Association Between Prehospital Delay and Subsequent Clinical Course in Patients With/Hospitalized for Heart Failure

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ABSTRACT

Background: The clinical consequences of prehospital delay in heart failure (HF) patients are unknown. This study explores the relationship between prehospital delay of HF patients and length of hospital stay, plasma values of brain natriuretic peptides (BNP) as well as the association of delay with all-cause mortality, readmission for HF, or all-cause readmissions during short- (60 days) and long-term (18 months) follow-up.

Methods: Data from 1023 hospitalized HF patients mean aged 71 years from the Coordinating study evaluating Outcomes of Advising and Counselling in HF study were analyzed.

Results: Patients who delayed less than 1 day had significantly shorter stay in hospital (10 days vs. 11 days, $P = 0.033$). They also had significantly ($P = 0.004$) lower median plasma values of BNP (377 pg/mL) at discharge compared to patients who delayed >24 hours (492 pg/mL). Delay was not related to all-cause mortality and/or readmissions for HF.

Conclusion: Although patients with a prehospital delay less than 1 day were more symptomatic on admission, they had a shorter hospital stay as well as lower plasma values of BNP at discharge. Delay was not associated hospital readmissions or mortality after discharge. (*J Cardiac Fail 2012;18:202−207*)

Key Words: Heart failure, delay, outcome and process assessment.

Heart failure (HF) is one the most common reasons for hospital admission, especially for people older than age 65 years.[1,2] It is hypothesized that many of these admissions could have been prevented if patients had responded more appropriate to early symptoms and signs of worsening HF.[3] Prehospital delay can be described as the amount of time between the first awareness of worsening HF symptoms to the initiation of treatment.[4,5] Prehospital delay has been studied in patients with acute coronary syndromes (ACS), because a short time between symptom and arrival in the hospital is crucial in those patients, leading to better clinical outcome (''time is muscle'').[6,7]

A substantial part of HF patients (50%) have a rather long prehospital delay of 3 to 7 days.[4,8,9] We have previously shown that prehospital delay is associated with depression, and the total delay (ie, patient delay and provider delay) was on average 72 hours.[10,11] A part of this total delay is related to patient delay and a part might be caused by factors in the health care system, such as transportation delay.[11] Recognition, interpretation, and awareness of the importance of symptoms can influence delay. Most HF patients have a gradual increase of symptoms over days or weeks and they often wait to seek medical care because they might not realize that their symptoms could be attributed to worsening HF.[9,12] Symptom distress or feelings of hopelessness and depression can prolong prehospital delay.[5,13] Other patients wait longer because they have been accustomed to a relatively high symptom burden of suffering of severe symptoms and they may not feel the need to respond to changes in symptoms.[14]

It has been assumed that a short prehospital delay in HF patients would decrease severity of HF and the length of hospital stay and decrease mortality.[5] However, there are no data on the association between prehospital delay and

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clinical outcome in HF patients. The aim of the present study therefore is to describe the relationship between prehospital delay and the following outcome variables: 1) length of hospital stay, 2) plasma values of brain natriuretic peptides (BNP), and 2) all-cause mortality, readmissions for HF or all-cause readmissions during a short- (60 days) and long-term (18 months) follow-up.

Methods

Study Design

Data collected in the COACH (Coordinating study evaluating Outcomes of Advising and Counselling in HF patients) study were used for this secondary analysis. The COACH study was a multicenter, randomized trial designed to compare basic support and intensive support to standard treatment in patients with HF. The design and main results of the study have been described in detail previously.[15,16] Patients were included in the study during a period of 28 months (October 2002 to February 2005), when they were >18 years of age, and admitted to the hospital with worsening HF, New York Heart Association (NYHA) functional classification II-IV, and evidence of structural underlying heart disease, diagnosed by the cardiologist. Major exclusion criteria were concurrent inclusion in another study, already treated at the HF clinic, inability to complete questionnaires, invasive cardiac procedure or cardiac surgery intervention <6 months, or planned <3 months, evaluation for heart transplantation, and inability or unwillingness to give informed consent. The COACH study was approved by the Medical Ethical Committee of the University Medical Centre of Groningen in compliance with the declaration of Helsinki and all patients provided written informed consent.

Measurements

Data on prehospital delay were collected retrospectively in an interview performed by well-trained independent data collectors. The specific question on delay was "Can you indicate the time between worsening HF symptoms and the date and time of admission to the hospital as accurate as possible in days, hours, and minutes."

Demographic and clinical characteristics were assessed by chart review. BNP plasma levels were determined using a fluorescence immunoassay kit (Triage®; Biosite Incorporated, San Diego, CA) and were only collected on the day of hospital discharge or the day before hospital discharge.

Depressive symptoms were assessed using the Centre for Epidemiological Studies Depression-Scale.[17] This instrument is designed to measure depressive symptoms in the general population, in the medically ill,[17,18] and have been used in HF patients previously.[19] A cutoff point of 16 was used to define patients with depressive symptoms.

Primary end point of the COACH study was a composite of all-cause mortality or admission for HF. A hospitalization for HF was defined as an unplanned overnight stay in a hospital from progression of HF or directly related to HF. Finally, the number of admissions days of the index hospitalization was calculated in the study. The reason for admission, the cause of death, and the date of the event were adjudicated by an independent end point committee.

Statistical Analysis

Categorical variables were presented as numbers and percentages and were analyzed using the chi-square test. Continuous variables were analyzed using Mann-Whitney U-test or Kruskal-Wallis test. Because no time criteria exist for long or short delay, this variable was first divided into 5 different time groups: 0-24 hours, 25-48 hours, 49-96 hours, 97-120 hours, and >120 hours (Fig. 1). However in this analysis the middle three groups were rather small and the group 0-24 hours included 38.7% of the population, whereas those in the group >120 hours included 42.9%. We therefore choose to compare delay 0-24 hours to delay >24 hours. We also performed secondary analyses of delay divided into three groups 0-24 hours, 25-120 hours, and >120 hours. We corrected for significant covariates that theoretically could influence the relationship between delay and outcomes: plasma values of BNP are related to age and atrial fibrillation and therefore analysis of covariance was performed with these covariates in the association between delay and BNP. Kaplan-Meier curve analyses were constructed to analyze the association between the different delay groups (short and long) and the combined end point of HF readmission and death over 18 months follow-up. Log-rank test was used to evaluate differences between the groups. A P value $< .05$ was considered statistically significant. SPSS 18.0 statistical software was used for the statistical analyses.

Results

Study Population

The mean age of the patients was 71 years, 62% were male (Table 1) and one third of the patients had a previous hospitalization for HF. The median prehospital delay time of the total sample was 72 hours (IQR 2-337). Of the studied population, 39% delayed ≤24 hours (Fig. 1). Those who delayed ≤24 hours had a median delay of 1.5 hours, whereas those who delayed >24 hours had a median of 264 hours (16 days). Patients who delayed >24 hours were significantly younger (70 years vs. 73 years, $P < .001$), more often had a history of atrial fibrillation (47% vs. 39%, $P = .016$), and reported more depressive symptoms (43% vs. 32%, $P = .002$) compared to those with a short delay (≤24 hours). Patients who delayed ≤24 hours more often had a history of ischemic heart disease (57% vs. 43%, $P < .001$). A significant association was found between prehospital delay and NYHA class at presentation to the hospital. Patients who had shorter delay times (≤24 hours) were less often in NYHA II at admission

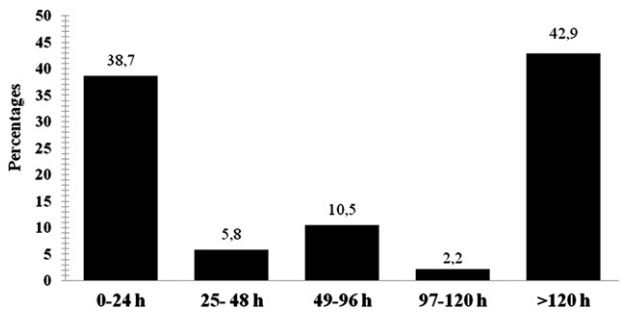

Fig. 1. Proportion of patients in relation to different times of delay.