Non symptom-related factors contributing to delay in seeking medical care by patients with heart failure: A narrative review

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Abstract

Background—Delay in seeking timely medical care by patients with acute coronary syndrome and stroke has been well established in the literature, but less is known about delay in care-seeking behavior by patients with heart failure (HF). The purpose of this narrative review was to synthesize the literature regarding non symptom-related factors that contribute to delay in seeking medical care for HF symptoms.

Methods and Results—A literature search of Scopus, Medline and PubMed was conducted for published articles from database inception to July 2009. Available evidence has shown that non symptom-related factors such as HF severity, HF history, age, and ethnocultural background were related to delay in certain studies; however, null results have also been reported. Other non symptom-related factors such as male gender, initial contact with a primary care physician, arriving in the emergency department by means other than by ambulance and patient responses such as self-care, low anxiety and hopelessness may play a role in longer delay.

Conclusion—Although this review has identified several non symptom-related factors that may be implicated in care-seeking delay, healthcare professionals should be vigilant in identifying all high-risk individuals and educating them about warning signs of HF. Moreover, access to outpatient chronic disease management programs that may have potential to reduce care-seeking delay behavior should be explored.

Keywords

Heart Failure; Medical Care; Patient Acceptance of Health Care; Time Factors

Introduction

Heart failure (HF) is a clinical syndrome characterized by inadequate systemic perfusion to meet the body's metabolic demands as a result of impaired cardiac function.{{4772 Hobbs, R., Boyle, A}} HF is marked by high prevalence, incidence, mortality and morbidity rates. {{2755 Kannel, W.B. 2000;}} Among the elderly, HF is the leading cause of hospitalization in the western world.{{2763 Canadian Cardiovascular Society 2002;1723 Ross H 2006;4699 Gigli, G. 2009;2755 Kannel, W.B. 2000; 4701 Neumann, T. 2009; 4702 McMurray, J. 1993}}

The course of HF is marked by frequent exacerbations that results in hospital readmissions. Research shows that one-fourth of patients hospitalized for HF in the US are readmitted within 30 days of discharge,{{5388 Bernheim, S.M. 2010;}} with up to 50% being readmitted within 6 months.{{3183 Krumholz, H.M. 2000}} HF readmissions result not only from clinical factors (such as arrhythmia or hypertension), but from behavioral factors such as non-compliance with diet or drug therapy,{{3377 Tsuyuki, R.T. 2001;1727 van der Wal, M.H. 2006; 4135 Schiff, G.D. 2003;}} and not seeking timely medical care.{{4128 Evangelista, L S. 2000;4127 Goldberg, Robert J. 2008;4133 Patel, H. 2007}}

Patient 'delay' is defined as the amount of time between first awareness of a symptom to time of presentation for care.{{4128 Evangelista, L S. 2000;4501 Safer, M.A. 1979;}} HF patients report wide variations in delay, ranging from 2 hours to 7 days, from symptom onset to hospital admission.{{5438 Gravely-Witte, S. 2010;}} Reducing care-seeking delay behavior can result in earlier diagnosis and initiation of treatment for HF. This is associated with improved outcomes such as shorter lengths of hospitalization, shorter stays in intensive care, lower mortality rates, improved quality of life and reduced resource utilization and healthcare treatment costs.{{4512 Emerman CL. 2003;4513 Saltzberg, M.T. 2004;4510 Amin, A. 2008;}}

Reasons for delay in seeking care for a cardiovascular event, such as acute coronary syndrome (ACS) or stroke have been reported in the literature.{{4502 Moser, D.K. 2007;237 Dracup, K. 1995;}}. The role of symptom-related factors associated with care-seeking delay have been reviewed in HF samples.{{5438 Gravely-Witte, S. 2010;}} Symptom characteristics such as dyspnea, edema, orthopnea, higher somatic awareness, higher symptom distress, nocturnal symptom onset and pattern of symptom onset were shown to be related to longer delay. Furthermore, cognitive responses to HF played a role in symptom appraisal. In addition, non-symptomatic factors that contribute to delay in seeking medical care after the development of HF are identified in the literature. Thus, this narrative review synthesized non symptomatic-related factors contributing to delay in seeking HF medical care, and presented gaps and directions for future research.

Methods

A literature search of Scopus and Medline was conducted for published articles from database inception (1996 and 1950 respectively) to July 2009. PubMed "related article" links was used as a compliment to the other databases and was searched to identify further

articles meeting inclusion criteria. The search strategy was limited to English language studies which identified factors that contribute to delay in seeking medical care for HF symptoms. Search terms included: *heart failure (congestive), patient admission, patient education as topic, health care system, patient readmission, hospitalization, emergency medical services, medical care, time factors, treatment delay, prehospital delay, delay in care-seeking, decision delay, patient acceptance of health care, care-seeking behavior and decision making*. A flow chart depicting the study search and selection is presented in Figure 1.

Results

Overall, 139 published articles were identified in the literature search and 10 were included in this review (years of study ranged from 1991–2006). One study included data from a duplicate cohort. { {4129 Evangelista, Lorraine S. 2002} } Table 1 summarizes included studies. The majority of studies were cross-sectional, { {4132 Friedman, M.M. 1997; 4492 Friedman, M.M. 2008; 4493 Jurgens, C.Y. 2006; 4128 Evangelista, L S. 2000; 4129 Evangelista, Lorraine S. 2002; 4127 Goldberg, Robert J. 2008; 4135 Schiff, G.D. 2003} } 2 were qualitative { {4133 Patel, H. 2007; 4594 Hedemalm A, Schaufelberger M, Ekman I. 2008} } and 1 used a mixed-methods design. { {4527 Jurgens, C.Y. 2009; } } Four studies collected data by means of retrospective chart review, { {4129 Evangelista, Lorraine S. 2002; 4128 Evangelista, L S. 2000; 4132 Friedman, M.M. 1997; 4127 Goldberg, Robert J. 2008} } while the other 6 studies used interviews and surveys. Five studies recruited HF patients from a single site, { {4128 Evangelista, L S. 2000; 4132 Friedman, M.M. 1997; 4133 Patel, H. 2007; 4135 Schiff, G.D. 2003; 4594 Hedemalm A, Schaufelberger M, Ekman I. 2008} } and 4 consisted of samples derived from multiple sites. { {4127 Goldberg, Robert J. 2008; 4527 Jurgens, C.Y. 2009; 4493 Jurgens, C.Y. 2006; 4492 Friedman, M.M. 2008} } Seven studies in this review were conducted in the United States (US) and 2 in Sweden. Six studies included samples that comprised of acutely-decompensated HF patients, 1 study included newly-diagnosed and chronic HF patients { {4492 Friedman, M.M. 2008} } and 2 studies included HF patients with a primary diagnosis of HF (acuity and chronicity were unspecified). { {4128 Evangelista, L S. 2000; 4132 Friedman, M.M. 1997} }

Contributing Factors to Delay in Seeking Medical Care for HF

Clinical Factors: HF Severity, HF Acuity and Chronicity, Cardiac Disease History, and Contact with Healthcare Providers

HF severity was examined in relation to delay in 2 quantitative studies. Firstly, in the study by Evangelista et al. (2000), 753 HF patients admitted to a veteran's medical center with a primary diagnosis of HF were examined. { {4128 Evangelista, L S. 2000; } } The authors ascertained disease severity, as per the New York Heart Association Class (NYHA), { {199 The Criteria Committee of the New York Heart Association 1994; } } from hospital medical records and reported that 15% were NYHA class III–IV (denoting greater disease severity). Results showed that patients with a higher NYHA class were more likely to delay seeking treatment. Second, in Jurgens' (2006) study, NYHA class was ascertained from medical records for 201 HF patients from 3 US hospitals. { {4493 Jurgens, C.Y. 2006; } } Nearly 60%

of admitted patients had an NYHA class of III–IV. Results showed a null effect in relation to delay.

Differing results between these two studies may be explained by the dissimilar samples and methodology. The Evangelista et al. (2000) retrospective study comprised 10 women (1%) recruited from a single hospital while the Jurgens (2006) prospective study included 88 (44%) women from multiple settings. HF disease severity can differ between men and women, {{4838 Olivotto, I. 2005; 3159 Regitz-Zagrosek, V. 2007; 4839 Pina, I.L. 2009}} which limits the generalizability of results in the former study. Moreover, the study by Evangelista et al. (2000) had fewer patients with a NYHA class of III–IV, which may also have affected results. The mixed results could also be related to the often poor association between symptoms and severity of cardiac dysfunction in HF. {{4773 Swedberg, K. 2005}} Finally, the NYHA classification system is subject to rater bias. It has been found that NYHA ratings may be difficult to reproduce. {{5347 Raphael, C. 2007;}} Furthermore, the classification system does not always correlate with objective estimates of functional capacity. Further research is therefore warranted to examine the contribution of HF disease severity to delay.

There were no studies identified in this review that compared delay times between acutely-decompensated HF patients and those presenting with chronic HF. One study however did examine if delay times differed between newly-diagnosed (n = 64) and chronic HF patients (n = 148). {{4492 Friedman, M.M. 2008}} Both groups had similar sociodemographic and clinical characteristics as well as symptom profiles. Results showed no significant difference in time before hospital admission (median of 7 days).

The data available on established HF as a predictor of delay is mixed. For instance, a retrospective study by Friedman (1997) found that a history of HF delayed care-seeking behavior among 181 patients admitted to a single hospital in the US. {{4132 Friedman, M.M. 1997;}} In contrast, two other studies reported no differences in delay to hospital admission {{4127 Goldberg, Robert J. 2008; 4492 Friedman, M.M. 2008;}} or time until physicians were notified after symptom onset, between patients with or without a history of HF. {{4492 Friedman, M.M. 2008;}} In addition, Jurgens (2006) failed to find an association between a previous history of admission for HF and total symptom delay. {{4493 Jurgens, C.Y. 2006;}}

In contrast, one study reported that a history of HF significantly reduced hospital delay for overall symptom presentation, {{4128 Evangelista, L. S. 2000;}} and one study found a reduction in delay in response to exertional dyspnea. {{4493 Jurgens, C.Y. 2006;}} HF history was also associated with increased likelihood of contacting emergency response services. {{4492 Friedman, M.M. 2008;}} Finally, 1 study identified in this review showed that a history of cardiac disease including angina, stroke or myocardial infarction (MI) was not related to delay by HF patients. {{4127 Goldberg, Robert J. 2008;}}

Evidence from these studies suggests that patients may be using previous experiences (for example symptom recognition or patient education) to aid in the decision to seek care during a HF exacerbation. In certain circumstances, a history of HF may have resulted in improved knowledge, symptom recognition, symptom appraisal, and reduced uncertainty. However,

there is a preponderance of evidence that indicates that having a prior cardiac event does not facilitate care seeking or improve knowledge.{{4502 Moser, D.K. 2007;237 Dracup, K. 1995;2945 Kayaniyil, S. 2009;}} Furthermore, with respect to methodological differences between studies examining delay by HF patients, the studies that reported no delay based on HF history (i.e., Goldberg et al. 2008) were multi-site studies, while the Freidman et al. (1997) and Evangelista et al. (2000) samples were derived from 1 hospital site only, lending more credence to the former findings. Clearly more research is needed.

While HF patients may seek appraisal of their symptoms from medical sources other than the hospital, little is known about seeking care from primary care physicians for suspected HF exacerbations. This review identified 1 quantitative study of HF patients seeking primary care first, in which hospital care was delayed.{{4128 Evangelista, L S. 2000;}} The authors hypothesized that delays may have resulted from the failure of the physician to perceive presenting symptoms as cardiac in nature, that the physician may have chosen to manage the symptoms without hospitalization, or instructed the patient to self-medicate. A primary care physician may possibly suggest using hospital services if symptoms do not improve or worsen. Finally, patients with advanced symptoms may require more specialized care than what their primary care physician is capable of providing in an outpatient setting.

Waiting to see a primary care physician was reported in 3 qualitative studies as a reason for not seeking hospital care earlier.{{4133 Patel, H. 2007;4135 Schiff, G.D. 2003}} Patel et al. (2007) described that 71% of patients waited to see their doctor after onset of their symptoms. Subsequently 27% of these patients were referred to the emergency department by an outpatient clinic.{{4133 Patel, H. 2007}} Schiff et al. (2003) reported that 30% of patients reported waiting until their next clinic visit as a response to worsening symptoms. {{4135 Schiff, G.D. 2003;}} Similarly, in the study by Hedemalm et al. (2008),{{4594 Hedemalm A, Schauffelberger M, Ekman I. 2008;}} qualitative methods were used to examine health care seeking patterns among immigrants and native Swedes with HF. When study participants were asked to give reasons why they had not sought care earlier, 10% reported that they waited for a follow-up visit.

Based on the evidence available, it may be appropriate to educate patients as to what level of care to seek based on specific symptoms. It may be that HF patients are uncertain which type of medical care is most appropriate in response to their worsening condition.{{4521 Alonzo, A.A. 2007; 4738 Leslie, W.S. 2000;}}

Finally, other clinical factors such as heart rate, estimated glomerular filtration rate and a diagnosis of diabetes were also tested in relation to delay. None were shown to be significantly associated with care-seeking delay among HF patients.{{4127 Goldberg, Robert J. 2008}}

Sociodemographic Factors

Age was examined in relation to delay in 5 quantitative studies.{{4128 Evangelista, L S. 2000;4132 Friedman, M.M. 1997;4127 Goldberg, Robert J. 2008;4493 Jurgens, C.Y. 2006;4527 Jurgens, C.Y. 2009}} Age was not related to delaying care-seeking in response to an overall HF symptom profile in 3 studies {{4128 Evangelista, L S. 2000;4127 Goldberg, Robert J. 2008;4493 Jurgens, C.Y. 2006}} and 1 study reported a trend in which older age

was related to delay in response to dyspnea.{{4527 Jurgens, C.Y. 2009}} Finally, in the cross-sectional study by Friedman et al., (1997) this study identified that among 181 elderly adult HF patients, age was not related to individual symptom duration, but did have a small, negative relationship with duration of acute symptoms.{{4132 Friedman, M.M. 1997;}} Younger elderly patients had acute symptoms longer before hospital admission than older elderly patients.

Racial or ethnocultural background was examined in relation to care-seeking delay in 5 studies. In the first study, a secondary analysis was performed to describe racial differences in treatment-seeking delays for HF.{{4129 Evangelista, Lorraine S. 2002;}} Results showed that the mean delay was significantly longer for African Americans (3.2 days) compared to Asians, Caucasians and Hispanics (2.9, 2.8, and 2.8, days respectively). Adjusted analyses confirmed that African Americans significantly delayed care to a greater degree compared to Caucasians. Three other quantitative studies did not find differences between white and non-white counterparts.{{4127 Goldberg, Robert J. 2008;4132 Friedman, M.M. 1997;4128 Evangelista, L S. 2000 }} This is likely to have resulted from the predominately white HF samples characterizing this literature.

Finally, in a qualitative study conducted by Hedemalm et al. (2008),{{4594 Hedemalm A, Schaufelberger M, Ekman I. 2008;}} interviews were conducted among 42 immigrants and native Swedes admitted to a Swedish University Hospital with a diagnosis of HF. Patients were asked about their health care seeking decisions in relation to the onset of HF symptoms. Results showed that twice as many immigrants (n=10, 47%) as Swedes (n=5, 24%) were unaware of the HF illness experience and which symptoms indicated worsening of HF. While a quantitative relationship of delay between the 2 groups was not tested, this may infer that immigrants may not be receiving adequate education and medical care compared to their native counterparts.

Gender was explored as a factor related to delay in 4 studies identified through this review. In the most methodologically-robust study of the 4, Goldberg et al. (2008) found that men were more likely than women to prolong delay {{4127 Goldberg, Robert J. 2008;}} Jurgens et al. (2009) similarly found that men with HF were more likely to delay seeking treatment for dyspnea compared to women.{{4527 Jurgens, C.Y. 2009;}} Two single-site retrospective studies found a null association between gender and delay.{{4132 Friedman, M.M. 1997; 4128 Evangelista, L S. 2000}}

Marital status, living situation, employment status and location of residence (urban/rural) were not found to be significantly related to delay among HF patients.{{4128 Evangelista, L S. 2000;4127 Goldberg, Robert J. 2008; 4132 Friedman, M.M. 1997}} Except for employment status, important socioeconomic indicators have not been explored in relation to care delay for HF patients. This is a gross omission, considering the social gradient in healthcare which is well established. For instance the relation of education and income to delay has not been assessed, and therefore more research is needed.

Patient Responses: Self-Care, Mode of Transportation for Care-Seeking and Emotions

Self-care is defined as a naturalistic decision-making process that patients use in the choice of behaviors that maintain physiological stability (symptom monitoring and treatment adherence) and response to symptoms when they occur.{{4606 Riegel, B. 2004;}} Self-care is the cornerstone of HF management. Many hospitalizations could be avoided if patients engaged in consistent self-care. Although patients with established HF should be instructed by healthcare providers to manage their disease – such as actively monitor themselves for signs and symptoms, titrate diuretics when symptoms occur, monitor their weight and decrease salt in their diet – these self-care behaviors are often challenging for this population.{{5184 Riegel B, Moser DK, Anker SD, et al. on behalf of the American Heart Association Council on Cardiovascular Nursing, Council on Clinical Cardiology, Council on Nutrition, Physical Activity, and Metabolism, and Interdisciplinary Council on Quality of Care and Outcomes Research 2009;}} More specifically, patients often have inadequate information about causes, symptoms, management and consequences of HF, thus they do not have the tools to aid with self-care and often end up seeking emergency care.{{4491 Horowitz, C.R. 2004;}}

In light of this however, there were no studies identified in this review that quantitatively examined if self-care behaviors were associated with delay in seeking urgent medical care. In one qualitative study, 83 HF patients were interviewed and asked to report their responses to worsening symptoms.{{4135 Schiff, G.D. 2003;}} The study found that only a very small minority of patients followed recommended measures, such as reducing salt intake and increasing diuretic doses. What is worrisome is that some patients delayed seeking care for their symptoms in order to undertake insufficient or counterproductive self-care practices such as drinking more water or taking medications other than those prescribed.

Patients may attempt self-care and delay seeking care for several reasons. One may be that they do not initially recognize worsening symptoms as being HF-specific, or are undecided of actions that should be taken, therefore rest or self-medicate and wait to see if symptoms go away. {{4491 Horowitz, C.R. 2004;}} Secondly, patients may decide to self-manage while waiting for an appointment with their primary care physician or at an HF clinic. {{4133 Patel, H. 2007; 4135 Schiff, G.D. 2003;}} Finally, waiting until daytime hours to seek care {{4127 Goldberg, Robert J. 2008;}} may be at play, with patients attempting self-care through the night. Clearly, appropriate patient self-care should be encouraged by all healthcare providers, but it should be done in conjunction with education about symptoms requiring urgent medical attention.

Mode of arrival to the hospital may partially explain delay among HF patients. Modes of transportation may include calling for an ambulance, driving one's self to the hospital, having a friend or family member drive them, or using public transportation. One study in this review examined medical records of 2587 patients hospitalized with acute HF.{{4127 Goldberg, Robert J. 2008;}} Information on duration of prehospital delay was available for 1142 subjects. Of these, 66.2% arrived to hospital by an ambulance. Other modes of transportation were not reported. Based on results of regression analysis, not being transported to hospital by ambulance was associated with prolonged prehospital delay. There were no other studies identified in this review that tested the relationship between mode of

arrival to hospital and delay. Reasons for not calling an ambulance may include lack of insurance or reluctance to call emergency services due to uncertainty of symptom seriousness.{{4739 Goff, D.C., Jr 1999; 4738 Leslie, W.S. 2000}}

Emotions play an important role in symptom perception and health-care utilization in populations with cardiovascular disease.{{4739 Goff, D.C., Jr 1999; 4738 Leslie, W.S. 2000}} Despite this evidence, the contribution of emotional factors with the decision to seek care by this population remains understudied.{{4502 Moser, D.K. 2007;}} In this review, only 1 study quantitatively tested the relationship between delay and emotional factors (anxiety, fear and embarrassment). In the study by Jurgens et al. (2009), 77 decompensated HF patients self-reported emotional responses to duration of dyspnea, specifically, anxiety related to symptoms, fear of consequences of seeking help, and embarrassment related to seeking help.{{4527 Jurgens, C.Y. 2009}} Results showed that lower anxiety was related to delay for dyspnea. Fear and embarrassment of the consequences of seeking help were not related to delay.

The only other study examining emotional factors and delay was qualitative. The study by Patel et al. (2007) reported that among patients with a diagnosis of deteriorating HF, 11% seeking medical care because they felt that their situation was hopeless. For instance, they perceived that seeking treatment was useless because there is no cure for HF.{{4133 Patel, H. 2007;}}

Discussion

This review has identified several non symptom-related factors that may be implicated in care-seeking delay by HF patients. The available evidence has shown that factors such as HF severity, cardiac history, age, and ethnocultural background were related to delay in certain studies; however, null results have also been reported. Other non symptom-related factors such as male gender, initial contact with a primary care physician, arriving in the emergency department by means other than by ambulance and patient responses such as self-care, low anxiety and hopelessness may play a role in longer delay. Below gaps in the literature and directions for future research are discussed.

The association between gender and delay has been mixed in the HF literature. In comparison to other cardiovascular samples, most studies that have examined care-seeking behavior among stroke patients did not find that gender was associated with delay.{{4502 Moser, D.K. 2007;}} In contrast, women with other chronic diseases such as heart disease and chronic obstructive pulmonary disease enter the health system later than men after the onset of symptoms.{{4557 Meischke, H. 1993;4575 Chandra, D. 2009; 4578 Ruston, A. 2007; }} In particular, previous literature has shown that women delay longer than men with ACS.{{4582 Waller, C.G. 2006; 4502 Moser, D.K. 2007; 237 Dracup, K. 1995;}} This is often attributed to differences in symptom recognition.{{5400 McSweeney JC, Cody M, OSullivan P, Elbertson K, Moser DK, Garvin BJ. 2003;}} Clearly more research is warranted in this area.

Other clinical factors such as diabetes were not found to be associated with delay by HF patients. Interestingly, chronic conditions such as diabetes has been shown to increase delay time among ACS patients.{{4502 Moser, D.K. 2007;}} Further, other risk and lifestyle factors such as hypertension, hyperlipidemia and smoking have been found to be associated with longer delay among ACS patients; however, most of the stroke research has described null associations.{{4502 Moser, D.K. 2007;}} More investigation in this area is needed prior to drawing conclusions.

Interventions and Other Health System Encounters

Future research should focus on designing and implementing programs that are aimed towards improving care-seeking behavior and outcomes among HF patients. A systematic review conducted by Gwady-Sridhar et al. (2004) showed that HF-targeted interventions can significantly reduce hospital readmissions.{{3198 Gwady-Sridhar, F.H. 2004;}} These programs included visits with healthcare professionals (i.e. dietitian, nurse or physician) and education on symptoms and self-care behaviors pre-hospital discharge. After discharge, patients were followed up with home visits, telephone calls or educational letters about treatment compliance, HF, medications, risk factors and behavioral issues. While such programs have been shown to significantly reduce readmission rates, there is no literature to date that has tested the effects of these programs on care-seeking behavior. Implementation of pre and post hospital discharge programs may improve the recognition of the onset or worsening of HF signs and symptoms and medication compliance and lifestyle adjustments, particularly among vulnerable subgroups.

The literature examining care-seeking delay behaviors among HF patients has mainly been limited to hospital admissions or emergency response services with scant focus on contacting a primary care physician or other outpatient disease management services. Better delineation of care-seeking timelines for different levels of care is warranted. Future research should address access disparities and delay to outpatient chronic disease management programs such as HF clinics and cardiac rehabilitation programs in particular. One study to date has explored factors related to the time from admission to accessing outpatient HF programs. {{4741 Ehrmann Feldman, D. 2009;}} This study examined 531 newly admitted HF patients to 1 of 6 clinics in Quebec, Canada. The results of the study showed that one-fifth of the patients did not have regular follow-up prior to the clinic admission. Factors associated with shorter duration of disease at admission to the HF clinic were: referral by a specialist, not having regular follow-up for HF, higher income and arrival to the emergency department for HF. As evidence shows that HF management programs improve patient risk-reduction behaviors, physician management, functional status, and reduce morbidity, mortality and health care costs, {{3196 McAlister, F.A. 2004;3871 Lainscak, M. 2004;3914 Crowder, B.F. 2006;2769 Ducharme, A. 2005;}} it may be beneficial for patients, clinicians and government to understand and promote timely access to such services.

Findings in this review should be interpreted with caution as there are several limitations in the literature on patients with HF who engage in care-seeking delay behavior, mainly pertaining to methodological weaknesses in study design, measurement, statistical analysis

and generalizability. With regard to design, research in this area has rarely included more than 1 site for patient recruitment. Multicentre studies provide greater heterogeneity and limit the potential of site-specific characteristics biasing results. Secondly, as patients were asked to retrospectively report delay information in some studies, this introduces retrospective bias.

With regard to measurement, delay data was ascertained by self-report and patient charts. As shown in the multi-centre study by Goldberg et al. (2008), medical chart information collected on care-seeking delay behavior data was missing for 56% of the sample. {4127 Goldberg, Robert J. 2008;} This gross exclusion introduces the potential of bias. Use of both hospital records and patient self-report may be a more comprehensive and reliable method to gather care-seeking delay behavior data. Finally, studies in this review did not assess delay in relation to several important clinical factors. For example, patient samples were not stratified by HF type (systolic or diastolic) or by clinical presentation (new onset, acute decompensation or chronic HF). These are important prognostic factors that may ultimately affect seeking timely care. Specific delineation of delay by clinical presentation is important as samples would most likely differ by degree of symptomatology, disease perceptions and self-care practices.

With regard to statistical analysis, examination of factors associated with care-seeking delay was inconsistent across studies included in this review. Some studies reported unadjusted analyses while others reported factors that were examined in adjusted analyses. Therefore cross-study comparisons are limited. Furthermore, unadjusted analyses give rise to the potential for confounding bias.

Finally, results found in studies included in this review may not be generalizable to all healthcare environments. In private healthcare systems, insurance coverage would likely affect care-seeking behavior. Patients may be less likely to delay arriving for timely treatment in a universal healthcare system; therefore more research is warranted in systems that are publicly funded. Finally, all of the studies identified in this review were conducted in developed countries, mainly the USA, therefore limiting generalizability to undeveloped countries where HF is also on the rise. {3372 Mendez, G.F. 2001;} Finally, it must also be noted that this review was narrative in design, and not systematic. Therefore, the literature search was not exhaustive and results were not synthesized quantitatively, raising the possibility of bias.

In conclusion, although there is some understanding of delay in non-HF cardiac patients, this review has synthesized clinical, sociodemographic, behavioral and emotional evidence to date examining care delay among HF patients. Available evidence showed that factors such as HF severity, HF history, age, and ethnocultural background have been found to be related to delay in certain studies; however, null results have also been reported. Other factors such as male gender, initial contact with a primary care physician, arriving in the emergency department by means other than by ambulance, and patient responses such as self-care, low anxiety and hopelessness may play a role in longer delay. Marital status, employment status, location of residence, living arrangements, heart rate, cardiovascular disease history and diabetes were unrelated to delay. Overall, healthcare professionals should be vigilant in

identifying all high-risk individuals and educating them about warning signs of HF. Among patients with established HF, regular follow-up with a primary care physician and access to outpatient programs such as HF clinics or cardiac rehabilitation may have a positive impact in not only increasing high risk patients' receipt of timely urgent care, but in reducing the need for urgent care.

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Figure 1.
Flow Diagram of Study Selection Process

Table 1
Studies examining non symptom-related factors contributing to delay in seeking medical care by patients with heart failure, N=10

Author, Year	Study design	Sample Size, HF Acuity n (% women) age (mean $\pm$ SD) % HF history	Year(s) of Study	Country	Number of hospitals	Location of treatment	Source of data
Evangelista 2000 {(4128 Evangelista, L S. 2006:)} }	Cross sectional (retrospective chart audit)	N=753 Primary diagnosis of HF (type unspecified) 10 (1.3%) women 69 $\pm$ 11.7 years 373 (50%) HF history	1997–1998	USA	1 hospital	Hospital Admission	Medical records
Evangelista 2002 [§] {(4129 Evangelista, Lorraine S. 2002:)} }	Secondary Analysis of Evangelista et al. (2000): Data reported above.	-	-	-	-	-	-
Friedman 1997{(4132 Friedman, M. M. 1997:)} }	Cross sectional (retrospective chart audit)	N=181 Primary diagnosis of HF (type unspecified) 107 (59%) women 76 $\pm$ 6.9 years 109 (60%) HF history	1991 – 1992 ⁺	USA	1 hospital	Hospital Admission	Medical records
Friedman 2008{(4492 Friedman, M. M. 2008:)} }	Cross sectional	N=212 Newly-diagnosed and chronic HF patients 103 (49%) women ⁺ 73 $\pm$ 9.78 years 148 (70%) HF history	1998 – 1999	USA	3 hospitals	Emergency Response Services & Hospital Admission	Patient report (qualitative structured interviews) & medical records
Goldberg 2008{(4127 Goldberg, Robert J. 2008:)} }	Cross sectional (retrospective chart audit)	N=2587 Acutely decompensated HF patients 1466 (56.7%) women 76.3 $\pm$ 12.3 ⁺ years 1942 (75.1%) HF history ⁺	2000	USA	11 hospitals	Hospital Admission	Medical records
Hedemalm 2008{(4594 Hedemalm A, Schaufelberger M, Ekman I. 2008:)} }	Qualitative	N=42 Acutely decompensated or chronic HF patients 18 (43%) women 75 $\pm$ 8.5 years ⁺ 36 (85.7%) HF history ⁺	2004 – 2006	Sweden	1 hospital	Hospital Admission	Patient report (qualitative structured interviews) & medical records
Jurgens 2006{(4493 Jurgens, C.Y. 2006:)} }	Cross sectional	N= 201 Acutely decompensated HF patients 88 (44%) women 108 (54%) HF history 70 $\pm$ 12 years	2001 – 2003	USA	3 hospitals	Hospital Admission	Patient report (survey and interviews) & medical records

Author, Year	Study design	Sample Size, HF Acuity n (% women) age (mean $\pm$ SD) % HF history	Year(s) of Study	Country	Number of hospitals	Location of treatment	Source of data
Jurgens et al. 2009{(4527 Jurgens, C.Y. 2009;)}	Mixed-methods	N=77 Acutely decompensated HF patients 37 (48.1%) women 75.9 $\pm$ 7.7 years 53 (72%) HF history	2004 – 2006 ⁺	USA	2 hospitals ⁺	Hospital Admission	Patient report (survey and interviews) & medical records
Patel et al. 2007{(4133 Patel, H. 2007;)}	Qualitative	N=88 HF exacerbation 34 (39%) women 77.7 $\pm$ 9.5 years 88 (100%) HF history	2004 – 2006	Sweden	1 hospital	Hospital Admission	Patient report (qualitative interviews) & medical records
Schiff et al. 2003{(4135 Schiff, G.D. 2003;)}	Cross sectional	N=83 Acutely decompensated HF patients 30 (36%) women 56 $\pm$ 14 years 67 (81%) HF history	2000 ⁺	USA	1 hospital	Hospital Admission	Patient report (survey and interviews)

HF, Heart Failure; USA, United States of America;

⁺Verified the information with author (s);

[§]Duplicate cohort

Table 2

Non-symptomatic factors contributing to delay in seeking medical care for HF symptoms

Author, Year	Factors	Estimate
Clinical Factors		
Evangelista 2000{{4128 Evangelista, L. S. 2000;}}	<ul style="list-style-type: none"> - Seeking initial care by a primary care physician (increase) - Higher NYHA Class (increase) - History of previous admission for HF (decrease) 	Adjusted Regression Analyses: OR = 2.04, 95% CI = 1.45 – 2.88 OR = 1.96, 95% CI = 1.47 – 2.61 OR = 0.42, 95% CI = 0.28 – 0.62
Friedman 1997{{4132 Friedman, M.M. 1997;}}	<ul style="list-style-type: none"> - History of HF (increase) 	Adjusted Regression Analyses: p < 0.05
Friedman 2008{{4492 Friedman, M.M. 2008;}}	<ul style="list-style-type: none"> - History of HF & calling emergency response services (decrease) - History of HF and arriving at the ED (no effect on delay) 	Unadjusted Analyses: p < 0.05n p = n.s.
Goldberg 2008{{4127 Goldberg, Robert J. 2008;}}	<ul style="list-style-type: none"> - History of Angina (no effect on delay) - History of Diabetes (no effect on delay) - History of HF (no effect on delay) - History of Stroke (no effect on delay) - History of Myocardial infarction (no effect on delay) - Lower heart rate (no effect on delay) - Estimated glomerular filtration rate (no effect on delay) 	Adjusted Regression Analyses: OR = 0.79, 95% CI = 0.54–1.15 OR = 0.76, 95% CI = 0.55 – 1.04 OR = 0.68, 95% CI = 0.46 – 1.01 OR = 1.09, 95% CI = 0.72 – 1.66 OR = 1.10, 95% CI = 0.80 – 1.51 p = n.s. p = n.s.
Jurgens 2006{{4493 Jurgens, C.Y. 2006;}}	<ul style="list-style-type: none"> - History of HF: in response to exertional dyspnea (decrease) - Previous heart failure admission (no effect on delay) - Higher NYHA Class (no effect on delay) 	Adjusted Regression Analyses: p = 0.01 p = n.s. p = n.s.
Sociodemographic Factors		
Evangelista 2000{{4128 Evangelista, L. S. 2000;}}	<ul style="list-style-type: none"> - Age (no effect on delay) - Gender (no effect on delay) - Race (no effect on delay) - Employment status (no effect on delay) - Marital status (no effect on delay) - Living arrangement (no effect on delay) 	Unadjusted Analyses: p = n.s. p = n.s. p = n.s. p = n.s. p = n.s. p = n.s.

Author, Year	Factors	Estimate
Evangelista 2002{{4129 Evangelista, Lorraine S. 2002;}}	- African-American race (increase)	Adjusted Regression Analyses: p < 0.001
Friedman 1997{{4132 Friedman, M.M. 1997;}}	- Younger age (increase) - Marital status (no effect on delay) - Living arrangements (no effect on delay) - Race (no effect on delay) - Gender (no effect on delay)	Adjusted Regression Analyses: p < 0.05 p = n.s. p = n.s. p = n.s. p = n.s.
Goldberg 2008{{4127 Goldberg, Robert J. 2008;}}	- Male gender (increase) - Mode of transportation to the hospital: by ambulance (decrease) - Age (no effect on delay) - Race (no effect on delay) - Urban residence (no effect on delay)	Adjusted Regression Analyses: OR = 1.42; 95% CI = 1.04–1.96 OR = 0.44; 95% CI = 0.30–0.63 p = n.s. p = n.s. OR = 1.24; p = 0.89–1.71
Hedemalm 2008{{4594 Hedemalm A, Schaufelberger M, Ekman I. 2008;}}	- Ethnicity: were unaware of the HF illness experience and which symptoms indicated worsening of HF • Immigrants • Natives	Unadjusted Analyses: 47% 24%
Jurgens et al. 2009 {{4527 Jurgens, C.Y. 2009;}}	- Male gender (increase) - Age (no effect on delay)	Adjusted Regression Analyses: p = 0.01 p=0.053 (trend)
Jurgens 2006{{4493 Jurgens, C.Y. 2006;}}	- Age (no effect on delay)	Adjusted Regression Analyses: p = n.s.
Patient Responses		
Hedemalm 2008{{4594 Hedemalm A, Schaufelberger M, Ekman I. 2008;}}	- Waited for follow-up visit - Used telephone counselling - Hoped for improvements - Long waiting time at ED - Seeking care puts too much strain on me - Expense - Had nobody to accompany me	Qualitative themes (among 21 responses): n=2, = 9.5% n=2 = 9.5% n=3, 14% n=1, 5% n=1, 5% n=1, 5% n=1, 5%
Jurgens et al. 2009 {{4527 Jurgens, C.Y. 2009;}}	- Lower anxiety (increase) - Fear (no effect on delay) - Embarrassment (no effect on delay)	Adjusted Regression Analyses: p = 0.035 p = n.s. p = n.s.

Author, Year	Factors	Estimate
Patel et al. 2007{{4133 Patel, H. 2007;}}	<ul style="list-style-type: none"> - Waited to seek care - Did not think that their symptoms warranted treatment - Patients reported that although they had wanted to seek care earlier, they had simply not done so - Feelings of hopelessness - Reluctance to use the health care system 	Qualitative themes: 71% 57% 34% 11% 10%
Schiff et al. 2003{{4135 Schiff, G.D. 2003;}}	<ul style="list-style-type: none"> - Waited to seek care with their PCP - Attempted self-management in response to worsening symptoms 	Qualitative themes: 30% N.R.

HF, Heart Failure; NYHA, New York Heart Association Class; OR, Odds ratio; CI, Confidence interval; n.s., Not significant; ED, Emergency Department. N.R., Not reported.