Continuity of care is good for elderly people with diabetes

Retrospective cohort study of mortality and hospitalization

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Abstract

Objective To examine the relationship between continuity of family physician care and all-cause mortality and acute hospitalizations in older people with diabetes.

Design Retrospective cohort study of administrative health databases. Continuity of family physician care for elderly patients newly diagnosed with diabetes was estimated by 3 continuity indexes using physician claims data. The relationship of continuity of family physician care to mortality and acute hospitalizations was investigated.

Setting The province of Newfoundland and Labrador.

Participants A total of 305 family practice patients 65 years of age or older with diabetes.

Main outcome measures Death rate and hospitalization rate during a 3-year period.

Results Overall, continuity of family physician care was high. In the 3 years examined, the higher-continuity group had lower rates of hospitalization (53.5% vs 68.2%) and death (8.6% vs 18.5%) than the lower-continuity group.

Conclusion The findings suggest an association between higher continuity of family physician care and reductions in likelihood of death and hospitalizations in older people with diabetes.

EDITOR'S KEY POINTS

• Continuity of care is a defining principle of family medicine, and it has been shown to improve outcomes and decrease costs.

• People aged 65 and older with diabetes comprise a high-risk group; the authors found a 1 in 7 chance of death within 3 years of the diagnosis being made and a 1 in 2 chance of hospitalization.

• Overall there was a high level of continuity of care in the population studied. But those with higher continuity of care index scores were significantly less likely to experience hospitalization (P=.025) or death (P=.027) in the 3-year study period.

• This study is the first to explore the relationship between continuity of care and mortality in elderly people with diabetes. It examined a random sample of people from administrative health databases, which were population-based and longitudinal, and it was longer than most other studies of continuity of care. However, the data used are now a decade old, and the study was only able to examine patients of fee-for-service physicians.

Les diabétiques âgés bénéficient d'un suivi continu

Étude de cohorte rétrospective portant sur la mortalité et l'hospitalisation

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Résumé

Objectif Examiner la relation entre la continuité des soins d'un médecin de famille et les taux de mortalité toutes causes confondues et d'hospitalisation aiguë chez des diabétiques âgés.

Type d'étude Étude de cohorte rétrospective à partir de bases de données administratives sur la santé. La continuité des soins dispensés par le médecin de famille à des patients âgés ayant un diagnostic récent de diabète a été estimée à l'aide 3 indicateurs de continuité, en utilisant des données sur la facturation des médecins. On a examiné la relation entre la continuité des soins du médecin de famille et les taux de mortalité et d'hospitalisation aiguë.

Contexte La province de Terre-Neuve-et-Labrador.

Participants Un total de 305 diabétiques de 65 ans et plus fréquentant des cliniques de médecine familiale.

Principaux paramètres à l'étude Taux de décès et d'hospitalisation sur une période de 3 ans.

Résultats Dans l'ensemble, il y avait un haut niveau de continuité des soins par les médecins de famille. Au cours de la période de 3 ans, ceux qui avaient un meilleur suivi avaient des taux d'hospitalisation (53,5 % vs 68,2 %) et de décès (8,6 % vs 18,5 %) plus faibles que ceux qui étaient moins bien suivis.

Conclusion Ces résultats suggèrent une relation entre un meilleur suivi du médecin de famille et une réduction de la mortalité et des hospitalisations chez les diabétiques âgés.

POINTS DE REPÈRE DU RÉDACTEUR

• La continuité des soins est un principe fondamental de la médecine familiale; il a été démontré qu'elle améliore les issues tout en réduisant les coûts.

• Les diabétiques de 85 ans et plus constituent un groupe à risque élevé; les auteurs ont observé qu'ils ont une chance sur 7 de mourir et 1 sur 2 d'être hospitalisés dans les 3 ans suivant le diagnostic.

• Dans l'ensemble, il y avait un haut niveau de continuité des soins dans la population à l'étude. Toutefois, ceux qui avaient des scores plus élevés pour les indicateurs de suivi continu étaient significativement moins susceptibles d'être hospitalisés (*P*=,025) ou de mourir (*P*=,027) durant les 3 années de l'étude.

• Cette étude est la première à étudier la relation entre continuité des soins et mortalité chez les diabétiques âgés. D'une durée supérieure à la plupart des études semblables, elle portait sur un échantillon aléatoire de patients provenant de bases de données administratives stratifiées et longitudinales sur la santé. Toutefois, les données utilisées datent déjà d'une dizaine d'années et l'étude ne portait que sur des patients de médecins rémunérés à l'acte.

Continuity of care is one of the defining principles of family medicine[1,2]; it is usually viewed as the relationship between a single practitioner and a patient that extends beyond single episodes of illness.[3,4] Having a regular primary care provider is associated with better problem recognition, improved preventive care, improved patient satisfaction, reduced hospitalization and emergency department visits, and lower health care costs.[5,6] A recent review, for example, found that health care costs were significantly lower when continuity was higher.[7]

Most of the work examining the relationship between continuity of care and patient outcomes has been done on pediatric[8,9] or adult populations.[10,11] Although elderly people have been found to value continuity of care more than younger people do[12] and are more likely to have preventive procedures and checkups done,[13,14] it is uncertain whether better continuity of care for older people is associated with better health outcomes. Also, there has been little investigation of the effects of continuity of care over time periods longer than 1 or 2 years.[15,16]

One of the most common health problems among the elderly is diabetes. In Canada, it is estimated that the number of individuals with diabetes will increase from 1.4 million in 2000 to 2.4 million in 2016, and that health care costs will increase by 80% in that time.[17] The results of studies on the relationship between continuity and diabetes outcomes are conflicting, with some showing improvement[18,19] and others showing no effect or a worsening of outcome.[7,20]

We conducted a study using secondary administrative databases to examine the relationship between 3 commonly used indices of continuity of care, death, and hospitalization in people 65 years of age or older with diabetes in Newfoundland and Labrador, the province with the highest prevalence of diabetes in Canada.[21]

METHODS

A sample of 350 people with diabetes, 65 years of age or older, was randomly selected from the Newfoundland and Labrador portion of the National Diabetes Surveillance System (NDSS) database. To be considered a diabetes case in the NDSS, an individual must have had 1 of the following: 1 hospital discharge with mention of diabetes; 2 medical services records with mention of diabetes not more than 2 years apart; or 1 medical services record followed by a hospital discharge, both with mention of diabetes, not more than 2 years apart. Gestational diabetes is excluded from the definition. The case date (the date on which the person becomes a case in the database) is the date of hospital discharge or the date of the first physician visit. The sample was selected such that all members had a case date falling within a fiscal year (1998-1999).

Database records for people with diabetes were linked using their provincial health insurance number to 3 administrative health databases, using SPSS 11.5 software. The 3 databases were the Medical Care Plan database, which is the provincial fee-for-service physician billing database; the Clinical Database Management System, which tracks acute hospitalizations; and the Mortality Surveillance System, which tracks all deaths occurring within the province. Information was obtained for each patient on all family physician contacts and all acute hospital discharges and deaths in a 3-year period after the diabetes case date.

Family physician visits from the Medical Care Plan database were used to calculate the usual provider continuity (UPC) index, a commonly used, well-validated index of continuity; it is a simple ratio of the number of visits to the most frequently visited provider, to the total number of visits to all providers. The index score was calculated for each patient; it produces a score ranging from 0 (lowest possible continuity) to 1 (highest possible continuity).[22,23] Patients were divided into low- and high-continuity groups; *high continuity* was defined as an index value of 0.75 or greater, and *low continuity* was defined as less than 0.75, following the convention of a previous Canadian study.[15]

The outcome measures were the rates of mortality and the proportion of people having acute hospitalizations during the 3-year period.

Statistics

Descriptive statistics were used for the outcomes, as well as for the covariates of age, sex, and total number of physician visits. The χ^2 test, the t test, or the Mann-Whitney U test was used to examine differences in outcomes and covariates between low- and high-continuity groups. Backward, conditional, binary multiple logistic regression analyses were used to examine the relationship between continuity of care index scores and each of the outcomes variables separately. The following predictors were entered into all models: age, sex, number of family physician visits, and continuity score (high or low for UPC). All analyses were done using SPSS 11.5.

The study protocol was approved by the Human Investigations Committee of Memorial University of Newfoundland.

RESULTS

Although all 350 people in the sample met the NDSS case definition for diabetes, only 305 (87.1%) had 2 or more fee-for-service family physician visits, and thus comprised the sample for whom continuity indices could

be calculated. The mean (SD) age was 74.3 (6.7) years and 42.6% were men. In total 177 people (58.8%) had at least 1 acute hospitalization, and 39 (12.8%) died in the 3-year study period.

During the 3 years, the 305 patients visited fee-for-service family physicians 9117 times, with a mean of 29.9 visits per patient during the 3-year study period and 10.0 visits per patient per year. There were 471 acute hospitalizations in the study period, giving a mean of 1.5 hospitalizations per patient over the study period.

Table 1 shows the UPC score for 3 years; the score was skewed toward 1.0 with the top 50% of patients having perfect or near perfect continuity (0.9 or greater).

Table 2 shows some characteristics of the high- and low-continuity groups. Most elderly people with diabetes in this study had high continuity of care. Patients in the high-continuity group were significantly younger than those in the low-continuity group ($P=0.13$), although the difference was small. Patients in the high-continuity

group saw their family physicians more often, but the difference was small.

Table 3 shows the proportions of the sample who died or had acute hospitalizations during the study period. The proportion of people dying was significantly lower in the high-continuity group (9.0% vs 18.1%, $P=.025$). The high-continuity group also had a significantly lower proportion of patients with at least 1 hospitalization (54.5% vs 67.5%, $P=.027$).

DISCUSSION

This was the first study to use administrative databases to examine the relationship between continuity of primary care provider and health care outcomes in Newfoundland and Labrador and, to our knowledge, the first in Canada to examine the relationship between continuity of primary care provider and mortality in people with diabetes.

People aged 65 and older with diabetes comprise a high-risk group; we found a 1 in 7 chance of death within 3 years of the diagnosis being made and a 1 in 2 chance of hospitalization. Despite known problems with administrative data, we found that it was feasible to calculate the UPC index of continuity. The UPC scores were high, as would be expected for a diabetic population with universal health care coverage. This has been found in previous studies of continuity of care for people with diabetes[18,19]; like these previous studies, we found that the distribution for the index was skewed toward 1.0, with 50% of patients having very high levels of continuity (0.9 or greater).

The association of higher continuity with a reduction in the likelihood of being hospitalized was similar to that found in other studies.[7,10,17] We know of only 1 study that examined the association between continuity of care and mortality[17]; it found that continuity of primary care provider was associated with decreased mortality in mental health patients.

The observed reduction in hospitalization in the high-continuity group would most likely result in lower costs. Researchers have previously found that there is a general reduction in health care costs as continuity of care improves.[23,24] As the number of older people with diabetes in Canada increases,[17] cost factors will need to be considered.

Strengths and limitations
The study is the first to examine the relationship between continuity of care and mortality in elderly people with diabetes. The study was carried out on a random sample

Table 1. Usual provider continuity of care during a 3-year period: N = 305.

MEASURE OF CONTINUITY	MEAN	SD	MINIMUM	MAXIMUM	INDEX QUARTILES		
					25TH	50TH	75TH
Index score*	0.84	0.17	0.31	1.00	0.71	0.91	0.99

*Possible usual provider continuity index scores range from 0 (lowest possible continuity) to 1 (highest possible continuity).

Table 2. Characteristics of high- and low-continuity groups: N = 305.

CHARACTERISTIC	LOW-CONTINUITY GROUP (UPC INDEX LESS THAN 0.75)	HIGH-CONTINUITY GROUP (UPC INDEX 0.75 OR GREATER)	P VALUE
N (% of total)	83 (27.2)	222 (72.8)	NA
Men, %	42.2	45.5	.349
Mean (SD) age, y	75.2 (6.7)	73.2 (5.9)	.013*
Mean (SD) no. of GP visits	27.7 (21.7)	30.7 (23.6)	.142

NA—not applicable, UPC—usual provider continuity.
*Indicates a significant between-groups difference ($P<.05$).

Table 3. Proportion of sample deceased and proportion having acute hospitalizations during the 3-year period, by UPC continuity group: N = 305.

OUTCOME	LOW-CONTINUITY GROUP (UPC INDEX LESS THAN 0.75)	HIGH-CONTINUITY GROUP (UPC INDEX 0.75 OR GREATER)	P VALUE (χ^2)
Deceased, %	18.1	9.0	.025*
Hospitalized, %	67.5	54.5	.027*

UPC—usual provider continuity.
*Indicates a significant between-groups difference ($P<.05$).

of people from administrative health databases, which were population-based and longitudinal, and it was longer than most other studies of continuity of care.

This study was limited by the fact that it retrospectively scanned existing databases. The data we used are now a decade old, and the situation might have changed. The study was also limited by the fact that the physician-visit database (Medical Care Plan), which provided data used to calculate the UPC index of family physician continuity, as well as specialist visit outcomes, tracked only fee-for-service physician visits. In Newfoundland and Labrador, approximately two-thirds of physicians are paid on a fee-for-service basis.[25] The other third are salaried and are scattered outside urban centres; no information about their individual patient contact activities was available to us. Thus, the data most likely underestimate health care service utilization, especially in rural areas. In addition, although previous research has shown that health care service utilization and continuity of care are related to other important covariates such as socioeconomic status,[15] we were unable to incorporate these variables into our models owing to the limited number of variables captured in the NDSS and physician claims databases.

Conclusion

Our findings suggest an association between higher continuity of family physician care and reductions in likelihood of death and hospitalizations in older people with diabetes. As the number of older people with diabetes in Canada increases, the benefits of continuity will become increasingly important. 🍁

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Competing interests
None declared

Contributors
Both authors contributed to concept and design of the study; data gathering, analysis, and interpretation; and preparing the manuscript for submission.

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