

# The Use of Telemedicine in Older-Adults During the COVID-19 Pandemic: a Weekly Cross-Sectional Analysis in Ontario, Canada



Cherry Chu, MSc<sup>1</sup>, Janette Brual, PhD<sup>1</sup>, Jiming Fang, PhD<sup>2</sup>, Cathleen Fleury, MSc<sup>1</sup>, Vess Stamenova, PhD<sup>1</sup>, Onil Bhattacharyya, MD, PhD<sup>1,3,4</sup>, Mina Tadrous, PharmD, PhD<sup>1,2,5</sup>

<sup>1</sup>Women's College Hospital Institute for Health System Solutions and Virtual Care, Toronto; <sup>2</sup>ICES, Toronto; <sup>3</sup>Institute of Health Policy, Management and Evaluation, Dalla Lana School of Public Health, University of Toronto, Toronto;

<sup>4</sup>Department of Family and Community Medicine, University of Toronto, Toronto; <sup>5</sup>Leslie Dan Faculty of Pharmacy, University of Toronto, Toronto, ON

<https://doi.org/10.5770/cgj.25.610>

## ABSTRACT

The COVID-19 pandemic led to rapid adoption of telemedicine for health-care service delivery. There are concerns that older adults, the highest users of the health-care system, would be left behind because of this shift. It remains unclear how the pandemic impacted telemedicine and other health-care service use in this group. We conducted a population-based, weekly cross-sectional study using administrative data from Ontario, Canada. Telemedicine use was measured for the overall older-adult population aged 65+ and across sociodemographic groups from January 2018 to March 2021. We also assessed the use of key health-care services between high and low patient users of telemedicine who were diagnosed with dementia. We found that telemedicine visits outnumbered in-person visits in older adults during the pandemic (average of 74 vs. 62 visits per 1000 per week). Of all specialties, psychiatrists delivered the most telemedicine visits, reaching 90% of visits in a week. Higher rates of telemedicine use during COVID-19 were found for patients who resided in urban regions (84 visits per 1000 per week), but no differences were found across income quintiles. Among dementia patients, high telemedicine users had higher health-care utilization than low telemedicine users (i.e., 21,108 vs. 3,276 outpatient visits per week) during the pandemic. Findings suggest that telemedicine was crucial in helping older adults, a group most vulnerable to COVID-19, maintain access to care during the pandemic. Telemedicine presents an important opportunity for older adults; however, future research should focus on barriers to equitable access and quality of care provided through telemedicine.

**Key words:** telemedicine, telehealth, virtual care, older adults, access, population; health services, COVID-19

## INTRODUCTION

Telemedicine grew during the COVID-19 pandemic, due to the need for physical distancing to reduce transmission. Many jurisdictions rapidly implemented ways to deliver health care remotely.<sup>(1-3)</sup> Prior to the pandemic, telemedicine uptake in Ontario, Canada was modest<sup>(4)</sup> and mostly limited to rural areas.<sup>(5)</sup> With the arrival of the pandemic, the Ontario government introduced temporary billing codes allowing for the reimbursement of telemedicine.<sup>(6)</sup> This led to a significant increase in telemedicine use in Ontario, from 1.6% of ambulatory visits in the second quarter of 2019 to 70.6% in the second quarter of 2020.<sup>(4)</sup>

Older adults have complex health needs and higher rates of comorbidities, putting them at great risk of harm from COVID-19. They are also among the highest users of the health-care system.<sup>(7,8)</sup> Older-adult patients with dementia are at high-risk of experiencing social isolation, cognitive decline, and other mental health issues, especially during the pandemic.<sup>(9)</sup> Telemedicine offers an opportunity for older-adult patients to continue their care during a time of physical distancing. However studies on older-adults' perceptions about telemedicine and virtual care suggest that there are several barriers to access, such as physical disabilities (such as visual or auditory deficits), inexperience or discomfort with technology, or lack of digital equipment.<sup>(10-12)</sup> Interestingly, a study conducted by our team using administrative data in Ontario found that telemedicine uptake was higher among older adults aged 65+ than any other age group during the pandemic.<sup>(4)</sup> It remains unclear how telemedicine uptake differs across various sociodemographic subgroups within the older-adult population, and how uptake influences the use of other forms of health-care services.

This report aims to describe telemedicine use in the older-adult population in Ontario. Additionally, we assess the association between telemedicine usage and other forms of health-care utilization among older-adult patients with dementia.

**METHODS**

**Study Design and Data Sources**

We conducted a population-based, weekly cross-sectional study of older-adult patients aged 65+ using routinely collected administrative claims data from Ontario, Canada (Appendix A). Databases were linked using unique encoded identifiers and analyzed at ICES.

**Analysis**

A detailed summary of methods used is described in Appendix B. Briefly, rates of telemedicine visits were calculated for each week from January 2018 to March 2021 for all Ontario residents aged 65+ and across patient groups. We also compared utilization of hospitalizations, emergency department visits, outpatient visits, and laboratory testing between high and low users of telemedicine who were diagnosed with dementia. All analyses were performed in SAS 9.4 (SAS Institute Inc., Cary, NC).

**RESULTS**

Demographic characteristics of the older-adult population in Ontario are reported in Appendix C. Ambulatory visit rates

were relatively stable prior to the pandemic, and visits were delivered almost exclusively in-person (Figure 1). The start of the pandemic led to a drop in overall ambulatory visits, from a weekly average of 157 to 136 visits per 1,000 (-13.4%). In-person visit rates experienced an even greater decrease, from 156 to 62 visits per 1,000 (-60.3%). In contrast, telemedicine use increased significantly when the pandemic began and remained stable thereafter (1 to 74 visits per 1,000).

Psychiatrists delivered the highest proportion of ambulatory visits virtually, reaching a maximum of 90.4% per week during the first COVID wave (Figure 2A). During the pandemic, the average weekly rate of telemedicine visits was highest among the two oldest age groups, age 75–84 (90 visits per 1,000) and 85+ (88 per 1,000), while the lowest use was recorded for those aged 65–74 (75 per 1,000) (Figure 2B). The weekly rate of telemedicine usage increased significantly across all income quintiles, with similar rates across quintiles during the pandemic (80–82 visits per 1,000) (Figure 2C). Before the pandemic, older-adult patients living in rural areas had marginally higher rates of telemedicine visits compared to urban patients (Figure 2D). During the pandemic, both urban and rural telemedicine use increased with significantly higher rates among urban patients (84 visits per 1,000) compared to rural (54 per 1,000).

Among patients with dementia, there was a reduction in the number of hospitalizations in low users, with a drop coinciding with the start of COVID-19 (from average of 978 per week pre-pandemic to 172 during pandemic, or -82.4%)

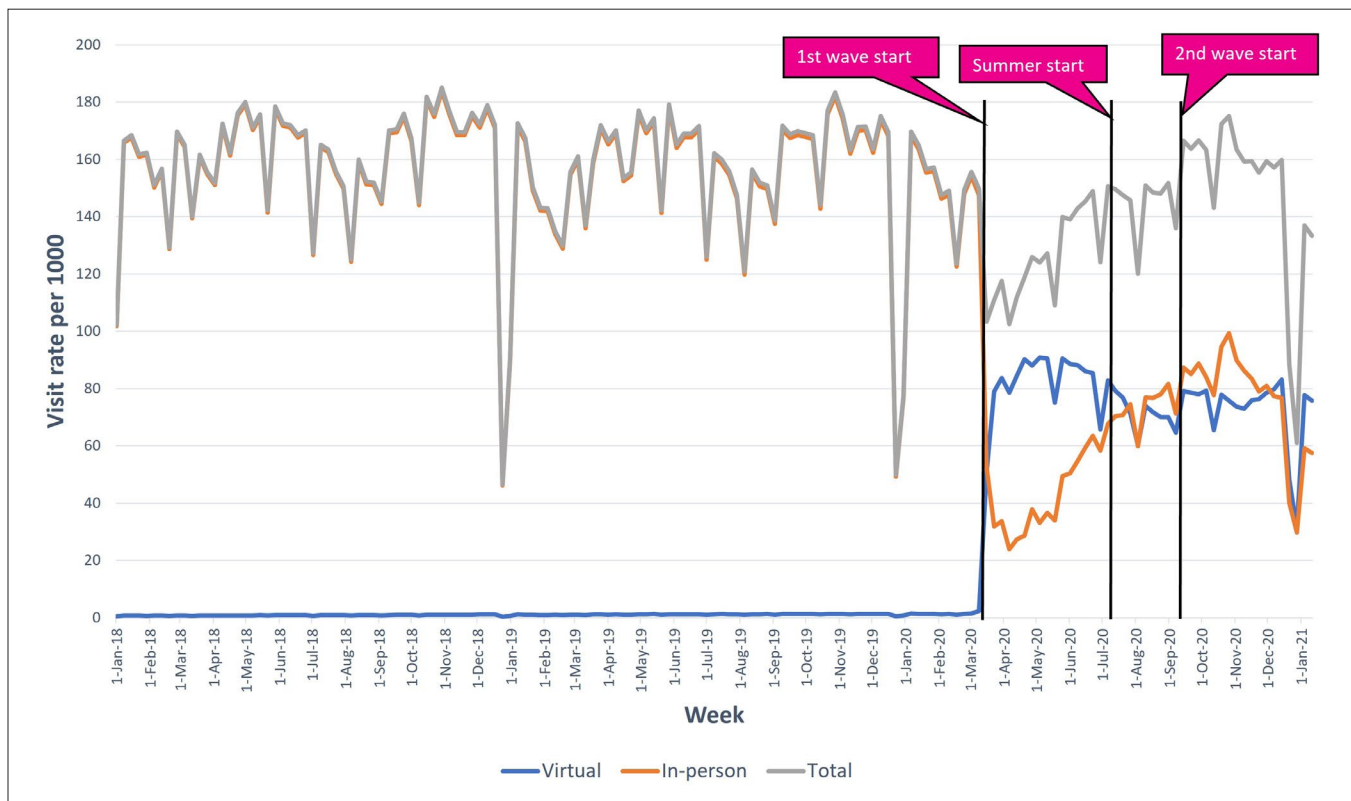


FIGURE 1. Rate of ambulatory visits per 1000 in the older-adult population (age 65+)

CHU: TELEMEDICINE USE IN OLDER ADULTS DURING COVID-19

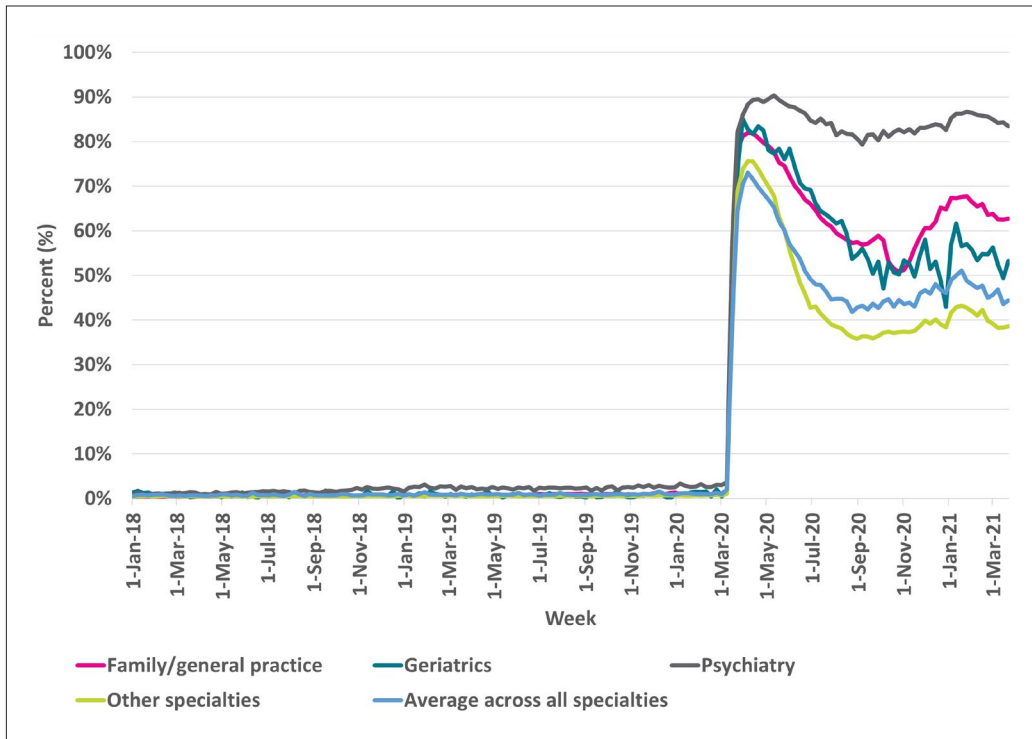


FIGURE 2A. Percent of telemedicine visits out of total ambulatory visits, by physician specialty

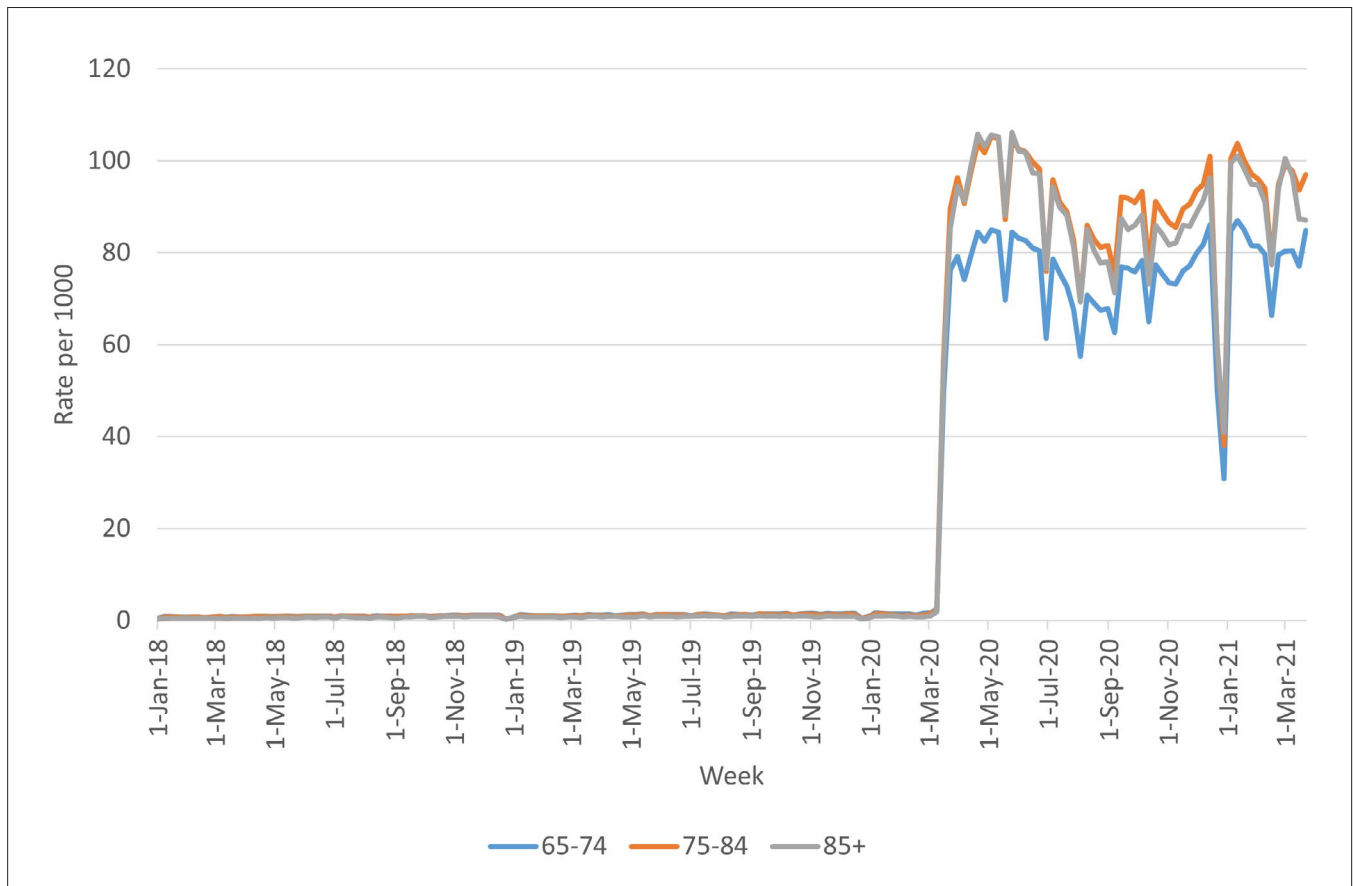


FIGURE 2B. Rate of telemedicine visits per 1000 eligible older-adult patients, by age group

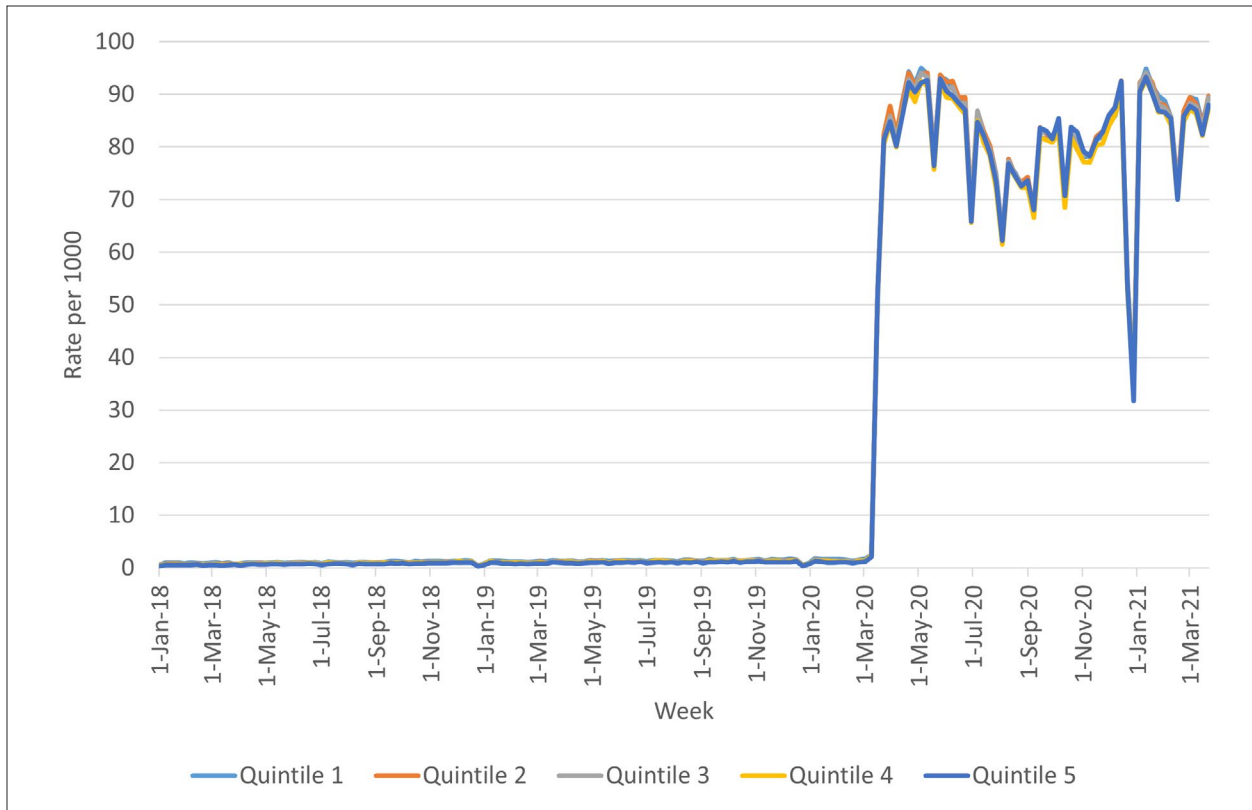


FIGURE 2C. Rate of telemedicine visits per 1000 eligible older-adult patients, by income quintile

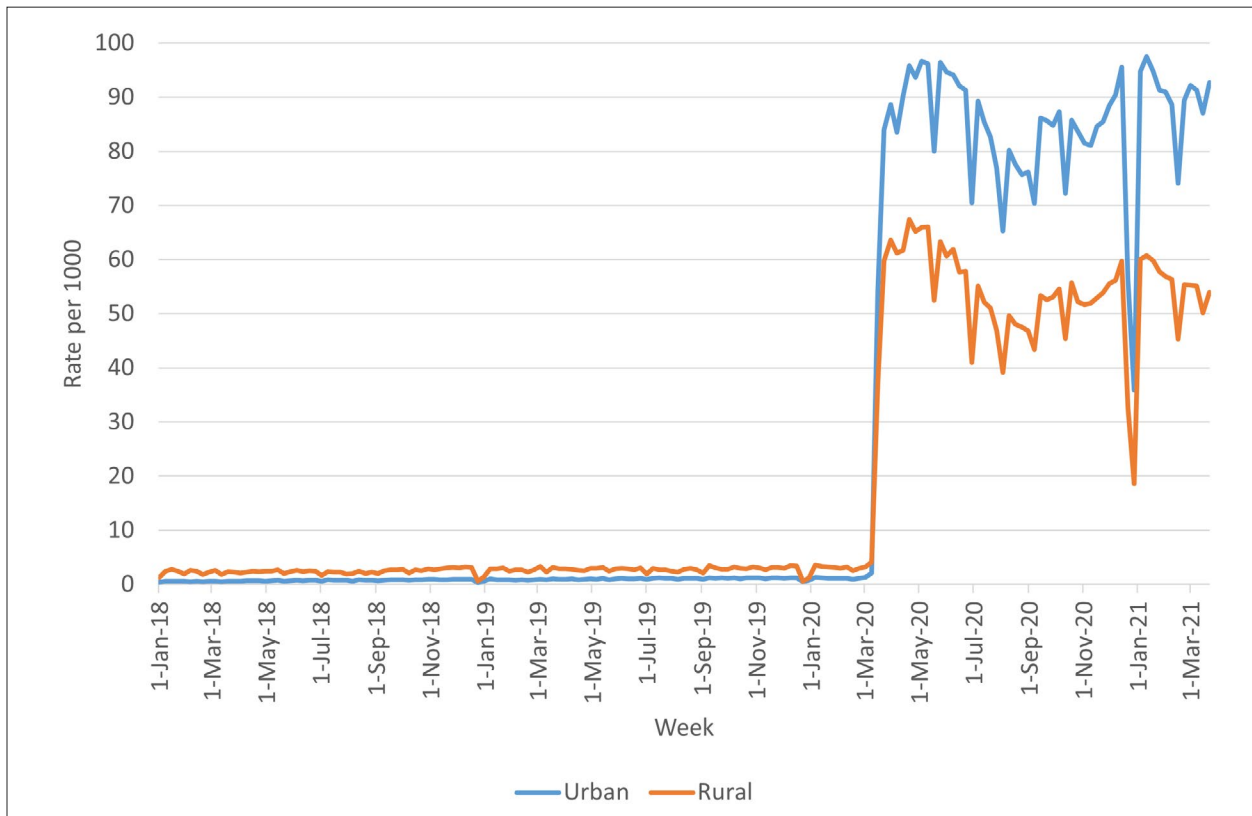


FIGURE 2D. Rate of telemedicine visits per 1000 eligible older-adult patients, by rurality

(Figure 3A). In contrast, high users saw a small continuous rise in volumes, followed by a sharp drop at the start of the pandemic, which increased again a few months after (535 to 674, or +26.0%). The pre-pandemic to during-pandemic change in ED volumes was from 2,184 to 374 (-82.9%) in low users and 1,727 to 1,664 (-3.6%) in high users (Figure 3B). Outpatient visits in low users gradually declined, with a sharp decrease at the start of COVID-19 and remained stable (13,931 to 3,276, or -76.5%) (Figure 3C). In high users, outpatient visits remained stable over time and even increased during the pandemic (19,093 to 21,108, or +10.6%). Patterns of lab tests were similar, where low users saw a gradual decrease until a significant drop during COVID-19 (30,117 to 5,807, or -80.7%) (Figure 3D). Although high users also experienced a decline in lab tests due to the pandemic (41,752 to 32,136, or -23.0%), volumes began to increase again.

**DISCUSSION**

This study highlights the massive shift in health-care delivery among older adults in Ontario due to the pandemic. Telemedicine uptake grew significantly in the older-adult population and across major sociodemographic groups, however differences were found between groups based on rurality, medical specialty, and age group. Trends in other health-care utilization also shifted among patients with dementia, though

trends differed based on patients’ usage of telemedicine. These findings demonstrate the lack of homogeneity in the older-adult population, and support the need to explore this issue across subpopulations.

Our study shows that even within older adults, telemedicine use was higher among the older age groups. Anecdotally, health-care providers have suggested that most of the telemedicine visits provided to older adults during the pandemic were telephone-based. This is likely due to telephone calls being easier to access for older adults than videoconferencing, as documented in other literature.<sup>(13,14)</sup> These findings suggest that telephone-based care was crucial in helping older adults maintain access to care during the pandemic, a time when physical distancing is strictly enforced. Telemedicine not only allows care to be more accessible for those with frailty or mobility issues who may experience difficulties when travelling to in-person appointments, but also saves time and money spent on travel for both patients and their caregivers.

The use of telemedicine was low for both urban and rural patients prior to the pandemic, albeit slightly higher among rural patients, as telemedicine was mainly promoted as a means for patients living in rural/remote areas to access care.<sup>(15)</sup> The subsequent surge in urban telemedicine rates relative to rural rates due to the pandemic may be explained by higher rates of urban health-care use in general,<sup>(16,17)</sup> as telemedicine

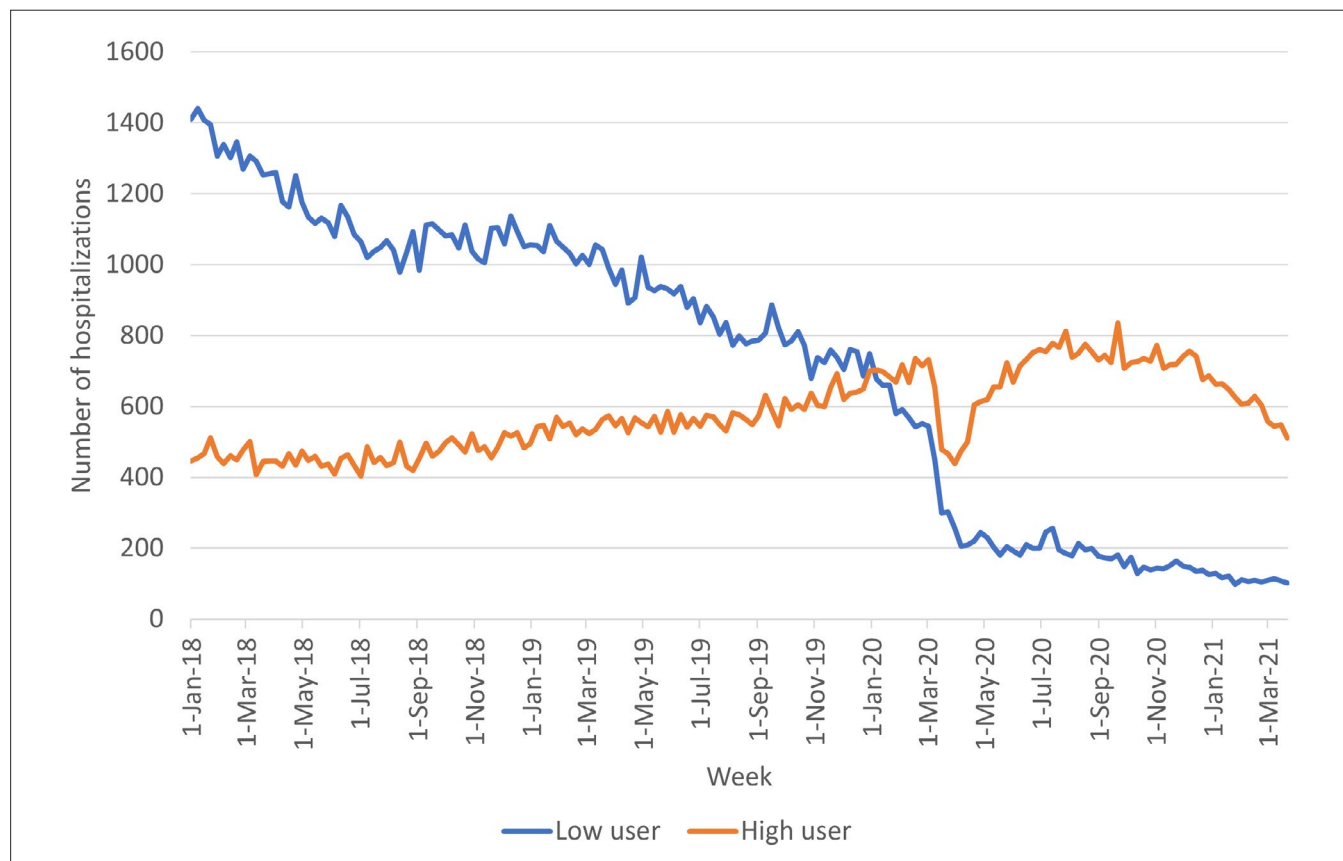


FIGURE 3A. Number of hospitalizations among patients with dementia



FIGURE 3B. Number of ED visits among patients with dementia

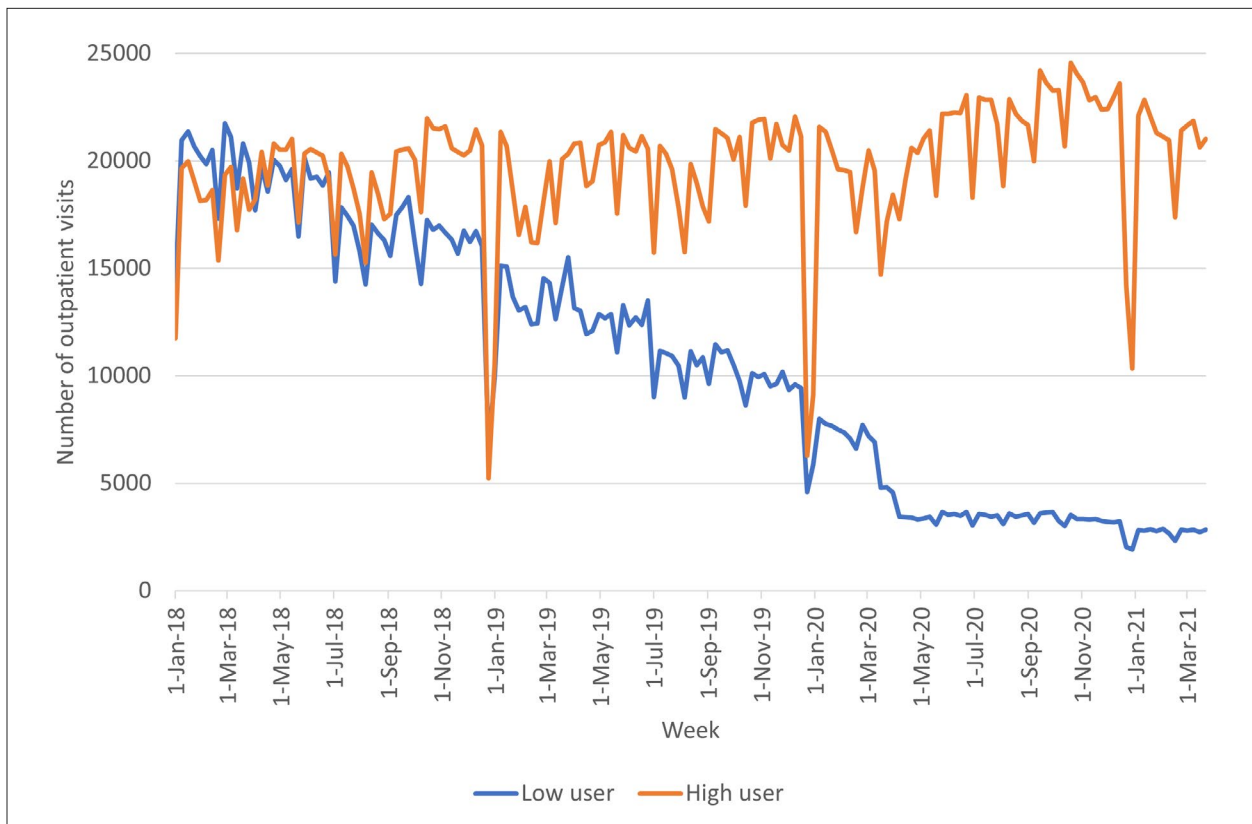


FIGURE 3C. Number of outpatient visits among patients with dementia

use becomes a more universal mode of health-care delivery. Surprisingly, there were no differences in telemedicine rates by neighbourhood income level, which mirrors the findings from our previous study on telemedicine in the general Ontario population.<sup>(4)</sup> However, these findings are based on population-level data and may not be applicable at the individual level. Of the physician specialties assessed, psychiatrists provided the most telemedicine to older-adult patients. The prevalent use of telemedicine in psychiatry has been cited elsewhere, since most psychiatric examinations do not require in-person interactions.<sup>(18,19)</sup> Furthermore, the isolation measures and loneliness affecting older adults during the pandemic may have led to increased virtual psychiatry care, as well.

Among patients with dementia, hospitalization and ED visit volumes during the pandemic were lower among low users than high users. Possibly low users were less ill, or that the care for these individuals was disrupted during the pandemic due to reasons such as caregiver burnout.<sup>(20)</sup> In contrast, higher volumes among the high users could suggest that telemedicine use was an avenue which allowed patients to remain connected with the health-care system during the pandemic. Trends in outpatient visits among high users remained unaffected from the pandemic compared to the decrease seen among low users, suggesting that health-care facilities in the province were successful in rapidly implementing telemedicine services to maintain outpatient volumes and access to care.<sup>(21,22)</sup> For both user groups, laboratory tests dropped when the pandemic

began, consistent with the Ontario government’s directive to ramp down elective surgeries and other non-emergent procedures to preserve resources.<sup>(23)</sup> This could also be explained by more judicious testing given the barriers to delivering health care during this time. However, volumes rose to pre-pandemic levels shortly after for high users only, and may be explained by increased test ordering by physicians out of caution when patients could not be seen in-person.

Limitations of this study include a lack of clinical granularity that accompanies the use of administrative data, which prohibited us from assessing appropriateness of the visits. Furthermore, although the new COVID-19 telemedicine billing codes issued in Ontario allowed for reimbursement of both telephone and video visits, there is a lack of data that distinguishes the type of modality used during the visits.

This short report summarizes the use of telemedicine and other health-care services within the older-adult population in Ontario before and during the COVID-19 pandemic. Telemedicine use surged in this population due to COVID-19, despite concerns that older adults may have issues with access to telemedicine for reasons such as physical or mental disabilities, or inexperience with technology.<sup>(10-12)</sup> Telemedicine likely helped older-adult patients, including those with dementia, maintain access to the health-care system for their needs during a time when physical interactions were restricted. While there may be significant barriers for older adults in accessing telemedicine, some research is

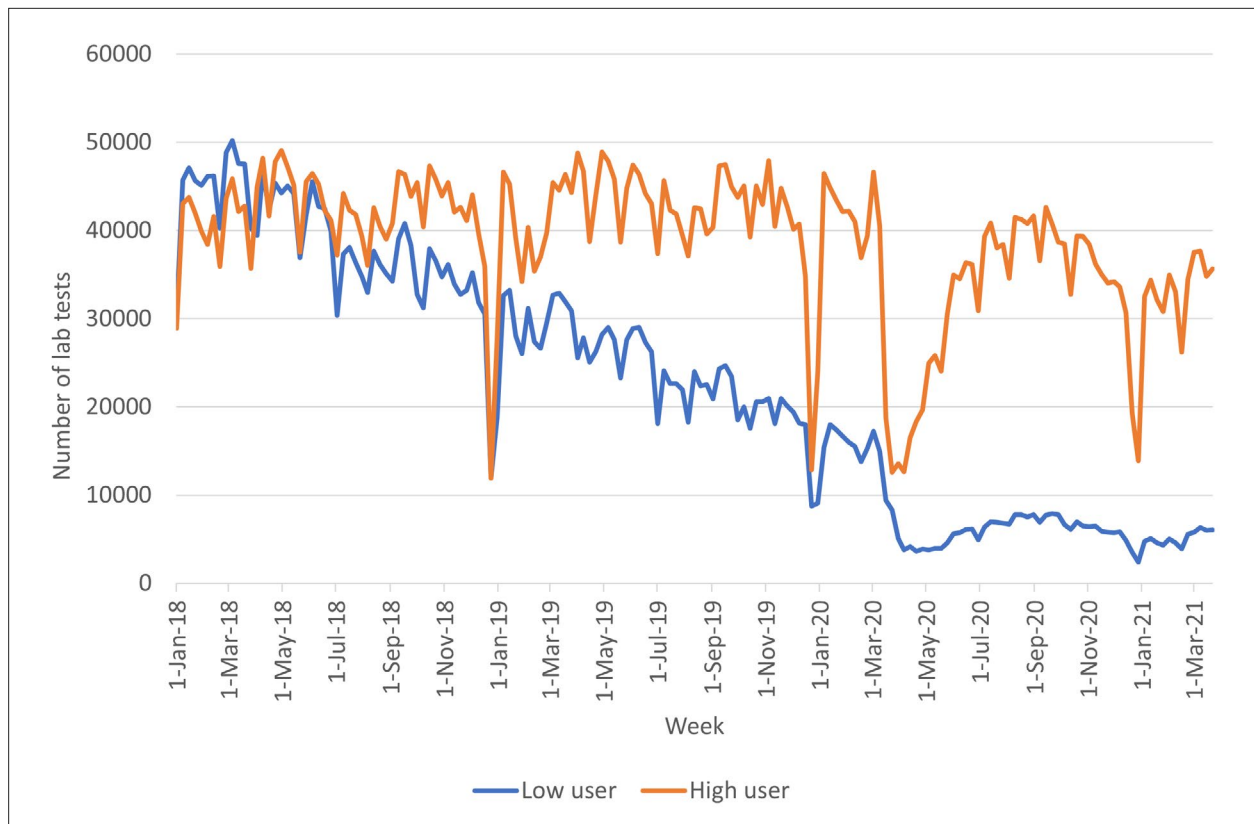


FIGURE 3D. Number of lab tests among patients with dementia

exploring how to improve older-adults' experiences and acceptance of telemedicine modalities.<sup>(24,25)</sup> Future research should seek to identify the effect of other demographic characteristics on telemedicine use in older adults, such as recent immigration or literacy level, and to understand the net benefit of telemedicine compared to in-person care on patient outcomes.

## ACKNOWLEDGEMENTS

This study was supported by ICES, which is funded by an annual grant from the Ontario Ministry of Health (MOH) and the Ministry of Long-Term Care (MLTC). Parts of this material are based on data and information compiled and provided by MOH and the Canadian Institute for Health Information (CIHI).

## CONFLICT OF INTEREST DISCLOSURES

We have read and understood the Canadian Geriatrics Journal's policy on conflicts of interest disclosure and declare no conflicts of interest.

## FUNDING

This study received funding from Canada Health Infoway, an independent, federally funded, not-for-profit organization. The analyses, conclusions, opinions and statements expressed herein are solely those of the authors and do not reflect those of the funding or data sources; no endorsement is intended or should be inferred.

## REFERENCES

- Centers for Disease Control and Prevention. Using Telehealth to Expand Access to Essential Health Services during the COVID-19 Pandemic. 2020 [updated June 10, 2020. Available from: <https://www.cdc.gov/coronavirus/2019-ncov/hcp/telehealth.html>
- Patel SY, Mehrotra A, Huskamp HA, Uscher-Pines L, Ganguli I, Barnett ML. Variation in telemedicine use and outpatient care during the COVID-19 pandemic in the United States. *Health Aff*. 2021 Feb 1;40(2):349–58.
- Mehrotra A, Bhatia RS, Snoswell CL. Paying for telemedicine after the pandemic. *JAMA*. 2021 Feb 2;325(5):431–32.
- Bhatia RS, Chu C, Pang A, Tadrus M, Stamenova V, Cram P. Virtual care use before and during the COVID-19 pandemic: a repeated cross-sectional study. *CMAJ open*. 2021 Jan 1;9(1):E107–E114.
- Ontario Ministry of Health and Long-Term Care. Ontario Health insurance Plan. OHIP Bulletins. Re: Virtual Care Program—Billing Amendments to Enable Direct-to-Patient Video Visits and Modernize Virtual Care Compensation. Bulletin #4731. Claims Services Branch, Ministry of Health; 2019 [updated November 15, 2019. Available from: <https://www.health.gov.on.ca/en/pro/programs/ohip/bulletins/4000/bul4731.aspx>
- Ontario Ministry of Health and Long-Term Care. Ontario Health insurance Plan. OHIP Bulletins. Re: Changes to the Schedule of Benefits for Physician Services (Schedule) in response to COVID-19 influenza pandemic effective March 14, 2020. Bulletin #4745. Health Services Branch, Ministry of Health; 2020 [updated March 13, 2020. Available from: <https://www.health.gov.on.ca/en/pro/programs/ohip/bulletins/4000/bul4745.aspx>
- Vegda K, Nie JX, Wang L, Tracy CS, Moineddin R, Upshur RE. Trends in health services utilization, medication use, and health conditions among older adults: a 2-year retrospective chart review in a primary care practice. *BMC Health Serv Res*. 2009 Dec;9(1):217.
- Griffith LE, Gruneir A, Fisher K, et al. Insights on multimorbidity and associated health service use and costs from three population-based studies of older adults in Ontario with diabetes, dementia and stroke. *BMC Health Serv Res*. 2019 Dec;19(1):313.
- 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 care partners living in the community. *Dementia*. 2021 Aug;20(6):2007–23.
- Kim EH, Stolyar A, Lober WB, et al. Challenges to using an electronic personal health record by a low-income elderly population. *J Med Internet Res*. 2009 Oct 27;11(4):e1256.
- Ware P, Bartlett SJ, Paré G, et al. Using eHealth technologies: interests, preferences, and concerns of older adults. *Interact J Med Res*. 2017 Mar 23;6(1):e4447.
- Kruse C, Fohn J, Wilson N, Patlan EN, Zipp S, Mileski M. Utilization barriers and medical outcomes commensurate with the use of telehealth among older adults: systematic review. *JMIR Med Inform*. 2020 Aug 12;8(8):e20359.
- Sachs JW, Graven P, Gold JA, Kassakian SZ. Disparities in telephone and video telehealth engagement during the COVID-19 pandemic. *JAMA Open*. 2021 Jul;4(3):o0ab056.
- 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 Nov 10;3(2):e23176.
- O’Gorman LD, Hogenbirk JC, Warry W. Clinical telemedicine utilization in Ontario over the Ontario Telemedicine Network. *Telemed e-Health*. 2016 Jun 2;22(6):473–79.
- Larson SL, Fleishman JA. Rural-urban differences in usual source of care and ambulatory service use: analyses of national data using urban influence codes. *Med Care*. 2003 Jul 1; 41(7):11165–74.
- Sibley LM, Weiner JP. An evaluation of access to health care services along the rural-urban continuum in Canada. *BMC Health Services Res*. 2011 Dec;11(1):20.
- Öngür D, Perlis R, Goff D. Psychiatry and COVID-19. *JAMA*. 2020 Sept 22;324(12):1149–50.
- Shore JH, Schneck CD, Mishkind MC. Telepsychiatry and the coronavirus disease 2019 pandemic—current and future outcomes of the rapid virtualization of psychiatric care. *JAMA Psychiatry*. 2020 Dec 1;77(12):1211–12.
- Borelli WV, Augustin MC, de Oliveira PB, et al. Neuropsychiatric symptoms in patients with dementia associated with increased psychological distress in caregivers during the COVID-19 pandemic. *J Alzheimers Dis*. 2021 Jan 1;80(4):1705–12.
- Berlin A, Lovas M, Truong T, et al. Implementation and outcomes of virtual care across a tertiary cancer center during COVID-19. *JAMA Oncol*. 2021 Apr 1;7(4):597–602.
- Glazier RH, Green ME, Wu FC, Frymire E, Kopp A, Kiran T. Shifts in office and virtual primary care during the early COVID-19 pandemic in Ontario, Canada. *Can Med Assoc J*. 2021 Feb 8;193(6):E200–E210.



23. Ontario Health. A Measured Approach to Planning for Surgeries and Procedures During the COVID-19 Pandemic. 2020 May 7 [updated June 15]. Available from: <https://www.ontariohealth.ca/sites/ontariohealth/files/2020-05/A%20Measured%20Approach%20to%20Planning%20for%20Surgeries%20and%20Procedures%20During%20the%20COVID-19%20Pandemic.pdf>
24. Haase KR, Cosco T, Kervin L, Riadi I, O’Connell ME. Older adults’ experiences with using technology for socialization during the COVID-19 pandemic: cross-sectional survey study. *JMIR Aging*. 2021 Apr 23;4(2):e28010.
25. O’Connell ME, Haase KR, Grewal KS, *et al*. Overcoming barriers for older adults to maintain virtual community and social connections during the COVID-19 pandemic. *Clin Gerontol*. 2022 Jan 1;45(1):159–71.

**Correspondence to:** Mina Tadrous, Women’s College Hospital Institute for Health System Solutions and Virtual Care, 76 Grenville Street, 6<sup>th</sup> Floor, Toronto, ON M5S 1B2  
**E-mail:** [Mina.tadrous@wchospital.ca](mailto:Mina.tadrous@wchospital.ca)

### APPENDIX A. ICES Administrative Databases Used In Study

A list of administrative databases used is shown in the table below. Databases were linked using unique encoded identifiers and analyzed at ICES, formerly the Institute for Clinical Evaluative Sciences, an independent, non-profit research institute whose legal status under Ontario’s health information privacy law allows it to collect and analyze health-care and demographic data, without consent, for health system evaluation and improvement. Use of these databases for the purposes of this study was authorized under §45 of Ontario’s Personal Health Information Protection Act, which does not require review by a research ethics board.

<i>Name of Database</i>	<i>Type of Data Collected</i>
Registered Persons Database (RPDB)	Demographic information of all patients covered under the Ontario Health Insurance Plan
Ontario Health Insurance Plan (OHIP)	All health services delivered by physicians to Ontario patients who are eligible for coverage
Discharge Abstract Database (DAD)	All inpatient hospital admissions
National Ambulatory Care Reporting System (NACRS)	All hospital- and community-based ambulatory care (including ED visits)
Ontario Dementia Database	ICES-validated registry of all patients diagnosed with dementia
Postal Code Conversion File (PCCF)	Converts all patient postal codes to neighbourhood income quintiles

### APPENDIX B. Summary of Methods

Rates of telemedicine visits were calculated for each week (Sunday to Saturday) from January 1st, 2018 to March 29th, 2021. The denominator for each week’s rate calculation includes all residents of Ontario who were age 65 and above during the week and eligible for health-care services in Ontario (i.e. OHIP-insured). Individuals who are non-Ontario residents or are currently residing in long-term care were excluded from analysis.

All OHIP billing codes used to identify telemedicine visits are available in the table below. We summarized the overall rates of telemedicine use within the older-adult population, as well as compared rates by physician specialty and across the following patient subgroups: age group, income quintile, and rurality.

We also compared utilization of the following health-care services between high and low users of telemedicine who were diagnosed with dementia: hospitalizations, ED visits, outpatient visits, and laboratory testing.

High users were defined as patients who received 2 or more virtual visits after March 14, 2020, while low users were defined as patients who received zero or one virtual visits after March 14, 2020. March 14, 2020 was considered the start date of the COVID-19 pandemic as it was the day that new temporary billing codes were introduced by the Ontario government which expanded physician reimbursement of telemedicine services in response to the pandemic. All analyses were performed in SAS 9.4 (SAS Institute).

<i>Time Period</i>	<i>Billing Codes</i>	<i>Modality</i>
January 1, 2012- March 31, 2021	B100, B200, B099	Video-visit
April 1, 2020- March 31, 2021	B103, B203, B209	Video-visit
March 14, 2020- March 31, 2021	K080, K081, K082, K083	Video and telephone visits

**APPENDIX C. Patient Demographics  
For Older-adult Population in Ontario  
(Total N = 2,282,798)**

<i>Characteristic</i>	<i>n (%)</i>
Number of virtual visits, mean (SD)	5.14 (5.88)
<b>Age</b>	
65-74	1,539,340 (67.4%)
75-84	567,625 (24.9%)
85+	175,833 (7.7%)
<b>Sex</b>	
Female	1,233,462 (54.0%)
Male	1,049,336 (46.0%)
<b>Neighbourhood income quintile</b>	
1	432,945 (19.0%)
2	469,631 (20.6%)
3	458,824 (20.1%)
4	439,791 (19.3%)
5	476,247 (20.9%)
<b>Rurality</b>	
Urban	2,060,282 (90.3%)
Rural	200,182 (8.8%)
<b>Region</b>	
Central	690,994 (30.3%)
East	599,098 (26.2%)
North	144,377 (6.3%)
Toronto	174,752 (7.7%)
West	673,577 (29.5%)
<b>Chronic conditions</b>	
COPD	188,974 (8.3%)
CHF	202,396 (8.9%)
Asthma	223,451 (9.8%)
Hypertension	1,583,965 (69.4%)
Angina	166,430 (7.3%)
Diabetes	721,699 (31.6%)
Mental Health	751,608 (32.9%)
Dementia	68,528 (3.0%)