Rhuematoid Arthritis (RA) and non-infused biologics: adherence, healthcare cost and utilization.

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Proportion of days covered (PDC) adherence for PQA "PDC-RA" methodolgy with select list of biologics and the outcomes of total medical costs, hospitalizations and length of stay for both Commercial and Medicare samples.

BACKGROUND

- Pharmacy Quality Alliance (PQA) promotes a useful reporting metric of proportion of days covered (PDC) for non-infused biologic medications to treat RA.

OBJECTIVES

- To identify significant associations between this PQA PDC adherence metric and total medical cost, hospitalizations, and length of stay (LOS) for RA patients.

METHODS

- This retrospective cohort study design used patients from both the MarketScan Commercial Claims and Encounters (aka Commercial) and Supplemental or Coordination of Benefits (aka Medicare) databases from 2019—2020.
- The sample had to meet the PQA "PDC-RA" criteria on the non-infused medication from the 2020 files (see Table 2.) along with at least 2 RA diagnosis codes (one as primary) in the medical files. Continuous enrollment was required per year and age ranged from 18--64 years in the commercial sample, or at least 65 years for the Medicare sample.
- Those with hospice care or inpatient transplant services were excluded from sample.
- General linear models predicted total medical costs (total net inpatient and outpatient costs), hospitalizations, and length of stay (LOS) (with gamma or logit links) on combined Commercial and Medicare 2020 files. New therapy/diagnosis indications in 2020 were inferred from a look back into 2019 data.
- Predictors included adherence (PDC ≥ 80% or not), gender (female vs. male), age (above median per sample, 52 yrs. or 71 yrs.), census region (southern vs. other), metropolitan location (metro vs. not metro), number of generics (2+ generics vs. 1), retail orders (all vs. mix or mail), presence of comorbidity (any non-RA Charlson comorbidity index category), other inflammatory conditions (primary diagnosis for ankylosing spondylitis, reactive arthritis, juvenile arthritis, psoriatic arthritis, osteoarthritis, or non-radiographic axial spondylarthritis), COVID-19 indication (diagnostic or procedure codes), inpatient surgeries (present vs. or not), PPO insurance type (present or not), and insurance (Commercial vs. Medicare). Interactions were

Walgreens

included between sample insurance and many covariates, as well as interactions between adherence and comorbidity or surgery.

RESULTS

- A total of 14,866 patients in 2020 met sample criteria, with 13,843 (93.1%) commercial coverage and 1,023 Medicare eligible. In this combined study sample, patients had a mean PDC=80.9% (s.d.=20.3%) with 64.8% adherent and all were found to have a prior 2019 RA diagnosis or biologic medication.
- Mean PDC was the same across payer types, but Medicare compared to Commercial patients had higher rates of comorbidity (by 25.9%), additional inflammatory conditions (by 9.8%), use of multiple generics (by 9.8%), inpatient admissions (by 8.6%), had PPO coverage (by 18.3%), and were less likely to reside in metropolitan locations (by 43%) or the southern census region (by 25.7%) (Table 1).

Table 1. Demographics and Clinical Characteristics for Sample with PDC-RA.

Payer Cohort	N	Female	Age (71+,52+)	Southern Region	Metro area	Retail Rx	COVID-19	Multiple generics	Comorbidity
Medicare	1,023	72.7%	56.1%	23.6%	30.9%	55.5%	2.7%	28.8%	60.7%
Commercial	13,843	79.0%	58.7%	49.3%	73.9%	53.6%	6.6%	19.0%	34.8%
		PPO	Inflammatory Dx	PDC	Adherent	Admission	Surgery	Mean LOS	
Medicare	1,023	71.3%	28.8%	80.9%	61.1%	15.4%	37.7%	5.3 days	
Commercial	13,843	53.0%	19.0%	80.9%	65.0%	6.8%	48.7%	5.4 days	

- The most utilized medications were etanercept (29.3%) followed by adalimumab (20.2%), tofacitinib (16.4%) and multiple Rx (13.4%), see Table 2. A similar ranking on biologics is present among the 19.7% of patients having another inflammatory diagnosis compared to RA only for these first four therapies.

Table 2. Distribution of Generic Biologics for 2020 PDC, by Diagnosis for RA Only or with Other Inflammatory Conditions.

Generic Biologic	RA Only	RA w/other	Total n (%)
abatacept	853 (80.2%)	210 (19.8%)	1,063 (7.2%)
adalimumab	2,460 (80.2%)	540 (18.0%)	3,000 (20.2%)
anakinra	11 (57.9%)	8 (42.1%)	19 (0.1%)
baricitinib	53 (69.7%)	23 (30.6%)	76 (0.5%)
certolizumab	337 (79.9%)	85 (20.1%)	422 (2.8%)
etanercept	3,586 (82.3%)	773 (17.7%)	4,359 (29.3%)
golimumab	311 (83.2%)	63 (16.8%)	374 (2.5%)
sarilumab	188 (74.3%)	65 (25.7%)	253 (1.7%)
tocilizumab	405 (79.9%)	102 (20.1%)	507 (3.4%)

tofacitinib	1,943 (79.5%)	502 (19.3%)	2,445 (16.4%)
upadacitinib	292 (80.7%)	70 (19.3%)	362 (2.4%)
Multiple Rx	1,497 (75.4%)	489 (24.6%)	1,986 (13.4%)
Total n (%)	11,936 (80.3%)	2,930 (19.7%)	14,866

- General linear models with a gamma link and listed covariates were used for both PDC-RA medication costs as net payments by carrier, and total medical costs (combine inpatient and outpatient net payments) for the year. As reported in **Table 3.** the adherent group had a much higher biologics costs than the less adherent group ($23,369, p<.0001) given they utilized more medication. Other significant covariates included lower costs with age (p<.0001), comorbidity (p<.0001) or PPO insurance (p<.0001); where as, there were higher costs among females (p<.02), metropolitan areas (p<.0001), southern region (p<.0001) and Commercial coverage (p<.0001). There were significant interactions between payer type and adherence (p<.0001) or with age (p<.0001) or with comorbidity (p<.0001) or with metropolitan area (p<.0001).

Table 3. Modeled Adjusted 2020 Outcomes of PDC-RA Prescription Costs and Total Medical Costs by Adherent Levels.

Outcome	PDC <80	PDC 80+	Adherence Δ
PDC Rx	$31,386	$54,755	$23,369
Total Medical	$14,784	$9,044	-$5,740

- However, the adherent group had significantly lower adjusted medical costs than the non-adherent group, by a difference of -$5,740 (p<.0003) (see **Table 3**).

- Other significant covariates included increase medical costs with age (p<.0001), females (p<.0001), multiple generics (p<.0001), COVID-19 (p<.0001), comorbidity (p<.0001), inflammatory conditions (p<.0001), surgery (p<.0001), metropolitan areas (p<.0001), southern region (p<.0001), and Commercial payer type (p<.0001); whereas those with PPO insurance had lower medical costs (p<.04). There were significant interactions with payer type and age (p<.0001) or with comorbidity (p<.0001) or with surgery (p<.002) or with metropolitan area (p<.0001), but not with adherence.

- The third outcome of interest is the comparative difference for inpatient admissions between the adherent and less adherent groups (n=1,093). General linear models with a log link predicted an inpatient admission event by adherence and the other mentioned covariates, and interaction terms.

- Inpatient admissions were significantly less likely among those adherent to the RA biologics compared to the less adherent group (OR=0.65, p<.0001), with a reduce adjusted mean rate of -3.9% (see **Table 4.**).

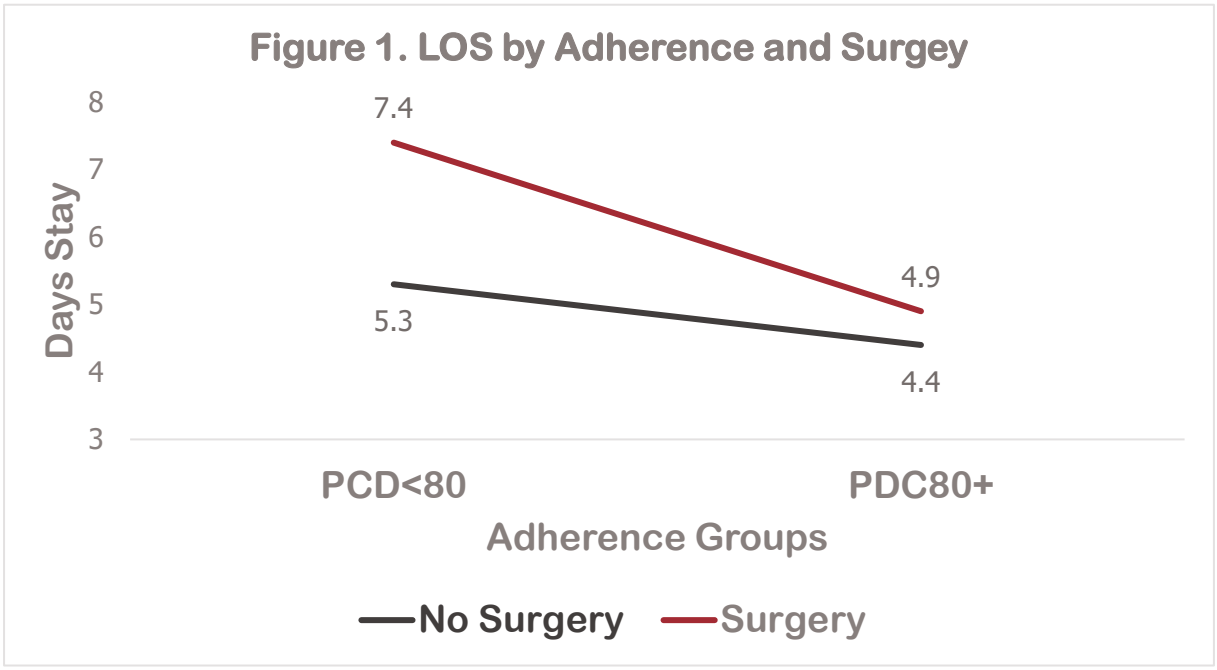
- Other significant predictors were increased odds of admission for age (p<.02), with a comorbidity (p<.0001), or COVID-19 (p<.0001), or inflammatory condition (p<.0001), and southern region (p<.03); where as, lower odds were indicated for group with commercial payer (p<.0001). No interactions with payer type were significant.

Table 4. Modeled Hospitalizations and LOS for 2020: Odds Ratio and Adjusted LOS of Adherence (reference: non-adherent).

Outcome	Odds of Hospitalization	Mean Hospitalization	Length of Stay (days)
Adherence Δ	0.65	-3.9%	-1.6

- Finally, for LOS among the 1,093 patient admissions, a general linear model with gamma link predicted days stay with adherence and other covariates. LOS was significantly shorter for adherent patients (-1.6 days, p<.0008) compared to less adherent patients (see **Table 4**).

- Other significant covariates for LOS were increased stay with age (p<.03), comorbidity (p<.003), COVID-19 (p<.0001), and surgery (p<.0001). Interactions between surgery with adherence (p<.02), and payer type with inflammatory conditions.(p<.04) were present. **Figure 1.** presents the interaction with adherence and surgery, were the difference between the longer length of stay among surgeries is significantly higher among the less adherent group compared to the adherent group (p<.0001).



CONCLUSIONS

- An adherence metric for non-infused specialty medications utilized by RA patients had significant associations with yearly healthcare cost and utilization. Being adherent to a non-infused RA biologic can lead to lower medical costs, odds of hospitalization and LOS after controlling for many other influences on these outcomes. These reductions were also dependent on age, comorbidity, COVID-19, inflammatory conditions, southern region, and payer type (Commercial or Medicare). Interactions between payer type and other covariates were often significant but payer type with adherence levels was never significant.

- In addition, these results help validate the PDC-RA methodology presented. This metric can be used for yearly reporting requirements by implementing filters controlling for alternative conditions, late medication starts in the given year, and allowing for medication switching.

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