A Randomized Trial Testing the Effect of Narrative Vignettes Versus Guideline Summaries on Provider Response to a Professional Organization Clinical Policy for Safe Opioid Prescribing

Zachary F. Meisel, MD, MSHP*; Joshua P. Metlay, MD, PhD; Lauren Sinnenberg, BA; Austin S. Kilaru, MD; Anne Grossesteuer, PhD; Frances K. Barg, PhD; Frances S. Shofer, PhD; Karin V. Rhodes, MD, MA; Jeanmarie Perrone, MD

Corresponding Author. E-mail: zfm@wharton.upenn.edu, Twitter: @zacharymeisel.

Study objective: Clinical guidelines are known to be underused by practitioners. In response to the challenges of treating pain amid a prescription opioid epidemic, the American College of Emergency Physicians (ACEP) published an evidence-based clinical policy for opioid prescribing in 2012. Evidence-based narratives, an effective method of communicating health information in a variety of settings, offer a novel strategy for disseminating guidelines to physicians and engaging providers with clinical evidence. We compare whether narrative vignettes embedded in the ACEP daily e-newsletter improved dissemination of the clinical policy to ACEP members, and engagement of members with the clinical policy, compared with traditional summary text.

Methods: A prospective randomized controlled study, titled Stories to Promote Information Using Narrative trial, was performed. Derived from qualitative interviews with 61 ACEP physicians, 4 narrative vignettes were selected and refined, using a consensus panel of clinical and implementation experts. All ACEP members were then block randomized by state of residence to receive alternative versions of a daily e-mailed newsletter for a total of 24 days during a 9-week period. Narrative newsletters contained a selection of vignettes that referenced opioid prescription dilemmas. Control newsletters contained a selection of descriptive text about the clinical policy, using length and appearance similar to that of the narrative vignettes. Embedded in the newsletters were Web links to the complete vignette or traditional summary text, as well as additional links to the full ACEP clinical policy and a Web site providing assistance with prescription drug monitoring program enrollment. The newsletters were otherwise identical. Outcomes measured were the percentage of subjects who visited any of the Web pages that contained additional guideline-related information and the odds of any unique physician visiting these Web pages during the study.

Results: There were 27,592 physicians randomized, and 21,226 received the newsletter during the study period. When each physician was counted once during the study period, there were 509 unique visitors in the narrative group and 173 unique visitors in the control group (4.8% versus 1.6%; difference 3.2%; 95% confidence interval [CI] 2.7% to 3.7%). There were 744 gross visits from the e-newsletter to any of the 3 Web pages in the narrative group compared with 248 in the control group (7.0% versus 2.3%; odds ratio 3.2; 95% CI 2.7 to 3.6). During the study, the odds ratio of any physician in the narrative group visiting one of the 3 informational Web sites compared with the control group was 3.1 (95% CI 2.6 to 3.6).


Please see page XX for the Editor’s Capsule Summary of this article.
**Editor’s Capsule Summary**

**What is already known on this topic**
Clinical support tools are infrequently used in practice, often from lack of understanding. Narratives often help audiences engage more with learning topics.

**What question this study addressed**
Would the use of clinical narratives increase the frequency of clinicians looking at a publication espousing a new American College of Emergency Physicians clinical policy?

**What this study adds to our knowledge**
In a randomized study of 21,226 emergency physicians receiving a Web-based newsletter, more receiving a narrative approach opened the policy compared with controls seeing standard policy presentation, with low frequencies of each (4.8% versus 1.6%).

**How this is relevant to clinical practice**
Narratives help engage physicians compared with classic approaches to policy description, but neither form has high use. Any clinical influence remains unstudied.

Medical providers, particularly those who deliver acute unscheduled care, are challenged daily when facing patients with moderate to severe pain, given the imperative to provide prompt and effective analgesia. Increasingly, the choices made for individuals with painful complaints are influenced by the societal risks of prescription drug abuse. Previous work finds that emergency physicians express frustration about how to best navigate the need to provide optimum pain relief to their patients while serving as stewards of these controlled medications. Indeed, significant variations in opioid prescribing practices have been demonstrated. To address these variations amid a public health crisis, physician organizations, government entities, and local hospitals and health systems have drafted guidelines to assist clinicians in the management of common pain complaints.

**Importance**
The net effect of any clinical guideline depends on the extent to which it is disseminated to and adopted by providers. Many factors have been shown to impede the adoption of clinical guidelines, including unawareness of their existence, disagreement with their content, and the challenges of changing established practices. Strategies to promote the dissemination and implementation of clinical guidelines are acknowledged to have variable effectiveness, and there is a limited evidence base to support any single approach. Little is known about how individual clinician specialists adopt and use existing opioid guidelines. Previous work found that emergency physicians use guidelines more often as a communication tool to inform patients about prescribing decisions. When queried specifically about opioid prescription guidelines, emergency physicians have expressed general favorability but have varied in awareness of the specific content.

One potential approach to improving guideline dissemination and engagement includes the use of evidence-based narratives. Narratives are defined as cohesive stories with an identifiable beginning, middle, and end that include characters, raise questions, and provide resolution. The theoretical underpinnings for narrative approaches to promote health behavior change include social cognitive theory and the theory of reasoned action. Many comparative studies of narratives on health have been conducted with the aim of modifying patient, not provider, behavior. Although physicians are known to use narrative sources to learn about health information, most programs for disseminating clinical information or recommendations to health care providers use summary methods (syntheses of data or recommendations presented without narrative context) alone. Guideline writers have been encouraged to use narrative-based approaches to disseminate recommendations; to date, these methods have not been empirically tested, to our knowledge. In accordance with previous studies comparing an evidence-based narrative to standard guideline text on emergency physician knowledge and recall of opioid prescribing guideline information, we sought to test this approach on provider response among a national sample of emergency physicians.

**Goals of This Investigation**
In October 2012, the American College of Emergency Physicians (ACEP), with support from the Centers for Disease Control and Prevention, published evidence-based guidelines to direct emergency physicians in the management of pain and to encourage use of state-based prescription drug monitoring programs before opioid prescribing. We sought to compare whether guideline information presented in narrative format compared with traditional summary form improved the way physician members responded electronically to the ACEP practice guideline as a marker of dissemination and engagement.
MATERIALS AND METHODS

Study Design and Setting

This was a national, prospective, randomized, controlled trial of emergency physicians (the Stories to Promote Information Using Narrative). To develop the narrative intervention, vignettes were empirically generated with established techniques in narrative communication, as well as data collected during an earlier phase of this study. The earlier phase took place in October 2012, during which semistructured interviews were conducted with emergency physicians attending the ACEP Scientific Assembly in Denver, CO, focusing on attitudes and beliefs related to pain control, opioid prescriptions, and perceived barriers and facilitators to the use of practice guidelines. The methods and findings from a qualitative analysis of these interviews have been described previously. The common themes identified during the interviews were local versus national guidelines, lack of engagement, communication with patients, physician autonomy, standardization, public health perspectives, liability, hospital case mix, word of mouth or spread of policy, and patient expectations.

Selection of Participants

All physician ACEP members (except students) as of September 1, 2014, were block randomized by state of residence to receive alternative versions of the Emergency Medicine Today newsletter for a total of 24 days between October 13, 2014, and December 19, 2014. The newsletter is provided free to dues-paying members, who can opt out of receiving the newsletter at joining the organization or renewing membership. The newsletter, produced by a professional medical information firm in cooperation with ACEP, contains general health and health policy news content, as well as specific information for emergency medicine and ACEP members. Those who opted out of receiving the daily e-mail newsletter were excluded. ACEP represents more than 33,000 emergency physicians, emergency medicine residents, and medical students across the United States (out of a total estimated 45,000 emergency physicians in the United States), with a small subset of international members. Block randomization was performed to ensure equal distribution of the interventions by state, for which policies related to opioid prescriptions and prescription drug monitoring program use vary. International members were coded as a single block in the randomization scheme.

The themes elicited in the first phase of the study served as the framework for a series of 10 written vignettes, constructed to optimize known elements of effective narrative communication. Each story contained at least 4 of the 10 identified themes, and their content was grounded in real stories collected during the interview process. The stories ranged from narratives about physicians to others about patients. Some had a “scary” ending with negative outcomes. Others were deemed more uplifting. Some stories featured patients with legitimate analgesia needs and others featured those with aberrant behavior. A consensus panel composed of clinical and implementation experts, professional journalists, and editors was used to measure, rank, and select 4 narrative vignettes for use in this guideline dissemination trial. The selection process used a validated scale for elements of effective narrative communication, focusing on the ability to “transport the reader.” Each narrative vignette referenced the ACEP guideline and incorporated at least one of its core recommendations (eg, for emergency providers to use a prescription drug monitoring program before prescribing opioids). The narrative vignettes described specific characters and contained conflict and resolution focusing on these theoretical elements of behavior change.

Each “narrative” newsletter contained a text box headlined “Stories From ACEP Physicians,” containing a short selection (or “teaser”) from one of the 4 narrative vignettes. Each text box contained 3 Web hyperlinks, as shown in Figure 1. The hyperlinks, when selected, led newsletter readers to one of 3 ACEP-hosted Web sites containing the complete narrative text associated with the text-box selection, the official 2012 ACEP opioid clinical policy, or a Web site containing a map of every state, with additional hyperlinks to each state’s prescription drug monitoring program enrollment site (Figure 2).

Interventions

The control text was written by the investigators and used descriptive language in a style similar to summaries that routinely accompany practice guidelines. It referenced specific elements of the guideline, including the core recommendation to use prescription monitoring programs, and was edited and vetted by the expert panel for clarity and similarity to other guideline summaries from ACEP. (See Appendix E1, available online at http://www.annemergmed.com, for complete examples of narrative and control text displayed on the ACEP hosted Web pages.)

Control newsletters contained a text box with a selection of descriptive text about the guideline, with length and appearance similar to that of the narrative newsletter text box. The control newsletters, otherwise identical to the narrative newsletters, likewise contained 3 Web hyperlinks to an expanded version of the control text, the ACEP guideline, and the prescription drug monitoring program enrollment map. The newsletters, sent to physicians randomized to either the narrative or control groups, were,
beyond the experimental text boxes, otherwise identical, including the subject line of the daily e-mails.

For both the narrative and control groups, the newsletter-linked Web pages also contained hyperlinks to the other engagement sites. For example, the “read more” pages (composed of the full narrative vignettes or complete guideline summary text) each contained additional hyperlinks to the prescription drug monitoring program map and ACEP guideline Web site. The 4 narratives were published on a weekday rotation during the 9 weeks of the study period, broken into 3 periods separated by 2-week “rest periods” in which no study-related content was included in the newsletters. Control content did not vary during the study. For each day that the experiment ran, all subjects

Figure 1. Text boxes embedded in the Emergency Medicine Today newsletter for the narrative and control groups, with experimental hyperlinks (see Appendix E2, available online at http://www.annemergmed.com, for example of newsletter).

Figure 2. ACEP prescription drug monitoring program enrollment Web page.
received either a narrative or control newsletter, depending on the initial randomized allocation. Subjects were blinded to the presence of the experiment. (See Appendix E2, available online at http://www.annemergmed.com, for examples of the Emergency Medicine Today newsletter with a narrative and control text box.)

Methods of Measurement and Outcome Measures

Primary outcomes measured were unique visitors to the Web pages involved in the study. Unique visitors counts each enrolled physician only once during the study period. The Web pages, which were accessed by hyperlinks embedded in the newsletter, contained the full experimental text (narrative or control), contained complete guideline information, or provided assistance with enrolling in prescription drug monitoring programs. Secondary outcomes included percentage of physicians who opened the newsletter e-mail. Data collected from ACEP included visits to the complete guideline or prescription drug monitoring program enrollment page. ACEP’s newsletter vendor provided additional data, including gross and unique newsletter, guideline, and prescription drug monitoring program enrollment page views originating from the newsletter itself. Because the hyperlinks were embedded in e-mailed newsletters, the analytics program was able to assign a unique identifier to each member who visited the Web sites of interest. During analysis, we counted each ACEP member number only once when measuring unique visitors. Therefore, if a user used 2 different computers, the overall count would not be affected.

Primary Data Analysis

Data were summarized with means and percentages and were imported from Google Analytics (Google, Mountain View, CA) into an Excel spreadsheet (version 12.3.3; Microsoft, Redmond, WA) in which descriptive measures were calculated. Google Analytics is a Web analytics tool that provides information and statistics about Web site visitors and their activity. It has been used previously in project impact evaluations. Multivariable logistic regression, adjusting for state of residence, was used to compare the Web visits from the narrative and control newsletters. Breslow-Day test was used to assess the homogeneity between the narratives. Analyses were completed in SAS (version 9.3; SAS Institute, Inc., Cary, NC). Institutional review board approval was obtained from the University of Pennsylvania to conduct this study.

RESULTS

Overall, 27,592 nonstudent ACEP physician members were randomized, 13,796 to the control group and 13,796 to the narrative group. After randomization, members who opted out of receiving the daily e-mail newsletters were not included in the study, leaving 10,631 physicians in the narrative group and 10,595 in the control group (Figure 3). The total number of times the newsletters were viewed by ACEP members during the study period was similar between the control group and the narrative group (96,814 versus 96,173).

During the study period, physicians randomized to the narrative group were significantly more likely to visit any of the Web pages related to the expanded informational text, the official guideline, or the prescription drug monitoring program enrollment sites (Table 1). There were 744 gross visits from the newsletter to any of the 3 Web pages in the narrative group compared with 248 in the control group (7.0% versus 2.3%; difference 4.7%; 95% confidence interval [CI] 4.1% to 5.3%). When each physician was counted only once during the study period (unique visits), there were 509 unique visitors in the narrative group and 173 unique visitors in the control group (4.8% versus 1.6%; difference 3.2%; 95% CI 2.7% to 3.7%). When unique visitors to only the prescription drug monitoring program enrollment Web site or the original ACEP clinical guideline were analyzed, 214 narrative subjects visited these sites compared with 151 control subjects (2.0% versus 1.4%; difference 0.6%; 95% CI 0.25% to 0.95%). During the study, the odds ratio of any physician visiting one of the 3 informational Web sites in the narrative group compared with the control group was 3.06 (95% CI 2.57 to 3.66). After adjusting for state of residence, physicians in the narrative arm demonstrated similarly increased odds of visiting any of the guideline-related Web sites (odds ratio 3.07; 95% CI 2.57 to 3.67).

Subjects had multiple opportunities to visit the informational Web sites over the study. Table 2 demonstrates Web site visitors sorted by each of the 4 narratives compared with the control on the days those narratives were published. Narrative subjects had higher visit rates than control subjects on any given study day (Figure 4). When the narratives were compared against one another, no significant difference was found in physician visits (P=.09).

On 2 specific days (October 20, 2014, and November 12, 2014), Web site visits were notably higher among both the control and narrative groups than on other days. These newsletters had unique features on these days compared with other days, including e-mail subject lines that referenced a highly newsworthy topic at the time (Ebola virus in the United States) and the placement of the experimental opioid guideline text boxes immediately after the Ebola virus news articles. On these days, the narrative newsletters continued to perform well compared with the control newsletters in
generating visits to the guideline information sites (52 and 68 unique physician visits in the narrative arm compared with 23 and 13 visits in the control arm, respectively).

LIMITATIONS

This study measured visits by physicians to Web pages that contained guideline information. Implementation science frameworks, such as Reach Effectiveness Adoption Implementation Maintenance (RE-AIM), identify reach and engagement as proximal to potentially more meaningful outcomes such as adoption, implementation, and maintenance.32-34 In this study, despite the demonstrated comparative efficacy of evidenced-based narratives over summary text in drawing physician members to visit additional Web material (ie, reach and engagement), we were unable to determine whether the physicians assigned to either communication approach were more likely to adopt, implement, and maintain behaviors recommended by the guideline. Additional limitations include the presence of new policies, substantial Table 1. Web site visitors in the narrative versus control group.*

<table>
<thead>
<tr>
<th></th>
<th>Narrative, N=10,595 (%)</th>
<th>Control, N=10,631 (%)</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross visits</td>
<td>744 (7.0)</td>
<td>248 (2.3)</td>
<td>3.2 (2.7–3.6)</td>
</tr>
<tr>
<td>Unique visitors</td>
<td>509 (4.8)</td>
<td>173 (1.6)</td>
<td>3.1 (2.6–3.6)</td>
</tr>
<tr>
<td>Unique prescription</td>
<td>214 (2.0)</td>
<td>151 (1.4)</td>
<td>1.4 (1.2–1.8)</td>
</tr>
<tr>
<td>drug monitoring program or clinical policy visitors</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**“Gross visitors” includes all narrative or control text page visits. “Unique visitors” counts each participant only once during the entire study period.

Table 2. Unique Web site visitors of each of the 4 narratives compared with the control on the days those narratives were published.*

<table>
<thead>
<tr>
<th>Unique Visitors by Day, Narrative No.</th>
<th>No. (%), N=10,595</th>
<th>Control, N=10,631</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>192 (1.81)</td>
<td>50 (0.49)</td>
<td>3.8 (2.8–5.1)</td>
</tr>
<tr>
<td>2</td>
<td>169 (1.60)</td>
<td>34 (0.35)</td>
<td>4.6 (3.2–6.6)</td>
</tr>
<tr>
<td>3</td>
<td>165 (1.56)</td>
<td>62 (0.58)</td>
<td>2.7 (2.0–3.6)</td>
</tr>
<tr>
<td>4</td>
<td>150 (1.42)</td>
<td>37 (0.35)</td>
<td>4.1 (2.9–5.9)</td>
</tr>
</tbody>
</table>

*Percentages represent the number of visits or visitors per person in the study group.
controversy, and national interest related to opioid use in emergency medicine during the study, which may have interacted with the primary effect of the communication strategy. Although we had previously identified challenges with prescription drug monitoring program enrollment as key barriers to adoption during the interview phase of the study, the policy and clinical landscape had evolved during the study (including mandatory prescription drug monitoring program use for physicians in some states and lack of available prescription drug monitoring programs in others), potentially making one of the study’s outcome measures (focused on aiding physicians with the process of enrolling in their prescription drug monitoring program) less salient.35 Many of these policies are, however, specific to individual states and we were able to account for some of these potential influences by block randomizing by state and adjusting by state in the analysis.

Because ACEP does not collect complete individual demographic or professional-level data on its members and because the data were anonymized before analysis, we were unable to determine whether sex, experience level, or other individual characteristics modified the effect of the intervention. Because the control content did not vary during the study, the narrative newsletters introduced more content variation than the control newsletters, a potential source of bias. However, we did not observe comparative trends in increased (or decreased) physician visits as the narrative content became more varied during the study period. Another limitation is that the generalizability of a narrative approach to other guideline implementation efforts (particularly for guidelines with lower baseline national attention) remains unknown.

**DISCUSSION**

Most guideline dissemination efforts use summary methods that synthesize data and provide recommendations without narrative context.36 Strategies to promote the dissemination and implementation of evidence-based clinical guidelines are acknowledged to have variable effectiveness and a limited evidence base.37 At a time when many providers are bombarded with information and daily e-mail, the Stories to Promote Information Using Narrative study adds to the literature by providing comparative evidence for a potentially low-cost dissemination and engagement strategy for an evidence-based practice guideline. In this randomized trial, we found that although an equal number of physicians opened the daily electronic...
newsletters, narrative text about the opioid guideline was more likely to engage physicians, as measured by online visits to Web sites providing additional information, compared with standard summary text. The narrative vignettes not only engaged physicians at levels higher than the summary text but also outperformed national marketing benchmarks for e-mail “click-engagement” campaigns (2.9% average unique click rates for health).38

The findings of this study, the Stories to Promote Information Using Narrative trial, align with previously described aspects of dissemination science. Research suggests that stories or narratives may be particularly effective ways to communicate information, particularly information that people might otherwise ignore or resist.39 The mechanisms underlying this process are multifactorial. The transportation-likelihood theory suggests that when information is communicated in stories, people are absorbed (or “transported”) into the narrative in a way that increases its persuasive potential.29 Stories also shape perceptions of norms. Narratives can allow people to observe behavior when it is modeled by others, which may make them more likely to try the behavior. Social cognitive theory suggests that “observational learning” is an important contributor to behavioral change, and that being exposed to other people performing that behavior (even through media) is important.40 In this study, the narratives were gathered from the provider perspective—each contained descriptions of physicians using and acting on the guideline recommendations. Observing a colleague in a behavior could alter individuals’ perceptions of norms such that they believe norms are more supportive of that behavior.41 At their simplest, persuasive narratives have been defined as “coherent stories with an identifiable beginning, middle, and end that provides information about scene, characters, and conflict; raises unanswered questions or unresolved conflict; and provides resolution.”27 Our previous experimental work with emergency medicine resident physicians demonstrated that narratives can help clinicians remember and recall content from opioid prescribing guidelines compared with standard guideline content alone.26 To our knowledge, narrative communication had not been tested before this study as a way to engage a national audience of providers with guideline content.

It is worth exploring the additional, and unexpected, findings that nearly one quarter of guideline-related visits in both arms occurred on 2 days during the entire study period. As noted above, these specific newsletters had the unique feature of displaying the guideline-related text boxes immediately adjacent to the high-profile news article that had been referenced in the e-mail subject line. On both of these high-visit days, the narrative text outperformed the control text, suggesting that newsletter layout and subject line “hooks” may enhance the overall effect of narrative communication.

In this study, the absolute difference between the narrative and control newsletters as measured by unique Web visits to the proxy sites of interest was a modest 3.2% during the study. However, when multiplied by the number of ACEP members who regularly receive the newsletter, an estimated 680 additional physicians in the narrative group during a 9-week period would likely read or open the guideline or indicate an intention to pursue one of its recommendations.

There are substantial future opportunities to explore the use of narrative methods as a way to disseminate and implement evidence-based guidelines. We believe that e-mailed evidence-based narratives may represent an efficient and cost-effective strategy to disseminate evidence and promote guideline adoption. Given the time, effort, and expense that is devoted to guideline development and dissemination, and given the historically poor rates of guideline adoption, we believe that many would find these results, although modest, to be valuable for future guideline dissemination efforts.

Although substantial time and resources were committed to performing thorough interviews and rigorous qualitative analysis to build the intervention for this study, future studies could test e-mailed newsletter stories built on published principles of persuasive narratives without the use of formal stakeholder interviews and analysis.

In summary, narrative vignettes led to higher levels of engagement with opioid prescription guideline content among a national sample of emergency physicians. Organizations invested in producing and communicating clinical evidence might consider adopting narrative techniques to improve the dissemination and influence of evidence-based polices.

The authors acknowledge Jim Steele, Nancy Steele, Charlotte Greensit, Hoag Levine, and Roy Rosin, MBA, for their invaluable advice and review of components of this article; Cynthia Singh, MS, Nancy Calloway, and Kathryn Mensah from the American College of Emergency Physicians and Danielle Sturgis from Bulletin Media/Emergency Medicine Today for their invaluable support and assistance with this project; and Jim Frederick, who provided invaluable camaraderie and advice on the narrative portion of the study, but who died before the project was completed.

Supervising editor: Donald M. Yealy, MD

Author affiliations: From the Center for Emergency Care Policy Research (Meisel, Sinnenberg, Grossestreuer, Shofer, Perrone) and Division of Medical Toxicology (Perrone), Department of Emergency Medicine

8 Annals of Emergency Medicine

Volume - - - - - - - - 2016
Narrative Vignettes Versus Guideline Summaries for Opioid Prescribing

Meisel et al

Medicine, Perelman School of Medicine, the Leonard Davis Institute of Health Economics (Meisel, Rhodes), and the Department of Family Medicine and Department of Anthropology (Barg), University of Pennsylvania, Philadelphia, PA; the Department of Emergency Medicine, Northshore Long Island Jewish Hospital, New Hyde Park, NY (Rhodes); the Department of Emergency Medicine, Highland Hospital, Oakland, CA (Kilaru); and the Division of General Internal Medicine, Massachusetts General Hospital, Boston, MA (Metlay).

Author contributions: ZFM, JPM, FKB, and JP conceived the study, designed the trial, and obtained research funding. ZFM, ASK, and AG supervised the conduct of the trial and data collection. FKB, FSS, and LS provided statistical advice on study design and analyzed the data. ZFM drafted the article, and all authors contributed substantially to its revision. ZFM takes responsibility for the paper as a whole.

Funding and support: By Annals policy, all authors are required to disclose any and all commercial, financial, and other relationships in any way related to the subject of this article as per ICMJE conflict of interest guidelines (see www.icmje.org). The authors have stated that no such relationships exist and provided the following details: Funded by the Agency for Healthcare Research and Quality (SR18HS021956) and National Institutes of Health Career Development in Comparative Effectiveness Research award (1K1CA156715).

Publication dates: Received for publication January 6, 2016. Revision received February 20, 2016. Accepted for publication February 29, 2016.

Presented at the Society for Academic Emergency Medicine annual meeting, May 2015, San Diego, CA; and the Academy Health annual research meeting, June 2015, Minneapolis, MN.

REFERENCES