Improving Primary Care Management of Joint Pain through a PI/QI-CME Approach

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**Background:** As the population ages, the number of patients reporting a complaint of joint pain is set to expand rapidly, greatly increasing the burden on the healthcare system in the United States. At present, however, the first line of patient contact—primary care—is ill-equipped to deal with this growing crisis. Here we report the results of a 6-month, site-based combined Performance/Quality Improvement and continuing medical education (CME) activity designed to demonstrate improved healthcare provider performance at the primary care level.

**Methods:** This activity was certified for continuing education credit for physicians, nurse practitioners, and physician assistants. The activity followed the Plan-Do-Study-Act process, and was based on the American Medical Association’s 3-stage methodology for performance improvement coupled with CME. Performance change was measured by comparing prospective de-identified joint pain patient and practice workflow data before and after implementation of evidence-based tools and resources into participant practices. Data obtained were subsequently assigned as level 5, according to Moore’s expanded outcomes framework, 2009.

**Results:** A total of 78 healthcare providers in 49 sites took part in this activity, and 1070 joint pain patients were reviewed. After the tools and resources had been implemented, statistically significant improvement was obtained in the management of these patients using clinically objective measurements with regards to provider diagnostic skills and the overall speed of the diagnostic process. Communication between the provider and the patient was noted to improve, and some evidence of an improvement in the referral process was observed. In addition, providers that chose to re-evaluate their entire practice workflow self-reported improved efficiency and an increase in patient volume.

**Conclusion:** This initiative’s positive impact on provider performance successfully demonstrates how Performance/Quality Improvement methodology may be coupled with CME to improve primary care performance for a burdensome chronic complaint. The inference that outcomes for patients with a complaint of joint pain will be concomitantly improved by this activity is discussed.
reach 67 million. Some 25 million adults (9.3%), more than half older than 65 years, are expected to report activity limitation as a result of their condition [6,9]. In addition, the concomitant effects on joint health from the obesity epidemic must also be recognized as a potential driver of increased patient volume [10,11]. Regardless of origin, it is clear that the burden of increasing patient numbers will reside with already overstretched primary care providers.

Significant deficits in healthcare quality have been identified for a broad range of rheumatic conditions. At the primary care level, gaps vary based on the differential diagnosis, but overall treatment quality seems to be highly variable [12,13]. Furthermore, because of the decreasing availability of specialist care, using referral during times of management doubt or indecision is becoming more difficult [14]. For several rheumatic conditions, most notably rheumatoid arthritis [15], outcomes are heavily dependent on providers making the right decisions early in patient management. Yet this “window of opportunity” continues to be missed in a large number of patients [16].

Two fundamental areas perpetuate the gaps preventing optimal rheumatology care. First, many providers demonstrate substandard clinical management in the areas of diagnostic procedures, pharmacotherapy, and referral criteria for a variety of musculoskeletal conditions [17-24]. Second, as noted by Harrington [16], despite the efforts to stimulate change, a large proportion of providers continue to deliver care using the processes they were trained to use. Impacting practice habits through education is imperative to enable providers not only to make correct evidence-based decisions, but also to enhance their own confidence in their abilities so that patients are referred only when appropriate. Reducing practice inefficiency is a must if the system has any chance of handling future demands. With a reduction in practice variability, efficiency can be increased, hence providers will be able to focus more on patient care and less on practice administration.

The Quality/Performance Improvement (QI/PI) process utilized in this activity has at its core the quality improvement methods originally developed by Walter A. Shewhart and Edward Deming. These methods have been widely used in other industries and applied to healthcare improvement by the Institute of Healthcare Improvement and several integrated health systems in the United States [25,26]. The Plan-Do-Study-Act (PDSA) methodology is a popular model that may be enacted both on a systems level (QI) and individual provider level (PI). PDSA parallels the 3-stage improvement methodology approved by the American Medical Association (AMA) for combining the PI/QI process with continuing medical education (CME) [27]. Briefly, once an area for change is selected, data are collected to measure baseline performance, then resources for change are employed and their effect measured. The impact of the changes is then reported back to the participant to stimulate further improvements to the process.

The discrepancies between current and best practice care of joint pain patients, as determined through a thorough needs assessment, presented a clear opportunity to apply PI/QI-CME methodology. The design of our activity addressed clinical judgment of providers using both clinically objective and self-report measures to allow practice level performance deficits to be determined and corrected (Level 5, Moore’s expanded outcomes framework, 2009) [28].

METHODS

The QI activity described in this article was conceived as a portion of a larger multiphase initiative that utilized a variety of educational approaches designed to raise awareness/competency of joint conditions, while educating participants on QI and how these skills should be incorporated into their practices. Early in the process a steering committee was convened from providers specializing in family practice, emergency medicine, and rheumatology, as well as experts in QI. The committee was responsible for evaluating the validity of the QI concept with regard to arthritis and joint pain management. Selected members were utilized as expert faculty during the development of materials for the activity.

Sponsorship and Commercial Support

This activity was sponsored by the Peer-Point Medical Education Institute, LLC, and was supported by an educational grant from Amgen and Wyeth.

Participants

This activity was accredited for physicians, nurses, nurse practitioners, and physician assistants. Participants were recruited as independent practice “sites.” Each site contained 1 to 10 healthcare professionals whose identities and level of participation were recorded so that credit could be duly awarded. In order to simplify interaction with Peer-Point, however, sites selected a primary contact person, and for these individuals a member of the Peer-Point staff was assigned as their “site coordinator” liaison to help answer questions and resolve problems associated with implementing the activity.

Theme Selection

Sites were asked to select a single “Theme” after participating in 2 training webinars. A total of 5 themes were offered, covering the principle practice deficits as defined in the needs assessment. Available Themes were:

- Improving Joint Pain Diagnostic Skills;
- Improving Practice Flow;
- Deceasing Diagnosis Time;
- Improving the Referral Process; and
- Implementing an Appropriate Primary Intervention.

Theme selection was based on 2 evaluation methods: (1) from site answers to a psychometric survey, and/or (2) via consultation with Peer-Point staff during which sites
were asked to describe their practice environments and areas needed for improvement. In this way, although sites were assisted to define their own practice deficit, it is largely through the application of adult learning and self-assessment principles that sites were primed to focus on their own individualized weaknesses.

**Structure of the PI/QI Program**

The PI/QI component of the initiative consisted of a total of 24 weeks of site-based QI activity. The principles of the accepted PDSA methodology for establishing and maintaining a continuous cycle of PI/QI in their practices were utilized by design. Structure was based on the AMA-approved methodology regarding PI-CME, and as such participants followed an activity timeline that was divided into Stages A through C. HIPAA regulations were strictly adhered to, and steps were put into place to ensure that Peer∙Point was not privy to any form of patient identifying information. With the exception of Theme 2: Improving Practice Flow, data were collected using de-identified patient screening logs that were filled out by sites during the patient encounters. The logs were theme-specific and tracked patient progress throughout the study. Theme 2 was unique in that it required sites to map practice flow and did not directly involve patient care metrics.

The first 12 weeks of the activity were devoted to Stage A (Baseline Period) data acquisition. In order to show completion of this stage, participants were required to send completed forms by fax or email to Peer∙Point before they were allowed to move on in the activity. The next 12 weeks of the program were devoted to Stage B (Tools Implementation) data acquisition. Here sites continued to maintain the de-identified patient screening logs, but in addition also incorporated theme-specific, evidence-based tools in the form of diagnosis/treatment algorithms, patient questionnaires, “Red Flag” referral criteria, or resources designed to facilitate better communication with the patient, testing facilities, or arthritis specialists. These tools and resources were not originally available to them in Stage A to prevent bias. All tools were designed to be simple to incorporate and were accompanied by instructions to facilitate their utilization into practice. In addition, Peer∙Point site coordinators were available to answer participant questions and assist in helping participants understand the value and correct utilization of the tools in their practice setting. For Theme 2 participants, Stage A required that sites map out their current practice flow and return the completed map to Peer∙Point. During Stage B, these sites remapped their processes using tools derived from several validated sources including those that are publicly available from the Institute of Healthcare Improvement (www.ihi.org).

Finally, for all themes, during Stage C the data generated by participants in Stage B were faxed or e-mailed to Peer∙Point. This was then subject to comparative analysis with Stage A data for both individual participants/sites and for data in aggregate. Stage C was completed once each participant at a site had returned a short post-activity evaluation. Participants at completing sites were then eligible for up to 20.0 CME/continuing nursing education (CNE) credits.

**Data Analysis**

Analysis was completed using data averaged across all the patients evaluated for a theme and by changes that occurred per site. In this way, gross changes in performance could be evaluated alongside changes at the level of individual sites. Comparative data were collected either in raw form or as a scored data rating based on performance. The same scoring parameters were maintained in both Stage A and Stage B in an effort to accurately measure change. Scoring utilized a 4- or 5-point scale depending on the parameter being measured; scores were defined by comparison to an idealized performance scenario in the diagnosis or treatment algorithm. Best practice performance was scored highest, and non–guideline-based performance decisions were given the lowest scores. In most cases, data values were averaged and standard errors calculated. Appropriate continuous or categorical data statistical analysis (using Student t test or Fisher’s Exact test) was performed to determine significance. Analyses were considered significant when \( P < .05 \). All statistical analysis was performed using JMP® 8.0 software (SAS Institute, Inc, Cary, NC, USA).

![Participant professions and site-theme selection.](image-url)
RESULTS
A total of 78 providers at 49 sites completed the activity. These sites entered 1078 patients with a complaint of joint pain into the screening logs over the 24-week study period (Figure 1). The majority of participants in the activity were physicians (56%); participants also included nurse practitioners (NPs) (33%) and physician assistants (PAs) (10%). Theme 1: Improving Diagnostic Skills (26 sites) was the most popular selection, followed by Theme 3: Decreasing Diagnosis Time (12 sites), Theme 2: Improving Practice Flow (6 sites), and Theme 4: Improving the Referral Process (5 sites). Surprisingly, no sites selected Theme 5: Implementing an Appropriate Primary Intervention.

Theme 1: Improving Joint Pain Diagnostic Skills
Data for Theme 1 utilized 3 measures of performance: (1) number of visits, (2) utilization of appropriate laboratory testing, and (3) utilization of appropriate imaging with regards to the formulation of the correct diagnosis.

Raw data describing the average number of visits that were required to obtain a correct diagnosis per patient (Stage A, n = 291; Stage B, n = 280) (Figure 2) showed a statistically significant ($P = .009$) reduction in visits that translated to a 21.9% relative change. When the numbers of patient visits required to obtain a correct diagnosis were averaged per site, the score in Stage A was 1.94 visits (n = 26 sites), but during Stage B, this was reduced to 1.68 visits (n = 21 sites). Although the difference between the 2 stages represented a 13.4% relative change improvement, this just failed meet the requirement for statistical significance ($P = .069$).

Skill scores related to the appropriate use of laboratory testing in the differential diagnosis of joint pain were generated using a 5-point scale in comparison to the evidence-based diagnosis algorithm. The algorithm used in this activity was based on joint pain management protocols published in Braunwald et al, 2002 [29], updated using guideline recommendations from the American College of Rheumatology (ACR) and modified for use in primary care by faculty. The scoring system made the assumption that providers had made a prior assessment of the patient during a history and physical examination and that their choice of diagnostic testing was objective based on these findings. Although arbitrary in nature, the scoring system defined a spectrum of performance weighted such that the highest score was assigned only when all the recommended tests ordered were correct with regard to their diagnostic

<table>
<thead>
<tr>
<th>Performance Measure</th>
<th>Comparison</th>
<th>Stage A Average (± standard error of the mean)</th>
<th>Stage B Average (± standard error of the mean)</th>
<th>Relative Change (%)</th>
<th>Statistical Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appropriate laboratory testing for diagnosis</td>
<td>Overall average score per patient</td>
<td>1.75 ± 0.05 (n = 291)</td>
<td>2.03 ± 0.06 (n = 280)</td>
<td>13.4</td>
<td>$P = .021^* (\chi^2 = 11.57, \text{degrees of freedom} = 4)$</td>
</tr>
<tr>
<td></td>
<td>Average patient score per site</td>
<td>1.73 ± 0.08 (n = 26)</td>
<td>2.07 ± 0.09 (n = 21)</td>
<td>19.7</td>
<td>$P = .028^* \text{[Student t test]}$</td>
</tr>
<tr>
<td>Appropriate imaging testing for diagnosis</td>
<td>Overall average score per patient</td>
<td>1.13 ± 0.06 (n = 291)</td>
<td>1.32 ± 0.06 (n = 280)</td>
<td>16.8</td>
<td>$P = .065 (\chi^2 = 5.44; \text{degrees of freedom} = 2)$</td>
</tr>
<tr>
<td></td>
<td>Average patient score per site</td>
<td>1.08 ± 0.10 (n = 26)</td>
<td>1.37 ± 0.10 (n = 21)</td>
<td>26.9</td>
<td>$P = .038^* \text{[Student t test]}$</td>
</tr>
</tbody>
</table>

*Statistically significant.
relevance, and that no recommended test was omitted. Conversely, the lowest score was given when all tests ordered were not relevant and therefore incorrectly utilized for a given diagnosis. Bias related to identification of individual participants was eliminated as much as possible, because received data were first converted into an electronic (Excel) format by a member of the staff who labeled the data with a unique “site number,” but removed all other participant identifiers. Analysis of data was then performed “blind” by staff members who were not privy to the identity of each site. Using this scoring system, both the overall average score per patient and the average scores per site were significantly increased in Stage B compared with Stage A ($P = .021$ and $P = .028$, respectively) (Table 1).

Skill scores related to the application of appropriate imaging in the diagnosis of joint pain were scored using a system similar to that used for laboratory test scoring, and comparison was again made to the diagnosis algorithm. However, reflecting the more simplistic nature of imaging in the diagnosis of joint pain, a 4-point scale was used. The overall average score per patient increased in Stage B compared to Stage A, although statistical significance was not quite achieved ($P = .065$) (Table 1). Similarly, the average patient score per site between the 2 periods was also increased; however, this change was statistically significant ($P = .038$).

**Theme 2: Improving Practice Flow**
Six sites completed Theme 2. Change was measured in terms of the number of steps in the original practice workflow process, from patient check-in through discharge, compared to the quantity of steps after the site was supplied with tools to help it to consolidate steps and/or remove inefficient and wasteful work practices. In Stage A, sites recorded an average of 23 workflow steps. This was reduced to 20 steps during Stage B, representing a relative change of 13.04%. The effectiveness of this revised workflow was consistent with a self-reported average 23.5% increase in daily patient volume over the 3 months of Stage B as compared to the same duration before workflow changes were made.

**Theme 3: Decreasing Diagnosis Time**
A total of 12 sites completed Theme 3. Measurements were designed to evaluate several steps in the diagnostic process. First, the time required for both laboratory testing and for imaging studies to be conducted after they were ordered by the provider was measured. Second, a measurement of the time for results to be processed by the testing/imaging facility and returned to the provider was recorded. Together these measurements constitute the “turn-around” time for diagnostically critical information to be placed in the hands of the provider. Finally, the percentage of patients who were contacted by the provider based on the report findings and the percentage of patient diagnoses that changed as a result of the laboratory or imaging tests was determined.

There was a significant reduction in the average time per patient for completion of laboratory and imaging tests after ordering in Stage B compared with Stage A ($P = .024$ and $P = .012$, respectively) (Table 2). In contrast, variability in the small samples meant that although comparisons of the average time for conducting laboratory and imaging tests per site were reduced, only the latter approached significance. Comparison of the processing time per patient similarly showed significant reductions of time for laboratory and imaging testing between the 2 periods ($P = .0004$ and $P = .017$, respectively). In addition, the average time per site for processing of laboratory results was also significantly improved ($P = .0009$).

Measurement of the percentage of patients that providers contacted as a result of diagnostic studies was significantly increased during the course of the initiative in terms

<table>
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<tr>
<th>Performance Measure</th>
<th>Comparison</th>
<th>Stage A Average (± standard error of the mean)</th>
<th>Stage B Average (± standard error of the mean)</th>
<th>Relative Change, %</th>
<th>Statistical Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time for laboratory tests to be conducted after ordering</td>
<td>Overall average time per patient, d</td>
<td>0.32 ± 0.12 (n = 98)</td>
<td>0.03 ± 0.02 (n = 97)</td>
<td>90.6</td>
<td>$P = .024^*$ (Student t test)</td>
</tr>
<tr>
<td></td>
<td>Average time per site, d</td>
<td>0.67 ± 0.46 (n = 12)</td>
<td>0.05 ± 0.03 (n = 12)</td>
<td>92.5</td>
<td>$P = .099$ (Student t test)</td>
</tr>
<tr>
<td>Time for imaging tests to be conducted after ordering</td>
<td>Overall average time per patient, d</td>
<td>0.37 ± 0.11 (n = 131)</td>
<td>0.08 ± 0.03 (n = 123)</td>
<td>78.4</td>
<td>$P = .012^*$ (Student t test)</td>
</tr>
<tr>
<td></td>
<td>Average time per site, d</td>
<td>0.63 ± 0.32 (n = 12)</td>
<td>0.09 ± 0.05 (n = 12)</td>
<td>85.7</td>
<td>$P = .053$ (Student t test)</td>
</tr>
<tr>
<td>Time for lab tests to be processed</td>
<td>Overall average time per patient, d</td>
<td>1.68 ± 0.18 (n = 98)</td>
<td>0.90 ± 0.10 (n = 98)</td>
<td>46.4</td>
<td>$P = .0004^*$ (Student t test)</td>
</tr>
<tr>
<td></td>
<td>Average time per site, d</td>
<td>1.27 ± 0.33 (n = 12)</td>
<td>0.87 ± 0.1 (n = 12)</td>
<td>31.5</td>
<td>$P = .0009^*$ (Student t test)</td>
</tr>
<tr>
<td>Time for imaging tests to be processed</td>
<td>Overall average time per patient, d</td>
<td>1.29 ± 0.11 (n = 131)</td>
<td>0.97 ± 0.08 (n = 123)</td>
<td>24.8</td>
<td>$P = .017^*$ (Student t test)</td>
</tr>
<tr>
<td></td>
<td>Average time per site, d</td>
<td>1.31 ± 0.31 (n = 12)</td>
<td>1.01 ± 0.12 (n = 12)</td>
<td>22.9</td>
<td>$P = .18$ (Student t test)</td>
</tr>
</tbody>
</table>

*Statistically significant.
of the average per patient (Stage A, 6.58%, n = 164; Stage B, 18.95%, n = 155) and average per site (Stage A, 18.81%, n = 12; Stage B, 37.77%, n = 12) (Figure 3). In contrast, there was no significant difference in the percentage of patients who had their diagnosis changed as a result of the laboratory or imag- ing testing, both for the average per patient (Stage A, 9.40%, n = 164; Stage B, 8.15%, n = 155) and average per site (Stage A, 18.40%, n = 12; Stage B, 20.07%, n = 12).

**Theme 4: Improving the Referral Process**

Five sites completed Theme 4. Data for this theme used 4 measures of performance including: (1) time in days required for a referral to be initiated from first visit; (2) time in days required before the referred patient was seen by the arthritis specialist; (3) time in days for the specialist report to be received by the referring provider; and (4) the time in days for the specialist report to be reviewed by the referring provider. Due to the small sample size and variability in the data, however, the majority of the measures made did not obtain a level of significance (Table 3). Only the measure of the time required for the specialist report to be reviewed showed a statistically significant reduction in Stage B compared to Stage A (change per patient, $P = .001$; change per site $P = .04$).

**DISCUSSION**

This national CME activity demonstrated statistically significant performance and quality improvement. Adult learning principles combined with PDSA methodology allowed participants to define their own practice gaps based on a range predetermined from a needs assessment and to apply evidence-based tools and resources in order to close them.

This activity shows evidence of participant improvement in the diagnosis of joint pain, including diagnostic skills and the number of patient visits required for a correct diagnosis. Improvement of referral processes was less successful, mainly because of the lack of patients reviewed. Compounding this, changes in referral patterns may be more difficult to measure based on the availability of specialist care which could provide some explanation for the highly variable data seen in this theme. Thus, although our data provide evidence of both increased and decreased referral times from different

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**Table 3. Comparative Referral Process Measurements**

<table>
<thead>
<tr>
<th>Performance Measure</th>
<th>Comparison</th>
<th>Stage A Average ($\pm$ standard error of the mean)</th>
<th>Stage B Average ($\pm$ standard error of the mean)</th>
<th>Relative Change, %</th>
<th>Statistical Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time for referral to be initiated from first visit</td>
<td>Overall average time per patient, d</td>
<td>$36.7 \pm 6.69$ (n = 40)</td>
<td>$59.85 \pm 14.61$ (n = 36)</td>
<td>63.1</td>
<td>$P = .15$ (Student t test)</td>
</tr>
<tr>
<td></td>
<td>Average time per site, d</td>
<td>$35.58 \pm 12.53$ (n = 5)</td>
<td>$51.25 \pm 24.79$ (n = 5)</td>
<td>44.0</td>
<td>$P = .23$ (Student t test)</td>
</tr>
<tr>
<td>Time for referred patient to be seen by arthritis specialist</td>
<td>Overall average time per patient, d</td>
<td>$15.10 \pm 2.02$ (n = 40)</td>
<td>$10.86 \pm 1.91$ (n = 36)</td>
<td>28.1</td>
<td>$P = .13$ (Student t test)</td>
</tr>
<tr>
<td></td>
<td>Average time per site, d</td>
<td>$15.30 \pm 2.56$ (n = 5)</td>
<td>$10.32 \pm 2.85$ (n = 5)</td>
<td>32.5</td>
<td>$P = .08$ (Student t test)</td>
</tr>
<tr>
<td>Time for specialist report to be received</td>
<td>Overall average time per patient, d</td>
<td>$6.45 \pm 0.45$ (n = 40)</td>
<td>$5.94 \pm 0.31$ (n = 36)</td>
<td>7.9</td>
<td>$P = .36$ (Student t test)</td>
</tr>
<tr>
<td></td>
<td>Average time per site, d</td>
<td>$6.65 \pm 0.81$ (n = 5)</td>
<td>$5.96 \pm 0.25$ (n = 5)</td>
<td>10.4</td>
<td>$P = .22$ (Student t test)</td>
</tr>
<tr>
<td>Time for specialist report to be reviewed</td>
<td>Overall average time per patient, d</td>
<td>$1.80 \pm 0.43$ (n = 40)</td>
<td>$0.0 \pm 0.0$ (n = 36)</td>
<td>100.0</td>
<td>$P = .0001^*$ (Student t test)</td>
</tr>
<tr>
<td></td>
<td>Average time per site, d</td>
<td>$1.75 \pm 0.73$ (n = 5)</td>
<td>$0.0 \pm 0.0$ (n = 5)</td>
<td>100.0</td>
<td>$P = .04^*$ (Student t test)</td>
</tr>
</tbody>
</table>

*Statistically significant.
participants, there is a possibility that both have modified practice patterns to either withhold patients longer in their care or to drive early referral. Depending on the condition causing the joint pain, early referral may benefit patient outcomes, but for others later referral reflects greater provider confidence; these data form an interesting subject for further study. The activity was also effective in improving practice-level deficits. The observation that just a 3-step difference equates to an almost 25% increase in patient volume is testament to the fact that simple changes in workflow can have a major impact on a practice’s ability to cope with future demands.

The observation that no participants selected to improve their joint pain treatment skills was interesting. This is in contrast to a pre-activity assessment that suggested that treatment is of great concern. We conclude from our data that although providers recognize the importance of improving treatment, most select a diagnosis-based improvement theme over a treatment theme because making appropriate diagnoses and triage decisions are of greater concern in most primary care practices. This also supports reluctance on the part of primary care providers to manage severe arthropathies and to opt for referral in difficult cases based on their comfort levels.

There are several limitations to this study. Primarily, the restrictions on the amount and type of de-identified data that can be gathered by participants have an effect on the depth to which conclusions can be drawn. This study does not claim to be a detailed clinical trial in which participants are tightly monitored and their practice conditions highly standardized. In our study, we do not know the details of each patient reviewed beyond the information supplied by the participant and therefore cannot say for certain that other unmeasured factors such as the presentation of comorbidities play into some of the observed changes in performance. However, we do know that patients usually do not conform to idealized standards. With this in mind, we also must reflect on the scoring system used in our study. This system is based on a simple but arbitrary scale that assigns high scores to apparent compliance with recommended testing modalities and low scores to deviation from the evidence-based standard. It rapidly becomes apparent that to define a scale that resolves performance for the management of all the various etiologies that present as joint pain is a very difficult task. Even more difficult is to present this scale as scientifically rigorous and precisely reproducible from reader to reader. As such we do not present the scoring system in this manner, but rather suggest that by defining a set of rules based on the standard of care, broadly taking into account multiple etiologies, gross level of change can be measured. This is provided only if the same measurement rules are applied throughout the activity without bias. These data provide some evidence for this hypothesis. Here we have set rules for scoring and applied them without bias and found evidence of performance change despite the confounders mentioned above.

Finally, we believe that our activity has provided data that strongly support the use of the proper PI/QI methodology in combination with CME. These data demonstrate the importance of education in improving the performance skills (behavioral change) of the participants involved in this activity. There is an inference that through the improved management of joint pain patients, there will be a concomitant improvement in patient health outcomes. The ACR [30] places great emphasis on the fact that outcomes for patients with joint pain etiologies such as rheumatoid arthritis are heavily dependent on their healthcare provider’s management decisions. Several examples of improved patient management are shown in this study, and we believe participants exposed to this form of education in practice will take these skills and continue to provide better care for their patients.

ACKNOWLEDGMENTS

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REFERENCES


