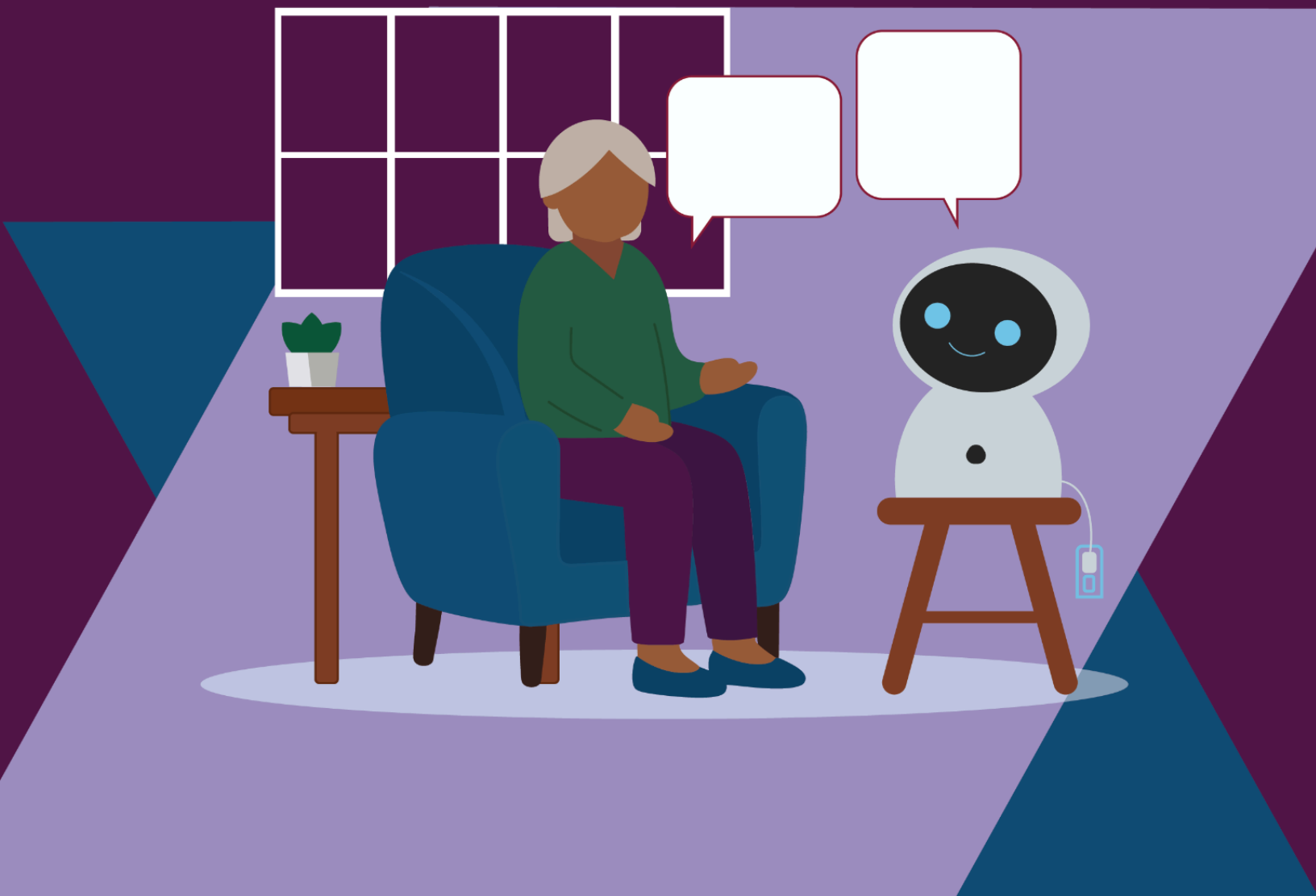
NATIONAL INSTITUTE ON AGEING

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Will Robots Be Helpful for Ageing Well?

An examination of the current pitfalls and potential for care robots to enable healthy ageing and ageing in the right place in Canada.



National Institute on Ageing

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About the National Institute on Ageing

Founded in 2016, the National Institute on Ageing (NIA) is celebrating a decade of impact in our mission to improve the lives of older adults and the systems that support them. Over the past 10 years, the NIA has become Canada's leading voice on ageing policy — convening stakeholders, conducting research, advancing policy solutions and practice innovations, sharing information and shifting attitudes. Our vision remains clear: a Canada where older adults feel valued, included, supported and better prepared to age with confidence.

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Executive Summary

Due to Canada's rapidly ageing population, a large and growing number of older Canadians require or will eventually require support with their daily care needs. Care will typically be administered in either a private dwelling or in long-term care or other residential care settings, by paid care providers and/or by the recipient's own family members or friends serving as unpaid caregivers.

Canada has crossed the threshold into becoming a "super-aged" nation, where at least one in five Canadians is aged 65 years or older. At the same time, there are significant shortages of both paid care providers and family members or friends available to provide unpaid care. These pressures are only expected to increase as the number and proportion of older Canadians grow.

One proposed contribution to addressing Canada's growing care needs is the development of "care robots," which have been suggested as a potential solution to support the needs of ageing populations around the world. For instance, Japan, as one of the world's oldest societies and a global leader in robotics, has been pursuing this approach by leading the development of both "physical care robots" (which aid in performing physical tasks) and "social engagement robots" (which aid in providing social connections). To date, there has been limited research examining the potential practical uses and implementation of care robots in Canada.

In this report, the NIA provides a narrative overview of selected studies and reports from around the world examining the implementation of care robots across a range of care settings. It also provides a review of their perceived benefits, along with potential risks and shortcomings, as described by those who have trialled various care robots. The report identifies important and emerging practical and ethical issues surrounding the incorporation of artificial intelligence (AI) into the development of care robots, as well as in their use with people living with dementia.

The NIA highlights key factors to analyze when considering the potential use of a care robot and presents two decision-making frameworks to guide both individuals and organizations who may be considering whether to implement the use of care robots in their care settings.

Finally, the NIA proposes a set of six policy and practice recommendations before the wider adoption of various care robots should be considered across Canadian care settings:

1. **Fund Independent, Canadian Evaluations on the Specific Uses of Care Robots**
2. **Tie the Provision of Public Funding and Scale Up to Evidence of Value and Equity, Not Adoption for its Own Sake**
3. **Develop Practical Procurement and Safety Guidance for Care Organizations**
4. **Clarify How Existing Regulations Apply to Care Robots**
5. **Incorporate Care Robots into Existing Reporting Systems**
6. **Involve Older Adults, Caregivers and Frontline Workers in Design, Selection and Training in the Development and Use of Care Robots**

Approach and Scope of This Report

This report is a narrative policy review based on peer-reviewed literature, grey literature (including government, industry and media reports) and Canadian and international policy documents identified through targeted searches between May 2025 and May 2026, supplemented by sources known to the authors and suggested by this report's expert reviewers. Only English-language sources were included. All cost estimates were converted to Canadian dollars.

The five care robots (Hug, Robear, ADAM, Paro and Pepper) discussed in this report are illustrative examples rather than a representative sample of the field. They were selected as they are among the most frequently cited examples in available literature on physical care and social engagement robots, and because together they span a range of stages of development, from experimental prototypes to products that became commercially available. Further, this report specifically discusses Japan, South Korea, the European Union, the United Kingdom and the United States because they have made notable public investments in care robots and/or produced much of the published research on care robots.

Understanding the Care Implications of Canada's Ageing Population

Canada is crossing the threshold into becoming a "super-aged" nation, commonly defined as one where at least 20% of the population is aged 65 years or older.[1,2] The proportion of Canadians aged 65 years or older is projected to keep rising, to the point where nearly 1 in 4 Canadians will be an older person in less than ten years.[3,4] Concurrently, care needs also tend to increase with age, in addition to frailty, disability and chronic illnesses.[5–8]

For the purposes of this report, the NIA uses its broader definition of long-term care (LTC), rather than what has traditionally been considered LTC in Canada (i.e., care provided in LTC homes alone). The NIA defines LTC as "a range of preventive and responsive care and supports, primarily for older adults, that may include assistance with Activities of Daily Living (ADLs) and Instrumental Activities of Daily Living (iADLs) provided by either not-for-profit or for-profit providers or unpaid caregivers in settings that are not location specific and thus include designated buildings, or in home and community-based settings."[9] As such, throughout this report, "LTC" refers to this full continuum of care, while "LTC homes" refers specifically to designated residential settings that provide 24-hour care and support.

Canada's ageing population typically receives care and support in one of two main settings.

The first setting, where most older Canadians prefer to receive care and support, is in their own homes. In these situations, home care and community supports are often provided by family members and friends (also known as caregivers or unpaid caregivers), paid care providers and sometimes volunteers who collectively assist older adults with basic and instrumental activities of daily living (such as bathing, eating, dressing, managing finances, shopping and transportation) that allow them to continue to age in their own homes and communities.[10,11] According to Statistics Canada, in 2021 there were 921,700 households (of all ages) that reported using formal home care services in Canada (excluding the territories), while 419,800 households still reported having unmet home care needs.[12] Beyond the home care that is provided by paid care providers, the majority of the assistance provided to older Canadians in their own homes is unpaid care provided by family members and friends. It is estimated that up to 75% of the total care provided to older adults in Canada who receive government-funded home care services is performed by unpaid caregivers (such as family members or friends).[13] Furthermore, the Canadian Centre for Caregiving Excellence estimates that there are now more than 8 million unpaid caregivers in Canada, and that it would cost an estimated $97.1 billion per year to replace the care they provide, with approximately two-thirds (67%) of caregivers caring for someone aged 65 years or older.[14–16] Demand for home care in Canada, either by those who receive professional care or receive only the support of unpaid caregivers but would like professional care, is expected to increase by 53% between 2019 and 2031.[17] Looking further ahead, the NIA's "The Future Co$t of Long-Term Care in Canada" report projected that the number of older Canadians needing support will more than double (growing by 120%) by 2050, while the public cost of providing LTC in both LTC homes and private homes will more than triple, from $22 billion in 2019 to $71 billion in 2050 (in constant 2019 dollars)[18].

The second place where many older Canadians receive care is in LTC homes. In this setting, adults (who often cannot be cared for in a home-based setting) have access to 24-hour care and support.[19] In 2021, there were an estimated 188,000 older adults living in LTC homes across Canada,[20] and many more were waiting for a placement (national waitlist data are not routinely published, and the most recent pan-Canadian estimate, from 2019, was over 70,000 people).[21]

Recent projections estimate that by 2035, Canada will need approximately 199,000 additional LTC beds to meet the current projected demands.[22]

Canada is facing a considerable care burden that will continue to grow in the coming decades as its population ages. Compounding this high and growing volume of care that will be required by more older Canadians are the existing pressures on those who provide care and support across various settings. Particularly, LTC homes in Canada have faced numerous compounding challenges over the past decade, including greater resident complexity, inadequate staffing and high staff turnover.[23–25] Compared with many other OECD countries, Canada has been found to have one of the lowest levels of paid LTC workers: a 2025 OECD report found that Canada has 3.7 LTC workers (nurses or personal care workers providing LTC either at home or in institutions) per 100 people aged 65 years or older, compared to the OECD average of 5.0.[26] Additionally, paid care providers across the LTC continuum (whether in home and community care or in LTC homes) have been found to leave the sector at high rates due to long work hours, high levels of emotional stress and burnout and low wages, which in turn leads to frequent gaps in the provision of care for many older adults.[27–29]

Unpaid caregivers, often family members or friends of the care recipient, have been found to frequently forgo formal employment or education opportunities in order to provide home care. They also experience high rates of burnout and emotional stress, all while completing labour-intensive care tasks with little to no formal training.[27–29] Further, previous research by the NIA projects that, under assumptions about declining birth rates and family sizes in Canada, there could be a 30% decrease in the collective pool of available unpaid caregivers by 2050.[18] Maintaining the same total volume of unpaid care with a smaller caregiver pool would require an estimated 43% more care per remaining caregiver, increasing demands on people who already provide substantial levels of support.[18]

As Canada's post-war baby boom generation is expected to begin turning 85 years and older in 2031, the number of Canadians in this age group is projected to triple by 2051[30]. This is particularly concerning when one considers the increased care requirements of this age group from Canada's health care and LTC systems. As of 2021, close to 3 in 10 (28%) Canadians 85 years and older were living in collective dwellings, including LTC homes and retirement residences.[31] A 2011 federal report estimated that 73% of people aged 85 years or older lived with a disability.[32] Among people aged 85 years or older living in private households in 2021, approximately 42% lived alone.[33] The 2025 *NIA Ageing in Canada Survey*, which surveyed 6,001 Canadians aged 50 years and older, found that 57% felt somewhat or very lonely and 43% were at risk of social isolation.[34] Increasing age is also the strongest known risk factor for developing dementia.[35,36] As of 2023–24, approximately 6.2% of Canadians 65 years and older have been diagnosed with dementia;[37] it is also important to note that the prevalence of dementia rises to roughly 17% among those 80 years and older.[38] As such, alongside an ageing population, the number of Canadians living with dementia is expected to rise to almost 1 million by 2030 and further rise to almost 1.7 million people by 2050.[39] The NIA has also noted that since approximately two-thirds of individuals living with dementia in Canada do not have a diagnosis, there could be between 1.3 and 2 million people currently living with dementia in Canada.[9]

People living with dementia have unique care and support requirements. As dementia progresses, some people require continuous care and support. Among unpaid caregivers of older adults receiving publicly funded home care, those caring for people living with dementia reported providing an average of 26 hours of care a week, compared with 17 hours a week for those caring for people without dementia.[40]

There is, therefore, a significant and growing demand for care for both home and community-based care and care in LTC homes for older adults across Canada.

The pace of increasing care requirements in Canada is also quickly outgrowing its existing strained and inadequate care resources, and as such, a range of workforce, service and technological responses should be evaluated to help care for the growing number of older Canadians moving forward. While various proposed policy changes and initiatives have been put forth to help ease the increasing care needs of this country, the potential use of care robots to assist in the delivery of care and support for older Canadians is a possible solution that has not yet been adequately explored in public policy discourse.

The Development and Current Use of Care Robots

While investigations into the potential use of "care robots" have been limited in Canada, other jurisdictions with rapidly ageing populations have long been exploring the potential for creating and deploying robots into the everyday care of and support for older adults.

Much of the research on care robots has originated from Japan, one of the world's oldest countries, where 29.6% of the population was aged 65 years or older as of September 2026;[41] a proportion that is projected to rise to approximately 37.5% by 2050.[4] As Japan has been increasingly struggling to develop and recruit adequate numbers of Japanese-speaking paid care providers,[4] its established robotics sector and related public investments have examined novel ways to address its care shortages.[25,42,43] In particular, the development and adoption of robots to meet the growing care and support needs of its ageing population has been viewed as a potentially fitting solution.[25,42,43] Since 2013, the Japanese government reportedly spent ~US$300 million (C$422 million) on research and development to explore the possible widespread use of care robots, in addition to a surge of private funding invested into the development of care robots across the country.[25]

Another rapidly ageing country is South Korea, where 21.6% of the population was aged 65 years or older in 2026; a proportion that is projected to reach 30% by 2036 and more than 40% by 2050.[4,44] The government's focus on promoting the development of care robots at the national level has taken two main forms: support for the purchase of robotic products and funding for research and development projects.[45–49] However, unlike Japan, the industry is still considered to be in its early stages, as evidenced by the limited use of care robots in South Korea.[50–52] Since 2025, the national government has planned to take a more active role in the older-adult technology industry through a planned national strategy. This strategy has identified AI care robots as one of five key focus areas to be advanced through substantial increases in investment, policy support, demand generation and enhanced public–private collaborations.[53] The government also indicated that elements of its upcoming strategy would be reflected in its next multi-year (2026–2030) national plan addressing its ageing society and its low birth rate, in which technology is expected to be a central tenet.[54]

Some other jurisdictions have also begun to explore the more widespread use of care robots in their respective countries. For example, the European Union (EU) made an investment of €85 million (C$138 million) into its "Robotics for Ageing Well Program" from 2015 to 2020, while in 2019 the United Kingdom announced £34 million (C$63 million) for research on trustworthy autonomous systems, including robots to support care.[55] Researchers in the United States and Japan have also examined care robots, including an observational study of LTC homes in Japan that reported an association between robot adoption and staff retention.[56,57] To date, there has been little work exploring the potential use of care robots to assist in the delivery of care and support for older Canadians. However, national bodies such as AGE-WELL, Canada's Technology and Aging Network, are currently working to build the domestic evidence base in this area.

Definitions and Framing

For the purpose of this report, the NIA uses the term “care robots” to refer to physical robotic devices that are specifically designed to be used to assist in providing care and support to an older person across any care setting (such as within a person’s home or within a residential care setting). This can include robots that work largely autonomously (with minimal supervision), as well as robots that assist care providers with completing care tasks.

The NIA uses the term “care provider” to refer to anyone providing care for an older adult (the “care recipient”). Care providers can include both individuals who are paid to provide care and family members or friends serving as unpaid caregivers.

While a range of care robots have been developed and tested worldwide to date, this report groups them by two main functions, which may overlap. The first category is “physical care robots,” which include a range of care robots created to assist care providers with physical care tasks, such as completing various activities of daily living (ADLs). The second category is “social engagement robots,” which are robots designed to support social engagement and interaction with older adults and potentially reduce loneliness or social isolation.

Finally, while much of this report focuses on research evaluating care robots in different settings, it is important to note that the health outcomes associated with any care robot are shaped by how it is integrated into existing care workflows, team dynamics and organizational culture rather than strictly the robot’s own technical capabilities. As this report discusses care robot integration into care settings, it is important to consider not only the robot itself but also the broader socio-technical system, including the robot's users and the surrounding care settings.

The Current State of Development of Physical Care Robots

A range of physical care robots have been developed with the aim of assisting existing care providers in meeting the physical care and support needs of older adults.[25,58,59]

Many tasks that physical care robots aim to assist with involve supporting an individual's activities of daily living (ADLs), which refer to various tasks that a person needs to complete to live independently. The Katz Index of basic ADLs was published in 1963, while Lawton and Brody described instrumental ADLs in 1969.[60,61] The assessment of ADLs is used clinically to understand a person's level of function. These ADLs are further sub-divided into basic ADLs (bADLs), which represent key self-care activities, and instrumental ADLs (iADLs) that represent more complex higher-level daily tasks.[60–62] Selected examples of basic and instrumental ADLs are outlined in **Table 1**.

Table 1: Overview of Basic and Instrumental Activities of Daily Living, adapted from Katz and Lawton–Brody.[60–62]

Basic Activities of Daily Living (bADLs)	
Self-care activities that are required for basic physical functions and personal hygiene.	
Bathing	The ability to wash oneself independently, safely and maintain cleanliness.
Dressing	The ability to independently get clothes from closets/drawers and put on and remove one's own clothing.
Toileting	The ability to independently get on and off and use the toilet, clean the anogenital area, and arrange/rearrange one's own clothing.
Feeding	The ability to independently feed oneself (getting food from a plate or bowl to one's mouth; excluding meal preparation).
Transferring	The ability to independently move in and out of a bed or chair; walking ability is assessed separately.
Instrumental Activities of Daily Living (iADLs)	
More complex activities that are required to live independently in the community.	
Meal Preparation	The ability to plan and prepare a meal independently.
Housekeeping	The ability to maintain one's living area and keep it clean.
Laundry	The ability to do one's own laundry independently.
Transportation	The ability to organize or plan a trip, and the ability to travel outside safely and independently.

Communication	The ability to use a communication device independently, including telephone, email or other communication methods.
Finances	The ability to manage one's own finances independently.
Medications	The ability to acquire, organize and take one's own medications correctly, consistently and safely.
Shopping	The ability to plan, acquire and pay for items (such as groceries and other necessities), whether in person or online.

Existing physical care robots have been developed to help accomplish bADLs including transferring, dressing and feeding as well as ambulation.[25,58] Other physical care robots have been used to help coach a person through their personal hygiene and grooming and/or meal preparation and eating tasks, detect when an older person has fallen or remotely acquire vital signs (such as blood pressure or heart rate).[25,58,59] Typically, physical care robots do not work completely autonomously and require human care providers present to operate or supervise them during care. The goals associated with the design, development and implementation of physical care robots have usually included improving the efficiency of performing physical care tasks, improving the experience of both care providers and care recipients and reducing the physical care burden typically placed on care providers.[25,58,59]

One example is "Hug," a care robot created in Japan that aims to assist in transferring persons (e.g., from a bed to a wheelchair).[25,63] The purpose of Hug is to alleviate the physical strain associated with transferring older adults, a common cause of workplace injury among care providers.[63] Hug supports the person's upper body while they hold on to handles, helping them rise from sitting to standing and stay standing (as seen in Figure 1).[25,63] It is intended for care recipients who can bear some weight through their legs and follow instructions.[63]

Figure 1: An illustration of "Hug," a physical care robot that is used to help transfer a person from a bed to another setting.



To date, some studies have explored the use of Hug in assisting with the care of older persons. One non-randomized study compared three facilities with different levels of experience using Hug (with 24 care staff and 10 residents included): an inexperienced facility reported transfer times of 4.6 minutes in week 2 and 3.0 minutes in week 5, compared with an average of 1.5 minutes at an experienced facility.[63] The authors also noted that transfers for older care recipients in the study initially often required the presence of two paid care providers, but after becoming proficient in using this care robot, many transfers only required one paid care provider to be present; however, no statistical comparison was reported.[63] It is important to note that the training time for paid care providers (a 1-hour training session was reported, although the time needed to become proficient is likely longer), the weight (35 or 50 kg) and cost of this care robot (~C$10,000) were all cited as barriers and may limit its widespread implementation.[25,63] Another qualitative study examining the beliefs and perspectives of paid care providers on the implementation of Hug into an LTC home in Japan[64] found that most paid care providers were "reluctant or even hostile" to the concept of implementing Hug, as lifting practices were viewed by many paid care providers as a core part of their ability to connect on a human level with care recipients.[64] As such, the use of Hug was seen as a detriment to the development and maintenance of care connections shared between paid care providers and recipients. Care providers also noted that the added time required to bring Hug between rooms, and that Hug did not work well for all care recipients depending on the recipient's specific physical and cognitive impairments, leading several care providers to stop using Hug altogether within one week.[25,64]

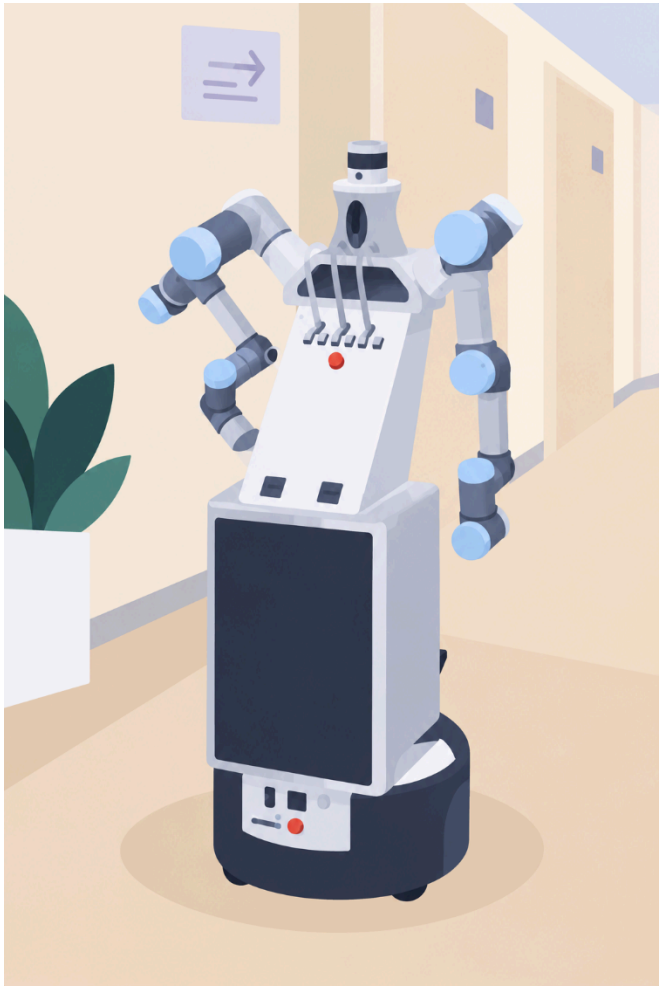
Another widely publicized physical care robot, "Robear," was also developed in Japan. While Hug was designed to assist care recipients who can stand with some support, Robear was designed to fully lift a person out of bed and into a wheelchair, including people who need more assistance with transfers, as well as to help those who can stand but need support.[25,65–67] At approximately 140 kg, Robear was also considerably heavier than Hug.[67] Robear was an experimental prototype, and its developers never made the product commercially available. One researcher who conducted fieldwork on care robots in Japan noted that "Robear was an experimental research project never actually used in a care home setting, being too impractical and expensive for real-life deployment."[25] Its project leader similarly stated when Robear was unveiled that "for commercialization in the near future, we need much simpler, lower-cost robots."[68] Other reports also raised concerns about its staff training requirements and its acceptance by both paid care providers and care recipients.[65,66] Additionally, Robear's inventor later "claimed that it was not a solution to the problems facing the care industry in Japan; he said migrant labor was a better answer."[25]

Figure 2: An illustration of "Robear," a physical care robot prototype developed to assist with lifting and transfers.



Despite some early hesitancy and pitfalls in the adoption of physical care robots, several groups are continuing to pursue this avenue to address the physical care needs of ageing populations. For instance, a new robot prototype called ADAM (Autonomous Domestic Ambidextrous Manipulator) was created by a group of researchers at the Universidad Carlos III de Madrid with the Spanish robotics company Robotnik. ADAM is being developed as a freestanding physical robot that is 160 cm in height and 50 cm wide, with two robotic arms as well as a "vision system" that is designed to resemble a human body.[69,70] ADAM aims to assist with a range of household and care-related tasks, such as cleaning, delivering objects, food or medication and monitoring care recipients for falls.[69,70] To date, published work on ADAM describes specific demonstrations of selected tasks (such as setting a table, sweeping and simple meal preparation) in controlled laboratory settings.[70] As of 2026, the developers described ADAM as an experimental robot costing approximately €80,000–100,000 (~C$126,000–158,000);[71] it should therefore be regarded as a research prototype rather than an available product. However, it does offer a glimpse into the possibility that physical care robots such as ADAM may offer a solution to help with iADL assistance for a range of care-related tasks beyond mobility or transfers.

Figure 3: An illustration of "ADAM" (Autonomous Domestic Ambidextrous Manipulator), a physical care robot being piloted to help care recipients with various physical tasks, including higher order iADLs.



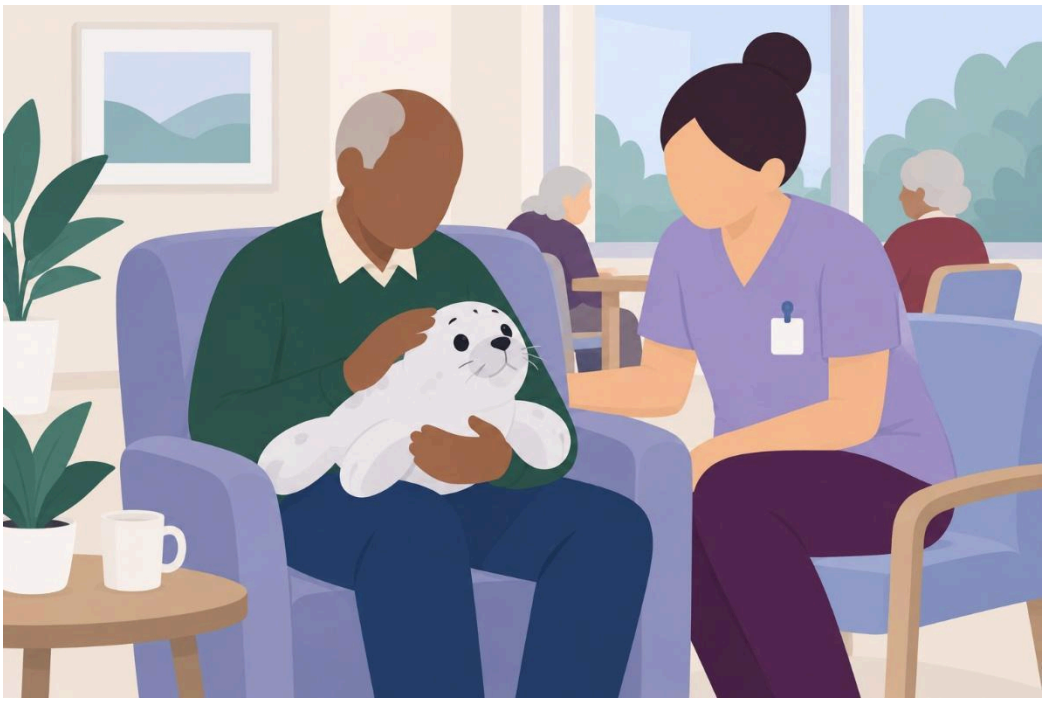
Social Engagement Robots

The other domain of care robot development is "social engagement robots" (also referred to as "socially assistive robots").[25,72,73] These robots have been developed with the aim of providing care recipients with a range of social interactions and engagement activities.[25,72,73]

Two illustrative examples of social engagement robots are "Paro" and "Pepper." They were chosen for inclusion in this report because they are among the most frequently studied social robots.

Paro is a social engagement robot that was designed to provide some engagement and interaction with older adults, particularly those living with a cognitive impairment or dementia.[74,75] Paro is designed to look like a baby harp seal with a synthetic fur coat, flippers and eyes, and it interacts with care recipients by moving and making noises when users speak to it or pet it.[74,75] It was designed with the aim of reducing the behavioural and psychological symptoms of anxiety, depression and agitation that can be common in people living with dementia.[74,75]

Figure 4: An illustration of an older adult engaging with "Paro," a social engagement robot.



Unlike many other care robots, Paro has been subject to several scientific studies that aimed to better understand its potential uses as well as effectiveness in a range of settings. For example, a recent 2023 systematic review and meta-analysis on the use of Paro in a variety of care settings found 12 studies that included over 1,400 participants.[74] The review reported potential benefits for selected behavioural and psychological symptoms and medication use, but the magnitude and certainty of benefit should be interpreted separately for each outcome.[74] However, small samples and methodological limitations confound the study findings, and a change in medication use does not necessarily equate to better care or health outcomes.[74] Additionally, none of the included studies examined whether the implementation of Paro was effective in reducing time required by

care providers to provide care and support to various care recipients using Paro.[74] A broader scoping review conducted in 2019 identified 29 publications examining the use of Paro for older adults living with dementia in a range of care settings.[75] Across these studies, the authors found some evidence to suggest Paro could improve behavioural symptoms and mood, increase social engagement and potentially improve the overall care experience.[75] On the other hand, the authors also reported significant barriers and potential pitfalls with the use of Paro, including the cost of the robots themselves (~C$8,400); concerns about their potential to become a vector for the spread of infectious diseases; and the increased workload for paid care providers because of the training required to use Paro, as well as the setup and cleaning required for every use.[75] Furthermore, several studies have also raised ethical concerns, questioning whether the use of Paro may be dehumanizing or infantilizing for older adults living with dementia.[75]

Another popular example of a social engagement robot is "Pepper," a social humanoid robot designed to provide and promote social interaction and engagement for care recipients. As a purposely designed humanoid robot, Pepper aims to resemble a human as it stands 1.2 metres tall with a human-like appearance, gestures, speech-recognition functions and a touch screen on its chest to allow for programming and engagement by both care recipients and providers.[25,75–78] Additionally, Pepper has been designed to "converse" with care recipients, as it can use programmed dialogue and (depending on its software configuration) AI-based responses to verbal cues, while also having the capacity to demonstrate non-verbal communication including various gestures.[25,75–78] With this range of abilities, Pepper has been trialled and implemented in a range of care settings. For instance, it has been used to run daily exercise programs, monitor vital signs (when connected to additional devices), provide reminders for care recipients to wash their hands or wear masks and initiate conversations to further engage care recipients socially.[25,75–78] However, it is important to note that the functions of Pepper depend largely on how a given unit is configured and were not all available in every study.

Figure 5: An illustration of "Pepper," a humanoid social care robot, interacting with an older adult.



Overall, the use of social engagement robots that provide verbal interactions remains at an early stage, and in particular there is limited research on the use of humanoid robots such as Pepper in

various care settings. While there is comparatively less evidence on the use of Pepper compared to Paro, some studies have explored Pepper's implementation to assist in the care of older adults.[76,79] One pilot qualitative study of the use of Pepper in an LTC home found many of the LTC residents welcomed Pepper into a social circle, while staff reported they believed residents enjoyed Pepper being integrated into their lives.[79] They also reported Pepper caused more "communal gatherings" in common areas, as residents were keen to engage with Pepper in their free time.[79] However, some negative themes also emerged, including the fact that care home staff required additional training and needed to dedicate time to set up Pepper for use by residents, along with concerns around the potential replacement of care provider roles with a humanoid robot. Another qualitative study examined the perspectives of 194 care providers (paid care providers and unpaid caregivers) on the use of Pepper to assist in caring for older adults living with dementia after watching a demonstration video of the care robot.[76] Potential benefits of using Pepper in care settings, as outlined by respondents, included assisting care recipients with performing various bADLs via prompting (such as eating and dressing); promoting greater physical activity; increasing social engagement; greater care recipient monitoring; and reminders to perform iADLs (such as taking medications). However, respondents also had many concerns, including the cost (~C$31,000–$49,000); privacy issues (such as how data is handled and who can access it); a general lack of trust towards the use of robots in supporting care; concerns around possible errors made by Pepper; uncertainty around Pepper's ability to navigate emergencies; and the fear of human replacement.[76] Because the study reported respondents' views following a video demonstration, these findings are based on perspectives rather than measured effects following an implementation trial of Pepper. As such, the researchers suggest that Pepper should not be considered a "one-size-fits-all solution," but rather the decision to use it and its implementation should be tailored to each individual care recipient and their care providers.[76]

Table 2 summarizes the stage of development and the main evidence discussed in this report for each example device.

Table 2: Stage of Development and Main Evidence for The Key Care Robots Discussed in This Report.

Device	Type	Stage of Development	Main Evidence Discussed	Key Limitations
Hug	Physical (transfer support)	Commercially available in Japan	Non-randomized comparison of facilities; qualitative studies of staff views	No randomized trials; staff reluctance; weight, cost and time to move between rooms
Robear	Physical (lifting and transfer support)	Experimental prototype (2015); discontinued	Developer announcement and media reports	No clinical evaluation; not commercially available
ADAM	Physical (household tasks, monitoring)	Research prototype announced in 2024	Design and laboratory reports	Not evaluated in routine care settings

Device	Type	Stage of Development	Main Evidence Discussed	Key Limitations
Paro	Social (animal-like)	Commercially available	Systematic review and meta-analysis; scoping reviews	Small, low-quality studies; cost; cleaning and infection control; ethical concerns
Pepper	Social (humanoid)	Original version available via resale; new company in China recently acquired rights	Qualitative pilot studies	Limited outcome evidence; cost; privacy; capabilities depend on software configuration

Key Factors, Barriers and Considerations Regarding the Greater and Widespread Adoption of Care Robots in Canada

In this report, the NIA has outlined the considerable care and support needs that Canada, like many other countries in the world, will face in supporting its rapidly ageing population. The concept and development of care robots has emerged as a potential solution to aid in delivering care and support to older adults and people living with dementia. While there may be benefits to deploying care robots across a range of care settings, several key issues and concerns must be systematically addressed if they are to help address Canada's current, and growing, shortage of paid care providers and unpaid caregivers.

This section outlines key potential benefits as well as potential risks that should be considered when deciding whether and how to adopt care robots into Canadian care settings. Sample implementation and evaluation frameworks that can be used both before and during the adoption of care robots in Canada are also provided.

Improving Care Recipient Experience and Evaluation of Potential Outcomes

When considering the adoption of care robots into any care setting, whether it be a home-based care environment or a residential care setting, the principal consideration must be the health and wellbeing of care recipients.

The first question asked when considering the use of care robots should be: "Does an individual or do a group of care recipients have care and support needs that may be effectively addressed or assisted by using either a physical care robot or social engagement robot?". Further: "Is there evidence that this care need can be appropriately addressed or improved with the use of a care robot, and that the care experience can be improved compared with using a human care provider alone?". For instance, if a care recipient is experiencing loneliness and anxiety, the social engagement robot Paro has shown potential benefits for some psychosocial outcomes in selected settings, with uncertainty about the size and durability of benefit.[74] If a care recipient requires assistance with transfers, but can weight-bear with assistance, then there is some evidence that a physical care robot such as Hug could be considered to support their care.[63]

Before a robot is considered, if a care recipient is in distress, the cause of distress should be assessed (e.g., pain, delirium, depression, sensory impairment, medication side effects, unmet social needs). A care robot should not delay that assessment or replace indicated treatment, non-robotic alternatives should also be offered and the person's choice should always be respected.

Additionally, it is important to distinguish between feasibility (whether a care robot can be used in a certain setting), acceptability (whether care recipients and providers want to use it), efficacy (whether it works under controlled conditions) and effectiveness (whether it works in routine care provision). Much of the existing literature on care robots, including many of the studies discussed in this report, reports short-term changes in discrete outcomes (such as mood, anxiety or task completion time). However, there is considerably less evidence demonstrating sustained system-level impact, such as a reduction in care provider workload over time and delayed institutionalization or improved long-term quality of life for care recipients. This gap between

preliminary findings and sustained impact is not unique to care robots, but it remains an important limitation to bear in mind when considering the real-world value of implementing care robots in various care settings. Many studies of care robots are small and uncontrolled and/or qualitative, and early improvements may partly reflect novelty or the extra staff attention that comes with a new intervention. It is also important to note that the absence of reported harms in many of the pilot studies reviewed is not evidence of the safety of various care robots.

Ascertaining the Acceptability of Care Robots Among Care Providers and Recipients

The theme of acceptability has been a common finding across studies that explore the implementation of care robots into various settings. Several research studies have found that both care recipients and care providers may not find the use of a care robot to be acceptable to them for various reasons.

As such, before using a care robot, it should be asked: "Does this care recipient find the use of a given care robot in this specific setting to be acceptable to them?". This conversation should involve the care recipient directly, with accessible communication and decision-making support as needed. In instances where the care recipient lacks capacity for the specific decision to include a care robot in their care, their substitute decision-maker (SDM) should be involved and any concerns or questions that a care recipient has should be appropriately addressed prior to using a care robot. Additionally, it is important to note that living with dementia does not mean a person lacks capacity, as capacity should be assessed and re-assessed for the specific decision – including the potential use of a care robot.

Some studies also highlight that care recipients might have differing views regarding the use of care robots, and some may not find it acceptable to have a robot assist in supporting them with completing a specific task in place of a human. For instance, a previous study on Pepper – the humanoid robot capable of engaging in conversation – found that, while most LTC residents studied enjoyed talking to Pepper, one LTC resident did not, as they were anxious about the thought of a robot taking over a human care provider's role in social interaction.[76] This highlights the need to always centre a care recipient's needs, preferences and wishes, and that the incorporation of care robots into an individual's care plan requires a personalized approach.

Finally, multiple studies have suggested that care providers are hesitant to accept the use of care robots. This consideration relates to the relational aspects of care, which is a concept that views some aspects of care provision as an inherently complex combination of personal tasks, and one that is uniquely relational between a care provider and care recipient.[80] As such, some researchers have argued that providing care also addresses human needs for connection beyond completing a given task, and as such, care robots cannot give "humanistic care" to care recipients.[80,81] For example, in a study from Japan discussed earlier in this report, many paid care providers reported negative opinions of a physical care robot as they considered supporting transfers to be a core part of a paid care provider's role, and key to creating a connection with a care recipient.[64] This study and others highlight the need to explore whether users of a care robot (care providers and care recipients alike) may even wish to avail themselves of a new technology to support certain tasks, as well as the need to address potential concerns (including the potential loss of human connection) before considering its incorporation into daily care practices. Furthermore, reluctance among care providers should not be treated as a barrier to overcome, but rather as a potential signal for concerns regarding safety, workload or the loss of relational care. Both care providers and care recipients should therefore be involved in selecting (and designing) these technologies where possible, and hesitancy regarding acceptability should be documented and seen as an opportunity for learning.

Alleviating Care Provider Burden

Another key question when considering the inclusion of care robots should be: "Would using a care robot help reduce the overall care provider burden associated with providing this care task?". When posing this question, it is important to consider the body of evidence associated with the implementation of a given care robot for the specific use being considered, as it relates to care provider burden.

For instance, is there evidence that a care robot significantly reduces the overall time and effort required to complete a care and support task? Is the benefit of using a care robot greater than the manual labour required to move the robot between LTC resident rooms or other settings within an LTC home (for example, is there evidence that a care robot reduces the rate and/or types of injuries sustained when performing certain physical care tasks)? Is the training time required to use a robot and then charge, set up and clean a robot between uses worthwhile, if that time could be spent providing physical care or social engagement with a care recipient instead? As discussed in this report, there are multiple examples of care robots that, on the surface, would appear to be net beneficial, yet in real-world situations lacked practicality and were abandoned shortly after their initial introduction.[25]

Furthermore, there is also the risk that care robots may simply redistribute care provider burden rather than reduce it. For instance, a physical care robot may reduce the physical strain associated with performing transfers while also introducing additional cognitive burden (such as the coordination required to incorporate it into care routines or troubleshooting when it malfunctions). As discussed in this report, accounts of Hug illustrate the importance of training and workflow demands, while Robear remains an example of experimental development rather than demonstrated reductions in routine care workload.[25,63–67] Particularly within LTC settings already operating with limited staff capacity, small increases in workflow complexity can lead to the abandonment of care robots following an initial pilot period. As such, unless a care robot is designed and implemented in a way that integrates smoothly into existing care routines, it is unlikely to see sustained use beyond a pilot phase, regardless of its technical capabilities. Assessments should therefore measure the "net workload" across a full shift or care episode (including setup, transport, charging, cleaning, supervision, documentation and troubleshooting), as opposed to strictly the time taken to perform a single given care task.

Additionally, beyond formally reducing task-specific care burdens on care providers, the fact that many care robots require care providers to receive specific training on their use warrants attention. As mentioned, paid care providers and unpaid caregivers are already overburdened in Canada. The training requirements for care robots also vary widely. For example, while Paro, the seal-like social engagement robot, likely requires less technical training than Pepper, the humanoid social engagement robot with a more advanced computer system, staff using Paro still need skills in obtaining consent for and facilitating its use, recognizing distress in care recipients, cleaning it and stopping its use safely if needed. The addition of extra time requirements for completing training, on top of existing care responsibilities, should be taken seriously. Furthermore, because care providers have varied language and accessibility needs, training would need to be available not only in English and French but in other languages that care providers can comfortably learn in. Training should account for literacy and digital confidence as well (see also "Training, Maintenance and Ongoing Support Requirements").

Cost Considerations

Multiple studies have indicated that the cost of care robots is a significant barrier to their widespread use in a range of care settings. Of the care robots reviewed in this report, the per-unit costs have ranged from an estimated C$8,400 to C$158,000. However, published cost estimates of care robots vary substantially, and existing prototype estimates may vary significantly from current or future commercial purchase prices. The average annual salary of a full-time health care aide or personal support worker in Canada is approximately C$47,000.[82] There have also been few formal health economics analyses conducted on the use of care robots in various care settings, and future economic evaluations should compare complete care pathways. While a care robot's purchase price is not directly comparable with a care worker's annual wage, future economic evaluations should set a robot's full lifetime costs (including maintenance, training, subscriptions and the staff time needed to operate it) against the care time it saves, using Canadian prices.

Additionally, while there are several potential broad financial and economic benefits that may occur with the implementation of care robots – such as fewer emergency department (ED) visits or hospitalizations, reduced paid care provider hours, fewer workplace injuries and less caregiver burden – the household or organization that pays for a care robot would not typically be the beneficiary of these savings. For example, a family that buys a robot for a care recipient's home would bear its full cost, while any savings from fewer ED visits or hospitalizations would accrue to the provincial or territorial health system. Similarly, an LTC home that buys a care robot to support resident transfers would pay for it, while savings from fewer workplace injuries may partly offset that LTC home's costs over the longer term. Unless funding arrangements share costs and benefits more fairly (for example, through public funding or reimbursement schemes), households and individual care organizations may have little financial incentive to adopt care robots.

The specific cost considerations and possible net cost benefits of using a care robot should be evaluated before using one in any context – including cost considerations related to the cost outlay for the robot itself, as well as the additional cost of training care providers to use it appropriately. A care robot that can assist a care recipient with functional tasks may reduce the hours required to pay a home care provider to help with a given task. If a care robot enables an older adult to continue to age in their own home (and prevents their premature admission to an LTC home), there could be substantial net cost savings associated with their use.

Infection Control Considerations

Infection control must be considered when introducing care robots into care settings.[75] Infection control procedures, including robot cleaning protocols, should be in place before introducing a care robot into a care routine, especially in LTC homes. Protocols should specify cleaning methods that are compatible with the manufacturer's instructions, who is responsible, how often cleaning should occur and how devices should be managed during outbreaks. Whether a device can be shared between care recipients should be reviewed by local infection prevention and control teams, and cleaning time and supplies should also be included in cost and workload estimates.

Risk Mitigation Considerations

It is important to consider potential risks associated with introducing new technologies into care settings, as well as appropriate mitigation strategies. For example, care robots with a wide range of movement, such as Pepper, pose potential safety concerns. Although Pepper includes built-in safety measures, such as movement controls and an emergency stop function,[83] these safeguards

must still be evaluated in relation to the physical and cognitive abilities of the care recipient and the level of supervision that is both required and available. For instance, a 2025 study examining over 120,000 LTC residents in Ontario found that 73% of residents had bADL limitations, ranging from a need for extensive assistance to total dependence (using the ADL Self Performance Hierarchy Scale), and 58% had a prior diagnosis of dementia.[84] Given the functional level and cognitive status of many care recipients who might use such care robots, it is imperative that individual risk assessments are considered for each care recipient prior to use.

Similarly, research has shown that the use of social engagement robots can be affected by technical issues and the complexity of their operation.[85,86] As these devices are intended to support emotional and mental wellbeing, disruptions or difficulties in use may provoke negative reactions. This risk may be especially pronounced among individuals living with cognitive impairment or dementia, who have been found to experience greater challenges when using care robots and may therefore require more tailored mitigation strategies.[87] Potential psychological harms may also include overstimulation, fear, sleep disturbance, frustration, dependency and grief (if a companion robot is removed). Individual responses should be monitored closely, and adverse psychological effects should be recorded.

Risk mitigation is not a one-time task but rather an ongoing process that should be reviewed at regular intervals, accounting for changes in the individual's condition, device use and surrounding environment.

Before use, the care team should define an accountable operator, required supervision, a route for urgent assistance and a safe fallback if the device, network or power supply fails. Harms, near misses, failures and distress should be recorded alongside benefits. Pre-specified stopping criteria should include injury, persistent distress or refusal, unsafe performance, an unresolved privacy breach and loss of necessary support.

Loss of Human Connection

It is well documented that many older adults experience loneliness and isolation.[88] Some studies suggest that social engagement robots may reduce loneliness in selected populations, although evidence varies by device, comparator and follow-up.[89–91] However, the widespread implementation of care robots raises concerns about the potential loss of human connection that may ensue over time,[92] as well as overreliance on care robots, which may potentially replace human interaction (e.g., paid care providers, family and friends).

While the tension between using care robots to augment versus replace human care is often framed as a philosophical consideration, there is a concern that gradual shifts toward replacement can occur in practice (even where a care robot was originally intended only to augment human care). For example, a social engagement robot introduced with the goal of reducing loneliness may over time be used to substitute for some human interactions, without this being an explicit or deliberate decision by care providers, family members or care organizations. Such a gradual shift would be difficult to detect in short-term studies, as it would only become apparent over a longer period of sustained use – further underscoring the need for a cautious, closely monitored approach to incorporating care robots that are intended to support (rather than substitute for) human connection. A cautious approach is necessary given the limited research on the long-term impact of care robots on older adults as well as on social connections, especially given that increasing levels of social isolation can raise the risk of experiencing loneliness. To detect such subtle shifts, organizations can consider implementing measures like recording the amount of contact (e.g., staff and family visits, participation in activities), monitoring levels of loneliness and isolation before and after a care robot is introduced and continuing close follow-up with all care recipients using care robots.

When contemplating implementing a care robot, consideration should be given to the potential consequences on the amount and quality of human interaction between care providers and recipients. If a social engagement robot is used to provide engagement, one should ensure that this does not unintentionally reduce the overall time that care recipients spend with care providers or other humans. If a physical care robot is used, can the potential time saved by a care provider be used to increase time spent engaging socially with a care recipient?

Ethical Issues – Informed Consent, Respect for Autonomy and Dignity

There are also several ethical issues to consider regarding the possible adoption of care robots in the care of older adults.

First, the principle of autonomy must be central, and obtaining informed consent before incorporating robots into the care of an individual is paramount. If a care recipient can provide informed consent, consent must be obtained prior to initiating any form of care with a care robot. Ethicists have argued that, regardless of the type of care robot, seeking informed consent fundamentally respects the dignity of a care recipient and should be sought in all cases.[93,94] However, there are also some well-described challenges associated with obtaining informed consent when using care robots. For instance, some of the emerging robotic technologies are very sophisticated and advanced, leading to challenges and questions surrounding how well informed care recipients or even care providers can truly be about the technology that will be used to assist with their care.[93,94] Further, there are also several instances of care robots being developed to assist in the care of persons living with dementia.[93,94] In such cases, it is possible that care recipients may be unable to provide informed consent as to whether they want care robots involved in their routine care.[93,94] Similar to other health care interventions, a designated SDM should be engaged in making the decision to implement the use of care robots if informed consent cannot be obtained from the care recipient directly. It is also important to note that consent for the use of a care robot as part of care is distinct from consent to take part in research, as well as from consent for the collection, use or disclosure of personal information (including secondary use, such as training AI models).

There are also concerns regarding respect for dignity with the implementation of care robots.[95,96] On one hand, some authors suggest that the greater independence care robots may provide older adults could support their dignity as individuals. Others believe that robotic support is less dignifying than receiving human care and should be used with caution.[95,96] Both the cultural backgrounds and prior experiences of care recipients and providers may influence their perspectives on the use of robots and respect for dignity in caring for older adults.[64]

Ethical scholarship on care robots is substantial, while translating its principles into evaluated practice remains an ongoing challenge. For these reasons, some scholars have suggested that ethical frameworks should be in place in settings where the inclusion of care robots is occurring or being considered.[97] Before proceeding with use of a care robot, it is paramount to obtain informed consent, and to ensure that respect for autonomy and dignity remain central throughout the process.

Legal Considerations and Protocols for Instances When Care Robots Make Errors

There is also growing concern around situations wherein care robots make errors or contribute to harm while caring for an individual,[94] as both health systems and medical-legal experts begin to consider the wider ramifications of the potential widespread adoption of care robots.

For instance, if a physical care robot is used to lift or transfer a care recipient, and the care recipient falls, does the responsibility fall on the care provider and the care provider's organization, the developer of the care robot or all three? What about instances in which a care robot is used to dispense medications or provide social engagement? Furthermore, will registries be created to monitor adverse events with care robots to reduce and prevent such instances in the future?

The possibility of errors and injuries associated with the use of care robots and handling of liability issues must be considered before implementing any care robot into a care setting. Responsibilities may be shared across the manufacturer, the software provider, the organization that purchased and deployed the care robot or the care provider operating the care robot. The responsibility should be clarified in advance of implementation. Some care robots may be regulated as medical devices in Canada, depending on their intended use, in which case existing mandatory reporting requirements under the Medical Devices Regulations may apply.[98] Organizations should also keep a local record of all incidents and near misses.

Training, Maintenance and Ongoing Support Requirements

Multiple studies reviewed in this report suggest that the training, maintenance, and support requirements associated with care robots can be underestimated, and these factors should therefore be a major consideration regarding possible implementation of a care robot.

First, training requirements vary widely across care robots, and the training burden should be considered prior to implementation in any care setting – particularly given the aforementioned workforce issues across Canadian care settings.[23–25,27–29] Further, high staff turnover rates in LTC and home care settings indicate that training must often be repeated. Also, as many care providers in Canada do not speak English or French as their first language, materials should be available in multiple languages.

Second, care robots require ongoing maintenance, including charging, cleaning, software updating, calibration and repair. Instances where such tasks fall to care providers add additional workload to an already strained system; instances where tasks fall to external providers represent a recurring additional cost. As such, plans for ongoing maintenance should be made before the deployment of care robots in any care setting. Procurement agreements should specify how long care robots will be supported (including software and security updates and repair), what happens to the data collected and how care can continue if the supplier stops operating.

Finally, there may be instances wherein a care robot becomes well ingrained into a care routine and the sudden loss of the care robot (e.g., failure of the robot, withdrawal of funding, discontinuation by the manufacturer) may cause a significant disruption to the provision of care. Care recipients, care providers and caregivers should be told at the outset that the technology may

not be permanently available, and a plan for discontinuation should exist before the device is introduced as a condition of implementation.

The Incorporation of AI in Care Robots

A rapidly emerging issue is the use of AI by various care robots used to deliver a range of care across multiple settings. For instance, Pepper – the humanoid social engagement robot discussed earlier – can be configured with software that uses large language models (LLMs), a type of AI, to converse and engage with care recipients, while allowing it to "learn" from prior interactions to help improve the quality of future social engagement interactions. While the possibilities of the use of AI in care robots appear endless, and AI may provide positive aspects for the overall care experience, many experts are still urging caution and careful consideration with integrating AI in care robots for several reasons.

First, there are valid concerns surrounding data privacy, storage and how consent is obtained. AI-driven care robots may collect, process and retain sensitive data from care recipients who may be cognitively impaired; various scholars have voiced concerns about how this data might be stored and used, and about the potential to violate the privacy of care recipients.[99] For instance, if a care robot is monitoring medication dosing and adherence, there is a risk that this sensitive data could be used for reasons beyond providing direct care to the care recipient.[99] If these AI-driven care robots use the data acquired to further refine and improve their algorithms, any secondary use should have a clearly established lawful basis, appropriate authorization and governance, with separate, meaningful consent where required, and access to care should not be conditional on optional model-training consent. There are also concerns about data protection and the risk of a breach of the data collected via care robots.[99,100] Overall, organizations, care providers and care recipients should understand what data a device collects, where it is processed and stored (including outside of Canada), who can access it and for how long and whether visitors, staff or other residents may be recorded incidentally.

Second, researchers have described potential concerns surrounding the concept of "algorithmic bias."[101] There are well-documented examples of bias in AI algorithms in health care, where the datasets used to train AI models inadvertently perpetuated bias against certain groups of patients.[101,102] Some scholars have expressed concerns that AI algorithms used in care robots could also be subject to algorithmic bias, where algorithms could inadvertently perpetuate sexism, racism and ageism.[101–103] As such, AI algorithms should be carefully evaluated and rigorously tested before their widespread implementation in Canadian care settings, with strict monitoring protocols of algorithm performance continuously in place. Evaluation should also include and reflect the people using the care robots, including people living with frailty or dementia; people with hearing, vision, speech or motor impairments; and people using different languages across various Canadian settings such as LTC homes and individual dwellings.

Third are concerns surrounding both the accountability and explainability of decisions made by care robots that use AI. This is particularly important when considering the use of generative AI, which is AI that creates its own content (e.g., text, speech, photos or videos) in response to a provided input or prompt. If a care robot using generative AI makes a recommendation or decision about how to respond to a care recipient's question and it is incorrect, there are concerns about how such devices are held accountable. If a clinician, home care provider, LTC worker or other care provider errs during their work, health systems have established systems of accountability, and such instances are used to improve how care is delivered in the future. However, beyond the earlier section ("Legal Considerations and Protocols for Instances When Care Robots Make Errors"), there are unique considerations when using AI-based models, as who holds responsibility for AI-related failures may be unclear. Additionally, the issue of explainability arises when discussing the use of generative AI, i.e., the concern that a model's explanation may not faithfully represent how its

output was produced. This is also important to consider in instances where care robots utilizing AI models may inadvertently cause harm in the delivery of care.

Finally, beyond decisions made directly by an AI-enabled care robot, it is important to consider how its presence may subtly influence the behaviour of those involved in a care recipient's circle of care. For instance, an AI-driven care robot over time may shape how care providers prioritize their time and tasks, how older adults perceive their own health and functional status (based on feedback from the care robot) or how involved care providers or family members choose to be in providing day-to-day care. This behavioural layer of influence is distinct from any single erroneous decision or recommendation made by a care robot, as it unfolds gradually and diffusely rather than at one identifiable point in time. As such, accountability frameworks for AI-enabled care robots should consider not only how to respond when the AI system makes an error in the delivery of care, but should also be able to monitor and respond to more gradual behavioural shifts that may occur among care providers, care recipients and families over time. Providers should monitor continually for overreliance on (or inappropriate trust in) AI-enabled care robots, and evaluation should continue after software updates. Moreover, while care robots with AI will inevitably require a "human in the loop," this is only meaningful if that person has the information, authority, training and time to intervene when needed.

Equitable access requires attention to affordability, housing space, connectivity, disability, language and the availability of ongoing human support. Older adults and caregivers should participate in design and evaluation, including people who decline to or cannot use the technology. Work with First Nations, Inuit and Métis partners should also respect their distinct priorities and applicable data-governance expectations rather than treating Indigenous communities as a single subgroup.

Technologies Beyond Care Robots That Could Assist People with their Activities of Daily Living (ADLs)

As discussed throughout this report, care robots are designed to assist with physical care or social support for older adults in different settings. However, beyond the field of robotics, various new and emerging digital technologies have also been developed and implemented to help older adults accomplish either their bADLs or iADLs in a variety of settings. While the purpose of this report is to focus on the development and use of care robots, it is worthwhile to note that various other digital technologies are increasingly used to support the care of older adults; examples are highlighted in this section. Additionally, it is worth noting that the distinction between a "robot" and "digital technology" is not uniform, and some products can be considered both. For the purposes of this report, the NIA considers a care robot as a robot specifically designed to help provide care to older adults; below, the NIA discusses some other technologies that were not designed for that specific purpose but could aid in accomplishing care tasks. They are included because they may be able to assist with some care needs for older adults, despite not being designed explicitly for that purpose.

Over the past decade there has been increased use of autonomous vacuum cleaners worldwide (such as "Roomba®," a registered trademark of iRobot Corporation). These autonomous vacuum cleaners can help older adults accomplish their housekeeping iADL and might be used to help older adults maintain their independence in the community, even though they were not designed specifically to provide care to older adults. There is minimal research on the use of such technologies by older adults in the community. However, a 2025 survey of 385 community-dwelling older adults in Hong Kong found that, on average, participants preferred robot over human assistance for 20 of 21 household chores (such as sweeping, mopping and cleaning), with meal preparation being the only chore for which human assistance was preferred (the study reported average preference ratings rather than the percentage of participants preferring a robot), suggesting that greater adoption of such technologies might be acceptable to some older adults.[104] There is limited safety data on the use of autonomous vacuum cleaners in homes with older adults; a cautious approach should be taken based on a person's functional and cognitive status, as such technologies could foreseeably increase the risk of falls in some individuals (for example, by tripping over the device).

One form of technology with some evidence supporting its use among community-dwelling older adults is automatic medication dispensers. They are generally programmed to organize and dispense various medications with the appropriate dose at the scheduled time. Some models also provide reminders for care recipients (such as sound alerts) to remind them that a dose of a medication is required. These technologies have been developed to help people in the community (not strictly older adults) perform their medication management iADL independently in their own homes, with some evidence supporting their use in these settings. A 2021 pilot randomized controlled trial in Calgary, Alberta randomized 50 adults (aged 50 years or older) with chronic health conditions, and found that the group using the dispensing device had higher recorded medication adherence (98.4%) than the control group (91.2%) over 26 weeks; however, dispensing a medication does not mean a medication was necessarily consumed.[105] A 2025 systematic review of 25 studies that assessed the implementation and effectiveness of medication dispensers in community-dwelling older adults found mixed evidence across outcomes, including the wellbeing and care experiences of care recipients and providers, health outcomes and cost effectiveness.[106]

Many of these studies were small and deemed to be low quality, and as such additional research should be undertaken before recommending widespread implementation. Nevertheless, this represents another emerging technology that may be considered to help community-dwelling older adults complete their iADLs to help maintain their overall independence.

Voice-activated smart speakers (also referred to as "digital assistants") are another modern digital technology that may be used to support ageing in the right place for community-dwelling older adults. These communication technologies allow users to use their voice to interact with a speaker that can provide information and complete tasks, such as setting reminders, searching the internet for information, providing local weather conditions and creating lists, as well as conventional speaker functions (such as playing the radio or music). Common examples of popular voice-activated digital assistants include “Google Home®” (a registered trademark of Google LLC) and Amazon’s “Alexa®” (a registered trademark of Amazon Technologies, Inc.). These technologies have been suggested as potentially helpful for older adults in the community in performing some of their communication tasks, such as speaking out loud to call a family member, and other iADLs. They also may provide reminders for appointment times or medication doses. To date, some studies have begun to explore the use of these technologies by community-dwelling older adults. A scoping review of 22 studies examining the use of these technologies by older adults in community settings reported that the most common uses were for reminders, weather updates, entertainment and news access and support with scheduling.[107] The review noted that most studies were preliminary and focused on their acceptability (which was generally reported as high), while some studies highlighted digital literacy challenges that exist within the population.[107] Evidence of effectiveness for health outcomes was limited.[107] As such, while this new technology offers another possibility to help support some iADLs in community-dwelling older adults, further research is needed before considering any widespread implementation. It is also important to note that these devices are not validated medical, diagnostic or emergency services, and their use can also raise concerns about privacy, missed reminders and the provision of incorrect answers.

There are other instances of new and emerging technologies beyond these three examples that aim to perform tasks that, in theory, could help older adults with managing their other iADLs. However, to date, these technologies have not yet been implemented as widely nor been adequately studied in older adults. For instance, “Waymo®” is a driverless vehicle company based in the United States that, as of October 2026, had been approved to begin testing in Toronto under Ontario’s Automated Vehicle Pilot Program, with passenger service targeted for 2028, but was not yet offering rides in Canada.[108] Such autonomous vehicles could be used to help older adults (particularly those unable to drive) maintain their independence with the transportation iADL in the future, provided that these services are accessible (for example, to wheelchair users and people who need assistance getting into and out of a vehicle). Another example includes the emergence of various “cooking robots,” machines designed to either assist with or autonomously prepare meals[109] that could support people’s meal preparation iADL. There is minimal research on the use of these cooking robots with older adults, and future studies would need to establish whether they can support safe, independent meal preparation in the homes of older adults, including managing risks such as burns, injuries and food safety issues.

While these are not examples of “care robots,” they offer a glimpse into the potential future use of increasingly common digital technologies that might be used to help support older adults in the community with completing their iADLs. However, there is limited evidence on the effectiveness of implementing these digital technologies in the community, and additional research is needed into these examples of technologies before care-specific health and independence benefits can be established. As such, decisions to use these technologies should be proportionate to the person’s goals, support needs and the risks of the intended task. Many of the key considerations detailed throughout this report, as well as the decision-making frameworks and recommendations that follow, may also apply to the adoption of these emerging digital technologies into Canadian homes for community-dwelling older adults to assist with their iADLs.

Decision-Making Frameworks for Both Health Care Organizations and Care Providers

Thus far in this report, the NIA has aimed to gather and review the pertinent evidence surrounding the use of physical care robots and social engagement robots around the world. A list of key considerations has been outlined that should be reviewed prior to introducing any care robots into a variety of potential care settings in Canada. This includes considerations for care organizations and authorities, care providers and technology developers undergoing formal evaluations of these care robots. Additional special considerations for care robots using AI technologies have also been presented. While these considerations focus on care robots, many may also be broadly applicable to the other emerging technologies discussed in the previous section.

In response to the considerations being raised around the use of care robots, the NIA has developed two decision-making frameworks to provide guidance for both individuals and organizations who may be considering whether to implement care robots in their care settings. The first framework, presented as Figures 6, presented as Figure 7, is designed to help guide health care organizations or authorities that might be considering large-scale purchases of a given care robot for use within their organization. The second framework is designed to help guide individual care recipients, caregivers or health care providers considering the use of a single care robot for a specific care recipient.

The frameworks were developed by this report's authors from the considerations identified in this report. They have not been validated or tested with users, and should be piloted with organizations, older adults, caregivers and clinicians before their wider use is considered.

While the NIA's two proposed decision-making frameworks are designed to help guide practical, real-world decisions being undertaken by organizations, care providers and care recipients regarding care robots, there are also existing academic frameworks that can offer a complementary lens for formal evaluations after a care robot has been implemented. One such established framework is the USUS evaluation framework for human-robot interaction, developed by Weiss and colleagues.[110] USUS assesses human-robot interactions across four factors: usability (effectiveness, efficiency, learnability, flexibility, robustness and utility); social acceptance (an individual's willingness to integrate a robot into their everyday environment, including performance and effort expectancy, attitude toward the technology, self-efficacy and attachment); user experience (embodiment, emotion, human-oriented perception, feeling of security and co-experience); and societal impact (effects on quality of life, working conditions and employment, education and cultural context). Many of the key considerations outlined earlier in this report, including care recipient experience, acceptability among care providers and recipients, care provider burden and the ethical and legal dimensions of care robot use, closely align with the four key USUS factors. However, USUS focuses on the interaction between people and robots; it does not assess clinical effectiveness, safety, cost or legal compliance, and should therefore be used alongside a planned clinical, implementation and economic evaluation.

Figure 6: A Proposed Decision-Making Framework Outlining Key Considerations Prior to Implementing a Care Robot into the Care of Older Persons for Health Care Organizations/Authorities

1) Is there a clearly defined care need, desired outcome and feasible role for a care robot?

- If yes, proceed to step 2.

2) Does the organization have the resources (e.g., budget, time, workforce) to undertake an evidence review and internal consultations on the use of a care robot?

- If yes, proceed to step 3.

3) Review the existing evidence for this device, population and setting against current care and feasible alternatives. Assess benefits, harms, equity, care experience, workload and costs, where possible. Where an independent assessment exists (for example, a health technology assessment or systematic review), consider using it. If not, consider conducting a review proportionate to the decision. Higher-risk functions (such as physical assistance, medication management or clinical decisions) require stronger evidence. Is the evidence sufficient for the proposed use or pilot?

- If yes, proceed to step 4.

4) Consult older adults, caregivers, frontline workers, management and relevant clinical, technical, privacy and safety specialists. Does the proposed use address shared priorities and fit the organization's resources, workflows and context?

- If yes, proceed to step 5.
- If no, defer, address the concerns or select an alternative before proceeding.

5) Have the following procedures and guidelines been developed and reviewed by relevant stakeholders?

- Implementation plan with accountable leads, resources, time-limited pilot, maintenance and backup care.
- Documented eligibility, regulatory status, safety controls, emergency response and stopping criteria.
- Accessible training, competency assessment and ongoing support for users and care providers.
- Infection prevention and control protocols.
- Capacity and informed-consent process, ongoing choice and withdrawal without loss of usual care.
- Assigned responsibilities, insurance, incident reporting and corrective-action procedures.
- Data minimization, privacy and cybersecurity controls and AI validation/update oversight (where relevant).
- Evaluation plan with baseline measures, comparators, harms, workload, costs, equity and review dates.
- If all requirements are met, begin the agreed pilot and proceed to step 6.

6) Review results at agreed intervals. Are person-centred benefits meaningful and are risks acceptable, and is consent ongoing and support sustainable?

- If yes, continue or expand only to the extent supported by the findings.
- If no, pause, modify or stop, address harms and activate backup care protocols.

Figure 7: A Proposed Decision-Making Framework Outlining Key Considerations Prior to Implementing a Care Robot into the Care of an Older Adult for Care Recipients, Caregivers, and Health Care Providers

Complete this framework with the care recipient, appropriate decision-making support and relevant caregivers or professionals; involve an authorized SDM if capacity is lacking for the decision.

1) Is there an aspect of care for an older adult (care recipient) that can be potentially improved by adopting the use of a care robot?

- If yes, proceed to step 2.

2) Is there evidence of benefit for this person, task and setting, or a justified, safe and monitored trial, compared with feasible alternatives?

- If yes, proceed to step 3.

3) Is the use of a care robot considered acceptable for this task, in this specific setting, for both the care recipient and care provider?

- If yes, proceed to step 4.

4) Has valid consent been obtained for the relevant use, with ongoing attention to the person's wishes, assent and dissent? A person's refusal should be respected.

- If yes, proceed to step 5.

5) Based on the following questions (where relevant), is the care robot an acceptable addition?

a. Is there a meaningful care goal agreed with the care recipient?
b. Will the use of the care robot improve the care provider experience (e.g., reduce injury, decrease time)?
c. Is the expected effect on caregiver workload and human contact acceptable?
d. Are purchase and ongoing costs affordable, with funding and support in place?
e. Can users operate the device safely with accessible training and assistance?
f. Are eligibility, safety, cleaning, emergency and backup-care requirements met?
g. Are data use, privacy and any AI functions understood, appropriately authorized and governed?

- If all requirements are met, begin the agreed trial and proceed to step 6.
- If no, defer, address the concerns or choose an alternative.

6) Review at agreed intervals and after changes in health or device function. Are benefits meaningful and risks acceptable, and is continued use wanted?

- If yes, continue with support and a scheduled review.
- If no, pause, modify or stop and arrange alternative care.

Barriers to Scaling and Implementing Care Robots in Canada

While this report has focused primarily on the evidence, benefits and risks associated with the use of individual care robots, it is also worth considering why Canada, despite strong research and innovation capacity, has not seen the widespread adoption of care robots domestically. Canada, like many other countries, has a burgeoning robotics and innovation sector. However, several barriers exist, including the lack of clear pathways to scale innovations such as care robots into sustained, widespread use across care settings.

Canada's research and innovation capacity in this area includes national efforts such as AGE-WELL, Canada's Technology and Aging Network, which has supported Canadian research and innovation in assistive and care technologies, as well as the Centre for Aging + Brain Health Innovation (CABHI). However, pathways to scale these innovations into sustained, widespread use across care settings remain limited.

Several structural barriers contribute to this gap. First, existing procurement models within LTC homes and health authorities across Canada are often not well-suited to the acquisition of novel care technologies; this is particularly pertinent given the significant upfront costs and uncertain return on investment associated with the adoption of care robots. Second, funding and reimbursement pathways for care robots may be limited and vary by province or territory, payer, device and intended use; an NIA-led jurisdictional analysis found no Canadian public program funding care robots as a category, although it is possible some provincial or territorial assistive-device programs, private insurance or institutional budgets may cover specific devices. Third, Canada's care delivery system remains highly fragmented across community-based care delivery, LTC homes and other residential care settings; each have different funders, regulators and operational structures, all of which could complicate efforts to implement and scale care robots across care contexts in Canada. Finally, while there is the possibility that some might consider personal purchases of care robots for use in their own homes, the high cost of most care robots means they are likely unaffordable for many older Canadians and their families.

Canadian organizations need clearer, practical guidance on the application of existing requirements to particular care robot functions. Currently, Canada has no single regulatory framework or standard of oversight for care robots, and oversight may largely depend on whether a given care robot is considered a medical device. Medical devices are regulated by Health Canada, and Health Canada has also issued guidance for medical devices that use AI.[98,111] Care robots that are not medical devices would face much less specific oversight, and there is currently no Canadian guidance in this area. The British Standards Institution's BS 8611:2023 addresses ethical hazards in robot design and use.[112] ISO 13482:2014, from the International Organization for Standardization (ISO), addresses safety requirements for certain personal care robots, but excludes robots that are medical devices from its scope[113]. A revised edition of ISO 13482 (retitled "Robotics — Safety requirements for service robots") was at the final approval stage in September 2026 and will replace the 2014 edition.[114] However, these standards are voluntary unless required by law or in a purchasing contract. It is therefore unclear to care organizations, care providers, care recipients and caregivers which requirements apply to a given robot and who is responsible for making sure it is safe. Organizations should verify current requirements and any relevant certification or procurement obligations before implementation.

Moving forward, the question of how to effectively and safely design, procure, fund and integrate care robots at scale into Canada's already fragmented care systems will likely be a key policy consideration.

Policy and Practice Recommendations

Drawing on the considerations in this report, the NIA proposes the following key policy and practice recommendations before the wider adoption of various care robots can be considered across Canadian care settings (many of which may also apply to other emerging technologies that support older adults):

1. Fund Independent, Canadian Evaluations on the Specific Uses of Care Robots

Federal and provincial/territorial funders, working with established networks such as AGE-WELL and CABHI, should prioritize independent evaluations of care robots for specific uses to assist with care across settings in Canada (for example, a transfer-assist device in LTC settings) against current care practices. Evaluations should report benefits, harms, net care provider workload, costs, and reasons for stopping use, and should include people living with dementia, diverse linguistic and cultural communities and rural and remote settings in their evaluations.

2. Tie the Provision of Public Funding and Scale Up to Evidence of Value and Equity, Not Adoption for its Own Sake

Federal, provincial and territorial ministries and agencies should consider the provision of public funding for care robots only for a defined use with evidence of benefit relative to feasible alternatives (such as standard lifting aids, home modifications or additional care hours), and only where access will not depend on a care recipient's ability to pay.

3. Develop Practical Procurement and Safety Guidance for Care Organizations

Federal, provincial and territorial ministries and health authorities, along with infection prevention and control, privacy, occupational health and safety experts, frontline workers and health standards bodies, should develop task-specific guidance on care robots. These should cover regulatory status, safety testing, cleaning, data protection, software updates, training, vendor support and what happens if a product is discontinued or a company closes.

4. Clarify How Existing Regulations Apply to Care Robots

Health Canada should publish plain-language guidance on when a care robot will be regulated as a medical device, and federal, provincial and territorial privacy regulators should clarify how health privacy laws apply to data collected by care robots across care settings.

5. Incorporate Care Robots into Existing Reporting Systems

Health Canada, provincial and territorial authorities and care organizations should make sure incidents involving care robots can be captured through existing routes (such as medical device incident reporting and organizational safety systems) and should encourage voluntary reporting from settings not covered by mandatory reporting, such as LTC homes and home care settings. Care organizations should keep a local log of incidents, near misses and reasons for stopping use.

6. Involve Older Adults, Caregivers and Frontline Workers in Design, Selection and Training in the Development and Use of Care Robots

Developers and care organizations in Canada should co-design care robots with the people who will use them, including people living with dementia, family caregivers, health care aides and

personal support workers and labour representatives. Training should be widely accessible and available in multiple languages.

Conclusions and Proposed Future Directions

As Canada's population continues to rapidly age, the care requirements of its population are high and will continue to grow in the coming decades. The adoption of care robots across various settings in Canada where older adults receive care may contribute to meeting selected care needs, alongside investment in the services and support available from both paid care providers and unpaid caregivers.

In this report, the NIA reviews the emerging and growing use of care robots around the world, with a focus on summarizing existing scientific evidence and real-world experiences of the implementation of both physical care and social engagement robots. While there are limited published data and reports on the use of care robots in Canada, the way forward can be informed by what has been learned so far in other jurisdictions.

Both physical care and social engagement robots show promise for improving the care experience for care providers and recipients alike. However, the evidence surrounding the effectiveness of these robots remains limited and mixed. Additionally, while some reports indicate successful implementation, others indicate that some devices were abandoned because their costs, workload or practical limitations outweighed their perceived benefits.

This report outlines key considerations that should be evaluated before introducing a care robot into an individual care setting as well as considerations that technology developers, care organizations and providers and care authorities that fund and oversee the delivery of care should be asking in their evaluations of these technologies. Special considerations for care robots that incorporate AI technologies are also highlighted. This report also highlights some emerging technologies that, while not care robots per se, may also help older adults to successfully age in the right place. These considerations have been incorporated into two proposed decision-making frameworks that older adults and their families, caregivers and care providers in Canada can opt to use when they are considering a care robot, and which may also be applied to other emerging technologies. The NIA also outlines some barriers preventing the potential adoption of care robots into Canadian care settings. Finally, the NIA proposes six key policy and practice recommendations to guide the evidence-informed, safe and equitable adoption of care robots in Canada.

It is also important to note some of the limitations of this report. It is a narrative review of identified evidence on care robots (rather than a systematic review), and the devices discussed are at very different stages of development. The studies reviewed involve different populations, comparisons and outcomes; most have short follow-up and very few were conducted in Canada. Published evidence may also over-represent positive findings as well as English-language research and manufacturer-supported studies or products, and the landscape of care robots and AI capabilities is changing rapidly. Finally, it is important to consider that the absence of evidence of the benefit of a given device is not evidence that it has no benefit, and the conclusions of this report should not be interpreted as globally applicable to all care robots.

Building on these findings, the NIA's recommendations offer an overarching way forward for Canada. Rather than adopting care robots for their own sake, governments and funders should support independent Canadian evaluations of specific uses of care robots, with longer follow-up, consistent measurement of harms and net workload and economic evaluations of complete care pathways, and should tie public funding and scale-up to evidence of value and equitable access. At the same time, care organizations need practical procurement and safety guidance, clear direction

on how existing medical device and privacy regulations apply and reporting systems that capture incidents involving care robots. Throughout, older adults, care providers and frontline workers should be involved in the design, selection and training associated with care robots, and pilots should have funded human support and explicit criteria for continuing, adapting or stopping their use. The aim should be better care and greater choice for older adults with care needs, rather than adoption or reduced staffing as ends in themselves.

While the field of care robots for older adults currently remains in its infancy, further Canadian development and evaluations are likely, and adoption should depend on demonstrated value, acceptable risk and equitable access. Through its decision-making frameworks and recommendations, this report offers context and preliminary guidance to help older adults, caregivers, care providers, care organizations and policymakers in Canada navigate this emerging space moving forward.

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