

Utilization of the healthcare system by Ontario First Nations people with diabetes: a population-based study

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Abstract

Background: First Nations people have an increased prevalence of diabetes compared to other residents of Ontario. This study examined utilization of healthcare services by people with diabetes, comparing First Nations people with other people in Ontario.

Methods: Using healthcare administrative databases, we identified all people in Ontario diagnosed with diabetes as of April 1 2014. We identified First Nations people using the Indian Register, and further separated them into those living in or outside of First Nations communities. We determined the proportion of patients with a regular family physician, and their continuity of care with that physician. We also examined visits with an endocrinologist or general internist, hospitalizations for ambulatory care sensitive conditions, and emergency department visits for hypo- or hyperglycemia.

Results: First Nations people, particularly those living in First Nations communities, were less likely to have a regular family physician, had lower continuity of care with that physician, and were less likely to see diabetes specialists. First Nations people also had more hospitalizations for ambulatory care sensitive conditions and more emergency department visits for hypo- or hyperglycemia.

Interpretation: First Nations people with diabetes in Ontario are less likely to have a regular family physician or to see a specialist than other people in Ontario. Higher rates of hospitalizations for ambulatory care sensitive conditions and emergency department visits for hypo- or hyperglycemia are also indicators of poor access to adequate primary care. These findings may help explain continued disparities in the rates of complications related to diabetes.

Introduction

Healthcare systems with strong primary care deliver better outcomes at lower costs and with fewer disparities, (1),(2) particularly among people with chronic diseases such as diabetes. (3) First Nations people in Ontario have an increased prevalence of diabetes compared to other people in the province, (4) and experience complications from diabetes at elevated rates. (5) First Nations people also face unique geographic and socio-political barriers to diabetes care. Colonialism is a major contributor to socioeconomic and environmental marginalization, geographic and transportation barriers, and the fragmentation of responsibility for healthcare services. (6),(7),(8) Racism, discrimination, unconscious bias and structural violence in the health care system also create barriers that keeps Indigenous people from accessing healthcare services. (9),(10),(11),(12) The objective of this study was to compare health service utilization by First Nations people with diabetes with other people in Ontario with diabetes.

Methods

ICES maintains comprehensive linked administrative datasets related to Ontario's single payer publicly funded healthcare system. The general approach to cohort creation, description of the major data sets used and a description of the characteristics of the study cohort are described in detail elsewhere. (13) In brief, we examined all individuals with diagnosed diabetes in Ontario as of April 1 2014, and identified those who were First Nations using the Indian Register. First Nations people were also divided into those who lived in or outside First Nations communities ("Indian Reserves") using postal codes and other geographic information. (13) Healthcare utilization outcomes were ascertained using physician service claims for fee-for-service reimbursement, and from hospital discharge abstracts compiled by the Canadian Institute of Health Information.

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3 We determined the proportion of people with diabetes who had a regular family physician by
4 examining their registrations to a family physician under a primary care enrolment model, where
5 patients are rostered with a specific family physician or team. For people who were not formally
6 rostered, we considered them to have a regular family physician if they had received any core
7 primary care services over the preceding 2 years. (14) Among those patients with diabetes who
8 had a regular family physician and who had at least 3 family physician visits over the preceding
9 2 years, we determined their continuity of primary care by calculating the proportion of their
10 family physician visits that were with their regular family physician. We then ascertained three
11 healthcare utilization outcomes over a 1-year period, from April 1 2014 to March 31 2015. The
12 first was ambulatory visits with an endocrinologist or a general internist. The second was
13 hospitalization for an ambulatory care sensitive condition (asthma, chronic obstructive
14 pulmonary disease, congestive heart failure or diabetes). Ambulatory care sensitive conditions
15 are chronic medical conditions for which adequate and timely primary care ought to reduce the
16 requirement for hospitalization for these conditions. (15),(16) Hospitalizations for these
17 conditions are potentially preventable, and so can be considered a marker of poor access to or
18 quality of primary care. Finally, the third was emergency department visit for hypo- or
19 hyperglycemia. These are an acute complication of diabetes, as they indicate a patient with
20 such profound metabolic abnormalities that they could not self-manage and instead required
21 medical assistance. We restricted these to unplanned emergency department visits and those
22 with triaged with a score of “urgent” or higher, to exclude emergency department visits that were
23 substitutes for primary care visits (e.g., prescription renewals or scheduled follow-up with a
24 family physician working an emergency department shift).

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50 All outcomes were age- and sex-adjusted. Analyses were conducted using SAS Enterprise
51 Guide version 7.1 (Cary, NC). The project was approved by the Chiefs of Ontario Data
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3 Governance Committee. The study received research ethics review from Queen's University
4 and Laurentian University.
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8 **Results**

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11 There were 1,380,529 people diagnosed with diabetes in Ontario, of whom 22,952 (1.7%) were
12 First Nations people. Table 1 shows the baseline characteristics of these populations. On
13 average, First Nations people with diabetes were younger and more often female than other
14 people in Ontario with diabetes. They are also more likely to reside in rural and remote areas.
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21 Figure 1 shows the proportion of people with a regular family physician. First Nations people,
22 particularly those who lived in First Nations communities, were less likely to have a regular
23 family physician than other people in Ontario. First Nations people living in First Nations
24 communities received 54.4% of their primary care from their usual provider, compared to 64.5%
25 for First Nations people living outside of First Nations communities and 74.1% of other people in
26 Ontario. Likewise, First Nations people with diabetes, especially those who lived in First Nations
27 communities, were less likely to receive care from endocrinologists or general internists than
28 other people in Ontario (Figure 2). Only 9.3% of other people in Ontario with diabetes saw an
29 endocrinologist, whereas only 2.1% of First Nations people living in First Nations communities
30 did.
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44 First Nations people with diabetes had more than double the rate of hospitalization for
45 ambulatory care sensitive conditions compared to other people with diabetes in Ontario (Figure
46 3). Emergency department visits for hypo- or hyperglycemia were infrequent, but occurred more
47 commonly in First Nations people than other people in Ontario (Figure 4). Both of these
48 measures were more common among First Nations people living outside of rather than in First
49 Nations communities.
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Interpretation

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7 First Nations people with diabetes were less likely to have a family physician compared to other
8 people with diabetes in Ontario. As primary care plays an important role in overall health, the
9 fact that nearly one-quarter of First Nations people with diabetes living in First Nations
10 communities do not have a family physician is concerning. However, it is important to highlight
11 that primary care delivered at Community Health Centres and Aboriginal Health Access Centres
12 (where physicians do not submit fee-for-service claims), or through federally-funded nursing
13 stations and health centres, was not captured within the data sources used in this study. Thus,
14 our results likely underestimate the proportion of First Nations people who are receiving regular
15 primary care. Patients who do not have regular primary care have been shown to have poorer
16 quality of diabetes care and lower screening rates. (17),(18) Even among people who have a
17 regular family physician, continuity of care was substantially lower for First Nations people with
18 diabetes, especially those living in First Nations communities. Continuity is an essential part of
19 high-quality care, (19) so these findings suggest First Nations people may be at increased risk
20 for poor quality care.
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37 First Nations people with diabetes were also less likely to receive specialist physician care,
38 especially if they lived in First Nations communities. Since specialist physicians, particularly
39 endocrinologists, are concentrated in larger urban centres, the unique geography of many First
40 Nations communities may exacerbate this gap. However, it may also reflect systemic barriers to
41 accessing specialized care for First Nations people. This gap in access to specialty care has
42 been reported in other studies of diabetes in First Nations populations, (20) as well as in studies
43 of other chronic conditions. (21),(22),(23)
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53 Hospitalizations for ambulatory care-sensitive conditions are a measure of primary healthcare
54 performance. (15),(16) First Nations people with diabetes in Ontario had higher rates of
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3 hospitalization for these conditions compared to other people in Ontario. This difference has
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5 been previously documented in First Nations people in Ontario and in other Canadian
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7 provinces, (20),(24),(25) and in the Métis. (26) Lavoie et al. (25) found that First Nations
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9 communities in Manitoba with better access to community-level primary healthcare (i.e., nursing
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11 stations) had lower rates of hospitalizations for ambulatory care sensitive conditions, whereas
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13 communities with limited access to primary healthcare services within the community had higher
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15 hospital admission rates. First Nations people with diabetes also had higher rates of emergency
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17 department visits for hypo- or hyperglycemia. Although the vast majority of hypo- and
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19 hyperglycemic events can be managed by patients themselves outside of acute care settings,
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21 these findings suggest that First Nations people are at particularly increased risk for severe
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23 metabolic abnormalities where they were unable to self-manage. Furthermore, many First
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25 Nations people live in communities that are remote from hospitals, where nursing stations or
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27 other healthcare facilities are the only available source of acute care. Thus, these data may
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29 underestimate the true burden of acute metabolic complications among First Nations people in
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31 Ontario. Our findings corroborate previous research in Ontario. (27) A recent qualitative study of
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33 healthcare experiences of Indigenous people with type 2 diabetes found that visits to clinics
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35 outside of their First Nation communities were considered a considerable challenge, not only
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37 because of geographic isolation, but also because the shortage of physicians in First Nations
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39 communities significantly jeopardized continuity of care. (9) Both of these indicators were less
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41 common for First Nations people living in First Nations communities compared to living outside
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43 of First Nations communities. This may reflect either that primary care resources (physicians,
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45 nurses, other healthcare providers) are more readily available and accessible within First
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47 Nations communities to prevent these events, or that access to hospitals is more difficult from
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49 First Nations communities so patients who would otherwise be admitted or sent to the
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51 emergency department are instead managed in the outpatient setting, out of necessity.
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3 This study had many important strengths, including that it was a participatory research
4 collaboration between academic researchers and First Nations community members, who were
5 involved through the inception, design and interpretation of the study. However, there are some
6 important limitations in the data to note. As discussed above, we were unable to capture primary
7 care services delivered by physicians or nurses at Community Health Centres and Aboriginal
8 Health Access Centres, or through federally-funded facilities; hence, we may be over-estimating
9 gaps in primary care between First Nations and other people in Ontario. In addition, any
10 specialist care delivered outside of Ontario was not captured. This may particularly impact First
11 Nations people living in northwestern Ontario, who may travel to Winnipeg, Manitoba for
12 specialist care.
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25 In conclusion, First Nations people in Ontario with diabetes are less likely to have a regular
26 family physician, have lower continuity of care, and are less likely to see a diabetes specialist.
27 They also had higher rates of hospitalization for ambulatory care sensitive conditions and higher
28 rates of emergency department visits for hypo- or hyperglycemia, both of which are indicators of
29 poor access to primary care. Some of these differences between First Nations people and other
30 people in Ontario may result from geographical issues: for example, many First Nations
31 communities are isolated and remote, where access to healthcare services, particularly
32 specialized services, is difficult. However, it is important to highlight the continuing impact of
33 colonization as a key barrier to healthcare access. (9),(28),(29) Because of this, First Nations
34 people may be sensitive to power imbalances in their interactions with healthcare service
35 providers, (30) and miscommunication is a large barrier to care. (31),(32) Inequities in access to
36 healthcare can be improved by implementing models of care that embrace Indigenous
37 knowledge systems and that acknowledge the social and historical context of First Nations
38 people's health. (9),(30),(33),(34) Improvements to healthcare access and utilization are
39 essential to reduce the burden of diabetes and its complications among First Nations people.
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Table

Table 1. Demographic characteristics of First Nations and other people in Ontario with diabetes, 2014.

Demographic characteristics		Overall	First Nations		Other people in Ontario
			Living in First Nations communities	Living outside First Nations communities	
N		22,952	8,869	14,083	1,357,577
Sex	Male	10,644 (46.4%)	4,234 (47.7%)	6,410 (45.5%)	705,528 (52%)
	Female	12,308 (53.6%)	4,635 (52.3%)	7,673 (54.5%)	652,049 (48%)
Age (years)	0-19	290 (1.3%)	111 (1.3%)	179 (1.3%)	11,409 (0.8%)
	20-34	1,605 (7%)	613 (6.9%)	992 (7%)	42,235 (3.1%)
	35-49	5,621 (24.5%)	2,202 (24.8%)	3,419 (24.3%)	188,779 (13.9%)
	50-64	9,218 (40.2%)	3,532 (39.8%)	5,686 (40.4%)	469,665 (34.6%)
	65-74	4,106 (17.9%)	1,597 (18%)	2,509 (17.8%)	335,360 (24.7%)
Rurality	75+	2,112 (9.2%)	814 (9.2%)	1,298 (9.2%)	310,129 (22.8%)
	Urban	6,644 (28.9%)	392 (4.4%)	6,252 (44.4%)	986,217 (72.6%)
	Semi-urban	4,600 (20%)	1,119 (12.6%)	3,481 (24.7%)	261,741 (19.3%)
	Rural	5,393 (23.5%)	2,400 (27.1%)	2,993 (21.3%)	105,371 (7.8%)
Comorbidity	Remote/missing	6,315 (27.5%)	4,958 (55.9%)	1,357 (9.6%)	4,248 (0.3%)
	Low	4,984 (21.7%)	2,464 (27.8%)	2,520 (17.9%)	247,756 (18.2%)
	Medium	8,868 (38.6%)	3,481 (39.2%)	5,387 (38.3%)	577,934 (42.6%)
	High	9,100 (39.6%)	2,924 (33%)	6,176 (43.9%)	531,887 (39.2%)

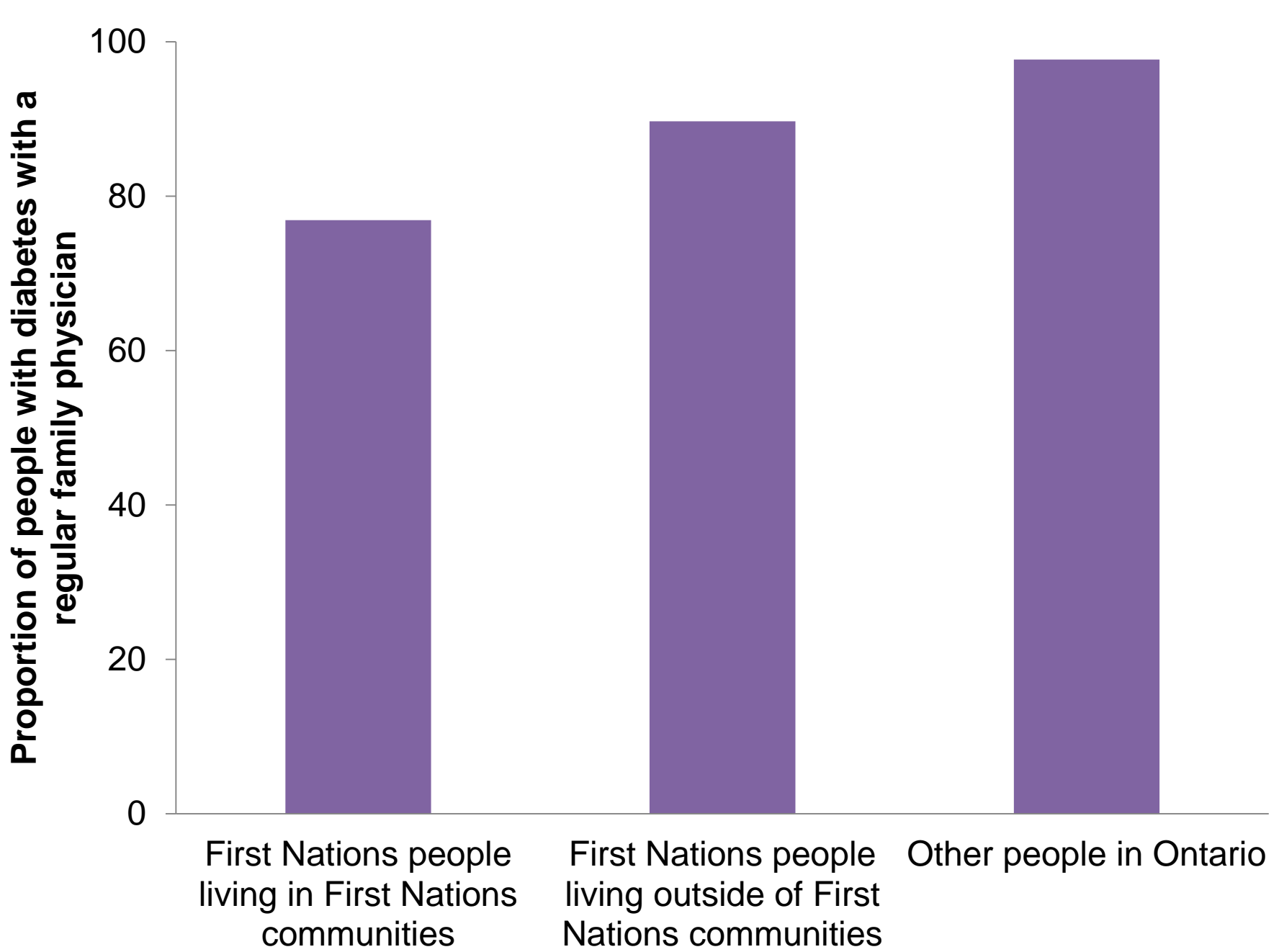
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3 **Figure legends**
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7 Figure 1. Age- and sex-adjusted proportions of people with diabetes who have a regular family
8 physician, for First Nations people living in and outside of First Nations communities and other
9 people in Ontario, 2014
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14 Figure 2. Age- and sex-adjusted proportions of people with diabetes who received care from a
15 diabetes specialist, for First Nations people living in and outside of First Nations communities
16 and other people in Ontario, 2014
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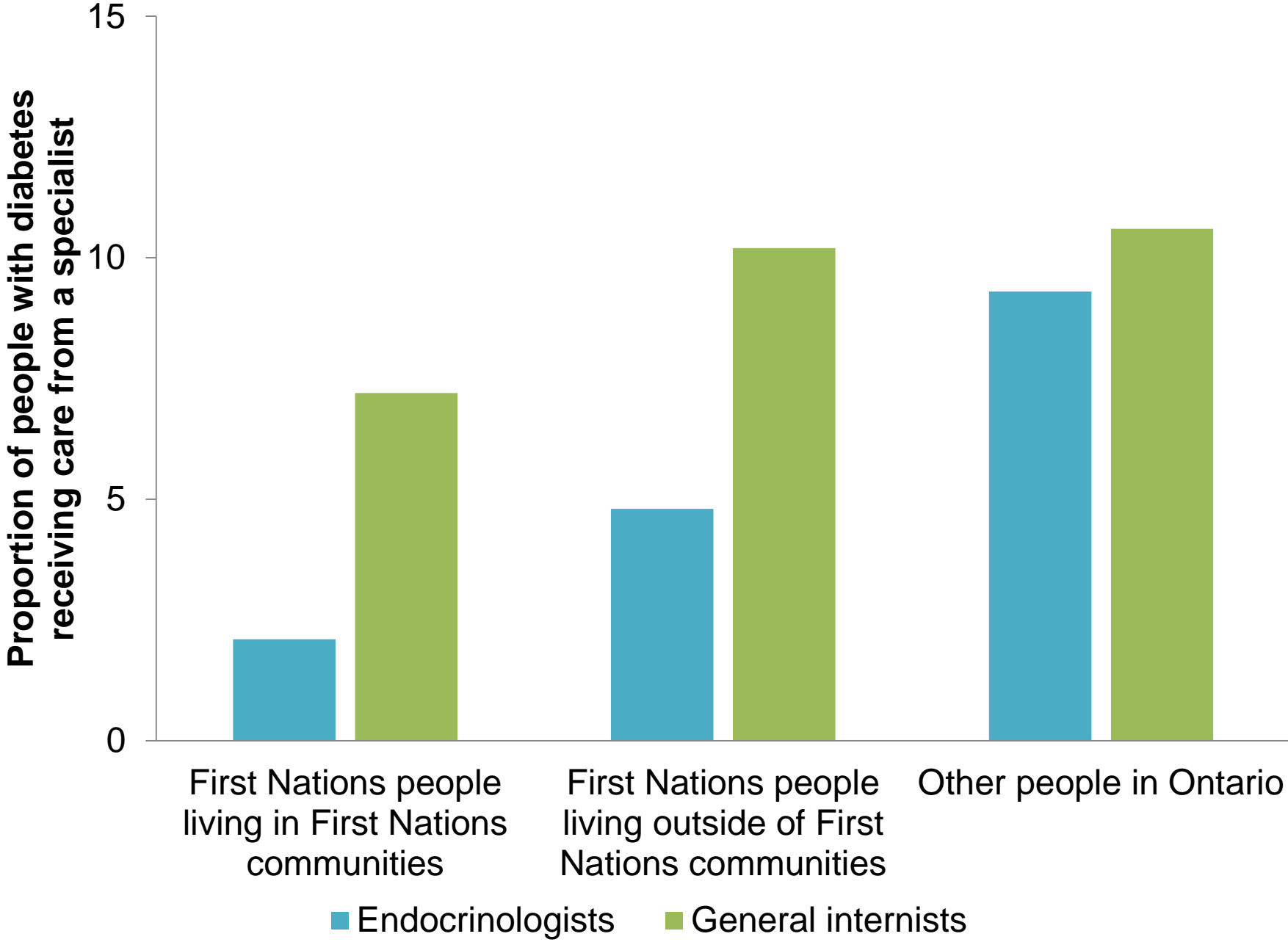
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21 Figure 3. Age- and sex-adjusted rates of hospital admissions for ambulatory care sensitive
22 conditions, for First Nations people living in and outside of First Nations communities and other
23 people in Ontario, with diabetes, 2014
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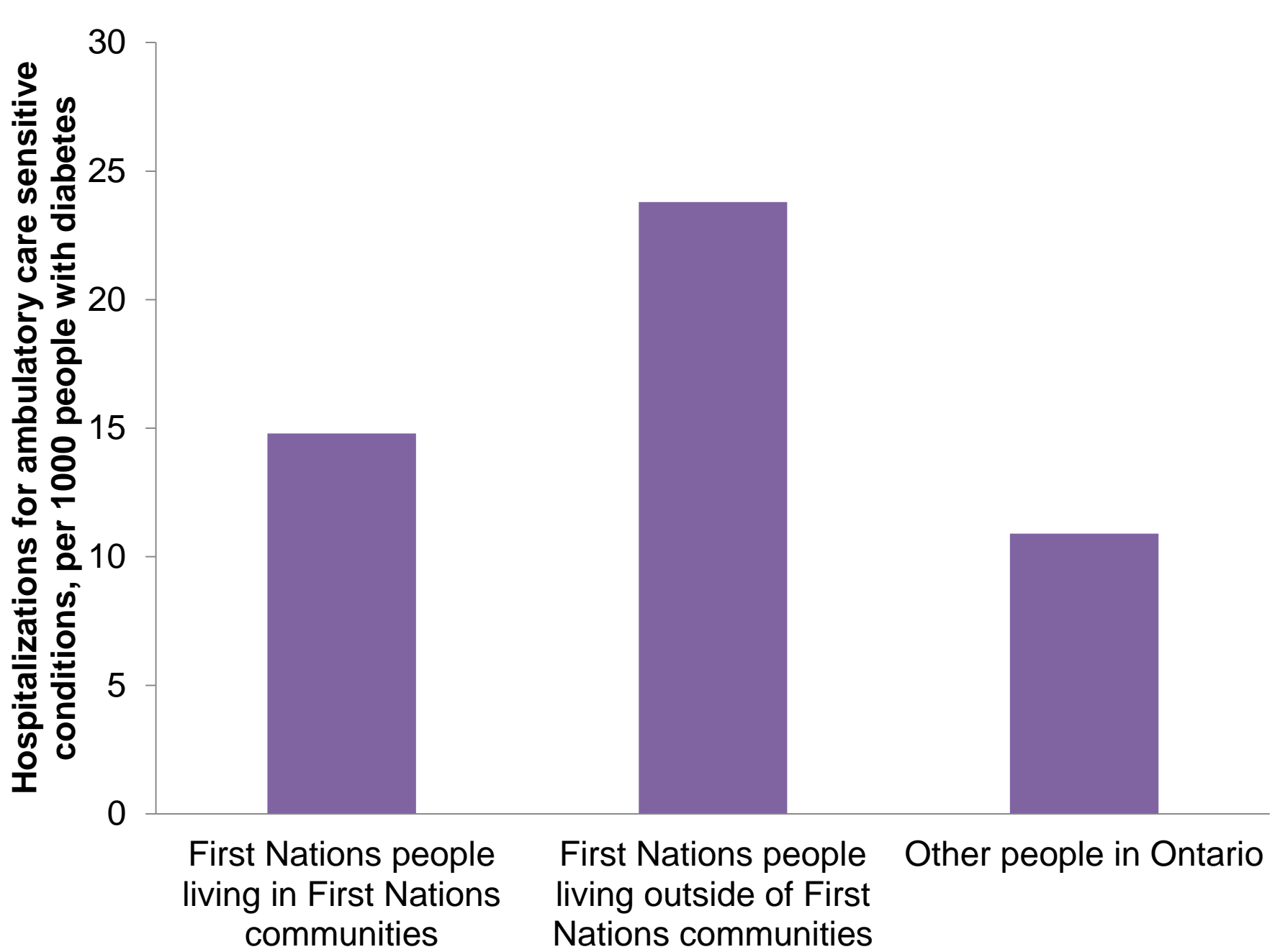
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28 Figure 4. Age- and sex-adjusted rates of emergency department visits for hypo- or
29 hyperglycemia. for First Nations people living in and outside of First Nations communities and
30 other people in Ontario, with diabetes, 2014
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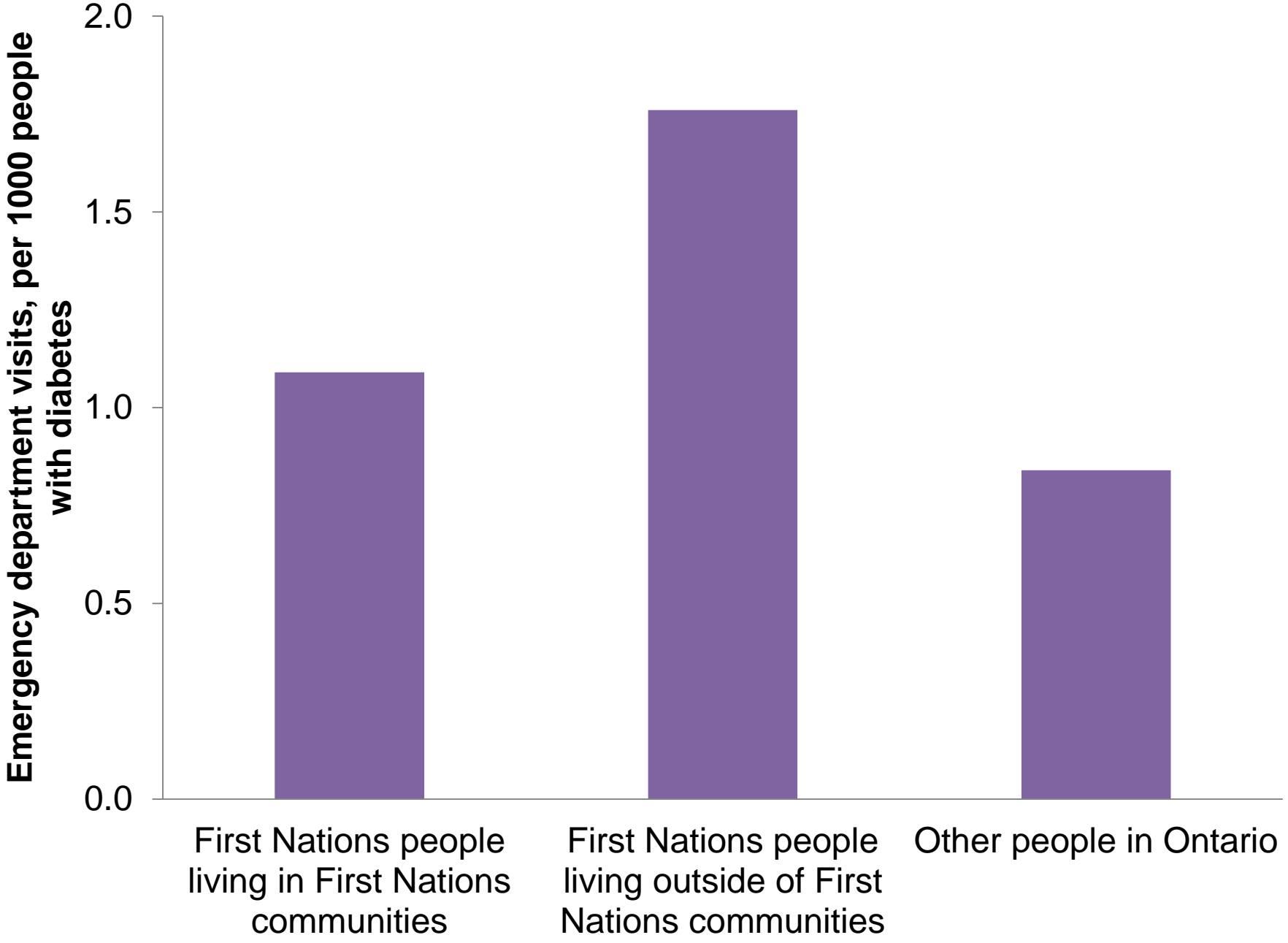
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STROBE Statement—Checklist of items that should be included in reports of *cohort studies*

	Item No	Recommendation	Page No
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract (b) Provide in the abstract an informative and balanced summary of what was done and what was found	1 3
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4
Objectives	3	State specific objectives, including any prespecified hypotheses	4
Methods			
Study design	4	Present key elements of study design early in the paper	4
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	4-5
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up (b) For matched studies, give matching criteria and number of exposed and unexposed	4-5
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	5
Bias	9	Describe any efforts to address potential sources of bias	5
Study size	10	Explain how the study size was arrived at	N/A
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	N/A
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding (b) Describe any methods used to examine subgroups and interactions (c) Explain how missing data were addressed (d) If applicable, explain how loss to follow-up was addressed (e) Describe any sensitivity analyses	5
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed (b) Give reasons for non-participation at each stage (c) Consider use of a flow diagram	N/A
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders (b) Indicate number of participants with missing data for each variable of interest (c) Summarise follow-up time (eg, average and total amount)	Table 1
Outcome data	15*	Report numbers of outcome events or summary measures over time	6, Figures

1	Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	6
2			(b) Report category boundaries when continuous variables were categorized	
3			(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	
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9	Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	N/A
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11	Discussion			
12				
13	Key results	18	Summarise key results with reference to study objectives	7-8
14	Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	9
15				
16	Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	9
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18				
19	Generalisability	21	Discuss the generalisability (external validity) of the study results	9
20				
21	Other information			
22	Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	2
23				
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*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at <http://www.strobe-statement.org>.