



**Rehabilitative  
Care Alliance**

# **Community-Based Rehabilitation: Providing High-Value Rehabilitative Care in the Community**

**Part 2: In-Home Rehabilitation**

**November 2020**

## ABOUT THIS WHITE PAPER

This is Part 2 of a four-part white paper that explores the critical role that community-based rehabilitation plays in the Ontario health care system. *Community-Based Rehabilitation: Providing High-Value Rehabilitative Care in the Community* describes the impact of community-based rehabilitation and provides recommendations for health system decision-makers in order to improve the spread of innovative and cost-effective community-based models of rehabilitative care.

*Community-Based Rehabilitation: Providing High-Value Rehabilitative Care in the Community* was released in four parts:

- Part 1: [The Value of Community-Based Rehabilitation: An Overview](#)
- Part 2: [In-Home Rehabilitation](#)
- Part 3: [Ambulatory-Based Rehabilitation](#)
- Part 4: [Rehabilitative Care in Primary Care](#)

The four parts of *Community-Based Rehabilitation: Providing High-Value Rehabilitative Care in the Community* were published from November 2020 to March 2022. Over that period, the RCA modified the patient-centred, needs-based categories used in the paper to describe and organize rehabilitative care. Prevention—primary, secondary and tertiary—has now been integrated across categories to better reflect the prevention continuum. The updated categories can be found in *Part 3: Ambulatory Rehabilitation* and *Part 4: Rehabilitation in Primary Care*.

In addition, the term “ambulatory rehabilitation” is no longer being used. In Part 4, it has been replaced by the more inclusive “rehabilitation in outpatient/community clinics” to reflect that not all patients served in these settings are able to ambulate.

## Part 2: In-Home Rehabilitation

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## 1. RECOMMENDATIONS

In-home rehabilitative care enables individuals with impairments and disabilities to reach and maintain their optimal level of function (i.e., physical, sensory, cognitive, communicative, psychological and social); promotes health and well-being; facilitates community reintegration; and improves quality of life. In-home rehabilitative care is also provided to prevent a decline in functional/clinical status because of deconditioning, a health condition, pain and/or other factors.

### *In-home Rehabilitative Care Recommendations*

- Timely and equitable access to quality community rehabilitative care should be provided across Ontario independent of geographical location and socioeconomic status.
  
- An in-home rehabilitative model of care in Ontario should ensure the following:
  - Patients and care partners are actively engaged as members of the rehabilitative care team, making decisions about their care. They are actively involved in developing their rehabilitative care program, including setting goals and participating in reassessment, individualizing the treatment program to their needs and receiving training in how to carry out a program independently at home.
  
  - High-quality, person-centred rehabilitative care is provided or supervised by regulated rehabilitative care professionals with expertise in the patient population, in collaboration with other members of the health care team, as appropriate.
  
  - Patients who would benefit from rehabilitative care are identified and receive rehabilitation early in their illness/injury.
  
  - Where more than one service is required, rehabilitative care is provided using an interdisciplinary, integrated and coordinated team approach.
  
  - Patients and care partners experience seamless transitions across the continuum of their rehabilitative care. Transition plans are developed and agreed upon in partnership with the patient, care partners and the rehabilitative care team.
  
  - Prevention and health promotion are a key focus of rehabilitative care provided in the home.
  
  - Level of intensity/frequency of rehabilitative care tolerated by the patient are accommodated in care planning and programming.
  
  - Multi-modal education is provided to patients and care partners. Materials are tailored to the individual's language, experience, preferences and level of health literacy.

- Best practice in-home rehabilitative care is personalized according to the patient's goals and environmental context. Providers take time at each visit to identify concerns and address outstanding issues. Each patient's care is designed, coordinated and delivered in a flexible manner and includes care partners.

#### *System-level Recommendations*

- Patient experience and outcomes should be measured using standardized and validated tools regardless of the location of care or care delivery mechanism (e.g., virtual care).
- A provincial data collection and reporting system, including a minimum subset of standardized and validated tools for community-based rehabilitation across the continuum of care and patient populations, should inform program, policy and funding decisions.
- Implementation of community-based rehabilitative care programs should be guided by best practices and a review of available models of care.
- Program, policy and funding decisions should be made through a thorough consultation process with subject matter experts.

#### *Pandemic Considerations*

- Rehabilitation services are essential and need to continue during and after a pandemic as a critical component of high-value care offered to individuals across the lifespan to optimize function and to reduce disability.
- Innovative, multi-modal in-home rehabilitative care approaches are necessary during a pandemic, as the health care system endeavours to provide quality care while maintaining physical distancing and adjusting to the closure/reduction of many community-based services.
- Although virtual care options had been implemented in some areas, since the COVID-19 pandemic, virtual care has been widely adopted as a feasible option and has stimulated innovative approaches to delivering care. Virtual care reduces isolation and improves the satisfaction of patients, care partners and professionals; however, it cannot always fully address a patient's rehabilitation needs. Virtual care should therefore only be used at the recommendation of the regulated rehabilitative care professional in consultation with the patient and care partner, and based on the needs, preferences and ability of the patient.
- The current COVID-19 pandemic has rapidly highlighted the importance of guidelines released by health care professional colleges. Knowledge translation to guide best practice implementation of virtual care is required. Numerous issues must be addressed when providing

virtual care, including patient safety concerns, technology and access issues, the need for privacy and informed consent, patient difficulties in understanding the virtual care application, or the need for hands-on assessment/treatment in order for a patient to achieve therapy goals. The best approach to support patient outcomes should be based on each patient's care needs.

## 2. INTRODUCTION

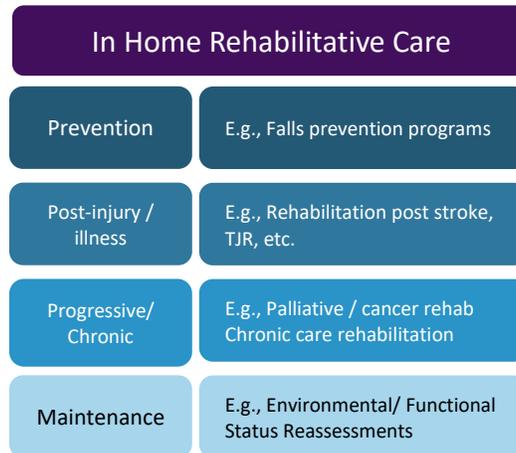
As outlined in Part 1 of this white paper, [The Value of Community-Based Rehabilitation: An Overview](#), community-based rehabilitation is focused on enabling individuals with impairments and disabilities to reach and maintain their optimal physical, sensory, intellectual, communicative, psychological and social functional levels. It promotes health and well-being, re-integration to and participation in community living and improved quality of life.<sup>1</sup>

Determination of where the patient receives community-based rehabilitative care (in the community, in-home or in a primary care setting) should be based on which environment is most appropriate and safe given the patient’s individual rehabilitative goals.

This paper (Part 2) will focus on in-home rehabilitation. *Part 3: Ambulatory-Based Rehabilitation* and *Part 4: Rehabilitative Care in Primary Care Teams* will be released separately.

## 3. METHODOLOGY

A review of the literature and best practice guidelines was conducted to identify best practices for in-home rehabilitative care and community-based in-home models of care that impact patient and system level outcomes. Drawing on the evidence, the various types of in-home rehabilitative care are described using the following patient-centred, needs-based categories, recognizing that patients requiring rehabilitation may fall under more than one category concurrently:



In each category, examples of effective rehabilitative care models are identified along with their outcomes, addressing the objectives of the quadruple aim framework whenever possible:

- Improving the patient experience of care (including quality and satisfaction),
- Improving the health of populations,
- Reducing the per capita cost of health care, and
- Provider satisfaction (professional wellness).

The examples included are evidence-based with measurable outcomes and meet the definitions of rehabilitation set out in the RCA's [Definitions Framework for Community Based Levels of Care](#). (For example, rehabilitation is provided under the direction and supervision of a minimum of one regulated rehabilitative care professional or by an integrated, inter-professional team of regulated health professionals.)

Finally, the paper presents a series of recommendations based on the evidence and the input of subject matter experts. These recommendations provide decision-makers with guidance on the optimal organization and provision of in-home rehabilitative care in order to realize the benefits demonstrated in the literature and support wider adoption of these practices and models. Please note that this paper does not recommend one model of care over another, but presents options, which may be adapted to local contexts.

This paper was developed by an In-Home Clinical Subject Matter Expert Group, made of a broad group of provincial stakeholders, and validated by the RCA Community Rehabilitation Advisory Group.

#### **4. WHAT IS IN-HOME REHABILITATION?**

The government of Canada defines home and community health care as “services [that] help people to receive care at home, rather than in hospital or long-term care facility, and to live as independently as possible in the community.”<sup>2</sup> The goal of home and community care is to enable individuals to receive high quality services at home and in the community to help them maintain or improve their health status and quality of life.<sup>2</sup> In-home rehabilitation is one component of this care.

In Ontario, an estimated 59 million hours of publicly and privately purchased home care service is provided annually across the province.<sup>3</sup> Home care providers are companies or organizations that coordinate and deliver home care services. Providers employ or contract with health care professionals to provide these services, including nursing care, home support services, personal care, social work, dietetics and rehabilitative care (physiotherapy, occupational therapy, speech-language therapy, kinesiology and respiratory therapy). Services are delivered to individuals of all ages who need medical, nursing, social or therapeutic treatment and/or assistance with essential and instrumental activities of daily living. This includes individuals who are at risk of health complications from injury or disease, recovering from illness or injury, living with chronic health conditions or disabilities, or who are terminally ill.

Generally, patients who access in-home rehabilitation services are not able to access outpatient services for a variety of reasons, or have rehabilitation goals that are best met in the home setting. These reasons include the nature of their condition, cognitive impairment, level of mobility, transportation access and availability of outpatient services. In-home rehabilitative care models offer home consultations and safety assessments that can be used to support safe transitions from hospital to home. Often, the patient may require a short-term “transition to outpatient from home” service to overcome physical barriers of their home setting (e.g., stairs) to attend ambulatory-based rehabilitative care. In addition, some patient goals may be best met through in-home services provided or supervised by a regulated health care professional or interdisciplinary team. Examples include: 1) assessing and

practicing meal preparation in a patient's own home, 2) gait aid or wheelchair prescription, 3) home modification recommendations, and 4) palliative pain and symptom management.

In-home rehabilitation is integral to home and community health care. It proactively optimizes function and safety to allow individuals to remain in their homes and communities rather than relocating to institutions. It also addresses the growing need to support family, friends and care partners<sup>i</sup> of persons with disabilities, recognizing the unique challenges that care partners face in these roles.<sup>4</sup>

## 5. WHY IS IN-HOME REHABILITATION IMPORTANT?

At the individual level, in-home rehabilitation improves overall physical well-being, enhances social function, ensures routine monitoring of individuals who are isolated, increases independence, teaches self-management, promotes empowerment and reduces the rate of re-hospitalization and future health care service utilization. In-home programs also ensure continuity of care and facilitate transitions from hospital to home.<sup>5</sup> The impact of these rehabilitative care services is evident both at the individual and system level and includes:

- Improved function and quality of life, which have been shown to reduce mortality rates;
- Improved muscle strength and balance, thereby decreasing the rate and risk of falls in community dwelling seniors;
- Improved communicative function;
- Increased opportunity for care partners to play an integral role;
- Earlier discharge home with rehabilitation services, reducing hospital length of stay; and
- Prevention of hospital re-admission.<sup>6</sup>

Among its ten recommendations to create an integrated health care system, the Premier's Council on Improving Healthcare and Ending Hallway Medicine advocated modernizing the home care sector and providing better alternatives in the community for patients who require a flexible mix of health care and other supports. This would give patients access to more innovative models of care in the community and access to wrap-around services,<sup>7</sup> relieving pressure on hospitals by providing highly cost-effective services, reducing hospital length of stay and/or preventing hospitalization.<sup>8</sup>

## 6. PANDEMIC CONSIDERATIONS

During the current COVID-19 pandemic, the initial focus was largely on ensuring adequate capacity to care for people who become critically ill, protecting health care providers and preventing spread. The result was a significant reduction in many services, including the provision of rehabilitative care.

However, rehabilitation services are essential and need to continue as an essential component of high-value care offered for individuals across the lifespan to optimize physical and cognitive function and to

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<sup>i</sup> Care partners are defined by the patient; they often serve as a liaison between patients and clinicians, are involved in day-to-day decision-making and care delivery and provide physical, social, emotional and navigation of care.

reduce disability.<sup>9 10</sup> A study in the United Kingdom predicted that 45% of COVID-19 patients discharged from acute care will require support from health and social services, suggesting that the greatest needs for rehabilitation post-COVID will be in the community.<sup>11</sup>

During the early months of the pandemic, challenges were noted in transition planning and access to the equipment required for effective implementation of community-based rehabilitation. Further exploration of innovative, multi-modal approaches to best practice community-based rehabilitative care is required based on the needs of patients, their environments and availability of resources, such as technology.<sup>12</sup>

Virtual care<sup>ii</sup> has been proposed as a possible solution during this pandemic, as it has proven feasible, reduced isolation, stimulated innovation and improved the satisfaction of patients, care partners and professionals.<sup>13</sup> One example is the use of virtual care to provide speech-language pathology services. The face-masking required for an in-person visit does not permit the speech-language pathologist to see the patient's mouth/positioning. In this case, virtual care is an effective solution for completing communication therapies and exercises that do not require the speech-language pathologist to physically manipulate the patient.

Prior to the pandemic, virtual care was also increasingly used to provide in-home rehabilitative care services in rural and remote communities, producing positive health outcomes.<sup>6</sup> In these communities, the demand for virtual care dramatically exceeded the virtual services offered. Furthermore, recent surveys conducted by Canada Health Infoway reported that 71% of Canadians would like to book their appointments online, 63% would like to email their health care providers and 41% would like video visits with their health care providers.<sup>14</sup>

Although virtual care has been identified as a viable option for providing rehabilitation, it is not always an appropriate substitute for in-person rehabilitation. Barriers exist, including patient safety concerns, technology and access barriers, the need for privacy and informed consent, patient difficulties in understanding the virtual care application, or the need for hands-on assessment/treatment in order for a patient to achieve therapy goals.<sup>15</sup> Virtual care should therefore only be used at the recommendation of the regulated rehabilitative care professional in consultation with the patient and care partner, and based on the needs, preferences and ability of the patient.

A detailed discussion of effective models of virtual rehabilitative care and their outcomes is provided later in this paper. See [8.3 Virtual Care Approaches Post-Injury/Illness](#) and [9.2 Virtual Care Approaches for Progressive/Chronic Conditions](#).

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<sup>ii</sup> Virtual care is defined as any interaction between patients and/or members of their circle of care, occurring remotely, using any forms of communication or information technologies, e.g. telephone, videoconferencing or sensor monitoring, with the aim of facilitation or maximizing the quality and effectiveness of patient care.

## 7. MODELS OF IN-HOME REHABILITATIVE CARE: PREVENTION

Models of rehabilitative care that focus on prevention address the needs of individuals with reduced physical, cognitive and/or speech-language functioning who require rehabilitative care to maintain or prevent a decline in functional status and enhance their capacity to remain at home. These individuals include seniors with multiple co-morbidities and complex health needs who may be at risk for falls, and patients presenting with a change in functional status. Prevention models may also address the needs of care partners experiencing stress or burnout.

Rehabilitative care can be provided to prevent a decline in functional/clinical status due to de-conditioning, a health condition, pain or aging. It can also help to optimize independence, reduce the risk of injury and maximize overall quality of life. This care may include, but is not limited to:

- Assessing barriers/risks to patient’s ability to maintain independence;
- Providing rehabilitation to support patient’s re-engagement in-home and community-based daily activities;
- Promoting adaptation of the home environment;
- Increasing self-management skills;
- Providing patient/care partner education to enhance coping with impairments and understanding of risk factors, activity limitations and participation restrictions; and
- Linking patients and care partners with wellness/health promotion programs, such as exercise or fall prevention classes, stress reduction programs or support groups.

As defined by the World Health Organization, **primary prevention** refers to actions aimed at avoiding the manifestation of a disease, **secondary prevention** deals with early detection when this improves the chances for positive health outcomes and **health promotion** is the process of empowering people to increase control over their health and its determinants through health literacy efforts and multi-sectoral action to increase healthy behaviors. Rehabilitation addresses all three.<sup>16</sup>

In-home approaches to rehabilitative care in each of these domains are expanded on below.

### 7.1 Primary Prevention

Primary prevention aims to prevent disease or injury before it occurs by preventing exposure to hazards that cause disease or injury, altering unhealthy or unsafe behaviours that can lead to disease or injury, and increasing resistance to disease or injury should exposure occur.<sup>17</sup>

#### *Fall Prevention*

From a rehabilitative care perspective, falls are a key focus of primary prevention in the community.

A fall is “an event that results in a person coming to rest inadvertently on the ground or floor or other lower level, with or without injury.”<sup>18</sup> The Canadian Institute for Health Information (CIHI) reports that falls account for 60% of all reported emergency room (ER) visits among seniors, with an estimated 20%

of these visits resulting in admission to the hospital. Four out of five injury hospitalizations involving seniors are due to a fall.<sup>19</sup>

A recently released position paper from the Ontario Fall Prevention Collaborative highlights the extensive evidence that fall prevention programs and services contribute to significant reductions in fall-related injuries, hospitalizations and associated health care costs among older adults in Ontario.<sup>20</sup> These fall prevention rehabilitative care interventions include balance and functional exercises;<sup>21</sup> interdisciplinary team expansion to include case management, patient reminders and staff education;<sup>22</sup> and treatment of hearing loss.<sup>23 24</sup>

*Table 1: Examples of Primary Prevention Approaches to In-home Rehabilitative Care*

Approach	Description	Key Outcomes
<b>Primary Fall Prevention</b>		
Canadian 1 <sup>st</sup> Fall Algorithm to predict level of risk of falls in-home care clients <sup>25</sup>	<ul style="list-style-type: none"> <li>• Use of minimum data set to develop predictive algorithm to inform fall prevention care planning</li> <li>• Use of Resident Assessment Instrument-Home Care (RAI-HC) – an inter-RAI patient-centred assessment system that includes items on symptoms, function and quality of life and is administered on admission to home care and approximately every six months thereafter</li> <li>• Algorithm includes the use of assistive devices, unsteady gait, age, cognition, pain and incontinence to identify six categories from low to high risk</li> <li>• Care coordinators can automatically obtain patient’s risk classification that guides the patient’s management plan, education and modification of fall risk through preventative actions</li> </ul>	<ul style="list-style-type: none"> <li>• 1<sup>st</sup> Fall Algorithm predicted future falls in persons who have not fallen in the past 90 days across the four provinces examined (Ontario, Manitoba, Alberta and British Columbia)</li> <li>• Fall rates and odds ratios increased with risk levels in the algorithm in all provinces examined</li> </ul>
New Zealand VIP Trial – Home Safety Program <sup>26</sup>	<ul style="list-style-type: none"> <li>• Occupational therapist (OT) conducts home safety assessment and follow-up visit for community-dwelling seniors aged 75 or older with poor vision</li> <li>• Visit includes hazard identification; discussion about the hazards, behaviour or lack of equipment that could lead to the fall; and agreement on which recommendations to implement</li> </ul>	<ul style="list-style-type: none"> <li>• Home safety group had 61% fewer falls and 44% fewer fall-related injuries compared with those who received social visits</li> </ul>
Germany Falls-HIT (Home Intervention Team) Program <sup>27</sup>	<ul style="list-style-type: none"> <li>• Supports frail, community-dwelling adults 65 years or older transitioning from hospital to home for conditions unrelated to a fall</li> <li>• OT and nurse/physiotherapist (PT) conduct first home visit while patient still admitted to hospital; identify home hazards and determine safety equipment required</li> </ul>	<ul style="list-style-type: none"> <li>• Fall rate was reduced by 31%</li> <li>• Most effective for those who had experienced two or more falls in the past year; resulted in fall rate reduction of 37%</li> </ul>

	<ul style="list-style-type: none"> <li>• Two-three subsequent home visits with OT/nurse to discuss home hazards, recommend and facilitate home modifications and teach patients to use safety devices and mobility aids</li> </ul>	
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## 7.2 Secondary Prevention

Secondary prevention aims to reduce the impact of a disease or injury that has already occurred and prevent recurrence. This is done by detecting and treating the disease or injury as soon as possible to halt or slow its progress, encouraging personal strategies to prevent re-injury or recurrence, and implementing programs to return people to their original health and function in order to prevent long-term problems.<sup>16 17</sup>

### *Secondary fall prevention*

From a rehabilitative care perspective, secondary fall prevention interventions aim to reduce the risk of or prevent subsequent falls, thereby mitigating functional decline and improving patient outcomes.

Repeat emergency department visits for falls represent 18% of the total emergency department visits for falls across Ontario.<sup>28</sup> Community paramedics also provide services for individuals who have fallen via “lift-assists.”<sup>iii</sup> If the patient subsequently refuses transport to the hospital for further medical attention, they remain at risk for further functional decline and potential secondary falls requiring medical attention and possible hospitalization. A cross-sectional study conducted in Southwestern Ontario Middlesex County found that approximately one-third of individuals who call for a lift-assist, call more than one time.<sup>29</sup>

Rehabilitative care to prevent the next fall mitigates functional decline in community-dwelling, frail older adults and reduces the potential for further falls in this population.

### *Restorative Care*

Similarly, restorative care programs extend the functional independence of community-dwelling frail seniors, reduce care partner burden and facilitate the adoption of evidence-based clinical processes and interventions that have demonstrated efficacy in improving functional independence for community-dwelling seniors.

The Ministry of Health’s Assess & Restore Guideline defines high-risk seniors as those who have begun to experience serious functional decline and are reaching a stage where that decline threatens to become precipitous and permanent.<sup>30</sup> Frail high-risk seniors typically have complex psychosocial needs, multiple chronic conditions and a history of frequent use of primary, home and community care, or hospital resources. A description of “failure to thrive” or “debility” is also common. Functional loss is a concern for all frail seniors, but the concern is heightened when the loss is severe and there is a

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<sup>iii</sup> A “lift-assist” is defined as a non-urgent 9-1-1 call to paramedics to assist a patient who has fallen and cannot regain ambulation independently.

likelihood that without timely intervention the loss would become permanent. For frail seniors, severe functional loss, if it becomes permanent, typically means a significantly greater risk of hospitalization or admission to a long-stay LTC home bed.

Restorative care programs aim to address the risk of functional decline and maintain the individual’s independence in their home and community. In-home rehabilitation services for frail seniors have resulted in an overall improvement in their strength and Activities of Daily Living (ADLs), while reducing personal support worker (PSW) requirements and costs.<sup>31</sup>

*Cardiac Rehabilitation*

There are a wide variety of cardiac rehabilitation programs, which include risk factor education or counseling and exercise. These secondary prevention programs are effective in the management of patients with coronary artery disease, having been shown to improve survival, quality of life, functional status and cardiovascular risk profile as well as reduce hospital readmissions and psychological disorders.<sup>32 33</sup>

*Table 2: Examples of Secondary Prevention Approaches to In-home Rehabilitative Care*

Approach	Description	Key Outcomes
<b>Secondary Fall Prevention</b>		
Hong Kong OT Fall Reduction Home Visit Program <sup>34</sup>	<ul style="list-style-type: none"> <li>• OT home visit within two weeks of ED visit due to a fall</li> <li>• Environmental hazards evaluation</li> <li>• Daily life routine assessment</li> <li>• Recommendations for environmental modification</li> <li>• Prescription of assistive devices, where appropriate</li> <li>• Customized fall reduction care plan for participant and care partners</li> <li>• Referral to other community agencies, if needed</li> </ul>	<ul style="list-style-type: none"> <li>• Average of 4.6 fall hazards were identified per case; adherence rate at two-month follow-up of 76.3% for advice on environmental hazards and daily life routine</li> <li>• Significantly fewer reported falls in the intervention group at six-month follow-up</li> <li>• Although a positive trend was noted, these findings were not statistically significant at nine- and 12-month follow-up; therefore, six-month booster OT visit suggested.</li> </ul>
<b>Restorative Care</b>		
New Zealand Model of Restorative Home Care <sup>35</sup>	<ul style="list-style-type: none"> <li>• Goal facilitation tool completed with a needs assessor to determine the patient’s needs and to establish the aims for the episode of care</li> <li>• Services structured according to the principles of restorative home care (independence-focused with individually tailored activity programs) with expert guidance of OT, PT, speech-language pathologist (SLP) and/or registered dietitian (RD)</li> </ul>	<ul style="list-style-type: none"> <li>• Outcome measures used: Short Physical Performance Battery (SPPB), Dukes Social Support Index (DSSI)</li> <li>• Significant improvements in physical function were observed after a period of restorative home care services as measured by the SPPB</li> <li>• Absence of an associated change in social support (measured by the DSSI) may</li> </ul>

	<ul style="list-style-type: none"> <li>• Assessor uses a goal-setting tool (Towards Achieving Realistic Goals in Elders Tool [TARGET]) during the initial assessment process to establish the aims of the rehabilitation episode</li> <li>• Support Needs Assessment (SNA) incorporates two outcome tools: the Nottingham Extended Activities of Daily Living Scale (NEADL)<sup>47</sup> and the EuroQoL 5D (EQ-5D)</li> </ul>	<p>have been the result of a combination of factors, including the threshold of physical function required for community ambulation, the low rate of allied health service provision, and the time required to reestablish social ties</p>
<p>Ontario Central West LHIN – Home Independence Program<sup>36 37</sup></p>	<ul style="list-style-type: none"> <li>• Eight-week, home-based restorative care program designed using a best practice approach to improve seniors’ optimal independence and prevent functional decline</li> <li>• Delivered by integrated teams that include regulated health professionals with expertise in geriatrics; program directed at increasing strength, mobility, and functional ability</li> <li>• Dedicated rehabilitation care coordinator provides operational oversight, service provider organization liaison; facilitated patient teleconferences</li> <li>• OT receives referral and completes assessment within three days, screens patient for program eligibility, completes the Canadian Occupational Performance Measure (COPM), completes HIP protocols on bathing and dressing, request additional services (PT, PSW) from care coordinator</li> <li>• Protocols designed to support PSWs to provide care and interventions under the guidance of rehabilitation professionals to restore functional independence in fall prevention, bathing, dressing and grooming and exercise</li> </ul>	<ul style="list-style-type: none"> <li>• Functional improvements noted on the Timed Up &amp; Go (Admit-41 sec D/C-22 sec) and COPM (Performance Intake-3.2 D/C-6.2, Satisfaction Intake-3.0 D/C-6.0 )</li> <li>• Falls and ED visits were reduced (falls – 61% at intake to 12% at discharge; ED Visits – 61% at intake to 10% at discharge)</li> <li>• PSW Survey – 100% found the training useful</li> <li>• Overall general wellbeing was noted by 74% of patients to be somewhat or much better</li> <li>• 90% of patients would recommend the program to others</li> </ul>
<p>Ontario CBI Home Health Home Independence Program (Lite)<sup>38</sup></p>	<ul style="list-style-type: none"> <li>• Serves patients who have required in-home service for an extended period of time (&gt;1 year) and who have not had any changes to their care-plan</li> <li>• OT/PT assess to identify potential to increase independence and self-management skills</li> <li>• Program navigator coordinates care</li> <li>• Program is up to 60 days with higher intensity/frequency of therapy services</li> </ul>	<ul style="list-style-type: none"> <li>• 100% of the team received HIP lite/restorative care training and were more satisfied when working in an integrated way</li> <li>• Functional improvements noted: Timed Up &amp; Go (Initial-60 sec D/C-25 sec) Barthel Index (Initial-14 D/C-17) Patient Specific Functional Scale (Initial-3 D/C-7)</li> <li>• 97% of patients reported fair to excellent patient engagement re: how important their goals were and their confidence in their ability to achieve their goals</li> </ul>

<p>Ontario Mississauga Halton Victoria Order of Nurses SMART Enhanced In-Home Program<sup>31</sup></p>	<ul style="list-style-type: none"> <li>Using the evidence-based, nationally accredited SMART™ (Seniors Maintaining Active Roles Together) program, the Victorian Order of Nurses for Canada (VON) offers a highly coordinated and integrated program</li> <li>Frail seniors (average 5.5 on the Rockwood Clinical Frailty Scale) who were identified as meeting the established criteria receive in-home one-on-one exercise session with a kinesiologist to increase their strength, mobility and functional abilities. Six-week program, 2 x 1.0 hours/week, consisting of 15 gentle exercises geared towards the frail elderly and other vulnerable individuals that have experienced a recent loss of functional abilities following a medical event or decline in health</li> <li>Physiotherapy interventions are accessible to complement the SMART program to benefit frail seniors who have neurological disease and may require additional interventions outside of the current 15 gentle exercises</li> </ul>	<ul style="list-style-type: none"> <li>Improvements noted on the quality of life measure (+3.33), Timed Up and Go (-9.24 sec), BERG (+6.60) and 30 sec Sit to Stand (+2.03)</li> <li>97.2% of patients sustained or improved on three or more outcome measures</li> </ul>
<p><b>Cardiac Rehabilitation</b></p>		
<p>Telehealth delivery of cardiac rehabilitation<sup>33</sup></p>	<ul style="list-style-type: none"> <li>Effective when addressed multiple risk factors in line with clinical guidelines and individualized to the patient</li> <li>Further enhanced by engagement with local services, engagement with physicians, and specialists giving patients control over which risk factors to address and modes of addressing them</li> <li>Interventions involved home electrocardiogram (ECG) monitoring of exercise sessions and telephonic transmission, with or without concurrent phone contact with a health professional</li> <li>Most studies were conducted with high-risk patients recovering from cardiac surgery and required patients to have the use of a stationary bicycle in their homes</li> </ul>	<ul style="list-style-type: none"> <li>Multifactorial individualized telehealth cardiac rehabilitation are effective alternative models of cardiac rehabilitation, as they produced similar reductions in cardiovascular disease risk factors compared with hospital-based programs</li> </ul>
<p>Community-based delivery of cardiac rehabilitation<sup>33</sup></p>	<ul style="list-style-type: none"> <li>Brief interventions demonstrated effectiveness comparable with more intensive strategies. May be related to the lower participant burden of brief interventions, as larger drop-out rates were observed in studies with a greater number of telephone contacts</li> <li>Community Interventions: Majority of patient-provider contact in these studies was delivered face-to-face, through either</li> </ul>	<ul style="list-style-type: none"> <li>Multifactorial, individualized home-based cardiac rehabilitation programs are effective alternative models of cardiac rehabilitation, as they produced similar reductions in cardiovascular disease risk factors compared with hospital-based programs</li> </ul>

	<p>home visits or patient attendance at community centres</p> <ul style="list-style-type: none"> <li>• Programs involved multiple elements including graduated exercise, peer support, education, goal setting and motivation</li> <li>• Strong evidence supports the value of flexible interventions, based on individualized risk factor assessment</li> <li>• While patients are informed about evidence-based guidelines for their risk reduction, brief interventions which encouraged autonomy and choice had long-lasting effects. However, this needs to be supported by infrastructure: local healthcare providers (primary care physicians, community/indigenous health workers) and specialists were involved with successful programs.</li> <li>• Translation of patient goals into action was also facilitated by comprehensive information about local means to support lifestyle change</li> </ul>	
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### 7.3 Health Promotion

Health promotion is the process of empowering people to increase control over their health and its determinants through health literacy efforts and multi-sectoral action to increase healthy behaviors. Health promotion usually addresses behavioral risk factors such as tobacco use, obesity, diet and physical inactivity, as well as the areas of mental health, fall and injury prevention, drug abuse control, alcohol control, health behavior related to HIV and sexual health.<sup>16</sup>

There are many best practice standards that address health promotion within current in-home rehabilitative models of care. For example, the RCA Rehabilitative Care Best Practices for Patients with Hip & Knee Replacement Framework<sup>39</sup> for in-home rehabilitative care recommends that education on the principles of a healthy lifestyle and active living should be incorporated into the rehabilitation program and may include provision of resources or referrals to external programs, i.e., wellness-focused health promotion/prevention programs.

### 7.4 Mixed Models of Preventative Rehabilitative Care

This paper describes the models of rehabilitative care in three categories: in-home, ambulatory-based and rehabilitative care in primary care teams. However, these categories are not mutually exclusive; many emerging and innovative models of care span different locations of care. In fact, the Ontario Fall Prevention Collaboration recommends a system-based approach to address the prevention of falls in Ontario:

*“An integrated, system-based approach to fall prevention across the older adult’s journey of risk means including the roles of public health, primary and community care, and acute and specialist services to create a framework of standards that can apply across the health continuum and*

*across sectors allowing for greater efficiency, effectiveness and excellence in service delivery. An integrated fall prevention strategy should not be thought of as a ‘stand-alone’ initiative; rather it has the potential to contribute to the objectives and outcomes of other provincial efforts to achieve greater integration in health services.”<sup>20</sup>*

Table 3: Examples of Mixed Approaches to Preventative Rehabilitative Care

Approach	Description	Key Outcomes
<b>Fall Prevention</b>		
Australia Queensland Stay on Your Feet <sup>40</sup>	<ul style="list-style-type: none"> <li>Promotes healthy active ageing and preventing falls among older people across different settings of community, hospital and residential aged care</li> <li>Designed to promote an integrated approach to the delivery of fall prevention interventions across the continuum of health service providers</li> </ul> Resources include: <ul style="list-style-type: none"> <li>Stay on Your Feet checklist to help older people quickly identify reasons why they may fall</li> <li>Queensland Stay on Your Feet Community Good Practice Guidelines and Toolkit<sup>41</sup> which provides a step-by-step guide showing how to investigate, plan, implement and review evidence-based local falls prevention initiatives at individual, organizational or community levels</li> </ul>	<ul style="list-style-type: none"> <li>Guiding principles for preventing falls span primary, secondary and tertiary levels of prevention and are based on fall prevention literature</li> <li>Stay on Your Feet Framework<sup>®</sup> has guided the development of comprehensive fall prevention strategies in Ontario, specifically in the North East and Champlain LHINs</li> </ul>
Australia Stepping On Community-based program <sup>42</sup>	<ul style="list-style-type: none"> <li>Multifaceted community-based program using a small-group learning environment to improve fall self-efficacy, encourage behavioral change, and reduce falls</li> <li>seven-week program led by OT with 12 participants per group/class</li> <li>Follow-up home visit to support follow-through of fall prevention strategies and activities and to assist with home adaptations and modifications if required</li> <li>Three-month booster session to review achievements and how to keep it going</li> </ul>	<ul style="list-style-type: none"> <li>31% reduction in falls, demonstrating that program was effective for community-residing elderly people</li> </ul>

## 8. MODELS OF IN-HOME REHABILITATIVE CARE: POST-INJURY/ILLNESS

In-home rehabilitative care may be required for patients following injury, surgical procedure or sudden onset, life-altering disability. The resulting functional impairments may subsequently cause a decrease in functional ability (e.g., in ADLs, mobility, communication, cognition, swallowing). These patient populations include those who have experienced brain injury, stroke, cancer, spinal cord injury,

musculoskeletal, multi-system complex health conditions, falls/fractures, work-related injuries and exacerbation of a chronic condition.

The role of in-home rehabilitative care is to enable individuals with impairments and disabilities to reach and maintain their optimal physical, sensory, intellectual, psychological and social functional levels; promote health, well-being and re-integration to community living; and improve quality of life.<sup>1</sup> In-home rehabilitative care assessment and treatment for these populations may include, but is not limited to:

- Assessing and developing treatment plan to address functional impairments, as needed;
- Providing patient/care partner education to enhance coping with impairments, activity limitations and participation restrictions;
- Teaching specific activities/exercise to improve/restore function;
- Progressing activity tolerance while providing reassurance/education;
- Promoting adaptation of/to the home environment;
- Supporting timely transition from (e.g., Early Supported Discharge [ESD]) or prevent admission to acute or rehabilitation hospital;
- Increasing self-management skills; and
- Linking patients with wellness/health promotion programs.

The following factors of best practice care are recommended for models of in-home rehabilitative care post injury/illness:

- Care is personalized according to patients' goals, personalities and progress.
- Providers take time at each visit to identify concerns and address emotional issues.
- Each patient's care is designed, coordinated and delivered in a flexible manner, particularly in terms of location, timing, providers, and discharge.
- Rehabilitation includes essential care partners.<sup>43</sup>

Sustainability of this exemplary care may be ensured by recognizing and supporting the work that all rehabilitation providers do in providing emotional support, ensuring visibility of patient-centred treatment goals within the health record, and supporting continued flexibility of location of service.<sup>43</sup> In-home rehabilitative models of care post-injury or illness are explored below.

### **8.1 Approaches to Transition to In-Home Care**

Transitions, which are the transfer of care between different care settings and providers, are critical and vulnerable points that require integrated communication and coordination among all health care team members, including the patient, their care partners, the hospital team, primary care, and home and community care providers.<sup>44</sup>

There are many points of communication and care planning where there may be potential for break down, errors or delays, including:

- Preparing patients and care partners for the person’s return home, including learning new tasks,
- Communicating the person’s care plan to the health care providers taking over the person’s care,
- Performing medication reconciliation and checking post-discharge medication adherence,
- Arranging for transportation and equipment needs at home, and
- Coordinating appropriate follow-up care (e.g., medical appointments, home and community care services).<sup>44</sup>

In fact, a prospective study of patients with stroke post-discharge from hospital found that 57% did not receive the therapy that was recommended on discharge.<sup>45</sup> The provision of timely, more intensive home-based rehabilitation services for those transitioning home and unable to access outpatient care addresses these types of communication breakdown, errors or delays and is associated with decreased hospital length of stay and readmission rates.<sup>46</sup>

Early-supported discharge (ESD), for example, accelerates the transition from hospital to home through the provision of therapy by an interprofessional team in the community and is intended as an alternative to inpatient rehabilitation for those recovering from mild to moderate stroke.<sup>47</sup> Similarly, health care navigation and transition planning pathways provide patient-centred care, meet national guidelines and potentially deliver both good clinical outcomes and cost savings for the health care system.<sup>48</sup>

Table 4: Examples of Transitional Approaches to In-home Rehabilitative Care

Approach	Description	Key Outcomes
<b>In-Home Transitional Hospital to Home Rehabilitative Care</b>		
Canadian Stroke Best Practice Recommendations: Early Supported Discharge <sup>47</sup>	<ul style="list-style-type: none"> <li>• Provided within 48 hours of discharge from acute care or within 72 hours of discharge from inpatient rehabilitation</li> <li>• Patients have mild to moderate disability, ability to participate in rehabilitation and are medically stable with the availability of appropriate nursing care and necessary resources and support services, such as care partners</li> <li>• Services are provided five days per week at the same level of intensity that patients would have received in an inpatient setting; where possible, services should be provided by the same team that provided inpatient rehabilitation to ensure smooth transition</li> </ul>	<ul style="list-style-type: none"> <li>• Evidence shows significant reductions in hospital length of stay (approximately eight days) with no significant differences between inpatient and ESD patients on outcomes associated with patient’s carers (subjective health status, mood or satisfaction with services)</li> <li>• Select group of patients with mild to moderate disabling stroke achieved better outcomes compared with inpatient care on a stroke unit</li> <li>• Evidence suggests that the cost associated with ESD is lower than usual care<sup>49</sup></li> <li>• ESD is associated with lower caregiver burden at 12 months post-stroke<sup>50</sup></li> </ul>

<p>South East Ontario Enhanced Community-Based Rehabilitation for Stroke Survivors<sup>46</sup></p>	<ul style="list-style-type: none"> <li>Enhanced intensity of home-based rehabilitation services provided to all new stroke survivors in the South East LHIN with ongoing rehabilitation needs who are discharged from the hospital and eligible for home care</li> <li>Enhanced service was made available across the region's rural geography to new stroke survivors transitioning home who were unable to access outpatient care</li> <li>Community rehabilitation provided for two months after discharge</li> </ul>	<ul style="list-style-type: none"> <li>15.7-day decrease in hospital LOS and decreased hospital readmission rates observed after enhanced service implementation</li> <li>Functional Independence Measure (FIM) efficiency improved for those discharged from inpatient rehabilitation</li> <li>Average wait time for community rehabilitation services decreased from 44 days to 4.4 days</li> <li>Mean total number of community therapy visits more than doubled to an average of 12 per patient</li> </ul>
<p>Ontario Waterloo Wellington Rapid Recovery Therapy Program<sup>51</sup></p>	<ul style="list-style-type: none"> <li>30-day home-based intensive rehabilitation program to shift care from inpatient rehabilitative care to the community</li> <li>Therapy intensity is similar to inpatient rehabilitative care in the first week and provided approximately three times per week thereafter</li> <li>40 to 60% of PT visits provided by physiotherapy assistant</li> <li>Designated care coordinator</li> <li>PSW may be assigned with option for PT/OT assigned protocols</li> </ul>	<ul style="list-style-type: none"> <li>Discharge 7.4 days earlier for rehab and 8.6 days earlier for low intensity rehab</li> <li>Those discharged from acute care would typically save 19 days for rehab and 42 days for low intensity rehab</li> <li>Patients showed improvements in the 30 days following hospital discharge on the RAI-HC</li> <li>Most rehab and low intensity rehab patients and half of the acute patients reached the highest ADL-measured level of functionality of the course of the treatment</li> <li>All patients improved mobility as per the Timed Up and Go</li> <li>Caregiver burden on the RAI-HC was lower compared to those with usual care</li> </ul>
<p>Ontario Mississauga Halton Putting Patients at the Heart (PPATH) Program<sup>52</sup></p>	<ul style="list-style-type: none"> <li>One health care professional team provides seamless services and the ability to share key patient health information through a shared electronic health record</li> <li>Dedicated 24/7 support line</li> </ul>	<ul style="list-style-type: none"> <li>Discharge one day earlier following heart surgery</li> <li>Patients report 98% satisfaction</li> <li>28% reduction in post-surgery emergency department visits</li> <li>38% reduction in hospital readmission rates</li> <li>Saves \$950,000 annually</li> </ul>
<p>Health Care Navigation</p>		

<p>British Columbia Community Stroke Navigator Program<sup>53</sup></p>	<ul style="list-style-type: none"> <li>Community Stroke Navigator Program bridges the gap in transitions by providing a hospital peer visitation program and community navigation services and by strengthening partnerships with health and community organizations to improve support to stroke survivors and care partners once back in the community</li> <li>Community navigator provides patient assessment and joint identified actions, liaison with and referral to community services, stroke survivor and care partner education on self-management, access to monthly education sessions and three-month follow up phone support</li> </ul>	<ul style="list-style-type: none"> <li>Referrals originate from hospital (77%) and community (23%)</li> <li>Of those referred (95 referrals in 2017), there was 95% enrollment rate and 92% completion rate</li> <li>The following were the most common requests for information: finding resources (76.9%), goal setting (64.1%), care partner support and decision making (51.3%) and stroke peer support (44.9%)</li> <li>Just over half of participants were satisfied with their current level of assistance, suggesting a large gap in appropriate community-based services and resources</li> </ul>
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## 8.2 Post-Injury/Illness In-Home Rehabilitative Care

There are circumstances where patient goals are best met through in-home rehabilitative care services provided or supervised by a regulated rehabilitative care professional or interdisciplinary team. As described in Canadian Stroke Best Practice Recommendations (CSBPR), “Outpatient and/or community-based services should be delivered in the most suitable setting based on patient functional rehabilitation needs, participation-related goals, availability of family/social support, patient and family preferences which may include in the home or other community settings (Evidence Level C).”<sup>47</sup> This suitability differs based on patient condition and preference. For example, there is evidence to indicate that patients with stroke who receive rehabilitation in their homes may have better short-term outcomes compared with day hospital or clinic settings.<sup>47</sup> Swallowing assessment is another example where, based on the triage and assessment of the speech-language pathologist in a tertiary care or specialty clinic, in-home management may be more appropriate.

There may also be circumstances, such as in rural settings, where accessing outpatient rehabilitation is not feasible and in-home rehabilitation would be a potential rehabilitative care approach. Other circumstances potentially requiring an in-home approach include situations in which a patient is homebound or cognitively impaired such that participating in an outpatient rehabilitation program is not possible or would negatively impact their progress.

Table 5: Examples of Post-Injury/Illness In-home Rehabilitative Approaches to Care

Approach	Description	Key Outcomes
Stroke Rehabilitative Care		

<p>Spain-home rehabilitation program post-stroke<sup>54</sup></p>	<ul style="list-style-type: none"> <li>• Interdisciplinary team of PT, OT and rehabilitation doctor</li> <li>• Home training is provided based on individual needs and rehabilitation goals</li> <li>• Treatment ends when functional goals are met or patient no longer wanted to continue</li> </ul>	<ul style="list-style-type: none"> <li>• Home program compared with standard hospital outpatient program using the Barthel Index to assess ADLs, the Canadian Neurological Scale to assess mental state, the Tinetti Scale to assess balance &amp; gait and the SF-36 to assess quality of life</li> <li>• No statistically significant differences found between groups, but improvements better in home-based patients on all functionality scales within a smaller number of sessions</li> <li>• Concluded that home rehabilitation is at least as effective as the outpatient rehabilitation programs in a hospital setting for the recovery of functionality in post-stroke patients</li> </ul>
<p>South West Ontario Community Stroke Rehabilitation Teams<sup>55 56 57</sup></p>	<ul style="list-style-type: none"> <li>• Individualized in-home services provided to adult stroke survivors who are unable to access outpatient rehabilitation services</li> <li>• Physical rehabilitation, social and emotional support, education, system navigation, community re-integration and care partner support</li> <li>• Interdisciplinary team includes PT, OT, SLP, social worker, therapeutic recreation therapist and rehabilitation assistant</li> </ul>	<ul style="list-style-type: none"> <li>• Significant improvements noted on the Hospital Anxiety and Depression Scale, Functional Independence Measure, Reintegration to Normal Living Index, Bakas Caregiver Outcomes Scale, Caregiver Assistance and Confidence Scale and the strength, communication, ADLs, social participation, memory and physical domains of the Stroke Impact Scale</li> <li>• Improvements were maintained at the six-month follow-up</li> <li>• Net monetary benefit of \$43,655 noted over usual care for stroke survivors with limited access to specialized outpatient stroke rehabilitation</li> <li>• CSRT was less costly (incremental cost=\$17,255) and more effective (incremental effect=1.65 on the Quality Adjusted Life Years (QALYs))</li> </ul>

		<ul style="list-style-type: none"> <li>No significant differences in functional gains were noted between rural and urban residents</li> </ul>
<b>Acquired Brain Injury</b>		
Central East Ontario Specialized ABI Team Model (ABI Team) <sup>58</sup>	<ul style="list-style-type: none"> <li>Specialized in-home interdisciplinary team coordinated by a case manager, including OT, social worker, behavioural therapy consultant, SLP and rehabilitation assistant</li> <li>Team provides services exclusively to ABI patients</li> <li>Nursing, PT, PSW and neuropsychological assessment available through home care services</li> <li>Services focus on retraining daily living skills, returning to work, adjusting to changes due to the brain injury, access to community services (for income, housing, etc.), managing challenging behaviours, improving speech and communication skills and addressing cognitive deficits</li> </ul>	<ul style="list-style-type: none"> <li>Patients showed increased community integration, improved health status and reduced care partner burden</li> <li>Increased care partner satisfaction noted</li> <li>Yearly service costs for ABI specialized team participants were approximately 50% of the yearly cost of general in-home services; cost of rehabilitation appears to be considerably less than the cost of nursing and PSW support services</li> </ul>

### 8.3 Virtual Care Approaches Post-Injury/Illness

Virtual care can be used for many components of patient care, including the patient interview, physical assessment and diagnosis, treatment, maintenance activities, consultation, education and training. Rehabilitative care professionals can carry out these activities using media such as videoconferencing, email, apps, web-based communications and sensor technology. For example, speech-language pathologists may conduct swallowing assessments with appropriate video technology and a facilitator to aid the patient; an occupational therapist may conduct a virtual in-home environmental assessment; or a physiotherapist may use sensor technology to assess mobility and range of motion.

Factors impacting the patient’s ability to benefit from virtual care must be considered prior to using technology. These factors include:

- Access to technology and internet and other practical limitations (e.g., communication abilities),<sup>59</sup>
- Potential safety issues,<sup>59 60</sup>
- Difficulty with hearing and vision or language barriers, and the impact this will have on their ability to participate,<sup>59</sup>
- Cognitive ability and how it may impact their safety, ability to complete a self-directed program and the carry-over advice that is provided,<sup>59</sup>
- Confidentiality issues,<sup>61</sup> and
- Need for flexible hours to accommodate the needs of patients and their care partners.<sup>59</sup>

When using technology, consideration must also be given to the conditions of use, reliability and quality of the audio/video communications. A study conducted in Quebec found that installation of a new

internet connection was required for 75% of post-total knee arthroplasty patients who participated in virtual rehabilitation, taking an average technician time of 304.8 minutes for travel and installation. The service reliability was 96.5%, but 21% of planned sessions required a reconnection during the session, and remote technical support was solicited in 43% of sessions. Despite this, participants evaluated the technical environment as good or acceptable in 96% of the sessions and clinical objectives were reached in 99% of sessions.<sup>62</sup>

Each of the professional colleges has statements and guidelines to support professionals in implementing virtual care as part of their practice. In the context of the pandemic, related guidelines, recommendations and educational webinars have recently been released to address these operational needs and can be found on professional association and regulatory college websites. Other resources, such as clinical evidence and consensus-based guidelines, are provided on the [COVID-19 Rehabilitation Resources section](#) of the RCA website to support rehabilitation professionals, other clinicians and administrators. (These resources and guidelines are not included in this paper.)

Table 6: Examples of Virtual Care Approaches to Rehabilitative Care Post-Injury/Illness

Approach	Description	Key Outcomes
<b>Total Joint Replacement</b>		
Quebec In-Home Tele-rehabilitation after Total Knee Arthroplasty <sup>63</sup>	<ul style="list-style-type: none"> <li>Rehabilitative intervention provided by a physiotherapist via 16 sessions of 45-60 minutes utilizing videoconferencing and PTZ (pan tilt zoom) cameras and dedicated software to allow real-time, two-way video and audio interaction over the Internet</li> <li>Intervention included assessment before and after exercise, 30 minutes of supervised exercises (mobility, strengthening, function and balance), prescription of home exercises and advice concerning pain control, walking aids and return to activities</li> <li>Intensity and level of difficulty were increased according to patient tolerance and need</li> </ul>	<ul style="list-style-type: none"> <li>Program was compared with a similar patient group who received the same rehabilitative care program via in-home, face-to-face visits from a physiotherapist</li> <li>Patients were assessed at baseline, two and four months using the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), Knee Injury and Osteoarthritis Outcome Score (KOOS), functional and strength tests and knee range of motion</li> <li>The non-inferiority margin was set at 9%; however, comparison of WOMAC scores showed a mean difference of near zero, which was similar for other outcomes demonstrating the non-inferiority of in-home virtual care to in-person home visits</li> <li>Mean cost for a single home visit was \$93.08 N and \$80.99 for the virtual care session. Cost differential was in favour of virtual care; however, when</li> </ul>

		the patient’s home was located less than 30 km round-trip, the cost differential was not significant. <sup>64</sup>
United States Virtual Exercise Rehabilitation In-Home Therapy after Total Knee Arthroplasty <sup>65</sup>	<ul style="list-style-type: none"> <li>• Virtual Exercise Rehabilitation Assistant (VERA) installed prior to surgery and patients had one pre-operative meeting with their virtual PT.</li> <li>• VERA is a cloud-based virtual telehealth system using 3D tracking technology to quantify pose and motion, an avatar (digitally simulated coach), visual and audible instructions and immediate feedback and virtual video connection with a PT.</li> <li>• Frequency and duration of use were unrestricted</li> <li>• PT provided remote clinician oversight and communicated progress at two and six weeks post-op</li> <li>• Patients and PT mutually agreed when therapy goals were met for discharge</li> <li>• All patients were able to receive in-person PT if clinically deemed necessary</li> </ul>	<ul style="list-style-type: none"> <li>• Mean costs were \$2745 US lower for virtual patients</li> <li>• Virtual patients had fewer rehospitalizations than usual care (in home or outpatient)</li> <li>• Virtual care was non-inferior to usual care on KOOS at six weeks (difference 0.77, 90% CI) and 12 weeks (difference -2.33, 90% CI)</li> <li>• Virtual care was also non-inferior for knee extension and flexion, gait speed, pain and hospital readmissions</li> <li>• Falls were reported by 19.4% of virtual care patients compared with 14.6% of usual care</li> </ul>
Netherlands tele-rehabilitation after total hip replacement using a tablet app and mobility monitoring <sup>66</sup>	<ul style="list-style-type: none"> <li>• Patients follow a 12-week exercise program with video instructions on a tablet PC and daily physical activity registration through a motion sensor</li> <li>• Patients asked to do strengthening and walking exercises at least five days a week</li> <li>• Weekly phone contact with a physiotherapist</li> <li>• Three in-person visits from a PT for initial teaching and assessment and follow-up assessment.</li> </ul>	<ul style="list-style-type: none"> <li>• Average adherence for exercising five times a week was 92%</li> <li>• Reasons mentioned most often for non-adherence were vacation or a day or weekend off 25% (33/134) and work 15% (20/134)</li> <li>• Total number of technical issues was eight</li> <li>• Average score on the user evaluation questionnaire (range 0-5) was 4.6 at T1 and 4.5 at T2. Highest score was for the subscale “coaching” and the lowest for the subscale “sensor” (a necklace-worn motion sensor containing accelerometer and barometric pressure sensor)</li> </ul>
Australia Kinect-based tele-rehabilitation system after total hip replacement <sup>67</sup>	<ul style="list-style-type: none"> <li>• Microsoft Kinect® is a tracking system that extracts information for 20 body joints</li> <li>• Kinect system allows physiotherapists to define sets of exercises through a therapy management tool or to customize by recording themselves in front of the Kinect</li> </ul>	<ul style="list-style-type: none"> <li>• High rate of correct execution of exercises (91.88%)</li> <li>• Overall patient satisfaction was positive. Found sessions as good as regular in-person sessions and helpful tool for doing their exercises at home</li> </ul>

	<ul style="list-style-type: none"> <li>Users are monitored while they are performing the exercises and the captured data is assessed by the physiotherapist</li> </ul>	
<b>Preoperative Rehabilitation</b>		
United Kingdom Home-based preoperative rehabilitation (prehabilitation) for frail patients undergoing coronary artery bypass graft and valve surgery <sup>68</sup>	<ul style="list-style-type: none"> <li>Patients with a wait time of at least six weeks received a baseline in-person assessment from a physiotherapist and were prescribed a functional home-based exercise program</li> <li>Patients were followed up weekly via telephone to ensure progression of exercise and troubleshoot problems</li> </ul>	<ul style="list-style-type: none"> <li>Patients who participated in this program showed improvements in their Clinical Frailty Score, six-minute walk test and Short Physical Performance Battery (SPPB) which was associated with a decreased hospital length of stay following surgery</li> </ul>

### 8.4 Mixed Approaches to Rehabilitative Care Post-Injury/Illness

Mixed models of rehabilitative care post-injury/illness span a continuum of services and typically include a community-based rehabilitation program and comprehensive home-based training.

Table 7: Examples of Mixed Approaches Rehabilitative Care Post-Injury/Illness

Approach	Description	Key Outcomes
<b>Stroke Rehabilitation</b>		
Central West Community Outreach Stroke Rehabilitation Team <sup>69</sup>	<ul style="list-style-type: none"> <li>Co-design clinical service model with hospital (William Osler), home and community care (CW LHIN), West GTA Stroke Network and service provider (one-to-one rehabilitation)</li> <li>Joint training/orientation to support new service model (i.e., outpatient therapists trained in conducting home visits and community safety; community OTA/PTA/CDA oriented by outpatient therapists)</li> <li>Patient treatment occurs in either clinic or home and community settings based on patient goals</li> <li>Goal-driven approach using Canadian Occupational Performance Measure (COPM<sup>®</sup>)</li> <li>Outpatient therapists implemented a shared common assessment record</li> <li>Stroke care coordinator meets each patient at beginning of rehab journey in hospital to assist with patient goal definition and navigation, and follows up in community</li> <li>Problems that arise during the program implementation are addressed during weekly project team meetings</li> </ul>	<ul style="list-style-type: none"> <li>Decreased acute length of stay by three days</li> <li>12% decrease in admissions to inpatient rehabilitation</li> <li>Eight-week decrease in wait time for specialized stroke rehabilitation services</li> <li>Three to four point improvement on COPM<sup>®</sup> Performance and Satisfaction Scores</li> <li>100% patient satisfaction with quality of care</li> </ul>
China Community-Based Rehabilitation for Stroke Survivors <sup>70</sup>	<ul style="list-style-type: none"> <li>Community-wide education including brochures, flyers and booklets on stroke rehabilitation</li> </ul>	<ul style="list-style-type: none"> <li>Fugl-Meyer Motor Function Assessment, Barthel Index, Social Functional Activities Questionnaire scores</li> </ul>

	<ul style="list-style-type: none"> <li>• Seminars, lectures and health advisory activities</li> <li>• Textbooks given to every stroke patient</li> <li>• Three-month community-based rehabilitation with group training 2x/week for one hour and home-based training 5x/week for 1.5 hours; patient and care partners watch a multimedia DVD; treatment log completed and care partners support home training</li> <li>• Patients with similar functional limitations were grouped together; four training groups: lying position, sitting position, sitting to standing and standing position</li> </ul>	<p>significantly improved after rehabilitation</p>
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### 9. MODELS OF IN-HOME REHABILITATIVE CARE: PROGRESSIVE/ CHRONIC CONDITIONS/ MAINTENANCE

In 2015, chronic diseases were responsible for approximately 75% of all deaths in Ontario and their estimated annual direct health care costs were \$10.5 billion.<sup>71</sup> The older adult population is at a higher risk for developing chronic conditions, increasing their risk for disabilities and their need for rehabilitative care. Given the rapid growth of the aging population, innovative methods of rehabilitation for chronic care management are urgently needed.

Individuals who require in-home rehabilitative care for chronic care management include those with a chronic disease/condition or patients who are experiencing a flare-up or worsening of symptoms due to a debilitating event or progressive condition. Chronic diseases or conditions include arthritis, pain syndrome or chronic pain, chronic obstructive pulmonary disease, congestive heart failure and coronary artery disease, certain types of cancer and neurological conditions.

In-home rehabilitative care for these populations may include, but is not limited to:

- Assessing impairments or disability;
- Providing consultation regarding patient’s functional needs/status;
- Triaging for surgical consult or conservative management;
- Providing treatment to improve, develop or restore lost or impaired function and reduce risk of hospitalization;
- Providing assessment, treatment and education to prevent functional decline/injury or maintain functional performance (e.g., strength, mobility, balance, fall prevention, etc.);
- Providing intermittent re-assessment/treatment and/or periodic oversight to maintain and/or prevent further decline;
- Increasing self-management skills and assisting patient in optimizing independence, maintaining activity and quality of life;
- Assessing need for and use of assistive devices;

- Providing education to care partners on illness/condition and providing strategies to optimize their support efforts and lower stress; and
- Linking patients to wellness-focused health promotion/prevention promotion programs in the community (e.g., group exercise, wellness promotion classes, swimming, walk-fit, yoga, tai-chi, pilates, peer support and friendly visiting programs).

The care partners of patients may be experiencing strain or burnout and their well-being should also be taken into consideration. For example, the majority of care partners of patients receiving cancer care have been found to experience severe physical, personal, emotional and social/financial strain.<sup>72</sup> In-home rehabilitative care programs can assess for potential caregiver strain and make referrals to support care partners.

Those with chronic illness who receive in-home rehabilitation have improved outcomes and lower utilization of costly health services. A study of long-stay adult home care patients with musculoskeletal disorders found that patients showed functional improvements and their risk of mortality and institutionalization was significantly reduced.<sup>73</sup>

In-home rehabilitative care programs showing positive findings actively involve the patient in the establishment of their home program, including setting goals; individualize the program to the patient's needs and train the patient in how to use the home program independently. Therapist feedback is provided to patients via a home visit, telephone call or clinic appointment.<sup>74</sup>

In-home rehabilitative models of care for those with progressive or chronic conditions or those requiring maintenance are explored below.

### 9.1 Palliative/End of Life Care/Care Partner Support

The World Health Organization defines palliative care as an approach that improves the quality of life of persons and their families/care partners who are facing the problems associated with life-limiting illness, through the prevention and relief of suffering. This is achieved through early identification and appropriate assessment and treatment of pain and physical, psychosocial and spiritual issues.<sup>75</sup>

The provision of palliative care occurs in a range of settings, including in-home, and is provided by an interdisciplinary team that includes doctors, nurses, nurse practitioners, pharmacists, social workers, physiotherapists, occupational therapists, speech-language pathologists and spiritual counsellors.<sup>76</sup> The continuum of rehabilitative care for patients with palliative needs is characterized by goal-setting that is highly individualized in light of limiting symptoms, with a focus on quality of life and minimizing functional decline.<sup>77</sup> This palliative approach to care, including a focus on symptom management and consideration of psychosocial/spiritual needs, may also benefit patients with life-altering illness that are not "terminal".

*Table 8: Example of Palliative/End of Life/Care Partner Support Approach to In-home Rehabilitative Care*

Approach	Description	Key Outcomes
Ontario CBI Home Health Enhanced Therapy for Palliative Patients & Families <sup>78</sup>	<ul style="list-style-type: none"> <li>• Early Identification and Clinical Indicator Guide (for in-home care coordinators) to guide decisions regarding appropriate therapy services and service initiation; goal was to initiate therapy services at the beginning of the palliative journey</li> <li>• Navigator identified enhanced interventions, including multi-modal symptom management, counseling, legacy projects, care partner assessment/intervention, enhanced service plans</li> <li>• In CBI's Care for the Caregiver Program, care partners are both providers/recipients of care (informal and formal); team could refer care partners directly to LHIN support services</li> <li>• Team 'huddles' provided forum for debrief, offer peer support, share updates and receive program information</li> <li>• CBI Palliative Care Integrated Toolkit includes standardized tools, outcome measures, resources and care plans</li> </ul>	<ul style="list-style-type: none"> <li>• Mean Palliative Performance Scale score 50%, indicating that patients in the program are experiencing extensive disease</li> <li>• Mean Clinical Frailty Scale score is six, indicating that these patients are moderately frail</li> <li>• Majority of care partners assessed using the Caregiver Strain Index scored above a seven indicating high level of stress</li> <li>• 100% of team received enhanced palliative education</li> <li>• 91% of the team said they were likely to recommend the program to a friend or family</li> <li>• 80% of the team said this program allowed them to work in a more integrated way</li> </ul>

## 9.2 Virtual Care Approaches for Progressive/Chronic Conditions

Virtual care approaches that combine care coordination, remote monitoring and rehabilitation with communications technology offer a means for managing chronic illnesses while potentially decreasing health care utilization and costs.<sup>79</sup> They also provide the opportunity to address a number of barriers that may impact access to rehabilitative care. For example, pulmonary and cardiac rehabilitation may not be easily accessed because of barriers such as transportation, work schedules and functional impairment.<sup>80</sup>

A recent systematic review and meta-analysis has shown that virtual care provided benefits similar to usual care with no adverse effects reported for those with cardiac conditions.<sup>81</sup> In fact, mobile health technologies, such as those used in virtual care, have been found to increase adherence to medical therapy and patients' ability to reach blood pressure targets and exercise goals. Patients also showed less anxiety and increased awareness of diet and exercise.<sup>82</sup>

Table 9: Examples of Virtual Care Approaches to Rehabilitative Care for Progressive/Chronic Conditions

Approach	Description	Key Outcomes
Palliative Care		
United States Tele-rehabilitation for functional impairment and pain among patients with	<ul style="list-style-type: none"> <li>• Remote monitoring using voice recognition telephone calls or web-based surveys</li> <li>• Monitoring included three items from the PEG — average pain intensity (P), interference with enjoyment of life (E) and</li> </ul>	Virtual care interventions showed the following outcomes: <ul style="list-style-type: none"> <li>• Improved function: difference of 1.3 on the AM-PAC-CAT</li> </ul>

<p>advanced-stage cancer<sup>83</sup></p>	<p>interference with general activity (G); five items from the Activity Measure for Post-Acute Care (AM-PAC); logging of step count; and option to request a PT call</p> <ul style="list-style-type: none"> <li>• Two PTs delivered physical conditioning program by telephone: incremental pedometer-based walking program and resistive exercise program</li> <li>• Participants set their own step-count goals</li> <li>• PTs received an email alert when patients did not complete their remote monitoring log</li> </ul>	<p>(Computerized Adaptive Testing)</p> <ul style="list-style-type: none"> <li>• Quality of life: difference of 0.04 on the EQ-5D-3L</li> <li>• Reduced pain interference and intensity: -0.4 on the Brief Pain Inventory (BPI)</li> <li>• Higher odds of home discharge home: odds ratio 4.3</li> <li>• Fewer days in hospital: difference -3.9 days</li> <li>• Outcomes were not enhanced with the addition of pharmacological pain management</li> </ul>
<p><b>Pulmonary Rehabilitation</b></p>		
<p>Greece COPD Home-based maintenance telerehabilitation<sup>84</sup></p>	<ul style="list-style-type: none"> <li>• Patient completed a two-month pulmonary rehabilitation program prior to initiation of maintenance program</li> <li>• Maintenance program consisted of 144 home-based sessions over 12 months and included individualized action plan, exercise sessions with remote monitoring, access to a call centre and psychological, dietary and self-management support via phone or videoconference</li> </ul>	<ul style="list-style-type: none"> <li>• Compared to hospital-based program, both programs were independent predictors of lower risk of acute exacerbation and hospitalization</li> <li>• Home-based program was an independent predictor of fewer emergency visits</li> <li>• Both programs had similar outcomes for physical activity, health-related quality of life, respiratory symptoms and exercise capacity</li> </ul>
<p><b>Chronic Illness</b></p>		
<p>United States Tele-rehabilitation Program to Support Chronically Ill and Disabled<sup>85</sup></p>	<ul style="list-style-type: none"> <li>• OTs serve as care coordinators and work collaboratively with care partners and the health care team</li> <li>• Through Low ADL Monitoring Program (LAMP), assistive technology/adaptive equipment provided, installed and training provided. Through home-based telehealth, patients' vitals are monitored in their place of residence from a central station.</li> <li>• Interventions include home environmental modifications, daily therapeutic regimes and assistance with self-care, education and self-management strategies</li> <li>• Used a combination of in-person and virtual care to facilitate successful living at home</li> </ul>	<ul style="list-style-type: none"> <li>• No significant differences noted in health care costs between the LAMP program and traditional home care</li> <li>• Increase in clinic visits post-intervention compared with home-based care</li> <li>• Decreases in hospital and long-term care admissions noted</li> </ul>
<p>United States Integrated Telehealth Care (I-TEAM) for Chronic Illness and</p>	<ul style="list-style-type: none"> <li>• Telehealth nurse conducting daily tele-monitoring of symptoms, body weight and medication use; providing eight weekly sessions of problem-solving treatment for depression; and providing communication</li> </ul>	<ul style="list-style-type: none"> <li>• Depression scores (Hamilton Depression Rating Scale and PHQ-9) were 50% lower in the I-TEAM group than in the</li> </ul>

<p>Depression in Geriatric Patients<sup>86</sup></p>	<p>with participants' primary care physicians, who also prescribed antidepressants</p> <ul style="list-style-type: none"> <li>Control participants were allocated to usual care with in-home nursing plus psychoeducation</li> </ul>	<p>control group at three and six months</p> <ul style="list-style-type: none"> <li>Those who received the I-TEAM intervention significantly improved their problem-solving skills (Social Problem-Solving Inventory – Revised) and self-efficacy in managing their medical condition</li> <li>I-TEAM group had significantly fewer ED visits, but did not have significantly fewer days in the hospital at 12 months after baseline</li> </ul>
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### 9.3 Mixed Approaches to Rehabilitative Care for Progressive/Chronic Conditions/Maintenance

Progressive and chronic conditions, such as chronic obstructive pulmonary disease (COPD), are characterized by a progressive and irreversible reduction in organ function. The main goal of treating patients with these diseases is to try to optimize their health and functional ability.

A single rehabilitative care strategy may not be effective with these populations for various reasons. For example, in-home strategies may be effective, but lack specialized equipment and may be less efficient due to seeing a smaller number of people in a day. And while hospital-based programs may be more cost-effective and offer peer support, patients may be unwilling to travel to attend and the benefits of the programs may not be sustained. Mixed approaches to rehabilitative care may be more effective for these populations.<sup>87</sup>

Table 10: Example of a Mixed Approach to Rehabilitative Care for Progressive/Chronic Conditions/Maintenance

Approach	Description	Key Outcomes
<b>Pulmonary Rehabilitation</b>		
<p>North-East England Tiered Model of Integrated Care<sup>87</sup></p>	<ul style="list-style-type: none"> <li>Patients grouped into four tiers based on their Medical Research Council Dyspnea (MRC) score</li> <li>Tier 1: Those with an MRC score of one to two were prescribed exercise and referred to an exercise referral scheme where physical activity goals were discussed and a physical activity action plan agreed. Patients were reviewed at 12 weeks and encouraged to maintain activity through the options available or independently.</li> <li>Tier 2: Those with an MRC score of three to four were referred to a specialized “healthy living” exercise and education group run by an exercise health trainer at a local NHS healthy living center; classes lasted for 12 weeks, with assessment at six weeks.</li> </ul>	<ul style="list-style-type: none"> <li>Significant improvements noted across tier 2 &amp; 3 (too small numbers to note significance in tiers 1 &amp; 4) on Chronic Respiratory Diseases Questionnaire (CRQ), COPD assessment test (CAT), and six-minute walk test</li> <li>Little difference between Tier 2 &amp; 3 on CAT &amp; CRQ score, but significantly larger increase in distance walked in tier 3</li> </ul>

	<ul style="list-style-type: none"><li>• Tier 3: Those with an MRCD score of four were enrolled in a group exercise and education class run by trained physiotherapists at a local hospital; classes lasted for six weeks.</li><li>• Tier 4: Those with an MRCD score of five were either enrolled in tier three or seen at home by a trained health care professional (typically a physiotherapist), depending on the severity of their symptoms. Those seen at home were given supervised exercises to perform and health education appropriate to their health status; classes lasted for six weeks.</li></ul>	
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## 10. CONCLUSION

In-home rehabilitative care improves outcomes for patients/care partners across the stages of life, health and recovery and contributes to an efficient and cost-effective health care system.

For patients, in-home rehabilitation has been shown to prevent functional decline, enhance functional status and quality of life, and improve patient, care partner and provider satisfaction. At a system level, models of in-home rehabilitative care are improving access and patient flow through the health care system, reducing emergency department use, reducing inpatient admissions and supporting earlier inpatient discharge.

These outcomes are demonstrated across the categories of in-home rehabilitative care:

- In-home **prevention rehabilitative models of care** address the needs of individuals with reduced physical, cognitive and/or speech-language functioning who require rehabilitative care to reduce disease risk factors, prevent a decline in functional status and/or to promote their capacity to remain at home. These models have demonstrated success in predicting those at risk and reducing their risk through mitigation of functional decline and improvement of patient outcomes.
- In-home **post-injury/illness rehabilitative models of care** provide rehabilitation for patients following injury, surgical procedure or sudden onset, life-altering disability. These models, including those using virtual care, have been found to improve patient function and outcomes and reduce hospital lengths of stay.
- In-home rehabilitative **models of care for progressive/chronic conditions or maintenance** address the needs of patients and care partners living with a chronic disease/condition or patients who are experiencing a flare-up or worsening of symptoms due to a debilitating event or progressive condition. These models have improved functional outcomes, reduced risk of mortality and institutionalization, lowered utilization of costly health services and improved care for care partners.

The innovative and cost-effective programs described in this paper illustrate many of the best practices required to provide high quality in-home rehabilitative care. They also provide examples of models of in-home rehabilitative care that can be adapted or spread to support patient-centred, integrated care.

Drawing on this evidence, this paper proposes a series of recommendations on the optimal organization and provision of in-home rehabilitative care in order to realize the benefits demonstrated in the evidence and support wider adoption of these practices and models. See [Section 1 – Recommendations](#).

**APPENDIX A: IN-HOME SUBJECT MATTER EXPERT GROUP**

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Name	Organization	Title	LHIN
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**APPENDIX B: COMMUNITY-BASED REHABILITATION ADVISORY GROUP**

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