During 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.”¹ 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.² 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.³,⁴ 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.⁵ Changes to a patient’s normal routine and supports may also aggravate patients’ neuropsychiatric symptoms and put caregivers at increased risk of burnout.⁶,⁷,⁸ Moreover, a 2016 evaluation predicted that the number of people living with dementia would nearly double within 15 years,¹³ 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.¹⁴ 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 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,4,14 teleneurology work groups have considered dementia to be potentially amenable to remote evaluation.15

Telephone

Telephone-based instruments for cognitive screening have been used in epidemiological and clinical contexts.16 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.17 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,18,19 although it may be limited in accurately classifying people across the spectrum of cognitive impairment.19 Other validated instruments for cognitive screening include telephone-based MMSE instruments and the telephone-based Montreal Cognitive Assessment (t-MOCA),16,20 though the latter has been validated only in patients with cerebrovascular disease.21 Although a telephone-based approach has been suggested as an effective means of cognitive screening,16,22 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.16,22

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.23 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.24 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.25 Although individual studies of cognitive tests often show good overall reliability between in-person and VTC assessments,26-36 their generalizability is limited as they often exclude patients with severe hearing, visual or cognitive impairment.27-29,31,34,37

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.37 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)38 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.28,40,41 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.40 Subsequent studies have found similar results.28,41 However, physicians in these studies often had access to supplemental information, such as findings from preliminary in-person neuropsychological testing.41

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)           | 8              | Healthy controls, MCI, AD, VD, other | 0.88–0.92         |
| Montreal Cognitive Assessment (MOCA)   | 3              | Healthy controls, MCI, AD, DBL       | 0.85–0.98         |
| Boston Naming Test (BNT)               | 5              | Healthy controls, MCI, AD            | 0.81–0.93         |
| Clock Drawing Test (CDT)               | 4              | Healthy controls, MCI, AD            | 0.65–0.71         |
| Hopkins Verbal Learning Test-Revised (HVLT-R) | 4             | Healthy controls, MCI, AD            | 0.54–0.90         |
| AD Assessment Scale-Cognitive Subscale (ADAS-cog) | 2              | Healthy controls, MCI, AD            | 0.86              |

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

E372
assessments or physical examinations. 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. 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. 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.

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, connect patients and families with support services, discuss issues of safety and planning, determine whether additional laboratory, imaging or neuropsychological testing is needed and reassess patients for evidence of cognitive decline. 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.

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. 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)                                                                 |
|------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1. Technological access, literacy and interference                      | • Suggest accessing technology through family, friends or local health care centres   |
|                                                                        | • Provide resources, support or education to improve technological literacy among    |
|                                                                        |   patients and families:                                                             |
|                                                                        | • Technologically prepare patients and families:                                     |
|                                                                        |   • Involve telehealth technicians                                                   |
|                                                                        |   • Send instructions ahead of time                                                  |
|                                                                        |   • Discuss back-up plan should technology fail                                      |
| 2. The physician–patient therapeutic alliance                          | • Employ verbal and nonverbal strategies to improve virtual patient–physician        |
|                                                                        |   relationship                                                                      |
|                                                                        | • “Webside manner” training for health care providers                               |
|                                                                        | • Use encrypted virtual interfaces that satisfy legal requirements for confidentiality|
|                                                                        |   of patient data                                                                    |
|                                                                        | • Obtain verbal informed consent for virtual care                                   |
|                                                                        | • Encourage private area for patient visit and opportunity to speak alone            |
| 3. Diagnostic challenges                                               | • Screen for hearing and vision impairments, and encourage use of sensory aids        |
|                                                                        |   (glasses, hearing aids) before virtual assessment                                 |
|                                                                        | • Document uncertainties; verify in person, when possible                           |
|                                                                        | • Have patients print written components of cognitive assessments in advance         |
|                                                                        | • Use webcam and screen sharing for visual display                                  |
|                                                                        | • Adapt tests as necessary, without altering cognitive construct being tested       |
|                                                                        | • Follow suggested guidelines for virtual neurologic examination                     |
|                                                                        | • Use clinical judgment to convert to in-person assessments                          |
| 4. The COVID-19 pandemic                                               | • Use virtual visits to educate patients and caregivers about BPSD management         |
|                                                                        |   techniques                                                                        |
|                                                                        | • Include caregivers virtually with 3-way calling                                    |

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.53 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,53 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.64 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.55,56

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.37,40,43,44,57 Patients, caregivers and physicians generally endorsed high levels of satisfaction with the use of VTC for follow-up care as well.48,49,58 Modality preferences among patients range from a preference for VTC over in-person encounters37,46 to no apparent preference.57 Identified advantages of virtual care include convenience from resources and time saved, and improved access to specialist care.40,42,45 When explicitly calculated, implementing telemedicine offered significant savings in terms of money, time and mileage.48 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.27,40,42

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.59 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.26,60 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.25 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.60 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.51,61 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.62,74 This can be particularly challenging in rural or remote communities that lack the necessary resources required for telemedicine services.2 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.70,75,76 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.74 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.56,63,64 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.75,64,70

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.14,64

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,3,4 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,
respectively. 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. Recent papers provide guidance as to how the neurologic examination can be adapted for virtual administration, although these techniques require validation. Ultimately, physicians must use clinical judgment to identify situations in which the limitations of a virtual visit warrant conversion to an in-person appointment.

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. 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.

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.

**References**

1. Shaw J, Jamieson T, Agarwal P, et al. Virtual care policy recommendations for patient-centred primary care: findings of a consensus policy dialogue using a nominal group technique. J Telemed Telecare 2018;24:608-15.

2. Gagnon M-P, Duplantie J, Fortin J-P, et al. Implementing telehealth to support medical practice in rural/remote regions: What are the conditions for success? Implement Sci 2006;1:18.

3. Albert MS, DeKosky ST, Dickson D, et al. The diagnosis of mild cognitive impairment due to Alzheimer’s disease: recommendations from the National Institute on Aging-Alzheimer’s Association workgroups on diagnostic guidelines for Alzheimer’s disease. Alzheimers Dement 2011;7:270-9.

4. McKhann GM, Knopman DS, Chertkow H, et al. The diagnosis of dementia due to Alzheimer’s disease: recommendations from the National Institute on Aging-Alzheimer’s Association workgroups on diagnostic guidelines for Alzheimer’s disease. Alzheimers Dement 2011;7:263-9.

5. McKeith IG, Boeve BF, Dickson DW, et al. Diagnosis and management of dementia with Lewy bodies: fourth consensus report of the DLB Consortium. Neurology 2017;89:88-100.

6. Rascovsky K, Hodges JR, Knopman D, et al. Sensitivity of revised diagnostic criteria for the behavioural variant of frontotemporal dementia. Brain 2011;134:2456-77.

7. Stephan A, Bieber A, Hopper L, et al. Barriers and facilitators to the access to and use of formal dementia care: findings of a focus group study with people with dementia, informal carers and health and social care professionals in eight European countries. BMC Geriatr 2018;18:131.

8. Bradford A, Kunik ME, Schulz P, et al. Missed and delayed diagnosis of dementia in primary care: prevalence and contributing factors. Alzheimer Dis Assoc Disord 2009;23:306.

9. Wang H, Li T, Barbarino P, et al. Dementia care during COVID-19. Lancet 2020;395:1190-1.

10. Lara B, Barnes A, Dakterzada F, et al. Neuropsychiatric symptoms and quality of life in Spanish patients with Alzheimer’s disease during the COVID-19 lockdown. Eur J Neurol 2020;27:1744-7.

11. Roach P, Zwiers A, Cox E, et al. Understanding the impact of the COVID-19 pandemic on well-being and virtual care for people living with dementia and caregivers living in the community. Dementia (London) 2020 Dec. 31. [Epub ahead of print]. doi: 10.1177/1471301220977639.

12. Migliaccio R, Bouzigues A. Dementia and COVID-19 lockdown: more than a double blow for patients and caregivers. J Alzheimer Dis Rep 2020;4:231-5.

13. Chambers LW, Bancej C, McDowell I. Prevalence and monetary costs of dementia in Canada. Toronto: Alzheimer Society of Canada; 2016.

14. Geddes MR, O’Connell ME, Fisk JD, et al. Remote cognitive and behavioral assessment: report of the Alzheimer Society of Canada Task Force on dementia care best practices for COVID-19. Alzheimers Dement (Amst) 2020;12:e12111.

15. Hatcher-Martin JM, Adams JL, Anderson ER, et al. Telemedicine in neurology: Telemedicine Work Group of the American Academy of Neurology update. Neurology 2020;94:30-8.

16. Castanho TC, Amorim L, Zihl J, et al. Telephone-based screening tools for mild cognitive impairment and dementia in aging studies: a review of validated instruments. Front Aging Neurosci 2014;6:16.

17. Brandt J, Spencer M, Folstein M. The telephone interview for cognitive status. Neupropsychiatry Neuropsychol Behav Neurol 1986;1:111-8.

18. Cook SE, Marsiske M, McCoy KM. The use of the Modified Telephone Interview for Cognitive Status (TICS-M) in the detection of amnestic mild cognitive impairment. J Geriatr Psychiatry Neurol 2009;22:103-9.

19. Knopman DS, Roberts RO, Geda YE, et al. Validation of the telephone interview for cognitive status-modified in subjects with normal cognition, mild cognitive impairment, or dementia. Neuroepidemiology 2010;34:34-42.

20. Frank C, John PS, Molnar F. Screening tools for virtual assessment of cognition. Can Fam Physician 2020;66:502-3.

21. Pendlebury ST, Welch SJV, Cuthbertson FC, et al. Telephone assessment of cognition after transient ischemic attack and stroke: modified telephone interview of cognitive status and telephone Montreal Cognitive Assessment versus face-to-face Montreal Cognitive Assessment and neuropsychological battery. Stroke 2013;44:227-9.

22. Carlew AR, Fatima H, Livingstone JR, et al. Cognitive assessment via telephone: a scoping review of instruments. Arch Clin Neuropsychol 2020;35:1215-33.
23. Barth J, Nickel F, Kolominsky-Rabas PL. Diagnosis of cognitive decline and dementia in rural areas — a scoping review. Int J Geriatr Psychiatry 2018;33:459-74.

24. Brela JW, Shura RD, Martindale SL, et al. Neuropsychological test administration by videoconference: a systematic review and meta-analysis. Neuropsychol Rev 2017;24:171-4.

25. Binng D, Splonskowski M, Jacova C. Distance assessment for detecting cognitive impairment in older adults: a systematic review of psychometric evidence. Dement Geriatr Cogn Disord 2020. Dec. 8. [Epub ahead of print]. doi: 10.1159 /000511945.

26. Lindauer A, Seelye A, Lyons B, et al. Dementia care comes home: patient and caregiver assessment via telemedicine. Gerontologist 2017;57:e85-93.

27. iboshi K, Yoshida K, Yamaoka Y, et al. A validation study of the remotely administered Montreal Cognitive Assessment tool in the elderly Japanese population. Telemed J E Health 2020;26:820-9.

28. Loh P-K, Donaldson M, Flicker L, et al. Development of a telemedicine protocol for the diagnosis of Alzheimer’s disease. J Telemed Telecare 2007;13:90-4.

29. Cullum CM, Weiner MF, Gehrmann HR, et al. Feasibility of telecognitive assessment in dementia. Assessment 2006;13:385-90.

30. Wadsworth HE, Galusha-Glasscock JM, Womack KB, et al. Remote neuropsychological assessment in rural American Indians with and without cognitive impairment. Arch Clin Neuropsychol 2016;31:420-5.

31. Munro Cullum C, Hynan LS, Grosh M, et al. Teleneuropsychology: evidence for video teleconference-based neuropsychological assessment. J Int Neuropsychol Soc 2014;20:1028-33.

32. DeYoung N, Shenal BV. The reliability of the Montreal Cognitive Assessment using telehealth in a rural setting with veterans. J Telemed Telecare 2019;25:197-203.

33. McEachern W, Kirk A, Morgan DG, et al. Reliability of the MMSE administered in-person and by telehealth. Can J Neurol Sci 2008;35:643-6.

34. Vestal L, Smith-Olende L, Hicks G, et al. Efficacy of language assessment in Alzheimer’s disease: comparing in-person examination and telemedicine. Clin Interv Aging 2006;1:467-71.

35. Galusha-Glasscock JM, Horton DK, Weiner MF, et al. Video teleconference administration of the repeatable battery for the assessment of neuropsychological status. Arch Clin Neuropsychol 2016;31:8-11.

36. Yoshida K, Yamaoka Y, Eguchi Y, et al. Remote neuropsychological assessment of elderly Japanese population using the Alzheimer’s Disease Assessment Scale: a validation study. J Telemed Telecare 2020;26:482-7.

37. Carotenuto A, Rea R, Traini E, et al. Cognitive assessment of patients with Alzheimer’s disease by telemedicine: pilot study. JMIR Ment Health 2018;5:e31.

38. Loh P-K, Ramesh P, Maher S, et al. Can patients with dementia be assessed at a distance? The use of Telehealth and standardised assessments. Intern Med J 2004;34:239-42.

39. Wadsworth HE, Dhhima K, Womack KB, et al. Validity of teleneuropsychological assessment in older patients with cognitive disorders. Arch Clin Neuropsychol 2019;33:1040-5.

40. Shores MM, Ryan-Dykes P, Williams RM, et al. Identifying undiagnosed dementia in residential care veterans: comparing telemedicine to in-person clinical examination. Int J Geriatr Psychiatry 2004;19:101-8.

41. Martin-Khan M, Flicker L, Woolton R, et al. The diagnostic accuracy of telegeriatrics for the diagnosis of dementia via video conferencing. J Am Med Dir Assoc 2012;13:487.e19-24.

42. Dang S, Gomez-Orozco CA, van Zuilien MH, et al. Providing dementia consultation to veterans using clinical video telehealth: results from a clinical demonstration project. Telemed J E Health 2018;24:203-9.

43. Tso JV, Farinpour R, Chui HC, et al. A multidisciplinary model of dementia care in an underserved retirement community, made possible by telemedicine. Front Neurrol 2016;7:225.

44. Powers BB, Homer MC, Morone N, et al. Creation of an interprofessional teledementia clinic for rural veterans: preliminary data. J Am Geriatr Soc 2017;65:1092-9.

45. Harrell KM, Wilkins SS, Connor MK, et al. Teleneuropsychology and the evaluation of cognitive impairment: the additive value of neuropsychological assessment. J Am Med Dir Assoc 2014;15:600-6.

46. Weiner MF, Rossetti HC, Harrah K. Videoconference diagnosis and management of Choctaw Indian dementia patients. Alzheimers Dement 2011;7:562-6.

47. Owens AP, Ballard C, Beigi M, et al. Implementing remote memory clinics to enhance clinical care during and after COVID-19. Front Psychiatry 2020;11:759934.

48. Powers JS, Buckner J. Reaching out to rural caregivers and veterans with dementia utilizing clinical video-telehealth. Geriatrics 2018;3:29. doi: 10.3390/ geriatrics3030025.

49. Azad N, Amos S, Milne K, et al. Telemedicine in a rural memory disorder clinic — remote management of patients with dementia. Can J Geriatr J 2012;15:56.

50. Chang W, Homer M, Rossi MI. Use of clinical video telehealth as a tool for optimizing medications for rural older veterans with dementia. Geriatrics 2018;3:44. doi: 10.3390/geriatrics3030044.

51. Weiss EF, Malik R, Santos T, et al. Telehealth for the cognitively impaired older adult and their caregivers: lessons from a coordinated approach. Neurodegener Dis Manag 2021;11:83-9.

52. Possin KL, Merrieles JJ, Dulaney S, et al. Effect of collaborative dementia care via telephone and internet on quality of life, caregiver well-being, and health care use: the care ecosystem randomized clinical trial. JAMA Intern Med 2019;179:1658-67.

53. Kim H, Jho JH, Jang JW. The effect of telemedicine on cognitive decline in patients with dementia. J Telemed Telecare 2017;23:149-54.

54. Cheong C-K, Lim K-H, Jang J-W, et al. The effect of telemedicine on the duration of treatment in dementia patients. J Telemed Telecare 2015;21:214-8.

55. Lyketsos CG, Roques C, Hovanec L, et al. Teleneuropsychology and the reduction of psychiatric admissions from a long-term care facility. J Geriatr Psychiatry Neurol 2001;14:76-9.

56. Lee JH, Kim JH, Jho JH, et al. A telemedicine system as a care modality for dementia patients in Korea. Alzheimer Dis Assoc Disord 2000;14:94-101.

57. Parikh M, Grosh M, Graham LL, et al. Consumer acceptability of brief video-conference-based neuropsychological assessment in older individuals with and without cognitive impairment. Clin Neuropsychol 2013;27:808-17.

58. Morgan DG, Kosteniuk J, Stewart N, et al. The telehealth satisfaction scale: reliability, validity, and satisfaction with telehealth in a rural memory clinic population. Telemed J E Health 2014;20:997-1003.

59. Huntke NC, Gould C. Examining older adult cognitive status in the time of COVID-19. J Am Geriatr Soc 2020;68:1387-9.

60. Moo LR, Gately ME, Jafari Z, et al. Home-based video telemedicine for dementia management. Clin Gerontol 2020;43:193-203.

61. Benaque A, Gurrruchaga MJ, Abdelnour C, et al. Dementia care in times of COVID-19: Experience at Fundació ACE in Barcelona, Spain. J Alzheimers Dis 2020;76:33-40.

62. Tousi B. Dementia care in the time of COVID-19 pandemic. J Alzheimer Dis Assoc Desord 2020;34:1352-6.

63. Walsh J, Markus HS. Telemedicine for follow-up of rare neurological disease. Stroke 2019;50:750-3.

64. Bulik RJ. Human factors in primary care telemedicine encounters. J Telemed Telecare 2008;14:169-72.

65. Liu X, Sawada Y, Takizawa T, et al. Doctor–patient communication: a comparison of telemedicine consultation and face-to-face consultation. Intern Med 2018;57:1509-13.

66. Bulik RJ. Human factors in primary care telemedicine encounters. J Telemed Telecare 2008;14:169-72.

67. Liu X, Sawada Y, Takizawa T, et al. Doctor–patient communication: a comparison of telemedicine consultation and face-to-face consultation. Intern Med 2018;57:1509-13.

68. Wechsler LR. Advantages and limitations of teleneuropsychology. JAMA Neurol 2015;72:349-54.

69. Terry C, Cain J. The emerging issue of digital empathy. Am J Pharm Educ 2016;80:58.

70. Steinman MA, Perry L, Perissinotto CM. Meeting the care needs of older adults and their caregivers: lessons from a coordinated approach. JAMA Intern Med 2020;180:819-20.

71. Phillips NA, Chertkow H, Pichora-Fuller MK, et al. Special issues on using the Montreal Cognitive Assessment for telemedicine assessment during COVID-19. J Am Geriatr Soc 2020;68:942-4.

72. Al Hussona M, Maher M, Chan D, et al. The Virtual Neuropsychic Exam: instructional videos and guidance for the COVID-19 era. Can J Neurol Sci 2020;47:598-603.
73. Boes CJ, Hunderfund ANL, Martinez-Thompson JM, et al. A primer on the in-home teleneurologic examination: a COVID-19 pandemic imperative. *Neurol Clin Pract* 2020. doi: 10.1212/CPJ.0000000000000876. Available: https://cp.neurology.org/content/early/2020/05/21/CPJ.0000000000000876.abstract (accessed 2020 July 20).

74. Lam K, Lu AD, Shi Y, et al. Assessing telemedicine unreadiness among older adults in the United States during the COVID-19 pandemic. *JAMA Intern Med* 2020;180:1389-91.

75. Rosenberg L, Kottorp A, Winblad B, et al. Perceived difficulty in everyday technology use among older adults with or without cognitive deficits. *Scand J Occup Ther* 2009;16:216-26.

76. Moyle W, Jones C, Murfield J, et al. “For me at 90, it’s going to be difficult”: feasibility of using iPad video-conferencing with older adults in long-term aged care. *Aging Ment Health* 2020;24:349-52.

77. Knopman DS, Boeve BF, Petersen RC. Essentials of the proper diagnoses of mild cognitive impairment, dementia, and major subtypes of dementia. *Mayo Clin Proc* 2003;78:1290-308.

78. Adams JL, Myers TL, Waddell EM, et al. Telemedicine: a valuable tool in neurodegenerative diseases. *Curr Geriatr Rep* 2020;9:72-81.

79. Schifeling CH, Shanbhag P, Johnson A, et al. Disparities in video and telephone visits among older adults during the COVID-19 pandemic: cross-sectional analysis. *JMIR Aging* 2020;3:e23176.

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**Affiliations:** Faculty of Medicine (Gosse, Kassardjian, Masellis, Mitchell) and Department of Medicine, Division of Neurology (Kassardjian, Masellis, Mitchell), University of Toronto; Sunnybrook Health Sciences Centre, Department of Medicine, Division of Neurology (Masellis, Mitchell); Department of Medicine, Division of Neurology (Kassardjian), St. Michael’s Hospital; Neurology Quality and Innovation Lab (NQIL) (Kassardjian, Mitchell), University of Toronto; Hurvitz Brain Sciences Research Program (Masellis, Mitchell), Sunnybrook Research Institute; Li Ka Shing Knowledge Institute (Kassardjian), St. Michael’s Hospital, Toronto, Ont.

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**Correspondence to:** Sara Mitchell, sara.mitchell@sunnybrook.ca