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Patterns and Loss of Sexual Activity in the Year Following Hospitalization for Acute Myocardial Infarction (A U.S. National, Multi-Site Observational Study)

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Abstract

A multi-site, observational study of sexual activity-related outcomes among patients enrolled in the TRIUMPH Registry during hospitalization for an acute myocardial infarction (AMI) was conducted to identify patterns and loss of sexual activity 1 year following hospitalization for AMI. Gender-specific multivariable hierarchical models were used to identify correlates of loss of sexual activity, including physician counseling. Main outcome measures included “loss of sexual activity” (less frequent or no sexual activity one year after an AMI in those who were sexually active in the year before the AMI) and 1-year mortality. Mean age (years) was 61.1 for women (n=605) and 58.6 for men (n=1274). Many were sexually active in the year before and 1 year after hospitalization (44% and 40% of women, 74% and 68% of men, respectively). A third of women and 47% of men reported receiving hospital discharge instructions about resuming sex. Those who did not receive instructions were more likely to report loss of sexual activity (women: adjusted RR 1.44, 95% CI 1.16–1.79; men: adjusted RR 1.27, 95% CI 1.11–1.46). One year post-AMI mortality was similar among those who reported sexual activity in the first month after their AMI (2.1%) and those who were sexually inactive (4.1%) (p=0.08). In conclusion, although many patients were sexually active prior to AMI, only a minority received discharge counseling about resuming sexual activity. Lack of counseling was associated with loss of sexual activity 1 year later. Mortality was not significantly elevated among individuals who were sexually active soon after their AMI.

Keywords

acute myocardial infarction; sexuality; quality of life; physician-patient communication

INTRODUCTION

The Translational Research Investigating Underlying Disparities in Acute Myocardial Infarction Patients’ Health Status (TRIUMPH) study is a national, multi-site, prospective longitudinal study that followed patients for 12 months after hospitalization for an AMI. We developed a substudy of the TRIUMPH study to specifically investigate sexual activity before and after AMI, the frequency of receipt of post-AMI counseling and its association with sexual activity, and the association of 1 year mortality with sexual activity after AMI.

METHODS

The TRIUMPH study design has been previously described and enrolled 4,340 adult patients (18 years or older) between April 2005 and December 2008 from 24 hospitals across the US.¹ This substudy (n=1879; 1274 men and 605 women) was initiated in September 2007 when a sexuality module was added (Figure 1). Inclusion of the sexuality module was prompted by the August 2007 publication of the first comprehensive U.S. population data on, and methods for eliciting, sexual activity and function among middle-age and older adults from the 2005–06 National Social Life, Health and Aging Project (NSHAP).² The study was conducted with written informed consent and approval of all participating sites’ and investigators’ institutional review boards.

Baseline data were collected through bedside interviews with trained staff within 24 to 72 hours of the index AMI and supplemented with medical record abstractions for the index hospitalization. These include data on patients’ sociodemographic characteristics, depressive symptoms, physical function, and disease severity. Depression was assessed using the 9-

item Patient Health Questionnaire (PHQ-9);³ patients were classified as having moderate depression if their score was ≥ 10 .⁴ Physical functioning was assessed using the 12-item Short-Form Health Survey Physical Composite Score (SF-12 PCS)⁵, with a higher score representing better physical functioning over the prior 4 weeks. Elements of the Global Registry of Acute Coronary Events (GRACE) Risk Score (age, heart rate, systolic blood pressure, initial creatinine, congestive heart failure, ST-segment deviation, prior MI, percutaneous coronary intervention, and cardiac enzymes) were prospectively collected at baseline and used to predict 6-month mortality among survivors of acute coronary syndrome; a higher GRACE Risk Score is associated with increased risk.⁶ Follow-up data were obtained via phone interviews at 1, 6 and 12 months. The sexuality module included a 5-item sexual activity and communication assessment administered by phone interviewers at 1- and 12-months after enrollment.

Sex or sexual activity was defined for study participants, as in the NSHAP study, as “any mutually voluntary activity with another person that involves sexual contact, whether or not intercourse or orgasm occurs.”² “Pre-AMI sexual activity” was measured using the yes/no question: “Did you have sex or sexual activity at any time in the 12 months prior to having a heart attack?” “Post-AMI sexual activity” was measured at 1 and 12 months using the yes/no question: “Have you had sex or sexual activity since having a heart attack?” Individuals who reported pre-AMI sexual activity were asked: “As compared with how things were in the 12 months before having a heart attack, have you had sex more frequently since your heart attack, with about the same frequency..., or less frequently...” (“don’t know” and “refused” were also coded). To model sexual outcomes at 12 months among those reporting pre-AMI sexual activity, individuals were coded for multivariable regression analysis as: 1) having “loss of sexual activity” if they reported no or less frequent sexual activity at 12 months after the AMI, or 2) the “reference group” if they maintained or reported an increased frequency of sexual activity.

Whether patients received discharge instructions about “when to resume sexual activity” following the index AMI was assessed by patient interview. Discussion with a physician about sex during the period after hospitalization was assessed using the dichotomous “Have you ever discussed sex with your doctor since your heart attack?,” adapting a similar question from the National Social Life, Health and Aging Project, the 2005–06 national benchmark study of sexuality among older U.S. adults.² Item refusal rates for the sexual activity items ranged from 3.6–5.2%.

Inclusion criteria for analysis required receipt of the sexuality module (all patients who had not yet completed 12 month follow-up or who enrolled in TRIUMPH after the substudy was initiated in September 2007), and completion of the 12 month follow-up interview (n=1879; 1274 men and 605 women). Unadjusted analyses evaluated gender differences in sociodemographic characteristics, health, pre- and post-AMI sexual activity, and communication with a physician about sex, using *t*-tests for continuous variables and chi-square tests for categorical variables.

Among the subset of individuals who reported pre-AMI sexual activity (n=1095, 866 men and 229 women), gender-specific and combined multivariable regression analysis was used to assess risk factors for loss of sexual activity 12 months after the AMI. The main variables of interest were those that could be modified by the physician, including the discharge instructions and physician discussions about sex. Models were adjusted for age, marital status, the PHQ-9 (dichotomized as ≥ 10 versus <10), SF-12 PCS, and the GRACE score. Individual co morbidities were not included in the model due to limited sample size. Because the outcome was not rare, we used a modified Poisson regression model with robust

standard errors to directly estimate relative risks (RR).⁷ A random effect for site and site-centered covariates were used to adjust for confounding by site.

Modeling of 12-month sexual activity outcomes used patients' 12-month recall of receiving discharge instructions and of discussion with a physician about sex. The 12-month recall of receiving discharge instructions was used in lieu of the 1-month variable to maximize the sample size for this analysis. Three hundred and fifty two individuals completed their 1-month interview prior to introduction of the sexuality module into the TRIUMPH study. To assess for possible recall bias on the discharge instruction variable, patients' 1- and 12-month recall about receipt of discharge instructions were compared with discharge instructions documented in the baseline chart (when available). This analysis was also stratified by gender and sexual activity status.

Survival time, for all patients who completed the sexuality module at 1 month (n=1130), was derived as the interval between the patient's 1-month interview date and death from any cause. Mortality data from any cause was assessed through the Social Security Administration Death Master file. Vital status data were available for over 99% of the cohort based on a matching algorithm for social security number, date of birth, and name. Patients still alive 1 year later were censored. Kaplan-Meier survival estimates⁸ were calculated among patients who had completed the 1-month sexuality module and were stratified by whether they had been sexually active since their AMI. Log-rank tests were used for comparisons between these groups. Multivariable adjustment for potential confounders was limited given the small number of events (N=40), therefore the multivariable Cox Proportional Hazards models were simply adjusted for baseline physical function (SF-12 PCS). As a validity check, the same analyses were repeated adjusting for the GRACE score, which includes baseline age.

P-values are 2 sided and were evaluated at a significance level of 0.05. All analyses were conducted using SAS software, release 9.2 (SAS Institute, Cary, North Carolina) and R version 2.10.1.⁹

RESULTS

The TRIUMPH study enrolled 4,340 patients, 1879 of whom received the sexuality module (Figure 1). Baseline characteristics, by gender, are shown in Table 1. Women were older and less likely to be married than men and had higher rates of depression, lower physical functioning scores and higher six-month mortality risk scores than men. Many patients were sexually active both at baseline and at 12 months. Among married women, sexual activity rates were significantly higher, both at baseline (65%) and at 12 months (62%).

People who were sexually active in the year before their AMI were significantly more likely than those who were inactive to report receiving discharge instructions about resuming sex (men: 54% vs. 32%, $p < 0.001$; women: 58% vs. 23%, $p < 0.001$). Married people were significantly more likely than unmarried people to receive discharge instructions about resuming sexual activity (men: 51% vs. 40%, $p < 0.001$; women: 44% vs. 28%, $p < 0.001$). In the 12 months of follow-up, 38% of sexually active people (41% of sexually active men and 24% of sexually active women, $p < 0.001$) discussed sex with their physician. Unmarried sexually active patients were significantly less likely to have discussed sex with a physician following their AMI (33% unmarried versus 40% married, $p = 0.03$). This marital status difference was similar among men and women. Patients' 1- and 12-month recall about receipt of discharge instructions were compared with discharge instructions documented in the baseline chart (when available). There was no difference in recall by gender or sexual activity status.

Of patients reporting pre-AMI sexual activity, 48% of men and 59% of women reported less frequent sexual activity in the 12 months after the AMI (Table 2), and 11% of men and 13% of women reported no sexual activity in the subsequent year. Some patients who were sexually inactive in the year prior to their AMI initiated sexual activity in the year following (9.1% of men, 4.0% of women). In the multivariable analysis, significant predictors of loss of sexual activity for men included not receiving discharge instructions about resumption of sex, having a discussion with a doctor about sex since the AMI and a lower baseline SF-12 Physical Function Score. The only significant predictor of loss of sexual activity for women was not having received discharge instructions about sex. Neither age, marital status, depression, or GRACE score were significant predictors of loss of sexual activity in males or females (Figure 2). The multivariable analysis was repeated combining males and females in a single model and no significant interaction between gender and receiving discharge instructions in predicting loss of sexual activity was found.

All-cause, unadjusted mortality in the year following the 1-month interview was 2.1% among those who reported sexual activity in the first month after their AMI, as compared to 4.1% among those who were sexually inactive in the first month after their AMI (Figure 3). Adjusting, in separate models, for pre-AMI physical function (Hazard Ratio (HR) inactive vs. active: 1.86, 95% CI 0.80–4.35, $p=0.15$) or GRACE score (which includes age) (HR: 1.11, 95% CI 0.48–2.54, $p=0.81$) shows that mortality was not significantly elevated among individuals who were sexually active in the first month after their AMI.

DISCUSSION

Although many patients were sexually active before their AMI, only one third of women and fewer than one half of men received discharge instructions about resuming sexual activity. Moreover, about 1 in 10 people who were sexually active before their AMI were not active in the subsequent year. Almost half of men and close to 60% of women were less active than in the period before their AMI. The absence of counseling at hospital discharge about when to resume sexual activity was a significant predictor of loss of activity for both men and women. Mortality was not significantly elevated among individuals who were sexually active in the first month after their AMI.

This study corroborates and extends previous cross-sectional findings about sexual activity among various populations of AMI patients, and expands the field by examining longer-term outcomes in a larger population sample.^{10–12} Overall, the rates of pre- and post-AMI sexual activity in this population were slightly lower than those reported for the general older adult population; in a 2005–06 nationally generalizable study of community-residing older adults in the US, 69% of men and 43% of women (68% of women with a partner) ages 57–85 were sexually active.² However, the rate of sexual activity in the 12 months prior to AMI in our cohort was higher (64%) than found in a predominantly male and somewhat younger cohort of AMI patients enrolled between 1989–93 (53%).¹⁰ In the largest comparable longitudinal study of AMI patients, which included only 51 women, Israeli researchers also found a reduction in patients' sexual frequency and satisfaction three to six months following AMI.¹³

Although a prior study has found depression to be a significant correlate of sexual problems in men and women with an AMI,¹⁴ we found no association with baseline depression, AMI severity, or, in women, physical health status. Instead, our findings point to communication with AMI patients, before hospital discharge, about sexual matters as a potentially critical factor in the preservation or loss of sexual activity. This finding may be explained by the privileged relationship between the cardiologist and patient. The discharging cardiologist has detailed knowledge of the patient's condition, has provided life-saving care, and is best

positioned to advise the patient on the safety of engaging in physical, including sexual, activity.

Prior work has shown that even sexually inactive older adults and those with chronic and life threatening illnesses value sexuality as an important part of life and health.^{2,15–19} Sexual inactivity before an AMI should not exclude patients from receiving counseling or information from physicians about sex after an AMI. Profiling patients based on prior sexual activity or other factors, including gender, marital or health status, will exclude patients who would benefit from the information and may be particularly problematic for patients of sexual minority groups²⁰ or unmarried people who might be reluctant to disclose their partnership status.²¹ In this study, nearly half of patients who were married or sexually active prior to AMI received no counseling about resuming sexual activity; among unmarried people who were sexually active, only a third received counseling.

Guidelines for post-AMI care recommend that physicians counsel patients about resuming sexual activity.^{22,23} The recommendation that “in stable patients without complications, sexual activity with the usual partner can be resumed within 1 week to 10 days”²² has been overlooked in quality assessments of AMI care. Factors like discomfort with or lack of training in the area of sexuality, time constraints, and liability concerns may contribute to physicians’ and other care providers’ reluctance to address sexuality issues.^{24,25} Our study indicates that the counseling may have an important effect on the likelihood of sexual activity after AMI and that men and women benefit equally from receiving such counseling. AMI care is typically delivered by a multidisciplinary team; additional research is needed to understand the role of both acute care and cardiac rehabilitation nurses, physical therapists, and other providers can play in helping patients optimize sexual outcomes.²⁶

Prior studies and recommendations document concern that sexual activity, particularly with a new partner, or among men with erectile dysfunction, might increase a patient’s risk for first AMI, repeat AMI, or death.^{10,23,27,28} This study is the first to prospectively assess, in a large population of men and women with AMI, the association of post-AMI sexual activity with 12-month mortality. Although limited by the small number of deaths, our study does not raise any safety concerns.

The study findings should be interpreted in the context of several potential limitations. Introduction of the sexuality module midway through patient enrollment in the TRIUMPH study meant that some patients were lacking 1-month data and limited the scope of sexuality questions we could ask. Similarly, the sexuality module was not included in the baseline (hospital) assessment, which theoretically would provide more accurate report of sexual activity prior to AMI. This study relied on patient self-report, which may have introduced recall bias. Recall about receipt of discharge instructions, as compared to documentation in the medical chart, did not differ by gender or sexual activity in the year following AMI. We did not ask questions about the specific content or quality of instructions received or discussions about sex after AMI. The finding that, among men, discussion about sexual matters with a physician was associated with loss of sexual activity could indicate that men with sexual problems after an AMI were more likely to initiate a discussion with their physician and/or that the discussion deterred them from subsequent sexual activity. This study did not ascertain who initiated discussion about sexual matters, nor did it ascertain specific dimensions of sexual function, such as frequency, type, or intensity of sexual behaviors; this information could be useful to interpret the lack of association with mortality. Additional research is needed to identify the key elements of effective communication about resuming or initiating sexual activity after an AMI and to understand the effects of AMI and AMI care on specific domains of sexual function. In addition, a

larger sample size would be needed to model the effects of specific co morbidities, medications, or other post-AMI factors on sexual outcomes after AMI.

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Figure 1.
TRIUMPH Patient Enrollment Diagram

Figure 2.
Gender Separate Models of Loss of Sexual Activity

Figure 3.
Kaplan-Meier Plot of All Cause Mortality

Table 1Characteristics of TRIUMPH Study Participants Stratified by Gender^{*}

	Overall (N=1879)	Male (N=1274)	Female (N=605)	p-value
Characteristics measured at baseline				
Age (mean ± SD)	59.4 ± 11.7	58.6 ± 11.0	61.1 ± 12.8	<0.001
Race				<0.001
White/Caucasian	1330 (71.0%)	964 (75.9%)	366 (60.7%)	
Black/African American	405 (21.6%)	209 (16.5%)	196 (32.5%)	
Other	138 (7.4%)	97 (7.6%)	41 (6.8%)	
Married	1066 (56.9%)	819 (64.4%)	247 (41.0%)	<0.001
Depression [†]	306 (17.4%)	177 (14.7%)	129 (23.2%)	<0.001
SF-12 PCS [‡] (mean ± SD)	43.3 ± 12.2	44.8 ± 11.9	40.1 ± 12.1	<0.001
GRACE [§] (mean ± SD)	99.1 ± 27.7	97.5 ± 27.4	102.5 ± 28.1	<0.001
Characteristics measured at 12M				
Sex prior to AMI	1095 (64.3%)	866 (73.6%)	229 (43.5%)	<0.001
Sex since AMI	1013 (59.6%)	803 (68.3%)	210 (40.0%)	<0.001
Received instructions	787 (42.9%)	585 (46.8%)	202 (34.6%)	<0.001
Discussed sex with MD	439 (33.6%)	378 (39.1%)	61 (17.9%)	< 0.001

^{*} All percentages are calculated excluding missing data, "Don't know," and "Refused" response options from the denominator.

[†] Depression defined as a PHQ-9 score of ≥ 10

[‡] Range: 0–100; higher score represents better physical functioning

[§] Range: 1–263; higher score represents higher mortality risk at 6 months post MI

^{||} Missingness for this variable (30.4%) was due a skip pattern error in interviews of individuals who reported no sexual activity before or since their MI; missingness did not vary by gender, age, marital or health status. Missingness on this item among those who were sexually active before their MI (the subset included in the multivariable models) was 3%.

Table 2
Characteristics of Sexually Active TRIUMPH Study Participants by Gender and Sexual Frequency at 1Y*

Male			Female			
Sexual Frequency Since AMI	More/Same (n=427)	Less/None (n=391)	p-value	More/Same (n=88)	Less/None (n=128)	p-value
Characteristics measured at baseline						
Age (mean ± SD)	55.3 ± 9.9	57.0 ± 10.1	0.013	53.8 ± 11.1	53.7 ± 11.1	0.954
Race			0.001			<0.001
White/Caucasian	349 (82.1%)	278 (71.5%)		68 (77.3%)	69 (54.3%)	
Black/African American	51 (12.0%)	79 (20.3%)		19 (21.6%)	46 (36.2%)	
Other	25 (5.9%)	32 (8.2%)		1 (1.1%)	12 (9.4%)	
Married	309 (72.4%)	271 (69.5%)	0.365	65 (74.7%)	72 (56.7%)	0.007
Depression [†]	40 (9.9%)	54 (14.8%)	0.036	17 (19.8%)	24 (20.2%)	0.944
SF-12 PCS [‡] (mean ± SD)	48.5 ± 10.1	44.0 ± 12.5	<0.001	44.1 ± 11.8	40.1 ± 11.8	0.019
GRACE [§] (mean ± SD)	87.8 ± 23.6	95.0 ± 25.8	<0.001	86.5 ± 22.8	88.5 ± 23.6	0.549
Characteristics measured at 12M						
Sex since AMI	426 (100%)	330 (85.5%)	<0.001	85 (97.7%)	109 (85.2%)	0.002
Received instructions	259 (61.2%)	185 (47.7%)	<0.001	60 (69.0%)	65 (52.4%)	0.016
Discussed sex w/ MID	162 (38.5%)	168 (44.1%)	0.107	25 (28.7%)	26 (20.3%)	0.154

* All percentages are calculated excluding missing data, "Don't know," and "Refused" response options from the denominator.

[†] Depression defined as a PHQ-9 score of 10

[‡] Range: 0–100; higher score represents better physical functioning

[§] Range: 1–263; higher score represents higher mortality risk at 6 months post MI