# Supplemental Online Content

Bronskill SE, Maclagan LC, Maxwell CJ, et al. Trends in health service use for Canadian adults with dementia and Parkinson disease during the first wave of the COVID-19 pandemic. *JAMA Health Forum*. 2022;3(1):e214599. doi:10.1001/jamahealthforum.2021.4599

**eTable 1.** Administrative data algorithms for neurodegenerative diseases

**eTable 2.** Rates of health service use for key weeks by community-dwelling persons with dementia, persons with Parkinson disease and older adults during the historical and pandemic periods in Ontario, Canada

**eTable 3.** Rate ratios for mortality in community-dwelling persons with dementia, persons with Parkinson disease and older adults comparing the COVID-19 pandemic period with the historical period in Ontario, Canada, by age group

This supplemental material has been provided by the authors to give readers additional information about their work.

**eTable 1. Administrative data algorithms for neurodegenerative diseases**

|  | Algorithm | Validated |
|---|---|---|
| **Alzheimer's and related dementias**[1] | 1 hospitalization or same-day surgery for dementia *and/or* 3 physician visits for dementia within 2 years (each at least 30 days apart) *and/or* filled prescription for a cholinesterase inhibitor | Yes, Se=79.3%, Sp=99.1%, PPV=80.4%, NPV=99.0% |
| **Parkinson disease**[2] | 3 physician visits for Parkinson's disease within 2 years (each at least 30 days apart) | Yes, Se=72.3%, Sp=100.0%, PPV=82.1%, NPV=99.9% |
| **Amyotrophic lateral sclerosis (ALS)** | Filled prescription for Riluzole with an electromyography test prior to first prescription | No |

Se= sensitivity; Sp=specificity; PPV= positive predictive value; NPV=negative predictive value

**References**

1.  Jaakkimainen RL, Bronskill SE, Tierney MC, et al. Identification of physician-diagnosed Alzheimer's disease and related dementias in population-based administrative data: a validation study using family physicians' electronic medical records. *Journal of Alzheimer's Disease*. 2016;54(1):337-349.
2.  Maclagan LC, Visanji NP, Cheng Y, et al. Identifying drugs with disease-modifying potential in Parkinson's disease using artificial intelligence and pharmacoepidemiology. *Pharmacoepidemiology and drug safety*. 2020;29(8):864-872.

**eTable 2. Rates of health service use for key weeks by community-dwelling persons with dementia, persons with Parkinson disease and older adults[a] during the historical and pandemic periods[b] in Ontario, Canada**

| Rate per 100 persons per week | Dementia 2019 | Dementia 2020 | Parkinson Disease 2019 | Parkinson Disease 2020 | Older Adults 2019 | Older Adults 2020 |
|---|---|---|---|---|---|---|
| **Emergency department visits** | | | | | | |
| Starting rate[c] | 1.52 | 1.42 | 1.30 | 1.13 | 0.75 | 0.72 |
| Week of minimum rate[d] | | 12APR2020 | | 12APR2020 | | 29MAR2020 |
| Minimum rate | 1.62 | 0.72 | 1.45 | 0.59 | 0.79 | 0.36 |
| Week of maximum rate[d] | | 20SEP2020 | | 30AUG2020 | | 02AUG2020 |
| Maximum rate | 1.64 | 1.61 | 1.44 | 1.42 | 0.88 | 0.78 |
| Latest rate[e] | 1.64 | 1.61 | 1.46 | 1.40 | 0.84 | 0.76 |
| **Hospital admissions** | | | | | | |
| Starting rate[c] | 0.85 | 0.82 | 0.63 | 0.63 | 0.31 | 0.29 |
| Week of minimum rate[d] | | 29MAR2020 | | 05APR2020 | | 05APR2020 |
| Minimum rate | 0.80 | 0.49 | 0.58 | 0.35 | 0.31 | 0.16 |
| Week of maximum rate[d] | | 05JUL2020 | | 19JUL2020 | | 01MAR2020 |
| Maximum rate | 0.82 | 0.84 | 0.57 | 0.67 | 0.31 | 0.29 |
| Latest rate[e] | 0.79 | 0.74 | 0.58 | 0.59 | 0.30 | 0.28 |
| **Hospital discharges** | | | | | | |
| Starting rate[c] | 0.96 | 0.93 | 0.66 | 0.54 | 0.30 | 0.30 |
| Week of minimum rate[d] | | 19APR2020 | | 12APR2020 | | 12APR2020 |
| Minimum rate | 0.90 | 0.52 | 0.52 | 0.34 | 0.30 | 0.16 |
| Week of maximum rate[d] | | 23AUG2020 | | 23AUG2020 | | 01MAR2020 |
| Maximum rate | 0.87 | 0.95 | 0.56 | 0.73 | 0.30 | 0.30 |
| Latest rate[e] | 0.90 | 0.91 | 0.55 | 0.67 | 0.30 | 0.28 |
| **Hospital discharges with a delay** | | | | | | |
| Starting rate[c] | 0.27 | 0.26 | 0.18 | 0.10 | 0.02 | 0.02 |
| Week of minimum rate[d] | | 19APR2020 | | 19APR2020 | | 12APR2020 |
| Minimum rate | 0.24 | 0.11 | 0.15 | 0.05 | 0.02 | 0.01 |
| Week of maximum rate[d] | | 22MAR2020 | | 22MAR20200 | | 15MAR2020 |
| Maximum rate | 0.25 | 0.34 | 0.12 | 0.18 | 0.02 | 0.02 |
| Latest rate[e] | 0.23 | 0.26 | 0.11 | 0.16 | 0.02 | 0.02 |
| **Total physician visits** | | | | | | |
| Starting rate[c] | 22.54 | 22.05 | 24.65 | 23.48 | 16.20 | 15.75 |
| Week of minimum rate[d] | | 15MAR2020 | | 15MAR2020 | | 05APR2020 |
| Minimum rate | 22.47 | 15.65 | 23.4 | 15.46 | 17.2 | 10.19 |
| Week of maximum rate[d] | | 13SEP2020 | | 13SEP2020 | | 13SEP2020 |
| Maximum rate | 23.25 | 25.01 | 25.52 | 26.61 | 16.98 | 16.85 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Latest rate^e | 22.97 | 24.39 | 24.01 | 26.19 | 16.98 | 16.62 |
| **Total family physician visits** | | | | | | |
| Starting rate^c | 13.78 | 13.63 | 12.29 | 11.79 | 9.09 | 8.73 |
| Week of minimum rate^d | | 15MAR2020 | | 15MAR2020 | | 05APR2020 |
| Minimum rate | 14.09 | 11.00 | 12.46 | 9.40 | 9.66 | 6.07 |
| Week of maximum rate^d | | 13SEP2020 | | 13SEP2020 | | 13SEP2020 |
| Maximum rate | 14.13 | 16.10 | 12.73 | 14.187 | 9.49 | 9.59 |
| Latest rate^e | 14.13 | 15.50 | 12.54 | 13.58 | 9.46 | 9.49 |
| **Total specialist visits** | | | | | | |
| Starting rate^c | 8.77 | 8.42 | 12.36 | 11.69 | 7.11 | 7.02 |
| Week of minimum rate^d | | 15MAR2020 | | 15MAR2020 | | 15MAR2020 |
| Minimum rate | 8.38 | 4.66 | 10.97 | 6.07 | 6.74 | 3.62 |
| Week of maximum rate^d | | 13SEP2020 | | 20SEP2020 | | 13SEP2020 |
| Maximum rate | 9.12 | 9.12 | 11.47 | 12.82 | 7.48 | 7.37 |
| Latest rate^e | 8.84 | 9.08 | 11.47 | 12.82 | 7.52 | 7.24 |
| **Total neurologist visits** | | | | | | |
| Starting rate^c | 0.56 | 0.53 | 3.5 | 3.3 | 0.12 | 0.12 |
| Week of minimum rate^d | | 15MAR2020 | | 15MAR2020 | | 15MAR2020 |
| Minimum rate | 0.50 | 0.27 | 2.92 | 1.51 | 0.10 | 0.06 |
| Week of maximum rate^d | | 20SEP2020 | | 16AUG2020 | | 20SEP2020 |
| Maximum rate | 0.46 | 0.61 | 3.00 | 4.02 | 0.11 | 0.13 |
| Latest rate^e | 0.46 | 0.61 | 2.48 | 3.76 | 0.11 | 0.13 |
| **Home care visits** | | | | | | |
| Starting rate^c | 206.52 | 214.25 | 152.02 | 157.13 | 17.01 | 18.52 |
| Week of minimum rate^d | | 26APR2020 | | 05APR2020 | | 05APR2020 |
| Minimum rate | 207.85 | 176.52 | 153.74 | 122.92 | 17.30 | 15.00 |
| Week of maximum rate^d | | 01MAR2020 | | 01MAR2020 | | 01MAR2020 |
| Maximum rate | 206.52 | 214.24 | 152.02 | 157.13 | 17.01 | 18.52 |
| Latest rate^e | 210.61 | 212.19 | 153.31 | 153.05 | 17.77 | 17.87 |
| **Long-term care admission** | | | | | | |
| Starting rate^c | 0.27 | 0.25 | 0.11 | 0.10 | 0.01 | 0.01 |
| Week of minimum rate^d | | 19APR2020 | | 26APR2020 | | 10MAY2020 |
| Minimum rate | 0.22 | 0.02 | 0.12 | 0.003 | 0.006 | 0.0007 |
| Week of maximum rate^d | | 01MAR2020 | | 22MAR2020 | | 08MAR2020 |
| Maximum rate | 0.27 | 0.25 | 0.11 | 0.12 | 0.006 | 0.007 |
| Latest rate^e | 0.21 | 0.16 | 0.08 | 0.09 | 0.006 | 0.003 |
| **Mortality** | | | | | | |
| Starting rate^c | 0.17 | 0.16 | 0.09 | 0.08 | 0.04 | 0.04 |
| Week of minimum rate^d | | 07JUN2020 | | 03MAY2020 | | 02AUG2020 |
| Minimum rate | 0.16 | 0.15 | 0.11 | 0.07 | 0.03 | 0.03 |
| Week of maximum rate^d | | 10MAY2020 | | 31MAY2020 | | 05APR2020 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Maximum rate | 0.15 | 0.21 | 0.09 | 0.15 | 0.04 | 0.04 |
| Latest rate[e] | 0.17 | 0.17 | 0.09 | 0.13 | 0.03 | 0.04 |

[a] Older adults include persons aged 65 years and older without a diagnosis of neurodegenerative diseases.

[b] 2019 - historical period starts the week of March 3rd 2019; 2020 - COVID-19 pandemic period starts the week of March 1st 2020.

[c] The starting rate indicates the weekly rate as of the start of the COVID-19 pandemic period (week starting March 1st 2020) and the equivalent week in 2019 (week starting March 3rd 2019) for all services.

[d] Minimum and maximum rates are calculated based on the minimum and maximum rate during the 2020 pandemic period. Historical 2019 rates are calculated based on rates for the equivalent week a year prior to the 2020 COVID-19 pandemic.

[e] The latest rate indicates the rate as of the latest week during the study period (week of Sept 20th 2020 for the COVID-19 pandemic and week of Sept 22nd 2019 for the historical period) for all services.

**eTable 3. Rate ratios for mortality in community-dwelling persons with dementia, persons with Parkinson disease and older adults[a] comparing the COVID-19 pandemic period with the historical period in Ontario, Canada, by age group**

| | Rate ratios (95% confidence intervals) | | Cumulative change in number of outcomes[c], N |
| | At highest rate in 2020 | At latest week[b] | |
|---|---|---|---|
| **DEMENTIA** | | | |
| <75 years | **2.57 (1.41, 4.67)** | 1.21 (0.73, 2.02) | 134 |
| 75-84 years | **1.65 (1.16, 2.34)** | 0.89 (0.62, 1.26) | 328 |
| ≥85 years | **1.41  (1.11, 1.78)** | 1.08 (0.85, 1.37) | 630 |
| **PARKINSON DISEASE** | | | |
| <75 years | 2.78 (0.89, 8.73) | 2.78 (0.89, 8.73) | 37 |
| 75-84 years | 1.53 (0.78, 2.99) | 0.99 (0.44, 2.20) | 60 |
| ≥85 years | 1.73 (0.85, 3.51) | 1.44 (0.67, 3.10) | 53 |
| **OLDER ADULTS** | | | |
| <75 years | 1.06 (0.90, 1.25) | 1.14 (0.96, 1.35) | 413 |
| 75-84 years | 1.06 (0.91, 1.23) | 1.09 (0.93, 1.29) | 500 |
| ≥85 years | 1.14 (0.98, 1.34) | 1.05 (0.89, 1.24) | 568 |

Bolded numbers indicate statistical significance at P < 0.05.
[a]Older adults include persons aged 65 years and older without a diagnosis of neurodegenerative diseases.
[b]The latest weekly rate is as of September 20, 2020 and September 22, 2019 for all services.
[c]The cumulative change in the number of outcomes was calculated comparing the number of events within the pandemic period (March 1 to September 20, 2020) and historical period (March 3 and September 22, 2019). Negative values indicate a decreased number of events in the 2020 COVID-19 pandemic period.