiac rehabilitation program. Upon completion, patients saw improvement in their exercise capacity, the number of hospital visits, diet and cholesterol levels, and these changes were still present a year later. The vCRP was also cost-effective, using less staff hours than an in-person program. • The vCRP has evolved from a research intervention to an integrated program in healthcare practice. Based on the results from the implementation research accompanying the delivery of the program in the two FHA hospitals, the hope is to expand the program across the rest of the FHA and eventually, all over British Columbia.
Patient Eligibility	• Seventy-nine patients with ischemic heart disease were recruited and randomized to usual care or the four-month online cardiac rehabilitation program. Patients in usual care received simple guidelines for safe exercise and healthy eating habits.
Delivery Model	• 4 month program followed by a 12 month follow-up • Patients in the intervention group received a heart rate monitor, blood pressure monitor and access to the vCRP website. They monitored heart rate during their exercise sessions and uploaded this data to the website for weekly review sessions with their assigned care provider. The vCRP program also allowed patients to track blood pressure and glucose levels and offered one-on-one chat sessions with a cardiac-trained nurse, dietitian and exercise specialist, as well as peer-support group chat sessions. Upon completion of the four-month program, patients were discharged into the care of their primary care physician. • All participants were assessed at baseline, four and 16 months for risk factors and lifestyle behaviours. Exercise capacity was measured at each assessment as total time on a symptom-limited exercise stress test.

	• Participants randomized to the intervention were registered to the vCRP website with a unique username and password, and received an off-the-shelf heart rate monitor (Polar s610i) and a home blood pressure monitor (Lifesource UA779) for the intervention. Participants underwent a 30 minute in-person training session following their randomization on the use of the vCRP, heart rate monitor and blood pressure monitor. The vCRP included on-line intake forms (medical, risk factor and lifestyle forms), scheduled one-on-one chat sessions with the program nurse case manager, exercise specialist and dietitian (three times each during the 12 weeks), weekly education sessions in the form of interactive slide presentations, data capture for the exercise stress test and blood test results, progress notes (for health professionals), and monthly ask-an-expert group chat sessions. Upon logging in participants were directed to the webpage that corresponded to their week in the vCRP. This page displayed the tasks that needed to be completed for each week. The one-on-one chat sessions were used to discuss progress, any change in symptoms, provide exercise prescription, dietary recommendations, and risk factor management. The heart rate monitor allowed for exercise heart rate data to be stored and downloaded to the patient's home computer and then uploaded to the vCRP webserver. Participants were asked to wear their heart rate monitors when exercising and upload their exercise data at least twice per week onto the vCRP. In addition, they were to enter their weight, pre- and post-exercise blood pressure, and random glucose (if diabetic) twice per week for 2 weeks, once per week for 2 weeks and once per month thereafter, unless instructed otherwise by the nurse case manager. • Participants from both groups returned for a follow-up assessment after four months. After this time, participants in the vCRP group were graduated from the program and returned to usual care. vCRP participants underwent a semi-structured, open-ended interview at the end of the intervention to assess patient satisfaction and attitudes. After another 12 months, all participants returned for a subsequent final assessment
Partners Involved	Fraser Health Authority Implementation Project • Members from the Fraser Health Authority (FHA) Cardiac Services Program are partnering with the BCATPR to implement and test the vCRP across the FHA region. The authority is hoping to increase the capacity and reach of cardiac services across both urban and rural areas, and to address the current gap in care. • We aim for 140 cardiovascular disease (CVD) patients to be referred to the vCRP during the project, from either existing FHA CRPs or community physicians. • The findings will be used to inform the ongoing provision of the vCRP in the FHA and have the potential to be used as a blueprint for use of the vCRP in other health regions. • Went live in 2017
Patient or system outcomes	Summary of outcomes from the vCRP Trial Program ○ After 16 weeks in the vCRP, patients saw improvement in their exercise capacity, diet and cholesterol levels, and all of these changes were still present one year after the end of the program. ○ There were fewer hospital visits among patients in the program than in usual care. ○ Drop-out rates were lower (less than 10%) than what is reported in literature (up to 35%). ○ Staff time required to administer the program was lower than in-person care, at 8 hours ($435) per participant. ○ Follow-up interviews revealed that participants found the vCRP to be accessible, convenient and effective. Participants additionally identified that: they came out with greater awareness of and motivation for managing their health conditions and improving their lifestyle ○ the program was useful in allowing them to assess and monitor their progress ○ they saw an improvement in health measurements over time ○ they had increased confidence when interacting with healthcare professionals ○ of those who experienced difficulty using the program, the main barrier was computer literacy. Fraser Health Implementation Project anticipates the vCRP will:

	a) improve access to cardiac rehabilitation services in urban and rural areas b) identify lessons learned and challenges (i.e., what worked and what did not) in the implementation of the vCRP c) reduce the CVD risk and improve self-management of patients participating in the vCRP.
Cost	See table 6 Lear, 2014, Use of the Internet to Deliver Cardiac Rehabilitation Remotely to Patients with Cardiovascular Disease: Report of the 'virtual' Cardiac Rehabilitation Program (8) • The per participant personnel cost of the vCRP is approximately $435. The health human resource costs for the standard hospital-based CRP of the same duration totaled $856,342 per year (including coordination costs). Assuming a total capacity of 600 participants per year, this is equivalent to $1,427 per participant.
Evaluation or references	• Lear, 2015, Improving Access to Cardiac Rehabilitation Using the Internet: A Randomized Trial (25) • Lear, 2014, Randomized Trial of a Virtual Cardiac Rehabilitation Program Delivered at a Distance via the Internet (6) • Lear, 2014, The use of the Internet to deliver cardiac rehabilitation remotely to patients with cardiovascular disease: Report of the 'virtual' cardiac rehabilitation program (8)
Related Web links	• http://bcatpr.ca/vcrp • http://bcatpr.ca/publications/vCRP-Briefing-Note.pdf
Contacts	Scott Lear, Principal Investigator slear@providencehealth.bc.ca www.bcatpr.ca

Ontario

Data Extraction for Summary Table 4 **Program Name**	Community Paramedicine Remote Patient Monitoring (CPRPM)
Jurisdiction	• Ontario
Condition(s)	• people living with CHF and/or COPD • also included patients with co-morbidities of diabetes and hypertension (high blood pressure)
Brief Description of program/RPM initiative	• The CPRPM program is an initiative of Community Paramedics across Ontario to keep patients with chronic illness, such as congestive heart failure (CHF) and chronic obstructive pulmonary disease (COPD), safe at home and out of the hospital. Through a partnership with Future Health Services, this free, innovative program is designed to improve quality of life, as well as to improve communication amongst health care providers to deliver the highest quality of coordinated care. • As choice providers of the Future Health Services telehome monitoring products, the **Ideal Life system** is very simple and easy to use. Once identified as a candidate for Community Paramedic Remote Patient Monitoring by paramedics or other health care professionals, a Community Paramedic will set up your home with convenient and easy to use devices. You will receive a combination of devices based on your specific health condition such as a weight scale, blood pressure monitor, heart rate monitor, glucometer, and a Pod that connects these devices to your Community Paramedics in real time. Using these devices daily will allow your Community Paramedic to monitor your biometric data. If the recording goes outside of the threshold set, an alert will be generated and you can expect a phone call from your Community Paramedic to review your current health status.
Service User/Patient Eligibility	• To be enrolled in the CPRPM program, patients had to have a diagnosis of CHF and/or COPD as well as a minimum of either three 911 calls, two ED visits or one hospitalization in the 12 months prior to enrollment. • To be eligible for the CPRPM program, patients had to have CHF and/or COPD, may have a comorbidity of diabetes or hypertension and must satisfy one of the following conditions indicative of patient acuity.

	○ Level 0: At least one hospitalization in the last 12 months (41%) 1 ; ○ Level 1: At least 2 ED visits (measured by EMS transports) in the last 12 months (15%); ○ Level 2: At least 3 911 calls in the last 12 months (44%)
Delivery Model	• target program duration was six months Program Setup and what's involved for patients • The intervention was a home-based remote patient monitoring system that transmitted data about a patient's health status from home to healthcare providers through the patient use of at-home medical devices. Consistent with the definition of telemonitoring (Paré et al. 2007), patients use medical devices to take daily biometric readings and transmit this information via a communications network to a secure health tracking and information management platform (IdealLife®). The platform generates two types of alerts: 1) Non-Compliance alerts: When no readings have been recorded within a 24-hour period; 2) Medical alerts: Alerts when readings of blood pressure, weight, oxygen saturation, and/or blood glucose are outside the patient's clinical thresholds (either too high or too low), as established by a clinical advisory board (i.e., primary care physicians and chronic disease specialists). Both types of alerts are logged in the platform's task manager tool used by the health provider – in this case, the community paramedic • Implementation of the home telemonitoring system was managed by the CPRPM program. Program guidelines, documentation and training procedures were designed and modified to align to the goals of the program. Table 1.2.1 describes the features and program tasks for both patients and providers (p.7 Evaluation Report). • All features of the home telemonitoring system, with the exception of alert detection, were voluntary in terms of use. Providers and patients were trained using carefully developed guidelines and protocols established by an independent Clinical Advisory Committee (CAC) with clinical specialist representation. • Semi-annual meetings with paramedics provided the opportunity to discuss and revise guidelines and protocols where appropriate. In addition, a Paramedic Advisory Board (PAB) met monthly and provided a forum for paramedics and other program stakeholders to share feedback and identify possible improvements to the CPRPM program. • During the installation process, instructions were provided to the patient including a detailed set of standardized instructions for the proper use of each device (Table 4.1). These instructions included: • An in-home demonstration with instruction card for the patient on how to use each device (see Appendix E); • Advice for the patient to take measurements (blood pressure, pulse oximetry, and blood glucose) each morning an hour after taking medications, or subsequently at the time of symptom exacerbation; • Taking weight readings first thing in the morning after voiding and prior to eating; • Instructions to observe each device successfully transmitted the result before moving on to the next device; • Observing patients taking readings on their own to demonstrate competence. • A requirement of the CPRPM program was that patients take daily readings on all assigned devices every day they are on the program.
Partners Involved	• Funded by Canada Health Infoway, Future Health Services (FHS) has managed all aspects of the program including onboarding Emergency Medical Services (EMSs), supporting EMS services in recruiting and on-boarding patients, conducting in-depth analytics on patient data, and communicating results to policy makers and funding partners in the broader healthcare community. FHS is a wholly owned subsidiary of the South Central Community Development Corporation (SCCDC) that provides telehome monitoring services to chronically ill patients in Southern Ontario. • Having the South Central Community Development Corporation (SCCDC) as the single sponsor for the project (vs having to deal with multiple services separately) was a big benefit. SCCDC played the role of service provider hosting the program and was able to then provision the service to each EMS Service which was the legal Health Information Custodian for the data. • CPRPM is an innovation in care that not only pays for itself, but provides a compelling net return on investment. This said, it does require bringing the system stakeholders together. LHINs, primary care, EMS services, hospitals and community providers need to work together to provide the right services, to the right people at the right time. Implementing CPRPM requires significant change to integrate RPM into day-to-day activity for paramedics. Strong buy-in is needed from all stakeholders so the management of CPRPM is effective. Formal sources of funding, clearly defined work routines, and clearly defined roles and responsibilities are essential.

Patient or system outcomes	• The average 911 call reduction was 26% and ED transport reduction was 31% across paramedic services. Results suggest services adopted different approaches for implementing the CPRPM program. Some services had higher ED transport reductions indicating a strategy to provide patients with care in the home to prevent transports to hospital and other services had higher 911 reductions suggesting a strategy that encourages patients to leverage community paramedics as opposed to calling 911. There may be additional strategies as well. The CPRPM program is encouraged to explore different CPRPM-related strategies as a way to recognize that the technology can be used in a variety of ways to generate different benefits. • paramedic service adaptation is the capability of the paramedic service to implement and sustain CPRPM tasks into the day-to-day workflow of the paramedic service. Services high in adaptation were also high in 911 and ER visit reduction. This means that EMS services that dedicated resources and provided strong leadership for the program generated better results. • Services with lower # of patients tended to have higher 911 and ED Visit reductions suggesting perhaps that lower patient enrollments allowed services more time and resources to coach patients and provide extra feedback. Services with higher enrollments and high reductions (i.e., Essex-Windsor, Renfrew) reported having to dedicate significant time and energy to the CPRPM program. The point here is that because there were differences in how the program worked in different communities this lead to some variation in the program. In general, achieving optimal benefit includes services onboarding a critical mass of patients, targeting patients with frequent 911 calls and/or ER Visits, and allocating sufficient paramedic resources to patient interactions to produce meaningful patient and health system outcomes. • See Chapter 7 pg 36 for a section on Lesson's learned (26)
Cost	Cost to Implement • The total cost to implement the CPRPM program is estimated to be $189/month that includes the cost of equipment ($75/month) plus a cost category created for this evaluation called Paramedic Client Time (PCT) estimated at $114/month. PCT was estimated by analyzing the 5,593 notes analyzed in the behavioral evaluation (full data tables in Appendix B). Table 2.6.2 shows the breakdown that describes how the $114/patient monthly cost was calculated. It takes into account the average number of patient interactions, the time spent coaching, and the time spent documenting notes. The total time was divided by the number of patients as well as the average patient time on program (PTP) to determine the monthly time per patient for each service • On average, the ratio for time spent coaching and time spent documenting notes was 60:404. Documenting patient notes provides many benefits that will be discussed further in Chapter 6. Although the average service spent 4.11 hours, the average time spent by services that had the highest patient adaptation rates as determined in Chapter 6 was 26% higher (5.20 hours) 5. Using the ratio and an average PTP of 6 months, it is recommended that the CPRPM program consider setting a standard 3 hours documentation and 2 hours coaching per CPRPM patient over the 6 month period. Making an added investment in coaching and documentation would increase the cost to $215/month but it is believed this would have an off-setting clinical benefit as well (not calculated) 6. These recommended standards are illustrated by the dotted lines in Figure 2.6.3) to show some services invested more hours/patient coaching and documenting and other services invested less. Effort to standardize the approach will make the patient experience more consistent across services allowing services to share best practices and leverage solutions (i.e., patient portal) to improve the overall program benefit moving forward. Savings to Paramedic Services • The CPRPM program resulted in total savings of $331,576 attributable to EMS Services. The source of the savings is 764 reallocated service hours as a result of overall reductions in both 911 calls and ED transports (see Table 2.7.2). It is important to note that these are not savings that go directly back to the service, they are expected benefits in terms of reallocating paramedic time to generate the most benefit for patients, the paramedic and the broader healthcare community. • Although the average is $117/patient/month, savings range from $29 (Grey) to $357 (Peterborough). Lower savings/month should not be interpreted as a negative result, it is not savings that go directly back to the service. It is recommended services use this indicator to manage patient enrollment (i.e., patients will higher 911 calls pre-program offer more potential savings/month) as well as evaluate the influence of patient time on program (PTP) to recognize there is a cost to paramedic services for keeping patients on the program longer than 6 months. For example, both Guelph and Middlesex London reallocated approximately 40 hours but as Guelph's average PTP is lower (5.81 months) their savings per

	patient per month is higher ($120/month). Savings to Hospitals (ICES Evaluation) • Based on estimates, the CPRPM program decreased 460 ED transports resulting in an estimate of 299 avoided hospital admissions and 2,123 avoided hospital days (assuming an Average Length of Stay of 7.1 days). The total cost savings to hospitals for the 346 patients included in the Interdev analysis is estimated to be $2,326,547 ($6,724/patient) • An actual reduction of 467 ED visits (26%) and 170 hospital admissions (32%) were avoided. ICES also provided actual readmission reductions showing a 35% reduction in 7-day readmits and 41% reduction in 30-day readmits. The Average Length Of Stay of 7.1 days was used to calculate the total number of avoided hospital days. The total cost savings to hospitals for 294 patients included in the ICES analysis is estimated to be $1,856,994 ($6,316/patient)8 • As the ICES data resulted in reductions that were very consistent with the Interdev results, the level of confidence in the net result is felt to be very high. Specifically, the average ED visit reduction was slightly lower with the ICES analysis (26%) suggesting that Interdev results may be over- estimated for ED transport reductions; however the reduction in admissions between pre-program and on program was very consistent (31% and 32% respectively). As the majority of hospital costs are incurred by admissions, consistency in admissions between the two approaches is very important. • Further evaluation is currently underway to examine the impact of CPRPM on length of stay using ICES actual hospitalization data. As this was outside the original scope of this evaluation, results are preliminary and require further evaluation. As illustrated in Appendix C, the average length of stay prior to joining the program was 4.9 days (versus the provincial 7.1 day average based on CIHI data). Patients admitted the hospital while being on the CPRPM stayed for an average of 5.8 days. We expect this result is indicative of the deteriorating condition of patients that participated on the CPRPM program. That said, we feel this needs further analysis as the project team felt targeted patients were at least as ill as average CHF and COPD patients (CIHI 7.1 day length of stay). While the decrease length of stay may lower the total savings per patient, the program benefits still outweigh the costs. CPRPM Return on Investment • Table 2.7.2 estimates EMS savings per patient was $958 ($331,576 total savings/346 patients) and Table 2.8.3 explains hospital savings of up to $6,316/patient. Table 2.10.1 extends the total program benefit to the 650 patients that completed the program to show a total savings of $4,728,100 from the CPRPM program. Using the cost of $189/patient/month and assuming patients participate according to the 6 month target, the ROI to the overall health system is 541%. For each $1 invested, there is a net $5 savings to the health system!
Evaluation or references	• Brohman, MK, Green ME, Dixon, J Whittaker, R, Fallon, L., Lajkosz, K. Community Paramedicine Remote Patient Monitoring (CPRPM): Benefits Evaluation & Lessons Learned, 2015/17. Toronto, ON: Canada Health Infoway; 2018. (26)
Related Web links	• https://futurehealthservices.ca/about/about-future-health-services/ • https://www.coachorg.com/en/newsandevents/resources/GT2015/AP1.2-_Community_Paramedic_Remote_Patient_Monitoring_Program.pdf
Data Extraction for Summary Table 5 **Program Name**	Remote Access to Care Technology - Re-ACT ©
Jurisdiction	• Started in Ontario but nationally linked, with over 50 locations across Canada
Condition(s)	• Chronic conditions

Brief Description of program/RPM initiative	CBI Home Health is part of CBI Health Group, one of Canada's largest and most diverse healthcare networks. We bring our comprehensive range of services to you, whether in the comfort of your own home or in a long-term care facility, assisted living facility, clinic or hospital. Our dedicated healthcare team — including registered nurses, physical therapists, speech language pathologists, dieticians, personal support workers — will provide the timely, personalized assistance you need to help you achieve maximum function, independence and wellbeing. Whether you require a little extra support with day-to-day activities or managing a disability or you need at-home care as you recover from an illness or injury, CBI Home Health is here to help. Re-ACT Using wireless technology, Re-ACT© (Remote Access to Care Technology) connects seniors living with chronic disease(s) to a Registered Nurse who monitors their vital signs remotely and encourages medication compliance, while providing assessment of vital signs, information about managing their chronic condition and adjustments to their care plan.
Patient Eligibility	• Seniors living with chronic diseases
Delivery Model	• Re-ACT uses wireless technology and monitoring devices to remotely connect seniors to a Registered Nurse (RN), who can then monitor, assess, and manage their chronic condition(s) and corresponding care plans. Patients are trained to use their monitoring device daily to check vital signs, and the data is subsequently stored on a secure server where results are then populated and categorized on a risk alert scale (normal to high) for RN and physician review. The main focus of the program is to reduce unnecessary hospitalizations and Emergency Room visits while encouraging patients' individual participation and skill development for managing their chronic conditions at home • Vitals signs remotely monitored include: blood pressure, pulse blood glucose, weight, blood oxygen • A goal of the Re-ACT© program is to help individuals develop skills for healthy living and managing their chronic condition. The program emphasizes the individual and family's role in their healthcare and encourages them to be an integral member of their healthcare team. It also engages them in decision making, goal setting, care planning and provides access to education programs and health information.
Partners Involved	• Operating out of We Care's Monitoring Centre in Barrie, Ontario, the Re-ACT program is supported by a partnership with the North Simcoe Muskoka Community Care Access Centre (NSM CCAC) and We Care Home Health Services. • We Care Home Health Services is proud to be part of CBI Health Group, the largest network of integrated community healthcare services in Canada.
Patient or system outcomes	• In a three-year period, We Care reported that 80% of clients are confident that they will be able to stay at home longer than before beginning Re-ACT, while 88% reported being very satisfied with the program (We Care, 2011). The Re-ACT technology has proven to increase healthy aging at home initiatives, and overall quality of life for clients living at home with chronic conditions.
Cost	• Cost Service starting at $199.00/month
Evaluation or references	• We Care Health Home Services, 2015,The Effects of Machine Learning Powered Remote Patient Monitoring on Home Health Care White Paper (27)
Related Web links	• https://cdn2.hubspot.net/hubfs/2702101/AA_AlayaCare_TBA/Resources/Documents/eGuides/Machine%20Learning%20White%20Paper%20eGuide.pdf?t=1511534953048 • https://www.cbi.ca/web/we-care-home-health-services/about-us/who-we-are • https://www.cbi.ca/web/we-care-home-health-services/remote-health-monitoring

Data Extraction for Summary Table 6 **Program Name**	Telehomecare Expansion Project
Jurisdiction	• Ontario
Main conditions	• CHF, COPD
Brief Description of program/RPM initiative	• In 2007, the OTN launched the Phase One - THC Pilot Project, one of the largest THC programs in Canada to date. The THC Pilot Project focused on chronic disease management and patient self-management, specifically for patients with CHF and chronic obstructive pulmonary disorder (COPD). The OTN, founded on evidence-based research, estimated that the pilot project would empower patients to live healthier lives with their chronic conditions resulting in significant savings on government health care expenditures. • The pilot was a success, but the Family Health Teams could only provide THC access to patients enrolled with their providers. **The OTN decided to expand to a LHIN wide THC service delivery model that would expand access to all health care providers across Ontario**. • The THC Expansion Project started in 2010; it is one of three RPM programs in Ontario and as of March 2015, the project has enrolled approximately 4,600 patients. The THC Expansion Project has three strategic goals: to offer support to patients living with complex chronic diseases; to create a new provincial chronic disease management care model through existing resources and providers and to create a continuum of care through collaboration. Currently, the expansion project only enrolls patients with CHF and COPD; however, upcoming pilot projects for people with diabetes and for people who need post-acute care are in development.
Service User/Patient Eligibility	• individuals receiving the THC service are referred to as patients in Ontario • A patient registered with THC Expansion Project can participate in a free three to six month program if he or she meets the OTN eligibility criteria. The MOHLTC will fund patients who are over 18 years of age; residing in Ontario; living with COPD or CHF, have had frequent emergency room visits or hospital admissions in the past year due to their conditions; are capable of learning and understanding instruction or have assistance from a care provider and live in a residential setting with access to a functional telephone line20. The host organization (usually a CCAC or hospital) will accept THC program referrals from a specialist, primary care provider or a patient self-referral.
Delivery Model	• 3-6 month program • This program is time-limited and on average lasts six months. It is a way for your primary care provider to help you stay healthy and at home. Based on your progress, and through consultation with your primary care provider, your nurse will determine how long you should be involved in the Telehomecare Program. • A member of the Telehomecare team will deliver the equipment to your home, install it and show you how to use it. The Telehomecare equipment is easy to use, and is loaned to you. No computer or Internet service is required. The program uses your phone line for a brief period each day at the time of your convenience. • The host organization delivers the THC equipment to a patient's home (on loan); the equipment requires the use of a phone or the Internet for a short period of time each day. The patient, in his or her home, is connected to a registered clinician through the THC equipment. The technology, consisting of a tablet, blood pressure cuff, scale and pulse oximeter is mostly touch screen and user-friendly. Patients submit vital signs and answer short health questions each day through the Telus Health RPM solution. The RPM solution receives the patient's data and based on the condition and clinical protocols and evidence, provides the THC clinician with a snapshot of the patient's health status10. • All of the THC clinicians have specialized training in chronic disease management and health coaching; the clinicians follow the Stanford Model for Chronic Disease Self-Management to help patients monitor and control their chronic conditions. The self-management techniques included in the model are how to deal with emotional stress caused by their condition (e.g. frustration, anxiety), how to exercise appropriately with their condition, medication management, nutrition and how to communicative effectively with others in their circle of care [Wilson, Rhonda. Conversation with: Carina Andreatta. 2015 March 4] The coaching sessions occur on weekdays and last approximately seven minutes; the sessions are educational for the patient and their families and are considered an integral part of chronic disease self-management. The coaching sessions also provide an

	opportunity for the clinician to assist patients in setting goals that align with his or her personal interest and beliefs20. The ultimate goal of the THC sessions is to demonstrate to the patient that self-care is easy, their involvement is important, and goal setting can lead to improved health outcomes20. Each THC clinician has a caseload of approximately 50 to 75 patients; the THC clinician will monitor a patient's health status electronically and will notify the care team of any substantial health status changes14-15. • All of the OTN THC clinicians must complete a THC curriculum to certify that they are equipped with the appropriate skills and up to date nursing best practices. The curriculum is three days long and involves a combination of in-person and online training. The THC curriculum is composed of five key competencies; clinical; self-management support, privacy and support; processes and tools; and practicum14. • The OTN offers many resources to inform the public and interested organizations on the THC Expansion Project. The OTN provides an implementation toolkit for new host organizations that contains THC procedures, policies and resources. The OTN website contains a social networking page, updated with discussions from subject matter experts and containing different platforms for THC colleagues to interact. Ideally, the OTN would eventually like to provide interested organizations with a consolidated, standardized THC "in a box". • Telehomecare registered nurses must be in good standing with the College of Nurses of Ontario. Previous experience and a strong knowledge base working with CDM patients are necessary, as well as background skills in adult education and case management. • Telehomecare Nurses will complete a rigorous education and training program which is evidence based, built on RNAO best practices and supported by subject matter experts in the fields of CHF, COPD, patient self-management and health coaching. • The registered Telehomecare nurse will partner with the patient's primary care team and other health care providers (i.e. specialists) to develop their care plan and keep them regularly informed of the patient's progress. Patients will continue to have appointments with their existing health care providers as required; Telehomecare is not a replacement for existing services. Continuity of Care provision or accompanying disease management strategy • At the end of the Program, you will have learned skills that you can use over the longer term and you will have been introduced to local health and community services to support you. A discharge summary is provided to your primary care provider who will continue to support your care plan.
Partners Involved	• Level of integration: integrated, stand-alone, hybrid Stakeholders • Ontario Telemedicine Network (OTN) acts as the project manager to the province wide project • The project allows Local Health Integrated Networks (LHINs) to run a telehomecare (THC) program through appropriate host organizations, such as hospitals or Community Care Access Centres (CCACs). • Ontario is made up of 14 local health integrated networks (LHINs) that plan and fund health care for their specified regions. In the THC LHIN-wide delivery model, the OTN would act as project manager for the THC projects in each LHIN; the THC would be delivered through a host organization within that LHIN, either a CCAC or hospital. • The MOHLTC provided funding for three LHINs to implement THC programs in their corresponding host organizations, Toronto Central LHIN and its Community Care Accesss Centre (CCAC), North East LHIN and its CCAC, and the Central West LHIN and the William Osler Health System. Currently, seven of the 14 LHINs and a total of eight host organizations administer THC programs. In addition to the three LHINs previously listed, the new projects are the Central LHIN and its Southlake Regional Health Centre and its CCAC; North West LHIN and its CCAC, Erie St. Clair LHIN and its CCAC and the North Simcoe Muskoka LHIN and its CCAC20. • The MOHLTC provides executive oversight for the THC program and conducts appropriate evaluations to ensure cost-efficiency and value for patients and clinicians.

	• The OTN is the THC project manager and provides leadership and overall support for THC implementation20. The OTN monitors each LHIN and their corresponding host organization to make sure the appropriate resources are available to provide high-quality care. The OTN ensures the RPM solution is functional and compatible in the patient's home and at the host organization, guaranteeing that all health information is being transmitted electronically, offering clinical process leadership and business process support and providing expertise in change management. The OTN also coordinates with each LHIN to improve program engagement and adoption. • Each LHIN utilizes the funding provided by the MOHLTC and Canada Health Infoway to create a sustainable THC program for their region20. The THC program must align with both provincial goals and local priorities. Each LHIN provides local governance and leadership over the THC program; they define enrolment targets based on regional demographics and set goals to meet their funding allocations14. Each LHIN will develop a regional THC delivery model that is transparent to the public to identify accountability. The host organization delivers the THC service to patients through their THC clinicians and services. The host organization is responsible for day-to-day operations, controlling human resources and workflows and ensuring stakeholder engagement14. As of March 2015, several LHINs, specifically Central West and Central, teamed up with their corresponding Health Links to deliver THC service. A Health Links2 is a network of providers in the community who work within the region to provide coordinated care to those with complex conditions. When a THC program and a Health Links program work together it creates an opportunity collaborative learning Utilize Telus Health RPM as a solution to enable home care for patients with CHF.
Patient or system outcomes	• significant decreases in hospitalizations, length of stay and improved patient satisfaction and self-management abilities • According to an early systems usage surve3, THC programs for CHF in the Toronto Central CCAC, William Osler Health System and Southlake Regional Health Centre have demonstrated a positive short-term impact, a 37%-48% reduction in emergency department visits, and a 44%-57% reduction in hospital admissions. The William Osler Health System23 reported significant long-term reductions in system usage, notably a 70% inpatient reduction 6 months after THC discharge, a 53% reduction in emergency department visits after THC discharge and a 4% reduction in length of hospital stay 6 months after THC discharge (all results are compared to pre-THC usage). The Toronto Central CCAC23 demonstrated positive patient experience post-THC implementation, indicating 87% of patients surveyed would recommend the program to others and 98% of THC patients felt that the clinicians understood what was important to them. Patients felt that the THC program taught them valuable lessons in chronic disease management, specifically medication management. **Key Success factors and lessons learned** • Engagement, stable funding, support and leadership at the provincial level down throughout the regions. • Using the pilot to show benefits evaluated by a third party helped build the case for provincial, scaled deployment. • Ramp up has been slow. Initial enrollment of 10,000 in the first year of phase 2 has been scaled back – recruitment of appropriate patients has taken longer than expected due to communication and collaboration barriers with other organizations. • Lots of project management and planning up front is necessary, especially in large scale deployment – clearly defined business and clinical model and mechanisms in place to evaluate benefits. • Focused communication plan to all stakeholders – LHIN, host organizations, OTN, primary care providers and patient's circle of care.
Cost	• The OTN THC Expansion Project receives 75% of its funding from Canada Health Infoway and the remaining 25% from the MOHLTC. • According to Canada Health Infoway, the expansion project remained within their planning budget of $691,500 and implementation is currently under budget as well at $4,709,275. • The expansion project has an estimated cost avoidance of approximately $7000 per CHF patient per year.
Privacy	• The Personal Health Information Protection Act, Ontario 2004 (PHIPA) is a provincial law that sets out the rules for health care providers to collect, use and share your personal health information. It also gives you the right to ask to see and ask for changes to your personal health information if the information is inaccurate or incomplete.

	• Only your health care provider, your Telehomecare Nurse and other members of the primary care team caring for you will see your personal health information. OTN staff may need limited access to your personal health information when they provide technical help to your primary care provider. Only staff members who need access to the system to do their jobs will have access to your personal health information.
Evaluation or references	• Andreatta, 2015, A Comparison of Telehomecare Delivery Models for Congestive Heart Failure In Three Canadian Jurisdictions(1) • Canada Health Infoway, Pan Canadian Connecting patients with providers RPM benefits (2)
Related Web links	• http://telehomecare.otn.ca/program-overview-pt • http://telehomecare.otn.ca/program-overview • https://rxtelehomecare.ca/how-telehomecare-works • http://healthcareathome.ca/central/en/care/Pages/telehomecare-nursing.aspx • https://otn.ca/innovationcentre/telehomecare/ • https://otn.ca/cep/programs/copdProgramDetails.pdf • https://otn.ca/cep/programs/chfProgramDetails.pdf
Data Extraction for Summary Table 7 **Program Name**	Telehome Monitoring Program (THM)
Jurisdiction	• Ottawa, Ontario
Condition(s)	• Heart failure, pulmonary artery hypertension, those who have undergone complex surgery
Brief Description of program/RPM initiative	• The Heart Institute's Telehome Monitoring Program (THM) is a nurse-run, intensive, post-discharge home health program designed to improve patient outcomes and reduce hospital readmissions. It is part of the Telehealth Programs run by the Cardiac Telehealth department. • Most patients enrolled in the telehome monitoring program have advanced heart failure, though some patients with pulmonary artery hypertension or who have undergone complex surgery may also participate.
Service User/Patient Eligibility	• Patients determined to be in need of the extensive daily follow-up are referred to the program before discharge from the Heart Institute.
Delivery Model	Program Setup and what's involved for patients • An advanced practice nurse reviews the referral against standardized acceptance criteria, and the patient is either placed in the TM or automated calling program based on their clinical needs and ability to use the technology. • All patients receive several pieces of home monitoring equipment and training in how to use them before they are discharged: a scale, an automated blood pressure cuff, a pocket ECG (optional), a home monitor that transmits vital signs and other pertinent data to a central station manned by expert cardiac nurses at the Heart Institute • Once home, patients use the equipment as taught once a day to transmit their vital signs and weight by regular phone line or cellular connection. ○ A nurse at the Heart Institute reviews the data daily, contacts the patients as needed for further assessment, and alerts a Heart Institute physician if safe levels in any of the parameters are breached. Patients' diets and medications can be adjusted as needed. • Patients' primary physicians and families are kept informed of the monitoring results and of any required changes in medications

	• Patients stay in the Telehome Monitoring Program from one to four months after discharge, depending on the severity of their disease. Some patients who require longer follow-up are transitioned to an automated calling or interactive voice response system, with calls from the system every two weeks.
Partners Involved	• With support from the Champlain LHIN, the Heart Institute has deployed monitoring equipment to most of the community hospitals. This allows identification of patients and training to be done locally, with follow-up by the THM nursing staff in collaboration with community physicians.
Patient or system outcomes	• The largest acute home monitoring program of its kind in Canada, it has reduced hospital readmission of heart failure patients by 54%, saving up to $20,000 in health care costs for every patient diverted from an emergency room visit or hospital stay From recent study from Jaana et, al. 2018 comparing utilization patterns of rural versus urban program users (28) • The results revealed no variation in the process and outcome measures associated with the utilization of TM as a patient management approach between urban and rural settings. Diuretic adjustments, cardiac medication changes, and the number of calls made by nurses did not vary between urban and rural patients. The TM duration was also similar between the two groups. Although more patients were older and living alone in urban areas, their profile did not affect the pattern of utilization of TM nor the process and outcomes associated with it. Similarly, the difference in diagnosis, with more rural patients diagnosed with DHF as opposed to SHF, did not contribute to any variation between the two groups in relation to the process of care. As such, patients in rural areas do not require more resources or additional interventions when using TM • The major variation in TM period, number of emergency visits, diuretic adjustments, and calls made by nurses was associated with the type of provider(s) regularly following patients, which persisted after controlling for all relevant variables. Surprisingly, patients who reported having a regular family physician and a specialist appear to be the highest consumer of resources, followed by patients who reported only having a family physician although the latter had the lowest emergency visits of resources. Future studies should further investigate this issue to identify the reasons for this variation, which is especially relevant in the context of health systems as in Canada where family physicians play a major role as gatekeepers. In addition, future research may benefit from a longitudinal design to investigate the implications of TM on HF patients in the community in relation to the improvement in their ability for self-care management and quality of living.
Cost	• None found
Evaluation or references	• CADTH, 2008, Home Telehealth Programs in Canada (29) • Jaana, 2018, Rural-Urban Comparison of Telehome Monitoring for Patients with Chronic Heart Failure (28)
Related Web links	• https://www.ottawaheart.ca/healthcare-professionals/regional-national-programs/telehome-monitoring
Contacts	Program Contact Christine Struthers, RN, MScN APN Chronic Cardiac Care 613-696-7000 x14134 cstruthers@ottawaheart.ca

Quebec

Data Extraction for Summary Table 8 **Program Name**	Telehomecare Program
Jurisdiction	• South-western Monteŕegie, near Montreal, Canada
Condition	• Variety of chronic health problems: CF, hypertension, uncontrolled diabetes, COPD
Brief Description of program/RPM initiative	From Infoway Report (11) • The Jardins-Roussillon Health and Social Services Centre (JRHC) was established in 2004, serving an area south-west of Montreal with a population of over 192,000. Homecare encompasses a major service offering for JRHS, providing a range of high quality health services for the prevention and management of health conditions to vulnerable populations such as the elderly and those living alone, as well as care following surgery or palliative care to allow them to effectively manage their health at home. As 2011, the program employed 16 nurse practitioners (NP), 18 registered nurses (RN) and 6 licensed practical nurses (LPN). • To further this mandate, JRHC has deployed a home telemonitoring solution to serve patients with chronic conditions, such as CHF, COPD and diabetes. From Economic Assessment (20) • We have analyzed the consumption of healthcare services by 95 patients with various chronic diseases over a 21-month period, that is, 12 months before, 4 months during home telemonitoring use, and over 5 months after withdraw of the technology • The main objective of this study was therefore to conduct a rigorous and exhaustive economic assessment of a home telemonitoring program recently implemented by a Quebec healthcare facility. More specifically, we analyzed the consumption of health services by 95 patients with a variety of chronic diseases over a period of 21 months: 12 months before, 4 months during and5 months after deployment of the telehomecare program
Service User/Patient Eligibility	From Economic Assessment (20) • elderly clients suffering from a variety of chronic health problem • Four main diagnoses were targeted: level 3 or higher congestive heart failure, hypertension when the patient had experienced an acute attack that was difficult to control (as identified by the physician), persons with uncontrolled diabetes, and chronic obstructive pulmonary disease (COPD) patients upon hospital discharge. Patients considered for this study had to have a regular physician, demonstrate a desire to manage their own care (with or without assistance from an informal caregiver) given their health condition, and have a working telephone line.
Delivery Model	From Infoway Report (2) The program involves the patient documenting and submitting various health parameters (blood pressure, weight, etc.) using a touchscreen device with an integrated modem for the electronic submission of clinical data. Nursing case managers consult the data on a regular basis, remotely monitoring the patient's medical condition and compliance with their individually prescribed care plan. The device has built-in alerts that are automatically generated and pushed out to both the patient and the case manager when the submitted data strays outside predefined thresholds, allowing for proactive detection of decompensation and early intervention. The program is designed to empower patients to manage their illness by reinforcing the relationship between their health status and their daily activities. The three guiding principles of the program are:

	1. Patient empowerment – enabling patients and their informal care givers to take charge of their health at home with the expert supervision of qualified health professionals with the goal of successfully self-managing their conditions. 2. Optimal use of health resources – allowing health professionals to successfully monitor and manage a larger number of patients and provide interventions at the right time while reducing the need for travel. 3. Complementary interventions that promote accessibility to care – remote patient monitoring must be integrated and not replace existing care pathways by adding to and not duplicating traditional service offerings. From Economic Assessment (20) • As for the technology used, the patients were equipped with a tactile screen and an integrated modem (from Telus Health Solutions). The device came programmed with a personalized monitoring protocol that monitored various health parameters, and the nurses taught the patients how to use the device at their initial meeting. On average, a training session last approximately 60 min. Then the patients were expected to send clinical data over an Internet connection each time the data was collected. More specifically, the patient needed to complete a data entry table every day, documenting vital signs, symptoms, and medication taken. The tool was designed to show the patient relationships between his or her health status and the environment, life habits and medication management, thereby empowering him or her to manage his or her illnesses by applying a therapeutic action plan
Partners Involved	From Infoway Report (2) • Service régional de soins à domicile and Le Centre de santé et de services sociaux Jardins-Roussillon (CSSS Jardins-Roussillon) manage the program • JRHC RPM program in Quebec clearly indicates that the interventions associated with the program are complimentary to the patient's course of care – there is a need for RPM to be integrated into a patient's care, but the program is not designed to replace existing care pathways by adding to and potentially duplicating service offerings.
Patient or system outcomes	From Economic Assessment (12) • Basically, our study reveals that the telehomecare program implemented at the JR Health Center resulted in significant savings, that is, a net gain of 41 percent. As mentioned above, these savings were mainly due to a significant reduction in the number of hospitalizations and ER visits as well as shorter hospital stays, supporting the findings of previous studies (e.g.,20–22). Importantly, we observed that these effects were more significant for heart failure and COPD patients
Cost	From Economic Assessment (20) • Lastly, the operating costs of the home telemonitoring program and the costs associated with the technology represented 38 percent of the home telemonitoring program's total costs. Cost minimization analysis • This economic analysis was performed from a health system point of view. This means that costs incurred by patients were not considered. It is our view that such costs should not change the results of the economic assessment, because the costs associated with the technology used were assumed by the health facility and both intervention types (usual home care and telehomecare) took place in the home, so that the expenses incurred by the patient should be similar • The above economic analysis provided positive results. For one thing, the telehomecare program (per period) cost a total of CAD171,309 representing an average cost of CAD1,803 per patient. Considering that patients participated in the home tele- monitoring program for 157 days on average, the daily cost of the intervention per patient equals CAD11.48. Using annualized data, the cumulated cost of the per and post periods is CAD216,903 or CAD147,937 less than the usual home care services program (pre period). This represents savings of CAD1,557 per patient (t= 2.4; p<.05) or a net benefit of 41 percent compared with the usual patient monitoring program, whose operating cost was close to CAD365,000. The main source of savings under telehomecare stemmed from drastic reductions to the number of hospitalizations and the average hospital stay which fell from 15.2 days (pre) to

	11.1 days (per) to 6.9 days (adjusted post). The cost of hospitalizations represented 91 percent of the total operating costs of the usual home care services program, compared with 40 percent of the total operating costs of the telehomecare program (per period). Although smaller in scale, additional savings were realized through fewer emergency room visits (However, total savings were offset by increased hours of nursing during home visits. Although we expected fewer hours of nursing in the home after system deployment, the data show a t =1.8; p< .10). However, total savings were offset by increased hours of nursing during home visits. Although we expected fewer hours of nursing in the home after system deployment, the data show a significant increase compared with the pre period. According to the managers of the home care services program, this increase was in large part due to the case managers' lack of experience with telemonitoring. At the start of the assessment period, the nurses participating in this project had no prior experience with telehomecare. They provided prompt responses to the system's automated alerts (signaling an abnormal situation or a problem) and went to the patient's home to personally check on the patient's condition. Lastly, as expected, the savings achieved through the tele- homecare program were partly reduced by the costs associated with using the technology and the cost of the time that the nurses spent running the program. These costs totaled CAD82,650, or 48 percent of the home telemonitoring program's total costs (per period).
Evaluation or references	• Canada Health Infoway, 2014, Connecting Patients with Providers: A Pan-Canadian Study on Remote Patient Monitoring (11) • Pare, 2013, Home Telemonitoring for Chronic Disease Management: An Economic Assessment (12)
Related Web links	• In French
Data Extraction for Summary Table 9 **Program Name**	Telehealth Coordination Center (CHUM) Health Monitoring Services
Jurisdiction	• Services are available in certain centers in Quebec (Le Centre hospitalier de l'Université de Montréal, Le CISSS de la Montérégie-Centre, Le CISSS de la Montérégie-Est, Le CISSS des Laurentides, Le CIUSSS de la Mauricie-et-du-Centre-du-Québec, Le CIUSSS de l'Est-de-l'Île-de-Montréal
Condition	• COPD, diabetes, high risk Gestational diabetes, hypertension, heart failure
Brief Description of program/RPM initiative	• To educate and improve self-management • Home health monitoring (also called telehomecare) is healthcare provided outside of a hospital setting. The technology used is proven, straightforward, efficient, secure, and confidential. • Once you have answered a series of questions, the telehomecare service lets you send your personal health information from your home to a healthcare professional assigned to your case. • A healthcare professional consults this health information regularly in order to assess and monitor your health condition. • You can sign up to receive informational videos about your illness or health condition. The video contents are based on healthcare and services best practices.
Service User/Patient Eligibility	• COPD, diabetes, high risk Gestational diabetes, hypertension, heart failure
Delivery Model	• The health monitoring services can be accessed via an online app or a dedicated app installed on your computer, tablet, or smart phone (for the online app). As needed, a tablet (iPad) can be provided to you for a set period of time to be used exclusively to access the telehomecare. • Your healthcare professional or an appointed case worker will explain how to access the service from your device (desktop or mobile) or from a borrowed tablet. • Your healthcare professional will analyze your answers and determine the appropriate treatment for your health condition.

	• Based on your specific needs, your healthcare professional may contact other healthcare professionals. As needed, he/she will then call or email you to adjust your care or treatment plan. • All of the information in your file will remain confidential
Partners Involved	• The Telehealth Coordination Center, CHUM (CHUM) serves all health facilities located on the territory of the Integrated University Health Network of the University of Montreal (RUIS UdeM). This is equivalent to supporting the deployment of telehealth in 13 facilities in 6 health regions in Quebec. However, second-line technology operational support is being done in close collaboration with the CTC at the McGill University Health Center (MUHC), which has been mandated by the Department of Health and Social Services to deliver the Technology Operational Management (MSSS). • In November 2015, the Ministry of Health and Services social partners has set up a new governance that telehealth services are developing so sustainable and harmonized across all institutions of Quebec Health (MSSS, 2016). In order to achieve this goal, four centers Telehealth Coordinating Committee (TCC) affiliated with the Centers university hospitals have been created. CCTs are responsible for the development, deployment and promotion of telehealth services in Quebec. This new governance has also led to appointment in each health facility of persons responsible for coordinating the activities of Telehealth specific to their points of service. These persons, that we call clinical and technological pilots in telehealth, work closely with CCTs. They are responsible for supporting the development of Telehealth services by ensuring first-hand that they can really add value to patients by meeting clinical needs. In addition, clinical and technology pilots guide stakeholders and managers in the development new clinical processes and in the choice of information and communication technologies. For any questions and to learn more about telehealth activities you can contact the CTC that serves your health facility. • Operating hours are from 8 am– 4pm • There is an end of service form that must be completed when telecare is discontinued for each patient indicated either that the objectives set at the beginning of care are reached or if it's preferable to stop telecare
Patient or system outcomes	• Advantages • Regular follow-up by a multidisciplinary team of health professionals • Customer approach focused on self-management • Potential decrease in complications and number of emergency visits • Intelligent, computerized and interactive technology proven • Secure communications and confidential information
Cost	• None found
Evaluation or references	• None found
Related Web links	• https://telesantechum.ca/cartable-tsd • https://telesantechum.ca/professionnel/offre-de-services-du-cct • https://www.oiiq.org/sites/default/files/uploads/periodiques/Perspective/vol14no05/12-technologies.pdf
	Centre de coordination de la télésanté, CUSM Téléphone : 514 412-4294 ou 1 877 536-3202 (sans frais) **Heures d'ouverture :** Lundi au vendredi : 7h à 18h

New Brunswick

Data Extraction for Summary Table 10 **Program Name**	Extra-Mural Program
Jurisdiction	• New Brunswick
Condition(s)	• The EMP team delivers acute, palliative, chronic, rehabilitative and supportive care services, as well as providing patients with access to additional services including medical, occupational therapy, physiotherapy, respiratory therapy, social work, clinical dietetics, speech language pathology, pharmacy, as well as nursing care available on a 24/7 basis.
Brief Description of program/RPM initiative	• Established in 1981 and based on a New Zealand model of care, Bustard explained "the philosophy of the Extra-Mural Program: home is first. It should be the first choice for where care is delivered before we go into more intensive, costly systems." • The New Brunswick Extra-Mural Program (EMP) delivers primary health care services to New Brunswickers of all ages in their homes and communities. • Medavie Health Services New Brunswick, which already runs the paramedic service Ambulance New Brunswick, will take over the home health-care program and 811 health advice line effective Jan. 1 2018.
Patient Eligibility	• People living within New Brunswick with a valid Medicare card (or in the process of receiving one) are eligible to receive Extra-Mural services, as long as health care needs can be met safely in the home.
Delivery Model	• EMP operates on a client and family centered model with a focus on building and maintaining partnerships with clients and their families, physicians, agencies, departments and other service providers to best meet patient needs. • Physicians with admitting privileges in Horizon and Vitalité Health Networks can refer to the EMP and professionals in the EMP can refer directly to their colleagues in other disciplines for clinical assessments. A physician may be required to sign orders for certain interventions. • Rehabilitation services can be accessed directly by clients and their families, physicians, schools, nursing homes, hospitals and tertiary service providers, the Department of Veterans Affairs, Public Health, and the Department of Social Development. **The Team** • The EMP's approximately 900 fulltime employees conduct over 450,000 visits across New Brunswick each year, working out of 29 office locations with a fleet of 515 vehicles. • The EMP's interdisciplinary team includes professionals from a variety of health care fields: ○ Registered Nurses ○ Licensed Practical Nurses ○ Social Workers ○ Respiratory Therapists ○ Registered Dieticians ○ Physiotherapists ○ Occupational Therapists ○ Speech-Language Pathologists ○ Rehabilitation Assistants • The EMP team also includes administrative support professionals and managers. Services

	Short-term care • We help patients get back home early from a health care facility, and prevent readmission by providing short-term care at home to people dealing with an acute illness. Chronic care • We help people suffering from chronic health problems with professional services to allow them to stay at home, avoid or delay admission to a health care facility, and maintain their health. Palliative care • Our palliative care team provides support and respite services to patients and their support network to help people with terminal illnesses stay at home, and avoid or delay admission to a health care facility. Home Oxygen Program • We provide eligible patients with oxygen therapy at home, based on their medical criteria. Rehabilitation services • Individuals and groups in nursing homes, at home, and in various community facilities could be eligible for occupational therapy, physiotherapy, and speech-language pathology services. Long-term care • Working with the Department of Social Development and Mental Health Services, we provide patients with simplified access to many long-term care services to help them stay at home, and avoid or delay admission to a health care facility.
Partners Involved	• The EMP is a publically funded provincial program whose services are delivered by Extra-Mural/Ambulance New Brunswick Inc. The DH is responsible for the overall direction of the EMP. • Medavie Health Services and the Gov. NB announced the creation of a transformational partnership that will integrate EMP services and Ambulance NB into a single public service entity. Effective Jan. 1st, 2018, MHSNB, an org. under the Medavie Health Services umbrella, will manage operations, including delivery of care for EMP in addition to ANB while the DH will continue to plan, fund and monitor the services by setting standards and performance expectations. • Payment to Medavie is contingent upon certain performance targets being met, such as more patients being served by extramural, decreased emergency room visits by extramural patients, and decreased wait times between referral to extramural and service delivery.
Patient or system outcomes	• The aim of the "primary health-care integration initiative" is better co-ordination and collaboration among health-care providers to enable people to stay in their homes as long as possible, get more help navigating the health-care system, and to experience greater continuity of care, he said.
Cost	• The estimated cost of the first year of the 10-year contract, which was awarded without a tendering process, is $4.4 million. • Boudreau said this doesn't mean a privatization of any health care, because nursing and Tele-Care will continue to be free for patients and paid for by the province. • Nurses and other employees remain public-sector workers under the contract with Medavie, said Boudreau. Their salaries, benefits, pension plans and work agreements remain unchanged. Only senior managers will become Medavie employees. • At the time, Boudreau said that by grouping the services together, Medavie may be able to better help the five per cent of the population that use the services most often. • The EMP’s services are funded by the Government of New Brunswick. The program and the work of its over 900 professionals around the province are managed by Medavie Health Services New Brunswick.

Evaluation or references	• CADTH, 2008, Home Telehealth Programs in Canada (29) ○ Note that this reference represents the older version of the Extra Mural Program. There has been a significant change in how these services are organized as of January 1, 2018.
Related Web links	• https://www.cma.ca/En/Pages/nb-extra-mural-program-showcased.aspx • https://www.cbc.ca/news/canada/new-brunswick/extra-mural-tele-care-medavie-privatize-1.4271568 • https://extramuralnb.ca/en/ • http://www2.gnb.ca/content/gnb/en/services/services_renderer.8975.Extra-Mural_Program.html • http://www2.gnb.ca/content/dam/gnb/Departments/h-s/pdf/en/extramural/AgreementAndSchedules.pdf • https://www.newswire.ca/news-releases/new-brunswickers-to-benefit-from-access-to-more-integrated-and-coordinated-health-care-in-their-homes-and-communities-642475063.html

Prince Edward Island

Data Extraction for Summary Table 11 **Program Name**	Remote Patient Monitoring Program
Jurisdiction	• Prince Edward Island
Condition	• Heart failure and now extended to COPD
Brief Description of program/RPM initiative	• The purpose of the Health PEI Remote Patient Monitoring program is to support care delivery through the integration of digital technology solutions for patients with heart failure and offer delivery of health care outside conventional care settings (i.e. in the patient's home). Approximately 1.5 years after deployment, the program was extended to include patients with chronic obstructive pulmonary disease (COPD). Connecting patients and care providers through technology and equipment allows daily transmission of patient data to a health care provider. This enables accurate anticipation of decompensation with sufficient lead time to permit intervention and activate support services required to alter the patient's treatment plan. Through this process, patients are better equipped to engage in self-management skills, thereby improving their quality of life while decreasing acute care resource utilization.
Service User/Patient Eligibility	• The RPM program was offered to individuals on PEI diagnosed with heart failure or chronic obstructive pulmonary disease (COPD). Program participants had to be over the age of 18, a resident of PEI with a valid personal health number (PHN) and be affiliated with a primary care physician or nurse practitioner willing to follow them through the RPM program. Participants were excluded if they had a cognitive impairment and did not have a caregiver, had an intellectual disability or were a resident in a long-term care facility, palliative care or geriatric care centre.
Delivery Model	• Patient referrals are received from several sources including family physicians, primary care nurse practitioners or physicians in a hospital setting. The RPM nurses are responsible for ensuring referred patients meet program inclusion criteria. Once a patient is deemed eligible, they attend an appointment with a RPM nurse where they receive a RPM kit, training on how to use monitoring equipment and technology and general education about the program. There are two RPM nurses, each with 0.5 FTE dedicated to the RPM nursing role.

	• Patients were monitored remotely (from their home setting) via monitoring equipment and technology in their RPM kits. Heart failure and COPD symptoms and vitals were monitored using a blood pressure cuff, weight scale and pulse oximeter. The RPM technology allowed clinical information to be transmitted to health care providers through an existing analog phone line, Wi-Fi, or 3G/4G network. The heart failure RPM program ran 12 weeks, and the COPD program ran 8 weeks. The COPD program was shorter due to pre-existing COPD care available in the province including a robust COPD program in primary care, access to a pulmonary rehab clinic and the COPD INSPIRED program. Monitoring was not provided on weekends and holidays. • Changes in patients' symptoms and vitals were monitored closely, and appropriate interventions were put in place based on established processes. The RPM nurses interacted with patients for support, advice and coordination of necessary resources. Relevant self-management education was provided to patients through their interactions with the RPM nurses. Family physicians and nurse practitioners received regular letters with monitoring trends for their RPM patients. To optimize monitoring and reporting, the RPM system was integrated with the existing Health PEI Clinical Information System (CIS). Within CIS, the program was listed on applicable order sets and if selected, generated a referral to the RPM program.
Partners Involved	• Health PEI and Canada Health Infoway
Patient or system outcomes	**Acute Care Resource Utilization** • The Remote Patient Monitoring program was successful at reducing all acute care resource utilization measures except average length of stay. The only visits that were coded with the most responsible diagnosis for the visit were acute care admissions, re-admissions and length of stay. Therefore, these measures provide the most significant look at the direct impact of the program on acute care resource utilization outcomes. Both admissions and readmissions saw a dramatic decrease of 80% and 100% respectively post-program, well beyond the program target of reducing avoidable re-admissions by 20% (Table 1). Consequently, it can be assumed the reduction in emergency visits would have been greater than the 45% calculated if the visits could have been isolated to those only due to heart failure. • The length of stay (LOS) target for heart failure participants was to reduce the average LOS by one day to 10.1 days (Table 1). The target for average length of stay (ALOS) was not achieved. Instead, the ALOS increased by 5 days, from 7 days in the six months before the program to 12 days six months post-program. However, the total LOS decreased by 74% from 487 days six months pre-program to 125 in the six months after the program • Primary care visits were included as a measure to allow a broader picture of system utilization. Primary care visits decreased by 20% in the six months post-program. The decrease does not mimic the decrease seen in acute care resource utilization. Part of this may be attributed to the finding of new chronic conditions or other medical issues through the interactions between the RPM nurses and program participants. **Clinical Efficacy** • The RPM program also demonstrated positive results in the area of self-management. The SUS identified both an increase in knowledge of the disease condition as well as an increase in general self-management. This is further supported by the decrease in acute care resource utilization, demonstrating that participants were more active in self-managing their condition and as a result did not have to utilize acute care as frequently. In the themed comments provided in the SUS, several participants indicated they continued with self-management behaviours. Many of these self-management behaviours would aid in the reduction of chronic disease risk factors beyond those specific to their condition (i.e. quitting smoking, increased physical activity, improved healthy eating). Consequently, the RPM program may be having a broad impact on disease prevention. To assess this, self-management behaviours should be evaluated again 6 to 12 months post-program. • Improvements were made for both heart failure and COPD participants' quality of life (QOL). Both the Minnesota Living with Heart Failure (MLHF) and the COPD Assessment Test (CAT) are validated tools used frequently in research projects to assess QOL. It is significant that both conditions demonstrated improvement as a result of the program since both heart failure and COPD are degenerative conditions. The MLHF demonstrated quality of life improved for heart failure patients most significantly in the physical/social and physical domains (Figure 8). Given the RPM program is designed to monitor and treat physical conditions it follows that these domains would show the most improvement. The domains

	with the least amount of improvement were the mental and emotional and the psychological domains. These domains may either require dedicated programming to be incorporated into the RPM program to assist with improvement or improve later in time as a natural result of improvements in the physical domains. The MLFH should be repeated six months post-program to help provide an answer to this question. • The average CAT score per participant decreased from 21.65 to 17.35. A study by Kon et al., (2014) indicates the minimum clinically important change in a CAT score for an intervention is a mean decrease of 2 points. The mean decrease difference in the CAT score across RPM participants analyzed was 4.3, indicating a clinically significant improvement in quality of life for participating COPD patients. **Quality and Access to Care** • Participants in the RPM program demonstrated a high degree of satisfaction with the program as indicated in the SUS results. Some of the comments indicated that caregivers and family members were also satisfied and in the SUS survey, 81% of participants either strongly or moderately agreed that the program has saved family members time not having to travel to or be involved with medical
Cost	• Funding to establish the Remote Patient Monitoring program for congestive heart failure on Prince Edward Island was provided through a partnership with Canada Health Infoway.
Evaluation or references	• Health PEI, 2017, Remote Patient Monitoring Project Canada Health Infoway - Benefits Evaluation Report (13)
Related Web links	• https://www.princeedwardisland.ca/en/news/remote-monitoring-program-helps-keep-islanders-home-out-hospital

Newfoundland & Labrador

Data Extraction for Summary Table 12 **Program Name**	Supporting Health. At Home Remote Patient Monitoring Program
Jurisdiction	• Newfoundland and Labrador Eastern Health
Condition(s)	• Chronic Obstructive Pulmonary Disease (COPD), heart failure or diabetes
Brief Description of program/RPM initiative	• Remote Patient Monitoring (RPM) is a free at-home monitoring program available to patients in the Eastern Health region who live with COPD, heart failure and diabetes. • Through the use of very simple technology, patients enrolled in this program will be monitored by a highly skilled, experienced registered nurse who will provide coaching, education and support to help patients gain the skills needed to reach health goals and improve quality of life. • The RPM program is designed to help patients become active, educated participants in the management of their disease.
Patient Eligibility	• A clinical diagnosis of Heart Failure (HF), Chronic Obstructive Pulmonary Disease (COPD), Diabetes • Emergency Department visit or acute hospital admission greater than or equal to 1 in a year (related to symptoms of HF, COPD or Diabetes) • Age greater than or equal to 18 years • Lives in a residential setting with internet or cellular service capabilities within Eastern Health's regional boundaries

Delivery Model	• Patients will be provided with a small computer tablet and home monitoring equipment, which they will be trained to use. is equipment may include a blood pressure monitor, weight scale and a device to measure oxygen levels. e patient inputs the results from the home monitoring equipment into the tablet. ese results are automatically sent to your monitoring nurse, who reviews the information. If any results need follow-up, your nurse will contact you. You will also be provided with your nurse's telephone number for advice and support, as required. • Registered Nurses monitor transmitted patient data as displayed on multiple dashboards. • Alerts are triggered when data falls outside of range for a particular patient. • The RN will contact the patient to follow up on alerts triggered. • Enrolled patients will receive a minimum of two health coaching sessions via telephone with their assigned nurse. • Reinforces the health information that is provided by the patient's care providers. • Educates on nutrition, medications, exercise, anxiety reduction, smoking cessation, etc. • Include family and caregivers. • A combination of remote monitoring and proactive coaching is the model which produces the best outcomes. Medication reconciliation and coaching regarding medication compliance is a key factor in positive outcomes. To ensure continuity of care: • A patients physician will be notified of their patient's enrollment in the RPM program. • The RPM nurse will refer a patient to their PCP if a patient issue cannot be resolved within their nursing scope of practice, such as a prescription change. • The RPM program will send patient summary reports to the physician on a monthly basis and on request. • A final summary report will be sent upon a patient's completion of the program. • Report content to be based upon identified information needs of physicians. • Nursing notes will be integrated into the EMR For the Evaluation Report (14) • Maestro Health Harmony – an RPM solution – was selected for implementation in Eastern Health. Patients are supplied with an iPad Mini and a home monitoring kit containing several Bluetooth peripherals allowing them to record and submit their weight, blood pressure, and/or oxygen saturation levels. This information is transmitted electronically so that nursing staff can remotely monitor patient risk level, educate patients on their conditions, and adjust care plans when necessary. Using this technology nurses can send patients reminders and messages and implement learning aids or tools that help patients manage their health.2 The intervention was initially designed for implementation with patients diagnosed with COPD and/or CHF.
Partners Involved	Program Integration • Overall Medical Direction: Dr. Pat Parfrey • Heart Failure Content Contributors • HF clinic Nurse Practitioners: Drs. Connors, Sussex, and Hayley, Heart and Stroke Foundation • COPD Content Contributors: Pulmonary Rehabilitation PT and RT, Drs. Azher and Vidyasankar, Lung Association Diabetes Content Contributors: Diabetes Clinic -DNE, RD, and NP, Canadian Diabetes Association • According to the Chronic Disease Action Plan of 2017 (1)

	○ Provincial Government to build on the experience of remote patient monitoring projects currently tested by Eastern Health and Labrador-Grenfell Health ○ The Department of Health and Community Services will expand remote monitoring across the province and further integrate remote patient monitoring with existing technology. Efforts will also be made to connect remote patient monitoring with primary health care providers to ensure continuity of care.
Patient or system outcomes	Key Insights and Lessons Learned • Important to collaborate with existing programs and stakeholders in program development and recruitment • Key success factor is the right person in the role and the right patients enrolled • Ensure clinical content, policies and procedures vetted through appropriate parties • Initially focused enrollment on acute inpatient admissions but learned higher uptake through ED and direct referral, and inclusion of LI and LII residents in PCH • Open communication between program and vendor is crucial and will avoid frustration in team members, when due to technical issues • Clinical algorithms are important but nursing expertise and judgment is as well. • Important to build efficiencies in to the clinical model Reported outcomes from Evaluation (14) • Patients' quality of life (QoL) and perceived health ratings improved immediately after program participation, as did their knowledge of and perceived ability to manage their condition. Conversely, their perceived activity limitations decreased after participation in the program. However, with the exception of perceived gains in knowledge, subjective measures returned to near-baseline levels when assessed at four-month follow-up. • Participants reported they had less need to visit an ER and health provider because of their participation in the RPM program. Decreased hospital admissions and ER visits were noted during the intervention period and post-intervention period compared to the pre-intervention period. Regression analysis suggested an impact of the program on hospital utilization over a twelve-month post-enrollment period. Finally, preliminary financial estimates suggest that the program could be self-sustaining given yearly operational costs, though a more thorough assessment is needed before definitive conclusions are made. • The results of this evaluation provide preliminary support for the RPM program implemented within Eastern Health for patients with COPD and/or CHF; however, the findings should be considered within the parameters of the study design and in conjunction with other information sources and clinical insight before definitive conclusions regarding program effectiveness are made. Shortcomings include, but are not limited to, our inability to generalize the findings to the overall COPD and/or CHF population in Eastern Health and our inability to fully account for extraneous factors that may influence outcomes. Therefore, a brief discussion of study limitations and suggestions for future research is also provided.
Privacy	• At Eastern Health, we respect our clients, patients and residents' right to confidential care. e information sent via the monitor is stored on secure computer servers to keep your information confidential. Only authorized staff members have permission to review and input this information into your health record.
Cost	From Evaluation Report (14) • The startup cost of the RPM program within Eastern Health was approximately $1,169,008, with annual operational costs estimated to be similar $1,066,016. The latter includes the cost of cellular connectivity ($36,000), software renewal ($170,000), asset management ($230,000), kit replacement as required ($1000/kit), and human resources ($630,016). • Among the 8628 program participants with available 12-month pre- and/or 12-month post-enrollment data, the total number of patients with one or more disease-specific hospital admissions during the 12-month pre-intervention period was 65 or 75.58%. The total number of individuals with disease-specific admissions during the post-enrollment period was 27 or 31.40%, suggesting a 58.46% decrease in the percentage of patients experiencing an admission. Based on nationally available figures29, the total costs of admissions for each patient group in the pre-enrollment period and the post-enrollment period were calculated and are presented in Table 10. The total estimated difference in cost for admissions between the 12-month pre-intervention period and the 12-month post-enrollment period was $258,75830 or $6809.42 per admission.

	• The total number of those enrolled in the RPM program during the 2016 period (n=256) was taken as an estimate of the minimum number of people who are likely to be enrolled in a given year. This was used to estimate total anticipated savings per year. Like the sample discussed above, it was assumed that 75.58% (n=194) of participants would experience a minimum of one admission prior to the intervention and 31.40% (n= 80) would experience a minimum of one admission after RPM enrollment. Using the per admission cost figure of $6809.42, the estimated cost savings would be $776,273.88 per year. • These crude cost saving estimates do not include physician fees, nor do they include savings resulting from reduced ER visits. This, in association with noted gains in perceived self-efficacy and overall health and QoL, as well as estimated time and transportation savings reported by the survey sample, suggest that the potential benefits of the program outweigh the costs.
Evaluation or references	• Reccord, C., Kean, R., Cross, L. (2017). The impact of a remote patient monitoring pilot program within Eastern Health. An internal evaluation conducted on behalf of the Remote Patient Monitoring implementation team. (14) • Government of Newfoundland and Labrador, 2017, Chronic Disease Action Plan (1)
Related Web links	• http://www.easternhealth.ca/OurCommunity.aspx?d=2&id=2273&p=1487 • https://www.arnnl.ca/supporting-health-home-remote-patient-monitoring-0 • http://www.southerngazette.ca/news/local/eastern-health-launches-monitoring-project-89253/

INTERNATIONAL

United States

Data Extraction for Summary Table 13 **Program Name**	Care Coordination/Home Telehealth (CCHT)
Jurisdiction	• USA
Condition(s)	• diabetes, congestive heart failure, hypertension, post-traumatic stress disorder, and other conditions
Brief Description of program/RPM initiative	• Since the 1990s, the Veterans Health Administration (VHA) has used information and communications technologies to provide high-quality, coordinated, and comprehensive primary and specialist care services to its veteran population. Within the VHA, the Office of Telehealth Services offers veterans a program called Care Coordination/Home Telehealth (CCHT) to provide routine non-institutional care and targeted care management and case management services to veterans with diabetes, congestive heart failure, hypertension, post-traumatic stress disorder, and other conditions. The program uses remote monitoring devices in veterans' homes to communicate health status and to capture and transmit biometric data that are monitored remotely by care coordinators. CCHT has shown promising results: fewer bed days of care, reduced hospital admissions, and high rates of patient satisfaction. • Telehealth involves the use of information and communications technologies to deliver medical care remotely by connecting multiple users in separate locations. The VHA Office of Telehealth Services uses health informatics, disease management, and telehealth technologies to facilitate access to care and improve health outcomes in three main ways: • clinical video telehealth uses interactive video technologies for the real-time delivery of physician visits to distant clinics to make diagnoses, manage care, perform check-ups, and provide care in polytrauma, mental health, rehabilitation, and surgical consultations;

	• store-and-forward telehealth supports the acquisition, transmission and storage of prerecorded information (sound, data, image), such as X-rays, video clips, and photos, between providers and specialists in radiology, dermatology, and retinopathy; and • care coordination/home telehealth uses electronic monitoring devices to capture patient physiological data related to symptoms and vital signs in the home environment and transmit those data to health care providers for review and appropriate coordination of care
Service User/Patient Eligibility	• Veteran's with diabetes, congestive heart failure, hypertension, post-traumatic stress disorder, and other conditions
Delivery Model	• The program uses remote monitoring devices in veterans' homes to communicate health status and to capture and transmit biometric data that are monitored remotely by care coordinators. • Group Health's Chronic Care Model serves as the conceptual framework for CCHT and has helped move toward the goal of making the patient's home into the preferred place of care where possible and appropriate. Promoting patient activation and self-management is fundamental in the CCHT model to prevent unnecessary hospital admissions or emergency department visits. Within CCHT, care is actively managed by care coordinators who are health care professionals, usually nurses or social workers, but who also include dieticians, occupational therapists, physicians, and pharmacists. An individual care coordinator handles a panel of 100 to 150 general medical patients or 90 patients with mental health-related conditions. • Care coordination is managed in association with the patient's clinician, and referrals to additional care services can be made by the care coordinator (subject to appropriate delegation and scope of practice) without the patient having to be automatically seen by a primary care physician. Ensuring the VHA has a competent telehealth workforce has been a critical component of its strategy to expand services nationwide. Standard professional training does not include telehealth. To remedy this situation, the VHA has established a dedicated CCHT training center. Formal telehealth certification does not exist, but the VHA ensures regular competency assessments and requires that staff are trained as part of its internal reviews of telehealth programs. Care coordinators undergo a three-to-five-week intensive training course in the requisite skills and competencies. The center has trained over 5,000 staff members, to date. Eligible patients are offered the choice to receive CCHT-based care or other non-institutional care services. Among those offered home telehealth, only 10 percent prefer to use the more traditional in-person encounters. When a patient is enrolled, the care coordinator selects the appropriate home health technology using an algorithm based on a patient's needs, the complexity of the disease or condition, and the individual's ability to use technology. The algorithm helps determine which CCHT device (videophone, messaging device, biometric device, digital camera, or tele-monitoring device) is most suitable and cost-effective for each patient's use. Upon device selection, the care coordinator gives the patient and caregiver the required training.13On an ongoing basis, the coordinator reviews telehealth monitoring data and provides active care or case management. Each patient is classified on the basis of his or her risk level, which is assessed daily according to preset thresholds, with alerts if any significant changes arise in the patient's symptoms or behavior that require intervention and management. When alerts occur, care coordinators intervene as necessary. For instance, a coordinator may call a patient to verify a potential exacerbation of their condition to prevent an emergency room visit or hospitalization. Care coordinators coordinate patients' care even when they receive care services outside the VHA system. The VHA also provides patients with the ability to authorize sharing of electronic patient record data, such as prescriptions or lab results, through the "Blue Button" application. Blue Button is a convenient and secure method for patients to retrieve information in plain text via the Internet. In addition to the 6 million veterans who receive care through the VHA, the VHA plans to also make the Blue Button application available to the 17 million veterans who receive care at non-VHA health providers and hospitals
Partners Involved	• Care Coordination/Home Telehealth was developed by the VHA to respond to the rising number of elderly veterans with chronic care needs and reduce their use of institutional care and its associated high costs. Group Health's Chronic Care Model serves as the conceptual framework for CCHT and has helped move toward the goal of making the patient's home into the preferred place of care where possible and appropriate. Promoting patient activation and self-management is fundamental in the CCHT model to prevent

	unnecessary hospital admissions or emergency department visits. The VHA's experience indicates that the messaging functionality within home telehealth services supports this goal through proactively identifying adverse symptoms, knowledge deficits, and negative health-related behaviors. Reduced use of health care resources for CCHT's patient population is attributed to patient self-management, disease management, and the use of virtual visits. • The pilot formed the basis for the model that was implemented nationally in the VHA after 2003. The national model also achieved high rates of patient satisfaction and reductions in resource utilization. When developing the national program, the VHA's senior leadership was committed to putting into place the necessary infrastructure. Core elements included developing algorithms for selecting patients and matching them to the right technology (e.g., video phones, messaging devices, biometric devices, digital cameras, and telemonitoring devices); establishing a national training center to ensure a competent work-force; awarding national contracts for technology, based upon meeting strict clinical and technological requirements; and integrating telehealth technologies with the VHA's electronic medical record.9 Although the growth of the national home telehealth program has been managed largely at a VISN level to meet the needs of the veteran patient population each serves, the enabling clinical protocols, workforce training, and business processes have been developed at the national level. Today, CCHT programs are available at 140 VHA medical centers. Forty percent of veteran patients receiving care via CCHT live in rural or remote locations. Resistance from clinicians has been successfully addressed by placing the emphasis on program outcomes, patient satisfaction, and training. The VHA has established strategic communications initiatives, like an annual telehealth meeting for key staff from around the country. In addition, a number of staff members who helped start the program are now in senior management within the organization and have effectively become champions of the telehealth program. Meanwhile, graduates of the national training program have gone on to serve as advocates for the program. Dr. Darkins describes their role as critical in helping solve programmatic issues at the local level and serving as ambassadors for the program. This has helped information about the program grow at an organizational level, increasing buy-in and understanding
Patient or system outcomes	• CCHT has shown promising results: fewer bed days of care, reduced hospital admissions, and high rates of patient satisfaction. This issue brief highlights factors critical to the VHA's success—like the organization's leadership, culture, and existing information technology infrastructure—as well as opportunities and challenges. • Through the end of fiscal year 2010, veterans reported patient satisfaction levels greater than 85 percent for home telehealth services offered through CCHT. In addition, the program was associated with a greater than 40 percent reduction in bed days of care, as compared with pre-enrollment figures, for the CCHT population receiving home telehealth. • Core principles in successful implementation include: a recognized responsibility for the care and case management of patients across the continuum; a systematic approach to the introduction of a quality performance improvement and management infrastructure; contracting with technology vendors on a national scale; and implementation that is driven at the local clinical level to ensure that benefits can be derived immediately. This is supported by a tremendous organizational readiness and capacity for change that is embodied in all areas of practice. The ability to directly control budgets for care services is also a strong motivator in making home telehealth programs work. While complementary infrastructure elements at the VHA, including electronic health records (EHRs), help make home telehealth operational at an organizational level, they are not necessarily required for a program to work. • Implementation at the VHA has centered around reengineering existing processes, a strong IT infrastructure, and a commitment to training. The VHA attributes the rapidity and robustness of its CCHT implementation to the systems approach taken to integrate the clinical, technology, and business elements of the program based on its experience with pilot programs Key Factors in Success • Systematic evidence of targeted outcomes • Standardization of core program elements • Technology-enabled tools and resources • Staff training and development

Cost	• The VHA has found that an enterprise-wide home telehealth system is an appropriate and cost-effective means of managing chronic care patients in both urban and rural settings. Studies that compared data from the year before entering the program and six months post enrollment show a 25 percent reduction in bed days of care, a 20 percent reduction in number of admissions, and a mean satisfaction score rating of 86 percent. Decreases in health resource utilization were largest in highly rural (50.1%) and urban (29.2%) areas, for mental health-related conditions, and for patients with multiple conditions. Patients' acceptance of CCHT was high, with only 10 percent declining services. The cost for CCHT ($1,600 per patient per year) compared favorably with the direct cost of VHA's home-based primary care services ($13,121 per patient per year) and market nursing home care rates (an average of $77,745 per patient per year)
Evaluation or references	• Broderick, 2013, The Veterans Health Administration: Taking Home Telehealth Services to Scale Nationally (15) • Darkins, 2015, Case Study: Reduced Cost and Mortality Using Home Telehealth to Promote Self-Management of Complex Chronic Conditions: A Retrospective Matched Cohort Study of 4,999 Veteran Patients (30)
Related Web links	• https://www.telehealth.va.gov/ccht/index.asp
Data Extraction for Summary Table 14 **Program Name**	Center for Telehealth - Remote Patient Monitoring
Jurisdiction	• Jackson, Mississippi
Condition(s)	• Chronic illnesses: e.g., diabetes, high blood pressure, heart disease, COPD
Brief Description of program/RPM initiative	• The Diabetes Telehealth Network, a statewide remote care management program launched in 2014 by the University of Mississippi Medical Center's Center for Telehealth, saved roughly $400,000, reduced A1C levels by 1.7 percent and saw no ER visits or hospitalizations among the 100 residents involved in the initial six-month pilot. • The program is now being expanded throughout the Southeast, and will target COPD, heart failure, hypertension and asthma as well as diabetes. In addition, UMMC has signed a five-year extension with Intel-GE Care Innovations, its partner in the Diabetes Telehealth Network, to help facilitate the expansion.
Service User/Patient Eligibility	• This program requires a provider referral. • Chronic illnesses: e.g., diabetes, high blood pressure, heart disease, COPD
Delivery Model	Services offered • With the TelEmergency program, specially trained nurse practitioners (NPs) can collaborate with physicians and work directly under emergency medicine physicians at the University of Mississippi Medical Center (UMMC) via a telemedicine connection. This team works together to provide quality care to patients in rural hospitals in real-time. The patients are treated with guidance and input from remote experts in a variety of fields. • The Center provides over 35 medical specialties for adults and children, including: remote patient monitoring • The Center also supports a Telehealth Call Center that is staffed 24/7 to provide medical advice and referrals to rural hospitals. • When a primary care physician makes a referral for remote patient monitoring, their patient enrolls in a four- to six-month program tailored to a specific chronic illness. UMMC specialists educate the patient about their condition and how to improve their health, and a trained clinician regularly checks on their progress. Over time, the patient masters the skills to monitor and manage the illness on their own. • With a primary care referral, remote patient monitoring is usually covered by the patient's insurance or Medicaid plan.

	• UMMC remote patient monitoring and chronic disease management services include: Monitoring at home, school, and work, Daily health sessions, Personalized interventions, Automatic notification of potential issues, Medication therapy management, Targeted education and health coaching, Behavior modification, Patient empowerment, Ongoing care coordination with primary care providers • The remote monitoring platform includes a tablet assigned to the patient, enabling him or her to connect with and upload data from a variety of home-based devices, and equipped with a video conferencing link to care managers at UMMC. Center for Telehealth staff collect data from the patient every day, and use that information to create a personalized care plan. • Telemedicine systems used to connect to customers: Cisco, SnapMD, eCareManager, Health Harmony • Electronic health records (EHR) incorporated in services: Yes
Partners Involved	• To launch the Diabetes Telehealth Network back in 2014, UMMC worked with the State of Mississippi, rural-based North Sunflower Medical Center, health IT vendor Intel-GE Care Innovations and telecommunications provider C Spire to coordinate the deployment of remote patient monitoring technology with the aim of improving health outcomes and reducing the cost of care. The pilot project enrolled 100-plus Mississippians living with diabetes and enabled those patients to have timely and consistent access to clinicians through technology in their homes. • UMMC has extended its collaboration with GE-Intel Care Innovations and will use the vendor's Health Harmony telehealth solutions platform to serve patients across the Southeast living with chronic conditions, such as diabetes, heart failure, COPD, asthma and hypertension. UMMC's goal is to enroll 1,000 patients each month both in and out of state by the end of 2016 • Initial funding for the program came from the Bower Foundation and the Mississippi State Department of Health. In 2017, the Center was designated one of two Telehealth Centers of Excellence by the Health Resources and Services Administration, receiving $600,000 of grant funding for the initial year. The designation allows the Center to serve as a national clearinghouse for telehealth research and resources, including technical assistance to other telehealth providers. • The UMMCs Center for Telehealth is Mississippi's first and most comprehensive telehealth network. Starting with TelEmergency services in 2003, UMMC Center for Telehealth now provides over 35 telehealth specialty services to 200+ non-affiliated sites in Mississippi. Some of the highlighted programs include Mississippi's only eICU program; remote patient monitoring for chronic disease management; and our Corporate Telehealth program. Health care workforce shortages, financial constraints, geographic barriers and poor health outcomes demand an innovative model that is culturally appropriate and cost effective. In over half of Mississippi counties, patients must drive more than 40 minutes to receive specialty healthcare. Without access to quality care, our state is falling short on national health standards. The Center for Telehealth at the University of Mississippi Medical Center is working to improve access to care in our state. Target(s) for services: • Accountable Care Organizations; Assisted living facilities; Community mental health clinics; Correctional facilities; Educational institutions; Employers; FQHCs; Government agencies; Government workers; Rural hospitals; Urban/suburban Hospitals; Insurers; Military bases; Nursing homes; Patients directly; Private physician practices; Schools; Senior communities; Skilled nursing facilities; Urgent care centers Corporate Structure: Public not-for-profit
Patient or system outcomes	• patients better manage their blood sugar and blood pressure, learn more about how to control their conditions, and reduce the number of times they had to go to the hospital for those conditions.

	• The Center for Telehealth led by UMMC is now in over 200 clinical sites in 69 of the 82 counties across Mississippi, including clinics, hospital, schools, and businesses. Their services have reached over 500,000 patients. As a result, rural facilities have managed to: ○ Keep patients in their local facilities and closer to home and family ○ Improve the hospital's operating margins ○ Enhance the rural recruitment and retention of health professionals at these hospitals ○ Avoid unnecessary transfer of patients by accessing specialty physicians remotely ○ Improve care coordination ○ Reduce duplicate tests ○ Improve workforce and professional development education Barriers • The UMMC Center for Telehealth faces similar barriers to other comprehensive programs across the nation. Provider capacity is an issue, as well as the ability to provide services across state lines, due to the lack of license reciprocity. The restrictions on payment from Medicare related to geography and type of telemedicine have slowed the program's growth. In light of these difficulties, the program's coordinators work through congressional delegation in Washington DC to address these issues. Replication • This program can be a viable solution for other rural hospitals, clinics, and other settings with a shortage of specialty care. It is a cost-effective way to expand services, and patients are able to receive a wide-range of medical services close to home. • UMMC offers the Clinical Training Program that teaches clinicians, administrators, and technical staff how to implement a telemedicine program like this one.
Cost	• It is estimated that the state will save approximately $189 million each year with the use of remote patient monitoring.
Evaluation or references	• None found
Related Web links	• https://www.linkedin.com/pulse/lessons-learned-from-mississippi-delta-tackling-chronic-heather-landi • https://mhealthintelligence.com/news/mississippi-scales-up-its-telehealth-network • http://news.careinnovations.com/blog/mississippi-telehealth-network-leads-the-nation-says-governor • https://www.ruralhealthinfo.org/project-examples/245 • https://www.aha.org/system/files/content/17/telehealth-case-examples.pdf#page=16 • https://hbr.org/2018/07/transforming-health-care-from-the-ground-up • https://www.umc.edu/Healthcare/Telehealth/Remote%20Patient%20Monitoring.html • https://telemedicine.arizona.edu/servicedirectory/ummc-center-telehealth
Contacts	• Michael Adcock, FACHE, Executive Director UMMC Center for Telehealth 601.815.2048 madcock@umc.edu

Data Extraction for Summary Table 15 **Program Name**	Banner iCare
Jurisdiction	• Arizona (facilities in 7 states)
Condition(s)	• Multiple chronic diseases
Brief Description of program/RPM initiative	• Banner iCare™ is a high-touch, high-tech in-home care delivery model that includes providers, technology and a highly collaborative care process to treat Banner Health Network members with complex, chronic illnesses. Through the use of a tablet-like device, patients interact directly with their health team – primary care physician, pharmacist, nurse and health coach – to track and address any medical concerns. • As a key innovative telehealth service, Banner iCare aims to decrease Emergency department visits and hospitalization, and increase medication compliance while providing care in the comfort of the patient's home. Our goal is improve the quality of life of these members while reducing the total cost of care. Banner's Case Management team is proactively identifying and recruiting patients admitted to Banner medical centers who fit criteria for participation. • Banner and Philips partnered using technology as a strategic mechanism for the remote care of super users • Starting in 2013 Banner piloted Philips' post-discharge program now called 'Hospital to Home' as Banner iCare, combined with Philips Lifeline PERS, but made it available to those only with a stunning five+ chronic conditions–the top 5 percent that is reputed to account for 50 percent of healthcare spend. Banner combined the tech with intense support by a multi-layered care team. • With facilities in 7 states, Banner Health employs over 46,000 people and is Arizona's largest private employer. It's also one of the largest secular, nonprofit healthcare systems in the U.S. with more than $5 billion in annual revenue.
Service User/Patient Eligibility	• must have at least 5 chronic health conditions
Delivery Model	Telehealth and RPM System • Type Store and Forward: Biometric Remote Patient Monitoring, Real-Time Biometric Remote Patient Monitoring, Real-Time Interactive Two-Way Video. • Targeting the 'Superusers' of Healthcare With Telehealth • The Philips supplied hardware includes an Android tablet, custom software and a range of biometric sensors for blood pressure, oxygen saturation, weight, and heart rate measurements. • Also included is Philips Lifeline — a personal emergency response device with automatic fall detection • Single-User/Patient Home Base Unit Business Model • Banner Health implemented the program as Standard of Care. While most patients were Medicare eligible, no reimbursement was sought from CMS. Banner covered the costs of the telehealth program including telehealth equipment hardware and software costs. Implementation Approach

	• The pilot included 135 “in home” patients. Requirement for patients in the program include having at least 5 chronic health conditions. The program also matches patients with multi-disciplinary care team that includes health coaches, nurses, social workers, pharmacists and primary care “intensivists” in a way that delivers near-instant access for patients to an entire care team. Combining team-based continuous care with remote delivery is a key part of the success. This isn’t consumer-grade, episodic care by a single specialist working in isolation. • The Philips supplied hardware includes an Android tablet, custom software and a range of biometric sensors for blood pressure, oxygen saturation, weight, and heart rate measurements. Also included is Philips Lifeline – a personal emergency response device with automatic fall detection. • The program also matches patients with health coaches, nurses, social workers, pharmacists and primary care "intensivist's" in a way that delivers near–instant access to patients by an entire care team. Combining team-based continuous care with remote delivery is a key part of the success. This isn't consumer–grade, episodic care by a single specialist working in isolation. • Banner pays directly for the home monitoring tools (no reimbursement through CMS) and patients like Marion Berg (turning 102 in July) are a great example of the "triple–aim" benefits (better care, better health and lower cost).

Partners Involved	• Banner Health
	  ○ With facilities in 7 states, Banner Health employs over 46,000 people and is Arizona’s largest private employer. It’s also one of the largest secular, nonprofit healthcare system in the U.S. with more than $5 billion in annual revenue
	• Banner Health implemented the program as Standard of Care. While most patients were Medicare eligible, no reimbursement was sought from CMS. Banner covered the costs of the telehealth program including telehealth equipment hardware and software costs.
	• Philips
	  ○ The Philips supplied hardware includes an Android tablet, custom software and a range of biometric sensors for blood pressure, oxygen saturation, weight, and heart rate measurements. Also included is Philips Lifeline — a personal emergency response device with automatic fall detection.

Patient or system outcomes	• 27% reduction in cost of care • 32% reduction in acute and long-term care costs • 45% reduction in hospitalizations • Coordinated care is hard to achieve without the right technology tools, and without a culture that embraces, encourages and instills this care delivery paradigm through development of communications and response protocols, training, outcome tracking and ongoing refinement. Consumer-grade telehealth is not suited for delivering care for this population. Lessons Learned • Care of superusers requires an integrated and well-coordinated from a multi-disciplinary care team.The success of integrated and coordinated care hinges upon having robust response protocols, frequent communications, and most of all equally-robust industrial-grade enabling technology. • Combining the multi-disciplinary integrated care team, coordinated care, with the right enabling telehealth technology leads to reduced hospitalizations, long-term care, and acute care costs. Advice to Share with Others • Have a specific target population of patients, preferable superusers or frequent fliers of healthcare.Adopt a multi-disciplinary care approach, response and communications protocols that address the needs of the target population.Make sure you have comprehensive telehealth tools that provide your integrated care team with the information they need in a timely manner, and that facilitate communications between team members, and ultimately help them deliver the proactive care needed.

Cost	• 32% reduction in acute and long-term care costs
Evaluation or references	• None found
Related Web links	• http://telecareaware.com/tag/banner-icare/ • https://www.leadingage.org/sites/default/files/Banner_Health_Case_Study.pdf • https://www.bannerhealth.com/about/innovation/banner-telehealth • https://www.forbes.com/sites/danmunro/2015/05/03/targeting-the-superusers-of-healthcare-with-telehealth/#331ec39d5cc7
Data Extraction for Summary Table 16 **Program Name**	Home Telemonitoring Program
Jurisdiction	• Maryland, Washington, D.C., and Virginia
Condition(s)	• complicated medical conditions like congestive heart failure, chronic obstructive pulmonary disease (COPD), or diabetes
Brief Description of program/RPM initiative	• With innovative telemonitoring technology, MedStar Visiting Nurse Association (VNA) can monitor patients' vital signs and symptoms remotely to identify abnormal readings and address negative symptoms or health concerns before they turn into medical emergencies. The remote monitoring program aims to keep patients healing safely and comfortably in their own homes by addressing the main reasons that patients are often readmitted to the hospital or sent to the emergency room, including: not taking medications, poor diet, inadequate family support and lack of understanding about their health conditions. • With the telemonitoring technology provided by Health Recovery Solutions (HRS), MedStar VNA's home healthcare team members receive a daily perspective of a patient's health status. This is especially helpful on days when there are no scheduled visits to the patient's home.
Service User/Patient Eligibility	• MedStar VNA's telemonitoring program focuses on high-risk patient populations. These patients have complicated medical conditions like congestive heart failure, chronic obstructive pulmonary disease (COPD), or diabetes which often require emergency care if symptoms cannot be controlled. Homecare team members explain the program to the patients and enroll them if they are willing to participate.

Delivery Model	• Each patient in MedStar VNA's telemonitoring program is provided with a 4G Samsung tablet loaded with HRS' easy–to-use telemonitoring software. It is customized to meet the patient's unique needs. The tablet provides patients with educational videos, medication reminders, and comes with biometric screening devices such as a:
	  ○ Blood pressure monitor
	  ○ Scale
	  ○ Pulse oximeter
	• These devices allow patients to take and record their own vitals signs on a daily basis. In addition, home healthcare team members can communicate with the patient through the tablet without the need for a landline or internet connection.
	• After patients record their data, it is automatically transmitted to their homecare nurse. The tablet and devices are safe, secure, and Health Insurance Portability and Accountability Act (HIPAA) compliant.
	• The telemonitoring software is customized with a patient's unique condition and its technology helps manage a patient's recovery. The daily vital sign recordings and health status updates are used to help the home healthcare team and the patient's physician adjust the treatment plan if needed. This helps patients to achieve the best outcome possible.

	• The HRS Telemonitoring Software allows patients to:
	  ○ Measure weight, blood pressure, heart rate, and oxygen levels and track their readings
	  ○ Let their nurse know of symptoms through a daily survey
	  ○ Learn about their disease condition and how to manage it
	  ○ Track whether they are taking their medications as ordered
	  ○ Communicate with the MedStar VNA through phone and text messaging
	• The HRS Telemonitoring Software allows the home healthcare team to:
	  ○ Monitor a patient's vitals in real time
	  ○ Respond to high-risk readings that could lead to a medical emergency or admission to the hospital
	  ○ Communicate with patients via phone call or text message
	  ○ Supplement education through videos and teach-back quizzes
	• Patients who are enrolled in the home monitoring program will receive HRS' telehealth technology package, consisting of a 4G tablet with Bluetooth biometric devices such as a blood pressure monitor, pulse oximeter, and scale. These tools allow patients to record their own vitals daily. Each tablet also comes pre-loaded with educational videos and teach-back quizzes individualized to meet each patient's needs. Nurses and other home healthcare team members can access patient vitals anytime and anywhere through HRS' ClinicianConnect web portal and smartphone application. Nurses will be able to respond quickly to abnormal readings while working with physicians to make changes to a patient's care plan.
	• The HRS telehealth platform allows for seamless communication between the clinician and the patient. The patient can communicate with his/her nurse through text messaging or phone call from the tablet. Likewise, the clinician can contact the patient through the HRS ClinicianConnect web portal and smartphone application.

Partners Involved	• MedStar Visiting Nurse Association (VNA) brings the services, technologies and therapies of a medical center into the comfort and privacy of patients' homes. We provide physician-prescribed home health care services for homebound patients and those who are disabled or living with a chronic condition.
	• The MedStar VNA homecare team is made up of nurses, therapists, social workers and home health aides who travel more than two million miles a year to make a positive difference in people's lives.
	• MedStar Visiting Nurse Association (VNA), which serves patients across Maryland, D.C. and Northern Virginia, has partnered with Health Recovery Solutions (HRS) to provide high-risk patients with innovative, in-home telemonitoring services. The partnership arises from MedStar VNA's goal to keep patients healthy and at home while reducing medical complications and the need for repeat hospital visits.
	• About MedStar Visiting Nurse Association
	  ○ MedStar VNA is a nonprofit, Joint Commission accredited, in-home healthcare provider that offers skilled nursing and rehabilitation for homebound, disabled and chronically ill patients in the Maryland, D.C. and Northern Virginia region. To support good health in the community, MedStar VNA offers vaccination and wellness programs across the region. For more information about MedStar VNA, call 800-862-2166 or visit medstarvna.org.
	• About Health Recovery Solutions
	  ○ Health Recovery Solutions (HRS) supplies healthcare providers with the most advanced patient monitoring devices, focusing on changing patient behavior to reduce readmissions. HRS' disease-specific 4G tablets are customized with medication reminders, educational videos and diet information while integrating with wireless devices. Tablets allow video chat, surveys, wound imaging and real-time risk monitoring by clinicians and patients' family members.

Patient or system outcomes	• According to MedStar VNA's telemonitoring partner, HRS, this program provides the following results to participants: ○ 71% reduction in repeat admissions to the hospital ○ $1.9M savings for insurance payers ○ Improved utilization by 50% ○ Increased care engagement by 24 minutes/day
Cost	• $1.9M savings for insurance payers
Evaluation or references	None found
Related Web links	• https://www.medstarvna.org/home-health-care/home-telemonitoring-program/#q= • https://www.prweb.com/releases/2017/12/prweb15013582.htm • https://www.healthrecoverysolutions.com/solutions
Data Extraction for Summary Table 17 **Program Name**	Remote Monitoring Telemedicine
Jurisdiction	• Pittsburgh
Condition(s)	• Heart failure (n the process of expanding to as many as four other conditions as of Feb 2018 article)
Brief Description of program/RPM initiative	• UPMC provides in-home telehealth equipment to promote proactive patient self-care, monitoring patients' key measures, providing patients with easy access to guidance about their health issues, and enabling physicians to follow their patients' health.
Service User/Patient Eligibility	• Diagnosis of heart failure • Admitted to the hospital with risk of readmission • Provider (PCP or cardiologist) feels the patient would benefit • The health kit is available to adults 18 and older • Average age of Heart Failure health kit users is 75
Delivery Model	• The Telemedicine Heart Failure health kit is designed to identify warning signs earlier. The health kit offers continuous care regardless of geographic location. Each patient is provided with a tablet device that wirelessly transmits information to the call center. • Patients use the tablet and included peripherals to report daily blood pressure, oxygen levels, heart rate, and weight. • Call center nurses can contact the patient to ask follow-up questions based on care plan question responses to confirm information. • Patients can contact the call center by phone or by two-way video via the tablet. • Nurses can respond to questions based on the physician's orders or forward the patient's questions or concerns to their physician. • The user-friendly health kit works anywhere in Pennsylvania and is provided to patients for a period of 90 days.

	• An educational video shows the patient how to use the tablet and its associated tools. • Communications with call center nurses, equipment, and wireless transmission of information (key measures, video conversations, etc.) are seamless. • Remote monitoring is not a replacement for emergency services. In case of emergency, patients must call 911 or their local emergency services. • To aid with its effort, UPMC turned to remote monitoring and telehealth vendor Vivify. There are the two main technologies: a tablet with or without peripherals and a patient's own mobile phone. • The Vivify platform provides the call center portal, equipment monitoring, reporting features, EHR integration and equipment delivery. • Caregivers log in to the Vivify portal and monitor alerts, bio-parameters and patient survey question responses to triage and guide virtual care. They also do live video visits with patients. Their documentation in Vivify flows back into UPMC electronic health records. • "Patients simply open a box, then turn on a tablet or respond to a text message to access remote patient monitoring," said Andrew Watson, MD, medical director of UPMC Telemedicine. "The process has been streamlined to make it simple for them. Care is provided through survey questions, educational videos, scales, BP cuffs and pulse oximeters, and live video visits." • Patients punch a four-digit PIN number into the HIPAA-compliant tablet-based system and they're online with UPMC. No browsing, though. The tablets are locked down • Vivify's system constrains the remotely gathered health data by coding high-risk readings with the color red, yellow for rising risk and a standard gray background for "good."
Partners Involved	• The University of Pittsburgh Medical Center (UPMC), one of the nation's largest integrated health systems, has long been at the forefront of telemedicine and remote patient care and is now expanding its services to treat more patients from the comfort of their own homes. • To aid with the expansion, UPMC turned to remote monitoring and telehealth vendor Vivify Health, whose platform allows UPMC to collect key biometric data - such as weight and blood pressure, along with answers to triage questions - from at-home patients on a daily basis. This data triggers alerts if a patient's condition worsens, allowing providers to intervene more quickly - often before a trip to the emergency department is necessary. • The Vivify platform provides a call center portal, equipment monitoring, reporting features, and integration with electronic health records. It also offers BYOD (bring-your-own-device) capabilities that allow patients to access the platform using their own personal devices. UPMC reports that Medicare members that have enrolled in the Vivify program at UPMC are 76% less likely to be readmitted to the hospital. "The transition to the remote patient monitoring technology was almost seamless," Watson said. "Patient satisfaction in over 1,500 patients remains over 90%. And compliance likewise is over 90%." • As an integrated health care provider and insurer, UPMC for more than a decade now has honed its remote patient monitoring strategies. It's all part of UPMC's long-standing mission to continuously improve patient outcomes, increase efficiency and reduce costs. It also explains why UPMC Enterprises — the innovation and commercialization arm of UPMC — decided to make a significant financial stake in Vivify Health as it became a customer of the company. • "What we saw in Vivify was a young company that had a product set that would fit both our health services division and help our health plan do a better job of providing services," says C. Talbot Heppenstall Jr., president of UPMC Enterprises. "And by becoming an investor, it simply tightens the relationship between UPMC and Vivify Health. Our incentives are aligned to ensure that [Vivify Health's] product road map rolls out quickly and is extremely successful by being tested and used here everyday." • For Vivify Health, which has contracts with health systems representing more than 500 hospitals, the project is significant as well, says Eric Rock, the company's CEO. • "Working with a leading integrated payer and provider organization is very exciting for Vivify. We have the opportunity to demonstrate Vivify's ability to shape behaviors for the rising risk population, while reducing acute utilization for the high-risk population. Also, as payer and provider organizations begin to work ever more closely together, it becomes more and more critical to have tools that can be leveraged across both organizations to improve outcomes and reduce costs," Rock says.

Patient or system outcomes	• As a result of the program, Dr. Ramani and his colleagues have seen 30-day readmissions rates for CHF patients in the program drop to 12 percent, compared to an average readmission rate of 21 percent for CHF patients at UPMC not enrolled in the remote monitoring program, and the national readmission rate average of 25 percent for CHF patients. • To really scale the program and get into the population level management," said Dr. Ramani, "we really need a vastly reduced cost per unit. The only way to really do this is to leverage what the patients already have, which is 'Bring Your Own Device.'" • UPMC also focused on refining their operational model so that they select the right patients, put them through an appropriate care pathway, and then integrate all of its other resources to work together, including analytics, operations and finances
Cost	• On June 1, 2016 University of Pittsburgh Medical Center (UPMC) rolled out its biggest remote patient monitoring technology initiative to date. • It's a project involving some 800 patients with congestive heart failure, each of whom has been provided with a free kit containing remote patient monitoring technology from Vivify Health Inc. • UPMC, through its UPMC Enterprises venture capital arm, is also an investor in Vivify; it provided the startup with $10 million as part of a recent $17 million financing round. • The kits include a pulse oximeter, blood pressure cuff, weight scale and a 4G tablet -- all wireless-enabled out of the box -- to which metrics from the devices are transmitted, which, in turn, uploads the data to a UPMC care team.
Evaluation or references	• None found
Related Web links	• http://www.upmc.com/healthcare-professionals/physicians/telemedicine/services/Pages/remote-monitoring.aspx • https://www.healthleadersmedia.com/innovation/how-build-remote-patient-monitoring-program • https://www.healthcareitnews.com/news/upmc-remote-patient-monitoring-helps-reduce-er-utilization-and-hospital-readmissions • https://www.vivifyhealth.com/platform/ • https://patientexperience.wbresearch.com/upmc-remote-patient-monitoring-and-telehealth-strategy-ty-u • http://hin.com/blog/2018/04/05/remote-patient-monitoring-fosters-a-new-generation-of-care-management-and-preventive-and-value-based-care/ • https://searchhealthit.techtarget.com/feature/Remote-patient-monitoring-technology-becoming-imperative-for-providers • https://www.hhnmag.com/articles/7040-how-upmc-invests-in-innovation-to-improve-care
Data Extraction for Summary Table 18 **Program Name**	UCLA Connected Health
Jurisdiction	• Los Angeles California
Condition(s)	• Patients that have undergone heart surgery, chronic diseases, such as heart failure and chronic obstructive pulmonary disease (COPD), post-surgery
Brief Description of program/RPM initiative	• UCLA Connected Health facilitates the use of the latest technologies to securely connect our healthcare providers to patients and other providers, no matter where you are. All you need is a reliable internet connection to access exceptional healthcare services when you need them the most. • Pre-programmed mobile devices, such as scales, blood pressure monitors and pulse oximeters, send important health data to your doctor's office. Our providers use this information, as well as two-way UCLA Connected Health video visits, to monitor your progress and detect problems early.

Service User/Patient Eligibility	• Cardiac telehealth Program: patients who undergo heart surgery • Chronic Diesase • As recovering from surgery
Delivery Model	Cardiac Telehealth Program • At UCLA, patients who undergo heart surgery receive a cardiac telehealth kit upon discharge. This telehealth technology allows you to send important health data over the internet to UCLA nursing staff. • Your team is alerted anytime your responses indicate a potential problem. You also can conduct video visits with your doctor using the computer tablet provided in the kit. • Our Cardiac Telehealth Program allows you to electronically send: ○ Daily updates about your recovery via a questionnaire ○ Videos and photos of your incision site ○ Daily health numbers (such as weight, heart rate, blood pressure and blood oxygen levels) using a scale, heart rate monitor, blood pressure monitor and pulse oximeter provided in the kit • Using this remote monitoring technology, your healthcare team can immediately detect and address problems, including: ○ Shortness of breath ○ Dehydration ○ Abnormal heart rhythm ○ Fluid retention ○ Early signs of pneumonia ○ Negative reactions to medications • patients are being equipped with video teleconferencing technology and paired with a nurse practitioner who places video calls at defined intervals, depending on their level of risk, to do a visual check of their recovery. Through UCLA's new cardiac telehealth program, patients also are being equipped upon discharge with a pre-programmed mobile device that includes a Bluetooth weight scale, pulse oximeter and heart-rate monitor. The device helps patients know what medications they should be taking and when, as well as providing verbal and visual reminders to regularly log their physiological information so that the healthcare team can ensure they are progressing appropriately. Chronic Disease Monitoring • Mobile devices and video visits give you the power to manage chronic diseases, such as heart failure and chronic obstructive pulmonary disease (COPD), from home. These technologies provide your healthcare specialist with real-time information about your health. Using this information, your healthcare provider can take action before problems worsen. This helps you avoid costly emergency room visits and hospital admissions. • Post-surgical Recovery Monitoring • Our care teams use telehealth services to monitor you at home while you recover from surgery. These technologies include pre-programmed mobile devices, like blood pressure monitors and pulse oximeters. Your physicians and other healthcare providers remain up-to-date with key health information in real-time to help make your recovery a successful one.
Partners Involved	• As one of America's top hospitals, UCLA Health provides the best healthcare to the people of Los Angeles and throughout the world.

	• UCLA Health ACO has been recognized in the Becker's Hospital Review list of "100 Accountable Care Organizations to Know," which features some of the most advanced ACOs in the country. • UCLA is currently participating in: CMS Medicare Shared Savings Plan, Anthem Blue Cross PPO Enhanced Care Coordination, Cigna Collaborative Accountable Care and Health Net Blue & Gold ACO.
Patient or system outcomes	Cardiac Telehealth • The program significantly lowers a patient's risk of being readmitted to the hospital with post-surgical complications.
Cost	• None found
Evaluation or references	• None found
Related Web links	• https://www.uclahealth.org/Telehealth/remote-patient-monitoring#cardiac-telehealth • https://www.youtube.com/watch?v=_R1Qun_mWbM
Contact	• For more information about UCLA Connected Health, please email us at connectedhealth@mednet.ucla.edu.
Data Extraction for Summary Table 19 **Program Name**	Remote Glucose Monitoring
Jurisdiction	• Southern California
Condition(s)	• Diabetes
Brief Description of program/RPM initiative	• Launched by the Southern California Permanente Medical Group in February 2017, Remote Glucose Monitoring has already begun to revolutionize the way diabetes is being monitored and treated.
Service User/Patient Eligibility	• Kaiser Permanente members with type 2 diabetes
Delivery Model	• Kaiser Permanente provides Bluetooth®-enabled glucose meters that make it easy for patients from any location to stick their finger and have the readings automatically synced to their mobile phone. On the backend, Kaiser Permanente has developed a way for the glucose readings to be remotely pushed to patients' electronic medical records from their phones. The patient's physician is notified when the patient's glucose level is high so that the care team can take corrective action. • "When our physicians see that a patient has been flagged with dangerously high levels of glucose, they can quickly intensify treatment by upping dosages, starting new medications, or using other interventions," says Jim Dudl, MD, physician lead of the Remote Glucose Monitoring program. "This leads to better care because they are handling the problem while it's happening rather than waiting until the patient's next visit." • Kaiser Permanente is also working to create advanced algorithms that will use data to predict which patients are likely to be flagged with unsafe glucose levels so preventive intervention can take place sooner.

Partners Involved	• KPSC's multidisciplinary teams include physicians, physician assistants, pharmacists, registered nurse practitioners, registered nurse (RN) care managers, office-based RNs, licensed vocations nurses, health educators, and others as needed. These teams address the patient's complete needs, and do so with consideration of the patient's native language and cultural needs. • In partnership with Kaiser Foundation Health Plans and Kaiser Foundation Hospitals, the Permanente Medical Groups and our physicians lead the movement to transform health care in America by exemplifying the tenets of Permanente Medicine – person-centered, high-quality care that embraces the latest innovations in medicine and is supported by an integrated care delivery model. • The Permanente Medical Groups (PMGs) make up the largest consortium of private medical groups in the United States, providing world-class care as part of the nation's largest nonprofit health system. It has been our mission to improve the health of patients and communities for more than 70 years. • The eight Permanente Medical Groups are self-governed, self-managed, physician-led, multi-specialty medical groups that work exclusively with Kaiser Foundation Health Plans and Kaiser Foundation Hospitals to provide care for the more than 12.2 million members of Kaiser Permanente. There are more than 22,000 Permanente physicians in eight states and the District of Columbia. They work collaboratively, enabled by state-of-the-art facilities and technology, to provide preventive and world-class complex care.
Patient or system outcomes	• Remote Glucose Monitoring has proved even more beneficial for underserved populations who find it difficult to receive care because of the lack of reliable transportation, concern over unpaid time away from work, and family obligations.
Cost	• None found
Evaluation or references	• None found
Related Web links	• https://permanente.org/revolutionizing-diabetes-monitoring/
Data Extraction for Summary Table 20 **Program Name**	Connected Cardiac Care Program
Jurisdiction	• Boston
Condition(s)	• Heart failure
Brief Description of program/RPM initiative	• CCCP is a 4-month home telemonitoring and education program designed to improve self-management in heart failure patients at risk for hospitalization within the Partners HealthCare network of hospitals.
Service User/Patient Eligibility	• heart failure patients at risk for hospitalization within the Partners HealthCare network of hospitals
Delivery Model	**Connected Cardiac Care Program** • four-month remote monitoring and education program designed to improve the management of heart failure patients at risk for hospitalization • Our team brings easy-to-use equipment to your home, installs it for you and shows you how to use it. There is no cost to enroll or for use of the equipment. • Heart failure is a chronic, life-changing and difficult disease to manage. At the end of this four-month program, you will have the confidence to take charge of your own health.

	Agboola, 2015 • CCCP is a 4-month home telemonitoring and education program designed to improve self-management in heart failure patients at risk for hospitalization within the Partners HealthCare network of hospitals. Participants monitor relevant physiologic parameters (blood pressure, heart rate, weight, and blood oxygen saturation) and answer questions on heart failure–related symptoms on a touch-screen computer on a daily basis (Figure 1). The remote monitoring equipment included ViTel Net and devices approved by the Food and Drug Administration: a UA 767PC Turtle 400 monitor, a Life-Source digital weight scale, an A&D blood pressure cuff and meter, and a BCI pulse oximeter device (UC-321PBT). Measurements and responses to symptom questions are transferred securely to a remote monitoring database where the records are reviewed by telemonitoring nurses. Participants also receive structured biweekly telephone-based education sessions over an 8-week period. Patient education covered a variety of topics including diet, physical activity, importance of daily measurements, recognizing symptoms of disease decompensation, and medication adherence. In addition to the structured educational sessions, they received "just-in time" teaching, that is, unscheduled education done to intervene when the remote monitoring nurses observe that measurements fall outside the set baseline range customized for each participant by their physicians or at the onset of new symptoms.
Partners Involved	• Partners HealthCare is an integrated health system founded by Brigham and Women's Hospital and Massachusetts General Hospital. In addition to its two academic medical centers, the Partners system includes community and specialty hospitals, a managed care organization, community health centers, a physician network, home health and long-term care services, and other health care entities. • Partners HealthCare is a non-profit organization. • Partners HealthCare at Home is part of Partners HealthCare, founded by Massachusetts General Hospital and Brigham and Women's Hospital, serving Eastern Massachusetts. • Together, Partners HealthCare at Home and the Spaulding Rehabilitation Network constitute the non-acute care services division of Partners HealthCare. We are committed to delivering compassionate care across the healthcare continuum to improve quality of life for persons recovering from, or learning to live fully with, illness, injury and disability. • Partners HealthCare at Home is part of Partners HealthCare, founded by Massachusetts General Hospital and Brigham and Women's Hospital, serving Eastern Massachusetts. • We take a multidisciplinary approach to home care. Our expert staff – including nurses, rehabilitation therapists, social workers and home health aides – works as a team to coordinate each individual's care • Partners selected Philips as its telemonitoring partner based on its proven track record in implementing their other home based innovative clinical programs — Lifeline and Medication Dispensing — for PHH patients. These services transform the way care is delivered by creating the shortest path to the best care, from hospital to the home. Developed in collaboration with clinicians and health systems, Philips' hospital to home programs equip providers with a range of tools and services that lay the foundation for long-term success with telehealth. • The first 200 home monitors were installed in patient homes in less than two weeks. Partners utilized its own network of installers as a key asset in establishing monitoring services in patients' homes and providing the training needed to ensure both clinical and patient adoption.
Patient or system outcomes	Chronic Cardiac Care • The agency has already demonstrated positive results with telemonitoring through its Chronic Cardiac Care program. Since 2006, PHH has served 1,200 heart failure patients through this program and found a 50 percent reduction in readmission rates for enrolled patients, with an estimated savings of $10 million in health care costs. • study to evaluate the effectiveness of a remote monitoring program for heart failure patients conducted by Partners HealthCare Connected Health demonstrated significantly lower hospitalization and mortality rates, for up to 90 days and 120 days after discharge, respectively • The hospitalization rates for both the intervention and control groups were similar at baseline; hospitalizations decreased dramatically in the CCCP group compared to the control group throughout the duration of the four-month remote monitoring program. Mortality rates were also significantly lower in the remote monitoring group compared with the

	control group at the end of the program. At the one-year follow up, hospitalizations did not differ significantly by group; the mean length of hospital stay was also similar in both groups. • Following patients an additional eight months after program completion showed that hospitalization rates increased among the remote monitoring group, but were not significantly different compared to controls. Although not statistically significant, mortality rates over one-year follow up were lower in the remote monitoring group. • Although mortality rates increased in the remote monitoring group after program completion, the overall effect was still beneficial compared to controls over the one-year follow up.
Cost	• Since 2006, PHH has served 1,200 heart failure patients through this program and found a 50 percent reduction in readmission rates for enrolled patients, with an estimated savings of $10 million in health care costs.
Evaluation or references	• Agboola, 2015, Heart Failure Remote Monitoring: Evidence From the Retrospective Evaluation of a Real-World Remote Monitoring Program (17)
Related Web links	• http://www.partnersathome.org/why-us/about-us/news/royal-phillips.aspx • http://www.partnersathome.org/why-us/about-us/default.aspx • http://www.partnersathome.org/our-services/healthcare-technology/telemonitoring.aspx • https://www.healthitoutcomes.com/doc/partners-health-heart-failure-patients-significantly-mortality-rates-improve-long-0001

Australia

Data Extraction for Summary Table 21 **Program Name**	My Health Clinic at Home (MHCAH)
Jurisdiction	• Australia
Condition(s)	• Chronic conditions
Brief Description of program/RPM initiative	• Aged care not-for-profit Feros Care has received the nod to expand the service to other regions following a successful pilot of its telehealth technology in Coffs Harbour. • The organisation has been given Commonwealth funding to roll out its telehealth service - which connects seniors to medical information and nursing staff from the comfort of their living room chairs - into South East Sydney on a more permanent basis, now that grants have dried up for its NBN-enabled Coffs trial. • The service, called My Health Clinic at Home (MHCAH), was formally launched across Feros' new Sydney sites this week. Promotion of the service, to increase uptake and community awareness, will begin next week. • MHCAH provides touch screen computers and measuring devices to 200 seniors, enabling them to test and record their own vital signs while maintaining regular contact with a health team via face to face consultations using a computer and a video camera.
Service User/Patient Eligibility	• The tools will be deployed to residents in South East Sydney who are over 65, and Aboriginal or Torres Strait Islanders over 50, who have a chronic health condition such as unstable blood pressure, lung disease, diabetes or heart failure. Patients will pay just $10 a week to use the service.

Delivery Model	• The service includes the installation of a touch-screen tablet that uses a simple big button interface that is customised for each client. Medical grade Bluetooth devices are paired to the tablet to allow for wireless transmission of vital signs such as blood pressure, weight, blood glucose and temperature.
	• Vital signs are then transmitted to a cloud-based triaging portal for a nurse or doctor to monitor patient care.
	• The tablets offer high definition video to allow the patient to talk to a Feros telehealth nurse, doctor or specialist either one-on-one or all together using multi-conferencing technologies. The tablet is also equipped with social video conferencing to allow patients to call family and friends with a one-click solution.
	• The service is initially being provided over 4G and ADSL, with plans to transition to high speed broadband when it is rolled out.
	
	My Health Clinic At Home is a service that allows you to monitor your health and wellness at home using simple technology. You can keep in regular contact with your health team without having to leave your home, using a computer with a video camera.
	
	• Delivered by Feros Care clients are provided with a touch-screen computer and measuring devices so you can record your vital signs (like your blood pressure, oxygen levels and blood sugars) each day.
	• Your results are transmitted securely to a specially trained Telehealth Registered Nurse for review. You can discuss your results with your Telehealth Registered Nurse via a videoconference or telephone call on any weekday.
	
	• The MHCAH service includes:
	  ○ MHCAH small touch screen computer
	  ○ Vital signs monitoring equipment
	  ○ Training on how to use the equipment and ongoing help
	  ○ Daily (weekday) remote monitoring by a telehealth registered nurse
	  ○ Self-management education and support from a telehealth registered nurse
	  ○ In-home video conferencing to the telehealth nurse and possibly a GP and other health professionals
	• MHCAH also provides daily vital signs information and trends; valuable information that can be used by GPs, specialists and other health professionals for clinical decision making. The video conference capability can allow the health professional to see the patient in a timely manner, in situations where clients are not able to find transport to a surgery or medical practice

Partners Involved	• Aged care not-for-profit Feros Care • Given Commonwealth funding to expand to other regions (past pilot sites) • The cutting edge service is under the umbrella of Home and Community Care (HACC), a federal government program funded through the Department of Social Services. • The My Health Clinic At Home (MHCAH) telehealth service was developed by award winning not for profit aged care provider, Feros Care, and funded by the federal government
Patient or system outcomes	• The Coffs Harbour pilot provided a chance to hone the service with improvements including the use of lighting, head phones and adjustments to the user interface. • “The NBN pilot was invaluable in improving the effectiveness and efficiency of the service,” Payne said. • The pilot project, funded by the federal government in 2013 under a scheme designed to demonstrate the capabilities of the nation's National Broadband Network (NBN), targeted seniors living at home with health conditions including chronic obstructive pulmonary disease, unstable blood pressure, diabetes and/or chronic heart failure.
Cost	• None found

Evaluation or references	• None found
Related Web links	• https://www.itnews.com.au/news/feros-care-wins-new-funding-for-telehealth-rollout-385638 • https://www.feroscare.com.au/alarms-tech-aids/my-health-clinic-at-home • https://www.agedcareguide.com.au/talking-aged-care/new-telehealth-service-promotes-health-at-home

Denmark

Data Extraction for Summary Table 22 **Program Name**	TeleCare North
Jurisdiction	• Denmark
Condition	• COPD
Brief Description of program/RPM initiative	• The TeleCare North project has implemented home monitoring to support patients suffering from COPD (chronic obstructive pulmonary disease). • Began 2013
Service User/Patient Eligibility	• Severe or very severe COPD
Delivery Model	• The concept includes tools such as video consultations, home training and solutions that enable patients to access patient networks or other sources of knowledge about their condition. It may also be supplemented with questionnaires, where the patient responds to health-related questions through an easy-to-use telehealth app. • Using a special 'Telekit', patients monitor vital data on their current health and consult with healthcare professionals directly from their own home. • Twice a week, the patient tests blood pressure, pulse rate, saturation and weight with equipment connected via Bluetooth to a tablet and a user-friendly telehealth app. The patient also responds to health-related questions about breathing difficulties and coughing. The results are immediately transmitted through mobile broadband, and healthcare professionals may take action at any given time if necessary. • The Telekit system was installed by a technician in the patients' home, and if the patients experienced various technical problems with the equipment or for other reasons desired to return the system, it was collected again by the technician who calibrated the equipment. • Telekit consists of a Samsung Galaxy tablet (Samsung Galaxy TAB 2, 10.1,Samsung Electronics, Seoul, South Korea) (123), a fingertip pulse oximeter (Nonin, Onyx II% SpO2, A&D Medical, Tokyo, Japan) (124), a blood pressure monitor (Model UA-767, plus BT-C, Nonin Medical, Minnesota, USA) (125), a precision health scale (UC-321PBT-C, A&D Medical, Tokyo, Japan) (125), a tablet pen, and a user guide [Paper I]. • The Telekit tablet has two apps. The first app, OpenTele, contains questionnaires that collect patients' answers regarding their respiratory symptoms. The app also collects vital signs measured through Telekit's devices via Bluetooth. Additionally, the patients have access to their measurements and access to a message function to initiate a conversation with the healthcare providers. This message function is for non-acute messages. The second app is a support app that contains a digital version of the instruction guide, several videos that illustrate how Telekit and the various devices can be used, and a training video targeted to patients with COPD (126). The COPD patients measured their respiratory

	symptoms and vital signs (heart rate, blood pressure, oxygen saturation, and weight) weekly through the Telekit system (see Figure 4). Patients' data were monitored asynchronously and sent via wireless internet connection through the tablet to a platform that was viewed by district nurses in the municipalities. Patients had access to their data on the tablet or via the public health portal (www.sundhed.dk). • The GPs also had access to the health portal (www.sundhed.dk). The district nurses viewed the data from a web portal, OpenTele, on scheduled days in the week. These nurses manually interpreted the data based on color codes: green (normal values – no threshold values are exceeded); yellow (providers should be aware of the condition of patients – one or more threshold values are exceeded); and red (the patient's condition is at risk, probably due to an exacerbation – one or more threshold values are exceeded and have not previously been recorded).The threshold values for the patients' conditions were specified by the patients' GPs. These color codes constituted a recommended order of reviewing the submitted data and were managed in accordance with the compiled instructions. The patients were contacted if their values fell outside these threshold values to establish further treatment. The intervention patients were able to keep the Telekit system and the control patients were offered the system after trial completion. The district nurses' web portal and the telehealthcare system architecture are depicted in Figures 5 and 6, respectively.
Partners Involved	• The project has established new cross-sector roles and procedures to support the region wide implementation of home monitoring. This has paved the way for a new integrated care model, which allows the concept to be expanded to other patient groups. • The Telecare North project required a new way of organizing referral of patients to telehealth and determining the cooperation between clinical professionals in hospitals, primary care and municipalities. Therefore, an Integrated Care model to document this new kind of workflow was developed a collaborative effort between the regional authority, its hospitals, GPs and 11 municipalities • Implementation of home monitoring requires a well-functioning IT infrastructure, telehealth equipment and solutions designed to meet the needs of patients and healthcare professionals. In the TeleCare North project, the technical solution is based on a flexible open-source telehealth platform. This makes it possible to expand the home monitoring concept to other patient groups and to integrate new devices and technologies. • The scalability is supported by an interorganisational service centre concept to deliver the logistics, education and maintenance solutions that are necessary to operate large scale telehealth services. • The Danish IT company, Silverbullet, provides the technical infrastructure for the project (at least originally)
Patient or system outcomes	• The majority of patients experience improvements with regard to disease control, confidence and self-management. For instance, they are able to respond to early signs of deterioration and prevent hospitalisation in favour of personalised self-management plans from their own GP. • Due to increased knowledge about their own illness, they also feel better equipped for the dialogue with healthcare professionals. • For patients with severe COPD, telehealth has increased rehabilitation activities by 9% • The results show that the group of patients with severe COPD experienced improved quality of life, and the number and length of hospitalisations were reduced by 11% and 20% respectively • Most patients (61.7%) experienced improved control of their disease by using the system. • Most patients (71.7%) experienced improved security by using the system. • Half of the patients (50%) experienced increased awareness of their COPD symptoms and responded proactively. • The majority of patients (96%) found the system "easy" or "very easy" to use. • 27% of patients experienced more freedom. • Patients **with severe** COPD experienced enhanced quality of life ○ CRT showed "The overall sample and all subgroups demonstrated no statistically significant differences in HRQoL between telehealthcare and usual practice" (21)

	○ May have other benefits but for quality of life improvements might only be expected for severe COPD • "The study concludes that, across the COPD severities, patients with severe COPD (GOLD 3 classification) are likely to be the most cost-effective group. This is primarily due to lower hospital-admission and primary-care costs. Telehealthcare for patients younger than 60 years is also more likely to be cost-effective than for older COPD patients. Overall, results indicate that existing resource patterns of patients and variations in delivery-site practices might have a strong influence on cost-effectiveness, possibly stronger than the included health or sociodemographic sources of heterogeneity." (23)
Cost	**The economics of telemedicine for patients with COPD (From Agency from Digitisation, Ministry of Finance)** • The research achievements from TeleCare North show that there is a need for targeting telemedicine to patients with severe COPD, if short term effects regarding both health and public spending are to be obtained. • In the spring of 2015, a preliminary business case was drawn up based on the initial data from TeleCare North. The business case shows a balance between gains and costs. The business case is based on all the included patients from the TeleCare North project. • There are relatively great gains (primarily due to fewer emergency hospitalizations) as well as costs (primarily due to purchase of equipment and the work of monitoring patients' data). • The business case shows that the accumulated net potential on a national basis is negative with 28 million DKK over a period of five years, while the annual net potential with a complete phase-in of the business case is positive by 1,5 million DKK on a national basis. • TeleCare North has four Ph.D.'s from the University of Aalborg assigned to the project, including a Ph.D. who has examined the health economic effects of telemedicine to patients with COPD. • The results from TeleCare North show that telemedicine for patients with COPD must be targeted, if both cost savings and an effect in 'quality-adjusted life years' are to be obtained. 'Quality-adjusted life years' is a complex measure showing how long a person lives and how well the person feels, while they are alive. If the telemedicine offer is targeted to patients with severe COPD (COPD patients in GOLD-group 3), it is possible to obtain both an effect in quality-adjusted life years and at the same time obtain cost savings. The reduced costs are around 7000 DKK annually per patient. • Furthermore, the results from TeleCare North show that telemedicine produces a gain regarding quality-adjusted life years for the majority of the patients, but that the gain is associated with additional costs around 5400 DKK per patient annually, if telemedicine is offered to all patients with COPD in the Tele Care North group, and not targeted to patients with severe COPD. **New consolidated business case** • Recently, a new business case based on solid data from Denmark's largest pilot project regarding telemedical home monitoring, TeleCare Nord, has been completed. The business case shows that telemedical home monitoring benefits patients in several areas. The patients become more knowledgeable about their own disease, gain better skills to self-care and influence on their own condition. Furthermore, patients in the intervention group experienced higher quality of life and safety compared to the control group. • There are both great financial gains and costs associated with a national dissemination of telemedical home monitoring for patients with COPD. The business case calculations show that the national accumulated net potential is positive by DKK 483 million over five years, while the yearly net potential at full phase-in of the business case is DKK 202 million. • The consolidated business case is available in English and Spanish and can be found in the right column.
Evaluation or references	• Healthcare Denmark, 2018, Denmark - a telehealth nation White Paper (18) • Lilholt, 2016, An Iterative, Mixed Usability Approach Applied to the Telekit System from the Danish TeleCare North Trial (19) • Lilholt, 2017, Telehealthcare for patients suffering from COPD: effects on health-related quality of life: results from the Danish 'TeleCare North' cluster-randomised trial (21)

	• Witt Udsen, 2017, Cost-effectiveness of telehealthcare to patients with chronic obstructive pulmonary disease: results from the Danish 'TeleCare North' cluster- randomized trial (22) • Lilholt, P. H. (2016). Evaluation of a Telehealthcare Intervention for Patients with COPD: health- and patient-related evaluation of the Danish telecare north trial. Aalborg Universitetsforlag. Ph.d.-serien for Det Sundhedsvidenskabelige Fakultet, Aalborg Universitet, DOI: 10.5278/VBN.PHD.MED.00070 (20) • Witt Udsen, 2017, Subgroup analysis of telehealthcare for patients with COPD the cluster-randomized Danish Telecare North Trial (23)
Related Web links	• https://www.healthcaredenmark.dk/media/1625194/HCD-Telehealth-white-paper-v1-single-0318.pdf • https://en.digst.dk/policy-and-strategy/digital-welfare/telemedicine/background/telecare-north-has-shown-the-way/ • https://en.digst.dk/policy-and-strategy/digital-welfare/telemedicine/background/the-economics-of-telemedicine/ • https://en.digst.dk/policy-and-strategy/digital-welfare/telemedicine/background/telemedicine-gives-patients-zest-for-life/ • http://www.ehealthforregions.net/fileadmin/user_upload/Virtuelt_seminar_Ehealth_for_regions_2._november_2016.pptx.pdf • http://www.healthcaredenmark.dk/news/danish-telehealth-project-expands.aspx

Appendix B:

Additional Information on Recent RPM Research and Services

Ongoing Pilot Studies/ Research

Jurisdiction	Research	Condition(s)	Technology	Reference/ Links
British Columbia	**Mobile Digital Access to Web-enhanced Network (mDAWN)** This was a feasibility study, mobile Digital Access to a Web-enhanced Network (mDAWN), to examine the use of mobile technologies (wireless monitoring sensors, social media, and text messaging) in an attempt to address this gap and to better understand the potential of mHealth programs to support both individuals with type-2 diabetes and their caregivers.	Type-2 Diabetes	Blipcare blood pressure monitor and weight scale, blood glucose monitor	Ho, 2015, mobile Digital Access to Web-enhanced Network (mDAWN): Assessing the Feasibility of Mobile Health Tools for Self-Management of Type-2 Diabetes (31)
	Phases of the Home Health Monitoring Expansion Projects • Cardiac Home Monitoring Project • Telehealth for Emergency-Community Continuity of Care Connectivity via Home Telemonitoring (TEC4Home Heart Failure; TEC4Home COPD)	Started with heart failure and is now expanding to have RPM for COPD	Used Honeywell Lifecare Solutions initially but switched to Telus Sensors in phase 2. Telus Sensors: touchscreen tablet, blood pressure cuff, weight scale, and pulse oximeter, pedometer	Buhler, 2018, Interior Health Cardiac Home Monitoring Project –Phase II: 2016 – 2018 Benefits Evaluation Report (32) University of British Columbia (UBC) Department of Digital Emergency Medicine: Projects
	Telehomecare Pilot Project VIHA initiated the pilot to support their five-year strategic plan that placed chronic disease management as a priority. The THC Pilot Project would allow clinicians to closely monitor their clients in an effort to reduce disease complications and empower clients to become more active in their own chronic disease self-management	Chronic Heart Failure	Monitoring Units: scale, blood pressure cuff, and oximeter, installed tablet device Device monitors scheduled readings for systolic and diastolic pressure, SpO2, heart rate, temperature, and weight	Andreatta, 2015, A Comparison of Telehomecare Delivery Models for Congestive Heart Failure In Three Canadian Jurisdictions (10) BC Ministry of Health, 2013, Benefits Evaluation Report Telehomecare Heart Failure Pilot Projects (33)
	MyHealthConnect The aim of the Internet-based Chronic Disease Management (iCDM) study is to develop and evaluate a multi-chronic disease management program (MyHealthConnect) delivered through the Internet, with telephone supports.	Multi-chronic disease	Interactive website: State and physical measure data recorded by patient	https://clinicaltrials.gov/ct2/show/NCT01342263 http://www.bcatpr.ca/news-assets/iCDM-research-media-article.pdf
Alberta	**MyHomeHealth Program** In May 2013, the Alberta government, in partnership with GE Canada and Alberta Health Services, collaborated on the Alberta	Heart Failure	Intel-GE Care Innovations Guide, a remote care device with touch-screen	Cited but not found- Home Health: A Virtual Care Management Pilot Program for Self-Management of Congestive Heart Failure. Final Report. Ivey

Jurisdiction	Research	Condition(s)	Technology	Reference/ Links
	MyHomeHealth Pilot Project. The pilot planned to remotely monitor 250 patients over 50 years of age living with CHF in the Sherwood Park-Strathcona County Primary Care Network.			International Centre for Health Innovation and Institute of Health Economics, Edmonton, Alberta. February 2016 Andreatta, 2015, A Comparison of Telehomecare Delivery Models for Congestive Heart Failure In Three Canadian Jurisdictions (10) Canada Health Infoway, Pan Canadian Connecting patients with providers RPM benefits (11) Care Innovations, 2016, Clinical Outcomes (34)
Ontario	**Welldoc's® BlueStar® diabetes virtual care coach app** OTN is partnering with diabetes education centres at St. Joseph's Care Group (Thunder Bay), William Osler Health System and North York General Hospital, to provide patients with type 2 diabetes a customized mobile diabetes self-management and lifestyle-tracking tool. The BlueStar app is a product of WellDoc, a digital health technology company. It provides patients with reminders and tools to support behavioural and lifestyle changes while providing their primary care providers with trending data to help support their care plan. The Women's College Hospital Institute for Health System Solutions and Virtual Care will evaluate results of the pilot, which is funded by Canada Health Infoway and the Ontario Ministry of Health and Long-Term Care.	Type 2 Diabetes	Smart phone enabled application – stores data on blood glucose readings, activities, exercise, sleep patterns, dietary patterns and medications	Desveaux, 2018, A Mobile App to Improve Self-Management of Individuals With Type 2 Diabetes: Qualitative Realist Evaluation (35) https://www.welldoc.com/product/ https://clinicaltrials.gov/ct2/show/NCT02813343
	SmartCoach is a remote monitoring system that uses wireless technology to connect patients living with chronic diseases to care providers who monitor their vital signs remotely, providing assessment of vital signs (blood pressure, pulse, blood glucose, weight and blood oxygen), information about managing their illness, and adjustments to their care plan. The main focus of the project was to reduce unnecessary hospitalizations and emergency room visits while encouraging and allowing patients to manage their conditions at home.	COPD Chronic heart failure	AlayaCare's RPM software, a patient app, a telehealth dashboard, family portal, and AI-powered clinical support tools Biometrics monitored: blood pressure, pulse, blood glucose, weight and blood oxygen)	https://www.alayacare.com/the-smartcoach-remote-monitoring-program#section-widget_1519147759208

Jurisdiction	Research	Condition(s)	Technology	Reference/ Links
	Cloud DX Connected Health Kit Markham Stouffville Hospital (MSH) in partnership with Women's College Hospital (WCH) Closing the Gap Healthcare and Cloud Diagnostics Canada (Cloud Dx) developed a comprehensive self-management program that includes a connected health kit and personalized action plan for COPD patients. They can use this program to be more knowledgeable about their disease and recognize when they require additional interventions. This will shorten the impact of a flare-up and reduce the impact that it has on their recovery and quality of life. Piloting solution 2017-2018	COPD	Cloud DX Connected Health Kit: Pulsewave wrist cuff device, a bluetooth body-weight scale and optionally a bluetooth oximeter and bluetooth thermometer. If you or your doctor has selected one, you will also receive a Cloud DX Health Tablet. The Pulsewave app will open automatically and the bluetooth devices are already paired. Batteries are included.	https://www.clouddx.com/#/remotepatientmonitoring http://hospitalnews.com/taking-control-chronic-illness-technology/
	iUGO (formerly called Carekit) The Sioux Lookout Meno Ya Win Health Centre (SLMHC) is taking part in a first of its kind in Ontario, automated remote patient monitoring pilot program. Partnering with iUGO Care by Reliq Health Technologies, the program will allow 20 Sioux Lookout Diabetes Program patients living in remote First Nation communities to be monitored by their circle of care team without having to leave their homes. The pilot program will start in January 2018 and run for six months.	Diabetes	The iUGO Care Solution: voice technology platform, measure their vitals using Bluetooth- enabled biometric devices Reliq Health's software platform	http://globenewswire.com/news-release/2018/02/27/1395951/0/en/Reliq-Health-Technologies-Announces-Go-Live-of-Diabetes-Pilot-with-Sioux-Lookout-Meno-Ya-Wen-Health-Centre.html
Yukon	**Home Health Monitoring for Yukoner**s Government of Yukon's home health monitoring trial is going live on January 16, 2017. It will allow Yukoners with chronic obstructive pulmonary disease (COPD) to monitor their condition from their homes and communities.	COPD	TELUS Health Solutions to provide support - tablets, weight scales, blood pressure monitors and other equipment to measure vital signs, oxygen saturation and lung performance	http://www.hss.gov.yk.ca/pdf/HHMbrochure.pdf https://www.cbc.ca/news/canada/north/yukon-home-health-monitoring-telus-pilot-1.3679237 http://www.gov.yk.ca/news/17-004.html#.WHel2n0a5o9

Jurisdiction	Research	Condition(s)	Technology	Reference/ Links
				https://www.yukon-news.com/news/home-health-monitoring-program-gets-up-and-running/
Australia	**My Healthcare Tablet (MyCH or Breezie Tablet)** CATHOLIC Healthcare, Samsung Electronics Australia, Breezie Inc., and Ethan Group, have entered into a collaboration to deliver a new tablet solution to older Australians designed to help support greater independence for clients, and improve connectivity to relevant health services and important online communication channels.	Seniors, Catholic Healthcare Community Services clients	Breezie tablet is a hand held digital device that comes fully personalised, connected to the internet	https://www.catholichealthcare.com.au/en/news/older-australians-benefit-from-tailored-technology-solutions/
	TEXT ME was a randomised controlled trial that was the first to show that a text message based-intervention reduced LDL cholesterol, blood pressure, weight and cardiovascular risk among patients with coronary heart disease. The messages were developed by a team of clinicians, public health academics, psychologists, patients and others and tailored to participants. Among the 710 participants involved, those who received the messages had a lower body weight (body mass index 29 versus 30), lower blood pressure (systolic 128 versus 136 mm Hg) and were less likely to smoke (26% versus 43%). Supported by the Heart Foundation and BUPA Foundation.	Coronary heart disease	Text message	Chow CK, Redfern J, Hillis GS, Thakkar J, Santo K, Hackett ML, Jan S, Graves N, de Keizer L, Barry T, Bompoint S, Stepien S, Whittaker R, Rodgers A, Thiagalingam, 2015, Effect of Lifestyle-Focused Text Messaging on Risk Factor Modification in Patients With Coronary Heart Disease: A Randomized Clinical Trial. Sep 22-29;314(12):1255-63 (36) Redfern J, Thiagalingam A, Jan S, Whittaker R, Hackett ML, Mooney J, De Keizer L, Hillis GS, Chow CK, 2014, Development of a set of mobile phone text messages designed for prevention of recurrent cardiovascular events. Eur J Prev Cardiol. 2014 Apr;21(4):492-9 (37) https://sydney.edu.au/research/centres/westmead-applied-research-centre.html#uniqueId_ykYvw3v7_2_button
	TEXTMEDS is an ongoing randomised controlled trial investigating whether a secondary prevention program delivered via text messages will improve medical adherence and cardiovascular risk factors in patients who have recently suffered a heart attack. Over 1200 of the target 1400 patients have been recruited from about 15 hospitals in Australia. The proposed study will be the largest study to examine the impact of texting in cardiovascular disease secondary prevention. Supported by the National Health and Medical Research Council of Australia (NHMRC).	Heart issues	Automated mobile text messages	
	SupportMe aims to extend and translate the evidence-based TEXTME program into a service model for a broader patient population with chronic disease in Western Sydney. In addition to formal evaluation in a randomised clinical trial, the project will examine how to integrate its delivery into existing state and national health services and technological platforms. It is conducted in partnership with Western Sydney Local Health District (LHD), Western Sydney Primary Health	Chronic disease	Mobile text messaging	

Jurisdiction	Research	Condition(s)	Technology	Reference/ Links
	Care Network (PHN), The George Institute for Global Health, The University of Sydney, The Office of Preventive Health, The Office of the Chief Health Officer, Illawarra Shoalhaven LHD, Diabetes NSW. Supported by the NSW Translational Research Grant Scheme (TRGS).			
	ITM Study aims is to utilise a text message support program to increase engagement and participation in chronic disease management programs (mainly cardiac and pulmonary rehabilitation) with the goal to reduce hospitalisations and improve quality of life. It is conducted in partnership with the Sydney Local Health District, The George Institute for Global Health, University of Sydney, NSW Agency for Clinical Innovation (ACI), Department of Premier and Cabinet. Supported by the NSW Cardiovascular Research Network (CVRN).	Chronic disease	Text messaging support program	
European initiative	**Universal solutions in telemedicine deployment for European health care – United4Health** is a Pilot A project under the ICT-PSP Competitiveness and Innovation Framework Programme, supported by the European Commission. The project ran from January 2013 - December 2015, a total of 36 months. The project involved 32 organisations from across Europe. Some organisations represented regional healthcare institutions or authorities, while others were multinational organisations or specialist organisations with a wider supporting role.	Diabetes COPD Heart Failure	Dependent on condition Can include devices to monitoring (glucose monitoring, heart rate, blood pressure, weight), website, video conferencing Portal for access to patient data	Rasmussen, 2016, UNIversal solutions in TElemedicine Deployment for European HEALTH care: D1.8 Final Report Version 1.2 (38) Stafylas, 2014, UNIversal solutions in TElemedicine Deployment for European HEALTH care: Document D3.1 Scientific study protocols for each of the three multicentre studies Version 1.5 (39)
UK	Our collective vision for Diabetes Digital Coach is to 'enable every citizen to self-care in their own way to the benefit of their health, both physical and mental.' This Test Bed gives the opportunity for healthcare commissioners, hospitals and community providers to work with a number of companies with self-management products already on the market in order to experiment with and evaluate different innovative approaches and technologies.	Type 1 or Type 2 Diabetes	Web-based, available via smart phone, tablet and PC Digital tools include: Lincus KiActiv® Health Mapmydiabetes SocialDiabetes Oviva	https://www.diabetesdigitalcoach.org/ https://www.diabetesdigitalcoach.org/test-bed-partners/ https://www.weahsn.net/news/update-diabetes-digital-coach/
	Digital Care Home Project (Sheffield City region) The Perfect Patient Pathway Test Bed aims to create the 'perfect patient pathway' to bring substantial benefits for patients suffering from long term health conditions, such as diabetes, mental health problems, respiratory disease, hypertension and other chronic conditions.	Long term health conditions – diabetes, mental health problems, respiratory	General digital Home Care Service (web portal) using desktop or smartphone app on a tablet device Data integrates directly into clinical systems including SystmOne and EMIS Web, meaning it can be accessed by NHS teams remotely.	http://ppptestbed.nhs.uk/projects/digital-care-home-project/ http://ppptestbed.nhs.uk/#story https://www.inhealthcare.co.uk/digital-health-services/digital-care-home/

Jurisdiction	Research	Condition(s)	Technology	Reference/ Links
		disease, hypertension and other chronic conditions		
Norway	National Personal Connected Health and Care Programme using MyDignio app This programme is designed to ensure that personal connected health and care is made an integrated component of health and care services by 2020. The personal connected health and care in Central Oslo project – Velferdsteknologii Sentrum (VIS) – was established in mid-2014 on the basis of this objective. The annual ministerial letter of allocation (no. 18/11-2913) from the Directorate of Health makes execution of the project subject to performance of formative dialogue research to document the effects of personal connected health and care within the home care services.	chronic, or long-term, health conditions	MyDignio app supplied 3 solutions: Electronic drug dispenser (Pilly), Mobile personal alarm, Remote care assistance (adapted to different needs)	VIS, 2016, The Introduction of Personal Connected Health and Care in the Central Districts of Oslo (40) https://www.dignio.com/our-services
USA	Youthisme (UTM) Remote Patient Monitoring Columbia Memorial Hospital Remote Patient Monitoring, or RPM, was created in a partnership between CMH and YouThisMe, abbreviated UTM. It was designed for patients with common chronic conditions such as congestive heart failure, myocardial infarction (heart attack), COPD (chronic obstructive pulmonary disease), diabetes and pneumonia.	common chronic conditions	iPhone pre-loaded with the RPM app and several wireless biometric devices. The devices include a Bluetooth-based scale, blood pressure cuff, and pulse oximeter. A provider enters acceptable data ranges into a patient monitoring dashboard before issuing the kit.	https://www.youthisme.com/healthcare/remote-patient-monitoring/

Services/Products

Jurisdiction	Service/Product	Condition(s)	Technology	Reference/ Links
Finland	MyHealthway is a mobile health startup company with a Nokia past and presence in bringing to the market a mobile service application for interactional self-management of any condition relating to health or wellness. The company is committed to building the bridge between patient and the care team for increased visibility and understanding of the overall condition of the patient.	chronic disease	An application for all smart phone operating systems (Android and iOS), secure internet application for the doctor and patient as well as a related database. In addition to smart phones, the application can also be used on tablets	http://www.myhealthway.fi/en/

Jurisdiction	Service/Product	Condition(s)	Technology	Reference/ Links
Sweden	ImagineCare solution for Telia Digital Health ImagineCare, an innovative provider of Digital Health Solutions, and Telia Company, are partnering to offer solutions for remote patient monitoring and individualized chronic care management. Initially, the partnership will target the Swedish market	Hypertension, CHF, COPD, and Diabetes	iOS mobile app, and Bluetooth-enabled remote sensing devic	https://static1.squarespace.com/static/572b7482b6aa6033e96c05c0/t/5ad584c070a6ad9f611bb699/1523942593727/English+Press+Release+-+ImagineCare+and+Telia.pdf
USA	Merlin@home™ transmitter, St. Jude Medical The Merlin.net™ Patient Care Network and Merlin@home™ transmitter work together to make up a communication system that offers increased safety in living with your pacemaker or implantable cardioverter defibrillator (ICD). If your medical team recommends remote monitoring for you and your device, you can perform follow-ups at home or even while travelling with the Merlin@home™ transmitter.	Heart failure	Merlin.net™ Patient Care Network and Merlin@home™ transmitter work together to make up a communication system using a landline to transmit data to a secure website for a doctor to view	https://www.sjmglobal.com/en-int/patients/arrhythmias/our-solutions/remote-monitoring
	Co-Pilot App & HGE Care Advanced application HGE Health HGE Health was formed as a Temple University spin off company to bring the Temple Lung Center's solution to the global COPD patient population. With senior executive experience from companies like Pfizer, Healthways, Change Healthcare, IBM, Deloitte, EDS, VerticalNet, Global Healthcare Exchange, and multiple large academic medical centers, a world-class team of health care and technology leaders has been assembled. The company leverages decades of insights and real-world experience tied to clinical care and research, healthcare technology, patient engagement, UI/UX experience, large-scale data and machine learning, and integrated delivery system-based disease management.	COPD	HGE Health's app on a smartphone, tablet, or PC that routes daily respiratory symptoms to a centralized secure platform	Smith HS, Criner AJ, Fehrle D, Grabianowski CL, Jacobs MR, Criner GJ. Use of a SmartPhone/Tablet-Based Bidirectional Telemedicine Disease Management Program Facilitates Early Detection and Treatment of COPD Exacerbation Symptoms. Telemed J E Health. 2016 May;22(5):395-9. doi: 10.1089/tmj.2015.0135. Epub 2015 Oct 9 (41) Cordova FC, Ciccolella D, Grabianowski C, Gaughan J, Brennan K, Goldstein F, Jacobs MR, Criner GJ. A Telemedicine-Based Intervention Reduces the Frequency and Severity of COPD Exacerbation Symptoms: A Randomized, Controlled Trial. Telemed J E Health. 2015 Aug 10. [Epub ahead of print] (42)
	Smart Meter iGlucoseDiabetes Management Care Solution The iGlucose solution, which uses cell-enabled technology to automatically transmit real-time blood glucose results, is providing clinicians with another tool for making connected health more available and more widely adopted, especially in support of chronic care management.	Diabetes	iGlucose Meter comes ready, out-of-the-box, for communicating via the cloud. After a simple registration on the web portal using the meter's serial number and the user's diabetes information, the meter and web portals are set for continuous two-way interaction, with no additional steps required.	https://www.smartmetercorporation.com/iglucose/

References

1. Government of Newfoundland and Labrador. The Way Forward: Chronic Disease Action Plan [Internet]. NL; 2017. Available from: http://www.releases.gov.nl.ca/releases/2017/health/0619n01.aspx

2. Government of Newfoundland and Labrador. The Way Forward: Building for Our Future [Internet]. NL; 2018. Available from: https://www.gov.nl.ca/pdf/the_way_forward.pdf

3. Lewis VA, Colla CH, Carluzzo KL, Kler SE, Fisher ES. Accountable Care Organizations in the United States: Market and Demographic Factors Associated with Formation. Health Serv Res. 2013 Dec;48(6 Pt 1):1840–58.

4. Fraser Health. BreatheWELL /COPD Services Condensed Implementation Plan [Internet]. 2015. Available from: https://www.divisionsbc.ca/CMSMedia/Divisions/DivisionCatalog-langley/March%202016/BreatheWell_Implementation_Jan_2016[1].pdf

5. Island Health. Evaluation of the Home Health Monitoring Expansion Project [Internet]. 20018. Available from: https://www.infoway-inforoute.ca/en/component/edocman/resources/reports/benefits-evaluation/3482-evaluation-of-the-home-health-monitoring-expansion-project

6. Lear SA, Singer J, Banner-Lukaris D, Horvat D, Park JE, Bates J, et al. Randomized trial of a virtual cardiac rehabilitation program delivered at a distance via the Internet. Circ Cardiovasc Qual Outcomes. 2014 Nov;7(6):952–9.

7. Lear SA, Singer J, Banner-Lukaris D, Horvat D, Park JE, Bates J, et al. Improving access to cardiac rehabilitation using the internet: a randomized trial. Stud Health Technol Inform. 2015;209:58–66.

8. Lear S. The use of the Internet to Deliver Cardiac Rehabilitation Remontely to Patients with Cardiovascualr Disease - Report of the “virtual” Cardiac Rehabiliation Program [Internet]. 2014. Available from: https://www.infoway-inforoute.ca/en/component/edocman/resources/reports/benefits-evaluation/2111-the-use-of-the-internet-to-deliver-cardiac-rehabilitation-remotely-to-patients-with-cardiovascular-disease

9. Brohman M, Green M, Dixon J, Whittaker R, Fallon L, Lajkosz K. Community Paramedicine Remote Patient Monitoring (CPRPM): Benefits Evaluation & Lessons Learned 2015-17 [Internet]. 2018. Available from: https://www.infoway-inforoute.ca/en/what-we-do/news-events/webinars/resources/reports/benefits-evaluation/3542-community-paramedicine-remote-patient-monitoring-cprpm-benefits-evaluation-lessons-learned

10. Andreatta C, McKibbon A. A Comparison of Telehomecare Delivery Models for Congestive Heart Failure In Three Canadian Jurisdictions [Internet]. 2015. Available from: https://www.google.com/search?q=A+Comparison+of+Telehomecare+Delivery+Models+for+Congestive+Heart+Failure+In+Three+Canadian+Jurisdictions&ie=utf-8&oe=utf-8&client=firefox-b-ab

11. Canada Infoway. Connecting Patients with Providers A Pan-Canadian Study on Remote Patient Monitoring [Internet]. 2014. Available from: https://www.infoway-inforoute.ca/en/component/edocman/supporting-documents/1918-rpm-benefits-evaluation-study-full-report-final

12. Paré G, Poba-Nzaou P, Sicotte C. Home telemonitoring for chronic disease management: an economic assessment. Int J Technol Assess Health Care. 2013 Apr;29(2):155–61.

13. Health PEI. Remote Patient Monitoring Project Canada Health Infoway - Benefits Evaluation Report [Internet]. 2017. Available from: https://www.infoway-inforoute.ca/en/component/edocman/resources/reports/benefits-evaluation/3476-remote-patient-monitoring-project-prince-edward-island

14. Reccord C, Kean R, Cross L. The impact of a remote patient monitoring pilot program within Eastern Health. An internal evaluation conducted on behalf of the Remote Patient Monitoring implementation team. [Internet]. NL; 2017. Available from: https://www.infoway-inforoute.ca/en/plan/resources/reports/benefits-evaluation/3472-an-evaluation-of-a-remote-patient-monitoring-solution-within-eastern-health

15. Broderick A. Case Studies in Telehealth Adoption: The Veterans Health Administration: Taking Home Telehealth Services to Scale Nationally [Internet]. The Commonwealth Fund; 2013. Available from: https://www.commonwealthfund.org/sites/default/files/documents/___media_files_publications_case_study_2013_jan_1657_broderick_telehealth_adoption_vha_case_study.pdf

16. Darkins A, Kendall S, Edmonson E, Young M, Stressel P. Reduced cost and mortality using home telehealth to promote self-management of complex chronic conditions: a retrospective matched cohort study of 4,999 veteran patients. Telemed J E-Health Off J Am Telemed Assoc. 2015 Jan;21(1):70–6.

17. Agboola S, Jethwani K, Khateeb K, Moore S, Kvedar J. Heart Failure Remote Monitoring: Evidence From the Retrospective Evaluation of a Real-World Remote Monitoring Program. J Med Internet Res. 2015;17(4):e101.

18. Healthcare Denmark. Denmark - a telehhealth nation: White Paper [Internet]. 2018. Available from: https://www.healthcaredenmark.dk/media/1625194/HCD-Telehealth-white-paper-v1-single-0318.pdf

19. Lilholt PH, Schaarup C, Hejlesen OK. An Iterative, Mixed Usability Approach Applied to the Telekit System from the Danish TeleCare North Trial [Internet]. International Journal of Telemedicine and Applications. 2016 [cited 2018 Jul 20]. Available from: https://www.hindawi.com/journals/ijta/2016/6351734/

20. Lilholt P. Evaluation of a Telehealthcare Intervention for Patients with COPD: health- and patient- related evaluation of the Danish telecare north trial [Internet]. Denmark: Aalborg Universitet; 2016. Available from: http://regioner.dk/media/6479/phd_pernille_heyckendorff_lilholt_e_pdf.pdf

21. Lilholt PH, Udsen FW, Ehlers L, Hejlesen OK. Telehealthcare for patients suffering from chronic obstructive pulmonary disease: effects on health-related quality of life: results from the Danish 'TeleCare North' cluster-randomised trial. BMJ Open. 2017 May 1;7(5):e014587.

22. Witt Udsen F, Lilholt PH, Hejlesen O, Ehlers L. Cost-effectiveness of telehealthcare to patients with chronic obstructive pulmonary disease: results from the Danish "TeleCare North" cluster-randomised trial. BMJ Open. 2017 17;7(5):e014616.

23. Witt Udsen F, Lilholt PH, Hejlesen OK, Ehlers LH. Subgroup analysis of telehealthcare for patients with chronic obstructive pulmonary disease: the cluster-randomized Danish Telecare North Trial. Clin Outcomes Res CEOR. 2017;9:391–401.

24. Park DG, Fraser J. BreatheWELL at Home: Access and Leadership in COPD Self-Management [Internet]. Webinar Series presented at; 2013 Jan 29. Available from: http://www.cdnhomecare.ca/media.php?mid=3276

25. Lear SA, Singer J, Banner-Lukaris D, Horvat D, Park JE, Bates J, et al. Improving access to cardiac rehabilitation using the internet: a randomized trial. Stud Health Technol Inform. 2015;209:58–66.

26. Brohman M, Green M, Dixon J, Whittaker J, Fallon L, Lajkosz K. Community Paramedicine Remote Patient Monitoring (CPRPM): Benefits Evaluation & Lessons Learned, [Internet]. Ontario, Canada: Canada Health Infoway; 2018. Available from: https://www.infoway-inforoute.ca/en/what-we-do/news-events/webinars/resources/reports/benefits-evaluation/3542-community-paramedicine-remote-patient-monitoring-cprpm-benefits-evaluation-lessons-learned

27. We Care Home Health Services, Alaya Care. The Effects of Machine Learning Powered Remote Patient Monitoring on Home Health Care White Paper [Internet]. 2015 Jul. Available from: https://cdn2.hubspot.net/hubfs/2702101/AA_AlayaCare_TBA/Resources/Documents/eGuides/Machine%20Learning%20White%20Paper%20eGuide.pdf?t=1511534953048

28. Jaana M, Sherrard H. Rural-Urban Comparison of Telehome Monitoring for Patients with Chronic Heart Failure. Telemed J E-Health Off J Am Telemed Assoc. 2018 May 30;

29. CADTH. Home Telehealth Programs in Canada [Internet]. 2008 May. Available from: https://www.cadth.ca/home-telehealth-programs-canada

30. Darkins A, Kendall S, Edmonson E, Young M, Stressel P. Reduced cost and mortality using home telehealth to promote self-management of complex chronic conditions: a retrospective matched cohort study of 4,999 veteran patients. Telemed J E-Health Off J Am Telemed Assoc. 2015 Jan;21(1):70–6.

31. Ho K, Newton L, Boothe A, Novak-Lauscher H. mobile Digital Access to a Web-enhanced Network (mDAWN): Assessing the Feasibility of Mobile Health Tools for Self-Management of Type-2 Diabetes. AMIA Annu Symp Proc AMIA Symp. 2015;2015:621–9.

32. Buhler H. Interior Health Cardiac Home Monitoring Project – Phase II: 2016 -2018 Benefits Evaluation Report [Internet]. 2018. Available from: https://www.infoway-inforoute.ca/en/component/edocman/3550-interior-health-cardiac-home-monitoring-project-phase-ii-2016-2018/view-document?Itemid=101

33. BC Ministry of Health. Benefits Evaluation Report Telehomecare Heart Failure Pilot Projects BC Ministry of Health [Internet]. 2013. Available from: https://www.infoway-inforoute.ca/en/component/edocman/resources/reports/benefits-evaluation/1671-benefits-evaluation-report-telehomecare-heart-failure-pilot-projects

34. Care Innovations. Clinical Outcomes [Internet]. 2016. Available from: http://www.connectwithcare.org/wp-content/uploads/2017/06/2016_Outcomes_Clinical-1.pdf

35. Desveaux L, Shaw J, Saragosa M, Soobiah C, Marani H, Hensel J, et al. A Mobile App to Improve Self-Management of Individuals With Type 2 Diabetes: Qualitative Realist Evaluation. J Med Internet Res [Internet]. 2018 Mar 16 [cited 2018 Jul 12];20(3). Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5878364/

36. Chow CK, Redfern J, Hillis GS, Thakkar J, Santo K, Hackett ML, et al. Effect of Lifestyle-Focused Text Messaging on Risk Factor Modification in Patients With Coronary Heart Disease: A Randomized Clinical Trial. JAMA. 2015 Sep 22;314(12):1255–63.

37. Redfern J, Thiagalingam A, Jan S, Whittaker R, Hackett ML, Mooney J, et al. Development of a set of mobile phone text messages designed for prevention of recurrent cardiovascular events. Eur J Prev Cardiol. 2014 Apr;21(4):492–9.

38. Rasmussen J. UNIversal solutions in TElemedicine Deployment for European HEALTH care: D1.8 Final Report Version 1.2 [Internet]. 2016. Available from: http://united4health.eu/wp-content/uploads/2017/04/D1.8-v1.2-United4Health-Final-Report.pdf

39. Stafylas P, Kotzeva A, Kidholm K, Lewis K, Murga N, Reoch A. UNIversal solutions in TElemedicine Deployment for European HEALTH care [Internet]. 2014. Available from: http://united4health.eu/wp-content/uploads/2017/04/D3.1-United4Health-scientific-study-protocols-2.pdf

40. VIS. The Introduction of Personal Connected Health and Care in the Central Districts of Oslo. 2016 Oct.

41. Smith HS, Criner AJ, Fehrle D, Grabianowski CL, Jacobs MR, Criner GJ. Use of a SmartPhone/Tablet-Based Bidirectional Telemedicine Disease Management Program Facilitates Early Detection and Treatment of COPD Exacerbation Symptoms. Telemed J E-Health Off J Am Telemed Assoc. 2016;22(5):395–9.

42. Cordova FC, Ciccolella D, Grabianowski C, Gaughan J, Brennan K, Goldstein F, et al. A Telemedicine-Based Intervention Reduces the Frequency and Severity of COPD Exacerbation Symptoms: A Randomized, Controlled Trial. Telemed J E-Health Off J Am Telemed Assoc. 2015 Aug 10;