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Acute coronary syndrome in relation to the occurrence of associated symptoms: A quantitative study in prehospital emergency care

Henrik Andersson [a,b,*], Andreas Ullgren [b,c], Mats Holmberg [a,e], Thomas Karlsson [d], Johan Herlitz [a,b], Birgitta Wireklint Sundström [a,b]

[a] PreHospen – Centre for Prehospital Research, University of Borås, Sweden
[b] Faculty of Caring Science, Work Life and Social Welfare, University of Borås, Sweden
[c] Emergency Medical Service System, Skaraborg Hospital, Skövde, Sweden
[d] Centre for Applied Biostatistics, Occupational and Environmental Medicine, Sahlgrenska Academy at the University of Gothenburg, Gothenburg, Sweden
[e] School of Health, Care and Social Welfare, Mälardalen University, Eskilstuna, Sweden

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ABSTRACT

Introduction: Acute chest pain is a common symptom among prehospital emergency care patients. Therefore, it is crucial that ambulance nurses (ANs) have the ability to identify symptoms and assess patients suffering from acute coronary syndrome (ACS). The aim of this study is to explore the occurrence of dyspnoea and nausea and/or vomiting in the prehospital phase of a suspected ACS and the associations with patients' outcome.

Methods: This study has a quantitative design based on data from hospital records and from a previous interventional study (randomised controlled trial) including five Emergency Medical Service (EMS) systems in western Sweden in the years 2008–2010.

Results: In all, 1836 patients were included in the interventional study. Dyspnoea was reported in 38% and nausea and/or vomiting in 26% of patients. The risk of death within one year increased with the presence of dyspnoea. The presence of nausea and/or vomiting increased the likelihood of a final diagnosis of acute myocardial infarction (AMI).

Conclusion: This study shows that dyspnoea, nausea and/or vomiting increase the risk of death and serious diagnosis among ACS patients. This means that dyspnoea, nausea and/or vomiting should influence the ANs' assessment and that special education in cardiovascular nursing is required.

1. Introduction

Acute chest pain is a common symptom among people contacting prehospital emergency care [1,2]. However, chest pain can be a challenge to assess [3]. It is essential to be prepared for an open and flexible encounter with the patient in order to avoid being influenced by preconceived ideas [4]. In a patient suffering from acute coronary syndrome (ACS), for example, it is important to identify and assess her/his symptoms to determine the degree of severity, to consider a number of different diagnoses and to carry out relevant interventions. This is crucial, because mistakes in the assessment of the patient are a significant threat to patient safety in prehospital emergency care [5].

The most typical symptom in ACS is pain or discomfort in the chest [6]. However, this symptom is often accompanied by other symptoms, here called associated symptoms. In this paper, associated symptoms consist of symptoms as experienced by the patients that can also be signs of ACS [7]. Examples of these symptoms are dyspnoea and nausea and/or vomiting [8]. Sometimes, patients with ACS react with these symptoms but without pain or discomfort in the chest [9–11]. At the same time, patients without sudden, continuous and severe chest pain are more likely to have longer prehospital delays [12]. The mechanism behind the development of associated symptoms is not always clear, particularly with regard to nausea and/or vomiting. With regard to dyspnoea, complicating factors such as heart failure and pulmonary disease may coexist [13,14]. Furthermore, it has been suggested that these associated symptoms are gender related, as they are more frequent in women than in men [15–17]. This means that associated symptoms appear together with typical ones, which influences the assessment of the patient.

Patient history and physical examination are essential in the care and treatment of patients with chest pain. One example is the electrocardiogram (ECG), which is essential to provide for

* Corresponding author at: PreHospen – Centre for Prehospital Research, University of Borås, Sweden.
E-mail address: henrik.andersson@hb.se (H. Andersson).

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optimal reperfusion strategy [18]. However, the assessment also includes questions on how patients experience their symptoms and signs. This highlights the need for the ambulance nurses (ANs) to be involved in and understand the patient's story [4]. For this reason, knowledge relating to medicine and knowledge relating to caring sciences are complementary [4,19]. Knowledge relating to the association of these symptoms with various types of complication among patients with ACS is less well described in the literature. This is a clinically relevant question, as it is possible to argue that these symptoms should increase the priority early in the prehospital setting. The aim of this study has been to explore the occurrence of dyspnoea and nausea and/or vomiting in the prehospital phase of cases with suspected ACS and their connection with the patients' outcomes. Our hypothesis has been that the presence of associated symptoms among patients with chest pain raising suspicion of ACS indicates an increased risk of an adverse outcome. This study is part of a larger research project, whose overall aim is to increase ANs ability to assess and relieve chest pain and anxiety among patients seeking prehospital emergency care.

2. Methods

2.1. Study design and setting

This study is a quantitative study. Data was obtained in two ways: 1) clinical measurements obtained in an interventional study (randomised controlled trial) to facilitate the description of the associated symptoms of patients with chest pain (for further information, see www.clinicaltrials.gov, registration number NCT00792181), 2) data about previous medical history, complications that required treatment, final diagnosis, mortality and length of hospitalisation was obtained from hospital records. Ethical approval was obtained from the Regional Ethics Committee in Gothenburg (Ref. 022-08). For further information on the study design, intervention, inclusion and exclusion criteria, see Wireklint Sundström and colleagues [20].

The study took place in western Sweden (1.5 million inhabitants) and included hospital records and five Emergency Medical Services (EMS) systems in western Sweden in the years 2008–2010. The ambulances in all the EMS systems participating in the study were staffed by at least one AN who was a registered nurse (RN), although not all RNs were prehospital emergency nurses (PENs) i.e. nurses with specialist education in prehospital emergency care. In this study, both RNs and PENs were included in the group of ANs.

2.2. Clinical measures

In the interventional study the presence of dyspnoea, nausea and/or vomiting (yes/no) was assessed by ANs on three occasions: on the arrival of the ambulance team, 15 min later and on arrival in hospital. In this study, we focused on the first occasion. Patients were therefore divided into two groups in relation to whether or not symptoms were present on the arrival of the EMS.

2.3. Hospital records and clinical endpoints

The primary endpoints were one-year mortality and the development of an acute myocardial infarction (AMI) during hospitalisation. The secondary endpoints were complications prior to and after arrival in hospital, defined as heart failure, hypotension, AV block, bradyarrhythmia, supraventricular and ventricular arrhythmias requiring treatment. Further secondary endpoints were anxiety and pain requiring treatment after hospital admission; the duration of hospitalisation; and 30-day mortality.

2.4. Data analysis

Fisher's exact test was used to test for associations with dichotomous variables and the Mann-Whitney *U* test was used for associations with continuous variables. The Kaplan-Meier method was used for estimations of 30-day and one-year mortality and the log rank test was used to test for associations with the presence of symptoms. Individuals with multiple inclusions in the study were only used once (the first time) in the analysis of 30-day and one-year mortality. All tests were two-sided and p-values below 0.01 were considered statistically significant. All analyses were performed using SAS for Windows v9.3.

3. Results

In all, 1836 patients were included in the intervention study. Of these, 1705 (93%) had information recorded in the study protocol (i.e. yes/no) on the arrival of the EMS regarding the presence of dyspnoea symptoms and 1702 (93%) regarding nausea and/or vomiting. These 1705 and 1702 cases respectively were included in the analyses.

3.1. Dyspnoea

In 646 (38%) cases, dyspnoea was reported on the arrival of the EMS.

3.2. Age, gender, previous history

The presence of dyspnoea was significantly associated with a previous history of heart failure and with a previous history of chronic obstructive pulmonary disease (Table 1).

3.3. Complications before and after hospital admission

There was a significant association between the presence of dyspnoea and heart failure requiring treatment before and after hospital admission (Tables 2 and 3).

3.4. Anxiety, pain, final diagnosis, mortality and length of hospitalisation

The presence of dyspnoea was significantly associated with anxiety requiring treatment in hospital, as well as with mortality during the course of one year after hospital admission and with a prolonged duration of hospitalisation (Table 4).

3.5. Nausea and/or vomiting

Nausea and/or vomiting was reported in 449 (26%) cases.

3.6. Age, gender, previous history

There was a significant association between female gender and the presence of nausea and/or vomiting. The absence of a history of heart failure was significantly associated with the presence of nausea and/or vomiting (Table 1).

3.7. Complications before and after hospital admission

There was no association between the presence of symptoms of nausea and/or vomiting and any complication prior to arrival

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