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Chest Pain in the Emergency Department: Causes and ED Disposition

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Abstract

Background: Chest pain is one of the most common reasons to visit the Emergency Department (ED), causes of which include life threatening conditions that need to be identified and stratified early for admission. The objective of this study was to examine the most common causes of chest pain and predictors for admission at an urban, level 1 trauma center. Methods: A retrospective chart review of patients that presented to the ED with a chief complaint of chest pain over a time period of one month was conducted. Data was analyzed using SPSS 16 statistical software. Results: A total of 497 patients were included in the study, 254 (50.4%) were males and 207 (41.1%) were in the age group 45 - 65 years. About 358 (71%) of these patients with acute chest pain were evaluated, treated, and discharged from the emergency department, while 123 (24.4%) of them were admitted. The majority of patients were admitted to the Telemetry unit (80, 65%), and 28 (23%) to regular floors. The most common causes of chest pain in the ED were musculoskeletal-related (252, 50.0%), followed by gastrointestinal causes (58, 11.5%), cardiovascular diseases (45, 8.9%), pulmonary diseases (53, 10.5%), and acute coronary syndrome (both unstable angina and myocardial infarction) represented 48 (9.5%) of the cases. The causes of chest pain varied with age ($p = 0.012$), sex ($p < 0.05$) and ED disposition ($p < 0.05$). Conclusions: Chest pain is a common ED presentation with varied etiologies and outcomes. While musculoskeletal causes are often benign and lead to discharge, acute coronary syndrome and cardiovascular conditions significantly increase the likelihood of admission. Understanding these patterns can improve triage decisions, optimize resource use, and support the development of targeted chest pain management strategies.

Keywords

Chest Pain, Emergency Department, Chest Pain Triage, Chest Pain

Outcomes

1. Introduction

Chest pain accounts for approximately six million annual visits to emergency departments (ED) in the United States, making chest pain the second most common complaint [1]. It is the second most common reason to present to the emergency department in the United States accounting for 5% to 20% of all ED admissions. Causes of chest pain range from musculoskeletal and gastrointestinal causes to life threatening conditions such as acute myocardial infarction, aortic dissection and pulmonary embolism [2]. Early risk stratification and identifying life threatening conditions are life-saving, at the same time inappropriate admissions are a burden to the health care system with tremendous costs. Accurate identification of these life-threatening and serious causes of chest pain must be accomplished without over testing and over treating patients with less serious causes [3].

The causes of chest pain and their magnitude vary among different countries and across institutions. Musculoskeletal and chest wall conditions were the most common conditions of chest pain at primary setting in the Unites States, Germany, and Switzerland accounting for 36.2%, 46.6%, and 48.7% respectively [4]. Considerable variation exists across U.S. hospitals in ED admission rates for patients with chest pain, with admission rates ranging from 38 to 81% [5]. There is limited data available on the common causes of chest pain and admission rates at the emergency department in our institution. The aim of this study was to determine the most common causes of chest pain in the ED and to determine which patients are likely to be admitted vs. discharged home from the ED.

2. Methods

2.1. Study Design

This was a retrospective cross-sectional study that evaluated the causes of chest pain and ED disposition of patients who presented with a chief complaint of chest pain to Jamaica Hospital Medical Center, an urban, level 1 trauma center in New York City.

2.2. Inclusion Criteria

Adult patients (>18 years) who presented to the Emergency Department with a chief complaint of chest pain during the month of March 2017 were included in the study.

2.3. Data Collection

De-identified data was obtained from the electronic medical records (EPIC) in March 2017 for scholarly activity. Variables collected included, age, gender, cause of chest pain, and ED disposition. Common causes of chest pain were grouped

based on organ systems: cardiovascular, pulmonary, gastrointestinal, musculoskeletal and others. Patients with unstable angina and myocardial infarction were grouped into a separate class as acute coronary syndrome. ED disposition was grouped as admitted, discharged, transferred, or left against medical advice. Missing data was cleared and omitted from the analysis.

2.4. Data Analysis

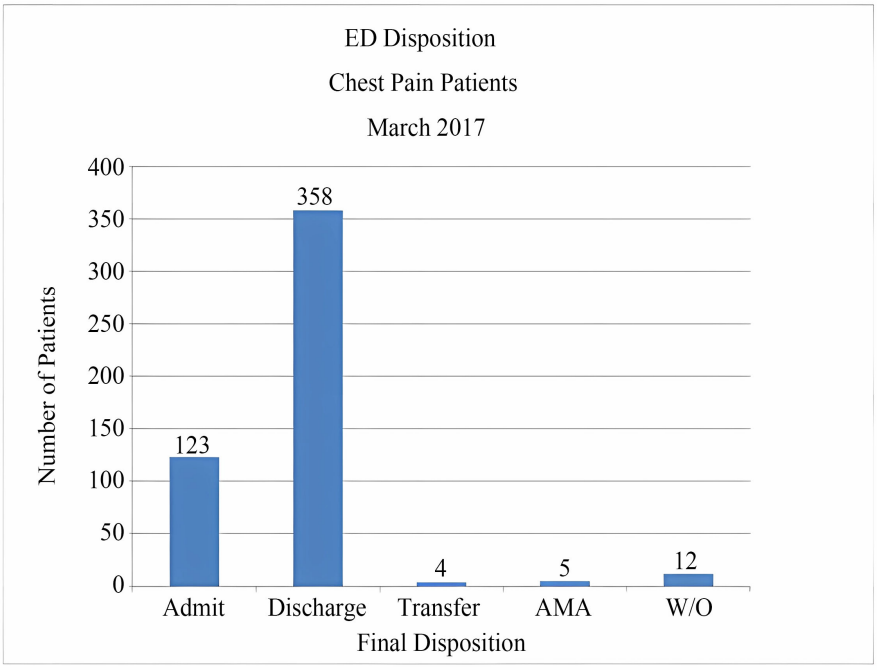
Data was cleared and analyzed using SPSS 16 statistical software. The socio-demographic characteristics age and sex were assessed for association with the causes of chest pain in a bivariate analysis. A similar association was examined between causes of chest pain and ED disposition at a probability level of 0.05.

2.5. IRB Review

This retrospective chart review was deemed exempt from IRB review under institutional guidelines for studies involving de-identified data.

3. Results and Discussion

Of the total 497 patients included in the study, 254 (50.4%) were males and 243 (48.2%) were females. The predominant age group was 45 - 65 years, accounting for 41.1% of the total patients. A total of 358 (71%) patients with acute chest pain were evaluated, treated, and discharged from the emergency department, while 123 (24.4%) were admitted for further evaluation and inpatient management (**Figure 1**).

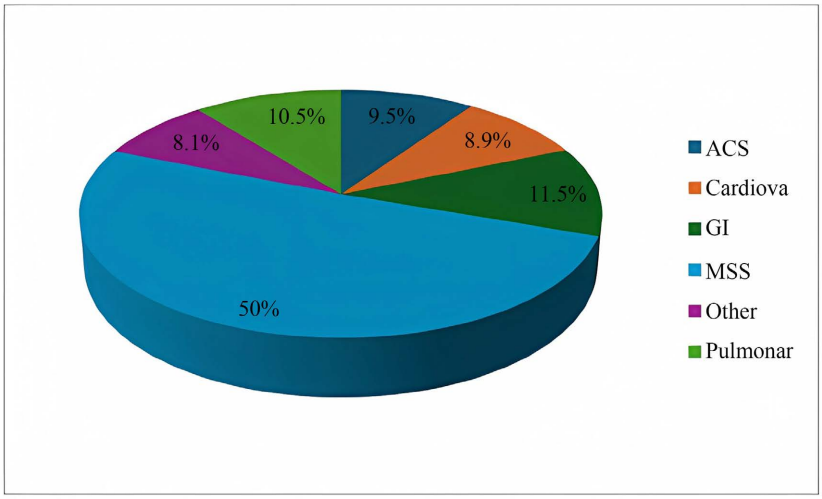


AMA: against medical advice; W/O: without chest pain.

Figure 1. ED disposition of chest pain patients.

The most common causes of chest pain were of musculoskeletal (MSS) origin (252, 50.0%), followed by gastrointestinal (GI) causes (58, 11.5%). These findings align with previous studies, which estimated approximately one-third to one-half of patients presenting with MSS pain, 10% - 20% with GI causes, 10% with stable angina, 5% with pulmonary conditions, and 2% - 4% with acute myocardial infarction [6] [8]. While other studies have cited GI causes as the leading etiology [9], the predominance of MSS pain in our study may reflect specific intrinsic characteristics of our population that warrant further investigation.

Cardiovascular diseases were identified in 45 (8.9%) patients, while 53 (10.5%) had pulmonary diseases. Acute coronary syndrome (ACS), encompassing both unstable angina and myocardial infarction, represented 48 (9.5%) of all cases (**Figure 2**). When stratified by age and sex (**Table 1**), musculoskeletal chest pain was the most frequent cause across all age groups and in both sexes, with statistically significant associations (p = 0.012 and <0.05, respectively).



ACS: acute coronary syndrome; CVS: Cardiovascular; GI: Gastrointestinal; MSS: Musculoskeletal; Pulmonary.

Figure 2. Causes of chest pain by percentage.

Table 1. Demographics stratified by causes of chest pain.

		ACS	Cardiovascular	GI	MSS	Other	Pulmonary	P-Value
		N = 47	N = 45	N = 58	N = 252	N = 41	N = 65	
Age group	<25	1 (2.9%)	1 (2.9%)	8 (23.5%)	27 (79.4%)	3 (8.8%)	6 (17.6%)	0.012
	25 -45	9 (6.3%)	14 (9.8%)	15 (10.5%)	87 (60.8%)	12 (8.4%)	12 (8.4%)	
	45 - 65	26 (13.8%)	18 (9.5%)	27 (14.3%)	99 (52.4%)	18 (9.5%)	19 (10.1%)	
	65 - 85	11 (12.9%)	10 (11.8%)	8 (9.4%)	39 (45.9%)	6 (7.1%)	15 (17.6%)	
	>85	0 (0%)	2 (66.7%)	0 (0%)	0 (0%)	2 (66.7%)	1 (33.3%)	
Sex	Female	18 (8.1%)	23 (10.4%)	35 (15.8%)	115 (51.8%)	21 (9.5%)	31 (14%)	<0.05
	Male	30 (11.1%)	22 (8.1%)	23 (8.5%)	137 (50.7%)	20 (7.4%)	22 (8.1%)	

ACS: acute coronary syndrome; CVS: Cardiovascular; GI: Gastrointestinal; MSS: Musculoskeletal; Pulmonary.

Acute coronary syndrome and cardiovascular causes were more prevalent in older adults, particularly those aged 45 - 65 and 65 - 85, reinforcing the known correlation between age and increased cardiovascular risk. GI causes were notably common among the 25 - 65 age range, especially in females, indicating potential sex-specific trends in chest pain etiology. Pulmonary causes were more common in the older population (65 - 85 years), but were also present in younger groups, highlighting the broad differential diagnoses required across age ranges.

Regarding ED disposition (Table 2), of the 123 admitted patients, 80 (65%) were admitted to the telemetry unit, 28 (23%) to regular floors, 6 (5%) directly to the coronary care unit (CCU), and 9 (7%) to the stroke unit. Patients diagnosed with ACS and cardiovascular conditions were significantly more likely to be admitted, whereas those with MSS pain were predominantly discharged. This reflects appropriate clinical prioritization of high-risk conditions. Furthermore, current literature suggests improved outcomes for acute MI management in institutions with Society of Chest Pain Centers-certified units [10], which highlights the importance of specialized care units. On the other hand, successfully implementing expert consensus for low-risk chest pain will reduce Emergency Department crowding and minimize unnecessary testing [11].

Table 2. Causes of chest pain stratified by ED disposition.

Cause of Chest Pain	Admitted	Discharged	P-value
	N = 123	N = 358	
ACS	46 (37.4%)	2 (0.6%)	<0.05
Cardiovascular	25 (20.3%)	19 (5.3%)	
GI	10 (8.1%)	46 (12.8%)	
MSS	18 (14.6%)	225 (62.8%)	
Other	5 (4.1%)	34 (9.5%)	
Pulmonary	19 (15.4%)	32 (8.9%)	
Total	123(100%)	358(100%)	481

ACS: acute coronary syndrome; GI: Gastrointestinal; MSS: Musculoskeletal.

4. Conclusion

This study provides a baseline for understanding chest pain presentations in a single, urban Level 1 trauma center. The high rate of discharge for patients with MSS and GI causes supports the effectiveness of ED triage in identifying low-risk cases. However, the significant proportion of serious conditions such as ACS and pulmonary diseases underscores the need for vigilant evaluation protocols. Early recognition of clinical predictors associated with high-risk presentations could enhance triage accuracy, reduce unnecessary admissions, and improve outcomes. Establishing dedicated chest pain units may further optimize patient management and ED resource utilization.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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