# Suboptimal Use of Cardioprotective Drugs in Newly Treated Elderly Individuals With Type 2 Diabetes

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Cardiovascular disease is the main complication experienced by elderly individuals with diabetes (1). Despite randomized trials showing the benefits of individual (2–4) or combined (5) pharmacological treatments of cardiovascular risk factors in diabetes, observational studies have shown suboptimal use of medications (6–8). However, little is known about the use of cardioprotective medication among elderly individuals who were not already taking it before diabetes treatment was undertaken. We therefore studied a population of elderly individuals with type 2 diabetes in the province of Quebec, Canada, who had not been treated with any antihypertensive, lipid-lowering, or antiplatelet drugs in the year before oral antidiabetes drug initiation. We assessed whether they used a comprehensive cardioprotective regimen (CCR) of those three medications in the year following oral antidiabetic initiation. We also identified the determinants of a CCR use.

## RESEARCH DESIGN AND METHODS

We carried out a population-based inception cohort study using the Quebec Diabetes Surveillance System, which is the product of linking public health administrative databases managed by the Quebec Health Insurance Board. It includes information on patient demographics, physician and hospital services, and data from the public drug plan for individuals who had been diagnosed with diabetes.

We selected individuals aged ≥66 years who had initiated an oral antidiabetes medication treatment between 1 January 1998 and 31 December 2002. The date of the first claim was the index date. We excluded individuals who had received any insulin or oral antidiabetes, antiplatelet, antihypertensive, or lipid-lowering drugs during the 365 days before the index date. We also excluded those who had not been beneficiaries of the drug plan for the entire 365-day period before the index date and individuals who had not for at least 1 year of follow-up.

A person was deemed to have a CCR if there was at least one claim for each of the following: an antihypertensive, lipid-lowering, and antiplatelet drug in the year following the index date. Each of the three drugs could be used at different times during follow-up.

Potential determinants of CCR use included sex, age, and residential area of the individuals; year of oral antidiabetes agent initiation; and whether the oral antidiabetes therapy was initiated in the 14 days posthospitalization. Other potential determinants measured in the year before the index date were included: *1*) number of outpatient medical visits, *2*) hospitalization, and *3*) cardiovascular disease.

The proportion of individuals using a CCR was calculated. Determinants of CCR use were identified using multivariate logistic regression. Odds ratios and their 99% CIs were calculated. Analyses were carried out using SAS, version 9.1.

This research was approved by the Commission d'accès à l'information du Québec and the Comité d'éthique à la Recherche du Centre Hospitalier Affilié Universitaire de Québec.

## RESULTS

Among the 12,150 individuals included in the cohort, 2,649 (21.8%) received an antiplatelet drug, 4,813 (39.6%) received an antihypertensive drug, and 2,562 (21.1%) received a lipid-lowering drug in the year following the oral antidiabetes medication initiation. Only 882 (7.6%) individuals received a CCR.

In the multivariate analysis, three out of eight potential determinants of CCR use remained statistically significant at the $\alpha$ level of 0.01 (Table 1). An older age at oral antidiabetes medication therapy initiation was inversely associated with CCR use, whereas suffering from cardiovascular disease was positively associated with the use of a CCR. The odds of being exposed to a CCR also increased over the time period (3.5% in 1998, 3.8% in 1999, 7.3% in 2000, 10.4% in 2001, and 12.9% in 2002).

## CONCLUSIONS

Among elderly individuals not exposed to cardiovascular drugs in the year before the initiation of oral antidiabetes medication therapy, the proportion of CCR users is low (7.6%). If diabetes is to be considered a cardiovascular equivalent (9), these results suggest that the management of cardiovascular risk for those patients is less than appropriate.

Other studies have demonstrated gaps in the use of cardiovascular risk–modifying drugs among elderly individuals with diabetes (10–11). Of 105,715 elderly individuals in Ontario, Canada, around two-thirds used antihypertensive agents and about one-quarter received a lipid-lowering drug in a period of 6 months following the 1st year of diabetes diagnosis (11).

A low proportion of the combined use

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**Abbreviations:** CCR, comprehensive cardioprotective regimen.

A table elsewhere in this issue shows conventional and Système International (SI) units and conversion factors for many substances.

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**Table 1—*Determinants of CCR* use among individuals who did not receive any cardioprotective drug in the year prior to antidiabetes treatment initiation* (n = *12,150*)**

| Characteristics | *n* (%) | Unadjusted OR (99% CI) | *P* | Adjusted OR (99% CI) | *P* |
|---|---|---|---|---|---|
| Age (years) | 72.4 ± 5.8 | 0.92 (0.90–0.94) | <0.0001 | 0.90 (0.89–0.92) | <0.0001 |
| Sex | | | | | |
| Male | 6,996 (57.6) | 1.36 (1.12–1.63) | <0.0001 | 1.08 (0.89–1.32) | 0.2971 |
| Female | 5,154 (42.4) | 1.00 | — | 1.00 | — |
| Residency area† | | | | | |
| Rural | 3,163 (26.0) | 1.24 (1.01–152) | 0.0076 | 1.21 (0.98–1.51) | 0.0225 |
| Agglomeration | 1,379 (11.4) | 1.21 (0.92–1.61) | 0.0763 | 1.18 (0.88–1.59) | 0.1536 |
| Metropolitan | 7,477 (61.5) | 1.00 | — | 1.00 | — |
| Unknown | 131 (1.01) | — | — | — | — |
| Reference year | | | | | |
| 1998 | 2,815 (23.2) | 1.00 | — | 1.00 | — |
| 1999 | 2,563 (21.1) | 1.08 (0.74–1.57) | 0.6012 | 1.06 (0.72–1.56) | 0.6849 |
| 2000 | 2,287 (18.8) | 2.15 (1.54–3.00) | <0.0001 | 2.17 (1.53–3.06) | <0.0001 |
| 2001 | 2,315 (19.1) | 3.19 (2.32–4.37) | <0.0001 | 3.35 (2.41–4.65) | <0.0001 |
| 2002 | 2,170 (17.9) | 4.05 (2.97–5.52) | <0.0001 | 4.44 (3.21–6.13) | <0.0001 |
| Antidiabetes agent initiated posthospitalization | | | | | |
| Yes | 428 (3.5) | 2.53 (1.78–3.61) | <0.0001 | 1.48 (0.97–2.25) | 0.0171 |
| No | 11,722 (96.5) | 1.00 | — | 1.00 | — |
| Cardiovascular disease in the year prior to antidiabetes treatment initiation‡ | | | | | |
| Yes | 1,467 (12.1) | 5.65 (4.64–6.87) | <0.0001 | 5.85 (4.65–7.37) | <0.0001 |
| No | 10,683 (87.9) | 1.00 | — | 1.00 | — |
| Medical visits in the year prior to antidiabetes treatment initiation | 4.5 ± 4.7 | 0.99 (0.96–1.01) | 0.0787 | 0.99 (0.96–1.01) | 0.0920 |
| Hospitalization in the year prior to antidiabetes treatment initiation | | | | | |
| Yes | 2,851 (23.5) | 2.063 (1.71–2.49) | <0.0001 | 1.20 (0.94–1.52) | 0.0530 |
| No | 9,299 (76.5) | 1.00 | — | 1.00 | — |

Data are means ± SD or *n* (%) unless otherwise indicated. *A person was deemed to have a CCR if there was at least one claim for each of the following in the year following the index date: an antihypertensive, lipid-lowering, and antiplatelet drug. Each of drug could be used at different times during follow-up. †Metropolitan: urban core of at least 100,000 people and its adjacent municipalities; agglomeration: urban core of at least 10,000 people and its adjacent municipalities; rural: municipalities not included in the two former categories. ‡A person was deemed to have a cardiovascular disease if there were any outpatient or hospital ICD (International Classification of Diseases)-9 code for ischemic cardiac disease, heart failure, or cerebrovascular disease or a procedural code of revascularization, coronary bypass, or peripheral limb revascularization recorded. A person with a prescription claim for a nitrate was also considered to have cardiovascular disease.

of antiplatelet drugs, statins, and ACE inhibitors was also found in a cohort of individuals with various length and duration of diabetes in Saskatchewan, Canada (12). In that study, of 12,106 patients aged 30–105 years, 596 (5%) used the combined treatment (12).

Some of the factors associated with CCR use in our study have been observed by others. Younger type 2 diabetic patients (13) and those suffering from cardiovascular disease (14) were found to be more likely to obtain aggressive cardiovascular treatments. Improvement in use of cardiovascular drugs through recent years has been reported (8,15). On the other hand, it has been reported that women with diabetes were less likely than men to receive acetylsalicylic acid (14,16) or lipid-lowering drugs (17) or to have blood pressure and cholesterol levels below current targets (18). In our population of newly treated individuals, sex did not appear to influence the use of a CCR.

The unavailability of clinical data in the administrative data used represents a limitation of the study, making it difficult to evaluate individual appropriateness of CCR use. However, according to clinical guidelines, the majority of individuals would qualify for CCR use. Most elderly individuals require pharmaceutical agents to reach aggressive blood pressure (130/80 mmHg) and LDL cholesterol (2.6 mmol/l) targets (19,20). The vast majority of elderly individuals with diabetes should also be using ACE inhibitors or angiotensin receptor antagonists for vascular protection (21). Moreover, all individuals included in our study should have received an antiplatelet drug unless contraindicated (19,20).

All in all, this study indicates that initiating a new antidiabetes agent does not much influence the use of a CCR. Future studies should evaluate the underlying risk of patients with clinical information and assess whether a CCR is beneficial in terms of outcomes.

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