

# Use of National-Scope Administrative Healthcare Claims Data for Targeting Physician Learners and Measuring Performance Change: Experiences from the RAPID® Primary Care CME Initiative on Rheumatoid Arthritis

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## ABSTRACT

**Background:** Objective assessment of performance changes resulting from participation in national-scope Continuing Medical Education (CME) initiatives is a challenge for CME professionals and organizations. An important related challenge is accurate identification of potential clinician learners on a national basis who most need to improve their performance. This article briefly describes the 6 year history and ongoing evolution of outcomes measurement for a CME initiative titled RAPID® (Rheumatoid Arthritis: Primary care Initiative for improved Diagnosis and outcomes), focusing on the use of national-scope aggregated healthcare claims data to address these challenges.

**Methods:** Examination of a national scope administrative healthcare (medical) claims database representing the activity of 870,000 US clinicians was used to identify 61,382 clinicians who underperformed in diagnosing rheumatoid arthritis (RA), defined as a high concentration of higher-risk patients, fewer than 15 RA diagnoses in 2008, and the fewest number of patients co-managed with a specialist, yet had the perfect patient profiles under their care to make an impact in this disease state. These clinicians were managing a community of 17,748,309 patients who were living with a higher risk for RA and had not yet received a diagnosis of RA. We targeted this group of clinicians for participation in RAPID® activities by specifically recommending the activities to them (e.g., by email/direct mail). For the analysis, the group of underperforming clinicians who later participated in RAPID® was designated as targeted learners. Non-targeted learners participated in the activity because of professional interest, but without prior outreach. The proportion of RA diagnoses per patient population made by RAPID® initiative clinicians in the full year prior to participation in the RAPID® initiative (2008) was compared with the proportion of RA diagnoses made post-participation in the initiative (during 2011). Therefore, the post-activity RA diagnoses counted in the analysis were determined to be ≥ 2 years post-participation in the RAPID® program. The same performance comparisons between 2008 and 2011 were made among highly matched control groups of non-participants, with approximately 40 non-participant controls for every participating clinician. Within this overall analysis population, changes in RA diagnoses were also compared between internists (IM) and general/family practitioners (GP/FP).

**Results:** A paired analysis of 784 RAPID® participating clinicians. Out of those, 256 diagnosed at least 1 RA patient in 2008. The number of clinicians making at least 1 diagnosis of RA increased after RAPID® participation. Overall, there was a 47% increase in the number of RAPID® providers who had at least one patient diagnosed with RA: 256/784 (2008), and 376/784 (2011). For all RAPID® participating clinicians, there was an 11% statistically significant increase ( $P<0.001$ ) in the proportion of RA diagnoses per total patient population in 2011 (1.25%) compared with 2008 (1.13%). In contrast, there was no change in the proportion (0.43%) of RA diagnoses per patient population in the control group. As a group, we found that IMs had better baseline performance than GP/FPs in diagnosing RA. This held true when comparing targeted, non-targeted, and control group IMs with the corresponding subgroups of GP/FPs. Non-targeted IMs who took the RAPID® course had the greatest proportion of RA diagnoses among their patients in the year before they took the course. Targeted GP/FPs had the lowest proportion of pre-RAPID® RA diagnoses. Targeted IMs ( $n=169$ ) had a significant increase in RA diagnoses (16%;  $P=0.05$ ) post-RAPID® participation, whereas the non-targeted group ( $n=109$ ) had a significant decrease (-43%) in RA diagnoses post-RAPID® participation. The targeted GP/FPs, the group with the lowest proportion of RA diagnoses pre-participation, also had the largest increase in the proportion of RA diagnoses post-participation (27%;  $P<0.001$ ). Of the 61,382 targeted prior underperforming clinicians, 1,691 completed at least one RAPID® CME activity and those 1,691 clinicians currently managed 265,834 of the 17,748,309 patients living at higher risk for RA. Overall, these performance improvements resulted in 1,837 newly diagnosed RA patients, and have the long-term potential to impact more than 265,834 higher-risk patients currently under the care of the participants of the RAPID® CME initiative.

**Conclusions:** This was the first study of which we are aware that used national-scope medical claims data to identify and target poorer-performing clinicians (i.e., low proportion of patients diagnosed with RA), then assessed whether participation in a national CME initiative improved performance (i.e., increased the proportion of patients with an RA diagnosis) by using the claims data to compare performance before and after the initiative. Participation in the RAPID® initiative was associated with positive changes in clinician performance, as measured by increased RA diagnoses. Results also indicated that identifying and inviting poorer performing clinicians through analysis of the medical claims database to specific CME activities improves the post-participation performance of the targeted group more than for non-targeted participants.

## INTRODUCTION

The objective assessment of physician performance change (Moore et al., Level 5) [1] resulting from participation in national-scope certified Continuing Medical Education (CME) initiatives has been a difficult challenge for stakeholders within the CME community. From 2007 through 2011, the RAPID® (Rheumatoid Arthritis: Primary care Initiative for improved Diagnosis and outcomes) CME initiative was initiated to educate primary care practitioners (PCPs) about the benefits of early diagnosis and treatment of rheumatoid arthritis (RA). The initiative included live symposia as well as written (monographs and web-based) activities, all focused on increasing the awareness and knowledge of PCPs about the symptoms of RA and the need to diagnose the disease as early as possible. RAPID® 2008 Initiative CME activities and implementation periods during the study timeframe were as follows:

- 2 Pri-Med symposia: November 14 and December 3, 2009
- 2 Pri-Med workshops: November 14 and December 3, 2009
- Medscape: Archived Video Webcast: November 2009 - November 2010
- 2 Monographs: December, 2009 - December, 2010
- Pocket Clinical Educator: November, 2009 – November, 2010

Using a case-based format, evidence-based practical strategies to facilitate early provisional diagnosis and treatment were recommended in the CME content to increase PCP competence in these areas. With early diagnosis and referral to a rheumatologist for treatment with disease-modifying antirheumatic drugs (DMARDs), patient disability can be significantly decreased and outcomes improved. An overview of DMARD therapy and long-term management of patients was also presented to provide PCPs with an understanding of how these agents work and to emphasize the critical importance of initiating DMARD therapy early to optimize

patient care. Also, in 2009 through 2011, a workshop format that incorporated input from RA patients with video content modeling optimal patient assessment for potential provisional diagnosis of RA was added to reinforce the learning of those participating in mostly didactic live formats. Outcomes measurements for RAPID® included pre/post knowledge assessment, with measures of changes in confidence, competence, self-reported performance change and self-reported observations of patient outcomes added in subsequent years. Based on analysis of these measurements, RAPID® has resulted in statistically significant increases in: 1) awareness/knowledge regarding RA, 2) confidence in the participants' ability to diagnose and monitor patients with RA, and 3) planned versus current frequency of use of optimal evidence-based diagnosis/monitoring strategies. Participants have also self-reported increased use of the same strategies and improvements in patient outcomes based on their use of these strategies. However, as performance outcomes were based on subjective assessments, they did not objectively measure whether participation in the RAPID® initiative caused an actual change in clinician practice. We therefore sought to use an administrative claims database to measure clinician performance before and after participation in RAPID® activities to obtain a more objective assessment of higher-level educational outcomes.

Administrative claims databases have been used for many purposes, but to our knowledge have not been used on a national scale to both target poorer-performing physicians and assess the impact of a national educational initiative on clinician performance after participation. Recognizing a background prevalence of RA of approximately 1% [2], we first conducted a pilot study to examine whether we could measure an effect of participation in RAPID® on clinician practice by assessing changes in patient diagnoses before and after RAPID® participation. To accomplish this, in 2008,

the RAPID® initiative utilized a medical claims database to determine changes in patient visits to rheumatologists (a proxy measure for diagnosis and referral rate), comparing rates measured 4 months pre- and post-participation for RAPID® learners. A control group of physicians was also created for the pilot study. The final analysis of the 4 month pre/4 month post data showed a 12% increase in referral rates among RAPID® learners (n=531, paired data) versus no change in the control group. The positive trends identified in the pilot study prompted the further use of the medical claims data for both outcomes measurement and audience generation purposes. For audience generation, we targeted clinicians who were underdiagnosing RA in their practices (see Methods).

In addition, during the previous RAPID® activities we received learner feedback suggesting that there is a subpopulation of clinicians within primary care who serve as specialists due to a shortage of rheumatologists in their geographic region. This was supported when we observed higher pre-survey knowledge and confidence scores: 65% in both knowledge and confidence among the attendees at the American College of Physicians (ACP) RAPID® symposia (IM specialists) compared to those of their GP/FP counterparts (55% knowledge; 59% confidence). We hypothesized that internists were a unique subpopulation compared with general practitioners and family practitioners. Due to study limitations we were not able to do an in-depth analysis to identify what might be driving these differences or to create the appropriate control groups to provide a basis for assessing changes within these groups.

In the study presented here, we present our analysis of physician performance after participation in a RAPID® CME activity, using a national-scope, irreversibly de-identified, Health Insurance Portability and Accountability Act of 1996 (HIPAA)-compliant, aggregated administrative health-care claims database.

## METHODS

### Collaborators

FACTORx, LLC/Curatio CME Institute, LLC and Penn State College of Medicine were RAPID® joint sponsors. Claims analyses were undertaken by FACTORx LLC, with Improve CME, LLC creating this report based on multiple discussions to interpret the results with the collaborators. Research funding was provided via an educational grant from Pfizer and commercial support for the CME activities was provided by AbbVie, Genentech and Janssen Biotech, Inc. Clifton O. Bingham III, M.D., Associate Professor of Medicine, Divisions of Rheumatology and Allergy, Department of Medicine, Johns Hopkins University and Director, Johns Hopkins Arthritis Center, Baltimore MD, and David Kountz, M.D., Vice President, Academic Affairs, Jersey Shore University Medical Center, Neptune, N.J., who served as faculty advisors for this analysis, participated in analysis of data and development of the report. RAPID® is a registered trademark of FACTORx, LLC.

### Study Objectives and Learner Groups

The proportion of RA diagnoses made by RAPID® 2008 initiative clinicians in the full year prior to participation in RAPID® 2008 was compared with the proportion of RA diagnoses made in the full calendar year post-participation in the 2011 initiative. As some clinicians participated in November, 2009 activities, this follow-up was measuring performance changes between  $\geq 2$  years post activity. The overall analysis included IMs, GP/FPs, and clinicians in other specialties.

The results for the following learner subsets were examined:

1. Examination of a national scope administrative healthcare (medical) claims database representing the activity of 870,000 US clinicians was used to identify clinicians who underperformed in diagnosing RA (defined as a high concentration of

higher risk patients, fewer than 15 RA diagnoses in 2008, and the fewest number of patients co-managed with a specialist). We targeted this group of clinicians for participation in RAPID® programs by specifically recommending the activities to them (e.g., by email). For the analysis, the group of underperforming clinicians who later participated in RAPID® was designated as targeted learners. Non-targeted learners participated in the activity because of professional interest, but without prior outreach.

2. New RA diagnoses were defined as the number of unique patients with a diagnosis of RA (ICD-9 codes 714.X) who had a claim from both a primary care provider and a rheumatologist (shared patients) in the time period prior to, or after the CME activity date. The assumption was made that patients would likely not self-refer to a rheumatologist, but what we know for sure is that the patient was seen by both a primary care provider and a rheumatology specialist within the study period.
3. The same performance comparisons between 2008 and 2011 were made among highly matched control groups of non-participants, with approximately 40 non-participant controls for every participating clinician.
4. Within this overall analysis population, changes in RA diagnoses were also compared between internists (IM) and general/family Practitioners (GP/FP).

### Claims Databases

The educational partners purchased access to a national scope administrative healthcare claims (medical) claims database containing data on more than 870,000 US clinicians for the analysis. The databases are owned by a data aggregator and include claims across all third-party payer types, including commercial, Medicare, Medicaid, and cash. Sources include claims for medical office services

and retail pharmacy covering all major regions of the US. All data were Health Insurance Portability and Accountability Act of 1996 (HIPAA)-compliant.

The sources used were:

1. CMS-1500 medical claims completed for patients seen in physician offices.
2. NCPDP prescription claims submitted for patients receiving a prescription via retail pharmacy.

Appropriately matched control groups (by specialty, degree, state, urban/rural, total RA diagnosis pre-period, and total prescriptions pre-period) for each RAPID® learner set or subset were identified from the medical claims databases. To account for uncontrollable factors, the number of clinicians in the control groups was 40-times larger than the corresponding RAPID® III learner group.

### Statistical Methodology

For each group analyzed, the proportion of RA diagnoses (%) was calculated as:  $(\text{Combined total \# of RA diagnoses} / \text{Combined total \# of patients}) \times 100$

CME initiative participant results for full years (2011 versus 2008) were compared using the Chi square test. Statistical results are reported as *P* values. A *P* value  $\leq 0.05$  was considered statistically significant. The analysis was conducted using *Excel* formulas and Oracle 10g with Oracle analytical functions.

## RESULTS

### Numbers of Clinicians and Patients in the Analyses

Overall, 3,919 clinicians participated in the RAPID® activities during the study period; 784 of these clinicians had been identified in the medical claims database, with 256 (33%) having made at least 1 RA diagnosis in 2008 (Table 1). Of the clinicians who made at least 1 RA diagnosis, 192 (75%) were targeted learners, including 77 IMs and 93 GP/FPs.

**Table 1. Number of RAPID® 2008 Clinicians and Patients**

Learner and Control Dataset	Number of Clinicians		Number of Clinicians		Number of RA Diagnoses	
	2008		2011		2008	2011
	RAPID®	Control	RAPID®	Control		
All	784	34,243	784	34,243	318,769 <sup>a</sup>	435,800 <sup>a</sup>
≥1 RA diagnosis	256	8,063	376	14,359	3,590	5,427
Targeted Learners (≥1 RA patient)	192	5,600	232	9,637	869	1,197
IM: Targeted Learners (≥1 RA patient)	77	2,272	106	4,016	398	541
GP/FP: Targeted Learners (≥1 RA patient)	93	3,036	108	5,199	371	498

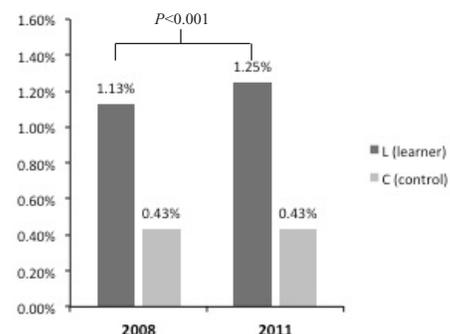
<sup>a</sup>These are total patients of the RAPID® participants, including both patients with an RA diagnosis and those without.

**Overall Performance of Clinicians**

Overall, there was an increase in the number of RAPID® participants who made a diagnosis of RA in 2011 compared with 2008, with a 47% increase in the number of RAPID® participants who had at least one RA diagnosis: 256 (2008) and 376 (2011), and a 53% increase in number of RA patients: 3,590 (2008) and 5,477 (2011). This increase in the number of RAPID® participants who made a diagnosis of RA was observed for all subgroups, but was not significant compared with controls. However, there was an 11% statistically significant increase ( $P<0.001$ ) in the proportion of RA diagnoses by all RAPID® learners following participation

in the initiative (Table 2 and Figure 1). In contrast, there was no change in the proportion of RA diagnoses by the control group over this same period (Table 2 and Figure 1). It is also of note that the RAPID® participants overall had a much larger proportion of patients (> 2-fold) with an RA diagnosis than the control group (Figure 1). This is due to the non-targeted RAPID® participants, who may have opted to take the RAPID® course because they had a larger number of RA patients and wanted to improve their care of these patients.

Examining the targeted RAPID® participants (those for whom RAPID® was specifically recommended), there was a 26%



**Figure 1.** Proportion of Patients with RA Diagnosis for All RAPID® Participants: Comparison of 2008 to 2011

statistically significant increase ( $P<0.001$ ) in the proportion of RA diagnoses by targeted RAPID® learners following participation in the initiative (Table 2 and Figure 2). This corresponded to a 21% increase in the number of RAPID® providers who made at least one RA diagnosis: 192 (2008) and 232 (2011). Pre-initiative, the proportion of RA diagnoses made by the participants who were recommended to take RAPID® was 81% of that for the control group; this increased to 100% post-participation (Table 2 and Figure 2). For the control group, there was a small increase in the proportion of RA diagnoses that was not significant (Table 2).

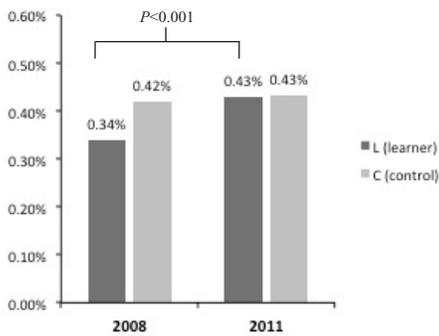
In contrast to the targeted learners, there was a 33% statistically significant decrease ( $P<0.001$ ) in the proportion of RA diagnoses following participation in the initiative

**Table 2. Summary of Claims Analyses Results, Including All RAPID® Participants**

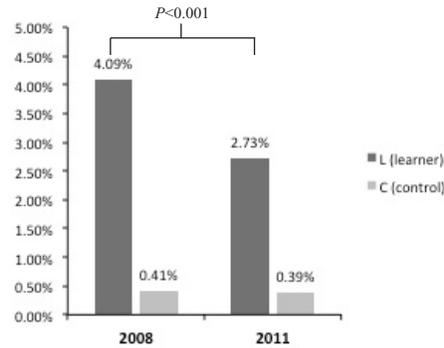
Learner Group	All				Targeted Learners				Non-Targeted Learners			
	Proportion of patients with RA diagnosis				Proportion of patients with RA diagnosis				Proportion of patients with RA diagnosis			
	2008	2011	% Δ	SS	2008	2011	% Δ	SS	2008	2011	% Δ	SS
All	1.13	1.25	11	Y	.34	.43	26	Y	4.09	2.73	-33	Y
Control	.43	.43	0	N	.42	.43	1	N	.41	.39	-5	Y
IM	.62	.63	2	N	.43	.50	16	Y	1.69	.96	-43	Y
Control	.61	.64	5	Y	.61	.64	5	Y	.59	.62	5	Y
GP/FP	.30	.36	20	Y	.26	.33	27	Y	.64	.49	-23	Y
Control	.34	.32	-6	Y	.34	.33	-3	Y	.29	.30	3	N

% Δ= % Change

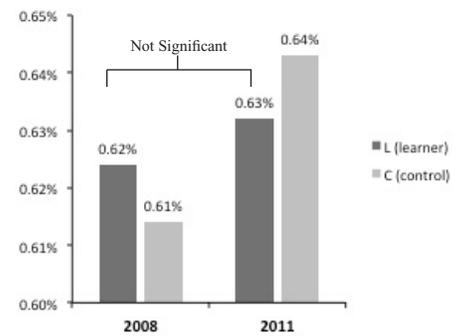
SS=Statistical Significance (Y=Yes,  $P \leq 0.05$ , N=No)



**Figure 2.** Proportion of Patients with RA Diagnosis for Targeted RAPID<sup>®</sup> Participants: Comparison of 2008 to 2011



**Figure 3.** Proportion of Patients with RA Diagnoses for Non-Targeted RAPID<sup>®</sup> Participants: Comparison of 2008 to 2011



**Figure 4.** Proportion of Patients with RA Diagnoses for IM RAPID<sup>®</sup> Participants: Comparison of 2008 to 2011

by the non-targeted learners (Table 2 and Figure 3). The control group also had a smaller but still significant decrease in the proportion of RA diagnoses in 2011 compared with 2008 (Table 2). On the other hand, there was a 125% increase in the total number of non-targeted RAPID<sup>®</sup> providers who had a least one RA diagnosis post-activity:  $n=64$  (2008) and  $n=144$  (2011). Also of significance, this group of learners made a much higher proportion of RA diagnoses both pre- and post-activity compared with the control groups (Figure 3). This is a much higher proportion (up to 10-fold higher) of RA patients than would be expected, with RA having an overall prevalence  $<1\%$  in the general population vs. the 4% measured in the non-targeted group. This large proportion of RA patients for the non-targeted learners may be an indication of an unusually high RA patient population in the practices of the non-targeted learners, or the larger proportion may include a number of patients who were misdiagnosed with RA. In the latter case, the non-targeted learners may be more accurately diagnosing RA after taking the CME activity. It is also possible that these clinicians chose to take these activities because of the high proportion of RA patients in their practices at the time. Lastly, there could be some physicians who are misclassified as primary care providers in the AMA Masterfile.

### Comparison of the Performance of IMs and GPs

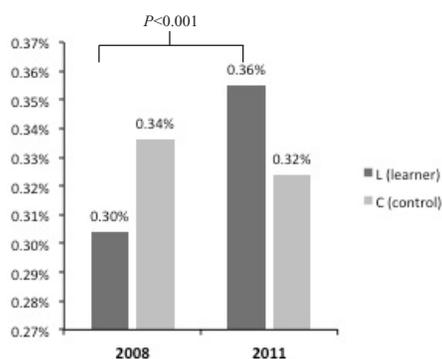
In comparing the performance of IMs and GP/FPs, IMs (both RAPID<sup>®</sup> participants and controls) made almost twice as many RA diagnoses (average proportion of RA diagnoses = 0.62/100 patients) as GP/FP participants and controls (average RA diagnosis ratio = 0.32 RA diagnoses/100 patients; Table 2). The group with the largest proportion of RA diagnoses per patient population was pre-participation non-targeted IM learners (1.69 RA diagnoses/100 patients). The poorest pre-participation performers based on this analysis were targeted GP/FPs (0.26 diagnoses/100 patients). As expected, based on the method used to identify low-performing clinicians for targeting with these programs, the targeted IMs had a 2.7-fold lower proportion of RA diagnoses compared with the non-targeted IMs, and targeted GP/FPs had a 2-fold lower ratio than the non-targeted GP/FPs (Table 2). The non-targeted GP/FPs had about the same proportion of RA diagnoses as IM controls, but almost twice as high as GP/FP controls.

Overall, taking into account both targeted and non-targeted clinicians, there was a small (2%) but not significant increase in the proportion of RA diagnoses made by IM RAPID<sup>®</sup> participants, and a larger (20%), significant increase in the proportion of RA diagnoses made by GP/FP participants (Table 2 and Figures 4 and 5). Whereas the

matched controls for the IMs showed a significant increase (5%) in RA diagnoses in 2011 vs. 2008 the control GP/FPs showed a small but significant decrease (-6%) in the proportion of RA diagnoses (Table 2).

When comparing the performance of targeted IMs vs. non-targeted IMs, it was found that the targeted group ( $n=169$ ; 77 made  $\geq 1$  RA diagnosis prior to the activity) had a significant increase in RA diagnoses (16%;  $P<0.001$ ) post-RAPID<sup>®</sup> participation, whereas the non-targeted group ( $n=109$ ; 18 made  $\geq 1$  RA diagnosis prior to the activity) had a significant decrease (-43%) in RA diagnoses post-RAPID<sup>®</sup> participation (Table 2). The control groups for both targeted and non-targeted IMs showed a smaller, but still significant, 5% increase in RA diagnoses per patient population when comparing 2008 and 2011 (Table 2). Thus, the targeted IMs improved their performance in diagnosing RA whereas the non-targeted IMs (who diagnosed RA at almost 3 times the rate of their controls) decreased the proportion of RA diagnoses post-activity.

Examining the GP/FP subgroup, the targeted GP/FPs who had the lowest proportion of RA diagnoses pre-activity also had the largest increase in the proportion of RA diagnoses post-activity (27%;  $P<0.001$ ). On the other hand, the non-targeted GP/FPs ( $n=63$ ) showed a large (-23%), significant decrease in proportional RA diagnoses (Table 2). The control group for the



**Figure 5.** Proportion of Patients with RA Diagnoses for GP/FP RAPID® Participants: Comparison of 2008 to 2011

targeted GP/FPs had a small, significant decrease in proportional RA diagnoses, whereas the non-targeted control group had a small increase in proportional RA diagnoses that was not significant. Thus, for both IMs and GP/FPs, the targeted clinicians exhibited significant increases in the proportion of RA diagnoses made post-RAPID® participation.

## DISCUSSION

Overall, there was a statistically significant 11% increase in the proportion of RA diagnoses by all studied RAPID® learners following participation in the initiative. There was no change in RA diagnoses by the control group. There was a 26% statistically significant increase ( $P < 0.001$ ) in the proportion of RA diagnoses by targeted RAPID® learners following participation in the initiative. Non-targeted learners had a 33% decrease in the proportion of RA diagnoses following participation in the initiative. When comparing the performance of targeted IMs vs. non-targeted IMs, it was found that the targeted group had a significant increase in RA diagnoses post-RAPID® participation, whereas the non-targeted group had a significant decrease. Examining the GP/FP subgroup, the targeted GP/FPs who had the lowest proportion of RA diagnoses pre-activity also had the largest increase in the proportion of RA diagnoses post-activity. On the other hand, the non-targeted GP/

FPs ( $n=63$ ) showed a significant decrease in RA diagnoses.

## CONCLUSIONS

In this study, identifying poorer-performing clinicians (as defined in the methods by analysis of the medical claims database) for invitation to targeted CME activities improved the post-activity performance of the targeted group more than for non-targeted participants. As a group, IMs were found to diagnose RA in a greater proportion of their patients than GP/FPs. Because the non-targeted groups of IMs and GP/FPs diagnosed RA patients in higher proportions than their respective control groups, we conjecture that they may have been motivated to take the RAPID® course to improve their management of RA, rather than for learning to diagnose RA. The decrease in the proportion of RA diagnoses post-participation by these non-targeted groups may indicate that these clinicians were misdiagnosing some patients as having RA before the RAPID® activity, and after taking the activity they may have more accurately been identifying patients with RA, leading to a lower proportion of RA diagnoses. Further study is required to investigate these hypotheses. It should be noted that even with the decreases in RA diagnosis post-activity, both the non-targeted IMs and GP/FPs continued to diagnose RA in higher proportions than their respective controls.

## Implications for Future CME and Performance Assessments

- Analysis of medical claims data is a useful tool for assessing performance change in CME initiative participants.
- Participation in CME activities such as those designed for the RAPID® program can result in long-term performance change, as measured with medical claims data post-initiative (>2 years).
- Continued targeting of clinicians for participation in RAPID® CME is highly recommended. Targeted learners are clinicians who are identified

as underperforming in the diagnosis of RA compared with clinicians having similar practice parameters.

- Subpopulations of clinicians such as IM and GP/FP should continue to be carefully defined and examined for the purpose of designing CME activities that optimize learning and performance improvement.

## ACKNOWLEDGMENTS

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