



BMJ Open Health service use before and after dementia diagnosis: a retrospective matched case-control study

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To cite: Kosteniuk J, Osman BA, Osman M, *et al.* Health service use before and after dementia diagnosis: a retrospective matched case-control study. *BMJ Open* 2022;**12**:e067363. doi:10.1136/bmjopen-2022-067363

► Prepublication history for this paper is available online. To view these files, please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2022-067363>).

Received 10 August 2022
Accepted 03 November 2022



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ABSTRACT

Objectives This study investigated patterns in health service usage among older adults with dementia and matched controls over a 10-year span from 5 years before until 5 years after diagnosis.

Design Population-based retrospective matched case-control study.

Setting Administrative health data of individuals in Saskatchewan, Canada from 1 April 2008 to 31 March 2019.

Participants The study included 2024 adults aged 65 years and older living in the community at the time of dementia diagnosis from 1 April 2013 to 31 March 2014, matched 1:1 to individuals without a dementia diagnosis on age group, sex, rural versus urban residence, geographical region and comorbidity.

Outcome measures For each 5-year period before and after diagnosis, we examined usage of health services each year including family physician (FP) visits, specialist visits, hospital admissions, all-type prescription drug dispensations and short-term care admissions. We used negative binomial regression to estimate the effect of dementia on yearly average health service utilisation adjusting for sex, age group, rural versus urban residence, geographical region, 1 year prior health service use and comorbidity.

Results Adjusted findings demonstrated that 5 years before diagnosis, usage of all health services except hospitalisation was lower among persons with dementia than persons without dementia (all $p < 0.001$). After this point, differences in higher health service usage among persons with dementia compared to without dementia were greatest in the year before and year after diagnosis. In the year before diagnosis, specialist visits were 59.7% higher ($p < 0.001$) and hospitalisations 90.5% higher ($p < 0.001$). In the year after diagnosis, FP visits were 70.0% higher ($p < 0.001$) and all-type drug prescriptions 29.1% higher ($p < 0.001$).

Conclusions Findings suggest the year before and year after diagnosis offer multiple opportunities to implement quality supports. FPs are integral to dementia care and require effective resources to properly serve this population.

INTRODUCTION

Dementia is the second-leading cause of death in high-income countries and the

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ A population-based matched cohort design was used to examine the usage of several health services over a substantial period of time before and after dementia diagnosis, among persons with dementia and persons without dementia.
- ⇒ The use of administrative health data to identify the study population may have resulted in misclassification of cases and controls.
- ⇒ Group differences in health service usage after diagnosis may be due in part to differences that emerged after the matching date, such as more persons with dementia than without dementia admitted to permanent long-term care.

seventh-leading cause of mortality globally.¹ An estimated 58 million people worldwide were living with dementia in 2020, a number that is projected to double by 2040.² Ageing populations and longer survival after diagnosis account for increasing prevalence.³⁻⁴ In Canada, more than 670 000 people were estimated to be living with dementia in 2020, including 20 200 people in the province of Saskatchewan.⁵⁻⁶ The economic cost of dementia including informal care is an estimated US\$1 trillion annually worldwide.⁷ Annual direct costs associated with dementia in Canada (health system costs and out-of-pocket caregiving expenses) are an estimated 5.5 times greater than for those without dementia and expected to increase from \$C12.4 billion in 2021 to \$C16.6 billion by 2031.⁸

Most Canadians with dementia live outside long-term care and nursing homes (261 000 or 61%) and may require complex care due to severe cognitive impairment, dependence for activities of daily living and responsive behaviours.⁹ Effectively managing complex long-term conditions such as dementia in primary and community care settings involves addressing cognitive and

physical functioning.¹⁰ Information about patterns of health service usage in the time before and after diagnosis can assist with forecasting demand for services, allocating resources and inform interventions to help alleviate demand. Interventions may improve access to community health and social services, such as an appointed contact person to coordinate services, flexible settings (eg, for respite care) and health personnel training.¹¹

Studies show that the usage of certain health services is greater among persons with dementia than persons without dementia. For example, people with dementia are more likely to be hospitalised^{12–20} and admitted to emergency departments than people without dementia.^{15 16 18 19} Reports also show more frequent use of certain services among people with dementia, including family physicians (FPs)^{21–24} and hospital admission.^{15 18 24 25}

When comparing patterns in health service usage between people with and without dementia, the usage period relative to diagnosis timing is not always specified. A few studies have examined both prediagnosis and postdiagnosis in the same analysis,^{15 22 23} however, the observation period was less than 3 years. Studies that include both prediagnosis and postdiagnosis and longer timeframes have the potential to account for interactions with the health system that occur over the lengthy course of the diseases that cause dementia and neurodegeneration. The purpose of this study was to use administrative health data to examine the association between dementia and health service usage over a 10-year period from 5 years before until 5 years after an initial dementia diagnosis.

METHODS

Design and data sources

This study used a population-based retrospective matched case–control design and reporting adhered to the Strengthening the Reporting of Observational Studies in Epidemiology Statement.²⁶ Administrative health data in the Canadian province of Saskatchewan (population 1.17 million in 2019)²⁷ routinely capture the health system interactions of Saskatchewan residents. For this study, population-based administrative health data from 1 April 2008 to 31 March 2019 were linked using unique identifiers based on the personal health services numbers of individuals eligible for provincial public health insurance. Saskatchewan residents who hold federal health insurance (<1%) do not also hold provincial health insurance, namely Royal Canadian Mounted Police, Canadian Forces members and inmates at federal penitentiaries.²⁸ However, the data of these individuals are captured in Saskatchewan administrative health data.

Linkage and data analysis were conducted at the Saskatchewan Health Quality Council. Data sources included the Medical Services Database, Hospital Discharge Abstract Database, Prescription Drug Plan Database, Person Health Registration System (demographics and geography) and Institutional Supportive Care Home Database. The Medical Services Database

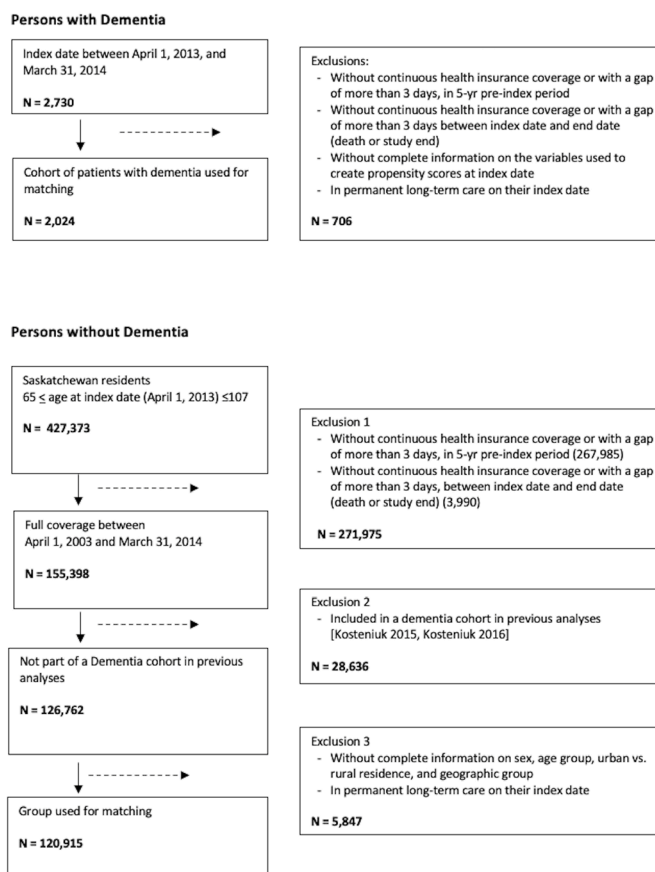


Figure 1 Study population selection.

includes billing claims by physicians paid on a fee-for-service basis (maximum of 1 diagnosis per claim), and shadow billing by primary health sites and practitioners paid under alternate non-fee-for-service methods.^{29 30} The Hospital Discharge Abstract Database consists of hospital admission and discharge dates, diagnosis codes (up to 25 codes per abstract), and other information submitted on a mandatory basis by all provinces and territories in Canada.³¹ The Prescription Drug Plan Database includes information about dispensations to all individuals regardless of the source of funding for the costs (ie, public or private insurance, out of pocket). The Institutional Supportive Care Home database is used by special care homes (ie, nursing or long-term care homes) to maintain records of admission, discharge and level of care changes.³²

Study population

Individuals aged 65 years or older were identified at their first recorded diagnosis of dementia (ie, index date) between 1 April 2013 and 31 March 2014. Study eligibility criteria are described in figure 1. A lookback period of 5 years prior to the index date was used to ensure these were incident cases. To identify the cohort, we used the Canadian Chronic Disease Surveillance System algorithm for dementia³³ that has been previously validated in Ontario, Canada.³⁴ Recent studies drawing on population-based administrative health data have used

this case definition,^{24 35 36} as has the Public Health Agency of Canada for the purpose of estimating dementia prevalence and incidence across Canadian provinces and territories.³⁷ The algorithm defines dementia based on one or more hospitalisations associated with a diagnosis code for dementia (International Classification of Disease (ICD-9-CM) codes 046.1, 290.0–290.4, 294.1, 294.2, 331.0, 331.1, 331.5, 331.82; ICD-10-CA codes F00, F01, F02, F03, G30), three or more physician claims for dementia within 2 years with at least 30 days between each claim (ICD-9 codes 290, 331), or one or more prescriptions for memantine or a cholinesterase inhibitor (donepezil, galantamine and rivastigmine). For physician claims, ICD-9 code 298 was also included in the case definition as it has been used as an alternative code in addition to 290 and 331 in Saskatchewan physician billing data since the 1970s.

For the purpose of selecting 1:1 matched controls, the index date was set as 1 April 2013. Propensity scores were estimated using a probit model³⁸ to determine the probability of being a case given the covariates included in the model. The covariates at index date were sex, age group (65–69, 70–74, 75–79, 80–84 and ≥85), rural versus urban residence (urban defined as postal code outside commuting zone of 10 000 or more population), geographical region (northern, central or southern Saskatchewan) and Charlson Comorbidity Index (CCI) score. A CCI score for each person was calculated based on 17 clinical conditions derived from ICD-9 and ICD-10 diagnoses in the Medical Services Database and Hospital Discharge Abstract Database^{39 40} during the 1-year period prior to each person's index date. A previous Saskatchewan study found the CCI demonstrated good predictive performance of hospital utilisation and mortality.⁴¹ Dementia was considered 1 of 17 comorbidities when calculating the CCI score to truly estimate the burden of diseases on older adults.

A total of 120 915 persons without dementia were identified as potential controls (figure 1). On estimation of propensity scores, we used the nearest neighbour matching technique to construct the control group.⁴² Individuals residing in permanent long-term care on the day of their index date, per Institutional Supportive Care Home data, were ineligible for the study. However, individuals discharged from permanent long-term care before their index date were eligible for inclusion, as were individuals admitted after their index date. Individuals eligible for this study had continuous health insurance coverage or a gap in insurance coverage not exceeding 3 days between 1 April, 2008 and the end of the follow-up period (ie, date of death or study end date of 31 March 2019). Eligible individuals were required to have complete information on all variables used to select the matched controls except for CCI information. Individuals included in dementia cohorts in previous analyses^{43 44} were ineligible to be included as controls.

Health service use

Health service use measures included FP visits, specialist visits, hospital admissions, prescription drug dispensations and admission to short-term institutional care (ie, adult day programming, respite and night care). Physicians were separated into two groups based on more than 70 categories of certified specialty,²⁹ namely family medicine (FP) and specialists (all specialties other than family medicine). A specialist visit requires a referral from a FP or nurse practitioner. Physician visits were included in this study regardless of location (office, home, hospital in-patient, hospital out-patient, emergency room and other locations). Multiple hospital admissions with less than 1-day gap between discharge and readmission were counted as one hospitalisation. Prescription drug use included all dispensations regardless of drug classification. Individuals may be admitted to institutional supportive care via one of eight streams, one of which is permanent long-term care. The other seven streams constitute short-term care and include temporary care of less than 60 days (respite, convalescence, rehabilitation, geriatric assessment and palliative care), adult day programming (personal and nursing care, rest, exercise, social and recreational activities) and night care (relief to primary care providers and family).⁴⁵

Statistical analysis

Propensity score matching based on probit regression and all health service use analyses were performed with SAS (V.9.3).

We calculated the proportion of older adults with at least one use of each health service during each year of the 5-year period before the index date, and each year of the 5-year period after the index date. Among those using a service at least once, we also calculated the annual mean number of services and 95% CIs. Significant differences in the proportion of services used by the two cohorts were identified using the χ^2 test ($p < 0.05$), and significant differences in the mean number of services were established using the Wilcoxon rank sum test ($p < 0.05$). The average number of short-term care admissions was not calculated due to challenges in interpreting this information given variability in the duration of stays across the three types of admission (adult day programming, respite and night care).

Negative binomial (NB) regression was used to estimate the impact of dementia on mean service utilisation each year of the preindex and postindex periods. Individuals who died each postindex year were removed from the study the following year. We chose the NB model over another count data model, Poisson regression, due to the presence of overdispersion.⁴⁶ The effect of dementia was estimated as the discrete change in the expected mean value of health service utilisation (eg, average number of hospital admissions) for a change in the dementia variable from 0 to 1. Values of $p < 0.05$ were considered statistically significant. The NB model for each health service was adjusted for sex, age group, rural versus urban

**Table 1** Descriptive data and mean comparison tests between a cohort of persons with dementia and a matched cohort of persons without dementia, at index date between 1 April 2013 and 31 March 2014

Characteristic	Persons with dementia (N=2024)			Persons without dementia (N=2024)			P value*
	n	% or Mean	SD	n	% or Mean	SD	
Propensity score (mean)	2024	0.024	0.0165	2024	0.024	0.0164	1.00
Age group (%)							
65–69	488	24.11	0.43	488	24.22	0.43	1.00
70–74	276	13.64	0.34	276	13.64	0.34	1.00
75–79	280	13.83	0.35	280	13.83	0.35	1.00
80–84	374	18.48	0.39	375	18.53	0.39	0.97
85+	606	29.94	0.46	605	28.89	0.46	0.97
Male sex (%)	802	39.62	0.49	801	38.58	0.49	0.97
Urban residence (%)	1407	69.42	0.46	1405	69.52	0.46	0.95
Charlson Comorbidity Index score, 1 year prior (mean)	2024	0.77	1.35	2024	0.77	1.36	0.96
Geographical region (%)							
Northern SK	21	1.04	0.10	21	1.04	0.10	1.00
Central SK	1174	58.0	0.49	1173	58.0	0.49	0.97
Southern SK	829	41.0	0.49	830	41.0	0.49	0.97

* χ^2 test at 5% level of significance.

residence, geographical region, 1 year prior health service use (physician, hospital and drug) and CCI score. Moreover, varying time spans were adjusted by using each individual's time (number of days) in each period as an offset variable. The other variables in the model were evaluated by their mean values in expected value calculations.

Patient and public involvement

None.

RESULTS

Study criteria were met by 2024 persons with incident dementia matched 1:1 to 2024 persons without dementia (table 1). At index date, 75.9% of persons with dementia were aged 70 years and older, 39.6% were male and 69.4% urban. The cohorts were similar in age, sex, rural/urban residence, number of comorbidities and geographical region. Individuals admitted to permanent long-term care between their index date and end of the 5-year postindex period were retained in the study, which included 38.8% of persons with dementia (n=786) and 8.5% of persons without dementia (n=173) (table 2). Death during the postindex period occurred in 44.6% of persons

Table 2 Mortality and admission to permanent LTC in the postindex period

	Postindex*					Total n
	1 year n (%)	2 years n (%)	3 years n (%)	4 years n (%)	5 years n (%)	
Admitted to permanent LTC†						
Persons with dementia	332 (42.2)	155 (19.7)	121 (15.4)	100 (12.7)	78 (9.9)	786
Persons without dementia	33 (19.1)	34 (19.7)	26 (15.0)	40 (23.1)	40 (23.1)	173
Mortality‡						
Persons with dementia	311 (34.5)	162 (18.0)	158 (17.5)	128 (14.2)	143 (15.9)	902
Persons without dementia	114 (22.1)	102 (19.8)	93 (18.0)	109 (21.1)	98 (19.0)	516

*Persons with dementia at index date, N=2024; Persons without dementia at index date, N=2024.

†People admitted to permanent LTC each year were retained in the study.

‡People who died each year were removed from the study the following year.
LTC, long-term care.

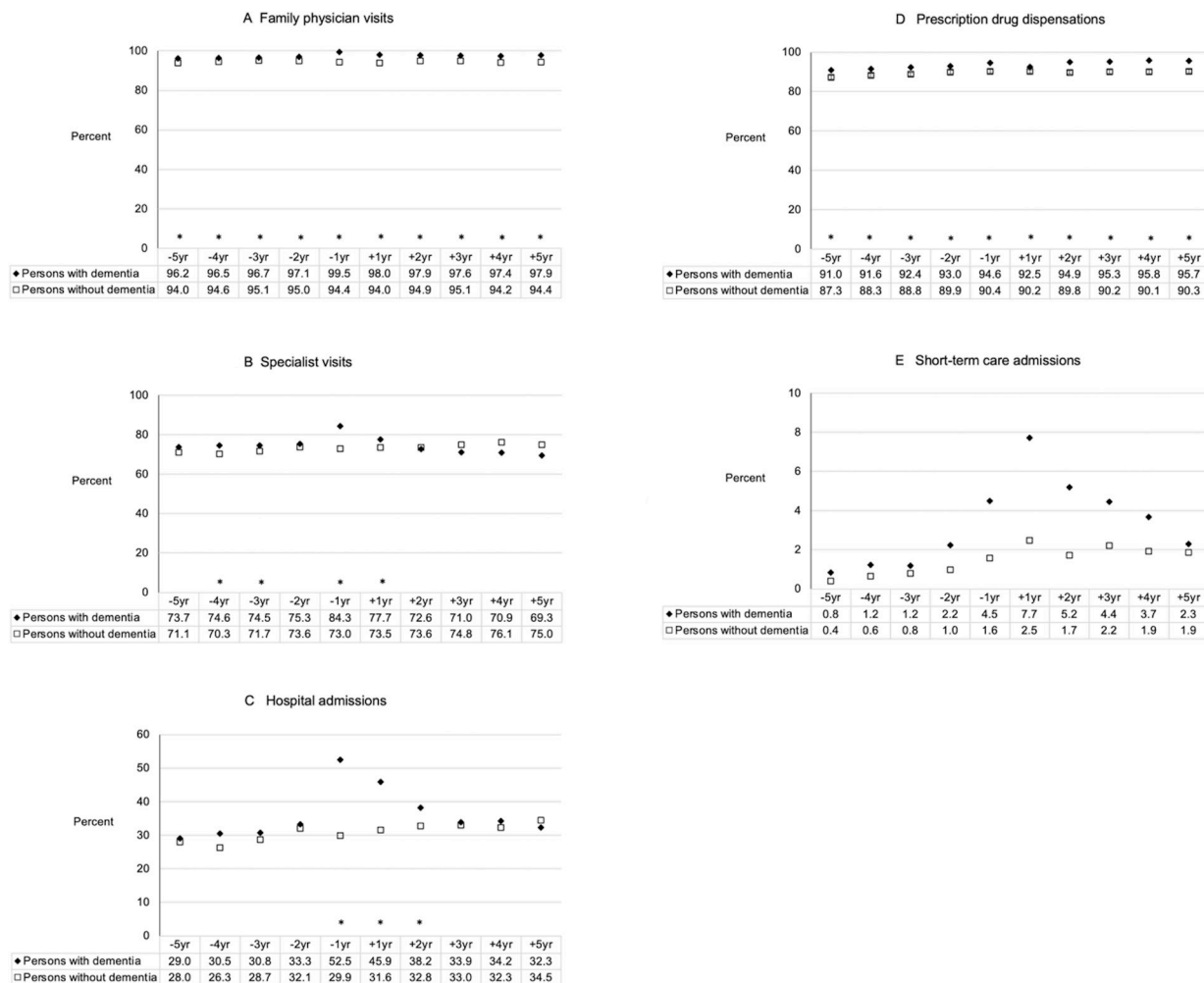


Figure 2 Health service utilisation among persons with dementia compared with a matched cohort of persons without dementia, preindex and postindex. (A) Family physician visits; (B) specialist visits; (C) hospital admissions; (D) prescription drug dispensations; (E) short-term care admissions. *Significantly different between persons with dementia and persons without dementia ($p<0.05$).

with dementia ($n=902$) and 25.5% of persons without dementia ($n=516$); these individuals were removed from the study each year.

Health service use

Most persons with dementia had at least one FP visit each year and a higher proportion of this group compared with persons without dementia had a FP visit over the study period ($p<0.05$) (figure 2A). Each year, 69.3%–84.3% of persons with dementia had at least one specialist visit. A greater proportion of persons with dementia had one or more specialist visit during most years until 1-year postindex ($p<0.05$) (figure 2B). During the preindex period, the specialties of psychiatry and neurology ranked 7th (5%) and 10th (3%) by visit frequency among persons with dementia, respectively (data not shown). Postindex, psychiatry and neurology ranked second (13%) and eighth (5%), respectively. Among persons without dementia, neurology and psychiatry ranked consistently outside the top ten. Between 29.0% and 52.5% of persons with dementia were hospitalised at least once annually and a higher proportion compared with persons without

dementia were hospitalised between 1-year preindex and 2-year postindex ($p<0.05$) (figure 2C). At least one prescription drug of any type was dispensed annually to 91.0%–95.8% of persons with dementia and each year this group was more likely than persons without dementia to receive any type of drug ($p<0.05$) (figure 2D). The proportion of older adults with dementia who used short-term institutional care at least once ranged from 0.8% to 7.7% annually and was highest at 1-year postindex (figure 2E).

The unadjusted mean number of FP and specialist visits by persons with dementia increased over the preindex period, with the greatest increases at 1-year preindex (figure 3A,B). After this point, FP visits continued to increase over the postindex period until 4-year and specialist visits decreased. Each year, hospital admissions ranged between 1.6 and 2.0 visits, peaking 1 year before and after diagnosis (figure 3C), and annual all-type drug prescriptions increased until 4-year postindex (figure 3D).

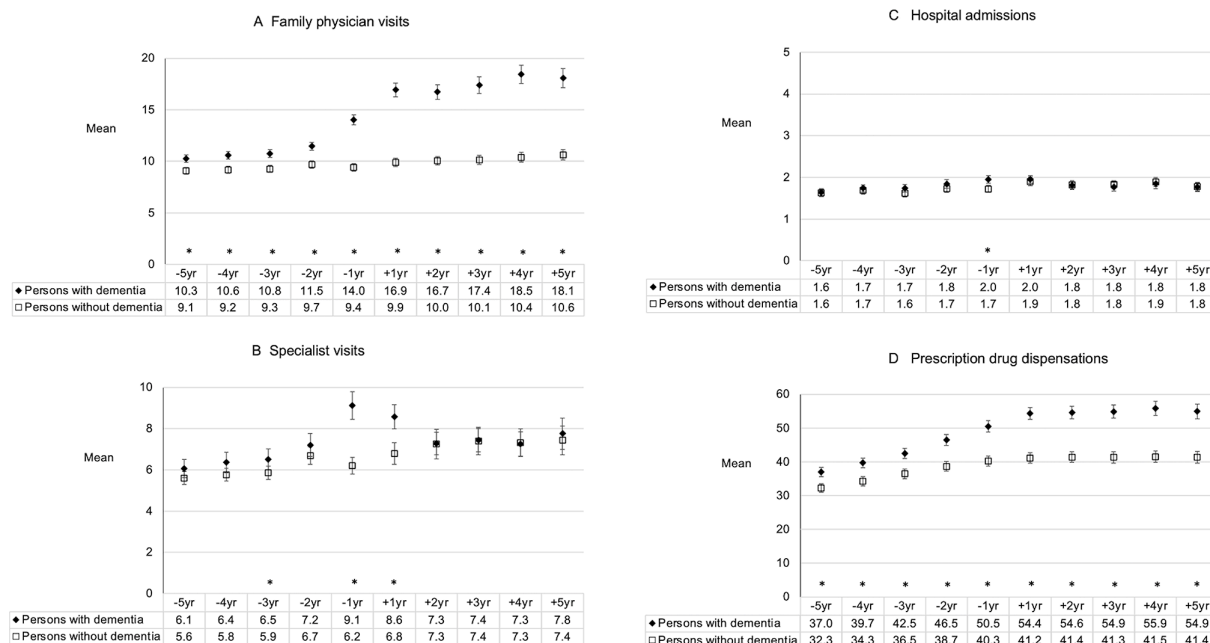


Figure 3 Unadjusted mean number of health services among persons with dementia compared with a matched cohort of persons without dementia, preindex and postindex. (A) Family physician visits; (B) specialist visits; (C) hospital admissions; (D) prescription drug dispensations. *Significantly different between persons with dementia and persons without dementia ($p < 0.05$).

Regression models for the association between dementia and mean service utilisation each year were adjusted for sex, age group, rural versus urban residence, geographical region, 1 year prior health service use

(physician, hospital and drug) and CCI score (tables 3 and 4). At 5-year preindex, usage of all health services except hospitalisation was lower among persons with dementia than persons without dementia (all $p < 0.001$).

Table 3 Adjusted* preindex differences in the mean number of health services used by persons with dementia and a matched cohort of persons without dementia

Health service	Preindex (N=4038)				
	5 years	4 years	3 years	2 years	1 year
Family physician visits					
Adjusted difference	-1.14	0.69	0.69	1.00	4.07
% difference	-12.3	8.5	8.5	11.7	49.3
P value	<0.001	<0.001	<0.001	<0.001	<0.001
Specialist visits					
Adjusted difference	-0.70	0.10	0.06	-0.23	2.43
% difference	-16.5	2.7	1.6	-4.9	59.7
P value	<0.001	0.503	0.684	0.203	<0.001
Hospital admissions					
Adjusted difference	-0.04	0.06	0.04	0.02	0.43
% difference	-8.3	13.8	8.2	3.3	90.5
P value	0.224	0.035	0.188	0.573	<0.001
Prescription drug dispensations					
Adjusted difference	-9.66	1.40	1.64	1.92	3.99
% difference	-32.3	6.0	6.5	7.0	13.6
P value	<0.001	0.009	0.003	0.002	<0.001

Bold values indicate statistical significance ($p < 0.05$)

*Adjusted for sex, age group, rural versus urban residence, geographical region, 1 year prior health service use (physician, hospital and prescription drug) and comorbidity score.

Table 4 Adjusted* postindex differences in the mean number of health services used by persons with dementia and a matched cohort of persons without dementia

Health service	Postindex†				
	1 year N=4038	2 years N=3614	3 years N=3350	4 years N=3099	5 years N=2862
Family physician visits					
Adjusted difference	6.42	2.41	3.71	3.26	2.77
% difference	70.0	23.9	38.5	32.2	27.0
P value	<0.001	<0.001	<0.001	<0.001	<0.001
Specialist visits					
Adjusted difference	1.11	-1.23	-0.88	-1.23	-1.18
% difference	23.1	-22.0	-16.2	-22.3	-21.0
P value	<0.001	<0.001	<0.001	<0.001	<0.001
Hospital admissions					
Adjusted difference	0.22	-0.07	-0.05	-0.06	-0.11
% difference	37.7	-10.5	-8.5	-10.5	-18.0
P value	<0.001	0.082	0.117	0.120	0.01
Prescription drug dispensations					
Adjusted difference	8.88	1.65	3.99	2.91	3.05
% difference	29.1	5.0	12.4	8.9	9.0
P value	<0.001	0.031	<0.001	<0.001	<0.001

Bold values indicate statistical significance (p<0.05)
 *Adjusted for sex, age group, rural versus urban residence, geographical region, 1 year prior health service use (physician, hospital and prescription drug) and comorbidity score.
 †People who died each year were removed from the study the following year.

After 5-year preindex, the pattern changed: FP visits (p<0.001) and all-type drug prescriptions (p=0.031 to p<0.001) were higher among persons with dementia until the end of the 10-year period, specialist visits were higher from 1-year preindex until 1-year postindex and lower between 2 years and 5 years postindex (p<0.001) and hospitalisations were higher from 1-year preindex until 1-year postindex (p<0.001) but demonstrated no significant difference for the majority of the study period. After 5-year preindex, differences in specialist visits and hospitalisations between persons with and without dementia were greatest at 1-year preindex, and differences in FP visits and all-type drug prescriptions were greatest at 1-year postindex (all p<0.001).

DISCUSSION

This retrospective study examined patterns in the use of health services among older adults with dementia and matched controls across a 10-year span that included 5-year periods before and after first diagnosis of dementia in 2013/2014. Compared with persons without dementia, a higher proportion of persons with dementia experienced at least one FP visit and received at least one all-type drug prescription annually. A higher proportion of persons with dementia also had at least one specialist visit annually during most the prediagnosis period until 1 year

after diagnosis, and were hospitalised at least once annually between 1 year before and 2 years after diagnosis. In adjusted models, usage of all services except hospitalisation was lower at 5-year prediagnosis among persons with dementia than persons without dementia. However, within 1 year, the pattern changed. After 5-year prediagnosis, differences in usage were greatest in the year before diagnosis for specialist visits and hospitalisations, and in the year after diagnosis for FP visits and all-type drug prescriptions, with higher usage among persons with dementia.

The pattern of an increasing number of FP visits leading up to diagnosis found in this study is consistent with the results of previous reports that had similarly lengthy prediagnosis periods of 3 years²³ and 5 years.²¹ These studies found a lower average number of visits each year, namely 4–7²¹ and 6–11²³ compared with our research (10.3–18.5 visits). Canada has a higher rate of physician consultations per capita than other Commonwealth countries,⁴⁷ which may partly explain the higher average in our study. Similar to our findings, previous case-control studies reported more primary care visits among persons with than without dementia in the years leading up to diagnosis and in the year following diagnosis,^{22 23} with particularly large differences 6–12 months before^{21 23} and after diagnosis.^{22 23} More frequent FP visits before diagnosis



can reflect a protracted diagnostic process with multiple visits and delays over time,^{48 49} involving an increase in help-seeking as the ability to self-manage declining health and chronic conditions decreases,⁵⁰ dementia-related symptoms such as falls increase⁵¹ and caregiver stress escalates. A pattern of elevated FP visits after diagnosis reflects the central role of FPs in managing the care of older adults with dementia⁵² and suggests a need to further support FPs and other primary healthcare professionals in providing high-quality ongoing postdiagnostic management.^{9 53}

In terms of specialist visits, the higher number among persons with dementia in the year prior to diagnosis suggests demand for specialist involvement in relation to symptoms of undiagnosed dementia. A similar finding with regard to neurologist and psychiatrist visits was reported in a study using German health insurance data.²² We also found a higher number of specialist visits among persons with dementia in the year immediately after diagnosis, although the difference was not as great as seen in Chung *et al*⁵⁴ who reported an eightfold higher number of psychiatrist visits among persons with dementia in a study of Taiwan health insurants. We considered all specialties rather than subspecialties such as psychiatry, which may partly account for this smaller difference. We also found that apart from the time immediately before and after diagnosis, the number of specialist visits was lower or no different among the two groups. This suggests specialists are consulted to a lesser extent than FPs when seeking a diagnosis and postdiagnostic support. In Saskatchewan, the specialist-to-population ratio is lower than the national average (87 vs 113 per 100 000),⁵⁵ as is the ratio of dementia specialists including psychiatrists, neurologists and geriatricians (0.1–7 vs 0.8–13 per 100 000).⁵⁶ It is possible that persons with dementia are less likely than those without dementia to request or receive a specialist referral from their primary care provider, or to follow up on a specialist referral. In the years following a dementia diagnosis, there may be greater challenges accessing specialists who practice mainly in the two major cities of Saskatchewan, and a shift in care responsibility to FPs particularly for less complex cases and persons in permanent long-term care.

Hospitalisation at least once in the year before diagnosis was more likely among persons with dementia than without dementia (52.5% vs 29.9%). Chen *et al*²³ also found persons with dementia were more likely to be hospitalised during this time frame, however, compared with our study the reported proportions were lower (24% AD vs 19% non-AD). The higher proportions in our study may be partly explained by our inclusion of all dementia subtypes, as there is evidence of higher use of inpatient services before diagnosis among persons with vascular dementia and non-specific dementia compared with AD and other subtypes.⁵⁷ Our findings may also suggest undiagnosed and therefore improperly managed symptoms of dementia, inappropriate medication management or mismanagement of chronic conditions.^{14 58} Similar to

other reports, we also found cohort differences in the proportion hospitalised at least once in the first year after diagnosis^{15 23 59} and 2 years after diagnosis.¹⁵ The adjusted number of hospitalisations was also higher 1 year before and 1 year after diagnosis in persons with dementia, in line with a US study of Medicare beneficiaries.²⁰ These findings may imply challenges in the short-term following diagnosis, possibly related to learning to manage a greater number of prescriptions, inadequate management of comorbidities^{60 61} and difficulties communicating symptoms.⁶² Later in postdiagnosis, the number of hospitalisations did not vary between the two groups for the most part, possibly reflecting the admission of a large share to permanent long-term care where conditions were managed on-site.⁶³

Approximately 9 in 10 older adults received at least one all-type drug prescription each year, in line with 81% of older adults (with and without prevalent dementia) reported in a previous Swedish study.⁶⁴ Our findings show that across the majority of the study period, the adjusted number of all-type drug prescriptions was higher in persons with dementia compared with without dementia. A recent review noted mixed results in studies comparing the two groups, with an equal number of studies reporting a lower average number as well as a higher average number of medications in persons with prevalent dementia.⁶⁵

Less than 8% of older adults with dementia were observed to use short-term institutional care annually. Previous studies show that day programmes are generally underutilised among persons with dementia.^{66–68} Caregivers may lack knowledge of short-term care options, or the options may be limited, particularly in rural communities in Saskatchewan.⁶⁹ Moreover, low use may be related to low perceived need,⁶⁸ feelings of guilt and loneliness in caregivers,⁷⁰ and negative perceptions of care programmes held by both caregivers and care recipients.^{67 68}

Future longitudinal investigations could yield further insight into service use variations by considering the causes of use, appropriateness and quality of services, and perceptions and preferences for health services among persons with dementia and their families. Future research should explore how patterns of postdiagnostic service use might be altered, for example, by earlier detection of the diseases that cause dementia. Inequities in healthcare use before and after dementia diagnosis should be identified and addressed in further research, for instance, in relation to age, sex, dementia subtypes and location of individuals (ie, rural or urban; community or long-term care).

Strengths and limitations

The strengths of this study include using a population-based matched cohort design and a lengthy prediagnosis and postdiagnosis observation period relative to comparable studies. As with such studies that use administrative health data, it is possible that case identification via diagnosis

codes and drug prescription data resulted in misclassification.⁷¹ It should be noted that income was not one of the five matched factors as individual-level income was not available in the administrative health data; it is possible that differences in health service use were partly due to income differences. Although this study excluded individuals living in permanent long-term care on the day of their index date, individuals living in permanent long-term care before or after this point were retained in the analysis. As persons with dementia were more likely than persons without dementia to be admitted to permanent long-term care after diagnosis, this may partly explain variations in service use. Also, it may be the case that service use differed among individuals who did not meet the study eligibility criteria. Sex and other sociodemographic stratification may provide further insight and is warranted, however, such comparisons were not included in this study given limited time and resources. As this study included the data of older adults living in Saskatchewan, Canada, the generalisability of our results is limited.

CONCLUSION

Our study found that differences in health service usage between older adults with dementia and those without dementia depended on the time of use relative to first diagnosis, as well as the health service in question. Overall, differences were greatest in the year before and year after diagnosis as persons with dementia had more FP and specialist visits, hospital admissions and drug prescriptions. This is a critical period with multiple opportunities to implement quality supports and establish effective coordinated care. Our research suggests that FPs were a mainstay of care in the years leading up to and following a dementia diagnosis, however, specialists were possibly underutilised in the years after diagnosis. FPs require high-quality training as well as the necessary resources and community services to provide appropriate care in the prediagnosis period and as the disease progresses. The COVID-19 pandemic recently exposed critical weaknesses in the Canadian healthcare system, particularly for persons with dementia,⁷² and these areas must be addressed to strengthen the system for the future.

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Acknowledgements This project was made possible by the support of Saskatchewan Health Quality Council leadership and staff. We are also grateful to Jagmeet Bajwa for data analysis contributions and to participants of the Annual

Summit of the Knowledge Network in Rural and Remote Dementia Care for their feedback on preliminary findings.

Contributors JK, BAO, MO, JMQ and DM formed the research questions, designed the study, and wrote the first draft. BAO, JMQ, MO and NI performed the analyses. JK, BAO, MO, JMQ, NI, MEO, AK, NJS and DM contributed to interpreting the data, revised the manuscript, approved the final version, and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. JK acted as guarantor and accepts full responsibility for the work and/or conduct of the study and controlled the decision to publish.

Funding Funding for the study was provided by a Canadian Institutes of Health Research (CIHR) Foundation Grant to DM (grant number 148444) and the Canadian Consortium on Neurodegeneration in Aging (CCNA) which is supported by a grant from the Canadian Institutes of Health Research. Funding for CCNA Team 15 is provided by several partners including the Saskatchewan Health Research Foundation, the Alzheimer Society of Canada, and the Centre for Aging and Brain Health. BAO, JMQ and MO were employed by the Saskatchewan Health Quality Council which contributed, in-kind, portions of their time for this project.

Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not applicable.

Ethics approval This study involves human participants and was approved by University of Saskatchewan Biomedical Research Ethics Board (Bio 12-339). This study involved secondary data analysis of existing deidentified data. No individuals were contacted or recruited for study purposes.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement No data are available.

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