Supplemental Online Content

Staples JA, Erdelyi S, Merchant K, et al. Syncope and the risk of subsequent motor vehicle crash: a population-based retrospective cohort study. *JAMA Intern Med.* Published online August 1, 2022. doi:10.1001/jamainternmed.2022.2865

This supplemental material has been provided by the authors to give readers additional information about their work.

eTable 1: Recommendations and restrictions on private driving after syncope

Region	Period of time to avoid driving after an episode of syncope
Canada **(including British Columbia)**[1,2]	Single episode of typical vasovagal syncope: No restriction ("unless the syncope occurs in the sitting position or if it is determined that there may be an insufficient prodrome to pilot the vehicle to the roadside to a stop before losing consciousness. If vasovagal syncope is atypical, the restrictions for 'unexplained' syncope apply.") Recurrent episode of vasovagal syncope within 12 months: 1 week Reversible cause (e.g. intravascular volume depletion): Successful treatment of underlying condition Diagnosed and treated cause (e.g. pacemaker for bradyarrhythmia): 1 week Situational syncope with avoidable trigger: 1 week Unexplained syncope, single episode: 1 week Unexplained syncope, recurrent episode within 12 months: 3 months Syncope caused by ventricular arrhythmias (e.g. ventricular tachycardia): Up to 6 months
USA[3]	Single episode of vasovagal syncope, none in prior year: No restrictions* Recurrent vasovagal syncope, ≤6 per year: 1 month Recurrent vasovagal syncope, >6 per year: Not fit to drive Orthostatic hypotension: 1 month Situational syncope other than cough syncope: 1 month Situational cough syncope, untreated: Not fit to drive Situational cough syncope, treated: 1 month Carotid sinus syncope, untreated: Not fit to drive Carotid sinus syncope, treated with permanent pacemaker: 1 week Syncope due to nonreflex bradycardia, untreated: Not fit to drive Syncope due to nonreflex bradycardia, treated with permanent pacemaker: 1 week Syncope due to supraventricular tachycardia (SVT), untreated: Not fit to drive Syncope due to SVT, pharmacologically suppressed: 1 month Syncope due to SVT, treated with ablation: 1 week Syncope of undetermined etiology: 1 month Syncope with presumed ventricular arrhythmia: 3 months or not fit to drive, according to circumstances
California, USA[4]	Single episode vasovagal: No restriction Single episode cardiogenic: No restriction Control only recently achieved for three months: Medical probation II Stable and controlled for six months or longer with potential for instability due to contributing factors: Medical probation III Fainting likely to recur because precipitating condition is not controlled: Suspension Precipitating condition not likely to ever be brought under control: Revocation

eTable 1: Driving restrictions after syncope by region (continued)

Region	Period of time to avoid driving after an episode of syncope
United Kingdom[5]	Typical vasovagal syncope, while standing: No restrictions Typical vasovagal syncope, while sitting: No restrictions, provided a) there is an avoidable trigger which will not occur whilst driving, or b) the annual risk of recurrence is <20% Syncope with avoidable trigger or reversible cause, while standing: No restrictions Syncope with avoidable trigger or reversible cause, while sitting: 4 weeks* Unexplained syncope, including syncope without reliable prodrome: 6 months* Cardiovascular, excluding typical syncope: 4 weeks* Recurrent typical vasovagal syncope with identifiable consistent prodrome, while standing: No restrictions Recurrent typical vasovagal syncope with identifiable consistent prodrome, while sitting: No restrictions, provided a) there is an avoidable trigger which will not occur whilst driving, or b) the annual risk of recurrence is <20% Recurrent syncope with avoidable trigger or otherwise reversible cause, while standing: No restrictions Recurrent syncope with avoidable trigger or otherwise reversible cause, while sitting: 4 weeks* Recurrent unexplained syncope, including syncope without reliable prodrome: Not fit to drive Recurrent cardiovascular but excluding typical vasovagal syncope: 4 weeks* Cough syncope, single episode: 6 months Cough syncope, multiple episodes over 5 years: 12 months Syncope due to arrhythmias: Various restrictions based on arrhythmia and treatment * if the cause has been identified and treated.
Australia[6]	Vasovagal syncope with clear trigger that is unlikely to occur while driving: 24 hours Cardiovascular syncope: ≥4 weeks followed by fitness to drive assessment Single blackout of undetermined mechanism: No restriction but annual review Multiple blackouts of undetermined mechanism within 6 months: Unfit to drive unless the treating specialist deems the risk of a crash caused by a blackout to be acceptably low
New Zealand[7]	Single episode syncope: Should not drive for at least 2 months, return to driving subject to specialist assessment Recurrent or persistent arrhythmias causing presyncope or syncope: Normally considered unfit to drive Syncope in the context of hypertrophic cardiomyopathy: Unfit to drive Blackouts of known cause: Unfit to drive until the cause of the blackout has been determined and successfully treated to minimize the potential for future blackouts

Legend. Table depicting the symptom-free interval during which private driving should be avoided after an episode of syncope driving, as recommended by national clinical practice guidelines or driver licensing authorities in Canada, the United States of America (USA), the United Kingdom, Australia and New Zealand. Commercial driving restrictions are typically more restrictive than private driving restrictions in all jurisdictions.

eMethod 1: Chart abstraction

We performed a standard chart abstraction for all syncope patients and a 5% random sample of control patients in our study. We used a structured ED visit chart abstraction tool that was developed, revised and field tested by our team as part of a prior study (**eMethod 1.b**).[8] For the current study, two research assistants with prior clinical experience were trained as abstractors (KM and CY; KM is a physician). KM, CY, and JS (an experienced general internist and the principal investigator) independently performed a structured chart abstraction on a training set of 96 ED visits that met study inclusion criteria (4 additional charts could not be located). We reviewed abstraction results as a group and resolved differences by consensus. We then split the study cohort into blocks of 1000 ED visits, with random assignment of ED visits to blocks and subsequent assignment of blocks to the two trained abstractors.

Abstractors reviewed all handwritten and electronic records generated during the index ED visit to assess patients' clinical presentation (including past medical history and physical exam findings) and to understand the ED physicians' diagnostic impression. Based on these records, abstractors deemed syncope to be definite, very likely, possible, unlikely, or absent (no syncope). Among patients with possible, unlikely, or no syncope, abstractors subsequently determined if presyncope was definite, very likely, possible, unlikely, or absent (no presyncope). We based our definition of syncope on that published by the European Society of Cardiology: "Syncope is a [transient loss of consciousness] due to transient global cerebral hypoperfusion characterized by rapid onset, short duration, and spontaneous complete recovery."[9] We held weekly meetings to review data collection, address questions, and resolve disputes. Medical charts with ambiguous data were reviewed by the principal investigator and abstracted according to a consensus opinion.

In the first block of ED visits assigned to each abstractor, 100 of the first 200 index ED visits scheduled for abstraction were abstracted by both abstractors, with abstractors blinded to dual abstraction status. We calculated inter-rater reliability for key variables to ensure reliable abstraction before proceeding further, using intra-class correlation for continuous variables and Cohen's kappa for categorical variables (unweighted for non-ordinal categorical and binary variables; linear weighting for variables with three ordinal categories; quadratic weighting for variables with ≥4 ordinal categories). Another set of 100 randomly selected index ED visit charts underwent dual abstraction about midway through the chart abstraction process, with abstractors once again blinded to dual abstraction status. Inter-rater reliability was very high for the deemed likelihood of syncope (**eMethod 1.a)**.

eMethod 1.a: Inter-rater reliability for key variables in dual abstracted charts

Description	Number of charts	Percent perfect agreement	ICC	Kappa
Sex	197	100		1
Age at index ED visit date (years)	197	100	1.000	
First systolic blood pressure recorded in ED (mmHg)	186	92.5	0.995	
Abstractor's conclusion: Based on the available documentation, do you think syncope occurred?	194	84		0.956*
Abstractor's conclusion: Based on the available documentation, do you think pre-syncope occurred?	194	75.3		0.906*
Abstractor's conclusion: What was the likely etiology of syncope or pre-syncope?	148	82.4		0.706
Was there any documentation of advice given regarding driving after syncope?	148	99.3		0

Legend. ICC = Intra-class coefficient. *indicates Cohen's kappa was calculated with quadratic weighting.

eMethod 1.b: Structured index ED visit chart abstraction tool

Section 1: Demographics, chief complaint, and discharge diagnosis

Linkage study identifier (Linkage ID) [free text]
Abstractor initials [free text]
Age at ED visit date [years]
Biological sex at birth [male/female]
Year of ED visit [YYYY]
Month of ED visit [MM]
Date of ED visit [DD]
Site of visit [VGH/UBCH/SPH/MSJ/LGH/RHS]
Chief complaint (Triage nurse quotation) [free text]
Chief complaint (Triage nurse coding/label) [free text]
Chief complaint (Triage nurse documented) [CEDIS drop-down list]
Chief complaint (Physician-documented, quotation) [free text]
Chief complaint (Physician- documented) [CEDIS drop-down list]
Presenting Complaint in EDRD database [drop-down list]
Discharge Diagnosis in EDRD database [drop-down list]
Discharge diagnosis (Physician-documented, quotation [free text]
Primary diagnosis at ED discharge (ICD code) [free text]
Primary diagnosis at ED discharge (ICD text) [free text]
Secondary diagnosis at ED discharge (ICD code) - #1 [free text]
Secondary diagnosis at ED discharge (ICD text) - #1 [free text]
Secondary diagnosis at ED discharge (ICD code) - #2 [free text]
Secondary diagnosis at ED discharge (ICD text) - #2 [free text]

Section 2: Syncope diagnosis on documentation?[10]

Was there a complete loss of consciousness? [yes or likely/no or unlikely/uncertain]
Note: Presyncope, light headedness, nausea, and dizziness without complete loss of consciousness do not meet the criteria of syncope. MD documentation considered gold standard.
Was loss of consciousness of rapid onset (i.e. symptoms likely progressed over < 5 minutes)? [yes or likely/no or unlikely/uncertain]
Was loss of consciousness transient and of short duration (i.e. likely < 5 minutes)? [yes or likely/no or unlikely/uncertain]
Was there rapid spontaneous recovery from loss of consciousness (i.e. recovery in < 5 minutes)? [yes or likely/no or unlikely/uncertain]
Did the patient have altered level of consciousness, somnolence, or delirium in the ED? [yes or likely/no or unlikely/uncertain]

Is it likely that alcohol, illicit drug intoxication/withdrawal, or prescription medications precipitated loss of consciousness by a mechanism OTHER than syncope?
[yes or likely/no or unlikely/uncertain]

Did head trauma occur immediately before loss of consciousness?
[yes or likely/no or unlikely/uncertain]

Was loss of consciousness clearly caused by seizure?
[yes or likely/no or unlikely/uncertain]
Note: Brief convulsions after syncope do not count.

Based on the physician documentation, what was the physician's apparent conclusion regarding seizure?
[Seizure definite or very likely/Seizure possible (i.e. on differential diagnosis)/Seizure unlikely/Definitely no seizure]
Note: If no written mention of seizure as possible diagnosis and no specific management of seizure (i.e. EEG ordered, Neuro consult, etc.), seizure should be categorized as either "unlikely" or "definitely no".

Based on the physician documentation, what was the physician's apparent conclusion regarding syncope?
[Syncope definite or very likely/ Syncope possible (i.e. on differential diagnosis)/ Syncope unlikely/ Definitely no syncope]
Note: Take into account the answers to questions written above in addition to factors not captured on this data abstraction form.

Based on the physician documentation, what was the physician's apparent conclusion regarding pre-syncope?
[Presyncope definite or very likely/ Presyncope possible (i.e. on differential diagnosis)/Presyncope unlikely/ Definitely no presyncope]
Note: Take into account the answers to questions written above in addition to factors not captured on this data abstraction form.

Based on the physician documentation, what was the diagnosis in the emergency department? [Vasovagal syncope/Cardiac syncope/Other syncope subtype or syncope subtype unknown/Non-syncope T-LOC/Presyncope/Other diagnosis]

Abstractor's conclusion: Based on the available documentation, do you think syncope occurred?
[Syncope definite or very likely/ Syncope possible (i.e. on differential diagnosis)/ Syncope unlikely/ Definitely no syncope]
Note: Take into account the answers to questions written above in addition to factors not captured on this data abstraction form. ("Syncope is a T-LOC due to transient global cerebral hypoperfusion characterized by rapid onset, short duration, and spontaneous complete recovery"[10])

Abstractor's conclusion: Based on the available documentation, do you think pre-syncope occurred?
[Presyncope definite or very likely/ Presyncope possible (i.e. on differential diagnosis)/Presyncope unlikely/ Definitely no presyncope]

Abstractor's conclusion: What was the likely etiology of syncope or pre-syncope?
[free text]
Note: Specifically note if etiology of syncope is remarkable (i.e. from pulmonary embolism, subarachnoid hemorrhage, severe aortic stenosis, etc.).

Abstractor's conclusion: What was the likely etiology of syncope or pre-syncope?
[Non-syncopal T-LOC/Reflex (neurally- mediated) – Vasovagal/Reflex (neurally- mediated) – Other/Syncope due to orthostatic hypotension (including volume depletion)/Cardiac syncope (cardiovascular)/Other syncope subtype]
Note: See Table 4 in Moya et al, Guidelines for the diagnosis and management of syncope (version 2009). Eur Heart J 2009.

Section 3: Syncope etiology and risk stratification[11,12]

Was there a predisposition to vasovagal symptoms? [Yes or probable/Documented as no or unlikely/Not documented]
Note: Defined as "Triggered by being in a warm crowded place, prolonged standing, fear, emotion or pain."[12]

Was there symptomatic shortness of breath around time of transient loss of consciousness (T-LOC)? [Yes or probable/Documented as no or unlikely/Not documented]

Past history of syncope? [Yes or probable/Documented as no or unlikely/Not documented]
Note: Previous episode of syncope >1mo ago. Make a note about timing of episodes if multiple episodes within 1 month of presentation.
Past history of heart failure? [Yes or probable/Documented as no or unlikely/Not documented]
Past history of heart disease?
[Yes or probable/Documented as no or unlikely/Not documented]
Note: "Includes coronary or valvular heart disease, cardiomyopathy, congestive heart failure and non-sinus rhythm (electrocardiogram evidence during index visit or documented history of ventricular or atrial arrhythmias, or device implantation)." [12]
What history of heart disease is documented? Check all that apply.
[Ischemic heart disease including angina, prior obstructive coronary lesions, or a history of myocardial infarction/valvular heart disease/cardiomyopathy/congestive heart failure/atrial fibrillation/bradyarrhythmia/other non-sinus rhythm/pacemaker/implantable cardiac defibrillator/other cardiac device implantation] [12]
Other documented past medical history:
Hypertension [Yes/No]
Diabetes mellitus [Yes/No]
Coronary artery disease [Yes/No]
Atrial fibrillation/flutter [Yes/No]
Valvular heart disease [Yes/No]
Congestive heart failure [Yes/No]
Cerebrovascular disease [Yes/No]
Peripheral vascular disease [Yes/No]
Chronic obstructive pulmonary disease/emphysema [Yes/No]
Pacemaker or implanted cardiac defibrillator [Yes/No]
Alcohol use disorder [Yes/No]
Other substance use disorder [Yes/No]
Dementia [Yes/No]
Other [free text]

Systolic blood pressure at triage (mmHg) [free text]
Systolic hypotension at triage? [Yes (systolic BP <90)/No (systolic BP >/= 91mmHg)/ Triage blood pressure not documented]
If triage sBP not recorded, what was earliest BP recorded (mmHg)? [free text]
Source of earliest recorded BP? [Ambulance crew report/MD documented/RN flow sheet/Other]
Highest systolic blood pressure
Highest diastolic blood pressure
Lowest systolic blood pressure
Lowest diastolic blood pressure
Any systolic pressure reading < 90 or > 180 mm Hg? [Yes/No]
Note: "Includes blood pressure values from triage until disposition from the emergency department." [12]
Postural vital signs checked in ED? [Yes/No]
Evidence of orthostatic hypotension in ED? [Yes/No]
Note: Orthostatic hypotension is present if the heart rate increases by >30bpm, the systolic BP decreases by >20mmHg, or the diastolic BP decreases by >10mmHg from supine to standing or sitting. Also considered positive if symptomatic presyncope prevents the patient from standing.

Section 4: Consequences and disposition
Did the T-LOC/syncope /presyncope result in an injury?
[Yes or likely/No or unlikely/Uncertain]
What injuries were caused by the T-LOC? [free text]
Did the syncope occur while driving? [Yes/No]
If the syncope occurred while driving, describe any injuries to the patient or to others. [free text]

Services consulted in the Emergency Department (including those consulted to admit the patient to the hospital)?
[Internal Medicine or Clinical Teaching Unit (CTU)/Hospitalist/Geriatrics/
Cardiology including cardiac care unit/Neurology/Surgical or trauma services/Intensive care unit other than cardiac care unit/Other/None]
Note: Service must have completed consult in ED or admitted patient to hospital. Referral to outpatient evaluation excluded. Routine nursing evaluation (i.e. Geriatrics) also excluded.

Outpatient clinic referrals made in the Emergency Department?
[Internal Medicine/Geriatrics/Cardiology/Neurology/Other/None]

Outpatient investigation referrals made in the Emergency Department?
[Echocardiogram/Holter monitor/Other forms of cardiac monitors (event monitors, loop recorders etc.)/Electroencephalogram/Tilt table testing/Carotid ultrasound/other]

Was there any documented advice given in the ED regarding driving following the syncopal event?
[Yes/None documented]

If the patient was admitted, was there any documented advice given during admission regarding driving following the syncopal event? [Yes/None documented]

What advice was given regarding driving following the syncopal event? [free text]

ED disposition? [Discharged home from ED/Left ED against medical advice/Admitted to hospital/Died in ED/Other]

Legend. ID: identification; ED: emergency department; VGH: Vancouver General Hospital; UBCH: The University of British Columbia Hospital; SPH: St Paul's Hospital; MSJ: Mount Saint Joseph hospital; LGH: Lions Gate Hospital; RHS: Richmond Health Services; CEDIS: Canadian Emergency Department Information System; EDRD: Emergency Department Regional Database; ICD: International Statistical Classification of Diseases and Related Health Problems; MD: medical doctor; EEG: electroencephalography; T-LOC: transient loss of consciousness; BP: blood pressure; sBP: systolic blood pressure; RN: registered nurse; CTU: Clinical Teaching Unit.

eMethod 2: Data sources

- **Laboratory data**: VCH Patient Care Information System [creator] (2018): Serum concentrations of hemoglobin, hematocrit, and troponin I. Vancouver Coastal Health [publisher]. Data Extract. VCH (2018).
- **Electrocardiogram (ECG) data**: VCH Regional MUSE™ Cardiology Information System v9 (General Electric, Boston, Massachusetts, USA) [creator] (2018): Numerical ECG data and physician ECG interpretation. Vancouver Coastal Health [publisher]. Data Extract. VCH (2018). Included all ECGs from the index ED visit and from baseline ECGs, defined as the two most recent ECGs in the VCH Regional MUSE™ system.
- **Population Data BC**: Population Data BC. Vancouver, BC: Population Data BC, 2019. www.popdata.bc.ca
- **Consolidation File**: British Columbia Ministry of Health [creator] (2019): Consolidation File (MSP Registration & Premium Billing). V2. Population Data BC [publisher]. Data Extract. MOH (2018).
- **Medical Services Plan**: British Columbia Ministry of Health [creator] (2018): Medical Services Plan (MSP) Payment Information File. Population Data BC [publisher]. Data Extract. MOH (2018).
- **National Ambulatory Care Reporting System**: Canadian Institute for Health Information [creator] (2018): National Ambulatory Care Reporting System (NACRS). V2. Population Data BC [publisher]. Data Extract. MOH (2018).
- **Discharge Abstract Database**: Canadian Institute for Health Information [creator] (2019): Discharge Abstract Database (Hospital Separations). Population Data BC [publisher]. Data Extract. MOH (2018).
- **PharmaNet**: British Columbia Ministry of Health [creator] (2019): PharmaNet. V2. Population Data BC [publisher]. Data Extract. Data Stewardship Committee (2018).
- **Income Band**: Statistics Canada [creator]: Statistics Canada Income Band Data. Catalogue Number: 13C0016. V2. Population Data BC [publisher]. Data Extract. Population Data BC (2018).
- **Vital Statistics**: British Columbia Ministry of Health [creator] (2019): Vital Events Deaths. V2. Population Data BC [publisher]. Data Extract. MOH (2018).
- **Driver data** (Driver license, BC Traffic Accident System, ICBC Claims File): Insurance Corporation of British Columbia [creator] (2019): Driver Experience, Contraventions, and Exam tables and the Traffic Accident System. Insurance Corporation of British Columbia [publisher]. Data Extract. ICBC (2018).

All inferences, opinions and conclusions drawn in this manuscript are those of the authors and do not reflect the opinions or policies of the Data Stewards.

Data was rarely missing for most elements in our analytic data set because:

1) We identified crashes using population-based province-wide sources of crash data. If there was no crash recorded in these data, we inferred that no serious crash occurred (so there is no 'missing' data on the presence or absence of serious crashes).

2) We identified ED visit exposures using a population-based source of that included all ED visits occurring within the Vancouver Coastal Health region. If no ED visit for syncope was identified in these data, we inferred that no ED visit for syncope occurred (so there is no 'missing' data on the presence or absence of ED visit for syncope). It is possible that an ED visit for syncope occurred outside of the Vancouver Coastal Health region, but we anticipate that this was uncommon and that there is no reason for the prevalence of such external ED visits to differ in syncope patients and controls.

3) The cohort study only included individuals with linked health and driving data. Individuals with missing data for age and sex in either health or driving data went unlinked. Age and sex are thus complete in the linked data.

4) We identified many adjustment covariates based on the presence of a corresponding qualifying event (e.g. hospitalization, clinic visit, driving contravention). We coded these covariates as negative when the event was absent, so there is no missing data for these adjustment covariates.

However, data was not complete:

- Residential neighborhood (and consequently residential neighborhood income quintile) was missing for 155/9,223 (1.7%) syncope patients and for 738/34,366 (2.1%) controls.
- The variable indicating impairment by alcohol and drugs at the time of crash was based on police reports. Testing for alcohol and drugs in BC is performed at the discretion of the officer; most drivers in our study did not undergo testing and the data field was therefore left blank ('missing'). For the purposes of our analysis, we coded impairment as positive if police reports indicated that the officer suspected impairment with alcohol or drugs, or if the blood alcohol concentration was >0 milligrams of alcohol per 100 milliliters of blood. We coded all other circumstances as negative (i.e. no police suspicion of alcohol or drugs AND blood alcohol concentration was 0 mg/mL or missing]). Blood alcohol concentration could be directly measured by the officer or inferred from breath alcohol measured by a police officer using an approved device.

eTable 2: ICD diagnostic codes for relevant comorbidities

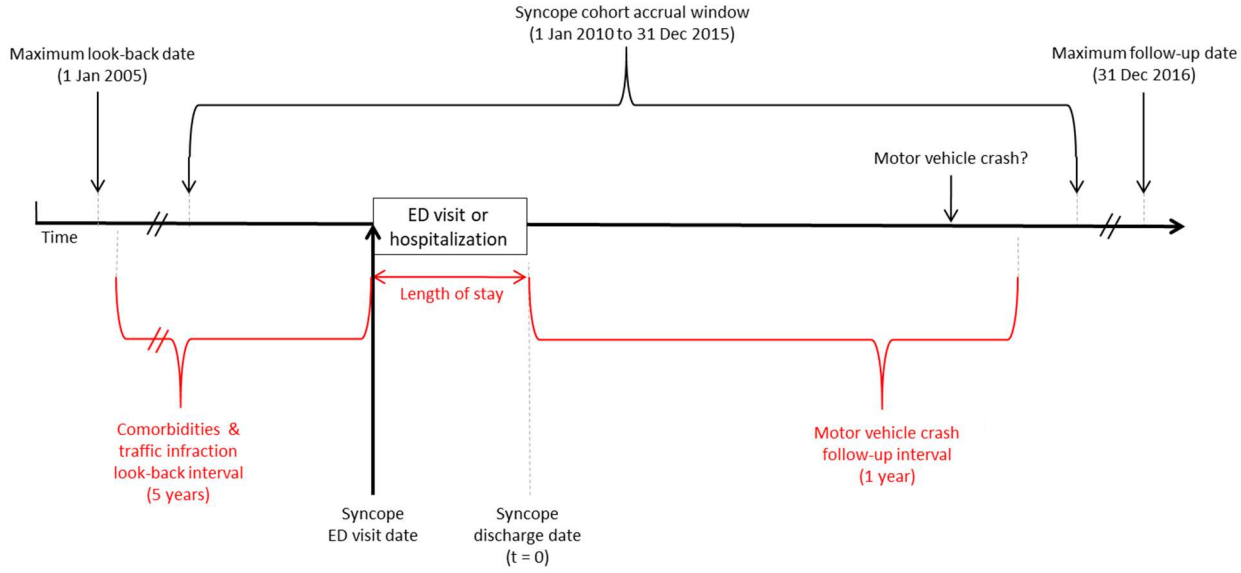
Condition	Codes
Myocardial infarction	ICD9: 410, 412; ICD10: I21, I22, I252
Congestive heart failure	ICD9: 39891, 402, 404, 425, 428; ICD10: I43, I50, I099, I110, I130, I132, I255, I420, I425, I426, I427, I428, I429, P290
Peripheral vascular disease	ICD9: 0930, 437, 440, 441, 443, 4471, 5571, 5579, V434; ICD10: I70, I71, I731, I738, I739, I771, I790, I792, K551, K558, K559, Z958, Z959
Cerebrovascular disease	ICD9: 36234, 430-438; ICD10: G45, G46, I60-I69, H340
Dementia	ICD9: 290, 2941, 3312; ICD10: F00-F03, G30, F051, G311
Chronic obstructive pulmonary disease	ICD9: 4168, 4169, 490-496, 500-505, 5064, 5081, 5088; ICD10: J40-J47, J60-J67, I278, I279, J684, J701, J703
Rheumatic disease	ICD9: 4465, 7100-7104, 7140-7142, 7148, 725; ICD10: M05, M32-M34, M06, M315, M351, M353, M360
Peptic ulcer disease	ICD9: 531-534; ICD10: K25-K28
Mild liver disease	ICD9: 07022, 07023, 07032, 07033, 07044, 07054, 0706, 0709, 570, 571, 5733, 5734, 5738, 5739, V427; ICD10: B18, K73, K74, K700-K703, K709, K717, K713-K715, K760, K762- K764, K768, K769, Z944
Diabetes without complications	ICD9: 2500-2503, 2508, 2509; ICD10: E100, E101, E106, E108, E109, E110, E111, E116, E118, E119, E120, E121, E126, E128, E129, E130, E131, E136, E138, E139, E140, E141, E146, E148, E149
Diabetes with complications	ICD9: 2504-2507; ICD10: E102- E105, E107, E112-E115, E117, E122-E125, E127, E132-E135, E137, E142-E145, E147
Paraplegia and hemiplegia	ICD9: 3341, 342, 343, 3440-3446, 3449; ICD10: G81, G82, G041, G114, G801, G802, G830-G834, G839
Renal disease	ICD9: 403, 404, 582, 5830, 5831, 5832, 5834, 5836, 5837, 585, 586, 5880, V420, V451, V56; ICD10: N18, N19, N052-N057, N250, I120, I131, N032-N037, Z490-Z492, Z940, Z992
Cancer	ICD9: 140-165, 170-172, 174-176, 179-195, 200- 208, 2386; ICD10: C00-C26, C30-C34, C37-C41, C43, C45-C58, C60-C76, C81-C85, C88, C90-C97
Moderate or severe liver disease	ICD9: 4560-4562, 5722-5724, 5728; ICD10: K704, K711, K721, K729, K765-K767, I850, I859, I864, I982
Metastatic carcinoma	ICD9: 196-199; ICD10: C77-C80
HIV	ICD9: 042; ICD10: B20-B24
Syncope	ICD9: 7802; ICD10: R55
Atrial fibrillation and flutter	ICD9: 427; ICD10: I48
Other arrhythmias	ICD9: 426, 427, 74686, 7850; ICD10: I44-I47, I49, R00
Presence of AICD	ICD9: 99604, V4502, V5332; ICD10: Z9501, Z9502, Z4501, Z4502
Presence of pacemaker	ICD9: V4501, V5331; ICD10: Z4500, Z9500, z9502, z4502
Unstable angina	ICD10: I200
Chronic ischemic heart disease	ICD9: 414; ICD10: I25
Hypertension	ICD9: 36211, 401-405, 6420, 64200-64204, 6421, 64210-64214, 6422, 64220-64224, 6427, 64270-64274; ICD10: I10-I15, O10, O11
Valvular heart disease	ICD9: 394, 395, 396, 397, 424, 746; ICD10: I05, I06, I07, I08, I091, I098, I099, I34, I35, I36, I37, I38, I39, Q22, Q23, T820, Z952, Z953, Z954

eTable 2: ICD diagnostic codes for relevant comorbidities (continued)

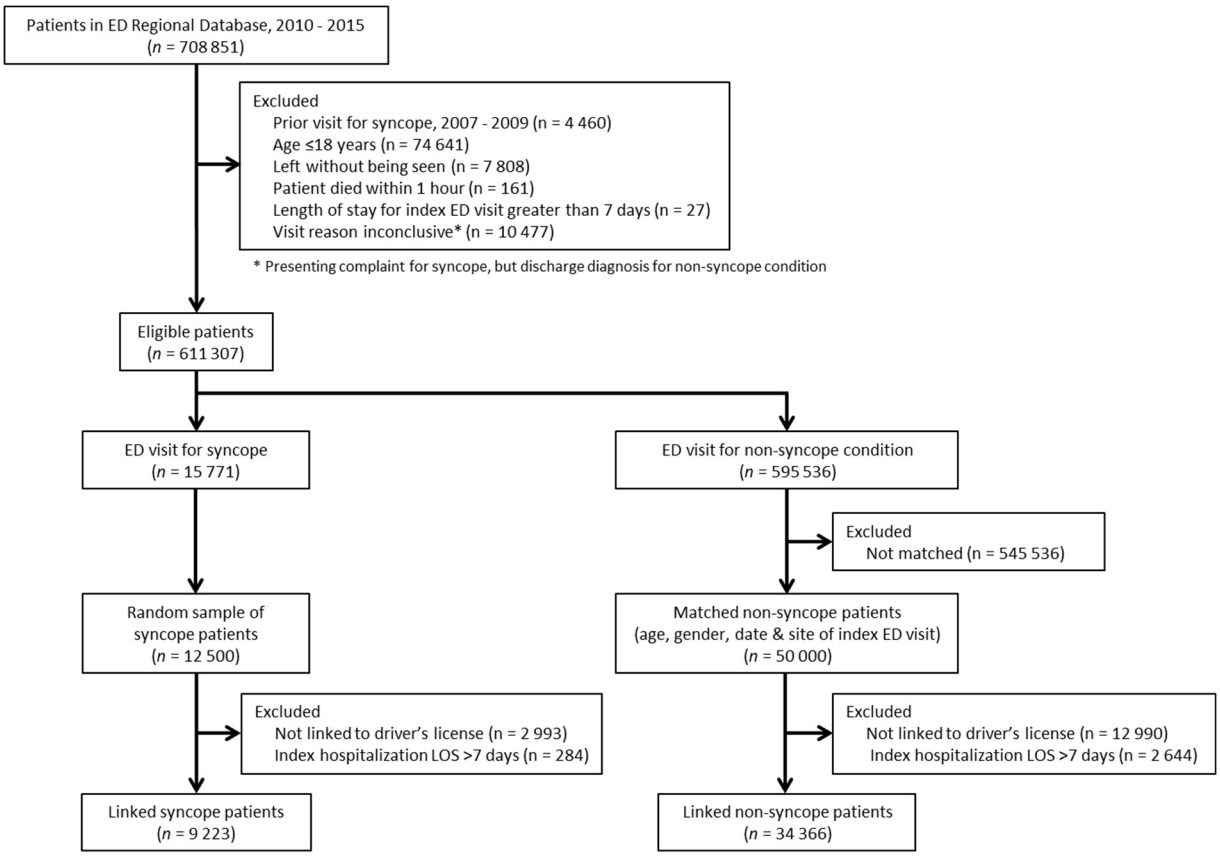
Condition	Codes
Cardiovascular disease (CVD)	Codes from myocardial infarction, chronic ischemic heart disease, peripheral vascular disease, congestive heart failure, atrial fibrillation and flutter, other cardiac arrhythmia, cerebrovascular disease
Cardiovascular disease (Numé definition)	ICD9: 410-414, 425-427, 430-438, 440, 443, 514; ICD10: I20-I25, I6, I11, I42, I44, I47-I50, J81, I70, I74
Seizure disorders	ICD9: 345, 78033; ICD10: G40, R5680
Obstructive sleep apnea and other sleep disorders	ICD9: 307, 327, 3270, 32711, 32712, 3272, 32720, 32721, 32723, 32724, 32726, 32727, 32729, 3273, 32730, 32731, 32732, 32733, 32734, 32735, 32736, 32737, 32739, 32742, 32743, 3275, 32752, 32753, 32759, 3278, 7805, 78050, 78051, 78053, 78055-78059, V694; ICD10: F51, G47
Traumatic brain injury	ICD9: 310, 80009, 80019, 80029, 80039, 80049, 80059, 80069, 80079, 80089, 80099, 80109, 80119, 80129, 80139, 80149, 80159, 80169, 80179, 80189, 80199, 80309, 80319, 80329, 80339, 80349, 80359, 80369, 80379, 80389, 80399, 80409, 80419, 80429, 80439, 80449, 80459, 80469, 80479, 80489, 80499, 850, 8500, 85011, 85012, 8502-8505, 8509, 85109, 85119, 85129, 85139, 85149, 85159, 85169, 85179, 85189, 85199, 85209, 85219, 85229, 85239, 85249, 85259, 85309, 85319, 85409, 85419, V1552, V8001; ICD10: F072, S06
Psychiatric disorders	ICD9: 295-301, 306-319; ICD10: F04-F09, F2-F9
Alcohol misuse	ICD9: 291, 303, 305, 3575, 425, 5353, 53530, 53531, 571, 76071, 7903, 9773, 980, E860, V113; ICD10: F10, G312, G721, I426, K292, K70, K852, O354, R780, T51, X45, X65, Y15, Y90, Y91, Z502, Z714, Z721, Z8640
Other substance misuse	ICD9: 292, 304, 305, 76073, 76075, 9650, 96501, 96502, 96509, 967, 9670, 9671, 9676, 9678, 9679, 9696, 96972, 9701, 97081, E8500, E8501, E8502, E851, E852, E8520, E8525, E8528, E8529, E8541, E9350, E9351, E9352, E937, E9370, E9371, E9376, E9378, E9379, E9396, E9401, E9501, E9502, E9801, E9802; ICD10: F11-F19

Legend. We used a definition of cardiovascular disease that combined codes used in other diagnoses. We evaluated the definition of cardiovascular disease used by *Numé et al* and found a very similar prevalence among each arm of the study.[13] To calculate the Canadian Syncope Risk Score, we defined 'history of heart disease' as in the original published manuscript, using a combination of comorbidities described above: coronary artery disease (myocardial infarction, unstable angina, or chronic ischemic heart disease), cardiomyopathy or congestive heart failure, valvular heart disease, or non-sinus rhythm (history of atrial or ventricular arrhythmia, or electrocardiogram evidence of non-sinus rhythm during index admission or at baseline).[12] HIV = human immunodeficiency virus; AICD = automated internal cardioverter-defibrillator.

eFigure 1: Cohort study schematic



eFigure 2: Participant flow diagram



Legend. We excluded individuals with hospitalization for >7 days because syncope alone is unlikely to be the cause of a prolonged hospitalization, and because individuals cannot crash while hospitalized, and because individuals may substantially reduce driving for a period of time after a prolonged hospitalization (due to ongoing illness or deconditioning). LOS = length of stay.

eTable 3: Cumulative events in the year following index ED visit

Outcome	Syncope n = 9,223; n (%)	Syncope 'definite or likely' n = 5,546; n (%)	Controls n = 34,366; n (%)
Crashes on index visit date (excluded)	63 (0.7%)	44 (0.8%)	410 (1.2%)
Motor vehicle crash (primary outcome)	865 (9.4%)	512 (9.2%)	3,577 (10.4%)
Casualty crashes (fatality or injury)	212 (2.3%)	129 (2.3%)	954 (2.8%)
Property damage only	653 (7.1%)	383 (6.9%)	2,623 (7.6%)
Any contravention	698 (7.6%)	454 (8.2%)	3,021 (8.8%)
Alcohol-related	38 (0.4%)	33 (0.6%)	152 (0.4%)
Speed-related	276 (3.0%)	187 (3.4%)	1,110 (3.2%)
Distraction-related	92 (1.0%)	57 (1.0%)	440 (1.3%)
License expiry, or unlicensed at t_0	1,978 (21.4%)	1,090 (19.7%)	7,856 (22.9%)
License suspension	47 (0.5%)	34 (0.6%)	276 (0.8%)
Insurance policy expiry, or none at t_0	4,821 (52.3%)	2,883 (52.0%)	18,286 (53.2%)
Hospitalized for > 30 days	185 (2.0%)	85 (1.5%)	824 (2.4%)
Hospitalized for motor vehicle crash			
As a driver	< 5	< 5	21 (0.1%)
As a non-driver	< 5	< 5	28 (0.1%)
Death (all cause)	281 (3.0%)	163 (2.9%)	1,666 (4.8%)

Legend. Values presented in this table reflect the number of individuals experiencing the event at any point in the year following index ED visit, with no censoring after other types of event. In contrast, values presented in Table 3 only reflect *first* events, excluding those occurring after the first censoring event.

Drivers who were unlicensed at t_0 might have been: a) visitors or recent migrants to British Columbia from another jurisdiction (driver licenses from many other jurisdictions can be used for 6 months by visitors and tourists to BC, for 3 months after moving to BC, and for longer periods of time for students residing in BC for school); b) not yet licensed at t_0 (i.e. syncope at age 18, but obtained driver license at age 20). Some drivers who allowed their license to expire during the study interval might have ceased driving because of advanced age, illness, or other factors. Available study data could not distinguish between these and other possibilities. However, the proportion without an 'active license in the five years prior to t_0' (Table 1) and the proportion with 'license expiry, or unlicensed at t_0' was very similar between syncope and control groups.

Vehicle insurance in British Columbia is held by the vehicle's owner. It is likely that most drivers who did not hold active insurance in the 5 years prior to baseline were driving a vehicle registered to and thus insured by a friend or family member. This likely explains the substantial proportion of the cohort with insurance policy expiry, or none at t_0.

Individuals who cease driving but nevertheless maintain their pre-syncope mobility will reduce their road exposure as a driver but increase their road exposure as a non-driver (passenger, pedestrian, or cyclist). This would plausibly increase the number of non-driver crash injuries. We found no increase in non-driver crash injuries after syncope, arguing against a major shift in road exposure as a driver after syncope.

eTable 4: Subgroup analyses for the main comparison between syncope and control patients

Characteristic	Syncope n = 9,223; n (%)	Controls n = 34,366; n (%)	Hazard ratio (95%CI, p-value)	
			Unadjusted	Adjusted
All crash	846 (9.2%)	3,457 (10.1%)	0.88 (0.82, 0.95) p=0.0008*	0.93 (0.87, 1.01) p=0.073
Sex				
Female	395 (8.4%)	1,590 (9.0%)	0.91 (0.81, 1.01) p=0.081	0.96 (0.86, 1.07) p=0.45
Male	451 (10.0%)	1,867 (11.2%)	0.85 (0.77, 0.95) p=0.0027*	0.91 (0.82, 1.01) p=0.074
Age (years)				
19-25	100 (9.6%)	405 (10.8%)	0.85 (0.69, 1.06) p=0.16	0.92 (0.74, 1.15) p=0.45
26-35	127 (9.3%)	552 (10.5%)	0.84 (0.69, 1.01) p=0.069	0.90 (0.74, 1.09) p=0.28
36-65	433 (11.6%)	1,776 (12.3%)	0.89 (0.80, 0.99) p=0.033*	0.93 (0.83, 1.03) p=0.16
66-85	174 (7.1%)	682 (7.5%)	0.92 (0.78, 1.09) p=0.33	0.99 (0.83, 1.17) p=0.87
86+	12 (2.0%)	42 (2.3%)	0.78 (0.41, 1.48) p=0.44	0.71 (0.36, 1.39) p=0.32
Population density				
Urban	751 (9.2%)	3,060 (10.1%)	0.88 (0.82, 0.96) p=0.0022*	0.94 (0.86, 1.01) p=0.11
Rural	95 (9.0%)	397 (10.0%)	0.86 (0.69, 1.07) p=0.18	0.91 (0.73, 1.15) p=0.43
ED disposition				
Hospitalized	57 (7.2%)	306 (7.5%)	0.91 (0.69, 1.21) p=0.53	0.98 (0.73, 1.31) p=0.89
Discharged	781 (9.4%)	3,124 (10.5%)	0.87 (0.81, 0.94) p=0.0006*	0.93 (0.86, 1.01) p=0.071

Legend. This table presents subgroup analyses for our main comparison between 9,223 syncope patients and 34,366 control patients. We also performed a sensitivity analysis comparing the 5,546 individuals deemed by abstractors to have 'definite or likely' syncope to the 34,366 control patients; subgroup analyses for this comparison are presented in **eTable 5**.

We also performed a *post* hoc analysis on commercial drivers who crashed while driving a commercial vehicle. Commercial drivers were identified by data on license class. License class data was only available for license renewed or obtained between 2000 and 2016, but because license renewals occur every 5 years in BC we reasoned this should capture most commercial drivers. Commercial vehicle crashes were identified using insurance claim data (vehicle type “commercial”, “commercial truck”, “commercial trailer” or “passenger carrying commercial”) and police reported crash data (vehicle use “business/commercial”, “emergency” (like ambulances), “towing”, “taxi” or “government”).

In the syncope cohort, 15 of 248 (6.0%) of commercial drivers crashed while in a commercial vehicle. In the control cohort, 55 of 1059 (5.3%) of commercial drivers crashed while in a commercial vehicle. This corresponds to an unadjusted hazard ratio of 1.15 (95%CI, 0.65 to 2.03; p=0.64) and an adjusted hazard ratio of 0.94 (95%CI, 0.52 to 1.70; p=0.83). Although commercial drivers had a lower crash rate while driving a commercial vehicle compared to the crash rate among all drivers in the cohort, the HR for crash in the subgroup of commercial drivers was nearly identical to the primary analysis.

*indicates p<0.05.

eTable 5: Subgroup analyses for syncope 'definite or likely'

Characteristic	Syncope 'definite or likely' n = 5,546; n (%)	Controls n = 34,366; n (%)	Hazard ratio (95%CI, p-value)	
			Unadjusted	Adjusted
All crashes	498 (9.0%)	3,457 (10.1%)	0.84 (0.76, 0.92) p=0.0002*	0.89 (0.81, 0.98) p=0.018*
Sex				
Female	232 (8.3%)	1,590 (9.0%)	0.87 (0.76, 1.00) p=0.051	0.92 (0.80, 1.06) p=0.24
Male	266 (9.7%)	1,867 (11.2%)	0.81 (0.71, 0.92) p=0.0011*	0.87 (0.76, 0.99) p=0.033*
Age (years)				
19-25	67 (9.2%)	405 (10.8%)	0.80 (0.61, 1.03) p=0.084	0.87 (0.67, 1.14) p=0.31
26-35	88 (9.9%)	552 (10.5%)	0.87 (0.70, 1.10) p=0.24	0.91 (0.73, 1.15) p=0.44
36-65	230 (10.3%)	1,776 (12.3%)	0.78 (0.68, 0.90) p=0.0005*	0.83 (0.73, 0.96) p=0.0096*
66-85	109 (7.8%)	682 (7.5%)	1.00 (0.81, 1.22) p=0.96	1.05 (0.85, 1.28) p=0.65
86+	-	42 (2.3%)	0.50 (0.18, 1.39) p=0.18	0.41 (0.14, 1.22) p=0.11
Population density				
Urban	436 (8.9%)	3,060 (10.1%)	0.83 (0.75, 0.92) p=0.0003*	0.88 (0.80, 0.98) p=0.016*
Rural	62 (9.7%)	397 (10.0%)	0.90 (0.69, 1.18) p=0.46	0.95 (0.72, 1.25) p=0.72
Syncope subtype				
Vasovagal	363 (8.8%)	-	0.81 (0.73, 0.90) p=0.0001*	0.86 (0.77, 0.96) p=0.0053*
Orthostatic	69 (9.3%)	-	0.92 (0.72, 1.16) p=0.48	0.99 (0.78, 1.25) p=0.92
Cardiac	25 (7.1%)	-	0.71 (0.48, 1.06) p=0.091	0.85 (0.57, 1.26) p=0.41
Other etiology	36 (12.5%)	-	1.15 (0.83, 1.60) p=0.39	1.17 (0.84, 1.62) p=0.36
Non-syncopal TLOC	5 (10.9%)	-	1.24 (0.52, 2.98) p=0.63	1.28 (0.53, 3.09) p=0.58
Can Syncope Rule				
Positive (score ≥ 1)	77 (7.6%)	-	0.80 (0.64, 1.01) p=0.06	0.92 (0.73, 1.16) p=0.47
Negative (score ≤0)	421 (9.3%)	-	0.85 (0.76, 0.94) p=0.001*	0.89 (0.80, 0.98) p=0.02*
SF Syncope Rule				
Positive (score ≥ 1)	259 (8.7%)	-	0.83 (0.73, 0.94) p=0.0030*	0.91 (0.80, 1.03) p=0.13
Negative (score 0)	239 (9.3%)	-	0.85 (0.75, 0.97) p=0.017*	0.88 (0.77, 1.00) p=0.053
Driving advice				
Yes	6 (6.6%)	-	0.55 (0.25, 1.22) p=0.14	0.58 (0.26, 1.29) p=0.18
No	492 (9.0%)	-	0.84 (0.77, 0.93) p=0.0004*	0.90 (0.82, 0.99) p=0.027*
ED disposition				
Hospitalized	34 (6.6%)	306 (7.5%)	0.81 (0.57, 1.15) p=0.24	0.90 (0.62, 1.29) p=0.56
Discharged	460 (9.2%)	3,124 (10.5%)	0.84 (0.76, 0.92) p=0.0004*	0.89 (0.81, 0.99) p=0.025*

Legend. This table presents subgroup analyses for the comparison between the 5,546 syncope patients deemed by abstractors to have 'definite or likely' syncope and the 34,366 control patients. **eTable 4** presents subgroup analyses for the main comparison between the 9,223 syncope patients and the 34,366 control patients. *indicates p<0.05.

eTable 6: Sensitivity analyses

Analysis	Syncope, crashes / individuals (%)	Control, crashes / individuals (%)	Unadjusted HR (95%CI; p-value)	Adjusted HR (95%CI; p-value)
Main analysis	846 / 9223 (9.2%)	3457 / 34,366 (10.1%)	0.88 (0.82, 0.95) p=0.0008*	0.93 (0.87, 1.01) p=0.073
Alternate censoring				
Ignoring license expiry as a censoring event	860 / 9223 (9.3%)	3540 / 34,366 (10.3%)	0.88 (0.82, 0.95) p=0.0009*	0.93 (0.86, 1.00) p=0.065
Ignoring all censoring events	865 / 9223 (9.4%)	3577 / 34,366 (10.4%)	0.90 (0.83, 0.97) p=0.0040*	0.94 (0.87, 1.01) p=0.099
Alternate outcome definitions				
Fatal or injury crashes only	208 / 9223 (2.3%)	910 / 34,366 (2.6%)	0.82 (0.71, 0.96) p=0.011*	0.88 (0.75, 1.02) p=0.092
Single vehicle crashes only	192 / 9223 (2.1%)	729 / 34,366 (2.1%)	0.95 (0.81, 1.11) p=0.50	1.00 (0.85, 1.17) p=0.99
Alternate exposure definition				
Syncope 'definite or likely' only	498 / 5546 (9.0%)	3457 / 34,366 (10.1%)	0.84 (0.76, 0.92) p=0.0002*	0.89 (0.81, 0.98) p=0.018*
Alternate matching schemes				
Complete matches only (1:4)	310 / 2858 (10.8%)	1305 / 11,432 (11.4%)	0.91 (0.80, 1.03) p=0.13	0.96 (0.84, 1.08) p=0.48
Incomplete matched sets only (1:1, 1:2 or 1:3)	530 / 6201 (8.5%)	1432 / 14,880 (9.6%)	0.86 (0.78, 0.95) p=0.0032*	0.92 (0.83, 1.02) p=0.11
Matched analysis				
Cox regression stratified by matched set	840 / 9059 (9.3%)	2737 / 26,312 (10.4%)	0.88 (0.81, 0.95) p=0.002*	0.92 (0.84, 1.00) p=0.054
Alternate statistical model				
One or more crash within 1 year after ED visit (cumulative incidence of crash, analyzed using logistic regression; cells on the far right in this row present odds ratios instead of hazard ratios)	865 / 9223 (9.4%)	3577 / 34366 (10.4%)	0.89 (0.82, 0.96) p=0.0037*	0.93 (0.86, 1.01) p=0.09

Legend. Our study design matched each syncope patient to 4 control patients with an index ED visit for a condition other than syncope. Matching was based on sex, age (+/-5 years), hospital site, and month of visit. For our primary analysis, we chose an unmatched analysis that adjusted for matched variables and for many additional potential confounders. This choice is supported by the statistical literature for its efficiency and adequate control of the Type I error rate.[14] The major advantage of this approach is that it allowed us to use the model developed for the primary analysis to perform subgroup analyses based on variables that were not used for matching. Additionally, patients whose matches were not linked to administrative health and driving data (n=8,218) were retained in the unmatched analysis. A matched analysis yielded similar results.

Overall, all sensitivity analyses suggested that the results of the main analysis were robust to changes in study design.

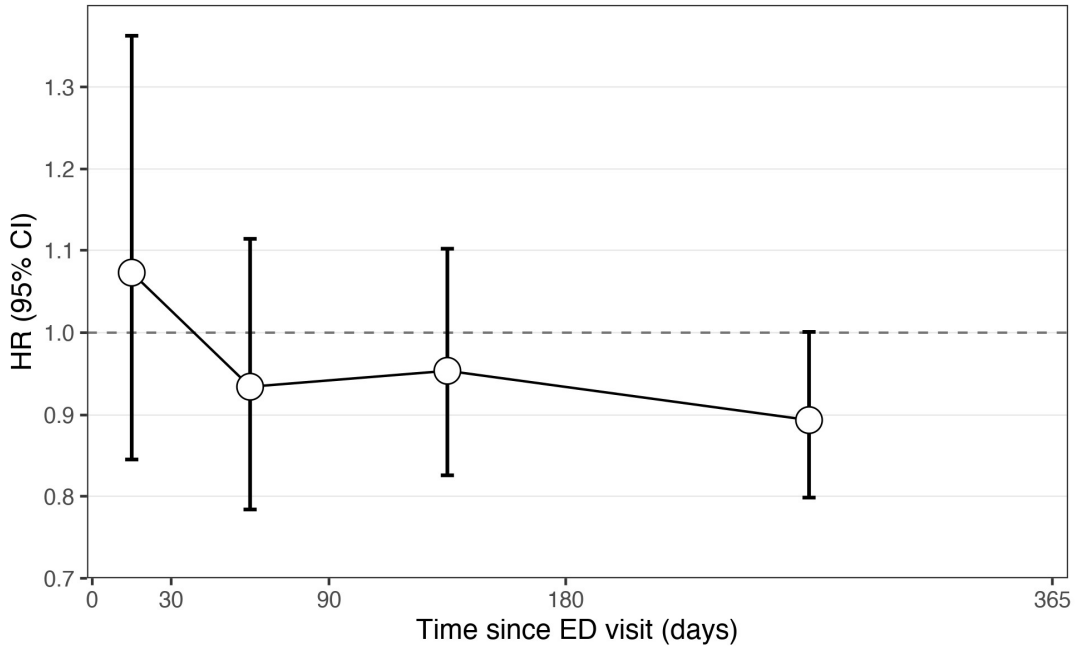
* indicates p<0.05.

eTable 7: Time interval analysis

Follow-up interval (days)	Syncope n = 9,223	Control n = 34,366	Adjusted HR (95%CI; p-value)
	Number of crashes / patients remaining at beginning of interval (%)		
All	846 / 9,223 (9.2%)	3,457 / 34,366 (10.1%)	0.93 (0.87, 1.01) p=0.073
(0-30]	86 / 9,223 (0.9%)	311 / 34,366 (0.9%)	1.07 (0.84, 1.36) p=0.56
(30-90]	155 / 7,503 (2.1%)	640 / 27,310 (2.3%)	0.93 (0.78, 1.11) p=0.45
(90-180]	231 / 7,215 (3.2%)	928 / 26,130 (3.6%)	0.95 (0.83, 1.10) p=0.52
(180-365]	374 / 6,851 (5.5%)	1,578 / 24,585 (6.4%)	0.89 (0.80, 1.00) p=0.052

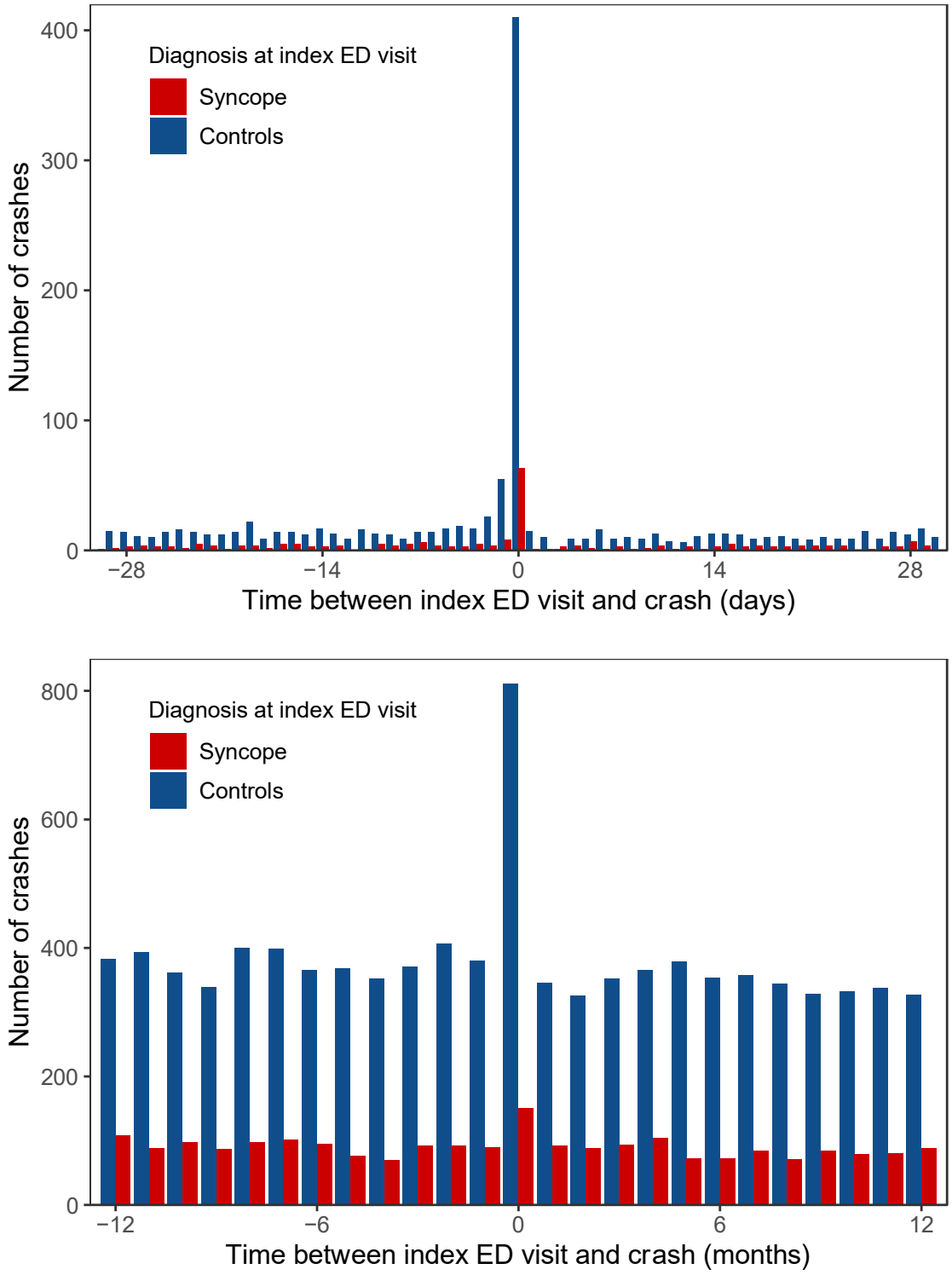
Legend. Crashes occurring at 0 days are only counted if they did not occur on *start date* for index visit since we cannot verify whether the crash came before or after the index visit.

eFigure 3: Time interval sensitivity analysis



Legend. Plot depicting changes in crash risk over time, obtained using a piecewise Cox proportional hazards model with an interaction term between cohort membership (syncope versus control) and time period from index ED visit (0-30, 31-90, 91-180, and 181-360 days).

eFigure 4: Crashes per month and crashes per day, before and after index ED visit



Legend. Motor vehicle crashes per day (upper panel) and per month (lower panel) before and after the index ED visit. Because of 4:1 control:syncope matching, the number of crashes in the control group is much greater than in the syncope group.

Main findings are: a) Among controls, crashes increase in the days leading up to and on the day of the index ED visit. The most likely explanation is that crashes resulted in an injury which prompted the index ED visit. b) In the syncope group, there is a much smaller increase in crashes on the day of the index ED visit. Crash-associated syncope (that is, syncope-causing-crash or crash-causing-syncope) is a rare and specific initial presentation of syncope in the ED. Based on the available study data it was difficult to determine whether the syncope or the crash occurred first. We excluded these patients from the current analysis as our study goal was to provide evidence to guide decision-making for typical ED syncope patients (not for crash-associated syncope). c) In both syncope and control groups, there is a modest decrease in daily crash counts in the days following index ED visits, most likely because some patients have a transient reduction in road exposure because they are hospitalized or recovering at home.

We calculated average crash risks before and after the index ED visit using a quasi-Poisson regression model (to account for overdispersion of crash counts) and an indicator variable for time relative to the index ED visit. There was no seasonality because index dates were distributed throughout the year. There was no autocorrelation in the time series.

Among control patients, the average monthly incidence rate of crash was 11.0 events per 1000 individuals at risk before the month of index ED visit and 10.4 crashes per 1000 individuals at risk after the month of index ED visit (relative risk, 0.95; 95%CI, 0.91-0.99; p=0.02).

Among syncope patients, the average monthly incidence rate of crash was 9.9 events per 1000 individuals at risk before the month of index ED visit and 9.3 crashes per 1000 individuals at risk after the month of index ED visit (relative risk, 0.94; 95%CI, 0.86-1.02; p=0.15).

Even prior to the month of index ED visit, syncope patients exhibit a lower crash risk than control patients (relative risk, 0.90; 95%CI, 0.84-0.96; p=0.003). This suggests that individuals who eventually have an ED visit for syncope have less road exposure or safer driving behaviors relative to controls visiting the ED for diagnoses other than syncope.

References

[1] Road Safety BC. Part 3: Canadian Council of Motor Transport Administrators Medical Standards with B.C. Specific Guidelines (Chapter 19 – Syncope). Victoria (BC): Government of British Columbia (Canada); 2021. Accessed from: https://www2.gov.bc.ca/gov/content/transportation/driving-and-cycling/roadsafetybc/medical-fitness/medical-prof/med-standards/19-syncope

[2] Canadian Medical Association. Determining Medical Fitness to Operate Motor Vehicles. Canadian Medical Association Driver's Guide. 9th edition. Ottawa (ON): Canadian Medical Association; 2019.

[3] Shen WK, Sheldon RS, Benditt DG, Cohen MI, Forman DE, Goldberger ZD, Grubb BP, Hamdan MH, Krahn AD, Link MS, Olshansky B. 2017 ACC/AHA/HRS guideline for the evaluation and management of patients with syncope: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines and the Heart Rhythm Society (Table 10). Journal of the American College of Cardiology. 2017 Aug 1;70(5):e39-110. Accessed from: https://www.ahajournals.org/doi/10.1161/cir.0000000000000499#d3e4819https://www.ahajournals.org/doi/10.1161/cir.0000000000000499#d3e4819

[4] Lapse of Consciousness Disorders, Physical and Mental Conditions Guidelines (Rev. 2-99), Driver Education and Safety. Department of Motor Vehicles - State of California. 2022. Accessed from: https://www.dmv.ca.gov/portal/driver-education-and-safety/medical-conditions-and-driving/lapse-of-consciousness-disorders/

[5] Assessing fitness to drive – a guide for medical professionals. Driver & Vehicle Licensing Agency. March 2021. www.gov.uk/dvla/fitnesstodrive

[6] Assessing fitness to drive for commercial and private vehicle drivers. Medical standards for licensing and clinical management guidelines. NTC Australia. 2016. Retrieved from: https://austroads.com.au/publications/assessing-fitness-to-drive/ap-g56/cardiovascular-conditions/general-assessment-and-managemenogtuxmnt/syncope

[7] Medical aspects of fitness to drive: A guide for health practitioners. Waka Kotahi NZ Transport Agency, New Zealand Government, 2014.

[8] Staples JA, Vadeanu C, Gu B, Erdelyi S, Chan H, Brubacher JR. Syncope and presyncope as a presenting symptom or discharge diagnosis in the emergency department: an administrative data validation study. Canadian Journal of Cardiology. 2017 Dec 1;33(12):1729-32.

[9] Task Force for the Diagnosis and Management of Syncope; European Society of Cardiology (ESC); European Heart Rhythm Association (EHRA); Heart Failure Association (HFA); Heart Rhythm Society (HRS), Moya A, Sutton R, Ammirati F, Blanc JJ, Brignole M, Dahm JB, Deharo JC, Gajek J, Gjesdal K, Krahn A, Massin M, Pepi M, Pezawas T, Ruiz Granell R, Sarasin F, Ungar A, van Dijk JG, Walma EP, Wieling W. Guidelines for the diagnosis and management of syncope (version 2009). Eur Heart J. 2009 Nov;30(21):2631-71.).

[10] Moya A, Sutton R, Ammirati F, Blanc JJ, Brignole M, Dahm JB, Deharo JC, Gajek J, Gjesdal K, Krahn A, Massin M. Guidelines: Guidelines for the diagnosis and management of syncope (version 2009): The Task Force for the Diagnosis and Management of Syncope of the European Society of Cardiology (ESC). European Heart Journal. 2009 Nov;30(21):2631-71.

[11] Saccilotto RT, Nickel CH, Bucher HC, Steyerberg EW, Bingisser R, Koller MT. San Francisco syncope rule to predict short-term serious outcomes: a systematic review. CMAJ 2011;183:e1116–26.

[12] Thiruganasambandamoorthy V, Kwong K, Wells GA, Sivilotti ML, Mukarram M, Rowe BH, Lang E, Perry JJ, Sheldon R, Stiell IG, Taljaard M. Development of the Canadian Syncope Risk Score to predict serious adverse events after emergency department assessment of syncope. CMAJ. 2016 Jul 4. pii: CMAJ.151469

[13] Numé AK, Gislason G, Christiansen CB, Zahir D, Hlatky MA, Torp-Pedersen C, Ruwald MH. Syncope and motor vehicle crash risk: a Danish nationwide study. JAMA Internal Medicine. 2016 Apr 1;176(4):503-10.

[14] Brazauskas R, Logan BR. Observational studies: matching or regression? Biol Blood Marrow Transplant. 2016;22(3):557-563.