Cost-related Medication Nonadherence in Older Patients with Rheumatoid Arthritis

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ABSTRACT. ***Objective.*** Economic access to costly medications including biologic agents can be challenging. Our objective was to examine whether patients with rheumatoid arthritis (RA) are at particular risk for cost-related medication nonadherence (CRN) and spending less on basic needs.

Methods. We identified a nationally representative sample of older adults with RA (n = 1100) in the Medicare Current Beneficiary Survey (2004-2008) and compared them to older adults with other morbidities categorized by chronic disease count: 0 (n = 5898), 1–2 (n = 30,538), and ≥ 3 (n = 34,837). We compared annual rates of self-reported CRN (skipping or reducing medication doses or not obtaining prescriptions because of cost) as well as spending less on basic needs to afford medications and tested for differences using survey-weighted logistic regression analyses adjusted for demographic characteristics, health status, and prescription drug coverage.

Results. In the RA sample, the unadjusted weighted prevalence of CRN ranged from 20.7% in 2004 to 18.4% in 2008 as compared to 18.5% and 11.9%, respectively, in patients with 3 or more non-RA conditions. In adjusted analyses, having RA was associated with a 3.5-fold increase in the risk of CRN (OR 3.52, 95% CI 2.63–4.71) and almost a 2.5-fold risk of spending less on basic needs (OR 2.41, 95% CI 1.78–3.25) as compared to those without a chronic condition.

Conclusion. Patients with RA experience a high prevalence of CRN and forgoing of basic needs, more than do older adults with multiple other chronic conditions. The situation did not improve during a period of policy change aimed at alleviating high drug costs. (First Release Jan 15 2013; J Rheumatol 2013;40:137–43; doi:10.3899/jrheum.120441)

Key Indexing Terms:
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Rheumatoid arthritis (RA) is a chronic inflammatory condition that affects 1.3 million Americans[1]. There is growing evidence that earlier and more aggressive treatment of RA with nonbiologic and biologic disease-modifying antirheumatic drugs (DMARD) reduces symptoms of the condition and slows disease progression[2,3]. The majority of patients with RA are first treated with a traditional nonbiologic DMARD, typically oral medications taken daily. Patients with an inadequate response are often switched to a biologic, or a biologic is added to their current therapy to achieve better control. Current biologic agents are available only as intravenous infusions or subcutaneous injections; most are administered over 1 to 8 weeks. The exception is rituximab, which is given as 2 infusions separated by 2 weeks and repeated every 4 to 6 months. Biologic agents are expensive, with average monthly costs ranging from $933 to $2748 (all US$) in 2010[4]. This is in comparison to methotrexate, the most commonly used nonbiologic DMARD, which costs about $48 per month[5,6].

Affording medications can be a challenge for older Americans. Several large surveys have reported cost-related

medication nonadherence (CRN) to be a common problem affecting 13% to 29% of elderly patients[7,8,9]. Specifically, some patients will skip doses, reduce doses, or let prescriptions go unfilled for financial reasons. In addition, they may spend less on basic needs such as food or heat so that they can afford medications. To address the challenges older Americans face in paying for chronic medications, the US Congress passed the Medicare Prescription Drug Improvement and Modernization Act in the fall of 2003. This law established and subsidized a temporary drug benefit for self-administered agents including biologic DMARD (called The Medicare Replacement Drug Demonstration program, which lasted from 2004 to 2005), and the Medicare Part D benefit, which became available in January 1, 2006. One goal of this legislation was to improve access to self-administered medications while decreasing the need for infused agents. Self-injectable biologic DMARD are covered by Part D; however, their specialty status requires higher cost-sharing for patients with RA who are enrolled in Part D plans (on average 26%–28% of the medication price) as compared to nonbiologic DMARD, which are covered using traditional and generally lower copayments[10].

Little is known regarding the rates of CRN in patients with RA as compared to those without and how new policies affecting medication coverage changed CRN rates. We examined changes in the prevalence of CRN and spending less on basic needs (e.g., food) to afford medications among a nationally representative community-dwelling cohort of Medicare enrollees based on the presence of RA in comparison to the number of non-RA diagnoses. We identified Medicare enrollees who participated in the Medicare Current Beneficiary Survey (MCBS) between 2004 and 2008. The purpose of our study was to assess the association of RA with CRN in a national sample of Medicare patients over time. In light of the costs associated with the treatment of RA, we hypothesized that the rates of CRN and spending less on basic needs would be higher in patients with RA as compared to those without.

MATERIALS AND METHODS

Data source. The MCBS is a continuous face-to-face panel survey of a representative national sample of Medicare beneficiaries conducted by the Center for Medicare and Medicaid Services[11]. Since 1991, the MCBS has provided detailed longitudinal data on annual samples of about 15,700 Medicare beneficiaries. The rich variety of measures includes demographic information, income, health status and function, health behaviors, insurance coverage, drug coverage, health service use, and health service costs. Medicare enrollment data and fee-for-service claims are also included.

The sample has a 4-year rotating panel design with staggered replenishments. Respondents are interviewed in person 3 times a year using Computer Assisted Personal Interviewing, resulting in very high response rates (initially ~85%, average > 70% during the observation period). We included all community-dwelling respondents (> 90% of all respondents) where administrative claims were available (> 80% of community-dwelling respondents). Accounting for overlap among years, the total number of individual respondents in our study was 32,857.

Our unit of analysis was the individual person-year. We identified patients with RA based on 2 administrative claims with the diagnosis [*International Classification of Diseases*, 9th ed (ICD-9) 714.XX] per year of interest and classified the remaining patients as those without RA based on self-reported comorbidity burden (0, 1 to 2, and ≥ 3 self-reported non-RA conditions). CRN was our primary outcome measure of interest and was based on response to questions developed by members of the study team and implemented in the MCBS since 2004[9]. These measures have been shown to be valid and reliable measures of cost-related nonadherence[7,8,9]. As in previous studies, we constructed a summary indicator of CRN for analysis that took the value of "yes" if a respondent indicated yes/ever during the current year to any of the following: "skipped doses to make the medicine last longer," "taken smaller doses of a medicine to make the medicine last longer," or "any medicine prescribed for you that you did not get." These questions were asked in combination with "(a reason or the main reason) you did not obtain the medication was you thought it would cost too much" or "decided not to fill or refill a prescription because it was too expensive"[9,12,13,14]. In addition, we examined spending less on basic needs as a separate indication of hardship related to medication costs based on a "yes" response to the question of whether they "spent less money on food, heat or other basic needs so that you would have money for medicine."

We also examined demographic and clinical characteristics from the MCBS that could potentially influence medication adherence over time including sex, age group (< 55, 55–64, 65–74, 75–84, and 85+ yrs), disability status, income (< $25,000 and ≥ $25,000/yr), race (black, white, Hispanic, other), education attainment (above high school, high school diploma, no diploma), prescription drug coverage [none, partial, full private (employer), and full public (Medicaid and Part D)], count of self-reported non-RA conditions (0, 1 to 2, and 3+) and a measure of self-rated health dichotomized into fair or poor versus good, very good, or excellent.

All measures were collected in each study year, thus a respondent's status on time-varying characteristics could change during the study period. We controlled for the interview sequence because preliminary analyses revealed that the reported prevalence of CRN and spending less on basic needs was higher during the initial MCBS interview than in subsequent annual interviews.

Statistical analysis. We compared the demographic and clinical characteristics among Medicare beneficiaries with RA separately among those with 0, 1 to 2, and ≥ 3 self-reported non-RA conditions in 2004, 2005, 2006, 2007, and 2008, using descriptive statistics. The results were weighted to represent the entire noninstitutionalized Medicare population using annual cross-sectional survey weights provided in the MCBS. Next we examined the relationship between morbidity burden (RA and 0, 1 to 2, and ≥ 3 self-reported non-RA conditions) and the unadjusted prevalence of CRN in 2004, 2005, 2006, 2007, and 2008 using chi-squared statistics. The absolute and relative decreases in CRN over time in the RA and non-RA populations were calculated. Using logistic regression, we examined trends in CRN over time in the RA and non-RA populations. We evaluated whether morbidity burden was associated with CRN after controlling for year, interview sequence, demographic characteristics, and socioeconomic status. All models used MCBS cross-sectional survey weights[15]. We corrected for the clustering at the primary sampling unit level inherent in the MCBS design, thereby also controlling for repeated responses by individuals over time[16]. The odds of forgoing basic needs were modeled separately using the same approach. We assessed the robustness of our results by conducting an alternative analysis that adjusted for repeated measures on the same individuals across survey years by using unweighted general estimated equation regression models. In addition, we recalculated all the analyses using only those patients with drug coverage to see if that influenced the results. Lastly, we evaluated the prevalence of CRN and spending less on basic needs in patients with RA as compared to those without the condition, controlling for the number of non-RA comorbid conditions in both groups. All analyses were conducted using SAS version

9.2, and the *a priori* level of statistical significance was p = 0.05. The Institutional Review Board at the University of Massachusetts reviewed and approved our study.

RESULTS

Our sample size included 14,498 beneficiaries in 2004, 14,699 in 2005, 14,731 in 2006, 14,804 in 2007, and 13,651 in 2008. Annually, 1.4% to 1.7% of beneficiaries had a diagnosis of RA (range 184–241). The vast majority (> 95%) of patients with RA had at least 1 comorbid condition. As shown in Table 1, in 2004 patients with RA were more likely than those without to be female and to have more generous prescription drug coverage. For every year of the study period, patients with RA compared to those with no morbid conditions were more likely to be female, older, and in poor health. Compared with those with 1–2 non-RA conditions, patients with RA were more likely to be female and in poor health. Lastly, patients with RA differed in terms of sex only with patients with 3 or more non-RA conditions. By 2008, the end of the study period, the proportion of Hispanic and non-Hispanic black patients with RA increased (18.4% vs 26.1% in 2008; p = 0.03). In both RA and non-RA, fewer patients reported an annual income < $25,000 a year by the end of the study period, and prescription drug coverage improved (Table 1).

As shown in Figure 1, the absolute decrease in CRN was 2.2% in patients with RA as compared to 4.0%, 5.3%, and 6.5% in those with 0, 1–2, and ≥ 3 non-RA conditions, respectively. The relative decrease in CRN was 10.8% in those with RA as compared to 54.0%, 40.5%, and 35.5% in those with 0, 1–2, and ≥ 3 non-RA conditions. The trend in CRN over time was significant in those with 0 (p = 0.007), 1–2 (p < 0.0001), and ≥ 3 (p < 0.0001) non-RA conditions.

The proportion of patients reporting that they spent less on basic needs to pay for medications is shown in Figure 2. Overall, fewer reported forgoing basic needs than reported CRN. Among the patients with RA, from 2004 to 2008 the

Table 1. Baseline characteristics of Medicare beneficiaries with and without rheumatoid arthritis (RA) stratified by number of comorbid conditions in 2004 and 2008. All data percentages unless otherwise indicated.

	2004				2008			
	RA	No. Comorbid Conditions in Those Without RA			RA	No. Comorbid Conditions in Those Without RA		
		0	1–2	3+		0	1–2	3+
Unweighted, n	219	1180	6275	6824	184	1087	5620	6760
Age, yrs								
< 55	8.2	7.1*	8.4	7.6	8.3	10.5*	8.8	7.6
55–64	6.9	2.2*	4.7	9.9	9.9	2.6*	5.6	10.5
65–74	38.8	57.9*	46.8	36.4	45.6	57.3*	48.3	36.5
75–84	36.5	25.3*	31.0	34.4	27.9	23.0*	27.6	32.4
85+	9.7	7.4*	9.1	11.6	8.3	6.6*	9.6	13.1
Female	76.2	49.9*	53.6*	58.1*	76.8	51.9*	54.1*	55.4*
Disabled	15.1	9.3	13.1	17.6	18.2	13.1	14.4	18.1
Income level								
< US$25,000	62.3	51.4*	54.8	63.7	48.4	46.7	47.7	55.8
US$25,000+	37.7	48.6*	45.2	36.3	51.6	53.3	52.3	44.2
Race/ethnicity								
Hispanic	10.1	8.0	8.3	7.3*	13.9	7.6*	7.6*	8.3
Black/non-Hispanic	8.3	5.3	9.6	10.6*	12.2	6.9*	9.5*	10.4
White	75.7	83.8	78.8	79.4*	72.1	82.9*	79.9*	77.8
Residence								
Rural	26.5	22.8	21.9	25.0	26.1	23.8	22.8	24.4
Metropolitan	73.5	77.2	78.1	75.0	73.9	76.2	77.2	75.6
Education level								
> High school	40.0	45.3	42.2	39.3	41.2	48.4	47.2*	41.6*
High school	35.1	29.8	31.6	29.3	39.9	31.6	31.0*	30.8*
No high school	25.0	24.9	26.1	31.5	18.8	20.0	21.8*	27.6*
Prescription drug coverage								
None	23.3	42.5*	31.0*	26.3*	10.9	16.4	9.7	7.9
Partial	19.4	21.4*	25.7*	28.0*	4.6	5.9	4.5	4.7
Full private	35.2	30.3*	33.4*	32.8*	32.0	25.3	28.5	26.5
Full public	22.1	5.7*	9.9*	12.9*	52.4	52.3	57.3	60.9
Self-reported health status								
Excellent/good	57.6	93.9*	83.1*	60.8	46.8	93.9*	84.2*	61.7*
Fair/poor	42.4	6.1*	16.9*	39.2	53.2	6.1*	15.8*	38.3*

* p < 0.05 for comparisons between the RA and non-RA groups (0, 1–2, and 3+) for the study year of interest.

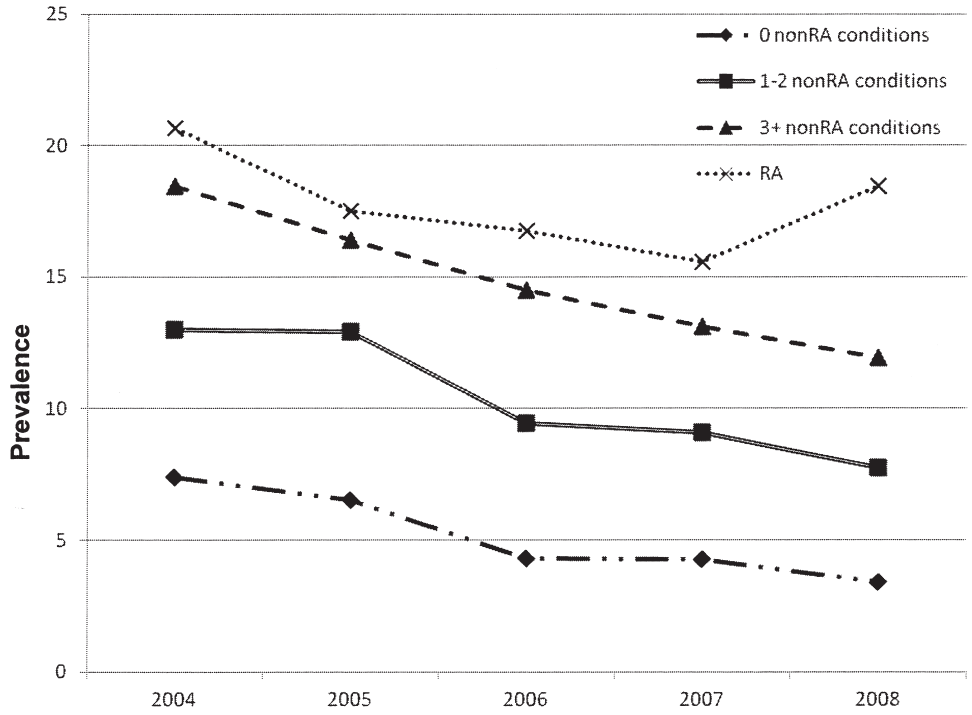

Figure 1. Prevalence of cost-related medication nonadherence (CRN) between 2004 and 2008 in those with and without RA. The trend in CRN over time was significant in those with 0 ($p = 0.007$), 1–2 ($p < 0.0001$), and ≥ 3 ($p < 0.0001$) non-RA conditions.

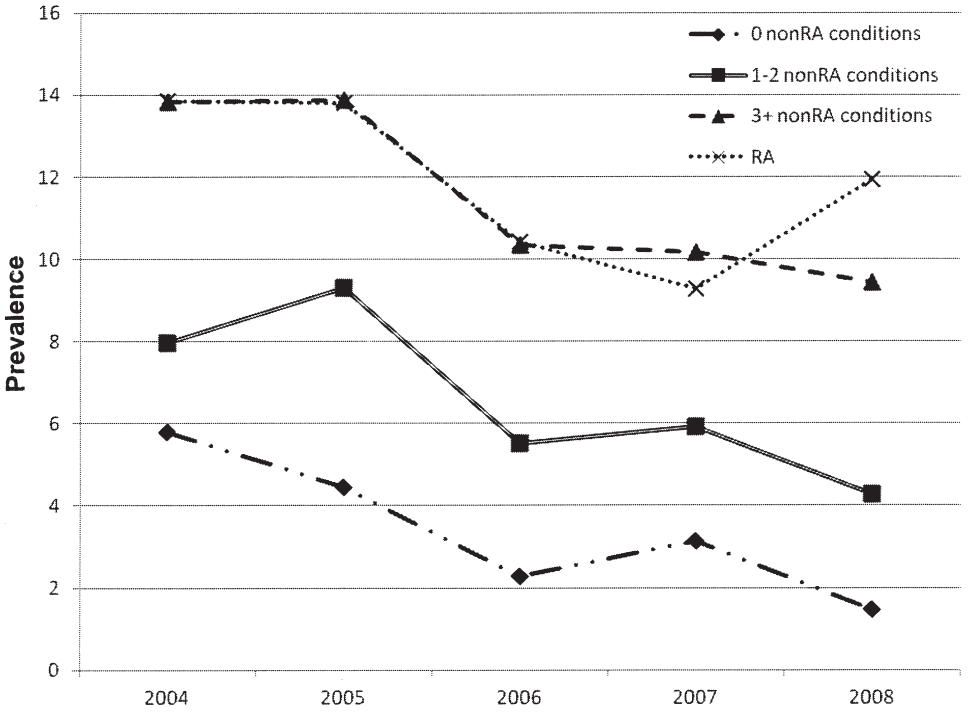

Figure 2. Prevalence of spending less on basic needs to afford medication between 2004 and 2008 based on morbidity burden. The trend in spending less on basic needs over time was significant for those with 0 ($p = 0.0002$), 1–2 ($p < 0.0001$), and ≥ 3 ($p < 0.0001$) non-RA conditions.

absolute decrease in spending less on basic needs was 1.9%. It was 4.3%, 3.7%, and 4.4% in those with 0, 1 to 2, and ≥ 3 non-RA conditions, respectively. The relative decrease in spending less on basic needs was 13.8% in those with RA as compared to 74.7%, 46.1%, and 31.9% in those with 0, 1 to 2, and ≥ 3 non-RA conditions. The trend in spending less on basic needs over time was significant for those with 0 ($p = 0.0002$), 1–2 ($p < 0.0001$), and ≥ 3 ($p < 0.0001$) non-RA conditions.

Table 2 shows the unadjusted and adjusted analyses examining factors associated with CRN. In adjusted analyses, RA increased the likelihood of CRN by 3.5-fold (OR 3.52, 95% CI 2.63–4.71) with a greater magnitude of effect than having 1–2 or ≥ 3 non-RA conditions (OR 2.20, 95% CI 1.84–2.63 and OR 3.12, 95% CI 2.56–3.80, respectively). Similarly, RA was associated with a greater likelihood of spending less on basic needs in adjusted analyses (OR 2.41, 95% CI 1.78–3.25; Table 3). The likelihood of spending less in those with 1–2 or ≥ 3 non-RA conditions was increased but the effect was less pronounced (OR 1.75, 95% CI 1.39–2.21 and OR 2.38, 95% CI 1.80–3.14). The results were similar when limiting the population to those with drug coverage as well as adjusting for repeated measures on the same individuals across survey years using unweighted general estimated equation regression models. In analyses evaluating the effect of a diagnosis of RA alone after controlling non-RA comorbid conditions, we found that RA was associated with CRN (OR 1.25, 95% CI 1.01–1.55) and spending less on basic needs (OR 1.08, 95% CI 0.85–1.37).

Table 2. Unadjusted and adjusted analyses examining predictors of cost-related medication nonadherence (CRN).

Predictors	Unadjusted OR of CRN (95% CI)	Adjusted OR of CRN (95% CI)
Comorbidity level (0 is reference)		
1–2	2.14 (1.80–2.55)	2.20 (1.84–2.63)
3+	3.19 (2.62–3.88)	3.12 (2.56–3.80)
RA	3.96 (2.99–5.25)	3.52 (2.63–4.71)
Trend over time	0.88 (0.85–0.90)	0.89 (0.86–0.92)
Age	0.96 (0.96–0.97)	0.98 (0.97–0.98)
Female sex	1.23 (1.16–1.30)	1.32 (1.24–1.41)
Disabled	3.31 (3.08–3.57)	1.60 (1.41–1.83)
Income < US$25,000	1.69 (1.58–1.81)	1.23 (1.14–1.32)
Race (white is reference)		
Hispanic	1.31 (1.16–1.48)	0.91 (0.79–1.05)
Black	1.51 (1.37–1.66)	1.09 (0.97–1.23)
Other	1.25 (1.02–1.54)	1.12 (0.93–1.35)
Education (high school diploma reference)		
No high school diploma	1.15 (1.06–1.26)	1.08 (0.98–1.19)
Above high school	0.99 (0.92–1.06)	1.13 (1.04–1.22)
Prescription coverage (none is reference)		
Partial	0.91 (0.81–1.03)	0.86 (0.75–0.99)
Full private	0.52 (0.47–0.57)	0.57 (0.51–0.63)
Full public	0.82 (0.75–0.90)	0.73 (0.65–0.83)
Fair/poor self-reported health status	2.40 (2.26–2.55)	1.55 (1.46–1.65)

Table 3. Unadjusted and adjusted analyses examining predictors of spending less on basic needs to afford medications.

Predictors	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Comorbidity level (0 is reference)		
1–2	1.99 (1.60–2.47)	1.75 (1.39–2.21)
3+	3.66 (2.88–4.65)	2.38 (1.80–3.14)
RA	3.78 (2.80–5.11)	2.41 (1.78–3.25)
Trend over time	0.88 (0.84–0.91)	0.89 (0.86–0.93)
Age	0.96 (0.96–0.97)	0.98 (0.98–0.99)
Female sex	1.28 (1.19–1.38)	1.39 (1.30–1.50)
Disabled	3.62 (3.32–3.95)	1.68 (1.44–1.97)
Income < US$25,000	2.75 (2.50–3.03)	1.75 (1.62–1.95)
Race (white is reference)		
Hispanic	1.96 (1.73–2.24)	1.29 (1.10–1.51)
Black	2.15 (1.90–2.43)	1.42 (1.28–1.57)
Other	1.44 (1.16–1.81)	1.19 (0.99–1.44)
Education (high school diploma reference)		
No high school diploma	1.42 (1.30–1.55)	1.17 (1.06–1.29)
Above high school	0.83 (0.75–0.92)	1.04 (0.95–1.13)
Prescription coverage (none is reference)		
Partial	0.91 (0.79–1.05)	0.82 (0.69–0.98)
Full private	0.39 (0.34–0.44)	0.48 (0.42–0.55)
Full public	0.86 (0.76–0.98)	0.68 (0.59–0.78)
Urban	0.81 (0.70–0.94)	0.81 (0.67–0.99)
Fair/poor self-reported health status	3.19 (2.91–3.48)	1.96 (1.82–2.11)

DISCUSSION

This study is the first to our knowledge that has examined medication nonadherence due to cost and forgoing basic needs in patients with RA as compared to those without the condition, using the largest face-to-face panel survey of Medicare enrollees. We found that unadjusted rates of CRN were worse in those with RA compared to those without, even when compared to those with 3 or more morbid conditions. In addition, relative and absolute decreases in CRN were much smaller in the RA population compared to those without RA. During the study time period, patients with RA had no improvements in CRN and in spending less on basic needs to afford medications, and the rates in RA have been the highest found to date among Medicare beneficiaries[9,13,14,17]. RA was associated with a 3.5-fold increase in the risk of CRN (OR 3.52, 95% CI 2.63–4.71) and almost a 2.5-fold risk of spending less on basic needs (OR 2.41, 95% CI 1.78–3.25) in adjusted analyses compared to those without a chronic condition.

Patients with RA are particularly at risk for CRN and forgoing basic needs to pay for medications because the condition is expensive to treat and may also result in underemployment or work disability[18,19]. The vast majority of patients with RA require chronic therapy with medications. For patients who do not adequately respond to nonbiologic disease-modifying drugs, biologic agents are suggested, and they are costly. In 2006, the average annual costs of biologics for the treatment of RA were $15,000 to

$20,000[20]. Prior to 2006, the traditional Medicare benefit package did not cover outpatient prescription drugs. Thus options for Medicare beneficiaries with chronic conditions such as RA included drug coverage through employer-sponsored supplemental insurance, individually purchased Medigap plans, Medicare health maintenance organization plans, or public programs such as Medicaid and state pharmacy programs.

To address this gap in coverage, the 2003 Medicare Modernization Act (MMA) established a temporary drug benefit for self-administered agents such as etanercept and adalimumab for the treatment of RA. One goal of the MMA was to remove the need for infused drugs covered under Medicare Part B such as infliximab [called the Medicare Replacement Drug Demonstration (MRDD) program, 2004 to 2005] and to improve access to self-injectable biologics including etanercept and adalimumab. It was hoped that by extending Medicare coverage, Medicare beneficiaries would have added convenience (receipt of their medication at home rather than in an infusion center or doctor's office), improved health outcomes by enabling access to other biologic agents, and reduced financial barriers to self-administered medications. Specifically, the costs of many of the self-administered medications covered under the demonstration program were previously prohibitive — they exceeded $20,000 a year for those without supplemental drug coverage. In 2006, the Medicare Part D prescription drug plan began covering oral and self-administered nonbiologic and biologic DMARD, a move that provided access to those without insurance but shifted costs to the patients as the specialty status of the biologic DMARD required higher cost-sharing for patients with RA enrolled in Part D plans[10].

While the introduction of Medicare Part D has been associated with reductions in out-of-pocket expenditures for Medicare beneficiaries overall[13,17], this shift has not been greatly explored in RA. Our previous work suggested that these expenses have stabilized, with annual out-of-pocket costs of $842 in 2000 and $832 in 2006 ($p = 0.68$) for patients with RA[21]. Among vulnerable, low-income patients with RA enrolled in the MRDD and transitioned to Part D in 2006, costs have been shifted to the beneficiary, with out-of-pocket costs exceeding $4000 annually[10]. This has therapeutic implications. Research has shown that drug benefit generosity influences the likelihood that patients with RA will initiate and continue a biologic agent[22]. Medication nonadherence as well as forgoing optimal medical treatment adversely affects health outcomes[23]. Our research suggests that patients with RA are exceptionally sensitive to cost-sharing. Policy makers may wish to consider tailored benefit designs to encourage better medication adherence for the RA patient population[24].

Rheumatologists and primary care providers who care for patients with RA should be aware of the financial obstacles involved in medication initiation and adherence and raise these issues with patients. Patients and their providers should have open and honest conversations about the clinical risks and benefits of medication therapy as well as the associated costs, and alter therapeutic plans accordingly. Unfortunately, while most patients and providers agree that discussion of out-of-pocket costs is important, it occurs infrequently[25]. Specifically, rheumatologists were found to discuss medication costs in only one-third of visits where drug therapy was being changed[26]. Additionally, communication about medication costs was less frequent with nonwhite and low-income patients[26]. Clearly, providers need to raise these issues with all patients regardless of race and socioeconomic status when initiating therapy and again during the course of therapy, particularly as patients approach gaps in coverage (for example the Part D "doughnut hole"). Some providers may preferentially decide to prescribe infused agents, which may be covered more generously under Medicare Part B (typically patients are responsible for 20% of the costs), rather than the self-administered agents covered under Part D, in which patients pay on average 26%–28% of the medication price.

The strength of our study is that it used well-validated measures to provide detailed estimates of CRN among a nationally representative population. Additionally, we are able to compare rates of CRN and a closely related measure of hardship among patients with RA in contrast to those with multiple non-RA conditions. These data also provide evidence of unintended drug cost reduction strategies such as patients spending less on basic needs to afford their medications, which is worrisome.

Our study has several limitations. While RA was significantly associated with CRN and forgoing basic needs, the confidence intervals for the estimates presented in Figures 1 and 2 were overlapping because of the heterogeneity of the populations and sample sizes involved. We were unable to systematically assess which medications were affected by CRN and which medications were continued. In addition, we do not know what component of having RA contributed to the higher risk of CRN and spending less on basic needs, for example, whether it was the costs of specific medications or costs associated with other medical care. As with all studies using ICD-9 codes to identify patients, misclassification is a concern. However, studies using Medicare claims have reported a sensitivity of 65% to 90% for RA and a high positive predictive value[27,28].

We found that patients with RA are at much greater risk for CRN than Medicare beneficiaries with other morbid conditions. The extra burden of CRN is due, in part, to the multiple comorbidities associated with this costly condition. Additionally, economic access to medications has not improved for those with RA, while it has for those without the condition. The Medicare drug benefit is a complex program and clearly not all patient populations are receiving

equal benefits. Our study highlights the importance of carefully monitoring the effect of recent policy changes on patients at high risk for CRN because of the clinical consequences of the disease as well as the associated treatments. In addition, to tailor therapy, providers need to be aware of the prevalence of CRN, keeping in mind both clinical and financial goals.

Appendix 1.

Prevalence of cost-related medication nonadherence between 2004 and 2008 in those with and without rheumatoid arthritis (Figure 1). These data are percentage (95% CI). Rates for 2004, 2005, 2006, 2007, and 2008 were as follows in the different groups: RA 20.7% (15.6-26.8), 17.5% (11.9-23.1), 16.8% (10.9-22.6), 15.6% (9.5-21.6), 18.4% (10.3-26.3); 0 non-RA conditions 7.4% (5.0-9.7), 6.5% (4.5-8.6), 4.3% (3.2-5.4), 4.3% (2.9-5.6), 3.4 (2.1-4.7); 1–2 non-RA conditions 13.0% (11.4-14.6), 12.9% (11.5-14.3), 9.5% (8.6-10.3), 9.1% (7.9-10.2), 7.7% (6.8-8.7); ≥ 3 non-RA conditions 18.5% (16.9-20.0), 16.4% (15.1-17.6), 14.5% (13.7-15.5), 13.1% (12.1-14.1), 11.9 (10.9-12.9).

Prevalence of spending less on basic needs between 2004 and 2008 based on morbidity burden (Figure 2). These data are percentage (95% CI). Rates in the different groups 2004, 2005, 2006, 2007, and 2008 were as follows: RA 13.9% (9.3-18.4), 13.8% (8.8-18.8), 10.4% (5.8-15.1), 9.3% (5.4-13.2), 11.9% (4.3-19.6); 0 non-RA conditions 5.8% (3.6-8.0), 4.4% (2.8-6.1), 2.3% (1.4-3.2), 3.1% (2.0-4.2), 1.5 (0.4-2.6); 1-2 non-RA conditions 8.0% (6.3-9.6), 9.3% (8.1-10.6), 5.5% (4.8-6.2), 5.9% (4.9-6.9), 4.3 (3.5-5.1); ≥ 3 non-RA conditions 13.8% (12.5-15.2), 13.9% (12.6-15.1), 10.4% (9.4-11.3), 10.2% (9.3-11.1), 9.4% (8.3-10.5).

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