Factors associated with physician follow-up among patients with chest pain discharged from the emergency department

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ABSTRACT

Background: Many patients with chest pain do not receive follow-up from a physician after discharge from the emergency department despite significant survival benefit associated with follow-up care. Our objective was to evaluate factors associated with physician follow-up to understand this gap in practice.

Methods: We conducted an observational study involving patients at high risk who were assessed for chest pain and discharged from an emergency department in Ontario between April 2004 and March 2010. We used multivariable logistic regression to determine the association of clinical and nonclinical characteristics with physician follow-up.

Results: We identified 56 767 patients, of whom 25.1% did not receive any follow-up by a physician, 69.0% were seen by their primary care physician, and 17.3% were seen by a cardiologist within 30 days. Patients who had medical comor-bidities and cardiac conditions such as myocardial infarction or heart failure were less likely to have follow-up. In contrast, a previous visit to a primary care physician was associated with the highest odds of having physician follow-up (odds ratio [OR] 6.44, 95% confidence interval [CI] 5.91–7.01). Similarly, a previous visit to a cardiologist was strongly associated with follow-up by a cardiologist (OR 3.01, 95% CI 2.85–3.17). Patients evaluated in emergency departments with the highest tertile of chest pain volume were more likely to receive follow-up from any physician (OR 1.52, 95% CI 1.31–1.77) and from a cardiologist (OR 2.04, 95% CI 1.61–2.57).

Interpretation: Nonclinical factors are strongly associated with physician follow-up for patients with chest pain after discharge from the emergency department. However, patients with comorbidities and at higher risk for future adverse events are less likely to receive follow-up care.

Chest pain is one of the most common presenting symptoms in emergency departments. In Canada, about 500 000 visits to the emergency department are related to chest pain assessment each year.[1] Most of these visits result in discharge after excluding a cardiac diagnosis with an immediate risk of adverse effect.[2] Current clinical guidelines strongly advocate for patients with chest pain who have been discharged from the emergency department to receive outpatient follow-up with a physician within 72 hours for further assessment or treatment, because many patients remain at risk for future events.[3]

Among patients at high baseline cardiovascular risk who were discharged from the emergency department after assessment of chest pain, our group has previously shown significantly reduced hazard of death or myocardial infarction associated with follow-up with either a primary care physician or a cardiologist within 30 days.[2] At 1-year postassessment, the rate of death or myocardial infarction was 5.5% among patients who received cardiologist follow-up, 7.7% with primary care follow-up and 8.6% with no physician follow-up.[2] In addition, we found a considerable gap in practice, with 1 in 4 high-risk patients with chest pain failing to follow-up with a physician within 30 days of assessment in Ontario, Canada.[2] A better understanding of why physician follow-up does not occur in accordance with guidelines is essential to improve the transition of care from the emergency department to home. Thus, the main objective of our study was to evaluate clinical and nonclinical factors associated with physician follow-up among patients with chest pain after discharge from the emergency department.

Methods

Data sources

We obtained data for this study by linking multiple large, administrative, population-based databases in Ontario. The databases have been extensively used in health research and have been validated for the identification of patients with cardiac risk factors.[4–8] We used the National Ambulatory Care Reporting System database, which contains information regarding emergency department visits, to identify patients and their comorbidities. We used the Ontario Health Insurance Plan physician claims database, which captures information of the services provided by practising physicians in Ontario, to identify physician visits. We used the Canadian Institute of Health Information Discharge Abstract Database to identify comorbidities and procedural interventions. We used the Ontario Registered Persons Database, which contains vital statistics for all Ontarians, to determine rural residency and mortality after the index event. We identified physician specialty through the Institute for Clinical Evaluative Sciences Physician Database.

Study population

The study cohort included patients at high cardiovascular risk at baseline aged 18 years and older who underwent assessment for chest pain in an Ontario emergency department between Apr. 1, 2004, and Mar. 31, 2010. We identified eligible patients using primary diagnostic codes pertaining to chest pain symptoms as defined by the International Classification of Diseases, 10th revision (codes R07.1–R07.4, I20.0, I20.1, I20.8, I20.88, I20.9). We defined patients as being at high risk at baseline if they had diabetes mellitus, a history of cardiovascular disease or previous cardiac intervention.[2] We excluded patients who had a subsequent visit to an emergency department for chest pain, who were admitted to hospital for an acute coronary syndrome or who died within 30 days of their assessment, because they might not have had sufficient opportunity for physician follow-up.

Definition of physician follow-up

Using billing records, we first evaluated follow-up with any type of physician within 30 days of discharge from an emergency department as our primary outcome. Our secondary outcome was follow-up with a cardiologist within 30 days of discharge from an emergency department.

Clinical and nonclinical predicting factors

We selected the following clinical factors for evaluation: age, sex, income, rural residency, cardiovascular conditions (diabetes, hyperten-sion, dyslipidemia, chronic atherosclerosis, unstable angina, previous myocardial infarction, previous admission to hospital for heart failure, valvular heart disease, atrial fibrillation, ventricular arrhythmias, other arrhythmias, shock, peripheral vascular disease and cerebrovascular disease) and previous medical conditions (respiratory disease, peptic ulcer disease, rheumatologic disease, hemiplegia or paraplegia, dementia, renal disease, cancer, anemia or blood disease, trauma and depression). We determined income using the postal codes of patients' main residences.[9] We evaluated care in the emergency department using factors such as cardiology consultation, stress tests, discharge against medical advice and use of health services in the preceding year. In addition, we evaluated the following hospital characteristics: teaching hospital status, availability of cardiac catheterization laboratory and annual emergency department chest pain volume in tertiles (as determined by the annual volume of visits for chest pain at each hospital).

Statistical analysis

We used descriptive statistics to compare the baseline characteristics of patients who followed up with any physician with those who did not; similarly, we compared those with follow-up by a cardiologist with those who had none. We used the χ^2 test to compare categorical variables, 1-way analysis of variance to compare for mean values and the Kruskal–Wallis test to compare median values.

We developed separate multilevel hierarchical logistic regression models, clustered at the hospital level, for any physician follow-up and cardiologist follow-up to assess their independent association with clinical and nonclinical factors. We analyzed all data using SAS version 9.3 (SAS Institute Inc, Cary, NC). All statistical tests were 2-tailed, and we considered p values of less than 0.05 to be significant. This study was approved by the ethics board at Sunnybrook Health Sciences Centre, Toronto, Ontario. Informed consent was exempted in accordance with Ontario law, which permits the use of administrative data for research purposes in prescribed entities.

Results

Physician follow-up after discharge from the emergency department

We identified 56 767 patients for inclusion in our study. The mean age of the cohort was 66 (± 15) years, and 53.0% of participants were male. We identified 42 535 (74.9%) patients who received physician follow-up within 30 days of discharge (69.0% with a primary care physician and 17.3%

with a cardiologist), leaving 14 232 (25.1%) patients without follow-up. Figure 1 shows the cumulative percentage of patients who received follow-up over time by type of physician. Within the first week, 46.1% of patients received follow-up with any type of physician, including 37.3% with a primary care physician, and 6.1% with a cardiologist.

Clinical and nonclinical predicting factors

Factors associated with follow-up by any physician
Patients aged 50 years and older and those with highsocioeconomic status, diabetes mellitus, hypertension, dyslipidemia, atrial fibrillation or cancer had a significantly higher likelihood of follow-up with any physician (Table 1 and Figure 2). Conversely, rural residents, those with cerebrovascular disease, renal disease or a history of trauma were significantly less likely to receive follow-up. Previous myocardial infarction (odds ratio [OR] 0.84, 95% confidence interval [CI] 0.80–0.88), heart failure (OR 0.89, 95% CI 0.82–0.97), hemiplegia or paraplegia (OR 0.61, 95% CI 0.52–0.71) and dementia (OR 0.36, 95% CI 0.32–0.41) were all strongly associated with a lower likelihood of physician follow-up.

A visit to a primary care physician in the pre-

ceding year was associated with the highest likelihood of physician follow-up (OR 6.44, 95% CI 5.91–7.01). Other factors that were independently associated with follow-up included visiting a cardiologist within the preceding year (OR 1.36, 95% CI 1.29–1.42) and admission to hospital within the preceding year (OR 1.27, 95% CI 1.22–1.32). Patients discharged from an emergency department with higher chest pain volumes (when compared with the lowest tertile) were more likely to receive follow-up (OR 1.52, 95% CI 1.31–1.77 for the highest tertile; OR 1.30, 95% CI 1.14–1.50 for the middle tertile).

Factors associated with follow-up by a cardiologist
Patients aged 50–69 years, men, and patients with higher socioeconomic status, dyslipidemia, chronic atherosclerosis, previous admission to hospital for heart failure, arrhythmia or ventricular arrhythmias had a significantly higher likelihood of follow-up with a cardiologist (Table 2 and Figure 3). Conversely, patients with medical comorbidities such as diabetes, unstable angina, peripheral vascular disease, cerebrovascular disease, respiratory disease, neurologic disease, cancer, trauma, and depression were significantly less likely to receive follow-up with a cardiologist postdischarge.

Cardiology follow-up was most strongly associated with a cardiologist visit within the preceding year (OR 3.01, 95% CI 2.85–3.17), admission to hospital during the preceding year (OR 1.30, 95% CI 1.23–1.36) and discharge from an emergency department with higher chest pain volume (when compared with the lowest tertile: OR 2.04, 95% CI 1.61–2.57 for the highest tertile; OR 1.46, 95% CI 1.17–1.81 for the middle tertile).

Patient characteristics stratified by follow-up
Only 2.5% of patients received a consultation with a cardiologist in the emergency department, 0.5% of patients underwent a stress test and 1.5% of patients left against medical advice (Table 1). The burden of illness, as determined using the Charlson–Deyo score, was significantly higher among patients who did not receive follow-up than among those who did (Table 1).

The clinical characteristics of patients differed substantially between those who received follow-up with a cardiologist and those who did not (Table 2). Patients who received follow-up with a cardiologist had fewer medical comorbidities (Charlson–Deyo score 1.47 in the group with cardiologist follow-up v. 1.68 in the group
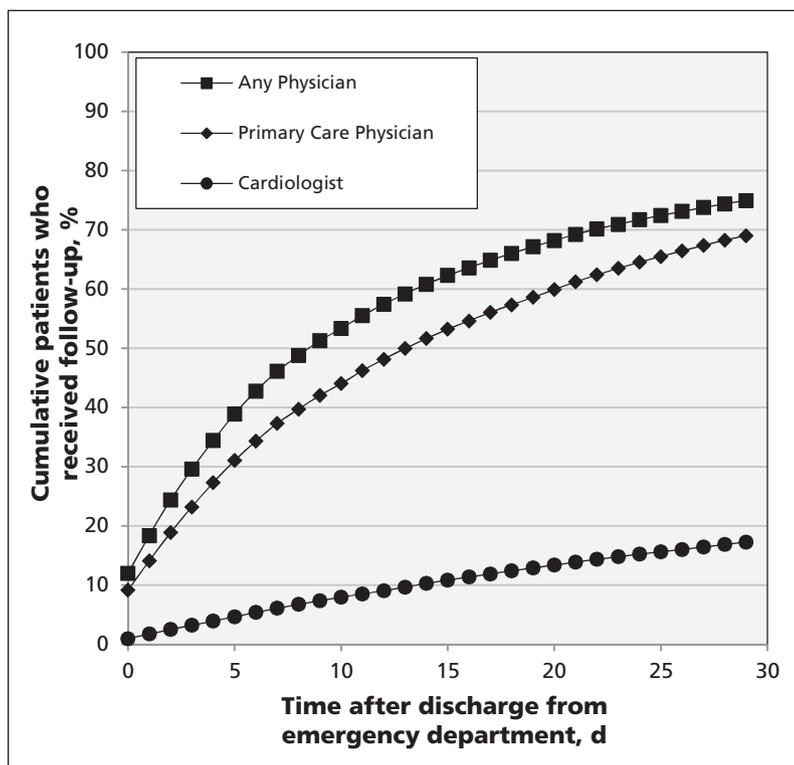

Figure 1: Time course of physician follow-up after discharge from emergency department. The cumulative percentage of patients who received follow-up within 30 days of discharge from the emergency department is shown by physician type.

Table 1: Baseline characteristics and factors associated with any physician follow-up within 30 d of visiting an emergency department with chest pain

Characteristic	No physician follow-up, no. (%)* n = 14 232	Any physician follow-up, no. (%)* n = 42 535	Unadjusted OR (95% CI)	Adjusted OR† (95% CI)
Age, yr, mean ± SD	65.90 ± 16.46	66.68 ± 14.05		
< 50 (reference)	2 494 (17.5)	5 335 (12.5)	1.00	1.00
50–69	5 212 (36.6)	17 276 (40.6)	1.55 (1.46–1.64)	1.36 (1.28–1.45)
≥ 70	6 526 (45.9)	19 924 (46.8)	1.43 (1.35–1.51)	1.34 (1.26–1.43)
Male sex	7 545 (53.0)	22 351 (52.5)	0.98 (0.95–1.02)	0.97 (0.93–1.01)
Rural residency	3 007 (21.1)	6 601 (15.5)	0.69 (0.65–0.72)	0.91 (0.85–0.98)
Income quintile 1 (lowest) (reference)	3 733 (26.2)	10 191 (24.0)	1.00	1.00
Income quintile 2	3 070 (21.6)	9 148 (21.5)	1.09 (1.03–1.15)	1.04 (0.98–1.11)
Income quintile 3	2 720 (19.1)	8 481 (19.9)	1.14 (1.08–1.21)	1.07 (1.01–1.14)
Income quintile 4	2 445 (17.2)	7 742 (18.2)	1.16 (1.09–1.23)	1.08 (1.01–1.15)
Income quintile 5 (highest)	2 264 (15.9)	6 973 (16.4)	1.13 (1.06–1.20)	1.04 (0.98–1.11)
Cardiac risk factors or previous cardiovascular conditions				
Diabetes mellitus	5 066 (35.6)	15 497 (36.4)	1.04 (1.00–1.08)	1.07 (1.02–1.12)
Hypertension	9 942 (69.9)	32 680 (76.8)	1.43 (1.37–1.49)	1.23 (1.17–1.29)
Dyslipidemia	5 044 (35.4)	18 250 (42.9)	1.37 (1.32–1.42)	1.14 (1.09–1.19)
Chronic atherosclerosis	6 556 (46.1)	20 887 (49.1)	1.13 (1.09–1.17)	1.02 (0.97–1.07)
Unstable angina	1 880 (13.2)	5 703 (13.4)	1.02 (0.96–1.08)	0.95 (0.89–1.01)
Previous myocardial infarction	3 979 (28.0)	11 086 (26.1)	0.91 (0.87–0.95)	0.84 (0.80–0.88)
Previous admission for heart failure	980 (6.9)	2 786 (6.5)	0.95 (0.88–1.02)	0.89 (0.82–0.97)
Valvular heart disease	651 (4.6)	2 305 (5.4)	1.20 (1.09–1.31)	1.05 (0.96–1.16)
Arrhythmias	3 553 (25.0)	11 210 (26.4)	1.08 (1.03–1.12)	0.92 (0.85–0.99)
Atrial fibrillation	2 291 (16.1)	7 639 (18.0)	1.14 (1.08–1.20)	1.18 (1.08–1.28)
Ventricular arrhythmias	272 (1.9)	879 (2.1)	1.08 (0.94–1.24)	1.13 (0.96–1.32)
Shock	358 (2.5)	1 000 (2.4)	0.93 (0.83–1.05)	0.99 (0.87–1.13)
Peripheral vascular disease	893 (6.3)	2 854 (6.7)	1.07 (0.99–1.16)	1.06 (0.98–1.15)
Cerebrovascular disease	1 830 (12.9)	4 445 (10.5)	0.79 (0.75–0.84)	0.91 (0.85–0.97)
Previous medical conditions				
Respiratory disease	1 759 (12.4)	5 083 (12.0)	0.96 (0.91–1.02)	0.99 (0.93–1.05)
Peptic ulcer disease	240 (1.7)	819 (1.9)	1.15 (0.99–1.32)	1.09 (0.94–1.27)
Rheumatologic disease	170 (1.2)	520 (1.2)	1.02 (0.86–1.22)	1.10 (0.92–1.33)
Neurologic disease	1 051 (7.4)	1 261 (3.0)		
Hemiplegia or paraplegia	359 (2.5)	555 (1.3)	0.51 (0.45–0.58)	0.61 (0.52–0.71)
Dementia	724 (5.1)	729 (1.7)	0.33 (0.29–0.36)	0.36 (0.32–0.41)
Renal disease	980 (6.9)	2 419 (5.7)	0.82 (0.76–0.88)	0.81 (0.74–0.89)
Cancer	693 (4.9)	2 881 (6.8)	1.42 (1.30–1.55)	1.35 (1.23–1.47)
Anemia or blood disease	1 230 (8.6)	3 414 (8.0)	0.92 (0.86–0.99)	0.94 (0.87–1.01)
Trauma	1 335 (9.4)	2 848 (6.7)	0.69 (0.65–0.74)	0.78 (0.72–0.84)
Depression	748 (5.3)	2 038 (4.8)	0.91 (0.83–0.99)	1.04 (0.95–1.14)
Charlson–Deyo comorbidity score‡	1.69 ± 1.65	1.62 ± 1.62		
Events in the emergency department				
Cardiologist consultation	260 (1.8)	1 167 (2.7)	1.52 (1.32–1.74)	1.33 (1.15–1.54)
Stress test	56 (0.4)	230 (0.5)	1.38 (1.03–1.84)	1.29 (0.95–1.76)
Discharged against medical advice	234 (1.6)	599 (1.4)	0.85 (0.73–1.00)	0.92 (0.79–1.09)
Use of health services in the previous year				
Primary care visit	12 194 (85.7)	41 667 (98.0)	8.02 (7.39–8.70)	6.44 (5.91–7.01)
Cardiologist visit	4 885 (34.3)	19 359 (45.5)	1.60 (1.54–1.66)	1.36 (1.29–1.42)
Admission to hospital	6 706 (47.1)	22 145 (52.1)	1.22 (1.17–1.27)	1.27 (1.22–1.32)
Hospital characteristics				
Teaching hospital	2 456 (17.3)	7 559 (17.8)	1.04 (0.99–1.09)	0.88 (0.74–1.05)
Cardiac catheterization laboratory	3 912 (27.5)	12 968 (30.5)	1.16 (1.11–1.21)	1.13 (0.96–1.32)
Annual chest pain volume, patients/yr				
Low (< 348) (reference)	1 189 (8.4)	2 242 (5.3)	1.00	1.00
Medium (348–1 237)	3 170 (22.3)	8 188 (19.3)	1.37 (1.26–1.49)	1.30 (1.14–1.50)
High (> 1 237)	9 873 (69.4)	32 105 (75.5)	1.73 (1.60–1.86)	1.52 (1.31–1.77)

Note: CI = confidence interval, OR = odds ratio, SD = standard deviation.
*Unless otherwise specified.
†Baseline demographics, cardiac risk factors and medical conditions, events in the emergency department, use of health services in the previous year and hospital characteristics were included in the model.
‡Not included in the prediction model because each individual component was adjusted.

without, $p < 0.001$). The largest difference in system-level factors was previous visits to a cardiologist; 70.9% of patients with cardiologist follow-up had previously visited a cardiologist, as opposed to 36.8% in the group without cardiologist follow-up.
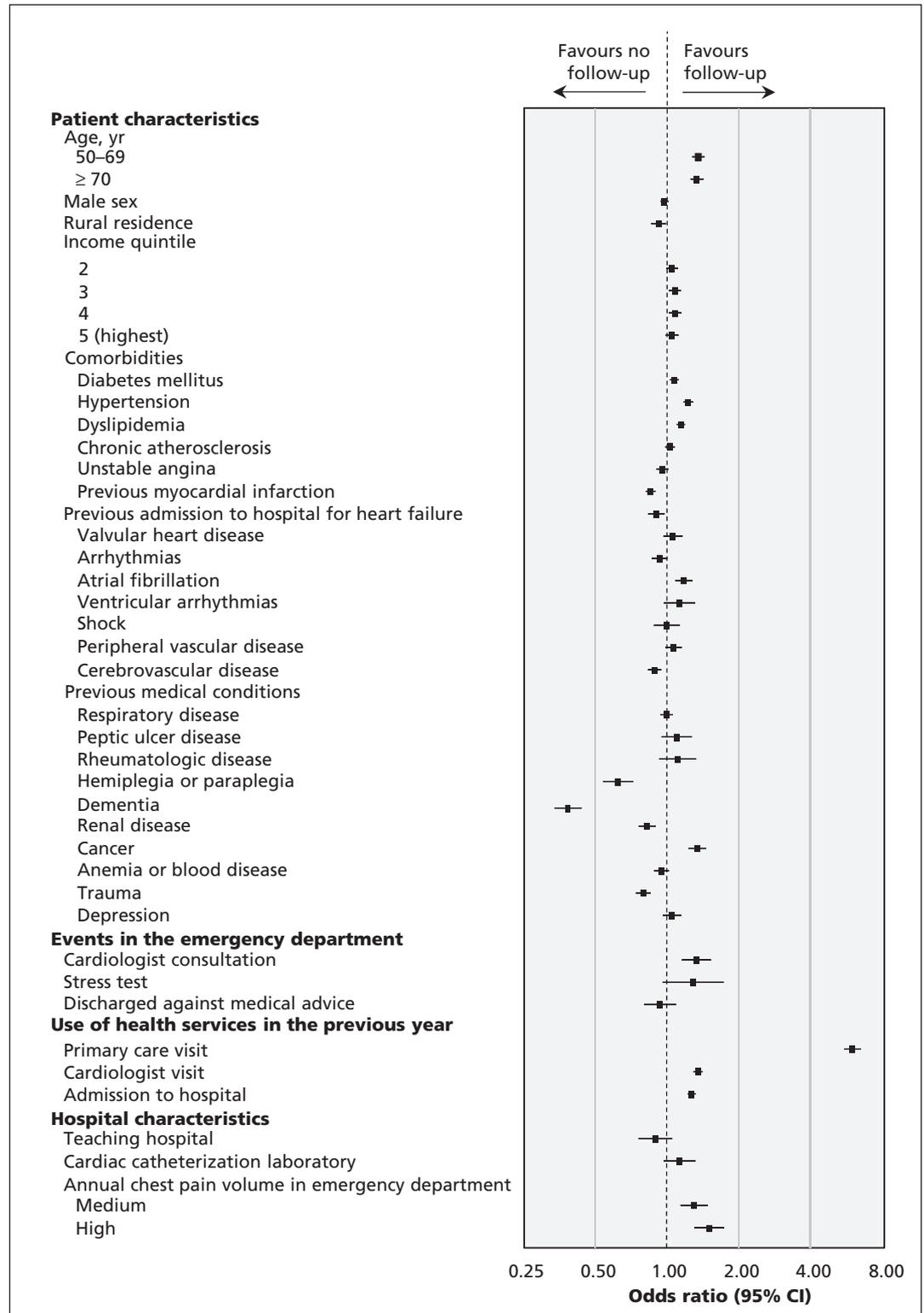

Figure 2: Adjusted odds of physician follow-up within 30 days for adult patients with established cardiovascular disease or diabetes who underwent assessment for chest pain and were discharged from the emergency department during the study period. Baseline demographics, cardiac risk factors and medical conditions, events in the emergency department, use of health services in the previous year and hospital characteristics were included in the model. CI = confidence interval. Note: Reference standards presented in Table 1.

Table 2: Baseline characteristics and factors associated with cardiology follow-up within 30 d of visiting an emergency department with chest pain

Characteristic	No cardiology follow-up, no. (%)* n = 46 957	Cardiology follow-up, no. (%)* n = 9 810	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Age, yr, mean ± SD	66.77 ± 14.95	65.11 ± 13.32		
< 50 (reference)	6 508 (13.9)	1 321 (13.5)	1.00	1.00
50–69	18 034 (38.4)	4 454 (45.4)	1.22 (1.14–1.30)	1.17 (1.08–1.26)
≥70	22 415 (47.7)	4 035 (41.1)	0.89 (0.83–0.95)	0.96 (0.89–1.04)
Male sex	24 087 (51.3)	5 809 (59.2)	1.38 (1.32–1.44)	1.14 (1.09–1.20)
Rural residency	8 590 (18.3)	1 018 (10.4)	0.52 (0.48–0.55)	0.98 (0.88–1.08)
Income quintile 1 (lowest) (reference)	11784 (25.1)	2 140 (21.8)	1.00	1.00
Income quintile 2	10 128 (21.6)	2 090 (21.3)	1.14 (1.06–1.21)	1.07 (1.00–1.15)
Income quintile 3	9 214 (19.6)	1 987 (20.3)	1.19 (1.11–1.27)	1.14 (1.06–1.22)
Income quintile 4	8 369 (17.8)	1 818 (18.5)	1.20 (1.12–1.28)	1.10 (1.02–1.19)
Income quintile 5 (highest)	7 462 (15.9)	1 775 (18.1)	1.31 (1.22–1.40)	1.19 (1.10–1.28)
Cardiac risk factors or previous cardiovascular conditions				
Diabetes mellitus	17 609 (37.5)	2 954 (30.1)	0.72 (0.69–0.75)	0.93 (0.88–0.98)
Hypertension	35 329 (75.2)	7 293 (74.3)	0.95 (0.91–1.00)	0.99 (0.93–1.05)
Dyslipidemia	18 581 (39.6)	4 713 (48.0)	1.41 (1.35–1.48)	1.13 (1.08–1.19)
Chronic atherosclerosis	21 700 (46.2)	5 743 (58.5)	1.64 (1.57–1.72)	1.12 (1.06–1.18)
Unstable angina	6 145 (13.1)	1 438 (14.7)	1.14 (1.07–1.21)	0.92 (0.86–0.98)
Previous myocardial infarction	12 001 (25.6)	3 064 (31.2)	1.32 (1.26–1.39)	0.96 (0.91–1.02)
Previous admission for heart failure	3 052 (6.5)	714 (7.3)	1.13 (1.04–1.23)	1.11 (1.01–1.22)
Valvular heart disease	2 293 (4.9)	663 (6.8)	1.41 (1.29–1.54)	1.04 (0.94–1.14)
Arrhythmias	11 787 (25.1)	2 976 (30.3)	1.30 (1.24–1.36)	1.11 (1.02–1.22)
Atrial fibrillation	7 980 (17.0)	1 950 (19.9)	1.21 (1.15–1.28)	1.04 (0.95–1.15)
Ventricular arrhythmias	804 (1.7)	347 (3.5)	2.11 (1.85–2.39)	1.30 (1.11–1.51)
Shock	1 096 (2.3)	262 (2.7)	1.15 (1.00–1.32)	1.03 (0.88–1.19)
Peripheral vascular disease	3 173 (6.8)	574 (5.9)	0.86 (0.78–0.94)	0.87 (0.79–0.96)
Cerebrovascular disease	5 576 (11.9)	699 (7.1)	0.57 (0.53–0.62)	0.77 (0.70–0.84)
Previous medical conditions				
Respiratory disease	6 039 (12.9)	803 (8.2)	0.60 (0.56–0.65)	0.72 (0.66–0.78)
Peptic ulcer disease	901 (1.9)	158 (1.6)	0.84 (0.71–0.99)	0.91 (0.76–1.09)
Rheumatologic disease	596 (1.3)	94 (1.0)	0.75 (0.61–0.94)	0.90 (0.72–1.14)
Neurologic disease	2 146 (4.6)	166 (1.7)		
Hemiplegia or paraplegia	835 (1.8)	79 (0.8)	0.45 (0.36–0.57)	0.71 (0.55–0.91)
Dementia	1 363 (2.9)	90 (0.9)	0.31 (0.25–0.38)	0.47 (0.38–0.59)
Renal disease	2 842 (6.1)	557 (5.7)	0.93 (0.85–1.03)	0.95 (0.86–1.06)
Cancer	3 054 (6.5)	520 (5.3)	0.81 (0.73–0.89)	0.89 (0.80–0.98)
Anemia or blood disease	3 988 (8.5)	656 (6.7)	0.77 (0.71–0.84)	0.92 (0.84–1.01)
Trauma	3 751 (8.0)	432 (4.4)	0.53 (0.48–0.59)	0.72 (0.65–0.81)
Depression	2 491 (5.3)	295 (3.0)	0.55 (0.49–0.63)	0.71 (0.62–0.80)
Charlson–Deyo comorbidity score‡	1.68 ± 1.64	1.47 ± 1.56		
Events in the emergency department				
Cardiologist consultation	868 (1.8)	559 (5.7)	1.41 (1.29–1.54)	2.03 (1.79–2.29)
Stress test	203 (0.4)	83 (0.8)	0.84 (0.71–0.99)	1.72 (1.29–2.29)
Discharged against medical advice	716 (1.5)	117 (1.2)	1.41 (1.29–1.54)	0.70 (0.57–0.87)
Use of health services in the previous year				
Primary care visit	44 507 (94.8)	9 354 (95.4)	1.13 (1.02–1.25)	0.88 (0.79–0.98)
Cardiologist visit	17 285 (36.8)	6 959 (70.9)	4.19 (4.00–4.39)	3.01 (2.85–3.17)
Admission to hospital	23 263 (49.5)	5 588 (57.0)	1.35 (1.29–1.41)	1.30 (1.23–1.36)
Hospital characteristics				
Teaching hospital	7 750 (16.5)	2 265 (23.1)	0.84 (0.71–0.99)	1.12 (0.88–1.44)
Cardiac catheterization laboratory	13 083 (27.9)	3 797 (38.7)	1.41 (1.29–1.54)	1.36 (1.09–1.70)
Annual chest pain volume, patients/yr				
Low (< 348) (reference)	3 171 (6.8)	260 (2.7)	1.00	1.00
Medium (348–1237)	10 100 (21.5)	1 258 (12.8)	1.52 (1.32–1.75)	1.46 (1.17–1.81)
High (> 1237)	33 686 (71.7)	8 292 (84.5)	3.00 (2.64–3.41)	2.04 (1.61–2.57)

Note: CI = confidence interval, ED = emergency department, OR = odds ratio, SD = standard deviation.
*Unless otherwise specified.
† Baseline demographics, cardiac risk factors and medical conditions, events in the emergency department, use of health services in the previous year and hospital characteristics were included in the model.
‡Not included in the prediction model because each individual component was adjusted.

Interpretation

Ensuring physician follow-up is often difficult for patients whose care is managed in the emergency department, where time is limited and addressing life threatening conditions is the priority. However, integration of services in the emergency
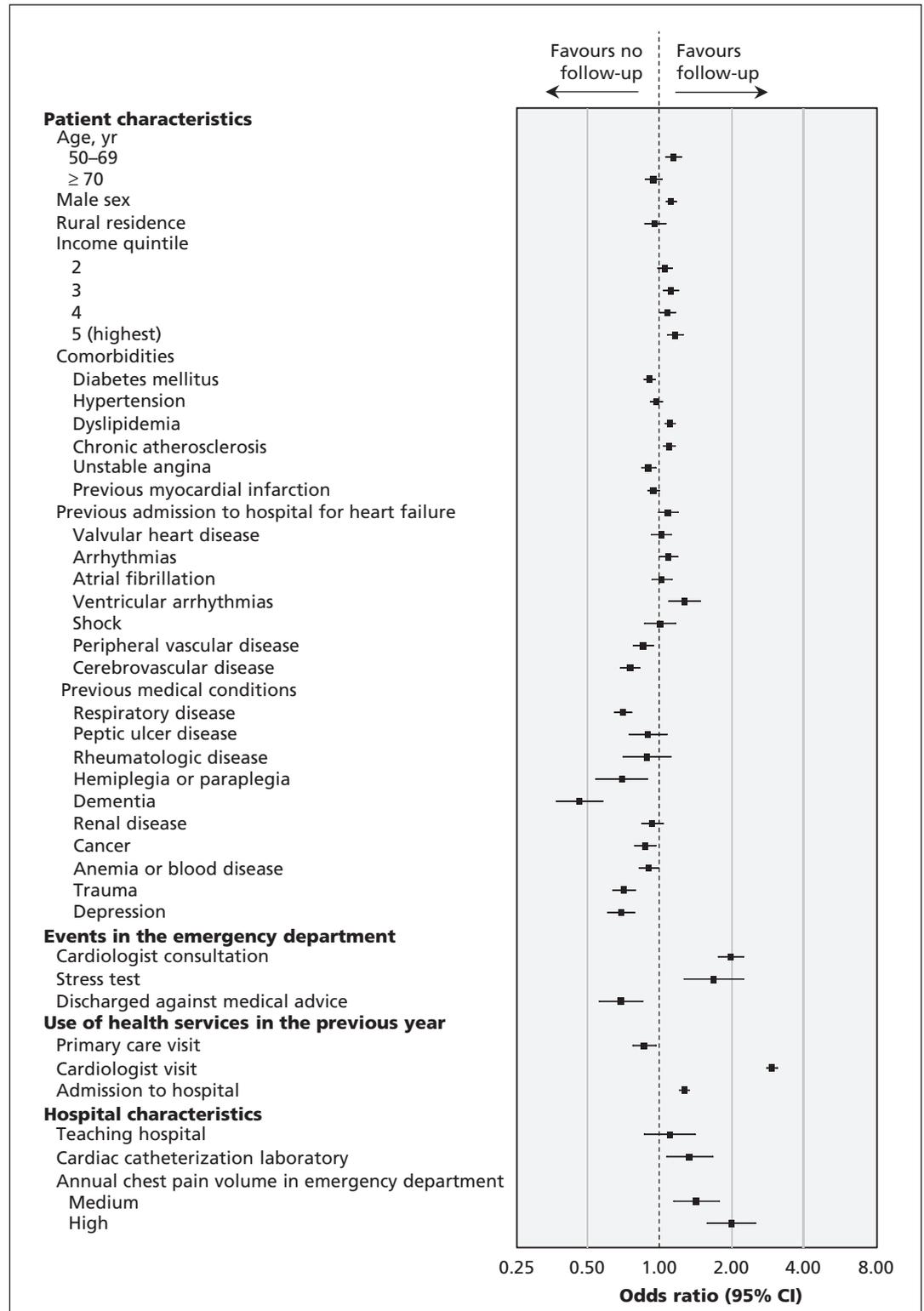

Figure 3: Odds of cardiology follow-up within 30 days for adult patients with established cardiovascular disease or diabetes who underwent assessment for chest pain and were discharged from the emergency department during the study period. Baseline demographics, cardiac risk factors and medical conditions, events in the emergency department, use of health services in the previous year and hospital characteristics were included in the model. CI = confidence interval. Note: Reference standards are presented in Table 2.

department to provide optimal continuity of care is increasingly recognized as a measure of quality of care.[10] In our study examining predictors of physician follow-up for high-risk patients with chest pain within 30 days of discharge from the emergency department, we identified established access to physician care as perhaps the most important predicting factor. Furthermore, although one would hypothesize that patients with the highest risk at baseline should receive more follow up, we saw a paradoxical pattern that generally favoured healthier patients with fewer comorbidities. In addition, hospital factors played an important role in predicting physician follow-up; we found that patients seen in emergency departments in the highest tertile of chest pain volume had about 50% increased odds of receiving postdischarge follow-up with a physician and twice the odds of follow-up with a cardiologist within 30 days compared with those seen in emergency departments in the lowest tertile.

We initially thought that emergency department physicians would risk stratify patients such that those with more medical and cardiac comorbidities would receive more follow-up physician care. However, patients with more medical comorbidities in our cohort were less likely to receive physician follow-up postdischarge. In addition, patient factors associated with any physician follow-up differed from those associated with cardiologist follow-up — poor access for patients with comorbidities was more remarkable for cardiology follow-up, likely reflecting how specialty practice focuses on a primary condition. For example, patients with previous myocardial infarction who presented to the emergency department for chest pain were less likely to receive any physician follow-up and showed no increased odds for cardiology follow-up. This pattern of care has been described as the "treatment–risk paradox," in which lower rates of treatment are given to patients at higher risk of adverse events.[11] Emergency department physicians would likely not discourage follow-up for patients with more comorbidities, but patients with more serious illness may have less access to follow-up than those who are healthier owing to their underlying conditions and the resulting restrictions in activity. Regardless of the specific reasons as to why physician follow-up was not achieved in patients with the highest baseline risk, we must emphasize that the potential impact of care and treatment is likely highest in these patients[11,12]

We found that systematic factors, such as previous access to health care, were the main driver of follow-up care after a visit to the emergency department rather than clinical characteristics. A visit to a primary care physician within the preceding 12 months was associated with 6-fold increased odds of any physician follow-up, and a previous visit to a cardiologist was associated with 3-fold increased odds of cardiology follow-up. Patients included in our cohort had diabetes or established cardiovascular conditions; however, 5.1% of these patients had not visited a primary care physician in the year before their chest pain assessment. These patients represent a vulnerable population prone to loss to follow-up and adverse outcomes.

Many studies in cardiology have shown a positive volume–outcome relation where higher volume providers are associated with better patient outcomes.[13,14] However, the relationship between emergency department volume and care is likely more complex in the Canadian system, given the potential for crowding in emergency departments, which has been shown to adversely affect care and outcomes.[15,16] We found that higher emergency department volume was associated with significantly higher odds of physician and cardiology follow-up. Although we did not evaluate patient outcomes, a previous study showed that emergency departments with higher volumes of myocardial infarction miss fewer diagnoses.[16] We hypothesize that higher volume hospitals are more likely to have established relationships with physicians to improve follow-up care.

Given that many studies have shown the importance of continuity of care during the transitional period between discharge from the emergency department and returning to the community setting, we believe a paradigm shift ensuring follow-up care is needed.[2,17,18] First, it is important to identify and advocate for vulnerable patients for whom follow-up care is less likely — that is, patients without regular contact with physicians and patients with multiple comorbidities. For these patients, it may be reasonable to schedule follow-up appointments before discharge. This strategy has been supported by several observational studies and randomized control trials to improve physician follow-up and may lead to fewer adverse cardiac events.[19,20] Methods to facilitate this, however, are uncommon in Canadian emergency departments. We support the development of rapid follow-up or chest pain clinics and online appointment booking for community physicians to allow for the scheduling of prompt follow-up. The participation of community family physicians and cardiologists is critical to ensure the success of such systems.

Limitations

We used administrative codes to identify a cohort of patient with chest pain. Although previous studies have used similar methods, these codes have not been validated.[2,21]

We used physician billing records to determine when follow-up occurred, but we did not have information on the intent of these visits. Thus, some visits may have been routine appointments, and some patients may have scheduled an appointment but were not compliant to follow-up.

We excluded patients with a subsequent visit to an emergency department for chest pain, who were admitted to hospital for acute coronary syndrome or who died within 30 days of assessment to create a stable cohort that had similar opportunities for follow-up. Anticipating the effect of the inclusion of these patients on follow-up rates is difficult.

Finally, our study was performed in the Canadian health care system, and its results may not be fully generalizable outside of this environment.

Conclusion

The need for follow-up must continue to be strongly emphasized among patients at high risk who present with chest pain to minimize the risk of adverse events. Our study suggests that system factors such as access to care and emergency department annual chest pain volume are the strongest predictors of follow-up rather than patient factors. An improved strategy to ensure follow-up of patients, particularly for those who have not previously seen a physician, is needed to improve the transition of care.

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