

# Virtual care for patients with Alzheimer disease and related dementias during the COVID-19 era and beyond

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**D**uring the coronavirus disease 2019 (COVID-19) pandemic, the Canadian Medical Association and provincial health authorities advised physicians to provide virtual care to patients where possible. Virtual care, or telemedicine, has been defined as “any interaction between patients and/or members of their circle of care, occurring remotely, using any forms of communication or information technologies, with the aim of facilitating or maximizing the quality and effectiveness of patient care.”<sup>1</sup> Such care has been increasingly used as a means of overcoming physical barriers to health care provision, particularly in the context of improving availability and accessibility in rural and remote areas.<sup>2</sup> More recently, the physical distancing measures necessitated by the pandemic have created an urgent imperative to integrate virtual care into existing health care infrastructure.

People with Alzheimer disease and related dementias (Box 1) may face unique challenges in securing access to necessary health care, such as difficulties recognizing their need for medical care, communicating health concerns and navigating complex health systems.<sup>7,8</sup> These challenges may be compounded during the COVID-19 pandemic, as people who normally rely on in-person support to complete daily tasks, such as transportation to and attendance at medical appointments, may be disproportionately affected by the need for physical distancing.<sup>9</sup> Changes to a patient’s normal routine and supports may also aggravate patients’ neuropsychiatric symptoms and put caregivers at increased risk of burnout.<sup>10–12</sup> Moreover, a 2016 evaluation predicted that the number of people living with dementia would

## Box 1: Alzheimer disease and related dementias

Cognitive impairment is a spectrum, from mild cognitive impairment<sup>3</sup> to dementia, depending on the severity of the impairment and its effect on daily functioning. Alzheimer disease and related dementias are a group of neurodegenerative diseases in which there is a progressive loss of cognition affecting daily function. Although Alzheimer disease, with or without cerebrovascular disease, is the most prevalent cause of dementia,<sup>4</sup> other causes of dementia include dementia with Lewy bodies<sup>5</sup> and frontotemporal lobar degeneration.<sup>6</sup>

## KEY POINTS

- Virtual care has the potential to improve access to health care for people with Alzheimer disease and related dementias, especially in the context of the coronavirus disease 19 (COVID-19) pandemic.
- Videoteleconferencing is a well-studied means of virtual care that has successfully been used to remotely assess, diagnose and manage such patients.
- Successful telemedicine programs often have access to supplemental clinical information to aid in diagnosis and involve interdisciplinary teams to manage patient complexity.
- Evidence regarding direct-to-home virtual care for people with Alzheimer disease and related dementias is lacking; this model is associated with unique challenges that must be considered as virtual care becomes a more common approach to health care delivery.

nearly double within 15 years,<sup>13</sup> which means that new, effective and cost-effective models of health care delivery for this population are urgently needed.

Virtual care holds promise in addressing many of these challenges while allowing patients to receive care from the safety of their homes or long-term care facilities.<sup>14</sup> However, rapid and widespread adoption of virtual care requires careful consideration. We review literature across a broad spectrum of specialties, including neurology, geriatrics and psychiatry, to synthesize the evidence and recommendations for generalists and specialists seeking to transition their care for patients with dementia to a virtual platform, considering potential barriers to adoption (Box 2).

## Can virtual visits be used to assess and diagnose dementias?

Assessing a patient for a possible diagnosis of Alzheimer disease or a related dementia involves taking a thorough history, determining the level of functioning, interviewing a third-party informant, performing cognitive and neurologic examinations and reviewing relevant investigations. Certain aspects of this diagnostic process

**Box 2: Evidence used in this review**

We searched MEDLINE, Embase and PubMed for articles published between Jan. 1, 2000, and Jan. 1, 2021. Using a strategy consisting of keywords relating to telemedicine and dementia, we included all articles that focused on the use of virtual care for a clinical encounter to either assess or manage individuals with mild cognitive impairment, Alzheimer disease or related dementias, but not those that focused on telerehabilitation, mobile applications and devices or virtual caregiver support. We reviewed the literature, organized it into thematic categories and synthesized findings (see Appendix 1, available at [www.cmaj.ca/lookup/doi/10.1503/cmaj.201938/tab-related-content](http://www.cmaj.ca/lookup/doi/10.1503/cmaj.201938/tab-related-content) for details regarding methodology). Given the limited number of randomized clinical trials in this field, most of the evidence in this review comes from test–retest studies, observational studies, as well as retrospective evaluations of telemedicine programs. Evidence for the recommendations in Table 2 predominantly come from expert opinion and guidance from previous telemedicine studies and programs.

are better suited to the virtual realm than others. Given that dementias are clinical diagnoses based on expert assessment,<sup>3,4</sup> teleneurology work groups have considered dementia to be potentially amenable to remote evaluation.<sup>15</sup>

**Telephone**

Telephone-based instruments for cognitive screening have been used in epidemiological and clinical contexts.<sup>16</sup> The Telephone Interview for Cognitive Status (TICS), a popular instrument modelled after the Mini-Mental State Exam (MMSE), has excellent sensitivity (94%) and specificity (100%) in dementia screening, with good correlation between MMSE and TICS scores.<sup>17</sup> The modified TICS (TICS-M) may be useful in distinguishing people with mild cognitive impairment from those who are cognitively healthy because of its assessment of verbal delayed recall,<sup>18,19</sup> although it may be limited in accurately classifying people across the spectrum of cognitive impairment.<sup>19</sup> Other validated instruments for cognitive screening include telephone-based MMSE instruments and the telephone-based Montreal Cognitive Assessment (t-MOCA),<sup>16,20</sup> though the latter has been validated only in patients with cerebrovascular disease.<sup>21</sup> Although a telephone-based approach has been suggested as an effective means of cognitive screening,<sup>16,22</sup> limitations include challenges

in evaluating visuospatial impairment and naming. A new clinical diagnosis of Alzheimer disease or a related dementia ultimately requires information beyond what telephone-based screening can currently provide.<sup>16,22</sup>

**Videoteleconferencing**

Videoteleconferencing (VTC) is likely the only telemedicine modality with the potential to replace in-person assessments when establishing a new diagnosis of Alzheimer disease or a related dementia.<sup>23</sup> A 2017 meta-analysis found that neuropsychological test scores obtained by VTC are comparable to those obtained in person, although greater inconsistencies were seen with slower Internet connections and older cohorts.<sup>24</sup> A recent systematic review noted that cognitive impairment and the use of nontraditional assessment methods, including the use of the home environment and a lack of supervision, posed potential challenges to the validity of remote cognitive assessments.<sup>25</sup> Although individual studies of cognitive tests often show good overall reliability between in-person and VTC assessments,<sup>26–36</sup> their generalizability is limited as they often exclude patients with severe hearing, visual or cognitive impairment.<sup>27–29,31,34,37</sup>

A well-designed longitudinal study reported differences between VTC and in-person assessment scores only among patients with severe cognitive impairment. Patients with severe impairment had worse scores when assessed by VTC than in person, suggesting that severe cognitive deficits may be overestimated by using telemedicine.<sup>37</sup> Table 1 summarizes existing evidence, comparing VTC to in-person administration of common cognitive assessment tests in patients with cognitive impairment. Supplemental tools, including the Geriatric Depression Scale (GDS)<sup>26</sup> and assessments of activities of daily living have also been reliably administered over VTC.

Videoteleconferencing has proven useful in remotely establishing a new clinical diagnosis of dementia.<sup>28,40,41</sup> In a small cohort study of patients with undiagnosed cognitive impairment, the accuracy of the virtual dementia assessment was evaluated by comparing diagnoses made in person to those made over VTC. Excellent diagnostic agreement was noted between the 2 modalities.<sup>40</sup> Subsequent studies have found similar results.<sup>28,41</sup> However, physicians in these studies often had access to supplemental information, such as findings from preliminary in-person neuropsychological testing,<sup>41</sup> functional

**Table 1: Summary of existing studies comparing videoteleconferencing to in-person administration of common cognitive assessment tests for patients with cognitive impairment**

Test	No. of studies	Types of populations studied	Available ICCs
Mini Mental State Exam (MMSE) <sup>28–31,33,37–39</sup>	8	Healthy controls, MCI, AD, VD, other	0.88–0.92
Montreal Cognitive Assessment (MOCA) <sup>26,27,32</sup>	3	Healthy controls, MCI, AD, DLB	0.85–0.98
Boston Naming Test (BNT) <sup>29–31,34,39</sup>	5	Healthy controls, MCI, AD	0.81–0.93
Clock Drawing Test (CDT) <sup>29–31,39</sup>	4	Healthy controls, MCI, AD	0.65–0.71
Hopkins Verbal Learning Test-Revised (HVLT-R) <sup>29–31,39</sup>	4	Healthy controls, MCI, AD	0.54–0.90
AD Assessment Scale-Cognitive Subscale (ADAS-cog) <sup>36,37</sup>	2	Healthy controls, MCI, AD	0.86

Note: AD = Alzheimer disease, DLB = dementia Lewy body, ICC = intraclass correlation coefficient, MCI = mild cognitive impairment, VD = vascular dementia.

assessments<sup>40</sup> or physical examinations.<sup>40</sup> As such, it is important to recognize the risks and limitations of remote diagnosis based on cognitive tests and clinical criteria originally designed for in-person application.

Telemedicine programs have shown the feasibility of incorporating VTC to improve access and diagnosis for patients with Alzheimer disease and related dementias living in rural communities.<sup>42–46</sup> In these programs, patients travelled to a telemedicine clinic closer to their homes to access a specialist at a major medical facility via VTC. Successful programs involved interdisciplinary teams to manage patient complexity, medical and psychiatric comorbidities and psychosocial needs.<sup>43–45</sup> In response to the ongoing need to continue diagnosing Alzheimer disease and related dementias during the COVID-19 pandemic, practical guidelines for the implementation of remote memory clinics have recently been outlined.<sup>47</sup>

## Can virtual visits be used for follow-up and management?

The progressive nature of Alzheimer disease and related dementias necessitates ongoing follow-up and management of patients. Additional obstacles to accessing in-person care may

arise with disease progression, such as declining mobility, increasing disorientation with schedule changes, worsening neuropsychiatric symptoms and an increasing reliance on caregivers. Virtual care may minimize the disruptions that in-person visits pose to this population, many of whom are frail, older adults.

Among people with dementias, telemedicine programs have shown the feasibility of using VTC to initiate and manage medications,<sup>44,48–51</sup> connect patients and families with support services,<sup>42,48,51</sup> discuss issues of safety and planning,<sup>44,49,51</sup> determine whether additional laboratory, imaging or neuropsychological testing is needed<sup>42,48</sup> and reassess patients for evidence of cognitive decline.<sup>46,49</sup> For example, having used VTC to manage patients over the span of 5 years, health care providers at a memory clinic were able to identify when patients transitioned from mild cognitive impairment to dementia.<sup>46</sup>

It is not yet known whether virtual care affects clinical outcomes; however, existing studies seem to show other benefits of this approach. A randomized trial of 1560 patients with dementia and their caregivers found that monthly follow-up visits with collaborative care teams over the telephone improved patient quality of life after 12 months when compared with those who received standard care.<sup>52</sup> In a prospective cohort study of

**Table 2: Barriers to virtual direct-to-home care for patients with Alzheimer disease and related dementias**

Barrier	Suggested solution(s)
<b>1. Technological access, literacy and interference</b> <ul style="list-style-type: none"> <li>Limited access to technological devices or Internet services</li> <li>Limited technological literacy</li> <li>Patient or family resistance</li> <li>Technical interference</li> </ul>	<ul style="list-style-type: none"> <li>Suggest accessing technology through family, friends or local health care centres<sup>62,63</sup></li> <li>Provide resources, support or education to improve technological literacy among patients and families<sup>63</sup></li> <li>Technologically prepare patients and families: <ul style="list-style-type: none"> <li>Involve telehealth technicians<sup>26,60,64</sup></li> <li>Send instructions ahead of time<sup>63,65</sup></li> </ul> </li> <li>Discuss back-up plan should technology fail<sup>14,64</sup></li> </ul>
<b>2. The physician–patient therapeutic alliance</b> <ul style="list-style-type: none"> <li>Reduced interpersonal engagement</li> <li>Issues of patient privacy, confidentiality and security of information</li> </ul>	<ul style="list-style-type: none"> <li>Employ verbal and nonverbal strategies to improve virtual patient–physician relationship<sup>66,67</sup></li> <li>“Webside manner” training for health care providers<sup>67–69</sup></li> <li>Use encrypted virtual interfaces that satisfy legal requirements for confidentiality of patient data<sup>14,68</sup></li> <li>Obtain verbal informed consent for virtual care<sup>14,64</sup></li> <li>Encourage private area for patient visit and opportunity to speak alone<sup>14</sup></li> </ul>
<b>3. Diagnostic challenges</b> <ul style="list-style-type: none"> <li>Inaccuracies because of nonstandardized conditions of the virtual encounter</li> <li>Adapting paper-based cognitive assessment tests for virtual administration</li> <li>Limitations of teleneurological examination</li> </ul>	<ul style="list-style-type: none"> <li>Screen for hearing and vision impairments, and encourage use of sensory aids (glasses, hearing aids) before virtual assessment<sup>14,70,71</sup></li> <li>Document uncertainties; verify in person, when possible<sup>64</sup></li> <li>Have patients print written components of cognitive assessments in advance<sup>20,26</sup></li> <li>Use webcam and screen sharing for visual display<sup>26,27,47</sup></li> <li>Adapt tests as necessary,<sup>26,64</sup> without altering cognitive construct being tested<sup>71</sup></li> <li>Follow suggested guidelines for virtual neurologic examination<sup>72,73</sup></li> <li>Use clinical judgment to convert to in-person assessments<sup>14,64,68</sup></li> </ul>
<b>4. The COVID-19 pandemic</b> <ul style="list-style-type: none"> <li>Increase in frequency of BPSD<sup>10</sup></li> <li>Reduced availability of caregivers to facilitate virtual encounter</li> </ul>	<ul style="list-style-type: none"> <li>Use virtual visits to educate patients and caregivers about BPSD management techniques<sup>51</sup></li> <li>Include caregivers virtually with 3-way calling<sup>14,70</sup></li> </ul>

Note: BPSD = behavioural and psychological symptoms of dementia, VTC = videoteleconferencing.

patients with dementia, the annual changes in MMSE scores between patients who received VTC visits compared with in-person visits were similar overall.<sup>53</sup> Those with milder impairment in the telemedicine group showed a slower decline in MMSE scores over time compared with their counterparts who received in-person care, suggesting that patients with milder cognitive deficits may be more sensitive to the benefits of telemedicine,<sup>53</sup> such as improved access to specialist care or more frequent follow-up visits. Patients who received VTC follow-up care also continued pharmacological treatment for longer periods than those who received in-person care.<sup>54</sup> Finally, VTC has been used to address behavioural symptoms and decrease rates of hospital admission among patients with dementia living in long-term care facilities.<sup>55,56</sup>

### What is the patient perspective on virtual care for Alzheimer disease and related dementias?

Patient acceptance of and satisfaction with virtual care is critical to the sustainability of virtual health care models. Older adults with these dementias appear to accept the use of telemedicine for cognitive assessments, with high rates of satisfaction with VTC encounters.<sup>37,40,43,44,57</sup> Patients, caregivers and physicians generally endorsed high levels of satisfaction with the use of VTC for follow-up care as well.<sup>48,49,58</sup> Modality preferences among patients range from a preference for VTC over in-person encounters<sup>37,40</sup> to no apparent preference.<sup>57</sup> Identified advantages of virtual care include convenience from resources and time saved, and improved access to specialist care.<sup>40,42–45</sup> When explicitly calculated, implementing telemedicine offered significant savings in terms of money, time and mileage.<sup>48</sup> Most virtual visits described in telemedicine programs are completed successfully, although commonly identified barriers to user satisfaction often related to technical limitations, such as reduced audio or visual quality.<sup>27,40,42</sup>

### Can patients be assessed and managed at home with virtual care?

Although telemedicine appears promising in this patient population, most virtual care research to date has focused on VTC between 2 health care facilities. This model has the advantage of having trained on-site personnel available to facilitate the virtual encounter, as well as allowing for standardization of the assessment environment.<sup>59</sup> It will be important to examine whether direct-to-home virtual care is as promising, particularly in the context of the current pandemic, during which staying home is imperative to health and safety.

Few studies have examined direct-to-home VTC care for patients with Alzheimer disease and related dementias.<sup>26,60</sup> In one study, dementia assessments were found to be both feasible and reliable when administered to patients in their homes; however, caregiver involvement was noted to be essential to visit success.<sup>26</sup> Another recent study found that most families, when given the option, declined VTC home visits for follow-up dementia care because of lack of access to appropriate technology, lack

of technological literacy or lack of in-home support to help facilitate the encounter. Those who accepted VTC home visits were as satisfied with them as they were with those completed in person.<sup>60</sup> Several clinics have also described their experiences transitioning from in-person care delivery to a direct-to-home VTC model for patients with cognitive impairment during the pandemic.<sup>51,61</sup> Given the dearth of quality evidence involving the direct-to-home approach, further attention is required to evaluate its use in this patient population.

### What are major barriers to virtual direct-to-home care for patients with dementia?

A virtual interface for direct-to-home dementia care has limitations. Barriers to virtual care include those relating to technology, the physician–patient therapeutic alliance, the diagnostic process and the COVID-19 pandemic (see Table 2 for a list of barriers to virtual care and associated recommendations).

Most patients with Alzheimer disease and related dementias are older adults who may have greater difficulty accessing technological devices or Internet services needed to support virtual visits.<sup>62,74</sup> This can be particularly challenging in rural or remote communities that lack the necessary resources required for telemedicine services.<sup>2</sup> Beyond access, some people may not have the technological literacy and comfort with using computers, Internet or VTC platforms, which can be further compounded by sensory impairments that accrue with increasing age.<sup>70,75,76</sup> A large cross-sectional study from the United States found that 38% and 20% of adults aged 65 years and older did not feel prepared for VTC- and telephone-based telemedicine, respectively.<sup>74</sup> Patient preference should be considered when selecting a telemedicine modality, and if necessary, telephone may be used either concurrently with VTC or on its own.<sup>14,63,64</sup> Additionally, the availability of a third party to facilitate the virtual visit, such as a caregiver, is essential to the success of direct-to-home care for dementia and must be considered by health care professionals offering virtual care to this population.<sup>26,64,70</sup>

Virtual visits are susceptible to privacy breaches because of their reliance on digital transmission and unregulated home environments. Telemedicine platforms should be secure and use only health care modes that do not collect patient information, but, even then, data breaches can occur. Informed consent regarding the risks of virtual care must be obtained from the patient or their substitute decision-maker at each visit. Patient identity should also be verified at each visit, and patients should be instructed to conduct the visit in a private area.<sup>14,64</sup>

Incorporating a focused neurologic examination into the virtual visit for an assessment of Alzheimer disease or a related dementia has not been well-studied. Although a full neurologic examination is not essential for the diagnosis of mild cognitive impairment or Alzheimer disease,<sup>3,4</sup> the limitations of the virtual neurologic examination pose a unique challenge for recognizing dementias associated with cerebrovascular disease or atypical dementias within the Parkinson-plus spectrum, which can present with focal deficits or extrapyramidal signs on examination,

### Box 3: Unanswered questions

- Is virtual care appropriate across the spectrum of cognitive and sensory impairment, including for those with more severe deficits?
- Can virtual care improve clinical outcomes in patients with Alzheimer disease and related dementias and other neurodegenerative diseases?
- Is the direct-to-home approach to virtual care feasible, acceptable, and effective for people with Alzheimer disease and related dementias?
- Is virtual care equally accessible to all people with Alzheimer disease and related dementias? If not, what measures can be taken to ensure equitable access?

respectively.<sup>77</sup> That said, some classic parkinsonian findings can be visually assessed, and telemedicine has been used to assess motor function among patients with idiopathic Parkinson disease.<sup>78</sup> Recent papers provide guidance as to how the neurologic examination can be adapted for virtual administration, although these techniques require validation.<sup>72,73</sup> Ultimately, physicians must use clinical judgment to identify situations in which the limitations of a virtual visit warrant conversion to an in-person appointment.<sup>14,68</sup>

Finally, for virtual care to become sustainable, inequities in access must be rectified. A recent cross-sectional analysis in the US found that characteristics such as race, ethnicity, language, income and caregiver support were major factors contributing to geriatric access to video-based telemedicine.<sup>79</sup> Systemic measures need to be implemented to ensure that virtual care is uniformly accessible regardless of sociodemographic factors.

## Conclusion

Virtual care is rapidly evolving and will continue to expand as technology advances to meet health care system demands. Research in this field in response to the COVID-19 pandemic has increased, yet many questions remain unanswered (Box 3). Existing literature suggests that cognitive assessment tools administered by telemedicine are generally reliable, the implementation of a telemedicine system for assessing and managing Alzheimer disease and related dementias is feasible and the virtual interface appears well accepted. Given the current limitations of virtual care, however, most experts suggest that virtual visits be used to supplement in-person encounters instead of replacing them, when possible.<sup>20,59</sup>

The COVID-19 pandemic has catalyzed a broader application of virtual care to keep vulnerable populations safely in their homes. Ultimately, providing patients, families and health care professionals with support, access, education and empowerment will be necessary to overcome barriers and facilitate uptake of virtual care for those with Alzheimer disease and related dementias. Collaborative efforts among clinicians and patients, reinforced by support from existing health care infrastructure, will be required to ensure that successful adoption and innovation in this field are actualized.

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