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Social Support and Pain Outcomes after Trauma Exposure among Older Adults: A Multicenter Longitudinal Study

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Abstract

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Objectives—Certain forms of social support have been shown to improve pain coping behaviors and pain outcomes in older adults with chronic pain, but little is known about the effect of social support on pain outcomes in older adults following trauma exposure.

Methods—We analyzed data from a prospective longitudinal study of adults aged 65 years and older presenting to an emergency department (ED) after a motor vehicle collision (MVC) to characterize the relationship between perceived social support and MVC-related pain after trauma overall and by subgroups based on gender, depressive symptoms, and marital status.

Results—In our sample (N=176), patients with low perceived social support had higher pain severity 6 weeks after MVC than patients with high perceived social support after adjustment for age, gender, race, and education (4.2 vs. 3.2, $p=0.04$). The protective effect of social support on pain severity at 6 weeks was more pronounced in men and in married individuals. Patients with low social support were less likely to receive an opioid prescription in the ED (15% vs. 32%, $p=0.03$), but there was no difference in opioid use at 6 weeks (22% vs. 20%, $p=0.75$).

Discussion—Among older adults experiencing trauma, low perceived social support was associated with higher levels of pain at 6 weeks.

Keywords

Social support; geriatrics; trauma; pain; motor vehicle collision

INTRODUCTION

MVCs are a common form of trauma exposure among older adults and result in an estimated 250,000 U.S. emergency department (ED) visits annually by individuals aged 65 years and older.^{1, 2} The majority of these patients do not have severe or life-threatening injuries and are discharged home following ED evaluation.¹ Unfortunately, among these discharged patients, persistent pain occurs in more than one quarter of patients and is associated with functional decline and lower self-reported health.³ In order to reduce the burden of post-MVC pain in older adults, a greater understanding of the factors influencing pain outcomes following MVC is needed.

Social support, typically defined as “the social resources perceived to be available or actually provided to an individual in the context of both formal support systems and informal helping relationships,”⁴ has been linked to effects on both mental and physical health. Individuals lacking social support have been found to have reduced capacity for coping with stressors and maintaining physiologic function with consequent negative effects on health.^{5–7} In the U.S., the number of older adults living alone is increasing, both because there are more older adults and because of a trend toward more older adults living independently from their adult children, putting this population at greater risk for social isolation.⁸ Among older adults, social isolation is associated with adverse health events, difficulty coping with health problems, and mortality.^{9–13} In contrast, higher levels of social support are associated with a reduced risk of cardiovascular disease, cognitive decline, and mortality among patients with hypertension,¹⁴ PTSD,¹⁵ and cancer,¹⁶ respectively. Several studies that have examined gender differences in the effect of social support on health find that men benefit more from social support than women.^{17–19} Additionally, recent research

has identified social support as a mediator between loneliness and depression,²⁰ and that social support is correlated with self-esteem and subjective well-being in older adults.²¹ Among older adults with osteoarthritis or chronic low back pain, high perceived social support is correlated with greater satisfaction with life,^{22, 23} and interventions to promote support from a spouse result in improved pain outcomes.^{24–26} Previous work in *younger* adults also indicates that a lack of social support following MVCs can lead to more complications and higher levels of persistent pain.^{27, 28} To our knowledge, however, no prior research has examined the effect of social support on pain outcomes following a traumatic event such as an MVC in *older* adults.

The objective of this study was to characterize the relationship between social support and pain intensity among older adults presenting to the ED following MVC. We hypothesized that individuals with higher perceived social support would have lower rates of MVC-related pain, and that the benefit of social support would be more pronounced in men, unmarried individuals, and individuals with symptoms of depression.^{18–21, 29–31} Secondly, we evaluated the relationship between social support and processes of care (e.g. imaging/diagnostic tests, medication prescriptions) during the ED visit and six weeks after the MVC.

METHODS

Study Design and Setting

The Older Adult CRASH study is a prospective longitudinal study of patients aged 65 years and older evaluated in an ED within 24 hours after an MVC. Patients were enrolled between June 2011 and November 2015 from nine EDs in five no-fault insurance states (Florida, N=1; Massachusetts, N=2; Michigan, N=3; New York, N=2; and New Jersey, N=1). No-fault insurance states were chosen to minimize the number of participants for whom on-going legal activity might promote symptom persistence.³² Study participants completed an initial interview by trained research assistants (RAs) at the time of the ED visit and follow-up assessments were completed by phone or mail at 6 weeks. The study was approved by institutional review boards at each site and each participant provided written informed consent. Additional details regarding study methods have been described elsewhere.³³

Participants

Patients aged 65 years or older who presented to the ED within 24 hours after an MVC were screened for enrollment. Patients were excluded if they had fractures, major lacerations, intracranial injuries, spinal injuries, or other injuries requiring time-sensitive interventions. Patients were also excluded if they had moderate or severe cognitive impairment based on a six item screener score ≥ 3 ,³⁴ did not speak English, were prisoners, or were receiving end-of-life or comfort care. Patients missing social support information from the ED interview or missing follow-up data were also excluded.

Measures

The ED interview assessed patient demographics, pain severity, and social support. Demographic information (age, gender, race, years of formal education, marital status) was assessed using standard questions. Patients were asked to rate their average overall pain

severity during the month before the MVC using a 0 to 10 numeric rating scale with 0 indicating “no pain” and 10 indicating “pain as severe as it could possibly be.” The 11-point pain numeric rating scale used to assess pain is considered the preferred tool for measuring pain intensity in clinical trials and has been widely used in studies of older adults.^{3, 35, 36} Patients were also asked to rate their pain severity overall and for 13 body parts at the time of the ED evaluation (0–10 scale).³⁷ Patients who had already received an analgesic were asked to recall their pain severity prior to taking the analgesic, and this value was used to represent the patient’s ED pain. Perceived social support was measured by asking four questions from the Medical Outcomes Study Social Support Survey Instrument.³⁸ Patients were asked how often they had 1) a special person when in need, 2) someone to help with daily chores, 3) someone to take them to the doctor, and 4) someone that they could count on to listen when they needed to talk. The response options for each item used a 5-point Likert scale ranging from “none of the time” to “all of the time.” The reliability and validity of the social support scale, and the distinction between these measures of social support and measures of loneliness, mental health, and general health perceptions have been described.³⁸ In this sample, correlations between the four items measured in this study ranged from 0.47 to 0.63 and Cronbach’s alpha ranged from 0.73 to 0.80. Scores on each item were summed to give a total score ranging from 4 to 20, with higher scores representing more perceived social support. Distribution of scores was highly skewed with 56% of participants reporting a score of 5 out of 5 for each question (total score 20 out of 20). In the absence of a previously defined cut-off point, we defined low social support as a total score below the lowest quartile of scores in the sample. We examined an alternative cut-off using the lowest decile of social support (social support score 13). Because the presence of a family member has been shown to affect the pain experience among older adults and may affect the care provided,³⁹ RAs also recorded whether the patient was accompanied by a family member or friend during the ED interview, as an additional measure of social support. Depressive symptoms were assessed using two questions about feelings of hopelessness or loss of pleasure in doing things in the past month;⁴⁰ participants were considered to have depressive symptoms if they responded “yes” to either question.

The primary outcome was MVC-related pain severity 6 weeks after the ED visit. Patients were asked to rate their pain severity overall and for 13 body parts at the time of the 6 week evaluation using the same 0–10 pain severity scale. If the patient gave a pain rating higher than zero, they were asked if the pain was related to the MVC. If the overall pain rating was related to the MVC, this was used as the MVC-related 6-week pain severity. A small number of patients stated that their overall pain severity was not MVC-related, but that their pain in a specific body part was MVC-related. For these patients, we used the pain score from this pain area to represent the patient’s MVC-related pain. MVC-related pain severity at 6 weeks was considered a more appropriate primary outcome than change in pain because social support might influence both the pain experience in the ED as well as pain outcomes at 6 weeks.

Secondarily, we examined a variety of processes of care during the ED visit and in the first 6 weeks, including ED length of stay, diagnostic imaging tests, analgesic administration in the ED, opioid prescriptions on discharge from the ED, and opioid use at 6 weeks. Characteristics of ED care were determined by data extraction from the patient’s medical

record after the ED visit was complete using a structured data collection template by trained RAs. To assess pain treatment at 6 weeks, patients were asked about pain management techniques in the past 24 hours, including whether they had taken an opioid, taken a non-opioid pain medication, or used non-pharmacologic therapies such as heat or ice. Opioid use was assessed using the question: “During the past 24 hours, have you taken any opioid pain medications such as Vicodin or Percocet?”

Statistical Analysis

Data were entered and stored using REDCap (Research Electronic Data Capture) hosted at UNC Chapel Hill.⁴¹ The relationships between 1) perceived social support and MVC-related pain severity at 6 weeks, and 2) accompaniment in the ED and MVC-related pain severity at 6 weeks were examined overall and by subgroups based on patient gender, marital status, and the presence of depression symptoms. We report unadjusted means and 95% confidence intervals for pain severity at 6 weeks; these differences in means were tested using t-tests. We then adjusted these analyses for the following covariates: patient age, gender, race, and level of formal education. Covariates used for adjustment were selected prior to analyses based on our understanding of factors which might confound the relationship between social support and subacute pain severity. Adjusted means were calculated using the *predxcat* command in STATA, which estimates mean values for the outcome (MVC-related 6-week pain severity) for patients with high vs. low social support and who were vs. were not accompanied, at the mean values for covariates. The p-values for these adjusted analyses are the p-values from the multivariable linear regression for the coefficient representing the effect of social support on the outcome. Residuals from these regressions were plotted to ensure that they were normally distributed and unrelated to the exposure. Processes of care were compared for patients with high and low social support and who were and were not accompanied in the ED. Unadjusted comparisons for processes of care used chi-squared and t-tests, as appropriate. Adjusted comparisons included the same covariates used for the adjusted analyses for the primary outcome, with means and proportions estimated using the *predxcat* command. Statistical analyses were conducted using STATA 14.1 (StataCorp LP, College Station, TX).

RESULTS

Of 1,005 patients screened, 447 were eligible and 215 consented to participate (Supplementary Figure). Among eligible patients who declined participation, the most common reasons were that the study would take too much time (N=67) or that the patient felt too stressed, overwhelmed, or anxious (N=41). Of the 215 consenting patients, 39 were excluded due to missing data: missing social support scores (N=4); missing 6-week follow-up (N=35). Patients who were eligible and participated were similar to those who were eligible but declined participation in regard to percentage women (59% vs. 58%, $p=0.73$) and mean age (72.6 vs. 73.7, $p=0.08$).

Among the study sample (N=176), patients had a mean age of 73 years, and the majority of patients were women (61%), white (82%), married (58%), and did not have a college degree (66%; Table 1). Thirty-seven percent of patients reported experiencing, on average,

moderate to severe overall pain during the month before the MVC (Table 1). Perceived social support scores ranged from 7 to 20, with scores in the lowest quartile ranging from 7 to 17 (Figure 2). Low perceived social support was more common in participants who were widowed, divorced, or lived alone (Table 1). Thirty-seven percent of patients were unaccompanied during the ED interview. Being unaccompanied was more common among participants who were aged 65–74 years, were single or divorced, were not college graduates, had less than 2 living children, or lived alone (Table 1). Accompaniment in the ED occurred for similar percentages of patients with high and low perceived social support (65% vs. 59%; Table 2). There were 27 patients in the sample who were accompanied in the ED but were in the lowest quartile of perceived social support. Additionally, there were 16 patients who lived with a spouse but were in the lowest quartile of perceived social support.

Pain severity at the time of the ED evaluation was similar for patients with low and high perceived social support (5.9 vs. 5.7, $p=0.70$; Table 3a). At 6 weeks, 147 (84%) patients reported an overall pain severity 1 (0–10 scale); of these, the majority (82%) reported that the pain was related to the MVC. Of the 24 individuals with an overall pain score 1 which was not attributed to the MVC, 9 (38%) had pain severity 1 in at least one body region that they did attribute to the MVC. Patients with low perceived social support had higher mean MVC-related 6-week pain scores than patients with high social support (4.2 vs. 3.2, $p=0.03$). This difference persisted after adjustment for gender, age, formal education, and race (4.2 vs. 3.2, $p=0.04$). Adding depression as a covariate to this model attenuated the association between low vs. high social support and MVC-related 6-week pain severity (4.1 vs. 3.2, $p=0.07$). The adjusted association between low vs. high perceived social support and MVC-related 6-week pain severity was more pronounced for men (5.0 vs. 2.7, $p<0.01$) than for women (4.0 vs. 3.4, $p=0.36$). A formal test of interaction between gender and perceived social support was not significant (interaction variable $p=0.13$), but the magnitude of the difference in pain scores for patients with high and low social support was clinically different between men and women (men difference = 2.3, women difference = 0.6). Individuals with low social support were more likely to also have depressive symptoms compared to individuals with high social support (37% vs. 19%, $p=0.02$), but the relationship between social support and MVC-related 6-week pain severity did not differ for patients with and without symptoms of depression (interaction variable $p=0.99$). The adjusted association between low vs. high social support and MVC-related 6-week pain was also more pronounced in married individuals (4.0 vs. 2.7, $p=0.11$) compared to unmarried participants (4.1 vs. 4.0, $p=0.84$). Pain scores at 6 weeks were also statistically significant for patients with social support scores below the lowest decile vs. those above the lowest decile (5.3 vs. 3.3, $p=0.02$).

Although ED pain severity was similar between patients unaccompanied vs. accompanied during the ED evaluation (5.8 vs. 5.7, $p=0.68$; Table 3b), at 6 weeks, patients who were unaccompanied in the ED reported higher MVC-related pain severity compared to those who were accompanied (4.2 vs 3.0, $p=0.01$). This difference persisted after adjustment for gender, age, formal education, and race (4.3 vs. 2.9, $p=0.01$). The adjusted association between being unaccompanied vs. accompanied in the ED and MVC-related 6-week pain severity was significant in both men (4.2 vs. 2.6, $p=0.01$) and women (4.4 vs. 3.1, $p=0.04$). Being unaccompanied was associated with higher MVC-related pain severity than being

accompanied in non-depressed individuals (4.4 vs. 2.5, $p<0.01$), but this relationship was not present in depressed individuals. A clinically significant difference in MVC-related 6-week pain severity in unaccompanied vs. accompanied participants was noted in both married (3.7 vs. 2.6, $p=0.09$) and unmarried (4.6 vs. 3.6, $p=0.14$) individuals.

At 6 weeks, 21% of patients reported taking opioid medications, 55% reported taking non-opioid pain medications, and 45% reported using non-pharmacologic therapies such as heat or ice in the past 24 hours. After adjusting for age, gender, education, and race, patients with low perceived social support were less likely to receive a prescription for opioid medication upon discharge from the ED (15% vs. 32%, $p=0.02$), but the use of opioids reported by patients at 6 weeks was essentially the same for patients with low or high social support (22% vs. 20%, $p=0.85$; Table 4a). Prescription for opioid medication upon discharge from the ED did not differ for patients who were or were not accompanied in the ED (28% vs. 25%, $p=0.65$; Table 4b). There were no clinically or statistically important differences in other processes of care in the ED based on either the patient's perceived social support (Table 4a) or whether they were accompanied in the ED (Table 4b).

DISCUSSION

In this sample of older adults receiving care in the ED after an MVC, patients in the lowest quartile of perceived social support had higher average MVC-related pain scores at 6 weeks. The relationship between social support and MVC-related pain severity at 6 weeks was more pronounced among men than women and among people who were married than those who were unmarried, but did not differ for patients with and without symptoms of depression. Patients with high social support were more likely to receive a prescription for opioids upon discharge from the ED, but this relationship did not persist at 6 weeks. There was no other observed association between social support or accompaniment and processes of care in the ED.

As this was an observational study, the findings do not prove a causal relationship between social support and pain recovery after MVC. However, given the presence of clinical trials demonstrating improved pain outcomes and functional ability in couples who received training in spouse-assisted coping skills, it seems plausible to interpret these findings as suggestive of a causal relationship.^{25, 26, 42, 43} We did not adjust the relationship between social support and MVC-related 6-week pain severity for acute pain in the ED because we hypothesized that social support might influence both pain in the ED and MVC-related pain at 6 weeks and that the cumulative effect of social support on the initial pain experience and pain recovery would be best represented by pain severity at 6 weeks. (Although patients are probably not receiving much social support between the time of the MVC and the ED assessment of pain, they are probably aware of the presence of this support and this might influence the subjective experience of pain in the ED.) We also chose not to adjust the analysis for psychological distress at the time of the ED evaluation as distress symptoms might also be influenced by perceived social support.^{44, 45}

There are a number of possible mechanisms by which social support might influence pain symptoms. In some cases, social support may allow people to exhibit pain behaviors that

have a therapeutic effect, like rubbing the affected area or verbally acknowledging the presence of pain, leading to improved pain outcomes.⁴⁶ Individuals with high social support may also receive more assistance with autonomy (i.e. a spouse fostering a patient's independence in decision-making), which has been linked to positive health outcomes and behaviors, such as increased physical activity.⁴⁷ Specifically in older adults, high levels of social support can protect against cognitive decline, enhancing quality of life and fostering independence.⁴⁸ Social support may also improve positive affect and reduce symptoms of depression.³⁰ Consistent with this, our analyses suggest that depression is a partial mediator of the relationship between social support and MVC-related 6-week pain. Although emergency providers were more likely to prescribe opioids for patients with high levels of perceived social support, social support did not appear to alter early opioid use in this sample. Whether social support alters other behaviors that may influence pain symptoms such as physical activity or sleep is unknown.

In our sample, the association between social support and MVC-related pain severity at 6 weeks was stronger in men than women. This finding is consistent with prior work describing gender differences in the relationship between social support and health. Specifically, men tend to derive greater benefit from social support than women, with some studies even describing, paradoxically, increased mortality in women with high levels of social support.¹⁸ Similarly, being married has a stronger reduction in mortality rate for men than women.⁴⁹ Analysis of longitudinal, community-based data from the MacArthur Studies of Successful Aging found that older men primarily receive emotional support from their spouses, while older women have more complex support networks and draw more heavily on friends, relatives, and children.^{18, 29, 48} The reason for the differential effect of social support by gender in our sample and in other studies is unclear. It may be that men with high social support are generally recipients of that support whereas women with high social support are both recipients and providers of support. Although in general, giving social support may be as beneficial or even more beneficial than receiving it,⁵⁰ the value of providing social support for individuals following musculoskeletal injury is unknown. In our sample, men were somewhat less likely than women to report low perceived social support (20% vs. 30%). It is possible that older men are more reluctant to report low social support than older women (i.e. are more influenced by social desirability bias), so that men in our sample reporting low social support were more isolated and less supported than women who reported low social support.

To our knowledge, no previous study has described the relationship between social support or accompaniment and processes of care in the ED. Although most of these processes were not different, patients with high social support were more likely to receive an opioid prescription in the ED. This was not a hypothesized relationship and the p-value reported is not adjusted for multiple comparisons, leading us to interpret this finding cautiously. It may be that patients with high levels of social support feel more confident requesting opioids from emergency providers or that emergency providers feel more empathy or a greater desire to please patients with high levels of social support. Curiously, accompaniment in the ED did not affect the proportion of opioid prescription upon ED discharge, and the proportion of opioid use two weeks after the ED visit did not differ across social support or accompaniment status. Additionally, our results showed no significant differences in ED

processes of care between unaccompanied and accompanied patients, suggesting that the presence of a family member or friend does not significantly alter ED physician's management of older adults following MVC. However, patients who were accompanied in the ED had significantly lower MVC-related pain scores at 6 weeks than those who were unaccompanied. Although we do not know that the relationship between accompanied in the ED and pain at 6 weeks is a causal one, there is evidence that the practical support from a family member improves patient adherence to treatment regimens and follow-up appointments.⁵¹ Emergency providers may be able to improve outcomes for unaccompanied patients by placing greater emphasis on patient education and linking these patients to community resources that provide social support.⁵²

Our results extend the evidence for a positive influence of social support on health outcomes to the important setting of subacute pain following trauma exposure in older adults.^{9–11, 17, 53–56} However, we did not assess which components of social support had the greatest influence in mediating the development of pain following MVC. The questions used in our study fall under the emotional/informational support and tangible support categories, which we thought were most relevant to this setting and best represented modifiable aspects of social support that could serve as points of intervention. Our results do not provide information about the relationship between affectionate support and positive interaction on the development of persistent pain in older adults. Further, we did not characterize whether the support provided encourage resilience and independence or undermined it. The results of clinical trials in patients with chronic pain suggest a specific value of spousal support in the form of pain-coping skills.⁴² Further research is needed to determine which components of social support have the greatest impact on health and quality of life among older adults recovering from an acute trauma.

This study has several limitations. Perhaps the most significant limitation of our study is our measurement of perceived social support. While the questions used to define social support came from a validated measure, our study used only 4 questions from the emotional and tangible support categories. A similar, shortened version of the original measure, with questions also drawn from the emotional and tangible support categories, has been validated for multidimensional assessments in older adults, suggesting that our abbreviated survey instrument is a reasonable measure of social support.⁵⁸ An additional limitation of the social support instrument we used is that it measures perceived social support, rather than the support actually given to the patient. While information about the resources available to the patient may also be useful, previous studies have stated that perceived social support is actually the most important type of social support.⁵⁹ In fact, perceived social support appears to have a stronger effect than actual or received social support on health and well-being in older adults,⁶⁰ and may overlap with perceived stress and psychological distress.⁶¹ The study sample was similar to eligible but non-consenting patients in regard to gender and age but had a lower percentage of racial/ethnic minorities, thus somewhat limiting the representativeness of the sample. Patients were asked whether their pain was due to the MVC, but the ability of patients to correctly attribute their pain to a specific cause is unknown.⁵⁷ Additionally, use of opioid and non-opioid analgesics at 6 weeks was based on self-report measures; it is possible that patients under-reported analgesic use. A majority of the patients in our sample had high perceived social support, limiting our ability to examine

effects across a broad spectrum of perceived social support levels. Our analytic approach combined patients within the lowest quartile of social support into a single group, but this group had a wide range of scores. We think this approach is acceptable since we are not attempting to define a level of social support that puts patients at risk for subacute pain, but rather simply test for a relationship between social support and MVC-related 6-week pain. Patients who experience MVC tend to have high baseline levels of physical and cognitive function. Perceived social support may be even more important in patients with lower functional levels and more dependence on others (e.g., patients experiencing a fall).

Among a sample of older adults presenting to the ED after an MVC, patients with low perceived social support had greater MVC-related pain at 6 weeks. This relationship was more pronounced in men compared to women and among married compared to unmarried individuals. Promoting social support may reduce MVC-related 6-week pain severity and associated adverse health outcomes, like functional decline, for older adults presenting to the ED after MVC.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1.
Histogram of perceived social support scores.

Table 1

Sociodemographic characteristics of all participants and participants with low perceived social support or unaccompanied in the ED. Note: social support and accompanied status are not mutually exclusive.

Patient Characteristic	Total N (%)	Low Social Support* % (95% CI)	Unaccompanied % (95% CI)
All	176 (100)	26 (20–33)	37 (30–44)
Age, years			
65–74	118 (67)	28 (21–37)	43 (35–52)
75	58 (33)	22 (14–35)	24 (15–37)
Gender			
Women	107 (61)	30 (22–39)	39 (31–49)
Men	69 (39)	20 (12–31)	33 (23–45)
Race			
White	145 (82)	26 (20–34)	36 (29–44)
Black	28 (16)	29 (15–47)	43 (27–61)
Other	3 (2)	0 (0–56)	33 (6–79)
Marital Status			
Married	102 (58)	16 (10–24)	31 (22–40)
Single	7 (4)	0 (0–35)	71 (36–92)
Divorced	34 (19)	35 (21–52)	53 (37–69)
Widowed	33 (19)	55 (38–70)	33 (20–50)
College graduate ^a			
Yes	60 (34)	22 (13–34)	50 (38–62)
No	115 (66)	29 (21–38)	30 (23–39)
Living children			
0	43 (24)	40 (26–54)	56 (41–70)
1	78 (44)	24 (16–35)	31 (22–42)
2	55 (31)	18 (10–30)	31 (21–44)
Family within 1 hour ^b			
0	19 (11)	26 (12–49)	58 (36–77)
1	24 (14)	38 (21–57)	38 (21–57)
2	133 (76)	24 (18–32)	34 (26–42)
# Living with patient ^c			
0	43 (25)	40 (26–54)	56 (41–70)
1	78 (44)	24 (16–35)	31 (22–42)
2	55 (31)	18 (10–30)	31 (21–44)
Pre-MVC pain ^d			
None	66 (38)	23 (14–34)	29 (19–41)
Mild (1–3)	44 (25)	16 (8–30)	41 (28–56)
Moderate (4–6)	33 (19)	36 (22–54)	39 (24–57)
Severe (7–10)	31 (18)	36 (21–53)	48 (32–66)

* Low social support defined as ≤ 17 on 4-item social support scale, representing the lowest quartile of scores

^a
n=175

^b
n=173

^c
n=172

^d Average overall pain intensity during the month before the MVC (0–10 scale), n=174

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Table 2

Percentage of patients with high and low perceived social support among those accompanied and unaccompanied in the ED and patients living with or without spouse (N=176).

Social Support*	Accompanied in ED N (%)		Living with Spouse N (%)	
	Yes	No	Yes	No
High (n=130)	84 (65)	46 (35)	86 (66)	44 (34)
Low (n=46)	27 (59)	19 (41)	16 (35)	30 (65)
Total (n=176)	111 (63)	65 (37)	102 (58)	74 (42)

* Low perceived social support defined as ≤ 17 on a 4-item social support scale, representing the lowest quartile of scores

Table 3

a. Initial and 6-week mean MVC-related pain severity by social support for all patients and by gender, depressive symptoms, and marital status. Unadjusted values and values adjusted for gender, age, education, and race are presented. Patients were excluded if week 6 pain score was missing.^a If patient received opioid during ED visit, they were asked to rate their initial pain before opioid usage (N=176).

	Pain severity, mean (95% Confidence Interval)					
	Unadjusted			Adjusted		
	High social support	Low social support*	p	High social support	Low social support*	p
All patients (N=176)						
ED	5.7 (5.2,6.2)	5.9 (5.0,6.7)	0.70	5.7 (5.2–6.2)	5.7 (4.9–6.6)	0.93
Change	-2.5 (-3.0,-2.0)	-1.7 (-2.5,-0.8)	0.08	-2.5 (-3.1,-2.0)	-1.5 (-2.4,-0.7)	0.06
6-week	3.2 (2.7,3.7)	4.2 (3.4,5.1)	0.03	3.2 (2.7,3.6)	4.2 (3.4,5.0)	0.04
Men (N=69) ^b						
ED	5.3 (4.5,6.1)	6.1 (4.5,7.8)	0.37	5.4 (4.6,6.2)	5.6 (4.0,7.3)	0.81
Change	-2.5 (-3.3,-1.7)	-1.2 (-2.7,0.3)	0.14	-2.7 (-3.5,-1.9)	-0.6 (-2.2,0.9)	0.03
6-week	2.8 (2.1,3.5)	4.9 (3.6,6.3)	0.01	2.7 (2.1,3.3)	5.0 (3.7,6.2)	0.003
Women (N=107) ^b						
ED	5.9 (5.3,6.6)	5.8 (4.8,6.7)	0.73	5.9 (5.3,6.5)	5.8 (4.9,6.7)	0.79
Change	-2.5 (-3.2,-1.8)	-1.9 (-2.8,-0.8)	0.27	-2.5 (-3.2,-1.8)	-1.8 (-2.8,-0.8)	0.26
6-week	3.4 (2.8,4.1)	3.9 (2.9,5.0)	0.44	3.4 (2.8,4.1)	4.0 (3.0,5.0)	0.36
Depressed (N=42) ^c						
ED	6.2 (5.2,7.1)	7.2 (6.0,8.4)	0.20	6.5 (5.6,7.3)	6.7 (5.6,7.8)	0.72
Change	-2.6 (-3.7,-1.5)	-2.6 (-4.0,-1.3)	0.96	-2.9 (-3.9,-1.8)	-2.2 (-3.5,-0.9)	0.48
6-week	3.6 (2.5,4.6)	4.6 (3.2,5.8)	0.26	3.6 (2.5,4.7)	4.5 (3.2,5.8)	0.33
Not depressed (N=134)						
ED	5.6 (5.0,6.1)	5.1 (4.0,6.2)	0.46	5.6 (5.0,6.1)	5.0 (4.0,6.1)	0.40
Change	-2.5 (-3.0,-1.9)	-1.0 (-2.0,0.0)	0.02	-2.5 (-3.0,-1.9)	-1.1 (-2.1,0.0)	0.02
6-week	3.1 (2.5,3.6)	4.1 (3.0,5.1)	0.11	3.1 (2.5,3.6)	3.9 (2.9,5.0)	0.12
Married (n=102)						
ED	5.5 (4.9,6.1)	5.6 (4.2,7.0)	0.89	5.5 (4.9,6.1)	5.3 (3.9,6.7)	0.78
Change	-2.7 (-3.4,-2.0)	-1.5 (-3.0,0.0)	0.16	-2.8 (-3.4,-2.1)	-1.3 (-2.9,0.2)	0.11
6-week	2.8 (2.2,3.4)	4.1 (2.8,5.5)	0.09	2.7 (2.2,3.3)	4.0 (2.6,5.3)	0.11

a. Initial and 6-week mean MVC-related pain severity by social support for all patients and by gender, depressive symptoms, and marital status. Unadjusted values and values adjusted for gender, age, education, and race are presented. Patients were excluded if week 6 pain score was missing.^a If patient received opioid during ED visit, they were asked to rate their initial pain before opioid usage (N=176).

	Pain severity, mean (95% Confidence Interval)			
	Unadjusted		Adjusted	
	High social support	Low social support*	High social support	Low social support*
Not married (n=74) ^d				
ED	6.0 (5.2,6.8)	6.0 (5.0,7.0)	6.1 (5.2,6.9)	5.9 (4.9,6.9)
Change	-2.1 (-2.9,-1.3)	-1.7 (-2.6,-0.8)	-2.1 (-2.8,-1.3)	-1.8 (-2.8,-0.8)
6-week	3.9 (3.0,4.7)	4.3 (3.3,5.3)	4.0 (3.2,4.8)	4.1 (3.1,5.1)

b. Initial and 6-week mean MVC-related pain severity by presence of a friend or family member in ED for all patients and by gender, depressive symptoms, and marital status. Unadjusted values and values adjusted for gender, age, education, and race are presented. Patients were excluded if week 6 pain score was missing.^a If patient received opioid during ED visit, they were asked to rate their initial pain before opioid usage (N=176).

	Pain severity, mean (95% Confidence Interval)			
	Unadjusted		Adjusted	
	Accompanied	Unaccompanied	Accompanied	Unaccompanied
All patients (N=176)				
ED	5.7(5.1,6.2)	5.8(5.1,6.5)	5.6(5.0,6.1)	6.0(5.3,6.7)
Change	-2.6(-3.2,-2.1)	-1.7(-2.4,-1.0)	-2.6(-3.2,-2.1)	-1.7(-2.4,-1.0)
6-week	3.0(2.5,3.6)	4.2(3.5,4.8)	2.9(2.4,3.5)	4.3(3.6,4.9)
Men (N=69) ^b				
ED	5.3(4.4,6.2)	5.8(4.6,7.1)	5.3(4.4,6.1)	5.8(4.6,7.0)
Change	-2.5(-3.3,-1.6)	-1.8(-3.0,-0.6)	-2.6(-3.5,-1.8)	-1.6(-2.8,-0.4)
6-week	2.8(2.1,3.6)	4.0(3.0,5.1)	2.6(2.0,3.3)	4.2(3.2,5.2)
Women (N=107) ^b				
ED	5.9(5.2,6.6)	5.9(5.0,6.7)	5.8(5.1,6.5)	6.0(5.2,6.8)
Change	-2.7(-3.4,-2.0)	-1.6(-2.5,-0.8)	-2.7(-3.5,-2.0)	-1.6(-2.6,-0.7)
6-week	3.2(2.5,3.9)	4.2(3.3,5.1)	3.1(2.4,3.8)	4.4(3.5,5.3)
Depressed (N=42) ^c				
ED	7.0(6.0,7.9)	5.9(4.6,7.2)	6.8(6.0,7.6)	6.2(5.1,7.4)
Change	-2.6(-3.7,-1.6)	-2.7(-4.2,-1.3)	-2.6(-3.5,-1.6)	-2.8(-4.2,-1.3)

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* Low perceived social support defined as 17 on a 4-item social support scale, representing the lowest quartile of scores

d Includes single (n=7), widowed (n=33), and divorced (n=34)

Table 4

a. Processes of care by level of social support presented as unadjusted and adjusted percentages. Adjusted percentages adjusted for patient age, gender, education, and race (N=176).

Outcome	Social Support ^a % (95% Confidence Interval)				
	Unadjusted		Adjusted		
	High	Low	High	Low	p
ED length of stay, minutes ^a	345(23)	307(39)	342(23)	316(38)	0.56
Received CT scans ^b	73(64–80)	67(53–79)	73(65–80)	68(53–80)	0.49
Received X-rays ^c	84(76–89)	78(64–88)	85(77–90)	80(65–89)	0.43
Analgesics in ED	35(27–43)	35(23–50)	34(26–43)	31(20–46)	0.72
Opioids in ED	28(21–36)	24(14–38)	28(21–36)	24(14–38)	0.61
Opioid prescribed in ED	32(24–40)	15(7–29)	32(24–40)	14(7–28)	0.02
Opioid use at 6 weeks	20(14–28)	22(12–37)	18(12–26)	19(10–34)	0.85
Admitted	21(15–29)	15(7–29)	19(13–27)	14(7–28)	0.52

b. Processes of care by accompanied status in emergency department presented as unadjusted and adjusted percentages. Adjusted percentages adjusted for patient age, gender, education, and race (N=176).

Outcome	Accompanied % (95% Confidence Interval)				
	Unadjusted		Adjusted		
	Yes	No	Yes	No	p
ED length of stay, minutes ^a	326(25)	351(29)	318(25)	364(33)	0.26
Received CT scans ^b	77(69–84)	61(49–72)	76(67–84)	64(51–75)	0.08
Received X-rays ^c	82(74–88)	83(72–90)	84(75–90)	83(71–91)	0.87
Analgesics in ED	33(24–42)	39(28–51)	31(22–40)	37(26–50)	0.38
Opioids in ED	25(18–34)	29(20–41)	25(18–34)	29(19–42)	0.54
Opioid prescribed in ED	28(20–37)	26(17–38)	28(21–38)	25(16–37)	0.65
Opioid use at 6 weeks	20(13–28)	22(13–34)	17(11–26)	21(12–33)	0.54
Admitted	21(14–29)	17(10–28)	18(11–26)	17(9–29)	0.94

* Low perceived social support defined as 17 on a 4-item social support scale, representing the lowest quartile of scores

^aMean (standard error), n=175

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