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An Educational and Skill Building Intervention to Improve Symptom Recognition and Interpretation in Women with Acute Coronary Syndrome: A Pilot Study

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Abstract

Background: The type of symptoms a woman experiences during an acute coronary syndrome (ACS) event influences symptom recognition and interpretation. Women who experience intense, abrupt symptoms are more likely to correctly attribute symptoms to a cardiac etiology and seek care faster than women with less intense, intermittent symptoms.

Objective: A single group pre-post-test design was used to evaluate the feasibility and acceptability of a nurse-delivered education and skill-building intervention designed to improve symptom recognition and interpretation in women with recurrent ACS symptoms.

Methods: Women hospitalized for an ACS event received an individualized education and skill building intervention that was conceptually framed by the investigator's prior research. Three in-person sessions were followed by 2 phone sessions for reinforcement. Outcomes and acceptability were evaluated at close-out (approximately 2 months after the index event).

Results: All but two women approached agreed to participate. Nine of the 10 women enrolled completed all study sessions within an average of 55 days. Mean knowledge scores increased by 7.4% measured by the *ACS Response Index*. Attitudes towards symptom recognition and help-seeking increased by 2.4, while beliefs towards expectations and actions increased by 3.2. The women were pleased with the intervention (satisfaction scores averaging 1.4 on a 4-point Likert Scale with "1" as "strongly agree"; "4" as "strongly disagree"). All women completing the study would recommend it to others.

Conclusion: The nurse-delivered intervention was feasible and acceptable to women in the study. Results support further testing and refinement of the intervention in a longitudinal randomized control study to determine efficacy and sustainability.

Keywords

acute coronary syndrome; education intervention; women; feasibility; treatment delay; nursing

Introduction

Every 40 seconds an American will have a heart attack.¹ In a given year, approximately 35% of those who have a coronary event will die from it.¹ The American Heart Association (AHA) recommends that anyone who thinks they are having symptoms of a heart attack call 9-1-1 immediately.² If treatment is administered within an hour of symptom onset, survival increases.³ Yet despite the clear advantages of timely treatment, many wait a median time of 2.8–3 hours after symptoms begin to seek medical attention.¹ Patient delay, defined as the time from symptom onset to the time of decision to seek medical treatment, is the biggest contributor of total delay accounting for three-quarters of the total prehospital time interval.^{4–6} Women delay longer than men when deciding to seek treatment for heart attack symptoms.^{5, 7–9} One reason for delayed care-seeking by women is that the symptom experiences of women differ from those of men. As highlighted in a recent 2016 AHA Scientific Statement entitled *Preventing and Experiencing Ischemic Heart Disease as a Woman: State of the Science*, women's decisions to seek care for suspected heart attack symptoms directly relate to their symptoms.¹⁰

A majority of past studies using public health messaging to encourage patients with symptoms of suspected heart attack to seek care quickly have failed to significantly reduce prehospital delay time or to increase the use of emergency medical services (EMS). Of the four randomized control trials (RCTs), the Rapid Early Action for Coronary Treatment (REACT) trial was the largest.¹¹ REACT was a 4-year study which randomized 20 cities (10 matched pairs) from 5 geographic areas of the US to intervention or control. The intervention of mass media education through community organizations, public education through mass media and local media, patient education by health professionals, and direct patient education for those known to have a history of or at high-risk for heart disease. Education focused on increasing knowledge of heart attack symptoms and calling EMS for symptoms. Findings showed no significant differences between the intervention and the control group in the proportion of patients receiving reperfusion therapy within 1 hour and 6 hours from symptom onset.

Three other RCTs have been directed towards the individual with or at-risk for heart attack. An RCT published in 1997 included 5,444 adults > 50 years of age who received brief education about heart attack symptoms and the importance of using EMS to seek care promptly through mass media.¹¹ The mass media education was accompanied by direct mailing which included information overcoming fear and denial when symptoms arise and the importance of seeking care quickly. Results revealed that there was no difference in prehospital delay times between the groups. The Patient Response to Myocardial Infarction Following a Teaching Intervention Offered by Nurses (PROMOTION) study ($N=3,522$) targeted individuals who were at high-risk for having heart attack symptoms.¹² The intervention group received a 30 to 40-minute individualized education and counseling

session by a nurse. The intervention was successful in increasing subjects' knowledge, attitudes, and beliefs for those in the intervention group, but a lack of differences between the groups for reduction of prehospital delay or EMS use for the patients who were admitted for suspected heart attack post-intervention. More recently, a RCT conducted in Ireland tested a 40-minute individualized intervention in patients who had been admitted for a heart attack across 5 emergency departments in Dublin.¹³ A nurse delivered education using motivational interviewing was used followed by a telephone session reinforcing the content one month later, and a written reminder of the key aspects of the intervention messages delivered through the mail. Of the 1944 subjects enrolled, 314 were readmitted for heart attack symptoms. The intervention was successful in reducing prehospital delay time in the intervention group compared to the control group (median time of 1.7 versus 7.1 hours; $p < .001$). However, there was no significant difference in EMS use ($p = .51$) and use of nitroglycerin ($p = .06$).

To date, no published studies have tested an intervention specifically targeted for women to improve symptom recognition and interpretation, ultimately reducing the time it takes to seek treatment. As highlighted in the 2017 AHA Scientific Statement entitled *Self-Care for the Prevention and Management of Cardiovascular Disease and Stroke*, a paradigm shift has occurred which moves away from educational interventions focusing on knowledge alone to interventions that incorporate skill development.¹⁴ Although knowledge is a pre-requisite to behavior change, skill development emphasizing tactical skills ("how to") and situational skills ("what to do when") are needed to improve self-care behavior. Symptom monitoring and symptom management, two critical components of self-care, should be practiced on a regular basis to engage patients in self-care activities. Thus, in addition to education, an important aspect of an educational intervention should include skill-building activities through daily symptom monitoring. Therefore, a nurse-delivered education and skill building intervention was developed to improve symptom recognition and interpretation in women with recurrent ACS symptoms.

Purpose and Methods

Study Design, Setting, and Sample

The primary purpose of this single group pre- and post-test pilot intervention study was to evaluate the feasibility and acceptability of the two-session educational intervention in women with a recent ACS event. A secondary purpose was to measure the intervention's effect on knowledge, attitudes, and beliefs related to ACS symptoms.

Participants were recruited from two inpatient cardiac units at a heart center in a not-for-profit, 803-bed state-owned academic medical center in the southeastern U.S. This site provided a heterogeneous sample in terms of age, race, ethnicity, and socio-economic status. Women age 35 years and older who had been hospitalized with a definitive diagnosis of ACS were eligible for the study. Diagnosis of ACS was determined through having symptoms of cardiac ischemia combined with one or more of the following: positive cardiac biomarkers, 12 Lead ECG changes (ST segment elevation, ST depression, and/or T wave inversion in 2 contiguous leads), and/or significant cardiac disease (noted by a cardiac catheterization during their index hospitalization). Women were excluded if they were

experiencing hemodynamic instability (cardiogenic shock, altered cognition, or life-threatening arrhythmias) or were unable to understand spoken English.

Procedures

Institutional review board (IRB) approval was obtained for the study and a limited waiver of HIPAA authorization was provided by the IRB to allow access to medical record information to review eligibility criteria and contact potential subjects. The medical records of potential subjects were reviewed to see if they qualified for the study and to document the time of symptom onset and the time of hospital arrival. If a female patient qualified for the study, the research nurse confirmed with the nurse who was providing direct care to the patient prior to the consent that the patient was hemodynamically stable and pain free before inviting her to participate in the study.

At the time of consent, subjects were asked in advance if they were available for a total of six sessions to be completed within 12 weeks of hospital discharge. Subjects were provided the option of completing the first (baseline data collection) session and the first teaching session before hospital discharge.

After obtaining consent, a baseline assessment was conducted within two weeks of hospital discharge. Two face-to-face (F2F) teaching sessions followed the baseline data collection session at a mutually convenient private setting. Three follow-up visits were conducted at two, four, and six weeks after the second F2F teaching session; two by telephone (at 2 and 4 weeks respectively) and one in-person closeout visit (6 weeks after the second F2F teaching session). Subjects were provided an incentive (gift card ranging from \$20 - \$25) for each session as a thank you for their time. Baseline and follow-up data were collected by the research nurse who provided the teaching sessions. See Figure 1 for a graphic display of the study activities.

The baseline data collection session started with administering three case vignettes to each subject to assess knowledge of ACS symptom recognition, symptom interpretation, and correct actions to take. The case vignettes were developed from the first author's prior qualitative research of women's experiences with ACS symptoms, contained varied symptom presentations.¹⁵⁻¹⁶ After the case vignettes, the *ACS Response Inventory* (to assess knowledge, attitudes, beliefs, and control) and the *Brief Symptom Inventory-Anxiety* subscale (to assess for anxiety) were administered. As with any new education interventional, it was important to measure anxiety pre (before the intervention) and post (at the close out visit) to assess whether anxiety levels changed, potentially as a result of the intervention.

Next, a semi-structured interview was conducted in which subjects were invited to "tell their story" including how they recognized, interpreted and acted on their symptoms. By intention, the baseline knowledge, attitudes, and beliefs (via the *ACS Response Index*) were collected before the women told their story so that realizations often gained through telling their story would not influence their baseline knowledge. Furthermore, the information obtained from the case vignettes and the semi-structured interview were used by the research nurse to identify specific knowledge deficits/misconceptions to include in the subsequent

teaching sessions. The baseline session then concluded with a sociodemographic and clinical data collection form.

Intervention

The research nurse (a registered nurse with expertise in caring for women with ACS) provided the individualized intervention which consisted of education and skills training needed for women to promptly recognize recurrent symptoms, to determine if a pattern of symptoms is developing, and to take appropriate action based on the presence of suspected heart symptoms. The intervention was conceptually developed from grounded theory research conducted by the first author.¹⁵ Based on the conceptual model from the grounded theory work, symptom recognition and symptom interpretation are distinct processes that women with ACS go through when trying to make sense of their symptoms. Symptom recognition begins with bodily cues which serve as the initial illness-related stimuli. Bodily cues are an awareness of a physical change in the body, which for some women accumulate over time. Having symptoms that are present and consistent enough over a period of time allow many women to form a symptom pattern, which helps them with symptom interpretation. However, formulating a coherent symptom pattern for many women does not occur at a single point in time, rather it is part of an unfolding process that requires time, especially if symptoms are intermittent or less intense.

The two F2F teaching sessions, each lasting approximately 60 minutes, included knowledge and skill building activities. The first session focused on symptom recognition and interpretation, while the second session focused on developing an individualized action plan should symptoms arise in the future. Because knowledge of symptom recognition is based on a foundational knowledge of understanding the ACS disease process, this was also included in the first teaching session. Table 1 displays the key components of the intervention.

To facilitate intervention fidelity, the first teaching session included foundational education following a consistent format. A standard pamphlet (*Women, Heart Disease, and Stroke*) and a pocket card (*Know and Go: Heart Attack*), both published by the AHA, were provided to each subject. The education and situation-specific skill-building activities were then individualized to the woman's symptom experience and actions taken during the index ACS event, her comorbid conditions that could mimic ACS symptoms, and specific misconceptions about ACS symptoms and care-seeking responses identified during the baseline assessment. In addition, at the first teaching session each woman was also provided a symptom monitoring notebook with instructions to document recurrent symptoms that they felt to be related to their heart (if any), how long the symptoms lasted, actions taken, and thoughts related to symptoms. The women were instructed to record the information after symptoms had resolved in order to prioritize timely action over documentation.

The second teaching session education followed a consistent format related to timely and appropriate care-seeking behavior for recurrent symptoms. In addition, information from teaching session one was reinforced along with individualized feedback related to recurrent symptoms and actions taken (if applicable) since the last subject contact. In doing so, entries in the symptom monitoring notebooks were reviewed to provide feedback about symptoms,

actions, and thoughts. Furthermore, each teaching session and follow-up session was digitally audio recorded, which was reviewed by an independent researcher to confirm that all essential components of the intervention were included for each subject.

Follow-up Sessions

Three follow-up visits were conducted at two, four, and six weeks after the second F2F teaching session; two by telephone (at 2 and 4 weeks respectively) and one in-person closeout visit (6 weeks after the second F2F teaching session). During the two telephone sessions subjects were asked whether they had experienced any suspected ACS symptoms since the last contact along with what actions (if any) were taken as a result of any symptoms. Subjects were reminded about the importance of symptom monitoring and were asked to review their individualized action plan with the investigator. The *ACS Response Inventory* and the *Brief Symptom Inventory* were administered post-intervention at the close-out session along with a paper/pencil survey on the acceptability of the intervention. By intention, the women completed the acceptability surveys on their own, in a private setting, without the research nurse next to them, and after the incentives were provided to avoid producing socially desirable answers.

Measures

Feasibility was assessed by the number of the sessions that subjects completed in the anticipated 12-week post-hospital discharge period and whether subjects participated in all data-collection activities from baseline to close out of the study. Acceptability were assessed by obtaining input from subjects at the close-out session. The survey started with four open-ended questions (i.e. the most important things learned from the study, what they liked best (and least) about participating in the study, and what aspects of the intervention, if any, could be left out if needed). Subjects were then asked to rate perceptions related to satisfaction on a Likert-type response rating scale ranging from “1” (strongly agree) to “4” strongly disagree). Seven statements included items about broad satisfaction with the intervention, the delivery mode, duration, and frequency of the study sessions, resources and activities provided, and whether they would recommend the study to other women.

ACS Response Index and Brief Symptom Inventory

Knowledge, attitudes, and beliefs about ACS symptoms were measured using the *ACS Response Index*,¹⁷ which included: a) four knowledge subscales of 21 dichotomous (yes/no) items for symptoms of ACS (stereotypical Symptom raw scores range 0–11; Other Common Symptoms 0–4; Incorrect Symptoms 0–3; and Stroke, not ACS Symptoms 0–3), b) two attitudes subscales of 5 items measuring symptom recognition and help seeking to which patients respond on a 4-point Likert-type scale anchored with 1 (not at all) to 4 (very sure) (Symptom recognition raw scores range 0–3; Help-seeking 0–2), and c) two beliefs subscales of 7 items measuring expectations and actions (Expectations raw scores range 0–4; Action 0–3), also rated on a 4-point Likert-type scale. Researchers have commonly rescaled overall knowledge scores to 0–100% answering correct.^{13, 18–19} The ACS Response Index have demonstrated reliability and validity in prior studies (range of alpha = .71 to .82).¹⁷

Anxiety was measured by the *Brief Symptom Inventory* (BSI) anxiety subscale. Total scores theoretically range from 0 to 24, with higher scores indicating more anxiety. Reliability and validity have been reported previously in ACS educational intervention studies (range of $\alpha = .71$ to $.85$; range of test-retest reliability = $.68$ to $.91$).^{20–21}

Data Analysis

Descriptive statistics were used to assess feasibility (defined as completion of at least $> 80\%$ of intervention sessions within the anticipated 12-week [84 days] post hospital discharge period and $> 80\%$ rate of data collection at baseline and follow-up). Descriptive statistics (mean scores along with their standard deviations (*SDs*)) were used to determine average levels of satisfaction. Content analysis was used to analyze the feedback from open-ended question responses related to acceptability and helpfulness of the intervention. Paired *t*-tests of Wilcoxon signed-rank tests (if *t*-test assumptions not satisfied) were used to determine whether subjects had higher knowledge, attitudes, and beliefs at the close-out visit as compared to baseline. A stepwise Bonferroni adjusted *p*-value $< .05$ for knowledge, attitudes, and beliefs outcomes was considered statistically significant.²²

Results

Sample

A total of twelve women were approached to voluntarily participate in the study. Two women declined participation. Reasons the women gave for not participating included an inability to committ to the study schedule due to a traveling work schedule (one woman) and hearing difficulty which interefered with the telephone sessions (second woman). Thus a total of ten women hospitalized for an ACS event were enrolled into the study. All ten women enrolled had a confirmed MI evidenced by a positive cardiac biomarker; two of the ten women had ST segment elevation MI on their ECG. The symptom to door time for the women ranged from 0.3 to 31.4 hours with a median symptom-to-door time of 4.4 hours.

The women's ages ranged from 45–65 years ($M 57.7$; $SD 7.0$). Two women were African American and eight were Caucasian. Six women lived with someone else (five with their spouse; three with adult children or grandchildren). The remaining four women lived alone. Eight of the 10 participants had a high school education or beyond ($M 12.7$ years of education; $SD 2.9$). Nine of the 10 women disclosed their annual household income, which was well distributed (two women had less than \$ 20,000; five reported \$ 20–39,999; one with \$40,000–59,999; and one woman \$60–79,999). All participants had some type of medical coverage, either Medicare ($n = 4$), private insurance ($n = 5$), social security/Medicaid ($n = 1$), or a combination of these. Six women were retired ($n = 2$) or disabled ($n = 4$); four were working either full time ($n = 3$) or in a part time ($n = 1$).

Feasibility

One of the ten women enrolled withdrew from the study after the baseline data collection session when she was notified from her cardiologist that she needed to undergo coronary artery bypass surgery. All of the remaining nine women completed all teaching and follow-up sessions including all data collection during these time points. The days from hospital

discharge to baseline assessment ranged from –3 days to 22 days; median 4.0 days ($M4.9$; $SD6.5$). Days from hospital discharge to completion of the study ranged from 47 to 71 days; median: 55 days ($M58.7$ days; $SD9.5$ days).

Acceptability

The nine women who completed the study were pleased with the intervention with satisfaction scores averaging 1.4 (on a 4-point Likert Scale with “1” as “strongly agree”; “4” as “strongly disagree”). Tables 2–4 display participant ratings of satisfaction, perception of skills gained from the intervention, and a summary of participants’ responses to the open-ended questions, respectively.

Analysis of the open-ended questions about how to improve the intervention revealed two suggestions; one related to the delivery mode of the intervention and the other related to the resources provided for skill building activities. The first suggestion was to convert the second teaching session to a telephone session to reduce the number of face-to-face sessions. The second suggestion was to include advance organizers (a list of symptoms and check off boxes) in the symptom monitoring notebooks for tracking symptom patterns and documenting actions taken to help facilitate recall of the information when communicating with their health care providers.

Knowledge, Attitudes, Beliefs and BSI Scores

As measured by the *ACS Response Index* mean knowledge scores increased by 7.4% ($M76.2$ at pre-intervention as compared to 83.6 post-intervention, $p = .056$). Attitudes towards symptom recognition and help-seeking increased by 2.4 on average, most notably in the symptom recognition component ($M8.2$ to 9.7, $p = .020$). Beliefs towards expectations and actions increased by 3.2 on average ($M19.9$ at pre-intervention as compared to 22.6 post-intervention, $p = .012$).

As measured by the *Brief Symptom Inventory* mean anxiety scores did not significantly change from pre-intervention to post-intervention ($M1.0$ to 1.6, $p = .22$). Table 5 displays the change in pre- versus post-intervention knowledge, attitude, beliefs, and BSI scores.

Discussion

This nurse-delivered education and skill building intervention was delivered for the first time in women status post an ACS event. The results indicated that the intervention was feasible and acceptable to the women in the study. Ninety percent of the women in the study completed the complete intervention sessions within the 12-week time frame and provided baseline and follow-up data. The median number of days from hospital discharge to study completion was much shorter than anticipated (55 days as opposed to the up to 84 days allowed). This was primarily due to request by subjects to have their first and second teaching sessions be scheduled “as soon as possible”. With the exception of one subject, all of the teaching sessions were conducted in the women’s homes (within a one hour’s drive from the hospital) to overcome any transportation issues and accommodate the women’s schedules. Furthermore, all nine women who completed the study indicated that they would encourage other women to participate in a future study such as this.

Mean knowledge, attitudes, and beliefs about ACS symptoms improved after the intervention as compared to baseline. This is important as the first step for any educational intervention is to change knowledge and skills. Results from this one-group pretest/posttest pilot study showed improvement in *ACS Response Index* subscales, where standardized mean differences (SMD) ranged from -0.185 to $+0.789$ and correlations of scores (r) from -0.282 to 0.496 . These differences are comparable to the examined effects of interventions by McKinley et al.¹⁹ and O'Brien et al.¹⁸ on *ACS Response Index* scores with follow-up at 3 months (SMDs of 0.055 to 0.390). The *ACS Response Index* subscale scores are emphasized in the current study because they are supported by construct validity via factorial validity based on the original analyses from Riegel et al.¹⁷

As with any educational intervention being tested for the first time, assessment of unanticipated consequences should be done. Thus, it is important to note that anxiety did not significantly increase between pre- and post-intervention.

Limitations

This was a pilot study with one group in a small sample of women. Moreover, the same registered nurse delivered the intervention and collected the baseline and follow-up data which may have introduced a threat to validity (Hawthorne Effect). Thus, a larger full-scale study with a control group is needed to validate the effects of the intervention on the outcomes over time. However, these findings are promising that the intervention was feasible and acceptable to women who have experienced an ACS event.

Implications for Future Research, Practice, and Policy

As with other educational intervention studies to decrease patient delay in seeking care for suspected ACS symptoms, a change in knowledge, attitudes, and beliefs is a prerequisite to behavior change. This intervention went beyond those factors, uniquely targeting women, to add a skill-building component, plus practice, to measure skill acquisition. The mechanism to behavior change is different in this intervention as compared to previous studies aimed at decreasing prehospital delay. This study was a first step for a new intervention to establish the mechanism before moving on to larger studies. Future larger studies should extend outcomes of the intervention to determining adherence to the intervention, namely whether the women document recurrent symptoms in their symptom monitoring notebooks and take appropriate action to seek medical attention should ACS symptoms arise. In addition, the time of follow-up should extend beyond two months to determine the short-term and long-term impact of the intervention (e.g. whether knowledge, attitudes, and beliefs about ACS symptoms as well as adherence to the intervention fade over time).

In relation to clinical practice, this education and skill building intervention was delivered by a registered nurse with expertise in caring for women with ACS. This underscores the importance of the registered nurse in educating patients post-ACS event. As in this study, after the baseline data assessment, the first (of two) teaching sessions generally lasted 45 minutes to one hour, which for some was delivered prior to hospital discharge. Thus, the proposed intervention is translatable to the current health care system. It is reasonable that

every woman diagnosed with ACS have one F-2-F counseling session with a registered nurse and a second (follow-up) teaching session by telephone (as suggested by the women in this study). This is consistent with what many health care systems offer through nurse navigators or case managers. However, the mechanism behind the proposed educational intervention is different from current education programs in that the skill-building component and practice was added.

In relation to clinical practice guidelines, the intervention tested in this pilot study is consistent with recommendations from the *ACC/AHA Guideline for the Management of Patients with Non-ST-Elevation Acute Coronary Syndromes*² in that, before hospital discharge, all patients with ACS should be informed about symptoms of worsening ischemia and should be given verbal and written instructions about *how* and when to seek emergency care for those symptoms. In addition, consistent with the ACC/AHA guideline, the intervention includes education and skill building to help patients recognize a change of pattern (or severity) of angina, suggesting worsening ischemia, indicating a need to contact their clinician.

Conclusion

Outcomes and acceptability of a nurse-delivered education and skill building intervention were evaluated at a close out visit approximately 2 months after the index ACS event. Nine of the 10 women enrolled completed all study sessions and data collection within an average of 55 days, sooner than anticipated. In addition, the women were highly pleased with the intervention. These findings indicate that the intervention was feasible and acceptable to the women in the study. Results support further testing and refinement of the intervention in a longitudinal randomized controlled trial to determine efficacy and sustainability of the intervention.

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References

1. Benjamin EJ, Virani SS, Callaway CW, et al.; on behalf of the American Heart Association Council on Epidemiology and Prevention Statistics Committee and Stroke Statistics Subcommittee. Heart disease and stroke statistics—2018 update: a report from the American Heart Association. *Circulation*. 2018;137:e67–e492. DOI: 10.1161/CIR.0000000000000558. [PubMed: 29386200]
2. Amsterdam EA, Wenger NK, Brindis RG, et al. 2014 AHA/ACC guideline for the management of patients with non-ST-elevation acute coronary syndromes: executive summary: A report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. *Circulation*. 2014;130(25):2354–2394. doi:10.1161/CIR.0000000000000133. [PubMed: 25249586]
3. Simoons ML, Serruys PW, van den Brand M, et al. Early thrombolysis in acute myocardial infarction: limitation of infarct size and improved survival. *J Am Coll Cardiol*. 1986; 7(4): 717–28. [PubMed: 2937825]

4. Rasmussen CH, Munck A, Kragstrup J, Hagfelt T. Patient delay from onset of chest pain suggesting acute coronary syndrome to hospital admission. *Scand Cardiovasc J*. 2003; 37(4):183–6. [PubMed: 12944204]
5. Moser DK, Kimble LP, Alberts MJ, et al. Reducing delay in seeking treatment by patients with acute coronary syndrome and stroke: a scientific statement from the American Heart Association Council on cardiovascular nursing and stroke council. *Circulation* 2006; 114: 168–82. [PubMed: 16801458]
6. Thuresson M, Jarlöv MB, Lindahl B, Svensson L, Zedigh C, Herlitz J. Thoughts, actions, and factors associated with prehospital delay in patients with acute coronary syndrome. *Heart Lung*. 2007;36(6):398–409. doi:10.1016/j.hrtlng.2007.02.001. [PubMed: 18005801]
7. Diercks DB, Owen KP, Kontos MC, et al. Gender differences in time to presentation for myocardial infarction before and after a national women's cardiovascular awareness campaign: a temporal analysis from the Can Rapid Risk Stratification of Unstable Angina Patients Suppress ADverse Outcomes with Early Implementation (CRUSADE) and the National Cardiovascular Data Registry Acute Coronary Treatment and Intervention Outcomes Network-Get with the Guidelines (NCDR ACTION Registry-GWTG). *Am Heart J*, 2010; 160 (1): 80–877 e3. doi: 10.1016/j.ahj.2010.04.017. [PubMed: 20598976]
8. Bangalor S, Fonarow GC, Peterson ED, et al., Get with the Guidelines Steering Committee and Investigators. Age and gender differences in quality of care and outcomes for patients with ST-segment elevation myocardial infarction. *A J Med* 2012 125 (10): 1000–1009. doi: 10.1016/j.amjmed.2011.11.016.
9. Nguyen HL, Saczynski JS, Gore JM, Goldberg RJ. Age and sex differences in duration of prehospital delay in patients with acute myocardial infarction: a systematic review. *Circ Cardiovasc Qual Outcomes*. 2010; 3: 82–92. Doi: 10.1161/CIRCOUTCOMES.109.884361. [PubMed: 20123674]
10. McSweeney JC, Rosenfeld AG, Abel WM, et al. Preventing and experiencing ischemic heart disease as a woman: State of the science: A scientific statement from the American Heart Association. *Circulation*. 2016;133(13):1302–1331. doi:10.1161/CIR.0000000000000381. [PubMed: 26927362]
11. Luepker RV, Raczynski JM, Osganian S, et al. Effect of a community intervention on patient delay and emergency medical service use in acute coronary heart disease: The Rapid Early Action for Coronary Treatment (REACT) Trial. *JAMA*. 2000;284(1):60–67. [PubMed: 10872014]
12. Meischke H, Dulberg EM, Schaeffer SS, Henwood DK, Larsen MP, Eisenberg MS. "Call fast, Call 911": A direct mail campaign to reduce patient delay in acute myocardial infarction. *Am J Public Health*. 1997;87(10):1705–1709. [PubMed: 9357360]
13. Dracup K, McKinley S, Riegel B, et al. A randomized clinical trial to reduce patient prehospital delay to treatment in acute coronary syndrome. *Circ Cardiovasc Qual Outcomes*. 2009;2(6):524–532. doi:10.1161/CIRCOUTCOMES.109.852608. [PubMed: 20031889]
14. Mooney M, McKee G, Fealy G, O' Brien F, O'Donnell S, Moser D. A randomized controlled trial to reduce prehospital delay time in patients with acute coronary syndrome (ACS). *J Emerg Med*. 2014;46(4):495–506. doi:10.1016/j.jemermed.2013.08.114. [PubMed: 24411656]
15. Davis LL, Mishel M, Moser DK, Esposito N, Lynn MR, Schwartz TA. Thoughts and behaviors of women with symptoms of acute coronary syndrome. *Heart Lung*. 2013;42(6):428–435. doi: 10.1016/j.hrtlng.2013.08.001. [PubMed: 24011604]
16. Davis LL. A qualitative study of symptom experiences of women with acute coronary syndrome. *J Cardiovasc Nurs*. 2017; 32(5): 488–495. doi: 10.1097/JCN.0000000000000381. [PubMed: 27870722]
17. Riegel B, McKinley S, Moser DK, Meischke H, Doering L, Dracup K. Psychometric evaluation of the Acute Coronary Syndrome (ACS) Response Index. *Res Nurs Health*. 2007;30(6):584–594. doi: 10.1002/nur.20213. [PubMed: 18022812]
18. O'Brien F, McKee G, Mooney M, O'Donnell S, Moser D. Improving knowledge, attitudes and beliefs about acute coronary syndrome through an individualized educational intervention: a randomized controlled trial. *Patient Educ Couns*. 2014;96(2):179–187. doi:10.1016/j.pec.2014.05.022. [PubMed: 24973196]
19. McKinley S, Dracup K, Moser DK, et al. The effect of a short one-on-one nursing intervention on knowledge, attitudes and beliefs related to response to acute coronary syndrome in people with

- coronary heart disease: A randomized controlled trial. *Int J Nurs Stud*. 2009;46(8):1037–1046. doi: 10.1016/j.ijnurstu.2009.01.012. [PubMed: 19243778]
20. Derogatis LP. BSI. Brief Symptom Inventory. Administration, scoring, and procedure manual. Minneapolis: National Computer Systems, Inc; 1993.
21. Moser DK. The rust of life: Impact of anxiety on cardiac patients. *Am J Crit Care*, 2007; 16(4): 361–369. [PubMed: 17595368]
22. Holm S (1979). A Simple Sequentially Rejective Multiple Test Procedure. *Scandinavian Journal of Statistics*, 6(2), 65–70.

Figure 1.
Timing of Study Activities

Table 1:**Key Components of the Intervention**

Conceptual Component	Education and Situation Specific Skill Building Activities
<u>Symptom Recognition and Interpretation</u> -Knowledge -Skills	<u>Session One (face-to-face):</u> Overview of the intervention Foundational knowledge of disease process Clarify misconceptions Symptom recognition within the context of their past experience Symptom interpretation within the context of their comorbidities Situation Specific Skill Building (related to symptom recognition/interpretation)
<u>Symptom Management: Timely Reporting of Symptoms</u> -Knowledge -Skills	<u>Session Two (face-to-face):</u> Care-seeking behavior knowledge Situation specific skill building

Table 2.

Satisfaction and Acceptability of the Intervention

	Mean	Standard Deviation
a. I was very satisfied with the help I got from being in this study.	1.33	0.5
b. The number of in-person sessions was appropriate.	1.44	0.53
c. The number of phone sessions were appropriate.	1.66	0.5
d. Each of the sessions lasted the right amount of time.	1.33	0.5
e. The notebook & resources provided by the nurse were very helpful.	1.33	0.5
f. I liked having goals and homework assigned between sessions.	1.55	0.53
g. I would recommend that other women participate in the study	1.11	0.33

* *Note.* Likert Scale: 1=strongly agree; 2= agree; 3=disagree; 4 = strongly disagree

Table 3:

Perception of Skills Gained from the Intervention

	Mean	Standard Deviation
a. I am better able to recognize symptoms of a heart attack.	1.22	0.44
b. I am better able to determine the difference between my heart symptoms and other types of symptoms.	1.22	0.44
c. I am better able to use a personal action plan in case I have future heart attack symptoms.	1.22	0.44

* *Note.* Likert Scale: 1=very much; 2=moderately able; 3=a little bit; 4=not at all

Table 4:

Acceptability of the Intervention: Responses to Open-ended Questions

	1. What was the most important thing you learned from your participation in this educational study?	2. What did you like best about participating in the educational study?
001	<ul style="list-style-type: none"> What to do if you have symptoms 	<ul style="list-style-type: none"> Learning about everything very interested; even if you didn't like hearing it
002	<ul style="list-style-type: none"> Women think it's cancer; don't think heart attack can happen Women less likely to take care of themselves Skills (things to look for, more aware/what to do) 	<ul style="list-style-type: none"> Getting info/how things work (where it was, how it works, process more)
003	<ul style="list-style-type: none"> Symptoms won't go away for good Going through how the heart works Why it happened/never taught that before Confirmed actually had heart attack What all that means/better grip on it now 	<ul style="list-style-type: none"> Definitely more knowledge than before (terms that I could understand) The journal helped at my doctor's appointment. Helps to have a woman teach it Education Individualized Helps to have a nurse who meets the person where they are
004	-----Dropped out-----	-----Dropped out-----
005	<ul style="list-style-type: none"> What a heart attack is That I need to know ALL the symptoms of CAD because if it happens to me again the symptoms could be different What to do if it does happen 	<ul style="list-style-type: none"> The one-on-one education by the nurse. I told someone that mercy had intervened on my account once again to bring me this study.
006	<ul style="list-style-type: none"> I was not aware of the symptoms of a heart attack I also like having a plan in place if this happens again 	<ul style="list-style-type: none"> Talking about my experience to the nurse was very healing for me I also liked that the nurse took the time to talk about the medicine that I'm taking
007	<ul style="list-style-type: none"> Very educational of knowing the right thing to do and not hesitate 	<ul style="list-style-type: none"> This gave me education about heart attack symptom. Wherein before I was not aware. I like this program and was very grateful that someone care enough to do research on this.
008	<ul style="list-style-type: none"> Taught me more of what to do if having heart attack 	<ul style="list-style-type: none"> Meeting the nurse who did the study
009	<ul style="list-style-type: none"> How to identify heart symptoms and what to do (Action Plan) More depth/reading booklets/women & heart disease and talking 	<ul style="list-style-type: none"> In person first Phone calls later Loved red notebook (take to doctor's appointment, writes more than heart symptoms in it)
010	<ul style="list-style-type: none"> Different symptoms of a stroke & heart attacks Next time know what to do Gave good outlook 	<ul style="list-style-type: none"> One-on-one meeting was great Meeting on my schedule Personalized teaching

	1. What was the most important thing you learned from your participation in this educational study?	2. What did you like best about participating in the educational study?
		<ul style="list-style-type: none">• Woman to woman was great

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Table 5.

Change in Pre- Versus Post-Intervention Knowledge, Attitudes, Beliefs, and BSI Scores *

Measure	Pre-Intervention			Post-intervention			Diff = Post – Pre			StpBon
	<i>M</i>	<i>SD</i>	<i>Med</i>	<i>M</i>	<i>SD</i>	<i>Med</i>	<i>M</i>	<i>SD</i>	<i>Med</i>	<i>P</i>
Knowledge, Overall (%)	76.2	9.0	76.2	83.6	10.4	81.0	7.4	6.8	9.5	0.0560
Stereotypical Sx	93.6	11.4	100.0	97.0	4.5	100.0	1.0	8.4	0.0	1.0000
Other common	80.0	30.7	100.0	94.4	11.0	100.0	16.7	28.0	0.0	0.3456
Incorrect	53.3	28.1	66.7	48.1	33.8	33.3	-3.7	38.9	0.0	1.0000
Stroke not ACS	30.0	33.1	16.7	55.6	37.3	33.3	29.6	45.5	33.3	0.3456
Attitudes, Overall	15.3	2.7	15.0	17.2	2.2	18.0	2.4	2.2	2.0	0.0200
Sx recognition	8.2	1.9	8.0	9.7	1.2	10.0	1.9	1.5	2.0	0.0135
Help-seeking	7.1	1.0	7.5	7.6	1.0	8.0	0.6	1.0	0.0	0.1388
Beliefs, Overall*	19.9	2.4	19.5	22.6	1.9	22.0	3.2	2.5	2.0	0.0117
Expectations	11.6	1.8	11.5	14.2	1.3	15.0	3.0	1.4	3.0	0.0117
Action	8.3	0.9	8.0	8.3	1.3	8.0	0.2	1.7	0.0	0.7078
Brief Sx Inventory	1.0	1.1	1.0	1.6	2.1	0.0	0.8	1.6	0.0	0.2188

* Note. Knowledge overall and subscale scores rescaled to 0–100% correct.¹⁸ 7 items for Beliefs (theoretical range from 0–24). All numbers are: *M* = mean, *SD* = standard deviation, *Med* = median. *N* = 10 for pre-intervention and *N* = 9 for post-intervention and difference (Diff) = Post – Pre. BSI = Brief Sx Inventory. Sx = symptoms. StpBon *P* = Stepwise Bonferroni multiplicity adjusted *p*-value (within each measure)