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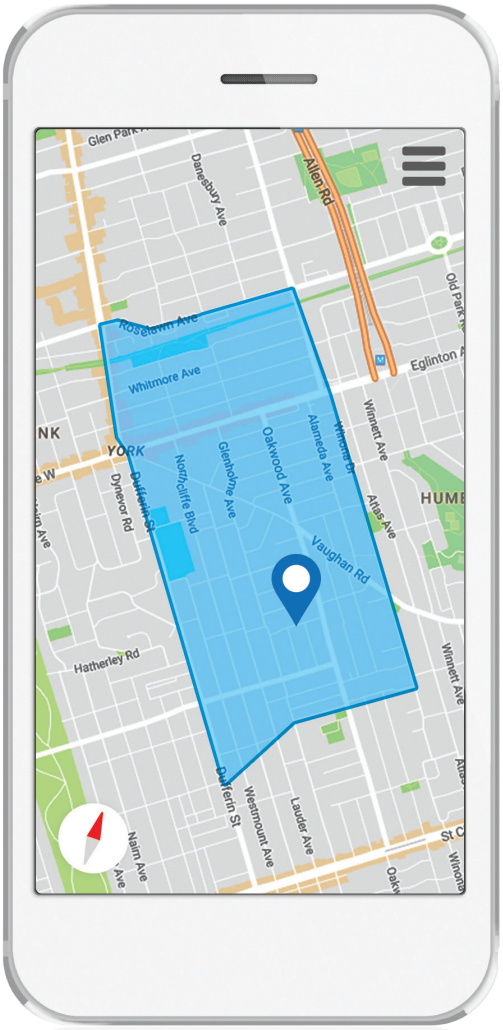
GPS Locator Devices for People With Dementia



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Summary

- Wandering[a] is a common behaviour in people with dementia, but cognitive impairment can cause them to become disoriented and lost.
- Locator[b] devices that use GPS (global positioning system) are assistive technologies that can help to promote safe walking by alerting caregivers when a person with dementia wanders outside of a designated area, and providing the geographic coordinates of that person so they can be found more easily.
- Because locator devices are a form of surveillance, using them raises ethical and legal issues regarding privacy and autonomy, but people with dementia and their caregivers believe the potential benefits outweigh potential harms.
- Locator devices may reduce the time required to find missing individuals with dementia and the costs associated with search and rescue operations.
- Locator devices may increase the independence, autonomy, and freedom of some people with early- to moderate-stage dementia, and reduce caregiver anxiety and stress.
- Evidence on the cost-effectiveness of locator devices is still needed.

Background

Dementia is a broad term for many different disorders that affect cognitive functions, including reasoning, speech, the ability to process information, and memory.[2,3]

A common behavioural characteristic of dementia is "wandering."[3] This can include pacing, lapping (repetitive walking around large areas), random walking with no clear route or with repetition, direct travel from one location to another, or elopement.[1,7] Wandering can occur during the day or night for various reasons; for example, as a response to confinement, pain, hunger, or thirst, or from boredom.[8-10]

Mobility and the freedom to walk outdoors are important for maintaining quality of life.[11,12] Wandering can provide beneficial physical exercise, a sense of personal autonomy, and social contact.[4,10,11,13-15] The involvement of people with dementia in activities outside of the home can also relieve some of the stress of their caregivers.[11] But, as their disease progresses and memory becomes impaired, people with dementia may become lost, even in familiar places.[16]

As a result, individuals with dementia can go missing or experience critical incidents when they leave home alone and are unable to find their way back.[8,15,17] People with dementia may also become lost while driving or taking public transit — where a much larger territory may need to be covered in a search to find them.[8,17]

Note:

[a] In this bulletin, we use the common term "wandering." Nevertheless, a recent Canadian paper suggests that rather than the term "wanderer," which pathologizes the behaviour, terms such as "people who like to walk" or "wayfarer" are preferable, as these reflect the person rather than the dementia.[1]

[b] The term "locator" is used, rather than "tracking" or "tagging," which have negative connotations.[4-6]

Table 1: Examples of GPS Locator Devices Available in Canada

Brand Name	Manufacturer/Distributor Website	Description	Cost (Price and Monthly Fee)[a]
TRiLOC GPS Locator (and the BlueBeacon indoor locating device, which uses Bluetooth technology and is intended for use with TRiLOC for supplemental location data [indoors] when GPS signals are not available)	SafeTracks GPS Canada safetracksgps.ca	Wristband	$349.99 + $49.95 monthly + activation fee[29] TRiLOC is also available for a lease fee of $69.95 per month[b]
ST200 PRIME	SafeTracks GPS Canada safetracksgps.ca	Cellular phone unit; can be worn on lanyard or belt, or carried in purse or pocket	$249.95 + $49.95 monthly + activation fee[29]
SmartSoles	SafeTracks GPS Canada safetracksgps.ca	Shoe insoles	$349.00 + $49.95 monthly + activation fee[29]
SafeLink GPS 2G Watch	SafeLink GPS safelinkgps.com	Watch	$199.99 + $26.99 monthly
SafeLink GPS 2G Tracker	SafeLink GPS safelinkgps.com	Cellular phone unit; can be worn on lanyard or belt, or carried in purse or pocket	$199.99 + $26.99 monthly
SafeLink GPS 3G Tracker	SafeLink GPS safelinkgps.com	Like 2G Tracker but with additional features, including voice call, improved coverage, and fall detection	$259.99 + $34.99 monthly (voice extra)
PAL Wandering Prevention System	Blackridge Solutions, North Vancouver, BC blackridgesolutions.com/wandering-prevention.html	Watch	$380 per year + $45 monthly (or $500 annual service plan)

BC = British Columbia; GPS = global positioning system.

[a] Unless otherwise shown, costs are from the company website.

[b] Source: Vince Morelli, SafeTracks GPS Canada, Red Deer, Alberta: personal communication, 2016 Jul 4.

Individuals with dementia who wander are at increased risk of injury or death from traffic accidents, hypothermia, dehydration, falls, fractures, and drowning.[6,7,14-16,18,19] They are also more likely to be sedated, physically restrained, malnourished or losing weight, and to be admitted to institutional care facilities.[5,6,13,19]

Dementia also imposes a burden on family caregivers and incurs substantial health care and societal costs.[20] This includes costs for police and emergency response services to help search for missing people.[21] In Toronto, for example, emergency services responded to an estimated 1,200 calls (five to seven calls per day) in 2013 from caregivers of people with dementia who went missing.[22] The Grande Prairie Royal Canadian Mounted Police (RCMP), as part of the Alberta Locator Device Project, estimated that seven to 15 of their 257 missing persons incidents in 2014 involved people with dementia.[23]

Locator devices may:

- help caregivers and emergency responders quickly locate and ensure the safety of people who wander[24]
- make people with dementia feel more secure and allow them to be more independent[24]
- provide reassurance and relieve caregiver anxiety.[13]

The Technology

There are two main types of locating device technologies:

GPS — Identifies a person's location using a transmitter that sends a signal to a network of telecommunications satellites, which then relay the signal through mobile phone networks to a caregiver's computer or mobile device, or to a call centre. Because they use satellites, GPS devices can locate a person across large areas, theoretically anywhere on earth that a satellite signal can reach. Some systems incorporate additional technologies (such as assisted GPS [A-GPS] or Bluetooth) to improve locating time and location accuracy in areas where satellite signals may be impeded; for example, by high-rise buildings. GPS devices can also be used to build virtual boundaries or "geofences," which trigger a notification if the user goes outside a designated safe area.[13,25] Examples of GPS locator devices available in Canada are shown in Table 1.

Radiofrequency (RF) — Identifies a person's location using a transmitter that emits radio waves, which can be picked up by an antenna. The nature of radio waves limits their use to relatively small geographic areas.[26]

This bulletin summarizes recent evidence on GPS locator technologies. These include special cellphones, watches, wrist or ankle bracelets, and shoe insoles.[27] These devices may be beneficial for some people with dementia (both at home and in residential care) and to their caregivers.[7]

Image courtesy of SafeTracks GPS Canada

Image courtesy of Blackridge Solutions

Many different GPS locator devices are commercially available, but only a few of these devices have been assessed in the published studies summarized in this bulletin. The 2006 Ontario Locating Technology Project identified 26 locating technologies or services.[28] Many of the devices no longer exist or have been superseded: as with most communications technologies, this is a rapidly changing area.

All GPS locator technologies rely on someone — usually a caregiver, but sometimes a call centre — being available to monitor and respond to alerts, check on the individual, and bring them home.[4]

Regulatory Status

In Canada, GPS locator devices are not considered medical devices under the *Food and Drugs Act*. As such, they are not regulated by Health Canada but rather as consumer products under the *Canada Consumer Product Safety Act* (Medical Devices Bureau, Health Canada, Ottawa, ON: personal communication, 2016 May 18). Canadian certification and licensing requirements for communication technologies may apply to GPS locator devices. Regardless of their regulatory classification, locator devices are assistive technologies that "help individuals to manage the risks associated with independent living."[30]

People Who May Benefit

Alzheimer disease is the most common type of dementia, affecting about 63% of people with progressive dementia.[31] Other types include vascular dementia (caused by reduced blood flow to the brain), Parkinson dementia, and Lewy body dementia.[31]

The Alzheimer Society of Canada estimates that more than 564,000 Canadians have dementia.[32] This number is expected to more than double over the next 20 years as the population ages.[21,31,32] A 2008 forecast estimated that there will be approximately 103,700 new cases of dementia in Canada each year, increasing to 257,800 new cases annually by the year 2038.[31] The rising number of people with dementia also means a corresponding increase in the number of caregivers who will be needed.[33]

> **"Not everyone with dementia wanders or might benefit from GPS locator devices."**

Estimates of the prevalence of wandering in people with dementia range widely — possibly because of differing definitions of wandering and because the stages of dementia included in the research vary from study to study.[24] Published estimates are that 12% to 60% of individuals with dementia will wander and become lost at some point, and about 5% of these people will repeatedly wander and become lost.[6,13,18,21,34-36] However, a recent systematic review noted the lack of reliable information on the nature and prevalence of critical incident wandering.[14]

Alberta Health Services estimates that 60% of people with dementia living in the community may wander.[37] But, in the recent Alberta Locator Device Project, only an estimated 11% to 13% of the participants experienced wandering or incidents of going missing.[30]

Not everyone with dementia wanders or might benefit from GPS locator devices. While the devices may be useful to individuals in the earlier stages of dementia — and to their caregivers — for those with advanced disease, unsupervised walking may not be safe.[13] A UK survey of 99 caregivers found that only about 7% of the people with dementia in their care could have benefited from a locator device at the time of the survey, while another 11% could have benefited earlier in the course of their disease.[6]

Although this bulletin focuses on the use of GPS locator devices by individuals with dementia, these devices may also be useful for children and adults with autism and other cognitive disorders.[27]

Current Practice

Identifying and addressing the reasons for wandering is recommended as a first step in care planning.[10] Barriers and restraints (physical or drug) have been used to prevent wandering, but these can cause adverse effects, including pressure ulcers, sedation, falls, and increased anxiety.[24]

Current clinical practice aims to recognize and maximize the autonomy of individuals with dementia while ensuring their safety.[13,19] Music, walking, or other exercise programs; access to safe outdoor spaces; and "dementia-friendly" design changes to make institutional environments more interesting and pleasant may also reduce wandering.[1,10,19,36]

In Canada, programs that work with law enforcement, social services, and other agencies to identify missing persons with dementia and other cognitive disorders include MedicAlert Safely Home (Canada),[38] Ontario's Finding Your Way program,[35] and Project Lifesaver.[39]

MedicAlert Safely Home is a partnership program between the Alzheimer Society of Canada and the MedicAlert Foundation Canada. For an annual fee of $60, the person with dementia receives a MedicAlert ID bracelet engraved with MedicAlert's emergency hotline number. If he or she is found or goes missing, emergency responders may call the hotline to access emergency and medical information (alzheimer.ca/en/Living-with-dementia/Day-to-day-living/Safety/Safely-Home).

Some police forces and charitable agencies in Canada participate in Project Lifesaver. This US-based agency works in collaboration with police and emergency responders to locate missing individuals. Its program is intended for any individuals who might wander (including those with autism, Alzheimer disease, or other cognitive disorders). Users wear a wrist or ankle bracelet that emits an RF signal. York Regional Police has used the RF locator technology of Project Lifesaver since 2006. The technology still relies on caregivers to alert police if someone is lost. Most Project Lifesaver participants are found within 30 minutes of the 911 call by utilizing the tracking equipment (Chris Plante, York

Regional Police, Aurora, Ontario: personal communication, 2016 May 24). Only the locator devices purchased through Project Lifesaver are supported. The cost of the radio transmitter device in Project Lifesaver is C$300 and battery replacement is $10 per month (in some jurisdictions, charitable agencies or subsidies may cover or partially cover the costs).[39-41] Project Lifesaver recently added a GPS watch to its service options.[42]

A 2013 review of non-GPS locator programs in the US, such as MedicAlert and Project Lifesaver, concluded that further research on the effectiveness of such programs is needed.[14]

The Evidence

The seven most recent studies (from 2011 to present) of locator devices for people with dementia are described below. Evidence from an earlier (2006) Ontario study is discussed in the Implementation section on page 10.

Alberta Locator Device Project

The Alberta Locator Device Project (2015) is the most recent Canadian study on the use of these devices.[23,30] The project followed 45 dyads (individuals with dementia and their caregivers) in rural (Grande Prairie, n = 14) and urban (Calgary, n = 31) Alberta Health Services home care sites. The participants with dementia had an average age of 76 years and were at moderate risk for wandering (measured using the Revised Algase Wandering Scale [Community Version]).[23] All participants were receiving home care; most (70%) lived with their spouse or other family caregiver, and 22% lived alone.[23]

Three types of locator devices were used in the study (ST200 Prime, SmartSole, and TRiLOC). Participants used their GPS devices for an average of 5.8 months.[23] About half of the participants used their GPS devices every day — mainly for walking or during other activities outside the home. In addition to the weekly caregiver log reports of their experiences, focus groups with caregivers and stakeholders (such as the Alzheimer Society of Alberta and Northwest Territories, and police services) were held at the end of the project.

The usability of the locator devices was rated as high by the dyads. Most (89%) said they would be willing to pay for a GPS device; however, 75% felt that government funding should be provided.[23] Although most caregivers did not mention concerns using the devices, some noted problems with charging (or forgetting to charge) the device, having the care-recipient wear the device, false alarms with geofences, and discomfort while wearing one of the devices.[23]

The Alberta Locator Device Project concludes that:

- Locator devices should be a standard option for home care and supportive living services, and should be provided at an earlier stage of dementia so people with dementia can participate in decisions about their use.
- Costs of locator devices and telecommunications charges should be considered for public funding or subsidy, depending on the ability of users to pay.
- Caregivers should be responsible for monitoring, but first responders and other stakeholders could facilitate access to the GPS devices for those who may need them.
- People with other cognitive conditions (such as autism) could also benefit from the devices.

Two additional recommendations were that:

- Those involved should collaborate with police services to collect data on the number of missing persons with dementia.
- A long-term study should be undertaken of the cost-effectiveness of using locator devices, including the impact of the technology on the utilization and cost of health care and first responder services.[23,30]

In the Alberta Locator Device Project, false alarms with the geofences were common and indoor location readings were not as accurate as outdoor readings, but the addition of Bluetooth technology may reduce the number of false alarms and improve finding indoor locations.[30]

Before the Alberta Locator Device Project began, several participants regularly needed police help in finding their family member with dementia. During the study, while the GPS devices were in use, police services were not used at all.[30]

Other Studies

Other recent studies of GPS locator devices are summarized by three main outcomes, as follows:

Time to locate missing person

A 2016 simulation study, funded by the US Department of Veterans Affairs, assessed the time to locate missing persons (role-played by researchers) under various outdoor scenarios using three commercially available RF locator devices and four GPS devices.[26] Each device was tested three times in each of three scenarios (open, wooded, and urban). Two device tests (one with RF and one with GPS) failed to locate the missing person within 25 minutes, but overall, the GPS devices were almost twice as time-effective in finding the wanderer and performed better over larger distances. The RF devices were limited by their range; however, the study did not test the devices indoors, where RF devices may have performed better.[26]

"A report on the study has not been published, but the principal investigator for the project noted a decrease in time and staff used in searching for missing people with dementia."

A 2014 UK study looked at the feasibility of conducting a randomized controlled trial of GPS locating devices for people with dementia.[13] The pilot study used various GPS services but found the main differences were format and battery life.[13] Although the study was small (12 participants and their caregivers) and relied on caregiver estimates, it found the use of GPS technology reduced the time spent searching for missing individuals.[13]

A 2012 pilot project launched by the Halifax Regional Police, called Project SOFT (Satellite Option Finding Technology), tested GPS devices in 10 people with dementia over a one-year period.[43] A report on the study has not been published, but the principal investigator for the project noted a decrease in time and staff used in searching for missing people with dementia.[23]

Independence, autonomy, and freedom

Caregivers in the Alberta Locator Device Project reported that their family member with dementia was given more freedom as a result of using the device.[30]

A 2015 Norwegian study assessed the use of various commercial GPS devices by 208 individuals with dementia and their caregivers.[3] Almost half of the participants in this study used their GPS locator for up to a year, 23% used the device for up to two years, and 12% used the device for more than two years. Caregivers considered the main benefit of the GPS devices to be the increased safety and freedom it provided. Reports by participants with mild dementia showed they valued the freedom to be able to continue their outdoor activities, and viewed GPS devices as less intrusive than physical or chemical restraints. The researchers concluded that the devices allowed those with dementia to continue to participate in outdoor activities and maintain their autonomy.[3]

Similarly, a 2015 Swedish report of three case studies found that the use of GPS locating devices increased the independent outdoor activities of two of the three participants with dementia.[44] Whether the locator reduced the caregivers' anxiety was not clear.[44] An earlier Swedish study, by the same investigators, examined the experiences of five couples (individuals with early- to moderate-stage dementia and their spouses) when using a GPS locator.[45] All participants felt the GPS device improved their safety outdoors, and the aspect of being monitored was not a concern.[45]

In a UK study published in 2014, the 10 caregivers of people with dementia prioritized the improved safety of the person with dementia when using GPS devices over concerns about their privacy.[25] They also viewed independence and freedom as an important part of their care-recipient's quality of life.[25]

A 2012 pilot study from the Netherlands assessed the acceptability and benefits of using GPS locating technology in 33 care-recipients with early-stage dementia who lived at home with their caregivers (mainly spouses).[46] Twenty-eight dyads completed the three-month study.[46] Approximately 25% of the participants reported they were outside the home more, and 45% indicated they had more independence from their caregivers when using the GPS device.[46] About 60% of the caregivers reported they allowed more freedom to their care-recipient, and 30% felt they themselves had more time for their own activities when using the GPS device.[46] About 50% of the care-recipients reported feeling less anxious about being outside alone when using a locator device.[46]

Reducing caregiver anxiety and stress

Although caregivers in the Alberta Locator Device Project reported that the GPS devices gave them peace of mind — knowing they could locate their family member if they wandered away — the study did not find a significant reduction in caregiver burden.[30] The Dutch study also found benefits to the use of GPS locator devices but no significant impact on caregiver burden.[46] However, the Norwegian study found that caregiver anxiety was reduced with the use of GPS technology,[3] and caregivers in one UK study also reported that use of the GPS devices reduced their anxiety and allowed them a break from constant caregiving.[25]

Adverse Effects

While GPS technology reduces searching time for lost wanderers, whether it increases overall safety has not been demonstrated.[4,13] For example, GPS devices cannot alert users to dangers such as traffic, or ensure that individuals are wearing appropriate clothing for weather conditions if they wander outside.[3,13]

Administration and Cost

Users of GPS locator devices need training and ongoing technical support.[3,23,30,33,45] Battery life is an important factor with this technology. The client or caregiver must remember to charge the device daily.[4] The more frequently the missing person's location is transmitted, the more quickly the battery will be drained.[4]

The Alberta Locator Device Project noted that costs for the three GPS devices ranged from $225 to $400, with monthly monitoring fees of $35 to $40.[30] Current device prices are slightly higher, as shown in Table 1. As an alternative to purchasing the device, the TRiLOC GPS is also available for a monthly lease fee of $69.95 (Vince Morelli, SafeTracks GPS Canada, Red Deer, Alberta: personal communication, 2016 Jul 4).

No studies of the cost-effectiveness of locator devices for people with dementia were identified for this bulletin or in an earlier (2006) UK review.[36] This type of evidence could assess, for example, whether the devices can prevent or delay admission to residential care, or reduce the costs of emergency services for search and rescue. If funding is available, the Alberta Locator Device Project research group plans to undertake such a study.[23,30]

Concurrent Developments

Devices that provide navigational assistance are in development. These may help those with mild cognitive disorders to find their way using GPS devices combined with visual, audio, or sensory directional cues.[33] Researchers are also investigating whether GPS technology can improve the driving ability of people with mild dementia,[47] or help to assess their driving performance.[48]

"Assistive therapy dogs are also being trained to help people with dementia. The dogs respond on command to lead the person with dementia home."

Researchers at CanAssist, at the University of Victoria in British Columbia, have developed a Wandering Redirect System to deter nighttime wandering in people with dementia. The system displays messages from caregivers on a tablet-sized screen placed inside the door. When a sensor activates the device, the messages remind the person that it is nighttime and not time to go outside.[49]

Although not designed for people with dementia, many smartphones offer GPS location apps, such as Find My Friends (iPhone) and iWander (iPhone and Android phones).[1,5,50]

Assistive therapy dogs are also being trained to help people with dementia.[51,52] The dogs respond on command to lead the person with dementia home. In some programs, the dogs are equipped with GPS collars that allow the caregiver to locate the dog and its owner and activate a signal that prompts the dog to bring them home. The dog is also trained to bark to attract attention if something is wrong and to track their owner if they wander away from home alone.[51]

The Canadian Dementia Priority Setting Partnership, in collaboration with the James Lind Alliance and the Alzheimer Society of Canada, is currently identifying the priorities of people with dementia and their caregivers for dementia research.[53]

Aging Gracefully across Environments using Technology to Support Wellness, Engagement and Long Life (AGE-WELL) Networks of Centres of Excellence and the Alzheimer Society of

Ontario are investigating the role of GPS technologies in supporting people with dementia and their caregivers. Dr. Lili Liu, at the University of Alberta, is leading the AGE-WELL Consumer Guideline for Locator Technologies project (May 2016 to April 2017).[54,55] This will include identification of the technologies available and the type of information provided by vendors to customers. The goal of the project is to develop standards and an online resource that collects the information consumers need on GPS-based products (Alex Mihailidis, AGE-WELL Network of Centres of Excellence, Toronto, Ontario: personal communication: 2 May 2016).

Rate of Technology Diffusion

The 2006 Ontario Locating Technology Project identified 26 locating technologies or services.[28] Many of the devices no longer exist or have been superseded by newer technologies — as with most communications technologies, this is a rapidly changing area.

We found no information on how widely GPS devices have been adopted by people with dementia and their caregivers across Canada. Marketing to consumers and the pervasiveness of technological developments with cellphones and GPS capabilities may affect the diffusion of these devices.[4,13]

Implementation Issues

Ethical and Legal Considerations

To date, discussions of ethical issues regarding locator technologies have been driven more by professional opinion than by people with dementia and their caregivers.[25] A key concern is balancing the rights of the person with dementia, including their right to privacy, with the potential benefits of the technology in reducing their risk of harm and possibly enhancing their personal liberty.[25] A 2009 report from the Nuffield Council on Bioethics recommends that GPS and other assistive devices for people with dementia should be assessed in terms of risk-benefit rather than merely risk assessment — for example, the benefits and risks of independent walking versus those of being confined.[56]

Advanced directives are important to ensure that people with dementia are involved in decisions on the use of locator technologies while they are able to make informed decisions.[3,14,24,25,27,34,57]

There is a potential stigma with the use of locator devices (i.e., marking the user as disabled, and possibly leading to social isolation or exclusion). There is also the negative connotation of the technology when associated with tagging or tracking technologies used in law enforcement.[4] However, UK caregivers did not associate the use of GPS locator devices with stigma — rather, they saw it as a tool for enabling independence.[25]

The needs of and possible benefits to both the care-recipients and the caregivers should also be considered — recognizing caregivers as individuals too, beyond their caregiving roles.[4,25]

The main intent of those who used GPS locator devices was to improve the security and safety of the person who might wander.[24] This took precedence over the individual's right to privacy — which was seen as already curtailed by constant caregiver surveillance. GPS technology was also intended to enhance the freedom of the individual with dementia, enabling them to leave home independently.[25] Locator devices were considered to be less restrictive than practices aimed at reducing wandering, such as psychotropic drug therapies and locked doors.[24]

Another concern is whether using these devices will result in decreased personal contact with caregivers or greater social isolation.[24] They might also be seen as a means to cost-savings through reducing staffing levels (particularly in for-profit care facilities).[9,10,57] The use of locator technology may also detract from the need for funding for adequate home care support for people with dementia and their caregivers.[57]

Other Issues to Consider

The Alzheimer Society of Canada has produced a checklist of features to help consumers compare different locator devices.[58] This information will be updated by the AGE-WELL Consumer Guideline for Locator Technologies project that is now underway and expected to be available online in December 2016.[54,55]

Valuing the individual and providing person-centred care is key, and this includes obtaining input from people with dementia and their caregivers on the design and use of these devices.[14,34,59] Locator systems must be easy to use, with minimal use of log-in passwords and designed for use by older individuals. The instruction manual should be as simple as possible, with a larger type font and clear diagrams.[33,45] It should also be easy to charge the battery and to clean the device.[27]

Whether the device is intended to be worn or carried or can be secured (such as a lockable watch strap) are other factors to consider.[24] Some of the participants in the Alberta Locator Device Project had tried consumer GPS products before entering the study, but found them too complicated for use by people with dementia, and because they were not wearable or lockable, they were too easily lost.[30]

The importance of devices that allow two-way communication was also noted.[45] This was a preferred feature for participants in both the Ontario and the Alberta locator studies.[23,27,30]

> **"GPS locator devices should be seen as an addition to, rather than as a replacement for, other types of care to improve the safety of those with dementia."**

At the time of the Ontario locator study, several of the devices were only at the prototype stage of development, but none of the devices assessed met all the needs of the participants.[24] However, GPS locator technology is changing rapidly as new features are added. Early studies cite user feedback that these devices should be "lightweight, small, and comfortable to wear and use" — improvements that have been incorporated into current devices.[24,34]

GPS locator devices should be seen as an addition to, rather than as a replacement for, other types of care to improve the safety of those with dementia. Simple identification bracelets or clothing tags are also important because individuals with dementia may be unable to communicate their name and address to emergency personnel.[17]

In 2007, the Mental Welfare Commission for Scotland published guidance on using technologies for people with dementia who may wander.[10] The guidance notes that location technologies may be seen as a form of restraint; however, "Where the use of technology can play a part in maintaining independence, or enabling continuity of care, we think it should be considered."[10] The Scottish guidance also includes a checklist of issues to consider when implementing locator technologies.[10]

Final Remarks

Locator technologies are a type of assistive device for people with dementia and funding is needed to support the use of these devices by those likely to benefit.[23,24,30,33] This was a recommendation of both the Ontario and the Alberta locator projects.[23,24,30]

Although more evidence is needed, the experience of the Alberta Device Locator Project indicates that GPS devices may reduce the involvement of police services in search and rescue for missing individuals with dementia.[30]

There is greater awareness that better types of dementia care are needed. Examples of innovative care models include the Netherlands' Hogewey ("dementia village") and Green Care farms.[21,60,61] These programs provide safe environments for walking, exercise, and work for people with dementia.

Most people, including those with dementia, prefer to stay in their own homes.[4,20,59] Coordinated home care services and the use of appropriate technologies can make this possible.[20,44] Rather than preventing wandering, attention is now focusing on ensuring safe walking for people with dementia.[15,36] Locator devices can contribute to this by allowing some individuals with dementia to participate in activities outside of their home while reducing the associated risks.

Methods — Literature Search

The literature search for this bulletin included the following bibliographic databases: PubMed, MEDLINE, Embase, Cochrane Library (2016, Issue 4), and the Centre for Reviews and Dissemination databases (DARE, NHS EED, and HTA). Grey literature was identified by searching relevant sections of the CADTH *Grey Matters* checklist (https://www.cadth.ca/resources/finding-evidence/grey-matters-practical-search-tool-evidence-based-medicine). No methodological filters were applied. The search was limited to English-language documents published within the last five years (2011 to April 2016). Regular PubMed alerts were used to update the search until July 2016.

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