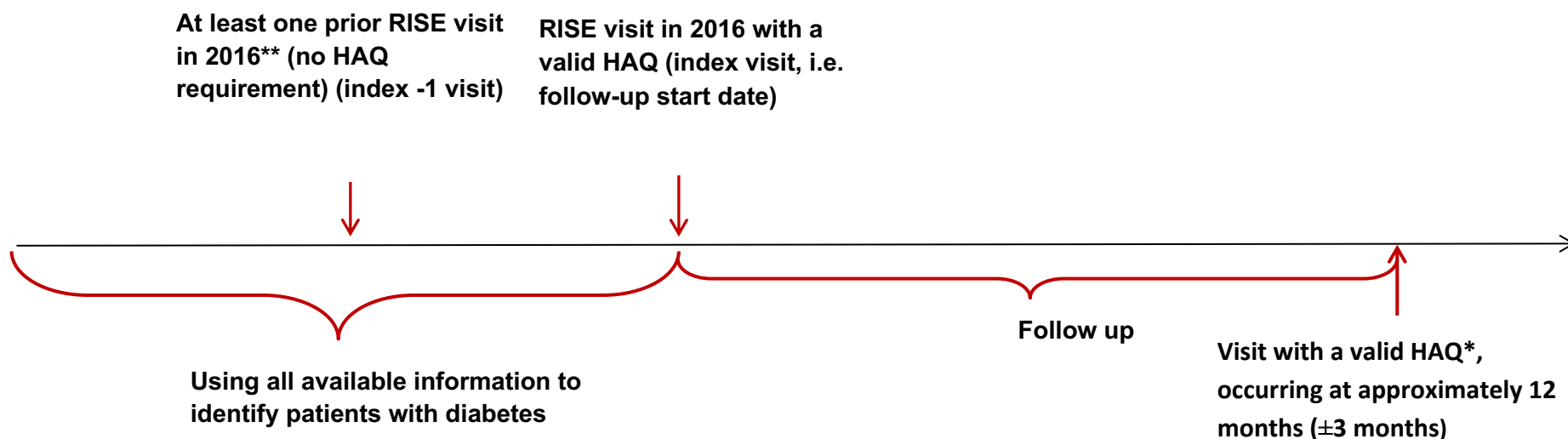


ONLINE SUPPLEMENTARY MATERIAL

Supplementary Figure 1: Study Design



*A valid HAQ measurement was defined as values in the data that conformed to HAQ (0-3 or 0-24), HAQ II (0-3 or 0-24), MHAQ (0-3 or 0-24), or MDHAQ (0-3 or 0-10 or 0-30).

** Some patients also have RISE visit from 2015.

Supplementary Table 1: Generalized Linear Regression Results for HAQ Change[§]

Variables	Crude	Age, gender, race adjusted model	Final adjusted model	Final adjusted model with baseline HAQ <0.5	Final adjusted model with baseline HAQ ≥0.5, but <1.0	Final adjusted model with baseline HAQ ≥1.0, but <3.0
Diabetes						
Yes	0.01 (-0.00-0.03)	0.01 (-0.01-0.02)	0.03 (0.01-0.04)	0.01 (-0.01-0.02)	0.03 (0.01- 0.06)	0.04 (0.00- 0.08)
Demographic Factors						
Age, years	0.00 (0.00-0.00)		0.00 (0.00-0.00)	-0.00 (-0.00-0.00)	0.00 (0.00- 0.00)	0.00 (0.00- 0.00)
Sex						
Male	0.01 (-0.00-0.03)		-0.01 (-0.02-0.01)	-0.01 (-0.03-0.00)	0.01 (-0.02- 0.04)	0.01 (-0.03- 0.04)
Female	Ref		Ref	Ref	Ref	Ref
Race						
Black	-0.03 (-0.05--0.00)		-0.00 (-0.03-0.02)	0.01 (-0.01-0.04)	0.01 (-0.03- 0.04)	-0.02 (-0.07-0.04)
NA	0.03 (0.01-0.05)		0.08 (0.07-0.10)	0.10 (0.08- 0.12)	0.16 (0.13- 0.20)	0.01 (-0.03- 0.06)
Other	-0.04 (-0.07--0.01)		0.02 (-0.00-0.05)	0.02 (-0.01-0.05)	0.02 (-0.03- 0.06)	0.03 (-0.03- 0.09)
White	Ref		Ref	Ref	Ref	Ref

Variables	Crude	Age, gender, race adjusted model	Final adjusted model	Final adjusted model with baseline HAQ <0.5	Final adjusted model with baseline HAQ ≥0.5, but <1.0	Final adjusted model with baseline HAQ ≥1.0, but <3.0
Index visit HAQ category						
0-<0.5	0.44 (0.42-0.45)	0.45 (0.43-0.46)	0.49 (0.48-0.51)	N/A	N/A	N/A
0.5-<1.0	0.34 (0.32-0.35)	0.34 (0.32-0.35)	0.36 (0.34-0.37)			
1-3	Ref	Ref	Ref			
Glucocorticoids, current use*						
Yes	-0.02 (-0.03--0.01)	-0.02 (-0.03--0.01)	-0.00 (-0.01-0.01)	0.02 (0.00- 0.03)	0.01 (-0.02- 0.03)	-0.03 (-0.06-0.01)
Non-Biologic DMARDs, current use*						
Yes	-0.02 (-0.03--0.01)	-0.02 (-0.03--0.01)	-0.01 (-0.02-0.01)	0.01 (-0.01-0.03)	-0.02 (-0.04-0.01)	-0.02 (-0.05-0.02)
Anti-TNF biologic, current use*						
Adalimumab	-0.04 (-0.06--0.01)	-0.03 (-0.05-0.00)	-0.04 (-0.06--0.01)	-0.03 (-0.06-0.00)	-0.01 (-0.07-0.04)	-0.05 (-0.13-0.02)
Etanercept	0.00 (-0.02-0.03)	0.01 (-0.01-0.04)	-0.01 (-0.04-0.02)	-0.02 (-0.04-0.01)	-0.01 (-0.06-0.04)	0.02 (-0.05- 0.08)

Variables	Crude	Age, gender, race adjusted model	Final adjusted model	Final adjusted model with baseline HAQ <0.5	Final adjusted model with baseline HAQ ≥0.5, but <1.0	Final adjusted model with baseline HAQ ≥1.0, but <3.0
Infliximab	-0.02 (-0.04-0.00)	-0.02 (-0.05-0.00)	-0.03 (-0.06--0.01)	-0.04 (-0.07--0.01)	-0.01 (-0.05-0.04)	-0.02 (-0.08-0.04)
Certolizumab	-0.01 (-0.05-0.04)	-0.01 (-0.05-0.04)	-0.02 (-0.06-0.02)	-0.03 (-0.07-0.02)	-0.01 (-0.09-0.07)	0.01 (-0.10- 0.12)
Golimumab	-0.03 (-0.07-0.01)	-0.03 (-0.07-0.01)	-0.00 (-0.05-0.04)	-0.00 (-0.05-0.05)	-0.00 (-0.08-0.07)	0.00 (-0.09- 0.09)
Non-Anti-TNF biologic, current use*						
Abatacept	-0.02 (-0.05-0.01)	-0.02 (-0.05-0.00)	0.01 (-0.02-0.04)	0.03 (-0.01-0.07)	0.04 (-0.02- 0.09)	-0.03 (-0.10-0.04)
Rituximab	-0.07 (-0.11--0.03)	-0.06 (-0.11--0.02)	-0.02 (-0.06-0.02)	-0.02 (-0.08-0.03)	0.00 (-0.08- 0.09)	-0.02 (-0.12-0.07)
Tocilizumab	-0.05 (-0.09--0.02)	-0.05 (-0.08--0.02)	-0.01 (-0.04-0.03)	0.00 (-0.04-0.05)	0.02 (-0.05- 0.09)	-0.01 (-0.09-0.07)
Tofacitinib	-0.06 (-0.11--0.02)	-0.06 (-0.10--0.02)	-0.02 (-0.06-0.02)	0.01 (-0.03-0.06)	0.06 (-0.01- 0.13)	-0.08 (-0.17-0.00)
Health Insurance						
Medicare						
Yes	0.02 (0.01-0.03)	-0.01 (-0.02-0.01)	0.03 (0.02-0.05)	0.03 (0.01- 0.05)	0.01 (-0.02- 0.04)	0.05 (0.01- 0.09)
Medicaid						

Variables	Crude	Age, gender, race adjusted model	Final adjusted model	Final adjusted model with baseline HAQ <0.5	Final adjusted model with baseline HAQ ≥0.5, but <1.0	Final adjusted model with baseline HAQ ≥1.0, but <3.0
Yes	-0.00 (-0.03-0.03)	0.01 (-0.02-0.04)	0.06 (0.03-0.09)	0.02 (-0.03-0.07)	0.11 (0.05- 0.17)	0.04 (-0.02- 0.10)
Commercial/Other						
Yes	-0.03 (-0.06-0.00)	-0.03 (-0.06-0.00)	-0.02 (-0.05-0.01)	0.02 (-0.01-0.06)	-0.03 (-0.08-0.03)	-0.05 (-0.13-0.02)
US Region						
Midwest	-0.00 (-0.02-0.01)	0.00 (-0.01-0.02)	0.04 (0.02-0.05)	0.02 (0.00- 0.03)	0.06 (0.03- 0.09)	0.04 (-0.00- 0.08)
Northeast	0.05 (0.02-0.09)	0.06 (0.02-0.09)	0.07 (0.04-0.10)	0.15 (0.12- 0.19)	-0.07 (-0.13--0.01)	0.03 (-0.06- 0.12)
West	-0.06 (-0.12-0.00)	-0.07 (-0.13--0.01)	0.01 (-0.04-0.07)	-0.01 (-0.08-0.06)	-0.19 (-0.33--0.05)	0.09 (-0.02- 0.19)
NA	-0.03 (-0.14-0.07)	-0.05 (-0.16-0.05)	-0.11 (-0.20--0.01)	-0.06 (-0.14-0.02)	-0.07 (-0.36-0.23)	-0.19 (-0.50-0.13)
South	Ref	Ref	Ref	Ref	Ref	Ref
History of infection						
Yes	0.02 (0.01-0.04)	0.02 (0.01-0.04)	0.03 (0.02-0.04)	0.01 (-0.00-0.03)	0.02 (-0.01- 0.04)	0.06 (0.03- 0.09)
Comorbidities						
Depression	0.01 (-0.02-0.04)	0.01 (-0.01-0.04)	0.04 (0.01-0.07)	0.04 (0.01- 0.08)	0.03 (-0.01- 0.08)	0.03 (-0.02- 0.09)

Variables	Crude	Age, gender, race adjusted model	Final adjusted model	Final adjusted model with baseline HAQ <0.5	Final adjusted model with baseline HAQ ≥0.5, but <1.0	Final adjusted model with baseline HAQ ≥1.0, but <3.0
Fibromyalgia	0.02 (0.00-0.03)	0.02 (0.01-0.04)	0.06 (0.04-0.07)	0.05 (0.03- 0.07)	0.07 (0.04- 0.09)	0.07 (0.03- 0.11)
Chronic obstructive pulmonary	0.07 (0.04-0.10)	0.06 (0.03-0.09)	0.07 (0.04-0.10)	0.10 (0.06- 0.14)	0.08 (0.02- 0.13)	0.02 (-0.05- 0.08)
Practice Site Characteristics						
2-4	-0.05 (-0.07--0.02)	-0.05 (-0.07--0.02)	-0.07 (-0.09--0.04)	-0.02 (-0.04-0.00)	-0.13 (-0.17--0.08)	-0.12 (-0.19--0.06)
Solo	0.02 (-0.01-0.05)	0.02 (-0.01-0.05)	0.02 (-0.01-0.05)	-0.05 (-0.09--0.02)	0.10 (0.05- 0.16)	0.09 (0.01- 0.17)
5 or greater	Ref	Ref	Ref	Ref	Ref	Ref
History of medications						
NSAID	-0.01 (-0.02-0.00)	-0.01 (-0.02-0.01)	-0.01 (-0.02-0.01)	-0.00 (-0.02-0.01)	0.01 (-0.02- 0.04)	-0.02 (-0.06-0.02)
Opioids	0.02 (0.00-0.03)	0.01 (-0.00-0.03)	0.08 (0.06-0.09)	0.05 (0.03- 0.06)	0.07 (0.05- 0.10)	0.12 (0.09- 0.16)
History of csDMARDs count						
1	-0.01 (-0.03-0.01)	-0.01 (-0.03-0.01)	-0.01 (-0.03-0.01)	-0.02 (-0.05-0.00)	-0.01 (-0.05-0.03)	0.01 (-0.04- 0.07)
2	-0.02 (-0.04-0.00)	-0.02 (-0.04-0.00)	-0.02 (-0.04-0.01)	-0.04 (-0.06--0.01)	0.00 (-0.04- 0.05)	0.00 (-0.06- 0.06)

Variables	Crude	Age, gender, race adjusted model	Final adjusted model	Final adjusted model with baseline HAQ <0.5	Final adjusted model with baseline HAQ ≥0.5, but <1.0	Final adjusted model with baseline HAQ ≥1.0, but <3.0
3	-0.05 (-0.08--0.02)	-0.05 (-0.08--0.02)	-0.06 (-0.09--0.03)	-0.08 (-0.11--0.04)	-0.01 (-0.06-0.05)	-0.07 (-0.15-0.01)
4	-0.08 (-0.14--0.02)	-0.07 (-0.13--0.01)	-0.07 (-0.13--0.01)	0.01 (-0.06-0.08)	-0.10 (-0.20--0.00)	-0.12 (-0.27-0.02)
0	Ref	Ref	Ref	Ref	Ref	Ref
History of TNFi count						
1	-0.01 (-0.03-0.00)	-0.01 (-0.02-0.01)	0.01 (-0.01-0.03)	0.01 (-0.01-0.03)	0.01 (-0.02- 0.04)	-0.00 (-0.04-0.04)
2	-0.01 (-0.03-0.01)	-0.00 (-0.03-0.02)	0.02 (-0.00-0.05)	0.01 (-0.02-0.04)	0.02 (-0.02- 0.07)	0.03 (-0.03- 0.09)
3	0.00 (-0.05-0.05)	0.01 (-0.04-0.06)	0.03 (-0.02-0.08)	-0.01 (-0.06-0.05)	0.08 (-0.00- 0.17)	0.04 (-0.08- 0.16)
4	-0.05 (-0.14-0.04)	-0.04 (-0.13-0.05)	0.01 (-0.08-0.10)	-0.05 (-0.15-0.05)	-0.07 (-0.26-0.11)	0.18 (-0.02- 0.38)
0	Ref	Ref	Ref	Ref	Ref	Ref
History of non-TNF biologic count						
1	-0.04 (-0.06--0.02)	-0.04 (-0.05--0.02)	-0.01 (-0.03-0.02)	-0.00 (-0.03-0.02)	-0.01 (-0.05-0.03)	-0.02 (-0.07-0.04)
2	-0.05 (-0.09--0.01)	-0.05 (-0.09--0.01)	-0.00 (-0.04-0.04)	0.00 (-0.05-0.05)	0.02 (-0.05- 0.09)	-0.02 (-0.10-0.07)

Variables	Crude	Age, gender, race adjusted model	Final adjusted model	Final adjusted model with baseline HAQ <0.5	Final adjusted model with baseline HAQ ≥0.5, but <1.0	Final adjusted model with baseline HAQ ≥1.0, but <3.0
3	-0.06 (-0.15-0.02)	-0.06 (-0.14-0.02)	0.03 (-0.05-0.10)	-0.00 (-0.12-0.12)	0.16 (0.02- 0.30)	-0.00 (-0.15-0.15)
0	Ref	Ref	Ref	Ref	Ref	Ref
Drug switch during follow-up						
Once	-0.04 (-0.05--0.02)	-0.03 (-0.05--0.02)	-0.01 (-0.02-0.01)	0.02 (0.01- 0.04)	0.01 (-0.02- 0.03)	-0.05 (-0.09--0.02)
Twice	-0.01 (-0.04-0.01)	-0.01 (-0.03-0.02)	0.04 (0.01- 0.06)	0.04 (0.02- 0.07)	0.08 (0.04- 0.12)	0.01 (-0.04- 0.07)
3 times or more	-0.03 (-0.07-0.02)	-0.02 (-0.06-0.03)	0.06 (0.02- 0.10)	0.12 (0.07- 0.17)	0.05 (-0.03- 0.13)	0.06 (-0.03- 0.14)
Never	Ref	Ref	Ref	Ref	Ref	Ref

*identified using the 16 weeks of data prior to the index visit

§ All HAQ variants were normalized to a 0-3 scale. Patients were required to have the same type of HAQ measured at both index visit and outcome visit.

Supplementary Table 2: Factors associated with Outpatient Infections

Parameter	Crude	Age, sex, race-adjusted model	Final Adjusted Model
Diabetes	1.14 (1.05-1.23)	1.17 (1.08-1.27)	0.99 (0.91-1.07)
Demographic Factors			
Age	1.00 (1.00-1.00)		1.00 (0.99-1.00)
Male	0.70 (0.65-0.76)		0.80 (0.74-0.87)
Race			
Black	0.78 (0.69-0.88)		0.82 (0.73-0.93)
NA	1.03 (0.94-1.12)		1.04 (0.95-1.13)
Other	0.78 (0.68-0.89)		0.95 (0.83-1.09)
White	Ref	Ref	Ref
Glucocorticoid use			
Glucocorticoid use	1.69 (1.56-1.82)	1.69 (1.57-1.82)	1.18 (1.09-1.28)
Combined_cDMARDs			
Combined_cDMARDs	0.78 (0.73-0.83)	0.79 (0.74-0.84)	1.02 (0.94-1.09)
Adalimumab	0.99 (0.87-1.13)	0.99 (0.87-1.14)	1.16 (1.00-1.35)
Etanercept	0.97 (0.86-1.10)	0.97 (0.86-1.10)	1.14 (1.00-1.30)
Infliximab	1.03 (0.92-1.15)	1.03 (0.92-1.15)	1.08 (0.95-1.22)
Certolizumab	1.20 (0.99-1.47)	1.19 (0.98-1.45)	1.26 (1.03-1.55)
Golimumab	0.87 (0.69-1.09)	0.86 (0.69-1.07)	0.83 (0.66-1.05)
Abatacept	1.32 (1.17-1.49)	1.29 (1.15-1.46)	1.11 (0.96-1.29)
Rituximab	1.66 (1.40-1.97)	1.64 (1.39-1.95)	1.22 (1.00-1.48)
Tocilizumab	1.21 (1.04-1.41)	1.17 (1.01-1.37)	0.95 (0.79-1.13)
Tofacitinib	1.21 (1.01-1.46)	1.18 (0.98-1.42)	1.16 (0.96-1.41)
Health Insurance			
Medicare			
Yes	1.24 (1.16-1.33)	1.39 (1.28-1.51)	1.20 (1.10-1.30)
Missing	1.15 (1.02-1.28)	1.15 (1.02-1.29)	1.32 (1.07-1.63)
No	Ref	Ref	Ref
Medicaid			
Yes	1.35 (1.16-1.56)	1.38 (1.19-1.61)	1.12 (0.96-1.31)

Parameter	Crude	Age, sex, race-adjusted model	Final Adjusted Model
No	Ref	Ref	Ref
Commercial/Other			
Yes	1.03 (0.87-1.21)	1.00 (0.85-1.17)	1.28 (1.07-1.52)
No	Ref	Ref	Ref
US Region			
Midwest	0.82 (0.75-0.88)	0.82 (0.75-0.88)	1.16 (1.07-1.27)
NA	0.92 (0.78-1.09)	0.92 (0.78-1.08)	1.26 (0.78-2.04)
Northeast	0.86 (0.63-1.17)	0.85 (0.62-1.16)	0.99 (0.84-1.17)
West	1.09 (0.68-1.76)	1.09 (0.68-1.76)	0.81 (0.59-1.10)
South	Ref	Ref	Ref
Comorbidities			
Previous infection	4.43 (4.14-4.74)	4.36 (4.08-4.67)	4.06 (3.77-4.36)
Depression	1.79 (1.61-1.99)	1.71 (1.54-1.90)	1.30 (1.16-1.45)
Fibromyalgia	1.41 (1.31-1.52)	1.34 (1.25-1.45)	1.02 (0.94-1.10)
Chronic obstructive pulmonary	2.56 (2.31-2.85)	2.59 (2.33-2.88)	1.58 (1.42-1.76)
Practice Site Characteristics			
2-4	0.96 (0.85-1.07)	0.96 (0.85-1.07)	0.96 (0.85-1.08)
Solo	1.33 (1.18-1.51)	1.33 (1.18-1.51)	1.48 (1.29-1.71)
5 or greater	Ref	Ref	Ref
History of medications, %			
NSAID	1.35 (1.25-1.46)	1.34 (1.24-1.45)	1.01 (0.94-1.10)
Opioid	1.67 (1.57-1.78)	1.66 (1.56-1.77)	1.15 (1.07-1.23)
Antidepressants	1.45 (1.36-1.54)	1.38 (1.29-1.47)	1.00 (0.93-1.08)
History of csDMARDs count			
1	0.91 (0.83-1.01)	0.92 (0.83-1.02)	0.92 (0.82-1.03)
2	1.05 (0.94-1.17)	1.04 (0.93-1.16)	0.89 (0.79-1.00)
3	1.24 (1.07-1.43)	1.22 (1.06-1.41)	0.91 (0.78-1.07)
4	1.29 (0.99-1.69)	1.28 (0.98-1.68)	0.87 (0.66-1.16)
0	Ref	Ref	Ref

Parameter	Crude	Age, sex, race-adjusted model	Final Adjusted Model
History of TNFi count			
1	1.16 (1.08-1.24)	1.16 (1.08-1.24)	0.97 (0.89-1.05)
2	1.38 (1.24-1.53)	1.37 (1.23-1.52)	0.93 (0.82-1.05)
3	1.26 (1.01-1.58)	1.22 (0.97-1.52)	0.76 (0.59-0.96)
4	1.33 (0.87-2.02)	1.31 (0.86-2.00)	0.78 (0.51-1.21)
0	Ref	Ref	Ref
History of non-TNF biologic count			
1	1.45 (1.34-1.56)	1.42 (1.31-1.53)	1.09 (0.98-1.22)
2	1.62 (1.39-1.88)	1.55 (1.33-1.81)	0.98 (0.82-1.18)
3	1.94 (1.42-2.65)	1.85 (1.35-2.52)	0.98 (0.70-1.37)
0	Ref	Ref	Ref
Drug switch during follow-up			
Once	1.15 (1.07-1.24)	1.15 (1.07-1.24)	1.18 (1.09-1.27)
Twice	1.28 (1.15-1.43)	1.28 (1.14-1.43)	1.24 (1.11-1.40)
3 times or more	1.55 (1.29-1.88)	1.56 (1.29-1.88)	1.49 (1.23-1.81)
Never	Ref	Ref	Ref
CDAI (remission referent)			
Low	1.33 (1.14-1.56)	1.32 (1.13-1.55)	1.16 (0.99-1.36)
Moderate	1.70 (1.44-2.00)	1.67 (1.42-1.97)	1.28 (1.08-1.52)
High	2.27 (1.89-2.72)	2.25 (1.88-2.70)	1.53 (1.27-1.85)
Missing	1.84 (1.59-2.14)	1.83 (1.58-2.13)	1.37 (1.18-1.59)