Quick Scan

A product of the Contextualized Health Research Synthesis Program
Newfoundland & Labrador Centre for Applied Health Research

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Quick Scan of Evidence: Remote Patient Monitoring - Frameworks, Tools, Approaches & Economic Evidence

Search focus: For this Quick Scan report, CHRSP researchers searched for and identified examples of frameworks, tools, and approaches related to remote patient monitoring, as well as related economic evidence and reports.

What we found: This report summarizes literature published between 2012 and 2026. It includes 53 documents, of which 7 focus on frameworks, tools, and approaches for remote patient monitoring. The remaining research examines the economic evidence related to remote patient monitoring and includes 9 reviews (rapid reviews, scoping reviews, and general reviews), 6 systematic reviews, 4 reports, and 9 economic modelling or primary research studies.

References are separated by category and listed alphabetically within each category. References are organized by study type and listed in reverse chronological order within each evidence category to facilitate review of the most recent evidence first. Quotes that reflect key areas of inquiry are **highlighted in bold** with Canadian content highlighted in yellow.

Content summary: This report comprises two sections, which are:

- Section1: Examples of Frameworks, Tools, and Approaches for Remote Patient Monitoring
- Section 2: Economic Evidence on Remote Patient Monitoring

Section 1: Examples of Frameworks, Tools, and Approaches for Remote Patient Monitoring

Assessment Frameworks and Tools

Lopatina et al., 2023. **Regulation, assessment, and adoption of digital health technologies in Canada: IHE Discussion Paper**. Institute of Health Economics Alberta, Canada. (LINK)

- IHE Discussion Paper
- **Aim**: "…to describe the current state of the regulation, evaluation, and adoption of [digital health technologies] DHTs in Canada and to propose considerations for future work…we conducted a narrative review of
    - (1) peer-reviewed syntheses of **guidelines, frameworks, and toolkits for assessing DHTs**;
    - (2) individual guidelines, frameworks, and toolkits discussed in the identified syntheses; and
    - (3) **grey literature focused on the regulation, evaluation, and adoption** of DHTs originating from the U.S, the UK, and Canada, which had been published between January 2015 and August 2022."
- **Defining [Digital Health Technologies] DHTs**:
    - "**In Canada, no formal taxonomy of digital health interventions has been adopted**...To standardize vocabulary, several approaches have been proposed, including the World Health Organization (WHO) taxonomy of digital health interventions, which organizes interventions based on the target primary user, health system challenge the intervention aims to address, digital functionality, and the information and communications technology used to deliver the intervention"
    - "**Depending on the intended use of the technology, some DHTs represent medical devices and, therefore, are subject to medical device regulations**. Given the unique features of DHTs additional guidance is required when applying the existing medical device regulations to them. Along with such guidance, **another approach to classifying a subset of DHTs has emerged, focusing on software as a medical device (SaMD**). **Due to the major focus of the existing regulatory documents on SaMD, much of what we identified in this work focuses on software**."
- **Regulations for DHS in the US, the UK, and Canada**

    "In the US, the UK and Canada, the premarket access oversight of medical devices, including SaMD, is provided by the Food and Drug Administration (FDA), the U.K. Medicines and Healthcare Products Regulatory Agency (MHRA), and Health Canada, respectively. The level of oversight required for SaMD is determined based on the significance of the information provided by the technology to the health care decision, the state of the health care situation or condition, and the technology's functionality. DHTs that do not meet the definition of a medical device are not subject to premarket review by health authorities in the US, UK or Canada."
- **Regulations for DHTs on the market**

    - "DHTs that are used for medical purposes can be subject to surveillance after being made available on the market. In the US, UK, and Canada, vendors of SaMD associated with higher potential risks are obligated to advise appropriate regulators of relevant information regarding adverse events, changes to the device itself or its labelling, and recalls or reassessment of the device by other jurisdictions. Technology changes may require a new premarket access assessment if those are associated with potential changes in the intended use of the technology and the associated risk"
    - "…additional considerations for the surveillance of DHTs have been proposed for SaMD incorporating AI and ML technologies. **In Canada, regulatory approaches are currently being updated to take account of the life cycle of AI/ML-based SaMD**. Factors such as the nature of the information that may be collected, created, or shared by DHTs are often considered when regulating DHTs available on the market. However, currently, Canada does not have legislation to enact serious penalties in case of data security breaches due to DHTs."
- **DHT-specific HTA guidelines, frameworks, and toolkits**
    - "Since 2015, over 40 guidelines, frameworks, and toolkits have been proposed to account for the important characteristics of DHTs during their design and evaluation. While common themes have been identified across these, no ultimate single framework capturing all relevant aspects for the evaluation of DHTs has been established."
- **Considerations for the regulation and assessment of DHTs in Canada**
    - "Absent clear national guidance, regulations and guiding documents for digital health have primarily focused on the most pressing topics such SaMD and virtual care, but do not consider the full range of DHTs or capture all relevant DHT-specific content and considerations. A thoughtful and systematic approach is required to meaningfully advance the digital health agenda in the Canadian context. For instance, one gap that should be addressed is the lack of a common national definition of digital health interventions and terminology to articulate differences and commonalities between the wide range of available digital interventions"
    - **Tools from other countries to potentially leverage**: FDA Total Product Lifecycle Regulatory Approach for AI/ML-based SaMD, NICE Evidence Standards Framework for DHTs, NHS Digital Technology Assessment Criteria
    - **"While resources from other countries could be leveraged to inform this work, the appropriateness of such resources to the Canadian context must be considered. Important Canada-specific issues include the decentralized regulation, assessment, and decision-making context, and geographic, cultural and historical causes of health disparities across and within the Canadian population."**

Scottish Health Technologies Group, 2023. **Health Technology Assessment in Scotland: What evidence do we need?** Healthcare Improvement Scotland. (LINK)

- Evidence Framework
- **What is the [Scottish Health Technologies Group] SHTG evidence framework and who is it for?**

- "We have shaped an evidence framework that is intended to help evaluators, technology developers, and decision makers better understand what information is required to identify technologies of value to service users and the health and care system.
- Our evidence framework has been adapted from existing frameworks including the EUnetHTA core model, and the NICE evidence standards framework for digital technologies. We have drawn from these frameworks and focused on elements that SHTG give consideration to when appraising a technology."

- **How should I use the evidence framework?**
  - "…intended to be used as a reference guide, aligned to the key evidence requirements for health technology assessment (HTA). If the needs under the relevant domains are met, we can determine the value of the technology under review.
  - The framework can help stakeholders understand how SHTG evaluates health technologies. SHTG advice is based on the quality and quantity of evidence available, across the domains set out in this framework.
  - Not all domains will be relevant for all technologies. For example, a new service may not require a UKCA or CE mark.
  - Some domains are particularly important for HTA. For example, technologies that are unable to demonstrate any evidence of clinical effectiveness are not ready for SHTG assessment."
- **Why is this important?**
  - "It is important to make evidence-based decisions. Demands on health and care services are high and resources are limited. Evidence helps us to target our resources on what really makes a difference. From the very early stages of technology development, planning how to gather evidence to demonstrate value will help with discussions between technology developers and decision makers."
- **Implementation**
  - "The purpose of HTA is to inform decision making. The value and impact of HTA is strongly linked to the implementation of its recommendations."
- **Evidence framework: "**Five domains are set out in this evidence framework. These are:
  - Domain 1: The technology and its value
  - Domain 2: Safety, acceptability and credibility
  - Domain 3: Demonstrating the performance of the technology
  - Domain 4: Capturing the cost and value for money of the technology, and
  - Additional domain 1: Digital Technology Assessment Criteria (DTAC)"
- **Contact**
  - "For more information on the Scottish Health Technologies Group, contact the team at email [his.shtg@nhs.scot] or visit our webpages at shtg.scot."

National Institute for Health and Care Excellence, 2022. **Evidence standards framework for digital health technologies**. (LINK)

- **Description**:

    - "**The evidence standards framework (ESF) is a set of evidence standards for a wide range of digital health technologies (DHTs).**"
    - "Evaluators and decision makers in the health and care system can consistently use these standards to help them identify DHTs that are likely to offer benefits to users and to the health and care system."
- **What is the evidence standards framework (ESF)?**
    - "The ESF has been produced to promote more consistency in the evaluation of digital health technologies (DHTs) across the NHS."
    - "The intended users are:
        - commissioners and evaluators in the health and care system making purchasing decisions; they can use the ESF to help them to decide whether to commission a DHT in their organization.
        - companies developing DHTs for use in the health and care system.
        - We've also produced a user guide that contains information on the purpose of the ESF along with how it can be used and by who. The guide contains some frequently asked questions relating to the ESF and explains many commonly used terms."
- **Who is the ESF for?**
    - "The ESF is for people in the health and care system who are responsible for:
        - identifying and evaluating new DHTs
        - conducting formal product reviews
        - authorising DHT product coverage, funding, or reimbursement
        - conducting ongoing clinical and economic product evaluations in real-world settings."
- **What does the standard help me to do?**
    - "…For evaluators and **decision makers in the health and care system** the ESF also:
        - helps to make more informed and consistent decisions when evaluating, commissioning or purchasing DHTs."
- **How can I use the framework?**
    - "View the ESF to view all the standards.
    - Read the user guide to understand more about the ESF and how to use it.
    - View the ESF classification examples spreadsheet (Excel) to see the ESF tier that may apply to a range of technologies.
    - Use the budget impact tool (Excel) to estimate the costs and impacts to current practice that arise from using the DHT."
- **Related resources**:
    - NHS England. **Digital Assessment Criteria (DTAC)** (LINK)
    - National Institute for Health Excellence and Care, **Health Technology Wales – using our evidence standards framework in topic selection Case study**. (LINK)
    - Bahadori et al., 2025. **Evolving Digital Health Technologies: Aligning with and Enhancing the National Institute for Health and Care Excellence Evidence Standards Framework**. JMIR Mhealth Uhealth. 2025 Aug 22;13:e67435. (LINK)

- Unsworth et al, 2021. **The NICE Evidence Standards Framework for digital health and care technologies - Developing and maintaining an innovative evidence framework with global impact.** Digit Health. 2021 Jun 24;7. (LINK)

Canada Health Infoway, 2012. Canada Health Infoway Benefits Evaluation Indicators, Technical Report: Version 2.0. (LINK)

- **Report Description**: "… intended to help jurisdictions plan and execute benefits evaluation projects in several Information and Communications Technology (ICT) for health domain areas by providing foundational pieces which can be modified and applied as needed."
- **Process for Updating the Benefits Evaluation Indicators**: "Indicators in the following ICT for health domain areas were included in the review: diagnostic imaging, drug information system, interoperable electronic health record/laboratory information system, telehealth, and public health surveillance program."
- **Includes sections on**:
  - Introduction to Canada Health Infoway Benefits Evaluation
  - Getting Started
  - System, Information, Service, Use and Satisfaction Indicators
  - Diagnostic Imaging Program
  - Drug Information System Program
  - Interoperable Electronic Health Record/Laboratory Program
  - Telehealth Program
  - Electronic Medical Record Program
  - Public Health Surveillance Program
  - Additional Resources
  - Appendix A. Benefits Evaluation Plan Structured Template
- **Related Resources:**
  - Canada Health Infoway. **Benefits Evaluation Framework & Tools Page** (LINK)

Centre for Innovative Medical Technology**. MAST (Model for Assessment of Telemedicine)**. (LINK)

- Centre for Innovative Medical Technology Webpage for MAST
- **Description**: "MAST (Model for ASsessment of Telemedicine) **provides a solid base for decision making when it comes to the introduction and use of telemedicine**."
  - "The model defines the relevant assessment framework for the effect of telemedicine:
    - the patient and the technology,
    - patient safety,
    - clinical effectiveness,
    - patient perspectives,
    - economic aspects,
    - organisational aspects,
    - legal and ethical aspects."
  - "…developed by Kristian Kidholm, Professor of Innovation and Head of Research at the Centre for Innovative Medical Technology (CIMT)**… most widely used framework for the**

assessment of telemedicine in Europe, and the European Commission recommends the model for the evaluation of telemedicine projects."

- **Mast Applied**
  - "… applied in various contexts where there is a need to evaluate telemedicine and e-Health. In 2014, the National eHealth Authority (NSI) and the National Coordination Group for Telemedicine in Denmark instituted the drafting of a new checklist for managers in the healthcare sector when they are to decide which telemedical solutions to implement. The checklist is based on the Danish experiences with both mini HTA (Health Technology Assessment) and MAST. It was drafted in collaboration with the unit for Health Technology Assessment at CIMT."
  - "In March 2015, the committee of eHealth in the Region of Southern Denmark decided to make the checklist mandatory in all decisions made by the Region of Southern Denmark concerning the implementation of telemedical solutions."
  - "MAST is applied in other organisations than hospitals; for instance in the assessment of a major welfare technological project between 11 municipalities in the Region of Zealand in Denmark. In addition, MAST is used to evaluate telemedicine and eHealth technologies by a wide range of Danish organisations working with eHealth and technology in the healthcare sector."
  - "The World Health Organization (WHO) and the Pan American Health Organization (PAHO) also use MAST in the Framework for the Implementation of a Telemedicine Service."
- **Related Resources:**
  - Kidholm et al. **The Model for Assessment of Telemedicine (MAST): A scoping review of empirical studies**. Journal of Telemedicine and Telecare. 2017;23(9). (LINK)
  - Ekeland AG, Grøttland A, 2015. **Assessment of MAST in European Patient-Centred Telemedicine Pilots**. Int J Technol Assess Health Care. 2015 Jan;31(5):304-11. (LINK)
  - Metho Telemed team, 2010. **The Mast Manual**. MethodTelemed. (LINK)

Program Design and Organizational Approaches

Abejirinde et al., 2026. **Design and development of a disease-agnostic remote patient monitoring typology and associated tools**. PLOS Digit Health. Jul 31;5(7). (LINK)

- **Aim**: "Recognising this challenge and in the absence of an existing solution, a research team at the Centre for Digital Health Evaluation (CDHE), Women's College Hospital Institute for Health System Solutions and Virtual Care (WIHV) decided to develop a novel typology of RPM programs."
- **Rationale**: "The rationale for developing a typology is that a disease-agnostic categorisation of RPM that goes beyond clinical use cases and spans the full spectrum of care - from self-management to active management - can advance thinking around the design, implementation, and delivery of RPM programs, and address the high variation in effectiveness evaluations. In this paper, we describe the development of such a first-of-its-kind tool which provides a systematic way to assess, compare, and potentially guide the implementation and evaluation of remote care interventions."

- **Author Summary**: "We **designed a tool based on 87 research articles and feedback from different people to define 12 core elements of remote monitoring programs divided into 4 categories. Our tool can be used to map different programs, track their implementation features as they evolve, and compare programs like-for-like**. This allows us to learn from what works best even when the programs are designed to support different illnesses. Our goal is for this tool to help decision makers better evaluate these programs so they can be more smartly designed to support patients most effectively. It can also help researchers and funding agencies that design or evaluate remote monitoring programs in determining areas that may require additional investments."
- **Results: "The 12 most reported characteristics of RPM programs (including size, resources, monitoring team, data flow, alert protocol, workflow, and equity considerations) were clustered into four domains. Integration and equity domains were recognised as ideal aspirations of all RPM programs.** Technology and touch domains were considered to exist on a spectrum from low-to-high- neither inherently superior to the other. 16 distinct RPM typologies were expressed through a 4x4 matrix (i.e., high or low on each of the four domains)."
- **Discussion:** "Importantly, the intention of the RPM typology tool is not to replace established evaluation tools or frameworks. Rather, **it is meant to be used in combination with existing evaluation tools which are crucial for understanding if RPM is working well (or not) and how it can be improved over time**. Some examples include: implementation effectiveness evaluation tools such as the **Proctor implementation outcome framework** or the **consolidated framework for implementation research**, **multi-level assessment of digital health systems** or **sources of complexity**, and **usability testing** to incorporate patient user experiences."
    - **"While there is no one standard for designing RPM programs, integration and equity enhancing traits should be inherent baseline features of an optimal RPM program.** This is reinforced through frameworks such as PROGRESS-PLUS, the digital determinants of health (DDoH), and the health system framework for measuring health equity. **Furthermore, implementation teams should consider an appropriate mix of technology and touch against aspirational domains of integration and equity."**
- **Related Resources:**
    - Proctor's Implementation Outcomes (LINK)
    - Consolidated Framework for Implementation Research (LINK)

Peters V., 2026. **Remote Patient Monitoring Is Scaling Without a Clear Organizational Model: Insights from the Netherlands**. J Med Internet Res. May 28;28. (LINK)

- **Description**: "In this piece, he [Vicent Peters, PhD, is an assistant professor at the Department of Information Systems and Operations Management at Tilburg University] highlights the tension between innovations in remote care and the slower evolution of organizational structures needed to support them in the Netherlands, based on his own research and informal conversations with hospital stakeholders."
- **Aim**: "reports on remote patient monitoring initiatives in the Netherlands and the organizational structures needed for effective implementation"
- **Includes sections on**:
    - The Rise of Remote Patient Monitoring

- Emerging Organizational Models
  - Decentralized Within the Hospital
  - Centralized Within the Hospital
  - Outsourced Centralized Model
  - Hybrid Model
- Choosing the "Right" Model
  - "Hence, the key question is not which model is objectively best. Nor should RPM be treated as a goal in itself. Rather, the challenge for hospitals is to make deliberate choices about how RPM is organized. The four models outlined here provide a practical lens to structure these choices and make trade-offs explicit. **Different priorities will naturally lead to different models, and there is no one-size-fits-all solution. However, this makes it all the more important to adopt a structured approach, rather than relying on ad hoc decisions**. Otherwise, RPM risks remaining stuck in experimentation and fragmentation."

Section 2: Economic Evidence on Remote Patient Monitoring

Reviews (Rapid Reviews, Scoping Reviews, General Reviews)

Sharp et al., 2026. **The effectiveness and cost-effectiveness of remotely monitored assistive technology in community-dwelling older people: An evidence review**. Dublin, Ireland: Health Research Board. (LINK)

- **Study type**: Evidence Review (25 studies, of which 20 reported on effectiveness outcomes **and 5 reported on cost-effectiveness outcomes**)
- **Aim**: "to provide an evidence base on the effectiveness and cost-effectiveness of remotely monitored AT for older community-dwelling adults in Organisation for Economic Co-operation and Development (OECD) member countries."
- **Review questions:** "The review questions were as follows:
  - 1. Is remotely monitored AT for older community-dwelling adults (65 years of age and over) in OECD member countries effective in improving healthcare utilisation and provision?
  - 2. **Is remotely monitored AT cost-effective for community-dwelling older adults (65 years of age and over) in OECD member countries?**
- **Methods:** "comprises a systematic review of primary quantitative studies and full economic evaluations in order to synthesise the evidence on the effectiveness and cost-effectiveness of remotely monitored AT for older community-dwelling adults (aged 65 years of age and over) in OECD member countries. It adhered to the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) Statement and the Synthesis Without Meta-analysis (SWiM) guidelines."
- **Findings**:

- See report for detailed findings on Healthcare utilization (ED visits, hospitalizations, admissions to long-term care, outpatient visits, days at home care episodes, access to diagnosis, other assorted healthcare utilization outcomes)
- **Cost-effectiveness**: "In relation to cost-effectiveness outcomes, **generalisability and certainty for the cost-effectiveness evidence was limited in the remotely monitored AT packages that were studied, with differences in healthcare systems, perspectives, and modelling assumptions**. Additionally, no Irish studies were identified, limiting applicability within the Irish context. However, **the majority of the cost-effectiveness studies demonstrated an impact, with models focused on remotely monitored AT projecting better cost benefit ratios or cost-savings (i.e. lower treatment costs and equal effectiveness), although the benefits sometimes varied across levels of risk."**
  - **For more detail see cost effectiveness results p.102, p. 118**

Heilig et al., 2026. **Identifying and Comparing Intervention Cost Components in Remote Patient Monitoring: A Scoping Review**. Pharmacoeconomics. Sep;44(9). (LINK)

- **Study type**: Scoping review (84 studies)
- **Aim**: "to identify and **compare the cost components used to estimate the remote patient monitoring intervention costs and the reported challenges in assessing them**"
- **Results**: "A total of 1282 articles were identified, of which 84 studies met the eligibility criteria. Forty-nine (58%) studies had an observational design, and the remaining studies had a model design. Components of remote patient monitoring intervention costs were reported in 71 (85%) of the included studies, with staff salaries (62%) and equipment/technology (56%) costs being the most frequently reported**. The most commonly reported challenge was uncertainty about which remote patient monitoring cost categories to include**."
- **Conclusions**: "**This review highlights the disparities in the assessment and reporting of remote patient monitoring intervention costs in economic evaluations**. We offer an updated checklist and guidance for assessing and reporting intervention costs in future economic evaluations."

Leleu et al., 2026. **EPOCA Tele-Monitoring System for Older Adults at High Risk of Hospitalization: Budget Impact and Cost-Effectiveness Analysis**. J Med Internet Res. May 14;28: e80302. (LINK)

- **Study type**: Budget and Cost-Effectiveness Analysis
- **Aim**: "…to assess the **cost-effectiveness of the EPOCA remote monitoring system**, implemented within the Vigie-Age framework, compared to the standard of care for older adults with multiple chronic conditions"
- **Methods**: "Using data from the Vigie-Age Article 51 pilot study (with 722 participants, including 408 participants with long-term follow-up), **a cost-utility analysis was conducted over a 10-year lifetime horizon**. A Markov model with daily cycles simulated transitions across health states: at home, emergency department visits, hospitalization, and death. Analyses were conducted from both the French National Health Insurance (NHI) and collective perspectives. Direct medical

costs, including hospital, outpatient, and intervention costs, were included. **Health outcomes were measured in quality-adjusted life years (QALYs)**. Deterministic and probabilistic sensitivity analyses assessed model robustness.

- **Results**: "EPOCA was associated with a reduction in emergency department visits by 54% and in hospitalizations by 46%, cutting the average hospital stay from 55.6 (SD 51.7) to 30.6 (SD 27.8) days. **Total costs per patient were €29,165 (EUR €1=US $1.13) with EPOCA and €39,929 for standard of care, representing a €10,764 saving from the collective perspective and a €7,430 saving from the NHI perspective. EPOCA yielded 0.04 additional QALYs and remained cost-saving even at higher program costs.** Sensitivity analyses confirmed the robustness of the results. EPOCA had a 90% probability of being dominant and a **95% probability of being cost-effective at a €30,000 per QALY threshold.**"
- **Conclusions**: "On the basis of currently available evidence, **EPOCA may be a cost-effective strategy for older patients at high risk of hospitalization**. It could reduce health care use while improving outcomes, supporting its integration into national older adult care pathways and reimbursement by the French NHI."

Bjorvig et al., 2025. **Economic Evaluation Methodologies of Remote Patient Monitoring for Chronic Conditions: Scoping Review**. J Med Internet Res. (LINK)

- **Study type**: Scoping review (40 studies)
- **Aim:** "to explore the methodologies used in economic evaluations of RPM interventions for chronic conditions, with a particular focus on cost identification, measurement and valuation, and reporting quality"
- **Results**: "A total of 41 papers, representing 40 studies, were included in the final review. Studies used diverse evaluation methods, such as cost-effectiveness analysis (20 studies), within which, 13 studies specifically conducted cost-utility analysis. Other approaches included cost-consequence analysis (7 studies), cost-minimization analysis (3 studies), cost-benefit analysis (2 studies), cost analysis (8 studies), and budget impact analysis (1 study). **Cost estimation approaches varied across studies, with differences in cost identification, measurement, and valuation**. **Cost estimation methodologies varied, both in terms of which cost components were included and how costs were identified, measured, and valued. Commonly reported costs related to health care resource use and technology, but the data sources used, and the level of transparency provided, varied. Studies reported a range of outcome measures, including quality-adjusted life years, mortality, and financial indicators.** Some studies reported multiple outcomes. Reporting inconsistencies were observed, and adherence to updated CHEERS 2022 standards was limited, particularly in sensitivity analyses and cost data transparency.
- **Conclusions**: "**This review highlights the diversity and methodological variability in economic evaluations of RPM interventions for chronic conditions. Key limitations include inconsistent cost methodologies and inadequate adherence to reporting standards, complicating cross-study comparisons.** Future research should adopt more standardized, transparent reporting protocols to improve the reliability and utility of economic evidence for decision-makers considering RPM implementation."

Bouabida et al., 2025. **Navigating the landscape of remote patient monitoring in Canada: trends, challenges, and future directions**. Front Digit Health. Feb 4; 7:1523401. (LINK)

- **Study type**: Review
- **Aim**: "offers a comprehensive overview of Remote Patient Monitoring (RPM) within the Canadian healthcare system from 2018 to 2023. It explores the state of play and provides a reflective analysis of current trends, the primary RPM platforms in use, and the associated impacts, benefits, and limitations of these technologies."
- **Description**: "By exploring RPM's evolving role, we present a forward-looking perspective on its potential to enhance healthcare outcomes in Canada. **Key strategic areas are identified, including regulatory adaptation, technological advancements, AI integration, and cross-platform interoperability, each essential for ensuring the continued growth and sustained impact of RPM on the healthcare landscape. This perspective aims to guide stakeholders in understanding the current RPM ecosystem and the strategic pathways necessary to maximize its future contributions to Canadian healthcare**."
- **Includes sections on**:
    - **Impacts on healthcare outcomes and economic dynamics**
        - **"For policymakers, a robust cost-benefit analysis, inclusive of both direct and indirect savings, will be pivotal in guiding the large-scale adoption of RPM."**
    - Challenges in implementation of RPM
    - **RPM in Canadian healthcare: benefits and limitations**
    - Integration of AI in remote patient monitoring (RPM)
    - Future and global perspectives

Le Goff-Pronost & Bongiovanni-Delarozière, 2023. **Economic evaluation of remote patient monitoring and organizational analysis according to patient involvement: a scoping review**. Int J Technol Assess Health Care. Sep 26;39(1): e59. (LINK)

- **Study type**: Scoping review (61 studies)
- **Aim**: "to provide a comprehensive overview of different systems of telemonitoring and their reported cost-effectiveness"
- **Results**: "We identified 61 eligible studies among the 489 records identified. Heart failure remains the pathology most represented in the studies selected (n = 24). The cost-utility analysis was chosen in a preponderant way (n = 41). **Forty-four studies (72 percent) reported that the intervention was expected cost-effective. Heterogeneity has been observed in the remote monitoring solutions but all systems are reported cost-effective. The small number of long-term studies does not allow conclusions to be drawn on the transposability**."
- **Conclusions**: "Remote patient monitoring is reported to be cost-effective whatever the system and patient involvement."

Bain et al., 2022. **Rapid synthesis: Identifying remote-monitoring technologies to enable existing level of care**. Hamilton: McMaster Health Forum. (LINK)

- **Study Type:** Rapid Synthesis

- **Aim: "…** requested by the AGE-WELL National Innovation Hub APPTA synthesizes current research evidence about how remote-monitoring and associated technologies could enable people to stay in their homes or existing level of care."
- **Methods:**
    - "This rapid synthesis mobilizes both global and local research evidence about a question submitted to the McMaster Health Forum's Rapid Response program. Whenever possible, the rapid synthesis summarizes research evidence drawn from systematic reviews of the research literature and occasionally from single research studies."
    - "In addition, we conducted a jurisdictional scan to identify experiences from Australia, the United Kingdom (U.K.), and the states of New York and California in the United States (U.S.), **as well as all Canadian provinces and territories**, with using remote monitoring technologies (RMTs). We outline in narrative form below our key findings from the highly relevant evidence documents and from the jurisdictional scan."
- **What we found**:
    - "69 relevant documents, which included five guidelines, 62 systematic reviews (including rapid, scoping, narrative, and integrated reviews) and two protocols for systematic reviews. We assessed each for relevance and categorized them as high, medium, or low relevance to the question. From this, we identified two guidelines, 35 systematic reviews, five rapid reviews, and two protocols for systematic reviews as being highly relevant to the question."
- **Select Findings related to cost**:
    - "**In terms of cost-effectiveness, the evidence we found indicates that cost outcomes of RMTs are associated with the size of the eligible population, the cost of monitoring equipment, and the size of the predicted market share of the monitoring technology, and that remote monitoring programs may be economically preferable for specific chronic conditions where only one or two vital signs need to be monitored (e.g., hypertension**)."
    - "Considering the challenges of using RMTs that were identified in the evidence, including susceptibility to privacy breaches of digital data, difficulty of patient self-management, added long-term workload commitment for care providers, and limited internet access, potential facilitators for implementing remote-monitoring programs may include increased access to the required technologies, quality of the technology, **cost-effectiveness,** and patient knowledge, involvement and convenience of use."
    - "We also conducted a jurisdictional scan of experiences from Australia, the United Kingdom (U.K.), and the states of New York and California in the United States (U.S.), as well as all Canadian provinces and territories, with using RMTs to enable people to manage their care at home, **and investing in digital infrastructure to increase access to RMT**s."

- "In terms of **financial supports for the development and implementation of RMTs**, NHS England allocated 200 million British pounds in its 2022-23 priorities and operational planning guidance to further develop RMT virtual wards, and Medicaid programs in both California and New York provide reimbursement for patients with certain chronic conditions that utilize RPM services that are ordered and billed by physicians or other qualified health professionals.
- "In Canada, in response to the COVID-19 pandemic, **the Government of Canada invested $200 million** and established bilateral agreements with provinces and territories to accelerate the development of virtual-care solutions for Canadian residents"

CADTH, Updated January 2022. **Remote Monitoring Programs for Cardiac Conditions: Health Technology Review-Optimal Use**. (LINK)

- **Description of Project Page**:
  - "Remote monitoring (RM) is a type of telehealth where health care is delivered to patients outside traditional settings by allowing health data to be exchanged between patients and health care providers using telecommunication technologies or stand-alone devices."
  - "It has been noted that implementation of RM technologies in Canada is not a question of if it will happen, but rather when and how it will happen. Jurisdictions are faced with the challenge of how best to implement RM programs for patients living in rural, remote, and urban settings."
  - "**This page features the Canada's Drug Agency Health Technology Review on the topic as well as Appropriate Use Recommendations, an In Brief, and a Summary Tool**."
- **Related resources**:
  - CADTH, 2025. Guidelines for the Economic Evaluation of Health Technologies: Canada — 4th Edition. (LINK)
  - CADTH. **Considerations for the Implementation of Remote Monitoring Programs in Canada: Summary Tool**. January 5, 2022. (LINK)
  - CADTH. **CADTH Health Technology Review Recommendation Remote Monitoring Programs for Cardiac Conditions.** November 21, 2021. (LINK)
  - Clark, A. et al. **CADTH Health Technology Review: Remote Monitoring Programs for Cardiac Conditions**. CADTH. Volume 1, Issue 9. September 2021. (LINK)
    - Realist Review & Perspectives and Experiences Review
    - **Key Messages**:
      - "**Although remote monitoring programs may ultimately reduce avoidable hospitalizations, they may increase net costs and workload during set-up and operational phases without careful pathway design and expectations management**."

        - **"More research is needed to identify the costs and cost-effectiveness of remote monitoring programs across chronic cardiac conditions**."
    - Hill & MacDougall. **Remote Monitoring Programs for Cardiac Conditions in Canada: An Environmental Scan**. CADTH. March 2021. (LINK)
    - CADTH. Inbrief, **Summarizing the Evidence: Remote Monitoring for Cardiac Conditions A Review**. January 2022. (LINK)

Ruyobeza et al., 2022. **Hurdles to developing and scaling remote patients' health management tools and systems: a scoping review**. Syst Rev. 2022 Aug 30;11(1):179. (LINK)

- **Study Type**: Scoping review
- **Aim**: "…to assess whether or not recent, relevant literature would support the development of in-community, design, deployment and implementation framework based on three factors thought to be important drivers and levers of RPMTS's adoption and scalability."
- **Results**: "Most RPMTSs are targeted at and focused on a single disease, do not extensively involve patients and clinicians in their early planning and design phases, are not designed to best serve a specific catchment area and are mainly directed at post-hospital, disease management settings. This may be leading to a situation where patients, potential patients and clinicians simply do not make use of these tools, leading to low adoption and scalability thereof."
    - "**Researchers have identified a number of factors broadly affecting the adoption and scaling of digital health systems**. These prominently include ease of use, **cost-effectiveness**, functional efficacy and versatility of addressed diseases as well as system's integration into existing clinical workflows."
    - "On the one hand, RPMTSs' evaluation studies remain thin on the ground. **There does not exist enough consistent empirical, compelling evidence to prove that, or evaluate if, the use of above systems and tools necessarily leads to reduced healthcare costs**, better quality of care or health outcomes and/or broader, more equitable access to healthcare services. **On the other hand, a research gap remains in terms of the contextual issues relating to the conception, planning, design and deployment of such systems**."
- **See Table 5 Table 5 How barriers and facilitators affect the adoption and scaling of RPMTS**
    - "Existing local ICT infrastructure Prior to the planning and designing of an RPMTS intervention, adequate ICT infrastructure (appropriate network coverage, device penetration, **data costs** and reliability thereof) must exist to support its deployment and subsequent scaling."
    - "Post-deployment assessment factors Interventions are expected to be able to convincingly demonstrate (a-priori) evidence of how they will be able to meet certain key performance indicators after their implementation in order to attract adequate support and funding which may in turn have a bearing on their subsequent adoption and scaling."

Systematic Reviews & Meta-Analyses

Gavan et al., 2025. **Active remote monitoring of long-term conditions with mobile devices: a systematic review of cost-effectiveness analyses**. *npj Digit. Med.* **8**, 625. (LINK)

- **Study type**: Systematic review of cost-effectiveness analyses (7 studies)
- **Aim**: "to identify and appraise published cost-effectiveness analyses of mobile device-based active remote monitoring technologies for long-term conditions"
- **Methods**: "identified studies from Medline and Embase (2008 until November 2024)"
- **Results**: "**Interventions required frequent patient-reported responses to questions about their condition on a mobile device (smartphone or tablet). Seven cost-effectiveness analyses were identified for six long-term conditions: rheumatoid arthritis; schizophrenia; older adults with complex conditions; cancer; multiple sclerosis; inflammatory bowel disease**. Interventions facilitated early intervention to prevent condition worsening (n = 4); self-management (n = 2); and patient-initiated care (n = 1). Intervention costs were estimated by top-down costing (n = 2); bottom-up micro-costing (n = 3) and assumptions (n = 2). **Mobile device-based active remote monitoring was cost-effective in six of the seven studies with a high degree of decision uncertainty.** The results will help decision-makers, intervention developers and analysts to guide resource allocation, product development and study designs for future mobile device-based monitoring interventions, respectively."

Tan et al., 2024. **A systematic review of the impacts of remote patient monitoring (RPM) interventions on safety, adherence, quality-of-life and cost-related outcomes**. npj Digit. Med. 7, 192. (LINK)

- **Study type**: Systematic review (29 studies)
- **Aim**: "examining the impacts of RPM interventions on **patient safety, adherence, clinical and quality of life outcomes and cost-related outcomes** during care transition from inpatient care to a home setting. "
- **Methods**: "We searched five academic databases (PubMed, CINAHL, PsycINFO, Embase and SCOPUS), screened 2606 articles, and included 29 studies from 16 countries. These studies examined seven types of RPM interventions (communication tools, computer-based systems, smartphone applications, web portals, augmented clinical devices with monitoring capabilities, wearables and standard clinical tools for intermittent monitoring)."
- **Results**: "RPM interventions demonstrated positive outcomes in patient safety and adherence. RPM interventions also improved patients' mobility and functional statuses, but the impact on other clinical and quality-of-life measures, such as physical and mental health symptoms, remains inconclusive. **In terms of cost-related outcomes, there was a clear downward trend in the risks of hospital admission/readmission, length of stay, number of outpatient visits and non-hospitalisation costs.** Future research should explore whether incorporating intervention components with a strong human element alongside the deployment of technology enhances the effectiveness of RPM. **The review highlights the need for more economic evaluations and**

implementation studies that shed light on the facilitators and barriers to adopting RPM interventions in different care settings."

Zakiyah et al., 2024. Economic **Evaluations of Digital Health Interventions for Patients with Heart Failure: Systematic Review**. J Med Internet Res 2024;26. (LINK)

- **Study type**: Systematic review (27 economic evaluations)
- **Aim**: "…to systematically review the economic evaluations that assess the adoption of DHIs in the management and treatment of HF"
- **Methods**: "A systematic review was conducted using 3 electronic databases: PubMed, EBSCOhost, and Scopus. Articles reporting full economic evaluations of DHIs for patients with HF published up to July 2023 were eligible for inclusion."
- **Results**: "Overall, 27 economic evaluations were included in the review. The economic evaluations were based on models (13/27, 48%), trials (13/27, 48%), or a combination approach (1/27, 4%). **The devices evaluated included noninvasive remote monitoring devices (e.g., home telemonitoring using digital tablets or specific medical devices that enable transmission of physiological data), telephone support, mobile apps and wearables, remote monitoring follow-up in patients with implantable medical devices, and videoconferencing systems**. Most of the studies (24/27, 89%) used cost-utility analysis. The majority of the studies (25/27, 93%) were conducted in high-income countries, particularly European countries (16/27, 59%) such as the United Kingdom and the Netherlands. Mobile apps and wearables, **remote monitoring** follow-up in patients with implantable medical devices, and videoconferencing systems yielded cost-effective results or even emerged as dominant strategies. However, **conflicting results were observed, particularly in noninvasive remote monitoring devices and telephone support**. **In 15% (4/27) of the studies, these DHIs were found to be less costly and more effective than the comparators (i.e., dominant), while 33% (9/27) reported them to be more costly but more effective with incremental cost-effectiveness ratios below the respective willingness-to-pay thresholds (i.e., cost-effective). Furthermore, in 11% (3/27) of the studies, noninvasive remote monitoring devices and telephone support were either above the willingness-to-pay thresholds or more costly than, yet as effective as, the comparators (i.e., not cost-effective). In terms of reporting quality, the studies were classified as good (20/27, 74%), moderate (6/27, 22%), or excellent (1/27, 4%)."**
- **Conclusions**: "Despite the conflicting results, the main findings indicated that, overall, DHIs were more cost-effective than non-DHI alternatives."

De Guzman et al., 2022. **Economic Evaluations of Remote Patient Monitoring for Chronic Disease: A Systematic Review.** *Value in Health*, *25*(6), 897-913. (LINK)

- **Study type**: Systematic review of economic evaluations (34 studies)
- **Aim:** "to systematically review and summarize **economic evaluations of noninvasive remote patient monitoring (RPM) for chronic diseases compared with usual care**."

- **Methods:** "A systematic literature search identified economic evaluations of RPM for chronic diseases, compared with usual care. Searches of PubMed, Embase, CINAHL, and EconLit using keyword synonyms for RPM and economics identified articles published from up until September 2021…. Article reporting quality was assessed using the Consolidated Health Economic Evaluation Reporting Standards checklist."
- **Results:** "This review demonstrated that the cost-effectiveness of RPM was dependent on clinical context, capital investment, organizational processes, and willingness to pay in each specific setting. **RPM was found to be highly cost-effective for hypertension and may be cost-effective for heart failure and chronic obstructive pulmonary disease. There were few studies that investigated RPM for diabetes or other chronic diseases.** Studies were of high reporting quality, with an average Consolidated Health Economic Evaluation Reporting Standards score of 81%. Of the final 34 included studies, most were conducted from the healthcare system perspective. Eighteen studies used cost-utility analysis, 4 used cost-effectiveness analysis, 2 combined cost-utility analysis and a cost-effectiveness analysis, 1 used cost-consequence analysis, 1 used cost-benefit analysis, and 8 used cost-minimization analysis."
- **Conclusion:** "**RPM was highly cost-effective for hypertension and may achieve greater long-term cost savings from the prevention of high-cost health events. For chronic obstructive pulmonary disease and heart failure, cost-effectiveness findings differed according to disease severity and there was limited economic evidence for diabetes interventions**."

McGee et al., 2022. **Remote monitoring in patients with heart failure with cardiac implantable electronic devices: a systematic review and meta-analysis.** Open Heart. Nov;9(2). (LINK)

- **Study type**: Systematic review and meta-analysis (10 studies)
- **Aim:** "This systematic review addresses the role of RM in patients with HF with a CIED.[cardiac implantable electronic devices."
- **Methods and results**: "A systematic search of the literature for randomised clinical trials in patients with HF and a CIED assessing efficacy/effectiveness of RM was performed using MEDLINE, PubMed and Embase. Meta-analysis was performed on the effects of RM of CIEDs in patients with HF on mortality and readmissions. Effects on implantable cardiac defibrillator (ICD) therapy, healthcare costs and clinic presentations were also assessed. 607 articles were identified and refined to 10 studies with a total of 6579 patients. **Implementation of RM was not uniform with substantial variation in methodology across the studies. There was no reduction in mortality or hospital readmission rates, while ICD therapy findings were inconsistent**. **There was a reduction in patient-associated healthcare costs and reduction in healthcare presentations**."
- **Conclusion:** "**RM for patients with CIEDs and HF was not uniformly performed. As currently implemented, RM does not provide a benefit on overall mortality or the key metric of HF readmission. It does provide a reduction in healthcare costs and healthcare presentations**."

Peretz et al., 2018. **Determining the cost of implementing and operating a remote patient monitoring programme for the elderly with chronic conditions: A systematic review of economic evaluations**. Journal of Telemedicine and Telecare. 24(1):13-21. (LINK)

- **Study type**: Systematic review of economic evaluations (13)
- **Aim**: "…reviewed the cost of RPM programmes targeting elderly patients with chronic conditions."
- **Results**: "In the 13 selected studies, the newly-created cost category 'Combined intervention cost' (reflecting equipment purchasing, servicing and monitoring cost) for the various RPM programmes ranged from US$275–US$7963 per patient per year**. The three main findings are: (a) RPM programme costs have decreased since 2004 due to cheaper technology; (b) monitoring a single vital sign is likely to be less costly than monitoring multiple vital signs; and (c) programmes targeting hypertension or congestive heart failure are less costly than those targeting respiratory diseases or multiple conditions**."
- **Conclusions**: "This review recommends that future studies present their cost data with more granularity, that grouping of costs should be minimized and that any assumptions, such as amortization, should be made explicit. In addition, studies should compare programmes with similar characteristics in terms of type of conditions, number of vital signs monitored, etc. for more generalizable results."

Reports

Suarthana et al., 2026. **Remote Patient Monitoring for Patients with Chronic Diseases**. Montreal (Canada): Technology Assessment Unit (TAU) of the McGill University Health Centre (MUHC). Report no. 108. 61 pages. (LINK)

- Health Technology Assessment Report
- **Aim**: "…to know whether remote patient monitoring improves health outcomes for patients with chronic diseases (such as heart failure or diabetes), whether it is safe, **and whether it would be worth the cost for the McGill University Health Centre (MUHC) to adopt this approach**."
- **Methods**: "…reviewed many research studies comparing remote patient monitoring to usual care. We also examined the experience with a commercially available RPM program used at another hospital in Montreal. In addition, **we estimated the potential costs of implementing such a program at the MUHC**."
- **Findings**:
    - **"Clinical outcomes**: Remote patient monitoring may slightly improve blood sugar control in people with diabetes, but it does not seem to meaningfully improve other measures like weight or fasting blood sugar. For people with heart failure, it may help reduce the number of hospital visits.
    - **Safety**: There is no clear evidence that remote monitoring improves survival, but it does not appear to cause harm.
    - **Patient-reported outcomes**: Remote patient monitoring may have little or no effect on patients' quality of life or mental health outcomes, although this is uncertain.

    - **Cost: The estimated cost of implementing the RPM program at the MUHC is modest, with the potential for some savings, although this is uncertain"**
- **How reliable is the evidence?**
    - "The evidence is rated as low to moderate certainty. This means we are not fully confident in the results, and future studies may change these findings."
- **Bottom line**
    - "Remote patient monitoring shows promise, especially for certain higher-risk patients, by helping detect problems earlier and improving patient engagement. However, evidence gaps remain for patient adoption and clinical workflow. A small pilot program at the MUHC is recommended to better understand how well it works in practice before making a larger investment."

Centre for Digital Health Evaluation (CDHE) at Women's College Hospital Institute for Health System Solutions and Virtual Care (WIHV), 2023. **Remote Patient Monitoring: Evaluation Final Report**. (LINK)

- **Prepared for**: Digital Health Division, Ontario Ministry of Health
- **Aim**: "This project had two evaluation objectives: 1) describe and categorize different RCM projects into distinct RCM typologies, and 2) understand the mechanisms that make remote monitoring programs successful to ensure appropriate and effective models of care are offered to the right patients."
- **Methods**: "The evaluation involved
    - 1) literature reviews on RCM programs for chronic diseases, COVID-19, and surgical transitions,
    - 2) the development of an RCM taxonomy to categorize a sub-set of RCM programs implemented in Ontario,
    - 3) case-study of six programs that included interviews with patients, caregivers, and organizational leads (OLs), and focus groups with health service providers (HSPs), and
    - 4) administration of the Clinical Sustainability Assessment Tool (CSAT) survey to assess OLs perceptions of the sustainability of their programs."
- **Includes:** Key Findings, Policy recommendations, Program Design recommendations, Integration and equity recommendations
- **Cost-effectiveness:**
    - "**Only one article assessed the cost-effectiveness of surgical transition RCM programming, reporting that there was a significant reduction in costs for patients that used a monitoring app compared to traditional care pathways**. Although most of the studies did not conduct a comprehensive cost-effectiveness analysis to assess the feasibility of implementing surgical transition RCM programs, several papers suggested that these interventions could potentially lead to significant reductions in health care costs due to lower readmission rates and decreased hospital stays (n = 7). However, given the limited evidence in this area, **further cost evaluations are necessary to validate the cost-effectiveness of surgical transition RCM programs**."
    - "With the appropriate funds and resources, RCM technologies can fill existing health system gaps in continuity of care. Further research on the cost-effectiveness of RCM

programs and their impact on health outcomes is needed to definitively establish their value and to inform future policy and practice decisions."

Dibaji et al, 2023. **PHSA Remote Patient Monitoring White Paper.** Provincial Health Services Authority BC. 2023. (LINK)

- White Paper
- **Aim**: "The purpose(s) of this document includes, but is not limited to, the following:
  - 1. Supporting a strategy for RPM within PHSA programs and services
  - 2. Evaluating the current state of RPM provincially
  - 3. Summarizing the available literature and national and global use of RPM
  - 4. Presenting best practices for successful RPM implementation
  - 5. Highlighting lessons learned to inform the future growth and sustainability of RPM initiatives
  - 6. Identifying gaps and areas for further exploration, knowledge gathering, and/or improvement
  - 7. Sharing patient and family stories and firsthand experiences of using RPM
  - 8. Discussing best practices in diversity, equity, and inclusion within the RPM landscape
  - 9. Exploring key technical requirements for RPM program development
  - Ultimately, this document will serve as an informative guide for health care leaders and decision-makers to plan for new models of care delivery within specific programs or services using RPM."
- **Includes a literature review that explores**:
  - Clinical benefits of RPM
  - Best practices in RPM
- **Other sections include**: Diversity, equity, and inclusion, Evaluation resources, **Cost-effectiveness and Return on Investment,** Provincial Top-Rated Vendors, Appendix 2. Summaries of RPM Programs Found in Literature, **Appendix 3. National RPM Summary Overview (includes NL)**
  - **Cost-effectiveness and Return on Investment section on p.25 includes subsections on:**
    - Upfront Investments vs. Direct and Indirect Cost Savings
    - Organizational Considerations
    - Condition-Specific Downstream Effects of RPM

Island Health, March 1, 2018. **Evaluation of the Home Health Monitoring Expansion Project**. (LINK)

- Evaluation
- **Background**:
  - "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."

    - "An evaluation was conducted in fiscal year 2017/2018 using retrospective data inclusive of April 1, 2015 to December 31, 2017, to assess if the program was being implemented as intended and if it was achieving the intended outcomes. This evaluation complied with the Canada Health Infoway requirements to plan and conduct an evaluation of the HHME project to assess the impact of the Infoway investment based on healthcare quality, productivity and access."
- **Home Health Monitoring (HHM)**: "HHM is a service free to Island Health residents that supports patients living with HF or COPD. It allows clients to manage their condition from the comfort of their own home. By participating in this service, clients intend to improve their knowledge of their chronic disease, as well as their ability to manage their own health. **HHM programs may be more broadly referred to as home-telemonitoring, telehomecare, or remote patient monitoring**."
- **Aim**: "A mixed methods evaluation was undertaken, including analysis of both quantitative and qualitative data. HHM program impact and stakeholders' experiences were collected through Key Informant Interviews and System and Use Assessment Surveys. Impact was also assessed through retrospective administrative data extracted from the Discharge Abstract Database, CernerPM, Vital Stats and the application used to deliver HHM (TELUS RPM)."
- **Results**: "The evaluation of the HHM program at Island Health confirmed that the program was achieving its intended benefits. The program had high levels of patient satisfaction and showed reductions to acute care utilization. It was a cost-effective service that is currently operating for COPD and HF but should be expanded to include other morbidities and efforts should be made to increase program referral rates."
    - **"$3,252.10 per Client Cost Avoidance at 365 Days Post-HHM (n=150)"**
- **See Section 2.1.2.1 Cost Effectiveness Analysis**
- **See Section 3.4: To what extent is the HHM a cost-effective model to address the need for a reduction in acute care utilization?**
- **Section 4 Conclusions and Recommendations:**
    - **Acute Care utilization and cost avoidance:** "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 from. **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."

Economic Modelling & Primary Studies

Bhonagiri et al., 2026. **Implementation and evaluation of a 24/7 virtual intensive care support model in regional Australia: A controlled quasi-experimental study**. Aust Crit Care. Aug;39(4):101646. (LINK)

- **Study type**: controlled quasi-experimental study
- **Local problem**: "Two regional level 4 intensive care units (ICUs) in New South Wales, Australia required sustainable capacity enhancement to manage critically ill patients while addressing workforce limitations and geographic isolation."
- **Methods**: "We implemented a multiphase virtual intensive care support model progressing from daily videoconference rounds to 24/7 remote monitoring by experienced ICU nurses with specialist physician backup. Using a controlled quasi-experimental design, we compared two intervention sites with two matched control sites across four time periods (January 2019-June 2022). Segmented interrupted time series and difference-in-differences analyses evaluated effectiveness (standardised mortality ratios, length of stay, and adverse events) and efficiency (admission rates and transfer rates). Economic evaluation followed Consolidated Health Economic Evaluation Reporting Standards (CHEERS) 2022 guidelines. Qualitative methods explored clinician and patient experiences following consolidated criteria for reporting qualitative research standards."
- **Interventions**: "The virtual support model included continuous remote patient monitoring, daily multidisciplinary videoconference rounds, tiered escalation protocols, bidirectional staff education, and formal governance structures with defined accountability frameworks."
- **Results:** "Standardised mortality ratios remained within 95% confidence limits throughout (range: 0.72-1.18). The interrupted time series analysis demonstrated significant level changes in transfers following 24/7 implementation (site 1: -2.8 transfers/month, p = 0.003; site 2: -2.1 transfers/month, p = 0.01). Difference-in-differences estimates confirmed intervention effects independent of concurrent care model changes. **An economic analysis revealed cost-benefit ratios of 1:7.1 and 1:5.9 (per AUD invested). Twenty-one clinicians described enhanced collaboration, improved access to expertise, and increased confidence in managing complex patients. Implementation fidelity exceeded 92% across monitored components**."
- **Conclusions**: "**Virtual intensive care unit support model represents a safe, cost-beneficial model for enhancing regional ICU capacity during routine operations**. Benefits extend beyond pandemic response to sustainable improvements in rural critical care delivery. Implementation requires robust governance, reliable technology, dedicated staffing, and systematic fidelity monitoring."

Heijdra et al., 2026. **A Cardiovascular Care Pathway Supported by Remote Patient Management in Dutch Primary Care: Cost-Effectiveness, Budget Impact, and Workload Analysis**. JMIR Mhealth Uhealth. Sep 28;14: e79512. (LINK)

- **Study type**: Cost-Effectiveness, Budget Impact, and Workload Analysis
- **Aim**: "…to estimate the long-term cost-effectiveness, 5-year health care budget impact, and expected changes in general practitioner (GP) and practice nurse (PN) workload associated with the CVRM-Box intervention in the Netherlands."
- **Methods**: "We conducted a model-based economic evaluation comparing CVRM-Box with care as usual in Dutch primary care integrated CVRM programs. **CVRM-Box is a multicomponent RPM intervention comprising a digital blood pressure (BP) monitor, digital weight scale, step counter/activity tracker, and a mobile app, with measurements transferred to the GP practice for periodic review.** A time-inhomogeneous cohort Markov model simulated lifetime transitions among health states, including at-risk, post-myocardial infarction (MI), poststroke, recurrent events, cardiovascular death, and noncardiovascular death. Cardiovascular risks were modeled

using prediction equations (SCORE2, SCORE2-OP, and SMART2) populated with subgroup-specific risk factor profiles. Intervention effects were modeled as changes in systolic BP derived from a matched cohort study of CVRM-Box. Other key parameters (costs and utilities) were similarly obtained from the matched cohort study, or routine primary care data, and published sources. **Outcomes included incremental cost-effectiveness ratios (ICERs, indicating cost per quality-adjusted life year [QALY] gained), cost-effectiveness probabilities, 5-year health care budget impact, and an exploratory workload analysis estimating annual changes in visit time and remote consultation frequency for GPs and PNs**. Probabilistic and scenario uncertainty analyses were performed."

- **Results**: "In the overall population, CVRM-Box increased costs and QALYs versus care as usual, yielding an **ICER of €17,340/QALY gained (EUR €1=US $1.11 as of 29 December 2023) and a 60% probability of cost-effectiveness at a willingness-to-pay threshold of €20,000/QALY**. **Cost-effectiveness was more favorable in higher-risk subgroups (uncontrolled BP and/or prior MI/stroke), with ≥70% probability of cost-effectiveness at €20,000/QALY, whereas in the lower-risk subgroup with controlled BP and no prior MI/stroke, the intervention is unlikely to be cost-effective (ICER: €42,384/QALY). The 5-year health care budget impact was €2.9 million and €662.2 million for regional and national rollout, respectively.** In a typical Dutch primary care practice, the CVRM-Box reduced PN workload by 25.9 h and 44.7 remote consultations annually, while the change in GP workload was negligible (0.5 h; 3.3 remote consultations)."
- **Conclusions**: "The **CVRM-Box multicomponent RPM intervention is likely to be cost-effective among high-risk subgroups but not in lower-risk groups**. **The intervention further reduces PN workload but not GP workload**. **Results primarily apply to the Dutch context and may not generalize to health care systems with different payment/incentive arrangements**. Additionally, long-term outcomes were modeled using prediction models rather than observed cardiovascular events. Nonetheless, our findings provide an argument for implementation in primary care for higher-risk subgroups."

Heilig et al., 2026. **Developing a Core Outcome Set for the Evaluation of Remote Patient Monitoring Interventions Using the Sextuple Aim: Modified Delphi Study**. J Med Internet Res. Jul 15;28: e92863. (LINK)

- **Study type**: Modified Delphi
- **Aim**: "...to identify the most important value aspects for evaluating RPM interventions from the Sextuple Aim domains."
- **Sextuple Aim**: "encompassing health outcomes, costs, patient and provider experience, equity, and sustainability"
- **Methods**: "Value aspects relevant to evaluating RPM interventions within the Sextuple Aim framework were identified in a review of the literature, and this initial set was refined through stakeholder meetings. Subsequently, 6 stakeholder groups completed 3 Delphi rounds. Patients and informal caregivers (25-30 respondents per group) were recruited via a patient federation. Health care providers (20-30 experts), managers, insurers, and researchers (10-20 experts per group) were recruited. In each round, participants rated the importance of aspects on a 5-point Likert scale. In round 2, participants ranked aspects within each domain to determine their relative importance; in round 3, they ranked aspects across domains. A multicriteria consensus rule was used to select aspects for the preliminary COS. The COS was finalized during a multistakeholder expert meeting with 7 experts."

- **Results**: "Of the 171 respondents, 137 (80%) completed all Delphi rounds. The input set, formed through a literature search and meetings, contained 43 value aspects. The total set contained 47 aspects after the first round. After all 3 rating rounds, 33 of 47 (70%) value aspects met the predefined importance threshold. Ranking results from rounds 2 and 3 identified aspects prioritized within and across domains. In total, 26 (55%) aspects met the multicriteria consensus rule and formed the preliminary COS. During the final multistakeholder expert meeting involving subgroup exercises and moderated discussions, value aspects with conceptual overlap were merged, removed, or relocated**. The final COS included 17 value aspects, with 1 additional emergent aspect identified during the expert meeting and included as a recommended item, which also resulted in full Sextuple Aim domain coverage**."
    - **"Notable differences were observed between stakeholder groups for value aspects within the cost domain. Managers and the small group of insurers consistently rated these value aspects as more important than other stakeholder groups."**
- **Conclusions**: "**An RPM Sextuple Aim COS comprising 17 value aspects and 1 recommended aspect was developed, providing a multidimensional and multistakeholder evaluation set. This COS provides a standardized, comprehensive basis for evaluating RPM interventions and can be used to support the validation and refinement of existing RPM evaluation tools.** Future research may consider operationalizing the COS and its recommended aspect into measurable items and assessing its feasibility and uptake in practice."

Zhang et al., 2026. **Program cost and return on investment analysis of remote patient monitoring for hypertension management in the cardiology department of a large healthcare system**. J Telemed Telecare. Sep;32(8):669-678. (LINK)

- **Study type**: "...cost-effectiveness analysis was undertaken from the perspective of the health service, using retrospective client data before and after enrolment in the RPM program"
- **Aim**: "…evaluated the financial performance of an RPM program"
- **Methods**: "Conducted from March to June 2024 in the Cardiology Division at **New York University Langone Health**, the study used field observation, surveys, and micro-costing methods. A costing tool was developed to quantify program costs in 2024 US dollars, including personnel, equipment, and supplies. RPM-related services reimbursement rates were estimated using Medicare billing information. The return-on-investment (ROI) ratio was calculated by dividing net return (profit) by the RPM program costs. Sensitivity analyses assessed the impact of varying parameters on the ROI of RPM."
- **Results**: "The **average RPM program cost was estimated at $330 per patient (range: $208–$452). Major expenses included data review by staff ($172 per patient), blood pressure devices ($48 per patient), and phone communications ($36 per patient).** ROI varied based on patient compliance with home blood pressure monitoring (≥16 days per month), with an average estimate of 22.2% (range: −11.1%–93.3%) per patient at a 55% compliance rate. The ROI was most sensitive to changes in data-review costs, insurance reimbursement rates, patient compliance, device setup, and communication costs."

- **Conclusions**: "The **RPM program achieved a positive ROI from the perspective of a clinical division in a large healthcare system**. Successful implementation and financial sustainability of RPM require efforts to reduce human resource costs and enhance patient engagement."

Mokri et al., 2025. **The impact of different perspectives on the cost-effectiveness of remote patient monitoring for patients with heart failure in different European countries**. Eur J Health Econ 26, 71–85. (LINK)

- **Study type**: Markov Model
- **Aim**: "…to assess the cost-effectiveness of RPM in the Netherlands (NL), the United Kingdom (UK), and Germany (DE) highlighting the differences between cost-effectiveness from a societal and healthcare perspective"
- **Methods: "**We developed a Markov model with a lifetime horizon to assess the cost-effectiveness of RPM compared with usual care. We included HF-related hospitalization and non-hospitalization costs, intervention costs, other medical costs, informal care costs, and costs of non-medical consumption. A probabilistic sensitivity analysis and scenario analyses were performed."
- **Results**: "RPM led to reductions in HF-related hospitalization costs, but total lifetime costs were higher in all three countries compared to usual care. The estimated incremental cost-effectiveness ratios (ICERs), from a societal perspective, were €27,921, €32,263, and €35,258 in NL, UK, and DE respectively. **The lower ICER in the Netherlands was mainly explained by lower costs of non-medical consumption and HF-related costs outside of the hospital. ICERs, from a healthcare perspective, were €12,977, €11,432, and €11,546 in NL, the UK, and DE, respectively**. The ICER was most sensitive to the effectiveness of RPM and utility values."
- **Conclusions**: "This study demonstrates that RPM for HF can be cost-effective from both healthcare and societal perspective. Including costs of living longer, such as informal care and non-medical consumption during life years gained, increased the ICER."

Vudathaneni et al., March 04, 2024. **The Impact of Telemedicine and Remote Patient Monitoring on Healthcare Delivery: A Comprehensive Evaluation.** Cureus 16(3): e55534. (LINK)

- **Study type**: Evaluation
- **Aim:** "…to conduct a comprehensive evaluation of the impact of these technologies on healthcare delivery, **focusing on patient outcomes, economic parameters, and overall satisfaction."**
- **Methods:** "A prospective observational study was conducted in various healthcare facilities, involving 186 **participants with chronic diseases**. Inclusion criteria included patients actively using telemedicine services. Data collection methods included surveys, interviews, and review of medical records, focusing on patient demographics, clinical outcomes, and economic parameters. The intervention involved a seamless integration of telemedicine technologies into the existing health system."
- **Results:** "Primary outcomes revealed significant improvements in patient health, including a decrease in disease-specific markers (mean reduction of 12,000 to 11,000, $p = 0.002$), a substantial reduction in severity of symptoms (mean reduction from 3,500 to 2,500, $p < 0.001$), and a general improvement in health status (mean increase from 7,200 to 8,500, $p < 0.001$). **The savings in healthcare costs were evident, with direct costs decreasing from 25,000 to 12,000 ($p < 0.001$) and indirect costs decreasing from <10,000 to <5,000 ($p = 0.004$).** Secondary results

demonstrated increased patient satisfaction with communication (increase from 80% to 95%, $p < 0.001$) and convenience of services (increase from 75% to 90%, $p < 0.001$). Patient satisfaction also increased significantly (from 80% to 95%, $p < 0.001$). Accessibility to healthcare services improved, with a reduction in geographic barriers (increase from 65% to 90%, $p < 0.001$) and a **decrease in the frequency of healthcare utilization** (decrease from 2.5 to 1.5, $p < 0.001$)."

- **Conclusions:** "The study provides robust evidence of the positive impact of telemedicine and remote patient monitoring on healthcare delivery. Significant improvements in patient outcomes, coupled with substantial cost savings and increased satisfaction levels, underscore the transformative potential of these technologies."

Michaud et al., 2023. **Cost analysis of a remote patient monitoring programme for post-discharge patients with type 2 diabetes**. J Telemed Telecare. Jul;29(6):417-425. (LINK)

- **Study type**: cost analysis
- **Aim**: "This study conducted a **cost analysis of a remote patient monitoring (RPM) programme to enhance the post-discharge management of type 2 diabetes**."
- **Methods**: "Using retrospective data collected during RPM implementation from September 2014 to February 2018, we estimated the costs of implementing an RPM in the primary care setting. Measures included total and average annual costs, costs per participant who was enrolled or completed the programme, and costs per person-day. We further conducted sensitivity and scenario analyses to examine variations in estimated programme costs associated with varying programme efficiencies and alternative personnel compositions of the RPM team."
- **Results**: "**The total RPM implementation costs were estimated at US$4,374,544 with an average annual programme costs of US$1,249,870, which translated to US$3207 per participant (n = 1364) completing the three-month programme. The per person-day cost was averaged at US$24 (182,932 person-days).** Sensitivity and scenario analyses results indicate that the **sustainment costs were approximately US$1.6 million annually and the per-person-day costs were between US$21 and US$29 with each nurse coach on average serving a panel of 62-93 patients**."
- **Conclusion**: "The implementation and sustainment costs of an RPM programme, estimated under various assumptions of programme efficiency and care team compositions, as exemplified in this study, will help healthcare organizations make informed decisions in budgeting for and sustaining telehealth programmes to enhance diabetes management."

Snoswell et al., 2023. **Cost-effectiveness of remote patient monitoring for First Nations peoples living with diabetes in regional Australia**. J Telemed Telecare. Dec;29 (10_suppl):3S-7S. (LINK)

- **Study type**: Cost-effectiveness analysis
- **Aim**: "...to determine the cost-effectiveness of remote patient monitoring (RPM) with First Nations peoples living with diabetes"
- **Methods**: "This study was set at the Goondir Health Service (GHS), an Aboriginal and Torres Strait Islander Community-Controlled Health in South-West Queensland. Electronic medical records and RPM data were provided by the GHS. Clinical effectiveness was determined by comparing mean HbA1c before and after enrolment in the RPM service"
- **Results**: "Our analysis found no statistically significant effect between the mean HbA1c before and after enrolment, so this analysis focused on net-benefit and return on investment for costs from the perspective of the GHS. **The 6-month RPM service for 84 clients cost AUD $67,841 to**

cover RPM equipment, ongoing technology costs, and a dedicated Virtual Care Manager, equating to $808 per client. There were 199 additional client-clinician interactions in the period after enrolment resulting in an additional $4797 revenue for the GHS. Therefore, **the program cost the GHS $63,044 to deliver, representing a return on investment of around 7 cents for every dollar they spent**."

- **Conclusions**: "Whilst the diabetes RPM service was equally effective as usual care and resulted in increased interactions with clients, **the cost for the service was substantially more than the additional revenue generated from increased interactions**. This evidence highlights the need for alternative funding models for RPM services and demonstrates the need to focus future research on long-term clinical effects and the extra-clinical benefits resulting from services of this type."

Chew et al., 2022. **Clinical and Economic Outcomes Associated with Remote Monitoring for Cardiac Implantable Electronic Devices: A Population-Based Analysis**. Canadian Journal of Cardiology, 38, 736-744. (LINK)

- **Study type**: population-based cohort study & model-based economic evaluation
- **Aim**: "…we assessed the clinical outcomes and medical resource use associated with remote monitoring in a large administrative cohort of **CIED patients in Alberta, Canada**. Second, **we performed a model-based economic evaluation of remote monitoring compared with in-clinic follow-up alone, using inputs informed by real-world data**."
- **Methods**: "We conducted a population-based cohort study of patients with de novo implantable cardioverter-defibrillators (ICDs) with or without cardiac resynchronization therapy (CRT-D), using administrative health data in Alberta, Canada, from 2010 to 2016. We assessed RM status as a predictor of all-cause mortality and cardiovascular (CV) hospitalization using Cox proportional hazards modelling, and direct health costs by generalized linear models. From this real-world data, we then constructed a decision-analytic Markov model to estimate the projected costs and benefits associated with RM compared with in-clinic visit follow-up alone."
- **Results**: "Among 2799 ICD and CRT-D patients, 1830 (63.4%) were followed by RM for a mean follow-up of 50.3 months. After adjustment for age, sex, and comorbidities, RM was associated with a lower risk of death (hazard ratio [HR] 0.43, 95% confidence interval [CI] 0.36-0.52; P < 0.001) and CV hospitalization (HR 0.76, 95% CI 0.64-0.91; P = 0.002). **In the economic model, cost savings were observed over 5 years with an estimated savings of $12,195 per person (95% CI −$21,818 to −$4,790). The model estimated a cost-savings associated with RM strategy in 99% of simulations**."
- **Conclusions**: "These population data support more widespread implementation of RM technology to facilitate better patient outcomes and improve health system efficiency."