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Original Contributions

PREVALENCE OF ACUTE MYOCARDIAL INFARCTION AND OTHER SERIOUS DIAGNOSES IN PATIENTS PRESENTING TO AN URBAN EMERGENCY DEPARTMENT WITH CHEST PAIN

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□ **Abstract—A retrospective cohort study and chart review were performed to estimate the absolute and relative prevalence of the serious diagnoses that might cause a patient to present to the Emergency Department (ED) with a chief complaint of chest pain. In this study, we queried a database of 347,229 complete visits to the San Francisco General Hospital Emergency Department between July 1, 1993 and June 30, 1998 for visits by patients > 35 years old with a chief complaint of chest pain and no history of trauma. Visits for chest pain that resulted in hospitalization were assigned to one of nine diagnostic groups according to final diagnoses as coded in the database. Manual chart review by trained abstractors using explicit criteria was done when group assignment based on coded diagnoses was unclear and in all diagnoses of pulmonary embolism and aortic dissection. Of 8711 visits (2.5% of all visits) with a chief complaint of non-traumatic chest pain, 3271 (37.6%) resulted in hospitalization. Of the 3078 (94.1% of those hospitalized) assigned a final diagnosis, 329 (10.7% of hospitalizations, 3.8% of all visits) had acute myocardial infarction, 693 (22.5%) had either unstable angina or stable coronary artery disease, and 345 (11.2%) had pulmonary causes (mainly bacterial pneumonia) deemed serious enough to require hospitalization. Pulmonary embolism and aortic dissection were diagnosed in only 12 (0.4%) and 8 (0.3%) patients, respectively. In 905 (29.4%) hospitalizations for chest pain, myocardial infarction was "ruled out" and no cardiac ischemia or other serious etiology for the chest pain was diagnosed. Among patients presenting with chest pain, those in older age groups had dramatically increased risk of acute myocardial infarction. Women presenting with chest pain had a lower risk of acute myocardial infarction than men. In conclusion, the prevalence of acute myocardial infarction in the undifferentiated ED patient with a chief complaint of chest pain is only about 4%. An equal number of patients will have a serious pulmonary cause as the etiology of their pain. Pulmonary embolism and aortic dissection are important but extremely rare causes of a chest pain presentation to the ED.**

□ **Keywords—chest pain; myocardial infarction; differential diagnosis**

INTRODUCTION

Chest pain is second only to abdominal pain as the most common reason for Emergency Department (ED) visits,

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making up 5.4% of all visits in 2000 (1). Although myocardial ischemia is the most common of the serious underlying causes of a chest pain presentation to the ED, the evaluation of chest pain should not be equated with the problem of diagnosing myocardial ischemia and infarction (2). Just as acute myocardial infarction (AMI) may not always present as chest pain, so chest pain can be caused by other serious conditions besides AMI (3,4). The differential diagnosis of life-threatening conditions other than acute cardiac ischemia (AMI and unstable angina) that present as chest pain is well known: pulmonary embolism (PE), aortic dissection, esophageal rupture, pericarditis, spontaneous pneumothorax, pneumonia, and certain acute abdominal conditions that may present with chest pain (cholecystitis, pancreatitis, and perforated ulcer) (5,6). The absolute and relative frequencies of all of the serious causes of acute chest pain in the ED, including AMI and unstable angina, are not well established.

The prevalence of AMI in patients with chest pain varies widely between studies, even when the settings and inclusion criteria are similar. The prevalence of unstable angina is even more uncertain (7). Recent estimates of the prevalence of AMI in ED patients presenting with chest pain range from 5% to 15%. The prevalence of unstable angina is anywhere from slightly higher to more than twice as high as the prevalence of AMI (8,9). The prevalences of the other serious causes of chest pain are essentially unknown, although PE, aortic dissection, esophageal rupture, pericarditis, and spontaneous pneumothorax are all felt to be much less likely than AMI in the chest pain patient.

Better established than the likelihood of serious diagnoses other than AMI are the effects of demographic factors such as age and sex on the likelihood of AMI. The Multicenter Chest Pain Study showed that, in patients with chest pain, older age and male sex are independently associated with substantially increased risk of AMI (10–13). However, except for age $\geq$ 40 years, neither of these risk factors was useful enough to include in the Multicenter Chest Pain Study's protocol for diagnosing AMI in ED patients with chest pain (10). It is important to note the distinction between the risk for AMI in chest pain patients vs. the prevalence of chest pain in patients who have AMI. Older patients with chest pain have a higher risk of AMI, and older patients with AMI have a higher risk of presenting *without* chest pain. Men with chest pain have a higher risk of AMI, but men with AMI have a *lower risk* of presenting *without* chest pain (4).

Our goals in this study were 1) to estimate the absolute and relative prevalence of serious diagnoses in patients presenting to an urban, public ED with a chief complaint of chest pain and 2) to determine the univariate relative risks and the multivariate odds ratios for AMI using age and sex as potential predictors of AMI in this population.

METHODS

Design

This was a retrospective cohort study and chart review with descriptive and analytic components. It was approved by the University of California San Francisco Committee on Human Research. The Committee waived the requirement for informed consent because this was a database and chart review with no interventions.

Setting

The San Francisco General Hospital (SFGH) Emergency Department is an urban hospital ED with 70,000 visits annually. Since July 1993, these visits have been recorded into the SFGH ED Database (14). The database catalogues multiple variables from the ED triage sheet, house staff and attending note, and the hospital discharge summary sheet if the visit results in hospitalization.

Selection of Subjects

We queried the database to determine the total number of ED visits over a 5-year period (July 1, 1993 to June 30, 1998). Of these visits, we determined the number of visits in patients $>$ 35 years old with a chief complaint of non-traumatic chest pain and the number of these patients who were subsequently admitted to the hospital. Our study sample included 1) all patients $>$ 35 years old visiting the SFGH ED between July 31, 1993 and June 30, 1998 with a chief complaint of non-traumatic chest pain and 2) the subgroup of these patients whose visit resulted in hospitalization.

Methods of Measurement and Primary Data Analysis

To compare the relative frequencies of the serious potential causes of chest pain, we used the subgroup of hospitalized patients. These subjects were stratified into one of nine groups based on *International Classification of Diseases, 9th Revision* (ICD-9) codes as entered into the database on hospital discharge. The nine diagnostic groups utilized were: AMI; Angina/CAD (coronary artery disease); Atypical Chest Pain (AMI rule out); Aortic Dissection; PE; Other Cardiac (includes congestive heart