# SUPPLEMENTARY INFORMATION

**For: “A model predicting healthcare capacity gaps for Alzheimer’s disease modifying treatment in Canada.”**

**Table S1. Model variables/assumptions for health care capacity demand**

|  |  |  |  |
| --- | --- | --- | --- |
| **Canadian Population** |  |  |  |
| **Population (by province, 50 years and older)** | Newfoundland (NL)  Prince Edward Island (PEI)  Nova Scotia (NS)  New Brunswick (NB)  Quebec (QC)  Ontario (ON)  Manitoba (MB)  Saskatchewan (SK)  Alberta (AB)  British Columbia (BC) | 243,745  66,627  432,700  353,741  3,514,980  5,653,744  476,676  408,241  1,447,376  2,096,282 | [Statistics Canada](https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1710000501&pickMembers%5B0%5D=1.10&pickMembers%5B1%5D=2.1&cubeTimeFrame.startYear=2021&cubeTimeFrame.endYear=2021&referencePeriods=20210101%2C20210101) |
| **Existing patient demand** |  |  |  |
| **AD disease prevalence rate** | AD dementia | 3.1-32.2% (varies with age) | [Herbert et al., 2013](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3719424/) |
| MCI | 6.7-25.2% | [Petersen et al., 2018](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5772157/) |
| **Access to Primary care** |  | 85.5% |  |
| **Diagnostic rate** | AD | 60% | The Dieringer Research Group, Inc. |
| MCI | 20% | The Dieringer Research Group, Inc. |
| **% Mild AD** | Prevalence of patients with Mild AD (vs moderate and severe) over the AD Dx population | 48% | [Hebert et al., 2003](https://jamanetwork.com/journals/jamaneurology/fullarticle/784558) |
| **MCI diagnosed prevalence** | AD dementia etiology among patients with MCI | 40% | [Monfared et al., 2022](https://pubmed.ncbi.nlm.nih.gov/35286590/) |
| **New patient demand** |  |  |  |
| **Subjective memory symptoms (SMS)** | prevalence of memory-related subjective memory complaint | 53% | [Luck et al., 2018](https://bmcpsychology.biomedcentral.com/articles/10.1186/s40359-018-0236-1) |
| **Care seeking behaviour** | % of individuals seeking care (SMS only) | 23% | [Steward et al., 2012](https://pubmed.ncbi.nlm.nih.gov/23127423/) |
| **Screening rate** | screening rate of individuals with SMS | 71% | [Judge et al., 2019](https://pubmed.ncbi.nlm.nih.gov/30937189/) |
| Non-SMS access to annual check-up visit | 60% | [NAMC survey, 2016](https://www.cdc.gov/nchs/data/ahcd/namcs_summary/2016_namcs_web_tables.pdf) |
| Non-SMS percentage of cognitive test performed at the annual check-up | 16% | [Alzheimer’s Association et al., 2019](https://www.alz.org/news/2019/new-alzheimer-s-association-report-shows-signifi#:~:text=The%20report%20found%20that%20just,%2C%20diabetes%20(66%20percent)%20and) |
| **Screening positivity at primary care** |  |  |  |
| **Prevalence rate AD** | Alzheimer’ disease dementia (prevalence) | 3.1%-32.2%  (Age based) | [Herbert et al., 2013](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3719424/) |
| **Prodromal AD Dx** | Mild cognitive impairment (prevalence) | 6.7%-25.2%  (Age based) | [Petersen et al., 2018](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5772157/) |
| **Diagnostic rate** | Rate of diagnosed AD | 60% | DRG |
| **Early AD Dx** | Rate of diagnosed MCI | 20% |  |
| **Progression rate** |  | 2.17 times | [Parfenov et al., 2020](https://www.scielo.br/j/dn/a/yZ7C4Lr9WBjQNs9mSxzHYZk/?lang=en) |
| **Weighted average undiagnosed prevalence** | Calculated weighted average of undiagnosed mild Alzheimer’s disease | General population (non-SMS): 0.66%  SMS: 1.30% |  |
| Calculated weighted average of undiagnosed mild Mild cognitive impairment | General population (non-SMS): 3.40%  SMS: 6.80% |  |
| **Sensitivity of the MoCA** | MoCA rate to correctly identify patients with MCI | 90% | [Nasreddine et al., 2005](https://pubmed.ncbi.nlm.nih.gov/15817019/) |
| MoCA rate to correctly identify patients with mild Alzheimer’s disease | 100% |  |
| **Specificity** | MoCA rate of false positivity result | 13% |  |
| **Referral rate to specialist** | % of individuals referred to a specialist following a positive MoCA result | 80% | [Mattke and Hanson, 2021](https://alz-journals.onlinelibrary.wiley.com/doi/full/10.1002/alz.12470) |
| **Aβ Positivity** |  |  |  |
| **% Aβ positivity** | Prevalence of patients with Aβ positivity over the Mild AD population | 88% | [Ossenkopple et al., 2015](https://jamanetwork.com/journals/jama/article-abstract/2293296) |
| Prevalence of patients with Aβ positivity over the MCI population | 55% | [Okello et al., 2009](https://n.neurology.org/content/73/10/754.short) |
| **Treatment rate** | Share of patient with amyloid who have no contraindications and are treated | 80% | Steering committee input |
| **Market share** | Proportion of patients receiving SC | 25% | Steering committee input |
| Proportion of patients receiving IV administered products | 75% | Steering committee input  (At the time data was collected, Sept 2022, only lecanemab had positive phase 3 data which led to the heavier weighting of this treatment) |

*Undiagnosed patients were divided into two groups; those with subjective memory symptoms (SMS) and those without. Patients without SMS were expected to undergo screening during their annual primary care visit. In patients with SMS, the model accounted for an increased rate of screening proportional to an anticipated increase in care seeking behavior. Rates for new early AD due to dementia and MCI (based on prevalent undiagnosed patient population) were then applied to the total screened new patient population. All newly diagnosed patients were assumed to present in the mild stage of disease.*

**Table S2. Model variables/assumptions for health care resources required**

|  |  |  |  |
| --- | --- | --- | --- |
| **Resources required (per year)** | **Variable** | **Variable assumption** | **Reference** |
| **Primary care provider** | Screening: | 40 min | [alzheimersdisease.net](https://alzheimersdisease.net/physical-neurological-exam), 2019  [Fernandes et al., 2021](https://pubmed.ncbi.nlm.nih.gov/34380424/) |
| **AD physician** | Diagnosis:  Eligibility:  SC titration:  IV:  Monitoring: | 180 min  110 min  10 min x 4  10 min x 4  70 min x 4 | [Scharre, 2019](https://practicalneurology.com/articles/2019-june/preclinical-prodromal-and-dementia-stages-ofalzheimers-disease)  [alzheimersdisease.net](https://alzheimersdisease.net/physical-neurological-exam), 2019  [Mayo Clinic](https://www.mayoclinic.org/tests-procedures/lumbar-puncture/about/pac-20394631) |
| **Nurse** | Diagnosis:  Eligibility:  SC titration:  SC sustained:  IV: | 15 min  5 min CSF / 30 min PET  50 min x 4  27.5 min x 14  100 min x 14 or 28 | [Mayo Clinic](https://www.mayoclinic.org/tests-procedures/lumbar-puncture/about/pac-20394631)  Cock et al., 2016 |
| **Pharmacist** | SC titration:  SC sustained:  IV: | 20 min x 3  20 min x 4  20 min x 4 or 8 |  |
| **Imaging specialist (nuclear medicine / radiologist)** | Diagnosis:  Eligibility:  Monitoring: | 20 min  45 min  20 min x 3 |  |
| **Technologist** | Diagnosis:  Eligibility:  Monitoring: | 30 min  35 min  30 min x 3 |  |
| **MRI** | Diagnosis:  Monitoring: | 1 slot  1 slot x 3 |  |
| **PET scan** | Eligibility: | 1 slot |  |
| **Other** |  |  |  |
| **# Patients supervised by the same nurse during infusions** |  | 8 |  |
| **% Patients receiving CSF Aβ testing vs. PET Aβ testing** |  | 50% / 50% |  |
| **% Patients experiencing ARIA-E for SC** |  | 25% | R. Bateman et al. Topline results of phase III GRADUATE I & II pivotal trials with subcutaneous gantenerumab. Oral Presentation at CTAD 2022 |
| **% Patients experiencing ARIA-E for IV** |  | 13% | Van Dyck CH, et al. NEJM 2023; 388:9-21 |

Note: IV time allocations are for titration and full dose.

**Table S3. Model variables/assumptions for health care capacity available**

|  |  |  |  |
| --- | --- | --- | --- |
| **Resources available (potential, prior to allocation to AD care), Nationally\*** | **Variable** | **Variable assumption** | **Reference** |

|  |  |  |  |
| --- | --- | --- | --- |
| \*Territories excluded |  |  |  |
| **# PCP** | National number of family medicine physicians | 43,366 | [CMA 2019](https://www.cma.ca/sites/default/files/pdf/Physician%20Data/01-physicians-by-specialty-province-e.pdf) |
| **# AD physicians** | Total geriatricians (327), neurologists (1,172) and psychiatrist (5,410) | 6,905 | CIHI Physician 2020 |
|  | % Allocation to dementia care  Neurologists  Geriatricians  Psychiatrist | 10%  10%  2.3% | [Pedroza et al., 2022](https://www.thelancet.com/cms/10.1016/j.eclinm.2022.101337/attachment/ff2804a0-c13d-4efc-b267-f3f902c68af5/mmc1.pdf) |
| **# General nurse** | Provincial number of nurses (includes NPs, RNs, Psychiatric nurse)  The number of nurses for Manitoba and PEI were not available for 2021. For these instances, the number of nurses available for Manitoba and PEI was taken for the latest available date, 2018 and 2020, respectively. | 274,961 | [Nursing in Canada CIHI 2020](https://www.cihi.ca/sites/default/files/document/nursing-in-canada-2011-2020-data-tables-en.xlsx) |
|  | % Allocation to dementia care | 2.3% | [Pedroza et al., 2022](https://www.thelancet.com/cms/10.1016/j.eclinm.2022.101337/attachment/ff2804a0-c13d-4efc-b267-f3f902c68af5/mmc1.pdf) |
| **# Pharmacist** | Total # licensed pharmacists | 47,106 | [NAPRA National Statistics](https://www.napra.ca/national-statistics), 2022 |
|  | % Allocation to dementia care | 2.3% | [Pedroza et al., 2022](https://www.thelancet.com/cms/10.1016/j.eclinm.2022.101337/attachment/ff2804a0-c13d-4efc-b267-f3f902c68af5/mmc1.pdf) |
| **# Imaging specialists** | Provincial # of nuclear medicine specialists | 271 | [CADTH - Imaging Inventory, 2019-2020](https://www.cadth.ca/canadian-medical-imaging-inventory-2019-2020) |
|  | Provincial # of radiologists | 2,582 | [CADTH - Imaging Inventory, 2019-2020](https://www.cadth.ca/canadian-medical-imaging-inventory-2019-2020) |
|  | % Allocation to dementia care | 2.3% | [Pedroza et al., 2022](https://www.thelancet.com/cms/10.1016/j.eclinm.2022.101337/attachment/ff2804a0-c13d-4efc-b267-f3f902c68af5/mmc1.pdf) |
| **# Technologist** | Medical radiation technologists | 25,033 | [CADTH - Imaging Inventory, 2019-2020](https://www.cadth.ca/canadian-medical-imaging-inventory-2019-2020) |
|  | % Allocation to dementia care | 2.3% | [Pedroza et al., 2022](https://www.thelancet.com/cms/10.1016/j.eclinm.2022.101337/attachment/ff2804a0-c13d-4efc-b267-f3f902c68af5/mmc1.pdf) |
| **MRI scans** | Average # scans per week (National, 52 weeks/yr) | 44,764 | [CADTH - Imaging Inventory, 2019-2020](https://www.cadth.ca/canadian-medical-imaging-inventory-2019-2020) |
|  | % Allocation to dementia care | 2.3% | [Pedroza et al., 2022](https://www.thelancet.com/cms/10.1016/j.eclinm.2022.101337/attachment/ff2804a0-c13d-4efc-b267-f3f902c68af5/mmc1.pdf) |
| **PET scans** | Average # scans per week (National, 52 weeks/yr) | 2,419 | [CADTH – Imaging Inventory, 2019-2020](https://www.cadth.ca/canadian-medical-imaging-inventory-2019-2020) |
|  | % Allocation to dementia care | 2.3% | [Pedroza et al., 2022](https://www.thelancet.com/cms/10.1016/j.eclinm.2022.101337/attachment/ff2804a0-c13d-4efc-b267-f3f902c68af5/mmc1.pdf) |
| **Working hours** |  |  |  |
| **Hours worked per week (clinical work)** | Estimated total number of hours health care providers would dedicate to AD practice. | 37.5 hours | [Health Service, Government of Canada](https://www.tbs-sct.canada.ca/agreements-conventions/view-visualiser-eng.aspx?id=19) |
| Estimated direct patient care hours per week for all physicians | 26 hours | [Canadian Medical association, 2019](https://surveys.cma.ca/viewer?file=%2Fmedia%2FSurveyPDF%2FCMA_Survey_Workforce2019_Q21_Q22Work_hours-e.pdf#page=1) |
| **Working weeks per year** | Assuming 10 completed years of service and 4 weeks of vacation. | 48 weeks | [Canada Annual Vacations](https://www.canada.ca/en/employment-social-development/programs/employment-standards/holidays.html#h2.01) |

**Table S4. Provincial capacity gaps for each step of the patient treatment journey. Proportions represent the number of patients with access, as a function of the total potential demand in that step (i.e., satisfied + unsatisfied demand from the previous step)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Province** | **Patient Journey Step** | | |
| **Diagnosis** | **Eligibility** | **Treatment/Monitoring** |
| **BC** | 5.13% | 0.72% | 0.72% |
| **AB** | 6.85% | 1.15% | 1.15% |
| **SK** | 8.53% | 0.75% | 0.75% |
| **MB** | 8.58% | 0.65% | 0.64% |
| **QC** | 5.58% | 2.54% | 2.51% |
| **ON** | 8.55% | 0.54% | 0.54% |
| **PEI** | 0.00% | 0.00% | 0.00% |
| **NB** | 5.52% | 0.85% | 0.84% |
| **NS** | 4.98% | 0.69% | 0.69% |
| **NL** | 4.17% | 1.28% | 1.27% |
| **Region** |  |  |  |
| **Western Canada** | 6.35% | 0.85% | 0.85% |
| **Quebec** | 8.55% | 0.54% | 2.51% |
| **Ontario** | 5.58% | 2.54% | 0.54% |
| **Atlantic Canada** | 4.68% | 0.83% | 0.82% |