

What is the Relationship Between Seeing a Primary Care Provider Following a Cardiac-related  
Visit in the Emergency Department and Positive Health Outcomes?

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Cardiac related Emergency Department (ED) visit such as chest pain and related symptoms accounts for approximately 7.8 million annually in the United States (US) in 2018 and ranks second as the principal reason for ED visit (NHAMCS, 2018). Heart disease is the leading cause of death among men and women in the US and cost about \$219 billion each year from 2014 to 2015 from health care services, medicines and lost of productivity due to death (Heart Disease CDC, 2020). The annual direct cost of heart diseases is estimated at \$273 billion and the overall cost is estimated at \$444 billion annually (Cash & Glass, 2017). Men are affected more than women by heart disease, especially before the age of 50, but after age 50, the incidence rate for women increases and eventually surpasses the incidence of cases for men (Goolsby and Grubbs, 2018). Little is known about positive health outcomes for those patients who transition care post ED discharge in the outpatient setting. The purpose of this evidence-based project is to explore positive health outcomes associated with seeing a primary care provider following a cardiac related visit in the ED.

## **Background**

### **Identification of the Problem**

Anyone including children can develop heart disease. Cardiac related symptoms such as chest pain can be further categorized into stable angina, variant or Prinzmetal angina, microvascular angina and acute coronary syndrome (ACS) which includes ST-elevated myocardial infarction (STEMI), Non-ST-elevated myocardial infarction (NSTEMI) and unstable angina (Hollander & Chase, 2020). According to the CDC in 2015, approximately 735,000 Americans suffer an acute myocardial infarction annually in the United States (Mozaffarian &

Go, 2015). A detailed risk estimator designed as a primary prevention tool was published in 2013 by the American College of Cardiology/American Heart Association (ACC/AHA) which may be used by a medical provider to calculate patients' 10-year risk of heart disease and stroke (Goolsby and Grubbs, 2018). A lot of factors can cause angina such as pre-existing heart diseases, coronary artery disease, heart failure, atrial fibrillation and other cardiac conditions (AHA, 2021). Upon rapid assessment in the ED for the cause of chest pain several studies are conducted to rule out myocardial ischemia using cardiac biomarkers, EKGs and possibly further testing such as exercise treadmill or pharmacological testing with or without nuclear imaging, as well as stress echocardiography and CT coronary angiography, all of which can assist cardiovascular risk stratification in the ED (Hollander & Chase, 2020). Other testing to consider are arterial blood gas, MRI, chest x-ray and cardiac catheterization (Goolsby and Grubbs, 2018). For patients who have high risk of ACS, in-patient hospital admission is recommended for further work up and evaluation (Anderson et al., 2007). Immediate hospitalization is needed to initiate thrombolytic therapy, cardioversion, hypertensive management, and additional diagnostic testing (Cash & Glass, 2017). Hospitalization is the largest component of health care spending in the United States (Eichelberger et al., 2020). Most hospitalized patients first visit the ED, where hospitalization decisions are made (Eichelberger et al., 2020). For patients in whom ACS has been ruled out, continuity of care post ED visit is important in the overall management of patient's cardiac syndrome. Failure to transition care with a primary care provider or a medical provider in the outpatient setting has shown decrease in survival rate, increased chance of recurrent events and decreased quality of life (Will et al., 2013). Low socioeconomic status is associated with reduced access to cardiac interventions that have demonstrated benefits for mortality and morbidity (Moledina & Tang, 2021). Interventions that improve access to

catheterization, revascularization, cardiac rehabilitation, primary and secondary prevention for low socio-economic status populations are needed if true equitable care is desired (Moledina & Tang, 2021). Barriers to participation in secondary prevention include many socioeconomic factors therefore improvements to health care delivery should be undertaken to reduce barriers to utilization and increase awareness among patients about the benefits of secondary prevention in preventing future events and rehospitalizations (Oberg et al., 2009).

### **Significance**

Identification of the origin of cardiac related chest pain and management of symptoms in the outpatient setting can diminish diagnostic uncertainty and prevent unnecessary returns to the ED (Amsterdam et al., 2010). A thorough history identifying the quality and quantity of the pain, alleviating and aggravating factors, and associated symptoms assists in raising or lowering your index of suspicion for a myocardial origin of the pain (Goolsby and Grubbs, 2018). Primary care providers should be notified of the evaluation received at the ED to help facilitate continuity of care post ED discharge (Anderson et al., 2007). Patients with low-risk ACS should be counseled to see their primary care providers or establish care with a primary care provider within 72 hours so that further investigation can be done into the cause of patient's symptoms (Anderson et al., 2007). If the patient is low risk with no further ischemic discomfort and a follow-up 12-lead ECG and cardiac biomarker measurements after 6 to 8 hours of observation are normal at the ED, the patient may be discharged and a follow up outpatient stress test can be ordered by primary care provider within 72 hrs (within 24 hours is preferred) to provoke ischemia or CCTA to assess for obstructive CAD (Anderson et al., 2007). Follow-up of these patients should be carried out for an indefinite period of time to detect the recurrence or progression of disease (Cash & Glass, 2017). Also, primary care providers can offer secondary

prevention such as tobacco cessation assistance, specialist referral and implement more cardiac rehabilitation programs (Oberg et al., 2009). Adherence to prevention guidelines improves survival, reduces recurrent events and the need for interventional procedures, and improves the quality of life (Oberg et al., 2009). The risk reduction measures seen in the literature ranges from a 12% reduction in mortality associated with aspirin use, to a 25% mortality reduction over 2 years with participation in a cardiac rehabilitation program, to an estimate of nearly 50% fewer deaths from coronary artery disease over 2 years if guidelines were followed in all cases (Oberg et al., 2009). Attempts to quantify the benefit of rehabilitation beyond adherence to drug regimens estimated a 52% reduction in reinfarction (Oberg et al., 2009). Follow-up visit within either 7 days or 30 days with a provider was associated with lower all-cause readmissions, emergency department visits, and mortality (Health Quality Ontario, 2017).

### **Conceptual Framework**

Care Transitions Framework is used to help aid with implementation of this paper. “The purpose of the framework is to guide research and evaluation of care transitions implementation within a broad range of organizational settings to address questions of how, why, and where care transitions interventions succeed or fail to achieve intended outcomes” (Rojas et al, 2014). This framework emphasized the focus of our current health care policy which is interventions for transitions from the acute hospital to the ambulatory setting to achieve set outcomes (Rojas et al, 2014).

This paper will be focused based on all the elements of the Care Transitions Framework and to answer the research question of this paper: What is the relationship between seeing a primary care provider following a cardiac-related visit in the ED and positive health outcomes? By performing a review of literature, an evidence-based recommendation can be formulated to

relate positive health outcomes to patients seeing primary care provider post ED visit with complaints of cardiac-related chest pain or symptoms.

### **Purpose Statement**

The purpose of this paper is to examine the relationship between positive health outcomes and seeing a primary care provider following a cardiac related visit in the ED. With Chest pain and other related symptoms ranking as 2<sup>nd</sup> most common reason for ED visits and heart disease as the leading cause of mortality among men and women, more intervention needs to be explored to help address cost reduction measures by cutting hospital readmissions, recurrent events, and promote better quality of life by promoting secondary measures.

### **Methods**

A search of literature was conducted using CINAHL complete, Hawai'i Pacific University's Academic Search Complete, Health Source: MEDLINE and PubMed, and Google scholar. The search term entered were "transitional care post chest pain ED visit", "follow up visit post cardiac related ED visit", "chest pain post ED visit discharge instructions" and "secondary prevention following ED visit with complaints of cardiac related symptoms". The search yielded more than 50 entries and 10 research articles were selected for suitable applicability to the research question. Each research article was examined for the correct patient population, post ED management, and health outcomes. Inclusion criteria consisted of prospective cohort study, prospective observational cohort study, retrospective chart review, case-controlled pilot study, retrospective cohort analysis, observational study and retrospective observational study. Any non-peer reviewed data was excluded from the literature review. This literature review was limited by huge variability of the hospital or outpatient setting.

### **Literature Review**

A literature of review was conducted on 10 research articles from level III evidence to level IV. The selection of these articles is based from positive health outcomes in relation to seeing a primary care provider post ED visit for patients with cardiac related symptoms. These articles were examined to determine patterns and themes, similarities and differences, and establish an evidence-based recommendation on seeking primary care provider for secondary prevention and further evaluation of chest pain origin post ED visit.

A case-controlled pilot study entitled *Factors associated with physician follow-up among patients with chest pain discharged from the emergency department* was conducted to assess patients with chest pain and discharged from ED in Ontario between April 2004 and March 2010 (Wong et al., 2015). The objective of the study was to evaluate factors associated with physician follow-up to understand this gap in practice (Wong et al., 2015). A total of 56,767 patients with high cardiovascular risk at baseline aged 18 and older were observed, 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 (Wong et al., 2015). At 1-year post assessment, 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 (Wong et al., 2015). The burden of illness, as determined using the Charlson–Deyo score, was significantly higher among patients who did not receive follow-up within 30 days than among those who did (Wong et al., 2015). The limitation of this study is that the administrative codes used to identify a cohort of patient with chest pain have not been validated (Wong et al., 2015). Also, Physician billing records was used to determine when follow-up occurred, but 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 (Wong et al., 2015). Finally, the study was performed in the Canadian health care system, and its results may not be fully generalizable outside of this environment (Wong et al., 2015).

A retrospective cohort study entitled *Factors associated with 90-day death after emergency department discharge for atrial fibrillation* was conducted to describe the post ED care of an older population (65 years old to 105 years old) of atrial fibrillation patients who were discharged home from the ED and to assess patient characteristics and processes of care associated with risk of death within 90 days of discharge (Atzema et al., 2013). A total of 12,772 patients with a primary ED diagnosis of atrial fibrillation who were treated at all nonpediatric EDs in the province of Ontario, Canada, between April 2007 and March 2010 were included in the study (Atzema et al., 2013). Patients admitted to the hospital were excluded in the study. Cox proportional hazard model was used to determine the factors associated with the hazard of death during the course of 90 days of follow-up (Atzema et al., 2013). The findings of the study noted that 417 deaths (3.3%) within 90 days of the index visit, occurring at a relatively steady rate throughout the follow-up period; 174 patients (1.4%) died within 30 days (Atzema et al., 2013). Although almost all study patients (99.0%) had previous care by a specialist or family physician, less than half (42.8%) had a follow-up visit for atrial fibrillation within 30 days of the ED visit, and 53.5% had follow-up care by 90 days (Atzema et al., 2013). Among older atrial fibrillation patients discharged from the ED in the province of Ontario, lack of follow-up care had the strongest association with subsequent mortality (Atzema et al., 2013). The limitation of the study is that the study was conducted on a population with universal health care coverage, and the results may not be generalizable to patients without coverage (Atzema et al., 2013).

*Factors associated with family physician follow-up 30 days post-discharge from a local Canadian community emergency department*, A retrospective chart review aimed to explore factors that are associated with outpatient follow-up by a family physician clinic following discharge from a local Canadian community emergency department (ED) (Lein et al., 2020). The study also talks about outcomes where Close outpatient follow-up with a specialist or family physician post-discharge from the ED has been shown to increase adherence to antihypertensive medications, decrease mortality in heart failure, and reduce the odds of myocardial infarction or death after ED presentation for chest pain (Lein et al., 2020). The study sample consisted of 234 patients who met the inclusion criteria 18 years old and older who visited a local ED within the study period of November 1, 2016 to January 1, 2019 referred for a follow up to a family physician within Southwestern Ontario (Lein et al., 2020). Seventy-two patients (31%) received discharge instructions from the ED physician to follow up with their family doctor, however, many of these charts did not have a specific time frame for when to book an appointment (Lein et al., 2020). In total, 93 of the 234 patients proceeded to have a documented clinic visit within 30 days (40%) and 52% of these were women (Lein et al., 2020). Receiving specific discharge instructions within a certain timeframe increased the odds of follow-up post discharge from the ED (Lein et al., 2020). The limitation of this study is that it was only conducted to a single community ED located 20 minutes away from the family clinic (Lein et al., 2020). More research needs to be conducted on how to improve transitions of care from hospital to outpatient setting (Lein et al., 2020).

A prospective cohort study by Walker NJ et al. (2001) entitled *Characteristics and outcomes of young adults who present to the emergency department with chest pain* was conducted to analyze the clinical presentation and 30-day outcome of non-cocaine using young

adults ( ages between 24 and 39 years old) without cardiac history (normal electro-cardiograms or no cardiac risk factors would be at a<1% risk for acute coronary syndromes and 30-day adverse cardiovascular events.) presenting to the ED with chest pain between July 9, 1999, and October 23, 2000 at an urban tertiary hospital ED. 487 patients who presented 527 times were selected for the study and self-reported or pts who tested positive for cocaine use were excluded from the study (Walker et al., 2001). A standardized data collection tool was completed by the treating physician at the time of ED evaluation (Walker et al., 2001). Data collected included demographics, chest pain description, history, laboratory, and ECG data (Walker et al., 2001). The main outcomes were discharge diagnosis and 30-day adverse CV events such as acute myocardial infarction (AMI), death, percutaneous intervention (PCI), or coronary artery bypass grafting (CABG) (Walker et al., 2001). Thirty-two percent were admitted, five hundred seven of 527 patient visits (96%) had 30-day follow-up (Walker et al., 2001). Overall, 11 of 527 patients had adverse CV events (2.1), 8 AMIs (1.5%), 4 deaths (0.8%), 5 PCIs (0.9%), and no CABG while twenty-five patients had a final diagnosis of ACS (4.7%) (Walker et al., 2001). The incidence of ACS in the 210 patients without a cardiac history and without cardiac risk factors was 0.5% (Walker et al., 2001). At 30 days, none of these 210 patients had AMI, PCI, CABG, or death (0%) (Walker et al., 2001). The incidence of ACS in the 312 patients with normal ECGs and a negative cardiac history was 0.3% and at 30 days, there was no AMI, PCI, or CABG in these 312 patients, and one patient with metastatic cancer died (adverse CV event 0.3%). In conclusion young patients without a cardiac history and with a normal ECG had a <1% risk of ACSs and adverse CV events at 30 days (Walker et al., 2001). It may be reasonable to expedite outpatient management and limit unnecessary admissions in these cohorts (Walker et al., 2001). Possible limitation can be due to selection and misclassification bias (Walker et al., 2001). To

reduce risk of selection bias, the research assistants were present at the ED for 16 hrs per day, 7 days a week during the study period (Walker et al., 2001). Misclassification bias was reduced by prospectively following all hospitalized study patients on a daily basis rather than relying on post discharge medical record review (Walker et al., 2001).

An observational study entitled *A critical pathway for patients with acute chest pain and low risk for short-term adverse cardiac events: role of outpatient stress testing* was conducted to evaluate the safety and feasibility of a critical care pathway protocol in which patients with acute chest pain who are low risk for ACS or coronary artery disease (CAD) and short-term adverse cardiac outcomes receive outpatient stress testing within 72 hours of an ED visit (Meyer et al., 2005). Out of 972 patients included in the study who are 40 years old and older patient who receive outpatient stress testing within 72 hours of an ED visit and 6-month follow up, 871 were stress-tested within 72 hrs post ED visit (Meyer et al., 2005). Results were 18 patients (2%) required coronary intervention, 1 (0.1%) had a myocardial infarction within 1 month, 2 (0.2%) had a myocardial infarction within 6 months, 6 (0.7%) had normal stress test results after discharge but required cardiac catheterization within 6 months, and 5 (0.6%) returned to the ED within 6 months for ongoing chest pain (Meyer et al., 2005). Hospital admission rates decreased significantly from 31.2% to 26.1% after initiation of the protocol ( $P<.001$ ) (Meyer et al., 2005). With an established evidence-based protocol, physicians efficiently identify patients at low risk for clinically significant ACS and CAD and short-term adverse cardiac outcomes (Meyer et al., 2005). For patients with chest pain and low risk for short-term cardiac events, outpatient stress testing and follow-up is feasible, safe, and associated with decreased hospital admission rates (Meyer et al., 2005). Study is limited to a single urban community emergency department and its results may not be fully generalizable outside of this environment (Meyer et al., 2005).

A retrospective observational study by Czarnecki et al. (2014) entitled *The role of primary care physician and cardiologist follow-up for low-risk patients with chest pain after emergency department assessment* was conducted to evaluate the relationship between physician follow-up and outcomes of care for patients without diabetes or preexisting cardiovascular disease, who presented for chest pain evaluation, and were discharged from the ED. The study sample size consists of 216,527 who are  $\geq 50$  years of age with no diabetes or preexisting cardiovascular disease (Czarnecki et al., 2014). Among 216,527 patients, 29% had no-physician, 60% had PCP-alone, 8% had PCP with cardiologist, and 4% had cardiologist-alone follow-up after ED discharge. After adjusting for important differences in baseline characteristics between physician follow-up groups, the adjusted hazard ratios for death or MI were 1.07 (95% CI 1.00-1.14) for the PCP group, 0.81 (95% CI 0.72-0.91) for the PCP with cardiologist group, and 0.87 (95% CI 0.74-1.02) for the cardiologist alone group, as compared with patients who had no follow-up (Czarnecki et al., 2014). In this study of low-risk patients with chest pain who presented to an ED, follow-up with a PCP and cardiologist was associated with significantly reduced risk of death or MI at 1 year (Czarnecki et al., 2014). The limitation of the study is that the study could not determine the optimal rate of specialist follow-up in this data set (Czarnecki et al., 2014). The study anticipates that patients at very low risk of cardiovascular disease would not benefit from evaluation or treatment by a specialist (Czarnecki et al., 2014). Accordingly, the data should not be used to mandate routine referral practices or ischemic testing in all patients (Czarnecki et al., 2014).

*Implementation and impact analysis of a transitional care pathway for patients presenting to the emergency department with cardiac-related complaints*, a prospective observational cohort study by Soto et al, (2018) was conducted to evaluate the impact of

implementing a structured transitional care pathway called HEART TRACKS, enrolling low-risk cardiac patients on ED discharges, 30-day revisits and admissions, and institutional revenues (Soto et al., 2018). HEART TRACKS transitional care pathway identifies low-risk chest pain patients eligible for early discharge from the ED where patients received specific teaching and instructions at the time of discharge from the ED regarding their enrollment and plans for further provider/cardiologist/APRN evaluation post discharge (Soto et al., 2018). ED discharge rates increased steadily and remained elevated after the launch (Soto et al., 2018). A total of 572 patients who were 18-years and older presenting with a cardiac-related complaint (such as chest pain, CHF, or an arrhythmia) and who were discharged from the single center ED were considered eligible for enrollment into HEART TRACKS transitional care pathway (Soto et al., 2018). A standardized risk measures were used to identify patients suitable for early discharge with cardiology follow-up within days (Soto et al., 2018). The primary endpoints were rates of discharge from the ED and 30-day ED revisit and admission rates, with a secondary endpoint including 30-day returns for myocardial infarction, also a cost analysis of the program's impact on institutional revenues was performed (Soto et al., 2018). The results are rates of discharge from the ED increased from 44.4 to 56.6% and enrollment in the transitional care pathway was associated with a reduced risk of cardiac-related ED revisits, all-cause ED revisits and admission at second ED visit, also among enrolled patients, the 30-day rate of return with a myocardial infarction was 0.35% (Soto et al., 2018). No significant reductions were seen in 30-day cardiac-related and all-cause revisits in the 12-months following transitional care pathway implementation; however, there was a significant reduction in admissions at second ED visit from 45.6 to 37.7% ( $p = 0.0338$ ), however, there was an estimated decline in institutional revenue of \$300 per enrolled patient, driven predominantly by a reduction in admissions (Soto et

al., 2018). The shifting of cardiac evaluations from hospital-based to ambulatory care settings may lead to significant cost-savings for payors and improve the value of healthcare delivery (Soto et al., 2018). The limitation of the study is that this was a single-center study with data on return ED visits and admissions being limited to patients presenting back to the same hospital (Soto et al., 2018). Another limitation is that enrollment of patients into HEART TRACKS was not randomized, thereby introducing potential biases into the patient selection process accordingly, the absolute revisit rates (Soto et al., 2018).

A retrospective cohort study entitled *Physician Continuity Improves Outcomes for Heart Failure Patients Treated and Released From the Emergency Department* by Robinder et al. (2014) was conducted to evaluate the effect of physician continuity for patients with heart failure (HF) treated and released from the ED. Study involved 12,285 adult Albertans with first time diagnosis of HF assessed in an ED between January 1, 1999, and June 30, 2009 in Alberta, Canada. Patients who were admitted to the hospital were excluded (Robinder et al., 2014). Of these 12,285 patients, 2,531 (20.6%) did not see a physician for follow-up within 30 days of discharge (Robinder et al., 2014). Taking into account all outpatient visits over each observation period and excluding those without follow-up, death or hospitalization was less common in those patients being followed up by a familiar physician (aHR of 0.79 [95% CI: 0.71 to 0.89] at 3 months; aHR of 0.86 [95% CI: 0.77 to 0.95] at 6 months; and aHR of 0.87 [95% CI: 0.80 to 0.96] at 12 months compared with unfamiliar physician follow-up) (Robinder et al., 2014). Any follow-up within 30 days of ED release was associated with a lower risk of repeat ED visit or death at 6 months (aHR: 0.78 [95% CI: 0.73 to 0.82] for familiar physicians; aHR: 0.79 [95% CI: 0.72 to 0.86] for unfamiliar physicians) (Robinder et al., 2014). Early follow-up after an ED visit is associated with better outcomes, particularly if conducted with a familiar physician (Robinder

et al., 2014). The limitation of the study is that the Alberta administrative databases do not include indicators of severity of HF; these indicators (elevated creatinine and heart rate, lower blood pressure, lower ejection fraction, and length of ED stay) have all been shown to negatively affect outcomes in HF patients in the ED (Robinder et al., 2014). Also, part of the limitation is the possibility of unmeasured confounders (including confounding by indication) driving the results: patients who are sicker (and have worse outcomes) may be more likely to receive early outpatient visits with new physicians not previously involved in their care, thereby lowering their continuity scores (Robinder et al., 2014).

*In Physician follow-up and long-term use of evidence-based medication for patients with hypertension who were discharged from an emergency department: a prospective cohort study,* A cohort study aimed to determine the association between follow-up care after discharge from the ED and whether the timing of that care was associated with use of evidence-based medication one year later (Atzema et al., 2018). The study had an inclusion criterion of 66 years old and older, who were seen and discharged from five tertiary and community ED in Ontario with a primary diagnosis of hypertension between Apr. 1, 2007, and Mar. 31, 2014, were eligible for inclusion (Atzema et al., 2018). There were 2 cohorts identified: an incident cohort, and a cohort in which patients were on no more than 1 class of evidence-based antihypertensive medication at the time of ED visit (Atzema et al., 2018). Using logistic regression, the study assessed the association of early follow-up care (within 7 days) and basic care (8-30 days), compared with no care within 30 days, on patient use of a new evidence-based antihypertensive medication 1 year later (Atzema et al., 2018). The study included 2088 patients in the first cohort with a new diagnosis of hypertension and 6420 patients in the second cohort with one antihypertensive med (Atzema et al., 2018). Of patients with new diagnoses, 48.2% and 30.2%

obtained early and basic follow-up care, respectively, compared with 50.0% and 30.9% of patients in the second cohort (Atzema et al., 2018). Compared with patients without follow-up care within 30 days, the adjusted odds of filling an evidence-based antihypertensive medication prescription 1 year later in the incident group were 2.36 (95% confidence interval [CI] 1.86-2.99) for those who received early care, and 2.00 (95% CI 1.55-2.58) for those who received basic care (Atzema et al., 2018). The adjusted odds in the second cohort were 2.12 (95% CI 1.84-2.43) and 1.96 (95% CI 1.69-2.27) (Atzema et al., 2018). Early follow-up care after leaving an ED with a diagnosis of hypertension was associated with improved long-term use of evidence-based antihypertensive medication (Atzema et al., 2018). By focusing in the transition of care between emergency and primary care, researchers, administrators and policy-makers may be able to capitalize on the steadily increasing ED visits for hypertension to improve the suboptimal rate of long-term use of preventive medication (Atzema et al., 2018). The limitation of the study is that it restricted the patient population to people with a primary emergency department diagnosis of hypertension, because whether a secondary finding of hypertension during an emergency visit for something unrelated is the responsibility of emergency care is controversial, and because the codes for nonprimary diagnoses of hypertension have not been validated (Atzema et al., 2018).

Lee et al. (2010) performed a cohort study in *Improved Outcomes with Early Collaborative Care of Ambulatory Heart Failure (HF) Patients Discharged from the Emergency Department*, which conducted a population-based study of HF patients who visited and were discharged from an ED, examining the type of physician care received within 30 days after discharge. The study has a sample size of 10599 patients who are  $\geq 18$  years of age discharged to their residence from the ED between April 2004 to March 2007 without hospital admission and were Ontario residents with a valid health card number (Lee et al., 2010). When patients visited

an ED multiple times during the study period, the first visit was deemed the inception date (Lee et al., 2010). There are 1478 patients who received collaborative care (both primary care physician (PCP) and a cardiologist/heart specialist), 6596 patients received PCP care, 535 patients who received cardiology/heart specialist care, and 1990 pts with no follow up care with any provider (Lee et al., 2010). Compared with PCP (1-year mortality, 10.4%), crude death rates were significantly reduced with collaborative care (7.2%;  $P < 0.001$  versus PCP), no significantly lower with cardiology care (9.5%;  $P = 0.526$  versus PCP), and higher for No provider care (15.5%;  $P < 0.001$  versus PCP) (Lee et al., 2010). The combined 1-year rates of death, ED visits, or hospitalizations for HF were 18.7% (collaborative;  $P = 0.004$  versus PCP), 18.9% (cardiology;  $P = 0.077$  versus PC), 27.3% (No provider;  $P < 0.001$  versus PCP), and 22.2% (PCP) (Lee et al., 2010). All-cause ED visits or hospitalizations and death were also lower with collaborative (57.5%;  $P < 0.001$ ) and cardiology (57.2%;  $P = 0.007$ ) care and higher with no provider care (66.2%;  $P = 0.007$ ) compared with PCP (63.1%) at 1 year (Lee et al., 2010). In summary, patients who received collaborative care within 30 days of discharge had lower rates of death, recurrent emergency visits, and hospitalizations and a sizable proportion of patients did not visit any physician within 30 days after ED discharge experienced greater death and higher risk of the composite of HF-specific outcomes and mortality (Lee et al., 2010). Patients who received early collaborative care were more likely to undergo important diagnostic testing, procedures, and received more evidence-based drug therapies than PCP patients alone (Lee et al., 2010). The limitation of the study is that it did not evaluate internal medicine generalists or other subspecialists as comparators (Lee et al., 2010). Finally, to create a comparison sample that could be examined for early physician visits and subsequent care, the primary analyses excluded events that occurred within 100 days to allow for equivalent durations of time for the

ascertainment of changes in drug therapy, diagnostic tests, and therapeutic interventions that would occur after the physician visit (Lee et al., 2010). Although researchers conducted sensitivity analyses including these patients and found consistent results, examination of very early events and care (within the first 30 days) was beyond the scope of this study (Lee et al., 2010).

### **Evidence Based Recommendation**

In summary, the studies reviewed reported a significant lower rate of death, recurrent ED visits, hospitalizations, medical cost and higher compliance to outpatient testing, procedures and evidence-based drug therapies among patients followed up by primary care provider post ED visit for cardiac related events. Therefore, seeing primary care provider following a cardiac related visit in the ED has a strong association with positive health outcomes and better quality of life.

Majority of the evidence reviewed in this paper consisted of Level III to IV evidence with 80% of the evidence are cohort studies. For the question of this research paper, it is unlikely that a randomized trial will ever answer the question therefore observational or cohort studies are the best evidence that could bring answers to our research question.

Visits to the ED may be the first presentation of a new medical issue or worsening of an existing chronic disease. Upon prompt assessment and evaluation at the ED most often low risk cardiac patients are discharged home and are often left to navigate the healthcare system with variable degrees of medical guidance depending on different institutional processes. It is also therefore recommended that more studies are to be done on transitional care between emergency setting to outpatient setting to further benefit from positive outcomes with seeing a medical provider post ED visit.

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