HHS Public Access

Author manuscript

Acad Emerg Med. Author manuscript; available in PMC 2017 March 01.

Published in final edited form as:

Acad Emerg Med. 2016 March ; 23(3): 306–314. doi:10.1111/acem.12888.

A Prospective Evaluation of Shared Decision-making Regarding Analgesics Selection for Older Emergency Department Patients With Acute Musculoskeletal Pain

Wesley C. Holland, **Katherine M. Hunold**, **Sowmya A. Mangipudi**, **Alison M. Rittenberg, MD**, **Natalie Yosipovitch**, and **Timothy F. Platts-Mills, MD, MSc**

Department of Emergency Medicine (WCH, NY, TFPM), the Department of Health Policy and Management (SAM), and the Department of Pediatrics (AMR), University of North Carolina, Chapel Hill, NC; and the School of Medicine, University of Virginia (KMH), Charlottesville, VA

Abstract

Objectives—Musculoskeletal pain is a common reason for emergency department (ED) visit by older adults. Outpatient pain management following ED visits in this population is challenging as a result of contraindications to, and side effects from, available therapies. Shared decision-making (SDM) between patients and emergency physicians may improve patient experiences and health outcomes. Among older ED patients with acute musculoskeletal pain, we sought to characterize their desire for involvement in the selection of outpatient analgesics. We also sought to assess the impact of SDM on change in pain at 1 week, patient satisfaction, and side effects.

Methods—This was a prospective study of adults aged 60 years and older presenting to the ED with acute musculoskeletal pain. Participants' desire to contribute to outpatient analgesic selection was assessed by phone within 24 hours of ED discharge using the Control Preferences Scale and categorized as active, collaborative, or passive. The extent to which SDM occurred in the ED was also assessed within 24 hours of discharge using the 9-item Shared Decision Making Questionnaire, and scores were subsequently grouped into tertiles of low, middle, and high SDM. The primary outcome was change in pain severity between the ED visit and 1 week. Secondary outcomes included satisfaction regarding the decision about how to treat pain at home, satisfaction with the pain medication itself, and side effects.

Results—Desire of participants (N = 94) to contribute to the decision regarding selection of outpatient analgesics varied: 16% active (i.e., make the final decision themselves), 37% collaborative (i.e., share decision with provider), and 47% passive (i.e., let the doctor make the final decision). The percentage of patients who desired an active role in the decision was higher for patients who were college educated versus those who were not college educated (28% vs. 11%; difference 17%, 95% confidence interval [CI] = 0% to 35%), received care from a nurse practitioner versus a resident or an attending physician (32% vs. 9%; difference 23%, 95% CI =

Address for correspondence: Timothy F. Platts-Mills, MD, MSc; tplattsm@med.unc.edu.

The authors have no potential conflicts to disclose.

4% to 42%), or received care from a female versus a male provider (24% vs. 5%; difference 19%, 95% = CI 5% to 32%). After potential confounders were adjusted for, the mean decrease in pain severity from the ED visit to 1-week follow-up was not significantly different across tertiles of SDM (p = 0.06). Higher SDM scores were associated with greater satisfaction with the discharge pain medications (p = 0.006). SDM was not associated with the class of analgesic received.

Conclusions—In this sample of older adults with acute musculoskeletal pain, the reported desire of patients to contribute to decisions regarding analgesics varied based on both patient and on provider characteristics. SDM was not significantly related to pain reduction in the first week or type of pain medication received, but was associated with greater patient satisfaction.

Adults aged 65 years and older make approximately 20 million visits to U.S. emergency departments (EDs) each year,[1] and ED visits by this population are increasing.[2] Musculoskeletal pain is one of the most common reasons for ED visit among these patients.[1] Most older adults who present to the ED with musculoskeletal pain are discharged home,[3] requiring emergency physicians to provide guidance to patients regarding the initial outpatient management of pain. Unfortunately, identifying the optimal approach for the use of analgesics in this population is complicated. Nonsteroidal anti-inflammatory drugs (NSAIDs) are contraindicated in patients with congestive heart failure, renal insufficiency, or a history of gastrointestinal bleeding and are also probably unsafe for patients receiving treatment for hypertension.[4–6] Even among individuals without contraindications, NSAIDs still place patients at increased risk for gastrointestinal bleeding, renal failure, and cardiac events.[5,7] Opioids are relatively contraindicated in patients with pulmonary disease or at risk for falls, and side effects from opioids frequently result in discontinuation of treatment.[8]

In part as a result of these concerns, older ED patients are less likely to receive pain medication than younger patients.[9] Failure to effectively manage acute musculoskeletal pain in older adults is common;[10] it also has consequences. Ineffective management of acute pain has been associated with poor long-term functional outcomes after orthopedic surgery in older adults.[11] Persistent musculoskeletal pain in this population is associated with poor sleep,[12] decreased balance,[13] increased falls,[14] decreased quality of life,[15] and mortality.[16] Given the risks of both treatment and nontreatment, improvements in methods used to identify appropriate analgesics for the outpatient treatment of acute musculoskeletal pain in older adults are needed.

One approach that might improve the outpatient treatment of acute pain in older adults is shared decision-making (SDM). SDM is the process in which information is shared between a patient and physician and this shared knowledge is used to reach a mutual agreement regarding treatment.[17] SDM has been studied for the treatment and prevention of a variety of diseases and has been found to be associated with increased patient satisfaction,[18] improved functional outcomes,[19] and increased adherence to treatment plans.[20] Earlier work by our group identified an association between patient participation in the decision-making process and pain recovery for older adults with acute musculoskeletal pain. However, this work used a limited, nonvalidated assessment of SDM that was employed 1 week after the ED visit, increasing the potential for recall bias.[10] Additionally, although it is known that

preferences for contributing to medical decisions among older adults vary,[21] no studies have characterized preferences for SDM in the context of outpatient analgesics.

We conducted a prospective observational study of older adults presenting to the ED with acute musculoskeletal pain to characterize preferences for SDM and to assess the association between SDM regarding the selection of outpatient analgesics and pain relief during the subsequent week. Secondary outcomes included side effects, satisfaction with the selected analgesic, and satisfaction with the decision-making process.

METHODS

Study Design

This was a prospective study of patients aged 60 years and older who presented to the ED of a single medical center between September 2012 and April 2015 with musculoskeletal pain. The study was approved by the local institutional review board, and all participants provided signed informed consent.

Study Setting and Population

The study site is an academic ED serving a racially and socioeconomically diverse community of older adults. In calendar year 2012, the ED had 64,480 visits with 16% of visits by patients aged 60 and older. Patients receive medical care from attending physicians or from residents or nurse practitioners working under the supervision of an attending physician. Eligible consenting patients completed an in-person ED interview. A second assessment was conducted by phone within 24 hours of the ED visit. A third assessment was conducted by phone 1 week following discharge.

Patients were eligible if they were aged 60 years and older, had an ED triage pain score greater than or equal to 4 on a 0–10 scale prior to receiving pain medication, reported musculoskeletal pain of less than 1 month duration, and had not been taking an opioid pain medication on a daily basis prior to the onset of the pain that brought them to the ED. Aged 60 years and older was used as an inclusion criteria, rather than age 65, because our clinical experience reveals that rates of comorbid illness and contraindications to analgesics are sufficiently high by age 60 to create challenges for outpatient pain management. Musculoskeletal pain was identified based on a review of all information available in the medical record by the principle investigator, an emergency physician, and included contusions, sprains, strains, fracture, dislocation, and noninjury pain condition in the extremities, neck, or back, which suggested musculoskeletal pain. Patients were excluded if they had headache, chest pain, or abdominal pain or if the pain was thought to be due to ischemia or infection. Patients were also excluded if they did not speak English, did not have a phone for the purposes of completing follow-up interviews, or had cognitive impairment as evidenced by a score of 3 or less on the Six-Item Screener for cognitive impairment.[22] Inclusion and exclusion criteria were identical to those in our earlier work on this subject.[10] An in-person, structured screening interview was conducted to determine if patients met inclusion criteria. The ED patient record was screened Monday through Friday between noon and 5 P.M. by study personnel to identify potentially eligible patients. Because of the

narrow window of enrollment and occasional interruptions in enrollment due to research assistants (RAs) being unavailable, the sample is reasonably characterized as a convenience sample.

Study Protocol

Eligible, consenting patients completed a structured, in-person interview which assessed patient sociodemographic characteristics, reason for ED visit, and pain symptoms including pain severity and interference with function. The discharge interview (completed by phone within 24 hours of discharge) assessed control preferences in analgesic selection, SDM, patient satisfaction, and amount of information received about the analgesic. A phone interview 6 to 10 days after ED discharge assessed pain symptoms, pain interference, and medication side effects. Patients were called at least once per day until a patient had been successfully contacted or until the time window closed. The RA completing the 1-week follow-up interview always differed from the RA who conducted the ED and discharge interview; this ensured that the RA completing the 1-week interview was blinded to the degree of SDM reported by the patient during the discharge interview. The medical record was used to collect data regarding emergency provider characteristics.[23] Inter-rater reliability for data elements in the interviews in this study was not tested, but reliability of similar outcomes in a similar population (older adults who received care in the ED after injury) has been previously examined by our research group and found to be excellent (99% agreement for all information obtained).[24]

At the hospital where this study was conducted, all nurse practitioners and resident physicians are supervised by attending physicians. Usual practice is for these patients to also be seen by an attending, but we did not record whether this occurred.

All interviews were conducted by RAs trained in clinical research ethics and the protocol of this study. Each RA followed a standardized script and had to demonstrate competence in supervised interviews prior to working independently. A Web-based database (REDCap) was used for recording data and storage.

Predictor Variables

Each patient's preference for control over the selection of analgesics was assessed using the Control Preferences Scale, a single-question measure of the extent to which patients wish to exercise control in making a decision with five response options ranging from the patient preferring to make the final decision to leaving all decisions regarding treatment to the doctor.[25] The reliability of the Control Preferences Scale was established in studies of patients with cancer.[25,26] Responsiveness of the Control Preferences Scale has also been established: preferences for involvement in decision-making increased among men with prostate cancer who received an empowerment intervention.[27] The Control Preferences Scale was created using a grounded theory approach, but direct evidence of construct validity is not available.

Shared decision-making was assessed using the 9-item Shared Decision Making Questionnaire (SDM-Q-9).[28] The SDM-Q-9 measures the degree of SDM present in an interaction between a patient and the care provider. Each item is a statement that a certain

component of SDM occurred; patients are asked to respond to each statement on a 6-point agree/disagree scale ranging from “completely disagree” to “completely agree.” For this study, the questions on the SDM-Q-9 were slightly modified to make it clear to the patient throughout the assessment that the questions were in regard to selecting an outpatient analgesic in the ED (Appendix). The SDM-Q-9 has been shown to have a unidimensional factor structure and high internal consistency (Cronbach’s $\alpha = 0.94–0.98$).[29]

Health literacy was measured using the Rapid Estimate of Adult Literacy in Medicine-Revised (REALM-R), which assesses a patient’s ability to correctly read and pronounce eight medical terms to identify those at risk for poor health literacy. Criterion validity of the REALM-R was assessed by comparing it to the Wide Range Achievement Test-Revised (WRAT-R), which is a nationally standardized test with extensive validity and reliability data with excellent agreement between the two tests (Cronbach’s $\alpha = 0.91$).[30] “At risk” for poor health literacy was defined as correct pronunciation of six or fewer of the eight words.[30] Although there are no reports on the reliability of the REALM-R, test–retest reliability of the REALM measure, which is a longer version of the REALM-R, is outstanding (0.99).[31] The amount of information patients received about the analgesic that was prescribed or recommended to them was assessed using a single-question measure with choices of “a lot”, “some,” or “none at all.”[10]

Outcome Variables

The primary outcome was the change in pain severity from the time of ED arrival to the 1-week follow-up phone interview. Pain severity in the ED was defined as the patient’s mean pain score reported over the past 24 hours or since the onset of injury if onset was within 24 hours. Pain severity at 1 week was assessed as mean pain during the past 24 hours. Both measures of pain used the 0–10 numeric rating scale. Secondary outcomes assessed at discharge include satisfaction with the decision that was made in the ED about how to treat pain at home and satisfaction with the recommended or prescribed pain medication. Satisfaction with the decision and satisfaction with the pain medication were each assessed on a 5-point scale with responses ranging from “not at all” satisfied to “completely” satisfied. For each analgesic medication taken, the presence of 15 common side effects attributed to that medication was assessed, and severity on a 0–10 scale was assessed for each present side effect. The total number of side effects experienced was then calculated as the sum of side effects with reported severity of 4 or more.[10] The type of analgesic(s) prescribed or recommended for each patient was sorted into three classes: opioid, acetaminophen, or NSAID.

Data Analysis

A sample size of 30 patients in each tertile of SDM to be used in an analysis of variance (ANOVA) was needed to identify a 2-point difference[32,33] in change in pain severity with a power of 0.80 and alpha of 0.05 assuming a standard deviation for change in pain severity of 2.5 points. The standard deviation estimate was based on the observed standard deviation for change in pain scores in an ongoing prospective observational study of older adults presenting to the emergency department after motor vehicle collision; the methods of this study have been described previously.[34,35] This power calculation was done a priori.

Enrollment exceeded the calculated sample size to account for loss to follow-up. Responses to the Control Preferences Scale were collapsed into three groups: patients stating they wanted to make the decision themselves or make the decision after seriously considering input from the doctor were categorized as “active”; patients stating they wanted to share with the doctor the responsibility of deciding what treatment is best were categorized as “collaborative,” and patients who wanted to have the doctor make the final decision about treatment after considering their opinions or wanted to leave all treatment decisions to the doctor were categorized as “passive.”[36] The SDM-Q-9 produces a raw score ranging from 0 to 45 by summing each of the 6-point questions, scored from 0 to 5. This raw score was transformed by multiplying by 20/9 as recommended by the instrument creators to produce a score ranging from 0 to 100, with higher scores correlating with higher levels of SDM. This transformation allows for easier interpretation.[28] An a priori decision was made to use tertiles for analysis as no prior literature describes cutoffs for this score and tertiles provide richer comparisons than a dichotomized analysis. A sensitivity analysis was conducted in which the SDM-Q-9 was treated as a continuous variable. The unadjusted relationship between shared decision-making and each of the outcomes was examined using ANOVA.

Outcome variables were assessed for normality before analysis. Change in pain is normally distributed, but SDM is not normally distributed due to kurtosis and number of side effects is not normally distributed due to skewedness. While the nonnormality of these variables may increase the Type I error rate, the degree to which this occurs is generally considered to be minimal and the use of nonnormal data for ANOVA is an accepted practice.[37] Additionally, although ANOVA is usually reserved for true continuous or ratio variables, we used ANOVA to analyze ordinal outcomes (satisfaction scores, control preferences, change in pain, number of side effects) because it allows for a more robust and powerful analysis than nonparametric tests. A chi-square test was used for unadjusted analysis of associations between SDM tertile and analgesic class.

Adjusted relationships between shared decision-making tertiles and outcomes were analyzed using the STATA predxcat command. Covariates were selected a priori based on our understanding based on prior work and clinical experience of factors which might confound the relationship between SDM and pain recovery: age, sex, race, initial pain severity, and health literacy. Patient education was considered for inclusion, but was collinear with health literacy and, therefore, was excluded. A theory driven approach to covariate selection is the preferred approach to model building for etiologic inferences using nonexperimental data.[38–40] The predxcat command estimates adjusted proportions for each outcome at each level of the SDM variable by setting covariates in regression models at their mean values. Predxcat treats the x-variable as a categorical variable. In the case of SDM, this is modeled with two dummy variables in a regression. The p-value for the adjusted analyses uses a 2-degrees of freedom partial F-test for an overall association between x and the outcome.

For all analyses, a p-value of less than or equal to 0.05 was considered significant. All analyses were conducted using STATA 11.0 (StataCorp, College Station, TX).

RESULTS

Characteristics of study participants and providers are presented in Table 1. A total of 257 patients were approached. Of the 173 eligible patients, 157 provided consent. Four patients did not consent because it would take too much time in the ED, four because it would take too much time in follow-up, one was in too much pain, one was too stressed/overwhelmed/anxious, one patient's family would now allow participation, and five for other reasons. Patients who were eligible but did not consent were similar to those who did consent in regard to sex (63% vs. 62% female), age (mean 73 years vs. 70 years), and race (71% vs. 70% white). One week follow-up was obtained for 94 patients, which constituted the analytic sample. The mean age was 70 (range 60–94) years. The majority were female (62%), white (74%), and in severe pain (69%) at triage. Twenty-seven percent were at risk for poor health literacy, which is slightly lower than the percentage observed in a recent study of 400 patients aged 18 years and older at the same ED.[41] There were no systematic differences between patients who completed and did not complete the 1 week follow-up with regard to age, health literacy, and median SDM score. However, the percentage of females (73% vs. 62%) and blacks (40% vs. 26%) were higher in the group that did not complete follow-up than in the group that did. Overall, participants showed a mean reduction in pain score of 2.1 points, from 6.6 to 4.5, between the ED visit and 1-week follow-up. Patients without an injury as the cause of their pain experienced a greater mean reduction in pain score (3.4-point decrease from 7.7 to 4.3) compared to those with injury (1.4-point decrease from 6.1 to 4.7; $p = 0.004$). Overall, 65% of patients reported a pain score of 4 or more 1 week after discharge, which is very similar to the 63% we found in our previous work.[10]

The desire of participants to contribute to the decision of analgesic selection as measured by the Control Preferences Scale varied: 16% active, 37% collaborative, and 47% passive (Table 2). Nineteen percent of patients stated they wanted to leave all treatment decision to the doctor. The following characteristics were associated with a greater desire for an active role in the decision regarding the selection of analgesics: college graduate versus not college graduate (28% vs. 11%; difference 17%, 95% confidence interval [CI] = 0% to 35%), receiving care from a nurse practitioner versus resident or attending physician (32% vs. 9%; difference 23%, 95% CI = 4% to 42%), and receiving care from a female versus male provider (24% vs. 5%; difference 19%, 95% CI = 5% to 32%). More patients who received care from an attending physician reported having received "a lot" of information than did those receiving care from a resident or a nurse practitioner (53% vs. 30%; difference 23%, 95% CI = 2% to 44%). Twenty-eight patients were seen primarily by nurse practitioners, 36 primarily by residents, and 30 primarily by attending physicians. The largest number of patients seen by a single provider was five (5%).

Tertiles of SDM were not significantly associated with the primary outcome of change in pain severity during the first week after the ED visit either prior to ($p = 0.08$) or after adjusting for confounders ($p = 0.06$; Table 3). Overall, 51% of patients reported any side effect and 41% reported a moderate or severe side effect (side effect severity of 4 or greater on a 10-point scale). Seven patients (7%) reported stopping a medication due to side effects. SDM was associated with greater patient satisfaction with the selected analgesic ($p = 0.002$);

pairwise comparisons showed significant differences between the first and second (low and moderate) and first and third (low and high) tertiles for satisfaction with the selected analgesic. The percentage of individuals receiving specific classes of analgesic did not vary significantly across SDM tertiles for opioids ($p = 0.06$), acetaminophen ($p = 0.4$), or NSAIDs ($p = 0.1$). Patients' stated preference for involvement in the decision regarding analgesic selection was not associated with the extent to which SDM actually occurred ($p = 0.55$). The sensitivity analysis treating SDM as a continuous variable did not change the significance of the primary outcome, change in pain. However, the relationship between SDM and the secondary outcome of satisfaction with the decision made in the ED was significant both unadjusted ($p = 0.01$) and adjusted ($p = 0.02$).

DISCUSSION

In this sample of older adults presenting to the ED with acute musculoskeletal pain, we observe an association between SDM and satisfaction, but do not see an association between SDM and pain reduction or side effects as we had in our earlier work.[10] The mean pain score at 1 week was 4.5, which is similar to findings in our earlier work and confirms that persistent pain at 1 week is a common problem. The design of this study addresses several limitations present in our prior work. Rather than assessing SDM simultaneous with the assessment of 1-week outcomes, in this study we assessed SDM within 24 hours of discharge. We also used a validated measure of SDM. These changes reduce recall bias and provide a more accurate assessment of the amount of SDM that occurred.

In our sample, the majority of participants (53%) wanted either an active or collaborative role in the decision-making process, and 81% wanted at least some contribution to the decision. Across the spectrum of medical decision-making, older patients' desire for involvement in decisions varies,[21] and emergency physicians recognize that some patients prefer to have doctors make treatment decisions.[42] We did not ask patients about desire for information, but other works suggests that most ED patients would like more information about analgesic treatment options.[43] Collectively, observed desire of patients to contribute to decisions and the positive effect of SDM on patient satisfaction support the hypothesis that SDM is an appropriate approach for making outpatient pain management decisions for older ED patients.

We observe that preferences for control over the decision regarding the selection of outpatient analgesics varied not just based on characteristics of the patient but also on characteristics of the provider. Although the general idea that preferences for decision-making vary depending on context is not surprising, the details are and raise a number of questions. A greater preference for an active role by patients seen by female providers and nurse practitioners may reflect that women and nurse practitioners do a better job of listening to and empowering older adults to make their own decisions. An alternate interpretation is that older adults may feel less comfortable leaving the decision to women and nurse practitioners. We did not collect information to help us differentiate between these interpretations. Also, many of the nurse practitioners providing care at the study site ED are female, but we did not have sufficient sample size to perform stratified or adjusted analyses

to see whether patients were more likely to want an active role in the decision when seen by female versus male physicians or female versus male nurse practitioners.

LIMITATIONS

The measure we used to assess SDM has been validated in a primary care setting and is widely used.[28] However, the measure has not been validated specifically in the ED. Further, we chose to modify the measure to ensure that patients understood that we were asking about decision-making regarding treatment of pain at home. The "observing patient involvement in decision making" (OPTION) scale provides an alternative approach to assessing SDM but relies on a third person or video camera in the room rather than a patient assessment and has lower internal consistency and inter-rater reliability than the SDM-Q-9.[44,45] Although the 1-week follow-up rate for the study was satisfactory (86%), differential loss to follow-up of patients related to either SDM characteristics or outcomes may have introduced bias. Given the complexity of outpatient management of pain in older adults, increased education of older adults at the time of discharge may be a valuable antecedent to SDM. In this study we did not take steps to ensure adequate education of patients regarding analgesic options. Patients were enrolled during weekday afternoons from a single academic ED in the southeastern United States. These patients and the providers who cared for them may differ from patients and providers elsewhere and those seen at different times.

Another limitation of this study was that the Control Preferences Scale was assessed during the discharge interview, which always occurred after the completion of the ED visit. Not only is it possible that the patient–physician interaction in the ED may have influenced the Control Preference Scale response, the associations between the physician's sex and level of training and the patient's Control Preference Scale responses suggests that an influence was present. As such, the preferences for involvement in decision making provided by patients in this study are probably best interpreted as the patient's preferences in the particular context of the care they received on this particular ED visit. Assessing Control Preferences Scale before the patient met their ED provider may have provided a different and arguable more objective measurement of the patient's desire for involvement in decision making.

Using ANOVA to analyze nonnormally distributed outcomes was another limitation of this study, although this approach is generally considered an acceptable practice.[37] Further, although ANOVA was initially developed to analyze continuous variables, we used it to analyze ordinal outcomes because it is a more powerful test than nonparametric alternatives. Finally, the sample size in this study is less than optimal for supporting a logistic regression model with eight covariates, which increases the potential for Type II error.

CONCLUSIONS

Interest in the role of shared decision-making during emergency care is increasing,[46] but the current evidence base is limited. Among older patients with acute pain, we find that more than half of patients wanted some involvement in the decision making process regarding outpatient analgesic selection and that shared decision-making was associated with greater

satisfaction with the analgesic selected, but was not associated with decreased pain. A clinical trial is needed to confirm this benefit of shared decision.

Acknowledgments

This study was supported by the Summer Undergraduate Research Fellowship at the University of North Carolina at Chapel Hill (WCH), the Clinical and Translational Science Award program of the National Center for Advancing Translational Sciences of the National Institutes of Health under award number 1UL1TR001111, and the National Institute on Aging grant K32AG038548 (TFPM).

References

1. Pines JM, Mullins PM, Cooper JK, Feng LB, Roth KE. National trends in emergency department use, care patterns, and quality of care of older adults in the United States. J Am Geriatr Soc. 2013; 61:12–7. [PubMed: 23311549]
2. Roberts DC, McKay MP, Shaffer A. Increasing rates of emergency department visits for elderly patients in the United States, 1993 to 2003. Ann Emerg Med. 2008; 51:769–74. [PubMed: 18069088]
3. Hastings SN, Smith VA, Weinberger M, Schmader KE, Olsen MK, Oddone EZ. Emergency department visits in Veterans Affairs medical facilities. Am J Manag Care. 2011; 17:e215–23. [PubMed: 21756015]
4. Roumie CL, Arbogast PG, Mitchel EF, Griffin MR. Prescriptions for chronic high-dose cyclooxygenase-2 inhibitors are often inappropriate and potentially dangerous. J Gen Intern Med. 2005; 20:879–83. [PubMed: 16191131]
5. Griffin MR, Yared A, Ray WA. Nonsteroidal antiinflammatory drugs and acute renal failure in elderly persons. Am J Epidemiol. 2000; 151:488–96. [PubMed: 10707917]
6. Guess H, West R, Strand L, et al. Fatal upper gastrointestinal hemorrhage or perforation among users and nonusers of nonsteroidal anti-inflammatory drugs in Saskatchewan, Canada 1983. J Clin Epidemiol. 1988; 41:35–45. [PubMed: 3257254]
7. Salvo F, Fourrier-Réglat A, Bazin F, et al. Cardiovascular and gastrointestinal safety of NSAIDs: a systematic review of meta-analyses of randomized clinical trials. Clin Pharmacol Ther. 2011; 89:855–66. [PubMed: 21471964]
8. Hunold KM, Esserman DA, Isaacs CG, et al. Side effects from oral opioids in older adults during the first week of treatment for acute musculoskeletal pain. Acad Emerg Med. 2013; 20:872–9. [PubMed: 24033733]
9. Platts-Mills TF, Esserman DA, Brown DL, Bortsov AV, Sloane PD, McLean SA. Older US emergency department patients are less likely to receive pain medication than younger patients: results from a national survey. Ann Emerg Med. 2012; 60:199–206. [PubMed: 22032803]
10. Isaacs CG, Kistler C, Hunold KM, et al. Shared decision-making in the selection of outpatient analgesics for older individuals in the emergency department. J Am Geriatr Soc. 2013; 61:793–8. [PubMed: 23590177]
11. Morrison RS, Magaziner J, McLaughlin MA, et al. The impact of post-operative pain on outcomes following hip fracture. Pain. 2003; 103:303–11. [PubMed: 12791436]
12. Pavlin DJ, Chen C, Penaloza DA, Buckley FP. A survey of pain and other symptoms that affect the recovery process after discharge from an ambulatory surgery unit. J Clin Anesth. 2004; 16:200–6. [PubMed: 15217660]
13. Poole E, Treleaven J, Jull G. The influence of neck pain on balance and gait parameters in community-dwelling elders. Man Ther. 2008; 13:317–24. [PubMed: 17553727]
14. Leveille SG, Jones RN, Kiely DK, et al. Chronic musculoskeletal pain and the occurrence of falls in an older population. JAMA. 2009; 302:2214–21. [PubMed: 19934422]
15. Wu CL, Naqibuddin M, Rowlingson AJ, Lietman SA, Jermyn RM, Fleisher LA. The effect of pain on health-related quality of life in the immediate postoperative period. Anesth Analg. 2003; 97:1078–85. table of contents. [PubMed: 14500161]

16. Zhu K, Devine A, Dick IM, Prince RL. Association of back pain frequency with mortality, coronary heart events, mobility, and quality of life in elderly women. Spine (Phila Pa 1976). 2007; 32:2012–8. [PubMed: 17700450]
17. Charles C, Gafni A, Whelan T. Shared decision-making in the medical encounter: what does it mean? (or it takes at least two to tango). Soc Sci Med. 1997; 44:681–92. [PubMed: 9032835]
18. Krones T, Keller H, Sonnichsen A, et al. Absolute cardiovascular disease risk and shared decision making in primary care: a randomized controlled trial. Ann Fam Med. 2008; 6:218–27. [PubMed: 18474884]
19. Greenfield S, Kaplan S, Ware JE Jr. Expanding patient involvement in care. Effects on patient outcomes. Ann Intern Med. 1985; 102:520–8. [PubMed: 3977198]
20. Wilson SR, Strub P, Buist AS, et al. Shared treatment decision making improves adherence and outcomes in poorly controlled asthma. Am J Respir Crit Care Med. 2010; 181:566–77. [PubMed: 20019345]
21. Belcher VN, Fried TR, Agostini JV, Tinetti ME. Views of older adults on patient participation in medication-related decision making. J Gen Intern Med. 2006; 21:298–303. [PubMed: 16686804]
22. Callahan CM, Unverzagt FW, Hui SL, Perkins AJ, Hendrie HC. Six-item screener to identify cognitive impairment among potential subjects for clinical research. Med Care. 2002; 40:771–81. [PubMed: 12218768]
23. Charlson ME, Pompei P, Ales KL, MacKenzie CR. A new method of classifying prognostic comorbidity in longitudinal studies: development and validation. J Chronic Dis. 1987; 40:373–83. [PubMed: 3558716]
24. Platts-Mills TF, Ballina L, Bortsov AV, et al. Using emergency department-based inception cohorts to determine genetic characteristics associated with long term patient outcomes after motor vehicle collision: methodology of the CRASH study. BMC Emerg Med. 2011; 11:14. [PubMed: 21943293]
25. Degner LF, Sloan JA, Venkatesh P. The Control Preferences Scale. Can J Nurs Res. 1997; 29:21–43. [PubMed: 9505581]
26. Degner LF, Sloan JA. Decision making during serious illness: what role do patients really want to play? J Clin Epidemiol. 1992; 45:941–50. [PubMed: 1432023]
27. Davison BJ, Degner LF. Empowerment of men newly diagnosed with prostate cancer. Cancer Nurs. 1997; 20:187–96. [PubMed: 9190093]
28. Kriston L, Scholl I, Hölzel L, Simon D, Loh A, Härter M. The 9-item Shared Decision Making Questionnaire (SDM-Q-9). Development and psychometric properties in a primary care sample. Patient Educ Couns. 2010; 80:94–9. [PubMed: 19879711]
29. Glass KE, Wills CE, Holloman C, et al. Shared decision making and other variables as correlates of satisfaction with health care decisions in a United States national survey. Patient Educ Couns. 2012; 88:100–5. [PubMed: 22410642]
30. Bass PF 3rd, Wilson JF, Griffith CH. A shortened instrument for literacy screening. J Gen Intern Med. 2003; 18:1036–8. [PubMed: 14687263]
31. Murphy PW, Davis TC, Long SW, et al. Rapid estimate of adult literacy in medicine (REALM): a quick reading test for patients. J Read. 1993; 37:124–30.
32. Farrar JT, Young JP Jr, LaMoreaux L, Werth JL, Poole RM. Clinical importance of changes in chronic pain intensity measured on an 11-point numerical pain rating scale. Pain. 2001; 94:149–58. [PubMed: 11690728]
33. Kovacs FM, Abraira V, Royuela A, et al. Minimal clinically important change for pain intensity and disability in patients with nonspecific low back pain. Spine (Phila Pa 1976). 2007; 32:2915–20. [PubMed: 18246018]
34. Platts-Mills TF, Flannigan SA, Bortsov AV, et al. Persistent Pain Among Older Adults Discharged Home From the Emergency Department After Motor Vehicle Crash: A Prospective Cohort Study. Ann Emerg Med. 2015 Epub ahead of print.
35. Richmond NL, Flannigan SA, Keil LG, Betz ME, Platts-Mills TF. Cessation of driving is rare in older drivers seen in the emergency department after a motor vehicle collision: a prospective cohort study. J Am Geriatr Soc. 2015; 63:183–5. [PubMed: 25597573]

36. Degner LF, Kristjanson LJ, Bowman D, et al. Information needs and decisional preferences in women with breast cancer. JAMA. 1997; 277:1485–92. [PubMed: 9145723]
37. Nimon KF. Statistical assumptions of substantive analyses across the general linear model: a mini-review. Front Psychol. 2012; 3:322. [PubMed: 22973253]
38. Hernan MA, Hernandez-Diaz S, Werler MM, Mitchell AA. Causal knowledge as a prerequisite for confounding evaluation: an application to birth defects epidemiology. Am J Epidemiol. 2002; 155:176–84. [PubMed: 11790682]
39. Robins JM, Greenland S. The role of model selection in causal inference from nonexperimental data. Am J Epidemiol. 1986; 123:392–402. [PubMed: 3946386]
40. Rothman, KJ.; Greenland, S.; Lash, TL. Modern epidemiology. Philadelphia: Lippincott Williams & Wilkins; 2008.
41. Kiechle ES, Hnat AT, Norman KE, Viera AJ, DeWalt DA, Brice JH. Comparison of brief health literacy screens in the emergency department. J Health Commun. 2015; 20:539–45. [PubMed: 25807061]
42. Kanzaria HK, Brook RH, Probst MA, Harris D, Berry SH, Hoffman JR. Emergency physician perceptions of shared decision-making. Acad Emerg Med. 2015; 22:399–405. [PubMed: 25807995]
43. Smith RJ, Rhodes K, Paciotti B, Kelly S, Perrone J, Meisel ZF. Patient Perspectives of Acute Pain Management in the Era of the Opioid Epidemic. Ann Emerg Med. 2015; 66:246, 252. [PubMed: 25865093]
44. Elwyn G, Edwards A, Wensing M, Hood K, Atwell C, Grol R. Shared decision making: developing the OPTION scale for measuring patient involvement. Qual Saf Health Care. 2003; 12:93–9. [PubMed: 12679504]
45. Scholl I, Kriston L, Dirmaier J, Härter M. Comparing the nine-item shared decision-making questionnaire to the OPTION scale - an attempt to establish convergent validity. Health Expect. 2015; 18:137–50. [PubMed: 23176071]
46. Hess EP, Grudzen CR, Thomson R, Raja AS, Carpenter CR. Shared decision-making in the emergency department: respecting patient autonomy when seconds count. Acad Emerg Med. 2015; 22:856–64. [PubMed: 26112797]

APPENDIX A

Modified SDM-Q-9 Questions

Participants were instructed “For each statement, please indicate how much you agree or disagree by circling your answer to each question.” with response choices of 1 = completely disagree, 2 = strongly disagree, 3 = somewhat disagree, 4 = somewhat agree, 5 = strongly agree, and 6 = completely agree.

1. My doctor made clear that a decision about how to treat my pain at home needed to be made.
2. My doctor wanted to know exactly how I wanted to be involved in making the decision about treating my pain at home.
3. My doctor told me that there are different options for treating my pain at home.
4. My doctor precisely explained the advantages and disadvantages of the pain treatment options.
5. My doctor helped me understand all the information about the different pain treatment options.
6. My doctor asked me which pain treatment option I preferred.

7. My doctor and I thoroughly weighed the different pain treatment options.
8. My doctor and I selected a pain treatment option together.
9. My doctor and I reached an agreement on how I would treat my pain at home.

Table 1

Characteristics of Study Participants and Providers (N = 94)

Characteristics	*N* (%)
Age (yr)	
60–69	54 (57)
70–79	22 (23)
≥80	18 (19)
Sex	
Female	58 (62)
Male	36 (38)
Race	
White	70 (74)
Black	24 (26)
College graduate	
Yes	25 (27)
No	69 (73)
Poor health literacy*	
At risk	25 (27)
Not at risk	69 (73)
Initial pain level†	
Mild (0–3)	11 (12)
Moderate (4–6)	30 (31)
Severe (7–10)	53 (56)
Provider sex	
Female	55 (59)
Male	39 (41)
Provider training	
Resident	36 (38)
Nurse practitioner	28 (30)
Attending	30 (32)

REALM-R = Rapid Estimate of Adult Literacy in Medicine-Revised.

*At risk defined as REALM-R score of ≤ 6.

†0–10 scale.

Table 2

Participation Preferences, SDM, and Information Received About Analgesics as Reported by Participants

	Participation Preference, % (95% CI)				
Characteristics	**Active***	**Collaborative†**	**Passive‡**	**SDM,§ Median (IQR)**	**Received "A Lot" of Information % (95% CI)**
Overall	16 (8–23)	37 (27–47)	47 (37–57)	51 (27–73)	38 (28–48)
Age (years)					
60–69	17 (7–27)	37 (24–50)	46 (33–60)	57 (33–73)	44 (31–58)
70–79	23 (5–41)	36 (16–57)	41 (20–62)	47 (22–73)	19 (2–36)
≥80	6 (0–17)	39 (15–62)	56 (32–79)	47 (24–80)	39 (15–62)
Sex					
Female	17 (7–27)	36 (24–49)	47 (33–60)	56 (27–80)	40 (27–53)
Male	14 (2–25)	39 (23–55)	47 (30–64)	50 (34–66)	33 (18–49)
Race					
White	19 (9–28)	41 (30–53)	40 (28–52)	47 (27–71)	37 (26–49)
Black	8 (0–20)	25 (7–43)	67 (47–86)	60 (47–80)	39 (18–60)
College graduate					
Yes	28 (10–44)	38 (20–56)	34 (17–52)	44 (24–67)	28 (11–44)
No	11 (3–18)	37 (25–49)	52 (40–65)	51 (33–73)	42 (30–55)
Poor health literacy‖					
At risk	8 (0–19)	28 (10–46)	64 (45–83)	56 (49–80)	40 (20–60)
Not at risk	19 (9–28)	41 (29–52)	41 (29–52)	44 (24–67)	37 (25–48)
Initial pain level¶					
Mild (0–3)	18 (0–42)	27 (0–55)	55 (23–86)	64 (33–80)	27 (0–55)
Moderate (4–6)	20 (5–35)	40 (22–58)	40 (22–58)	58 (40–71)	47 (28–65)
Severe (7–10)	13 (4–23)	38 (24–51)	49 (35–63)	49 (24–73)	35 (21–48)
Provider sex					
Female	24 (12–35)	33 (20–45)	44 (30–57)	49 (27–71)	35 (22–47)
Male	5 (0–12)	44 (28–60)	51 (35–67)	58 (27–80)	42 (26–58)
Provider training					
Resident	8 (0–18)	44 (28–61)	47 (30–64)	50 (24–80)	29 (13–44)
Nurse practitioner	32 (14–50)	14 (1–28)	54 (35–73)	44 (28–61)	32 (14–50)

Characteristics	Participation Preference, % (95% CI)			SDM,[§] Median (IQR)	Received "A Lot" of Information % (95% CI)
	Active[*]	Collaborative[†]	Passive[‡]		
Attending	10 (0–21)	50 (32–68)	40 (22–58)	58 (44–78)	53 (35–72)

IQR = interquartile range; REALM-R = Rapid Estimate of Adult Literacy in Medicine-Revised; SDM = shared decision-making.

[*] Patient preferred to independently make final decision about treatment or to make final decision after seriously considering opinion of doctor.

[†] Patient preferred to share responsibility of decision regarding treatment with doctor.

[‡] Patient preferred to have doctor make the final decision regarding treatment while considering opinion of patient or to leave all decisions to doctor.

[§] Scores range from 0 to 100.

[||] At risk defined as REALM-R score of ≤ 6.

[¶] 0–10 scale.

Table 3

Mean Change in Pain; Number of Side Effects; Satisfaction With Decision; Satisfaction With Pain Medication; and Class of Analgesic Received by SDM Tertile Adjusted For Age, Sex, Race, Initial Pain Severity, and Health Literacy

	SDM*							
	Unadjusted				Adjusted			
Outcome	**Low**	**Moderate**	**High**	**p-value†**	**Low**	**Moderate**	**High**	**p-value‡**
Change in pain	−2.8	−1.1	−2.5	0.08	−2.8	−1.0	−2.3	0.06
Number of side effects	1.3	2.2	2.0	0.4	1.4	2.2	1.8	0.4
Satisfaction with decision§	3.3	3.7	4.1	0.07	3.3	3.7	4.1	0.1
Satisfaction with pain medication§	2.7	3.5	3.9	0.002	2.7	3.4	3.9	0.006
Percent receiving opioid analgesic	48	77	67	0.06	55	76	68	0.25
Percent receiving acetaminophen	21	27	13	0.4	14	25	11	0.4
Percent receiving NSAID	12	17	32	0.1	11	12	33	0.07

ANOVA = analysis of variance; NSAID = nonsteroidal anti-inflammatory drug.

*Scores ranged from 0 to 100.

†Change in pain, number of side effects, and satisfaction outcomes analyzed using ANOVA; analgesic outcomes analyzed using chi-square test.

‡Adjusted using STATA's predxcat command,

§1–5 scale with 1 corresponding to "not at all satisfied" and 5 corresponding to "completely satisfied."