Anxiety Associated with Increased Risk for Emergency Department Recidivism in Patients with Low Risk Chest Pain

Running title: Anxiety and Low Risk Chest Pain

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ABSTRACT

Anxiety contributes to the chest pain symptom complex in 30%-40% of patients with low risk chest pain seen in the Emergency Department (ED). The validated Hospital Anxiety Depression Scale – Anxiety subscale (HADS-A) has been used as an anxiety screening tool in this population. The objective was to determine the prevalence of abnormal HADS-A scores in a cohort of low-risk chest pain patients and test the association of HADS-A score with subsequent healthcare utilization and symptom recurrence. In a single-center, prospective, observational cohort study of adult ED subjects with low risk chest pain, the HADS-A was used to stratify participants into 2 groups: Low anxiety (score<8) and High anxiety (score≥8). At 45-day follow-up, chest pain recurrence was assessed by patient report while ED utilization was assessed via chart review. Of the 167 subjects enrolled, 78 (47%) were stratified to high anxiety. The relative risk for high anxiety being associated with at least 1 30-day ED return visit was 2.6 (95% CI 1.4 to 4.7) and this relative risk increased to 9.1 (95% CI 2.18 to 38.6) for 2 or more ED return visits. Occasional chest pain recurrence was reported by more subjects in the high anxiety group, 68% vs. 47% (p=0.029). In conclusion, 47% percent of low risk chest pain cohort had abnormal levels of anxiety. These patients were more likely to have occasional recurrence of their chest pain and had an increased risk multiple ED return visits.

Key Words: Acute Coronary Syndrome, Psychological Conditions, Chest Pain, Anxiety, Emergency Department, Recidivism

INTRODUCTION

Chest pain is 1 of the most common chief complaints evaluated by emergency practitioners.[1] However, the majority of visits are found to be low risk for cardiopulmonary emergencies including acute coronary syndromes after extensive emergency department (ED) evaluations.[2-4] Previous work has found that 25% - 50% of patients presenting with low-risk chest pain have moderate to severe anxiety which often remains undiagnosed in up to 90%.[5-9] This is significant as undiagnosed and untreated anxiety has a negative impact on quality of life, worsens the patient's perceptions of wellness[5,10], and ironically contributes to systemic inflammation[11], which is the underlying pathophysiology of coronary artery disease.[12,13] The validated HEART score is a common acute coronary syndrome (ACS) risk-stratification tool for ED patients with chest pain; patients designated as low risk have a <2% risk of major adverse cardiac events (MACE) in 30 days.[14] Likewise, the validated Hospital Anxiety Depression Scale – Anxiety subscale (HADS-A) has been used as an anxiety screening tool in the ED chest pain population.[7,15] We administered these tools sequentially in a population of patients with low risk chest pain with the objective of determining the prevalence of abnormal anxiety levels (HADS-A ≥8) in a cohort of low-risk chest pain patients and to provide preliminary estimates of the risk of increased healthcare utilization and symptom recurrence over the course of the subsequent 45 days associated with a HADS-A score ≥8. We hypothesized that the prevalence of subjects with HADS-A scores ≥8 would be 30% or greater and that these subjects would display greater ED utilization and chest pain symptom recurrence than subjects with HADS-A scores <8.

METHODS

This was a single-center prospective observational cohort study of patients with low risk chest pain and symptoms of anxiety. This study was approved by the Indiana University School

of Medicine Institutional Review Board (protocol # 1602878994) and written informed consent was obtained from all participants. These results are reported in accordance with STROBE guidelines. Between June 2016 and June 2017, we prospectively collected data on patients presenting with chest pain to Indiana University Health Methodist Hospital, an urban emergency department. This academic center has an annual ED volume of approximately 105,000. Trained research assistants identified potential subjects using the electronic tracking board in the ED. Enrollment occurred Monday through Friday with coverage for 10 hours per day. Inclusion criteria consisted of adult patients (aged 18-70) presenting with a triage nurse-written chief complaint of "chest pain". These subjects were screened for ACS risk status using the validated HEART score. Low risk patients with a score less than 4 corresponding to < 2% risk of MACE were eligible for enrollment.[14] ED faculty and residents provided this information to research assistants in real time. Exclusion criteria included a prior ACS history, traumatic injury, active psychosis or behavioral issues requiring psychiatric monitoring, hemodynamic instability, and potential issues affecting follow up (prisoners, homeless patients, out-of-town residences).

Participating subjects signed a written informed consent statement. Using a standard case report form (available upon request) we collected a number of domains including demographics (age, gender, race, ethnicity, level of education, employment status as well as marital status), past medical history, symptom descriptions, healthcare utilization over the previous 12 months as well as stratification by the HADS-A, which was our primary variable of interest. The HADS depression subscale (HADS-D) was also collected. This information was obtained from both the patient and the electronic medical record (EMR). At 45 days, we followed these patients for outcomes through telephone contact, custom and validated questionnaires, and review of the EMR.

After enrollment, participants were stratified by level of anxiety as indicated by their score on the HADS-A. The population was split into 2 groups: 1 – normal or low anxiety levels (HADS-A score < 8) and 2 – abnormal or high anxiety levels (HADS-A score ≥ 8). The prevalence of abnormal anxiety (proportion of subjects stratified into group 2) was the primary outcome of this study. This score was calculated at both enrollment as well as 45-day follow up in order to determine whether the abnormal anxiety symptoms identified persist beyond the ED evaluation. The HADS is a prospectively validated self-report scale made of 14 items to screen for mood disorders in non-psychiatric outpatient settings. There are 2 subscales (anxiety and depression) consisting of 7 items each. The total score from each subscale ranges from 0-21 with scores ≥ 8 indicating borderline or abnormal anxiety/depression. This tool has been prospectively validated in the Emergency setting and has been found to be reliable with a Cronbach's α=0.83 indicating excellent internal consistency of the anxiety subscale.[7,15,16] Both providers and patients were blinded to HADS-A scores.

After stratification via the HEART score but before approach of low-risk patients, clinicians (faculty and residents) were presented with a 100-mm visual analog scale (VAS) and asked: "What is your level of suspicion that this patient's chest pain is caused by stress or anxiety?" The physician was instructed to place a vertical mark on the line corresponding to their level of suspicion. These marks were measured in millimeters and directly converted to percentages. These clinicians were aware their assessment was being used for research purposes.

At enrollment, patients were asked what they thought the cause of their chest pain was and answer choices included: 1. heart problems, 2. heartburn or stomach problems, 3. lung problems, 4. problems with the muscles or bones of chest wall, 5. stress/anxiety or 6. other cause. With regard to healthcare utilization, from the EMR, we documented the number of ED visits

regardless of reason in the previous 12 months as well as in the 30 days post enrollment. Additionally, we collected the patient's ED disposition at their enrollment visit (discharge, overnight observation, admission) as well as up to 3 documented discharge diagnoses. Similarly, the EMR was reviewed for intervening 30-day ED returns, overnight observations, admissions and their disposition. At 45-day phone follow-up, patients were asked if they had recurrence of their chest pain, and if that recurrence was daily, occasionally/several times per week, or never.

Based on prior work we estimated that approximately 30% of low risk chest pain patients would score ≥8 on the HADS-A, indicating abnormal anxiety.[17] Thus, with a 95% confidence level and a 15% confidence interval width, the required sample size was estimated to be 154. Data were analyzed using STATA 14.2 (Stata Corp., College Station, Texas). T-tests were utilized to compare means for continuous outcome variables. Categorical outcome variables were assessed with chi-square or Fisher's exact test as appropriate. At study inception, it was decided that the prevalence of anxiety would be equal to the proportion of subjects with a HADS-A score ≥8. We used McNemar's test to evaluate initial and follow-up HADS. We report the number of subjects with missing data for each outcome assessed and those subjects are not included in that particular analysis. The Indiana University – Purdue University Indianapolis Office of the Vice Chancellor for Research had no role in the study design, collection, analysis, or writing of this manuscript. Participants were eligible to receive a total of $80 for completion of the ED interview and as well as the follow-up questionnaires.

RESULTS

Four hundred forty-two patients were screened for enrollment (Figure 1). Of these, 80 patients (18.1%) were not eligible due to a HEART score > 3 and thus not considered low risk, 182 (41.4%) declined enrollment (demographics provided in appendix 1), 12 (2.7%) were

discharged prior to being approached for the study, and 5 (1.1%) were unable to complete the study tasks. Ultimately 163 (36.8%) subjects met enrollment criteria and gave informed consent. Demographics and ultimate disposition of enrolled subjects are presented in Table 1. Eighty-seven (53%) had normal anxiety levels (Group 1) with a score <8 while the remaining 76 (47%) subjects (Group 2) had abnormal or high anxiety levels (HADS-A ≥ 8). There were no statistically significant differences between patients stratified into these 2 groups based on age, gender, race, marital status, education, or employment status.

ED provider VAS scores (gestalt) for the suspicion of anxiety correlated significantly with HADS-A scores (Spearman's rho = 0.43, P<0.001). Mean VAS scores were also significantly different and concordant with anxiety group stratification (low anxiety - 28% vs. high anxiety - 43%) as shown in Table 1. Overall, 58 subjects (39%) indicated a belief that their chest pain symptoms were caused by stress or anxiety at enrollment and 44/58 (76%) of these were in the high anxiety group (p<0.01). This belief regarding anxiety and symptoms remained significant at 45-day follow-up as 28/41 (68%) subjects who indicated they believed anxiety was the cause of their symptoms at follow-up were group 2 participants (Appendix 2).

The clinician marked a ≥50% suspicion of anxiety on the VAS in 28 of the 58 patients (48%) who also indicated belief that stress or anxiety caused his or her chest pain. Clinicians also marked a ≥50% suspicion of anxiety in 34 (45%) high anxiety subjects compared to 20 (23%) stratified to low anxiety (p=0.005). Finally, there were 44 (58%) high anxiety subjects who ascribed their symptoms to anxiety and the clinician also marked ≥50% suspicion of anxiety in 22 patients (50%) in this group (p=0.008) with a kappa statistic 0.21 (95% CI= 0.06 to 0.37). The HADS-A was again assessed at follow-up and the majority of subjects in each group maintained their group classification – group 1 (73%) and group 2 (76%) (see Figure 2). This

change at follow-up assessment shown in figure 2 was not significantly different (McNemar's Test, p-value 0.64).

Comorbid depression, had an overall moderate positive correlation between HADS-A and HADS-D scores (Pearson's R of 0.519). Abnormal depression scores were found in 30% of all subjects and 35 (45%) had both abnormal anxiety as well as depression. Mean depression scores were significantly higher in the high anxiety subgroup compared with the low anxiety subgroup (Difference = 3.64, 95% CI 2.17 to 5.10).

Discharge diagnoses (primary through tertiary) were obtained for 162 patients. Primary diagnosis was categorized and examined by HADS-A score (Table 2). Chest pain NOS (including chest pain unspecified, chest pain, and other chest pain) was the primary discharge diagnosis for 69% of patients. Five subjects (3%) received an anxiety-related diagnosis at least secondarily and 4 of those were in group 2. Nineteen (14%) patients received a stress echocardiography, 10 (7%) received a nuclear stress test, and 3 (2%) underwent cardiac catheterization. The frequency of cardiac testing did not differ between groups. There were 2 patients (1.2%) diagnosed with Acute Coronary syndrome, both of whom were in the low anxiety group and were admitted. A complete breakdown of specific primary diagnoses is shown in Appendix 3.

To examine the potential cause and effect relationship between anxiety and recurrent ED use, we measured ED visits both retrospectively and prospectively. Figure 3a shows the distribution of return ED visits in the 12 months prior to enrollment. Among 306 visits to the ED in the 12 months prior to enrollment, 191 (62%) came from subjects with high anxiety. ED utilization was significantly different and concordant with group stratification when looking at the 105 subjects that had at least 1 ED visit during that time period. Fifty-two percent of subjects

(45/87) in the low anxiety group had at least 1 ED visit during the previous 12 months compared with 79% (60/76) in the high anxiety group for a proportional difference of 27% (95% CI for difference -0.41 to -0.13).

Regarding ED recidivism after enrollment, overall, there were 72 return ED visits within 30 days, 56 (78%) of which were in the high anxiety group (p=0.001) (Figure 3b). The relative risk for anxiety being associated with at least 1 30-day ED return visit was 2.6 (95% CI 1.4 to 4.7) and this relative risk increased to 9.1 (95% CI 2.2 to 38.6) for 2 or more ED return visits. There was no difference in 30-day observation stays or admissions between groups (Figures 3c and 3d). At 45-day follow-up, 109 subjects provided information about the recurrence of their chest pain as described above. We analyzed the provided answers by anxiety group stratification comparing no recurrence versus at least occasional recurrence. Overall, 58% of the cohort reported at least occasional recurrence of their chest pain (Figure 4). Twenty-five low anxiety subjects (47%) had recurrent chest pain compared to 38 (68%) of high anxiety subjects for a difference of 21% (95% CI for difference 0.01 to 0.41). Three subjects reported daily recurrence and were in the low anxiety group.

DISCUSSION

This work focuses on quantifying the importance of psychosomatic contributors such as panic or anxiety disorders to the chest pain symptom complex, a constellation of measureable and unmeasurable factors which manifest in varying degrees of intensity and is defined by angina-like pain in the absence of coronary stenosis.[8,9,18,19] Measureable factors include the perception of pain, fear, anxiety, and patient desire for an explanation of the problem. Currently unmeasured factors include the influence of anxiety as a symptom amplifier, coping skills, personality traits, and the future risk of cardiac injury, either from undetected coronary stenosis,

microvascular ischemia, or progression of atherosclerosis. We believe this study represents the first use of the specific 2-step screening process (HEART score + HADS-A) to identify low-risk chest pain subjects with abnormal anxiety as part of their chest pain symptom complex. The main message of this work is that in this cohort of low-risk chest pain subjects, the prevalence of abnormal anxiety symptoms was 47% and this was associated with a high rate of ED recidivism and a low rate of medical diagnoses.

The prevalence of anxiety found in this population (47%) is higher than recent work done by Al-Ani et al, who showed the prevalence of anxiety in their low risk population to be 30%.[20] However, it is quite consistent with the literature at large taking into account a systematic review by Webster et al, which incorporated 9 studies and found the prevalence to be between 21 and 58%.[21] We asked providers to rate their suspicion (gestalt) of current anxiety on the presenting chest pain, whereas the HADS-A asks about anxiety symptoms over the past 2 weeks. Without the benefit of the HADS-A results, provider gestalt correlated significantly with those values, as mean provider VAS scores for the suspicion of anxiety was significantly higher in the group stratified to have abnormal anxiety levels. Surprisingly, subjects also self-identified anxiety as the cause for their symptoms at rates that were concordant with their anxiety group classification. A striking observation is that over half the individuals in the high anxiety group (58%) ascribed their chest pain symptoms to anxiety when asked and given a list of possible causes. This is much higher than the 8% of patients who self-identified anxiety as likely the cause for their chest pain symptoms as assessed via an open-ended question at follow-up regarding the perceived cause of their chest pain.[22] This is quite interesting as the individuals in our study made this determination while they were still in the ED undergoing current evaluation of their chest pain. Reliable self-report has been identified as a key feature of future DSM-V anxiety disorder.[23,24]

The fact that subjects were willing to disclose this thought process while still undergoing evaluation demonstrates self-awareness and may indicate that simply asking patients what they attribute their symptoms to yields valuable information in this population.

Our data allow the hypothesis that patient anxiety may drive them towards low value healthcare utilization. The rates of ED use were 2-fold higher in patients with HADS-A scores ≥8 both before and after enrollment, and these differences were not explained by illness acuity or medical diagnoses. Additionally, three-quarters of the enrolled population had persistent, problematic levels of anxiety at follow up, suggesting more than a "white coat" phenomenon. It is unclear if these subjects had generalized anxiety or specifically cardiac related hypervigilance leading to anticipatory anxiety when experiencing sensations associated with their chest pain. The latter can also be classified as interoceptive fear conditioning which has been shown to be associated with high longitudinal healthcare utilization despite the chest pain symptoms over time.[25] Additionally, abnormal anxiety and interoceptive symptomatology are associated with increased vigilance and fear of cardiopulmonary sensations.[26,27] It may be possible that the development of anxiety or "post-traumatic" stress response described in patients after life threatening events like ACS may also affect predisposed individuals after cardiac evaluation.[28] In any case, there is strong evidence showing that low risk or non-cardiac chest pain associated with anxiety and other psychological comorbidities are associated with more frequent medical visits than community norms.[25,29] It appears that normal test results and reassurance are not enough to allay the residual anxiety and persistent belief in a cardiac cause of their chest pain symptoms.[21,30] We suspect these subjects are at risk of falling into a cycle with contributory learned responses of unexplained chest pain, anxiety, and health seeking behavior.

The primary limitation of this work is that the presence of anxiety symptoms was assessed using a screening tool, the Hospital Anxiety Depression Scale, but subjects did not undergo a formal diagnostic psychiatric evaluation using accepted tools such as the Structured Clinical Interview for DSM Disorders (SCID). However, as a practical consideration, a formal evaluation would rarely occur in the ED and that some combination of provider gestalt + anxiety symptom severity screening tool and/or patient self-report is probably sufficient to initiate referral for further anxiety evaluation. Further, the HADS-A has been shown to perform well as a screening tool assessing symptom severity and a case-finder for anxiety when the appropriate cutoffs are used.[16] Secondly, this was a convenience sample of subjects at a single hospital site and does not account for the patient population who would have presented either on nights or weekends, which may have had different characteristics. Additionally, follow up chart review was limited to a single hospital system which may have missed recurrent visits to other hospitals not within the system. ED visits were also included regardless of reason for visit thus not all may have been due to chest pain. However, it is informative that the number of visits were significantly different when stratified by anxiety symptom severity. Chest pain recurrence is quite subjective and prone to recall bias especially given the 6-week period of time we assessed.

Using a simple 2-step screening process in chest pain patients in the ED we identified a subpopulation with abnormal and largely persistent anxiety symptoms with a high rate of ED recidivism and recurrent symptoms. Thus, despite the primary imperative of an ED provider to identify threats to life, we posit that early identification using a screening process such as this in addition to appropriate referral may break this cycle and affect the trajectory of their care. To ensure generalizability, next steps should include confirmation of these outcomes in a larger cohort of patients with different sociodemographic characteristics at multiple sites.

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Appendix 1
Demographics of participants who declined enrollment.

Variable	Patients who declined enrollment
Age, mean (SD)	47.8 ± 10.6
Female	105 (59%)
Male	74 (41%)
African American	81 (46%)
White	90 (51%)
Asian	1 (0.6%)
Hispanic	5 (2.8%)
Other	1 (0.6%)
Provider suspicion of anxiety VAS, mean (95% CI)	34 (30, 38)
Disposition	
Admit inpatient	9 (5%)
Admit observation	17 (10%)
Discharged	149 (85%)
Left AMA	0 (0%)

Appendix 2
Patient belief regarding cause of chest pain at 45-day follow-up

Variable	All patients	Group 1 HADS-A score < 8	Group 2 HADS-A score ≥ 8	P-value
Stress or anxiety*	41 (38%)	13 (25%)	28 (50%)	0.006
Non-stress or anxiety*	68 (62%)	40 (75%)	28 (50%)	
Heart	15 (14%)	8 (15%)	7 (13%)	
Lung	6 (6%)	2 (4%)	4 (7%)	
Heartburn/Stomach	15 (14%)	12 (23%)	3 (5%)	
Muscles or bones	11 (10%)	6 (11%)	5 (9%)	
Other	21 (19%)	12 (23%)	9 (16%)	

*Groups compared for test of significance

Appendix 3
Full primary discharge diagnosis by group

Diagnosis	All patients	Group 1 HADS-A score < 8	Group 2 HADS-A score ≥ 8

Abdominal pain	1 (0.6%)	1 (1%)	0 (0%)
Angina	1 (0.6%)	1 (1%)	0 (0%)
Anorexia	1 (0.6%)	0 (0%)	1 (1%)
Arm pain	1 (0.6%)	1 (1%)	0 (0%)
Atherosclerotic heart disease	1 (0.6%)	1 (1%)	0 (0%)
Bronchitis	1 (0.6%)	1 (1%)	0 (0%)
Chest pain	40 (26%)	20 (23%)	20 (27%)
Chest pain, non-cardiac	2 (1%)	1 (1%)	1 (1%)
Chest pain, unspecified	46 (28%)	29 (33%)	17 (23%)
Chostochondritis	2 (1%)	1 (1%)	1 (1%)
Chronic obstructive pulmonary disease	2 (1%)	1 (1%)	1 (1%)
Epigastric pain	1 (0.6%)	1 (1%)	0 (0%)
Fatigue	1 (0.6%)	0 (0%)	1 (1%)
Gastro-esophageal reflux disease	1 (0.6%)	1 (1%)	0 (0%)
Generalized hyperhidrosis	1 (0.6%)	0 (0%)	1 (1%)
Headache	1 (0.6%)	0 (0%)	1 (1%)
Hypertension	4 (3%)	2 (2%)	2 (3%)
Intestinal obstruction	1 (0.6%)	1 (1%)	0 (0%)
Low back pain	1 (0.6%)	1 (1%)	0 (0%)
Nausea and vomiting	1 (0.6%)	0 (0%)	1 (1%)
Non-pressure chronic ulcer	1 (0.6%)	1 (1%)	0 (0%)
Other chest pain	24 (15%)	7 (8%)	17 (23%)
Other specified anxiety	1 (0.6%)	0 (0%)	1 (1%)
Pericarditis	1 (0.6%)	1 (1%)	0 (0%)
Pleurodynia	1 (0.6%)	1 (1%)	0 (0%)
Precordial pain	17 (11%)	11 (13%)	6 (8%)
Premature depolarization	1 (0.6%)	1 (1%)	0 (0%)
Respiratory failure	1 (0.6%)	0 (0%)	1 (1%)
Shortness of breath	4 (3%)	2 (2%)	2 (3%)
Thoracic aortic ectasia	1 (0.6%)	0 (0%)	1 (1%)

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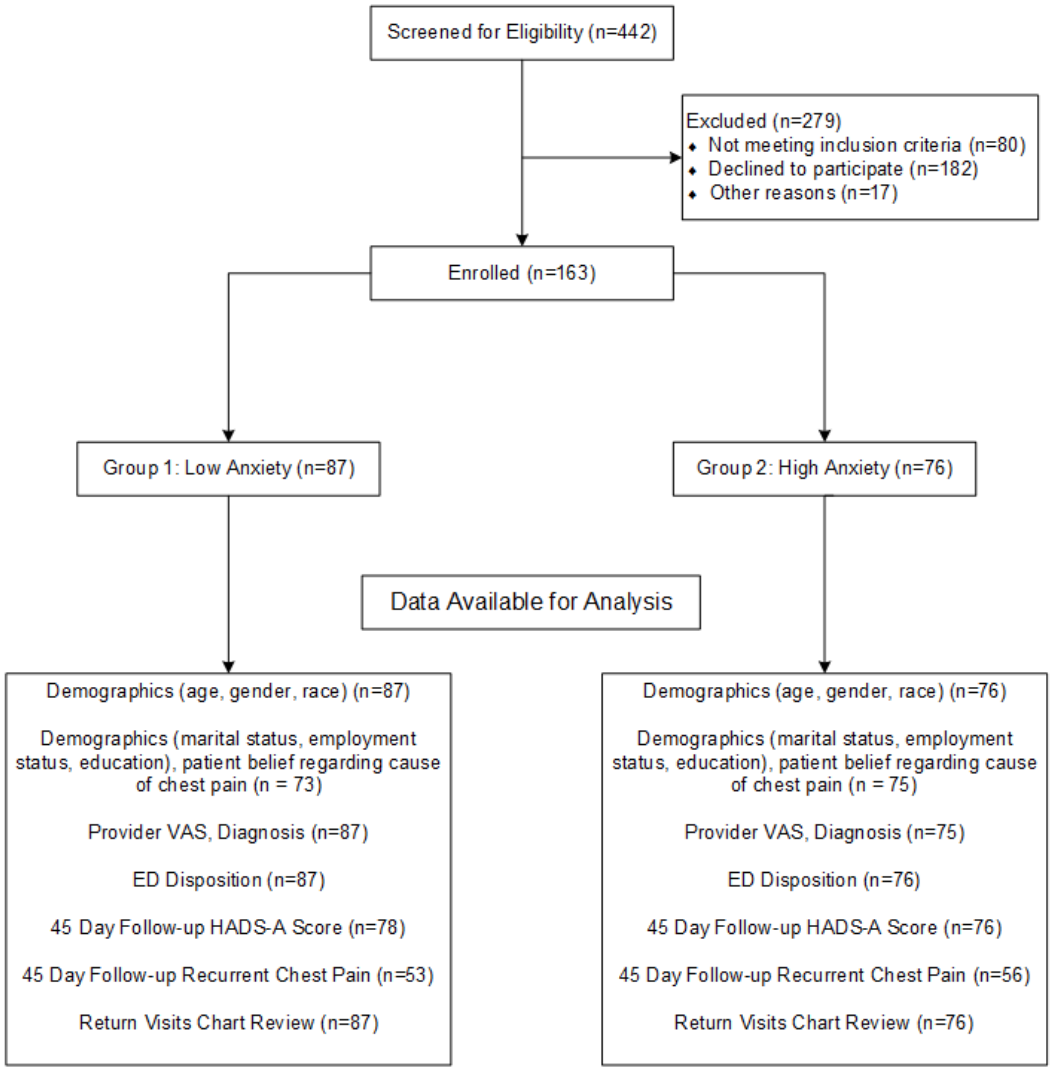
Screened for Eligibility (n=442)
Excluded (n=279)
Not meeting inclusion criteria (n=80)
Declined to participate (n=182)
Other reasons (n=17)
Enrolled (n=163)
Group 1: Low Anxiety (n=87)
Group 2: High Anxiety (n=76)
Data Available for Analysis
Demographics (age, gender, race) (n=87)
Demographics (marital status, employment status, education), patient belief regarding cause of chest pain (n = 73)
Provider VAS, Diagnosis (n=87)
ED Disposition (n=87)
45 Day Follow-up HADS-A Score (n=78)
45 Day Follow-up Recurrent Chest Pain (n=53)
Return Visits Chart Review (n=87)
Demographics (age, gender, race) (n=76)
Demographics (marital status, employment status, education), patient belief regarding cause of chest pain (n = 75)
Provider VAS, Diagnosis (n=75)
ED Disposition (n=76)
45 Day Follow-up HADS-A Score (n=76)
45 Day Follow-up Recurrent Chest Pain (n=56)
Return Visits Chart Review (n=76)

BOTTOM

Figure 1: Flow Diagram of Enrollment. Shows number of subject screened, excluded and ultimately enrolled. Additionally, provides number of participants included in each outcome analyzed.

Abbreviations: emergency department (ED), hospital anxiety depression scale-anxiety subscale (HADS-A), visual analog scale (VAS).

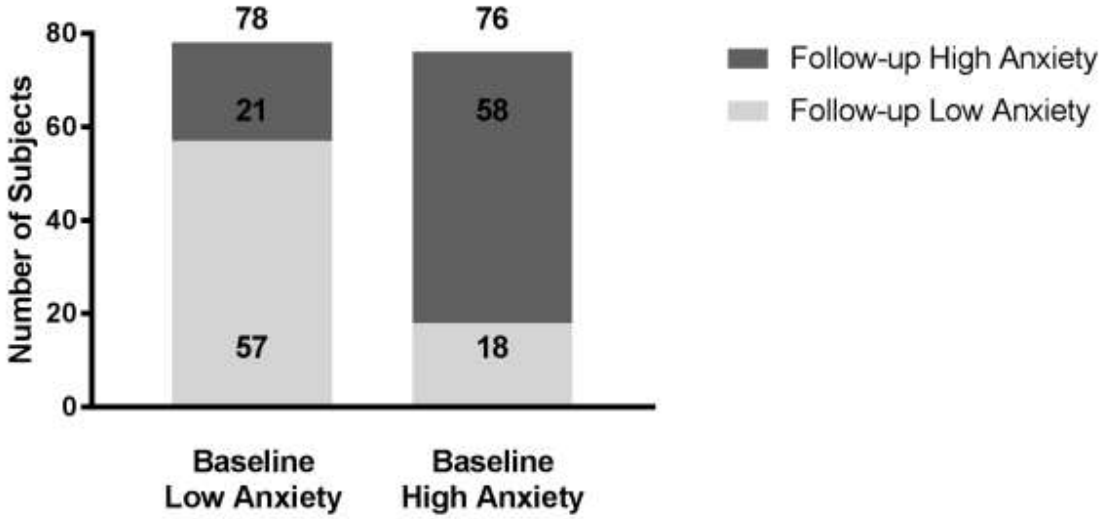

Figure 2: Anxiety level at 45-day follow-up compared to baseline.

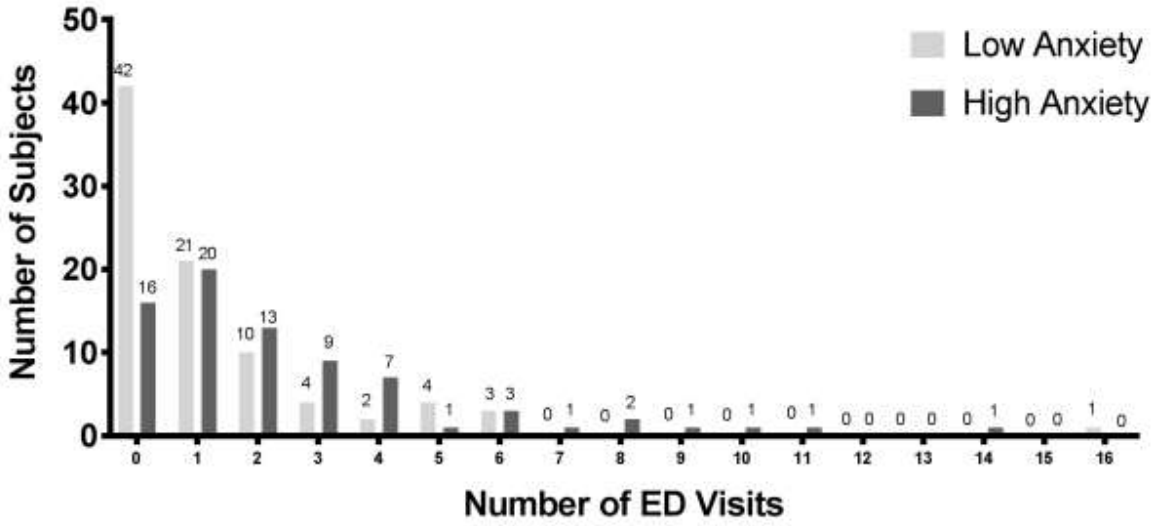

Figure 3a: ED visits in the past twelve months

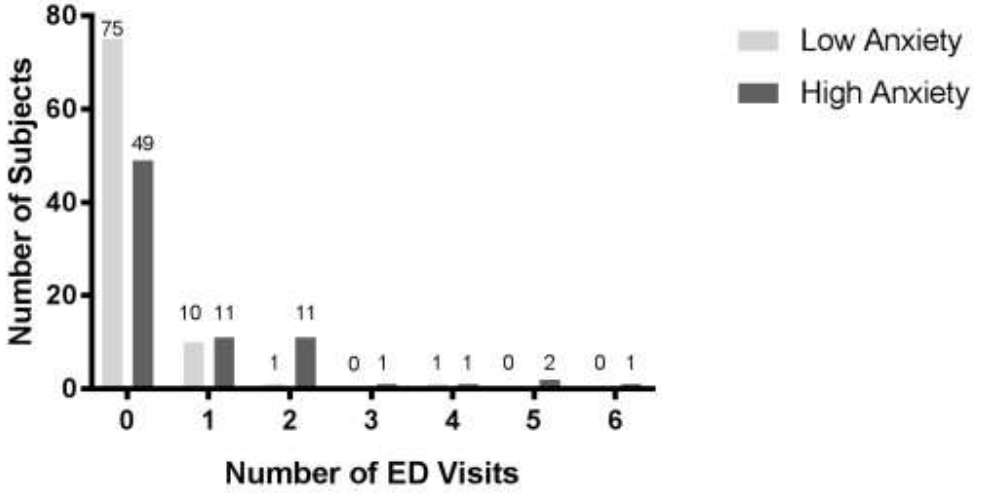

Figure 3b: Return visits to the ED within 30 days.

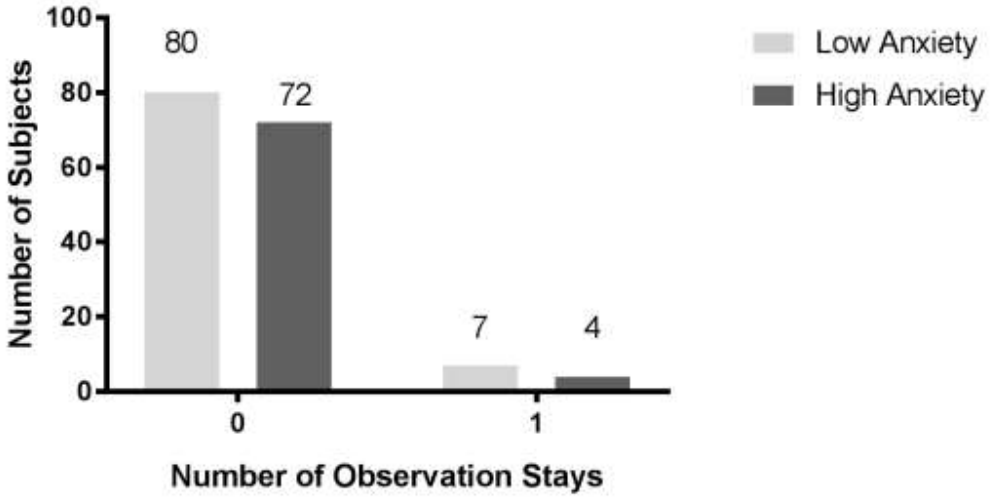

Figure 3c: Number of return visits resulting in an observation admission within 30 days.

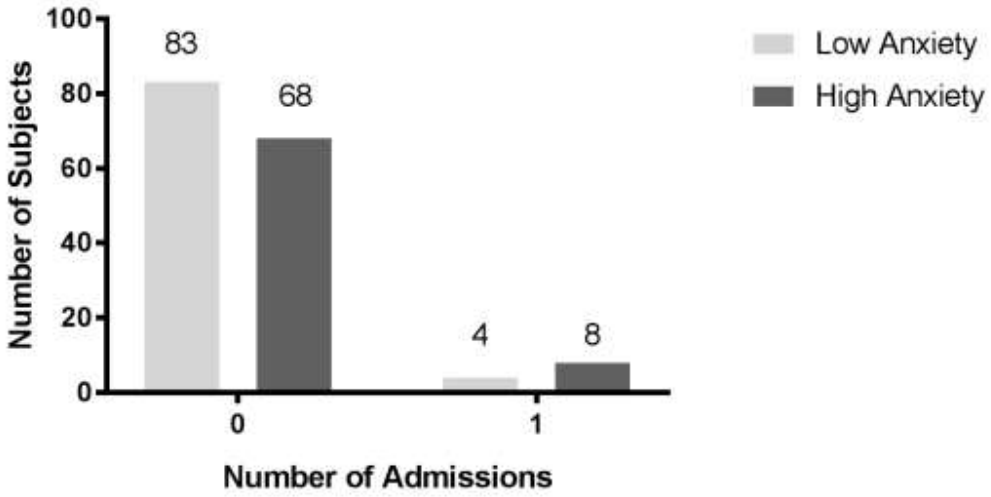

Figure 3d: Number of return visits resulting in an inpatient admission within 30 days.

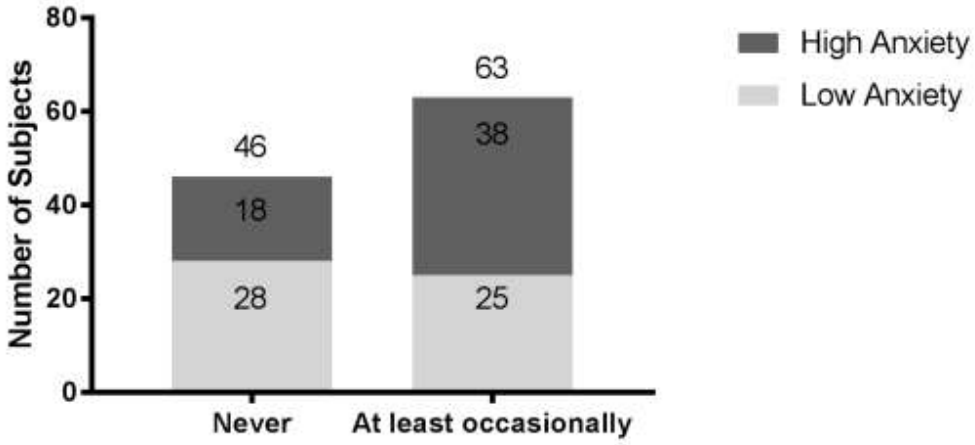

Figure 4: Recurrence of chest pain episodes assessed at 45-day follow-up.

Table 1
Demographics and provider visual analog scale for anxiety suspicion versus patient perception of chest pain cause

Variable	All patients	Group 1 HADS-A score < 8	Group 2 HADS-A score ≥ 8	P-value
Age, mean (SD)	47.4 ± 10.8	48.6 ± 10.6	46.0 ± 10.8	0.13*
Female	111 (68%)	56 (64%)	55 (72%)	0.27
Male	52 (32%)	31 (36%)	21 (28%)	
Black	84 (52%)	44 (51%)	40 (53%)	0.97
White	74 (45%)	40 (46%)	34 (45%)	
Asian	2 (1%)	1 (1%)	1 (1%)	
Hispanic	3 (2%)	2 (2%)	1 (1%)	

Marital status[a]				0.64
Divorced	27 (18%)	14 (19%)	13 (17%)	
Married	47 (32%)	25 (34%)	22 (29%)	
Separated	7 (5%)	2 (3%)	5 (7%)	
Single	63 (43%)	31 (43%)	32 (43%)	
Widowed	4 (3%)	1 (1%)	3 (4%)	
Education[a]				0.25
General Equivalency Diploma	6 (4%)	1 (1%)	5 (7%)	
Graduate/professional	8 (5%)	4 (6%)	4 (5%)	
Graduated college	30 (20%)	19 (26%)	11 (15%)	
High School	41 (28%)	21 (29%)	20 (27%)	
Some college	43 (29%)	21 (29%)	22 (29%)	
Some high school	20 (14%)	7 (10%)	13 (17%)	
Employment[a]				0.13
Disabled	18 (12%)	5 (7%)	13 (17%)	
Full-time	88 (60%)	48 (66%)	40 (53%)	
Part-time	16 (11%)	8 (11%)	8 (11%)	
Retired	6 (4%)	5 (7%)	1 (1%)	
Student, not working	1 (1%)	0 (0%)	1 (1%)	
Student and working	1 (1%)	0 (0%)	1 (1%)	
Unemployed	18 (12%)	7 (10%)	11 (15%)	
Disposition				0.38
Admit inpatient	13 (8%)	6 (7%)	7 (9%)	
Admit observation	15 (9%)	11 (13%)	4 (5%)	
Discharged	132 (81%)	68 (78%)	64 (84%)	
Left Against medical advice	3 (2%)	2 (2%)	1 (1%)	
Provider suspicion of anxiety - Visual Analog Scale, mean (95% CI)	34.9 (30.5,39.3)	27.9 (22.8, 33.0)	43.0 (36.1, 49.9)	<0.001*
Patient belief regarding cause of chest pain				<0.01
Stress or anxiety**	58 (39%)	14 (19%)	44 (59%)	
Non-stress or anxiety**	90 (61%)	59 (81%)	31 (41%)	
Heart	29 (20%)	18 (25%)	11 (15%)	
Lung	10 (7%)	6 (8%)	4 (5%)	
Heartburn/Stomach	12 (1%)	9 (12%)	3 (4%)	
Muscles or bones	11 (7%)	8 (11%)	3 (4%)	
Other	28 (19%)	18 (25%)	10 (13%)	

[a]Missing values for 15 patients
*T-test
**Groups compared for test of significance

Table 2
Primary discharge diagnoses

Diagnosis	**All patients**	**Group 1 HADS-A score < 8**	**Group 2 HADS-A score ≥ 8**	**P-value**
Anxiety related diagnoses Total				
Primary	5	1	4	0.13
Secondary	1	0	1	
	4	1	3	
Final diagnosis by category				0.67

Angina	1 (1%)	1 (1%)	0 (0%)
Coronary artery disease	1 (1%)	1 (1%)	0 (0%)
Chest pain	112 (69%)	57 (66%)	55 (73%)
Hypertension	4 (3%)	2 (2%)	2 (3%)
Other	15 (9%)	9 (10%)	6 (8%)
Respiratory	28 (17%)	17 (20%)	11 (15%)