Additional file 1. Background and outcomes of the participants by classes of b/tsDMARD.

		TNFi (N = 986)			IL-6i (N = 805)			CTLA4-Ig (N = 556)			JAKi (N = 465)			p
Background		Mean	SE	Median	Mean	SE	Median	Mean	SE	Median	Mean	SE	Median	
Age		58.56	0.52	60	64.54	0.48	67	68.61	0.57	71	58.55	0.65	60	<0.01
Disease duration (month)		81.90	3.67	37	111.12	4.96	60	125.14	5.72	86.5	122.49	5.54	93.5	<0.01
BMI		22.51	0.14	21.97	22.72	0.15	22.20	22.33	0.20	21.80	22.78	0.20	22.21	0.22
eGFR		84.54	0.85	83.14	72.59	1.03	71.80	70.02	1.05	69.43	80.72	1.17	80.20	<0.01
RF (IU/mL)		138.32	11.65	51.3	191.01	15.44	56.7	226.82	30.60	88.65	213.66	22.91	63.6	<0.01
anti-CCP antibody (U/mL)		310.97	20.41	59.8	354.94	32.53	56.5	407.66	39.22	111.3	320.45	31.86	56.3	<0.01
CDAI at week 0		24.32	0.45	22.7	25.17	0.48	23.3	23.69	0.51	22.25	24.80	0.58	23.6	0.01
SDAI at week 0		25.92	0.49	24.04	28.08	0.54	25.36	25.20	0.53	24.06	26.13	0.63	24.36	<0.01
DAS28-ESR at week 0		5.23	0.05	5.24	5.58	0.05	5.61	5.34	0.05	5.37	5.16	0.06	5.18	0.04
HAQ-DI at week 0		1.07	0.03	1	1.27	0.03	1.125	1.31	0.04	1.25	1.20	0.04	1.125	0.35
Pain VAS at week 0		49.78	0.91	50	52.90	1.01	53	51.55	1.15	51	52.06	1.28	55	0.47
EGA at week 0		41.55	0.70	40	44.82	0.77	45	41.55	0.87	40	45.07	1.05	45	0.09
Global Health at week 0		48.37	0.87	50	52.10	0.94	51	50.68	1.10	50	52.59	1.22	56	0.89
Dose of MTX (mg/week)		11.00	0.18	12	5.75	0.23	4	6.75	0.29	6	8.33	0.31	10	<0.01
Dose of GC (mg/day, PSL equivalent)		0.57	0.06	0	1.58	0.12	0	1.25	0.12	0	0.89	0.11	0	<0.01
Outcome														
CDAI at 6 months		5.89	0.26	4	6.75	0.30	5	7.47	0.38	5.65	6.24	0.39	4.2	0.14
SDAI at 6 months		6.15	0.26	4.36	6.86	0.32	5	8.08	0.40	6.165	6.53	0.40	4.62	0.04
DAS28-ESR at 6 months		2.87	0.04	2.69	2.49	0.05	2.28	3.45	0.06	3.325	3.04	0.06	2.845	0.99
HAQ at 6 months		0.62	0.03	0.375	0.83	0.03	0.6875	1.06	0.05	1	0.72	0.05	0.5	<0.01
Pain VAS at 6 months		25.36	0.92	18	29.22	1.09	22	31.90	1.32	25	26.96	1.37	20	0.56
Change in clinical parameters	Δ CDAI	-18.64	0.49	-16.65	-18.68	0.55	-17.5	-16.65	0.61	-14.85	-19.08	0.75	-18.2	0.22
	Δ SDAI	-20.01	0.06	-17.62	-21.54	0.06	-20.08	-17.52	0.07	-15.705	-20.31	0.09	-19.09	0.01
	Δ DAS28-ESR	-2.40	0.06	-2.36	-3.11	0.06	-3.17	-1.93	0.07	-1.87	-2.17	0.09	-2.12	0.06
	Δ HAQ	-0.45	0.02	-0.25	-0.40	0.03	-0.25	-0.27	0.03	-0.125	-0.48	0.04	-0.375	0.32
	Δ Pain VAS	-24.48	1.06	-21	-24.26	1.36	-22	-20.73	1.43	-19	-24.65	1.63	-18	0.02
		N	**%**		**N**	**%**		**N**	**%**		**N**	**%**		
Disease activity	CDAI ≤ 10	126	18.9		108	21.1		85	23.2		63	19.0		0.43
	10 < CDAI	540	81.1		405	78.9		281	76.8		248	74.9		
HAQ-DI improvement		375	56.3		272	53.0		169	46.2		192	58.0		0.02
HAQ-DI at 6 month ≤ 0.5		342	51.4		189	36.8		110	30.1		152	45.9		<0.01
Pain VAS reduction at 6months		174	26.1		145	28.3		84	23.0		93	28.1		0.19

HAQ-DI: health assessment questionnaire disability index, BMI: body mass index, GFR: glomerular filtration rate, RF: rheumatoid factor. CCP: cyclic citrullinated peptide, CDAI: clinical disease activity index, SDAI: simplified disease activity index, DAS: disease activity score; VAS: visualised analogue scale, EGA: evaluator's global assessment, MTX: methotrexate, GC: glucocorticoid, TNFi: tumour necrosis factor inhibitor, IL6i: interleukin-6 inhibitor, CTLA4-Ig: cytotoxic T-lymphocyte-associated antigen 4 immunoglobulin, JAKi: Janus kinase inhibitor

Additional file 2. Breakdown of those who stopped treatment within 6 months by classes of b/tsDMARDs.

	TNFi (N = 986)		IL-6i (N = 805)		CTLA4-Ig (N = 556)		JAKi (N = 465)		Total (N = 2813)	
Treatment cessation (N, %)	162, 16.4%		92, 11.4%)		69, 12.4%		42, 9.0%		365, 13.0%	
	N	%	N	%	N	%	N	%	N	%
Primary failure	61	37.7	21	22.8	28	40.6	6	14.3	116	31.8
Secondary failure	27	16.7	6	6.5	9	13.0	5	11.9	47	12.9
Insufficient effect	15	9.3	14	15.2	13	18.8	8	19.0	50	13.7
Remission	6	3.7	2	2.2	2	2.9	0	0.0	10	2.7
Malignancy	4	2.5	0	0.0	0	0.0	1	2.4	5	1.4
LPD	0	0.0	2	2.2	0	0.0	2	4.8	4	1.1
Other adverse events	39	24.1	33	35.9	14	20.3	16	38.1	102	27.9
Economic reason	4	2.5	1	1.1	0	0.0	1	2.4	6	1.6
Pregnancy	0	0.0	1	1.1	0	0.0	1	2.4	2	0.5
Non-adherence	3	1.9	5	5.4	2	2.9	2	4.8	12	3.3
Loss of follow up	1	0.6	1	1.1	0	0.0	0	0.0	2	0.5
Other	2	1.2	6	6.5	1	1.4	0	0.0	9	2.5
Total	162	100	92	100	69	100	42	100	365	100

b/tsDMARD: biological and targeted synthetic disease modifying anti-rheumatic drug, TNFi: tumour necrosis factor inhibitor, IL6i: interleukin-6 inhibitor, CTLA4-Ig: cytotoxic T-lymphocyte-associated antigen 4 immunoglobulin, JAKi: Janus kinase inhibitor , LPD: lympho-proliferative diseases

Additional file 3. Multiple regression analysis for factor related to HAQ-DI normalization (< 0.5) at 1 year of b/tsDMARD treatment.

		HAQ-DI < 0.5 at 1 year (N = 705)			
		OR	95%CI		p
Age	< 40	1 (Reference)			
	40-49	0.45	0.21	0.96	0.04
	50-59	0.36	0.18	0.73	0.01
	60-69	0.54	0.26	1.09	0.09
	70-79	0.36	0.18	0.76	0.01
	80-	0.23	0.08	0.60	<0.01
Female		0.36	0.23	0.55	<0.01
Disease duration	< 1y	1 (Reference)			
	1-2y	0.53	0.30	0.92	0.03
	2-5y	0.48	0.29	0.80	0.01
	5-10y	0.66	0.38	1.14	0.14
	10-20y	0.45	0.26	0.76	<0.01
	20y-	0.22	0.12	0.43	<0.01
Overweight		0.78	0.53	1.15	0.20
CKD		0.77	0.50	1.19	0.24
Glucose intolerance		1.12	0.77	1.61	0.56
RF or anti-CCP positive		1.37	0.90	2.07	0.14
ILD		0.60	0.41	0.87	0.01
Past history of fracture		1.12	0.71	1.77	0.63
Past history of cancer		0.76	0.46	1.26	0.29
≥ 2 classes of b/tsDMARD failure		0.52	0.35	0.76	<0.01
≥ 2 csDMARD failure		1.01	0.66	1.56	0.96
HAQ-DI at week 0		0.20	0.15	0.26	<0.01
Pain VAS at week 0		1.00	0.99	1.01	0.55
EGA at week 0		1.01	1.00	1.02	0.26
Global Health at week 0		1.00	0.99	1.01	0.94
Disease activity at week 0	LDA	1 (Reference)			
	MDA	0.64	0.33	1.24	0.19
	HDA	0.71	0.34	1.49	0.37
Class of b/tsDMARD	TNFi	1 (Reference)			
	IL6i	1.21	0.79	1.85	0.39
	ABT	0.72	0.45	1.14	0.16
	JAKi	1.56	0.94	2.59	0.09
Dose of MTX		1.21	0.79	1.85	0.39
Dose of GC		0.72	0.45	1.14	0.16

HAQ-DI: health assessment questionnaire disability index, CKD: chronic kidney disease, RF: rheumatoid factor, CCP: cyclic citrullinated peptide, ILD: interstitial lung disease, b/tsDMARD: biological and targeted synthetic disease modifying anti-rheumatic drug, csDMARD: conventional synthetic disease modifying anti-rheumatic drug, VAS: visualised analogue scale, EGA: evaluator's global assessment, LDA: low disease activity, MDA: moderate disease activity, HDA: high disease activity, TNFi: tumour necrosis factor inhibitor, IL6i: interleukin-6 inhibitor, CTLA4-Ig: cytotoxic T-lymphocyte-associated antigen 4 immunoglobulin, JAKi: Janus kinase inhibitor, MTX: methotrexate, GC: glucocorticoid

Additional file 4. Sensitivity analysis of Table 3 including only those whose disease duration < 5 years.

		HAQ-DI normalization (< 0.5) (N = 418)			
		OR	95%CI		p
Age	< 40	1 (Reference)			
	40-49	1.11	0.46	2.67	0.82
	50-59	0.40	0.19	0.86	0.02
	60-69	0.63	0.29	1.34	0.23
	70-79	0.42	0.19	0.95	0.04
	80-	0.28	0.09	0.85	0.03
Female		0.49	0.29	0.82	0.01
Disease duration	< 1y	1 (Reference)			
	1-2y	0.36	0.21	0.64	<0.01
	2-5y	0.56	0.33	0.94	0.03
Overweight		0.56	0.34	0.91	0.02
CKD		1.12	0.58	2.16	0.74
DM		1.36	0.85	2.20	0.20
RF or anti-CCP positive		1.94	1.19	3.14	0.01
ILD		0.65	0.39	1.10	0.11
Past history of fracture		0.64	0.31	1.34	0.24
Past history of cancer		0.57	0.28	1.15	0.12
≥ 2 classes of b/tsDMARD failure		0.46	0.26	0.81	0.01
≥ 2 csDMARD failure		0.94	0.42	2.11	0.87
HAQ-DI at week 0		0.21	0.14	0.31	<0.01
Pain VAS at week 0		1.00	0.99	1.02	0.66
EGA at week 0		1.01	0.99	1.02	0.27
Global Health at week 0		1.00	0.99	1.01	0.87
Disease activity at week 0	LDA	1 (Reference)			
	MDA	0.30	0.11	0.82	0.02
	HDA	0.34	0.12	1.01	0.05
Class of b/tsDMARD	TNFi	1 (Reference)			
	IL6i	0.76	0.45	1.30	0.32
	ABT	0.75	0.39	1.41	0.37
	JAKi	2.22	1.05	4.72	0.04
Use of MTX at week 0		0.84	0.47	1.48	0.54
Use of GC at week 0		1.12	0.63	2.01	0.70

b/tsDMARD: biological and targeted synthetic disease modifying anti-rheumatic drug, RF: rheumatoid factor. CCP: cyclic citrullinated peptide, CKD: chronic kidney disease, ILD: interstitial lung disease, csDMARD: conventional synthetic disease modifying anti-rheumatic drug, HAQ-DI: health assessment questionnaire disability index, VAS: visualised analogue scale, EGA: evaluator's global assessment, CDAI: clinical disease activity index, LDA: low disease activity, MDA: middle disease activity, HDA: high disease activity, TNFi: tumour necrosis factor inhibitor, IL6i: interleukin-6 inhibitor, CTLA4-Ig: cytotoxic T-lymphocyte-associated antigen 4 immunoglobulin, JAKi: Janus kinase inhibitor, MTX: methotrexate, GC: glucocorticoid, OR: odds ratio, CI: confidence interval

Additional file 5. Sensitivity analysis of Table3 including only those who achieved CDAI remission (<2.8).

		HAQ normalization (< 0.5) at 1 year (N = 793)			
		OR	95%CI		p
Age	< 40	1 (Reference)			
	40-49	0.64	0.20	2.02	0.45
	50-59	0.38	0.14	1.02	0.06
	60-69	0.60	0.22	1.63	0.32
	70-79	0.41	0.15	1.13	0.08
	80-	0.45	0.11	1.89	0.28
Female		0.39	0.20	0.77	0.01
Disease duration	< 1y	1 (Reference)			
	1-2y	0.36	0.15	0.86	0.02
	2-5y	0.44	0.20	0.99	0.05
	5-10y	0.68	0.29	1.61	0.38
	10-20y	0.30	0.13	0.69	0.01
	20y-	0.18	0.06	0.50	<0.01
Overweight		0.81	0.45	1.47	0.49
CKD		0.88	0.46	1.69	0.71
Glucose intolerance		1.41	0.80	2.50	0.24
RF or anti-CCP positive		2.23	1.21	4.13	0.01
ILD		0.62	0.35	1.11	0.11
Past history of fracture		1.72	0.78	3.80	0.18
Past history of cancer		0.47	0.23	0.97	0.04
≥ 2 classes of b/tsDMARD failure		0.48	0.26	0.90	0.02
≥ 2 csDMARD failure		1.10	0.56	2.14	0.78
HAQ-DI at week 0		0.24	0.16	0.37	<0.01
Pain VAS at week 0		1.00	0.99	1.02	0.76
EGA at week 0		1.01	0.99	1.02	0.47
Global Health at week 0		1.01	0.99	1.02	0.46
Disease activity at week 0	LDA	1 (Reference)			
	MDA	0.49	0.20	1.24	0.13
	HDA	0.51	0.18	1.47	0.21
Class of b/tsDMARD	TNFi	1 (Reference)			
	IL6i	0.99	0.50	1.95	0.98
	ABT	0.80	0.38	1.67	0.55
	JAKi	2.46	1.07	5.67	0.03
Dose of MTX		1.01	0.97	1.06	0.59
Dose of GC		0.96	0.87	1.07	0.47

b/tsDMARD: biological and targeted synthetic disease modifying anti-rheumatic drug, RF: rheumatoid factor. CCP: cyclic citrullinated peptide, CKD: chronic kidney disease, ILD: interstitial lung disease, csDMARD: conventional synthetic disease modifying anti-rheumatic drug, HAQ-DI: health assessment questionnaire disability index, VAS: visualised analogue scale, EGA: evaluator's global assessment, CDAI: clinical disease activity index, LDA: low disease activity, MDA: middle disease activity, HDA: high disease activity, TNFi: tumour necrosis factor inhibitor, IL6i: interleukin-6 inhibitor, CTLA4-Ig: cytotoxic T-lymphocyte-associated antigen 4 immunoglobulin, JAKi: Janus kinase inhibitor, MTX: methotrexate, GC: glucocorticoid, OR: odds ratio, CI: confidence interval

Additional file 6. Background and treatment outcomes of the participants by positivity or negativity of RF/anti-CCP antibody.

		RF or anti-CCP positivity						p*
		Negative (N = 359, 19%)			Positive (N = 1497, 81%)			
Background		Mean	SE	Median	Mean	SE	Median	
Age		60.76	0.66	64	62.68	0.32	65	0.01
Disease duration (month)		68.55	4.41	34	115.12	2.80	72	<0.01
BMI		23.39	0.22	22.49	22.38	0.09	21.94	<0.01
eGFR		75.11	1.17	74.49	78.06	0.58	77.84	0.03
CDAI at week 0		25.43	0.59	23.5	24.31	0.27	23	0.08
SDAI at week 0		27.25	0.66	25.11	26.25	0.30	24.365	0.15
DAS28-ESR at week 0		5.24	0.06	5.19	5.37	0.03	5.4	0.05
HAQ at week 0		1.14	0.04	1	1.22	0.02	1.125	0.06
PainVAS at week 0		51.75	1.17	52	51.37	0.60	52	0.78
EGA at week 0		42.17	0.95	40	43.34	0.46	42	0.26
Global Health at week 0		51.85	1.10	52	50.36	0.57	50	0.24
Dose of MTX (mg/week)		8.63	0.28	10	8.04	0.15	8	0.07
Dose of GC (mg/day, PSL equivalent)		1.32	0.13	0	0.99	0.06	0	0.01
Outcome								
CDAI at 6 months		6.57	0.35	4.8	6.48	0.18	4.7	0.83
SDAI at 6 months		6.76	0.36	5.03	6.80	0.19	4.86	0.92
DAS28-ESR at 6 months		2.67	0.06	2.47	2.96	0.03	2.82	<0.01
HAQ-DI at 6 months		0.71	0.04	0.5	0.80	0.02	0.625	0.04
Pain VAS at 6 months		29.39	1.26	23	27.66	0.64	20	0.23
Change in clinical parameters	Δ CDAI	-19.07	0.67	-17.3	-18.15	0.32	-16.8	0.21
	Δ SDAI	-20.76	0.76	-18.635	-19.80	0.35	-18.17	0.24
	Δ DAS28-ESR	-2.59	0.08	-2.55	-2.43	0.04	-2.425	0.07
	Δ HAQ-DI	-0.40	0.03	-0.25	-0.41	0.02	-0.25	0.91
	Δ Pain VAS	-22.34	1.51	-18.5	-24.03	0.74	-20	0.32
		N	%		N	%		
Disease activity	Remission	124	34.5		532	35.5		0.71
	LDA	154	42.9		664	44.4		
	MDA	69	19.2		249	16.6		
	HDA	12	3.3		52	3.5		
HAQ-DI improvement		187	52.1		821	54.8		0.19
HAQ-DI at 6 months ≤ 0.5		153	42.6		640	42.8		0.97
Pain VAS reduction at 6months		78	21.7		418	27.9		0.02

HAQ-DI: health assessment questionnaire disability index, BMI: body mass index, GFR: glomerular filtration rate, RF: rheumatoid factor. CCP: cyclic citrullinated peptide, CDAI: clinical disease activity index, SDAI: simplified disease activity index, DAS: disease activity score; VAS: visualised analogue scale, EGA: evaluator's global assessment, GH: patient's global health, MTX: methotrexate, GC: glucocorticoid, CKD: chronic kidney disease, ILD: interstitial lung disease, b/tsDMARD: biological and targeted synthetic disease modifying anti-rheumatic drug, csDMARD: conventional synthetic disease modifying anti-rheumatic drug

*Student's t-test was used for continuous variables and chi-square test were used for categorical variables

Additional file 7. Proportion of the patients who achieved LDA (CDAI ≤10.0) at 6 months by age groups.

Age group	LDA (CDAI < 10.0)		MDA-HDA (CDAI ≥ 10.0)		Total		p*
	N	%	N	%	N	%	
<40	131	8.9	23	6.0	154	8.3	0.19
40-49	159	10.8	49	12.8	208	11.2	
50-59	278	18.9	86	22.5	364	19.6	
60-69	410	27.8	96	25.1	506	27.3	
70-79	393	26.7	98	25.7	491	26.5	
80-	103	7.0	30	7.9	133	7.2	
Total	1474	100.0	382	100.0	1856	100.0	

LDA: low disease activity, CDAI: clinical disease activity index, MDA: moderate disease activity, HDA: high disease activity
*Difference between the age groups was compared using chi-squared test.

Additional file 8. Multiple logistic regression analysis for factors associated with pain VAS reduction by ≥40 mm at one year.

		Pain VAS reduction by ≥ 40 mm at one year (N = 404, 28%)			
		OR	95%CI		p
Age	< 40	1 (Reference)			
	40-49	0.71	0.31	1.61	0.41
	50-59	0.75	0.35	1.58	0.44
	60-69	1.31	0.62	2.74	0.48
	70-79	0.80	0.37	1.73	0.57
	80-	0.63	0.22	1.86	0.41
Female		0.96	0.60	1.53	0.85
Disease duration	< 1y	1 (Reference)			
	1-2y	0.63	0.33	1.18	0.15
	2-5y	0.65	0.36	1.16	0.14
	5-10y	0.56	0.30	1.03	0.06
	10-20y	0.62	0.34	1.15	0.13
	20y-	0.71	0.34	1.48	0.36
Overweight		0.72	0.46	1.14	0.16
CKD		0.97	0.58	1.61	0.90
Glucose intolerance		0.98	0.64	1.50	0.92
RF or anti-CCP positive		1.25	0.76	2.03	0.38
ILD		1.01	0.66	1.57	0.95
Past history of fracture		0.80	0.46	1.38	0.43
Past history of cancer		0.97	0.54	1.74	0.92
≥ 2 classes of b/tsDMARD failure		0.51	0.32	0.83	0.01
≥ 2 csDMARD failure		0.83	0.49	1.38	0.47
HAQ-DI at week 0		0.81	0.61	1.08	0.15
Pain VAS at week 0		1.10	1.08	1.12	<0.01
EGA at week 0		1.00	0.98	1.01	0.64
Global Health at week 0		1.00	0.98	1.01	0.55
Disease activity at week 0	LDA	1 (Reference)			
	MDA	0.91	0.30	2.76	0.86
	HDA	1.15	0.35	3.73	0.82
Class of b/tsDMARD	TNFi	1 (Reference)			
	IL6i	0.75	0.45	1.23	0.26
	ABT	0.74	0.43	1.28	0.28
	JAKi	1.31	0.71	2.43	0.38
Dose of MTX		0.99	0.96	1.02	0.46
Dose of GC		0.93	0.85	1.01	0.07

VAS: visualised analogue scale, HAQ-DI: health assessment questionnaire disability index, CKD: chronic kidney disease, RF: rheumatoid factor, CCP: cyclic citrullinated peptide, ILD: interstitial lung disease, b/tsDMARD: biological and targeted synthetic disease modifying anti-rheumatic drug, csDMARD: conventional synthetic disease modifying anti-rheumatic drug, EGA: evaluator's global assessment, LDA: low disease activity, MDA: moderate disease activity, HDA: high disease activity, TNFi: tumour necrosis factor inhibitor, IL6i: interleukin-6 inhibitor, CTLA4-Ig: cytotoxic T-lymphocyte-associated antigen 4 immunoglobulin, JAKi: Janus kinase inhibitor, MTX: methotrexate, GC: glucocorticoid

Additional file 9. Sensitivity analysis of Table5 including only those with disease duration < 5 years.

		Pain VAS reduction by ≥ 40mm (N = 256, 35%)			
		OR	95%CI		p
Age	< 40	1 (Reference)			
	40-49	1.42	0.40	5.01	0.59
	50-59	0.52	0.19	1.48	0.22
	60-69	1.02	0.35	3.01	0.97
	70-79	0.91	0.29	2.86	0.88
	80-	0.60	0.16	2.28	0.45
Female		1.49	0.82	2.71	0.19
Disease duration	< 1y	1 (Reference)			
	1-2y	0.58	0.30	1.10	0.09
	2-5y	1.02	0.53	1.96	0.96
Overweight		0.57	0.33	1.00	0.05
CKD		0.65	0.30	1.40	0.27
DM		1.00	0.56	1.77	0.99
RF or anti-CCP positive		1.80	1.03	3.17	0.04
ILD		1.11	0.58	2.09	0.75
Past history of fracture		0.45	0.21	0.94	0.04
Past history of cancer		0.69	0.31	1.53	0.36
≥2 classes of b/tsDMARD failure		0.49	0.26	0.95	0.04
≥2 csDMARD failure		0.74	0.28	1.94	0.54
HAQ-DI at week 0		0.79	0.52	1.20	0.27
Pain VAS at week 0		0.98	0.96	0.99	0.01
EGA at week 0		1.01	0.99	1.03	0.36
Global Health at week 0		0.99	0.98	1.01	0.49
Disease activity at week 0	LDA	1 (Reference)			
	MDA	0.23	0.03	1.90	0.17
	HDA	0.30	0.03	2.56	0.27
Class of b/tsDMARD	TNFi	1 (Reference)			
	IL6i	1.29	0.65	2.57	0.47
	ABT	1.11	0.49	2.54	0.80
	JAKi	0.76	0.33	1.75	0.52
Use of MTX at week 0		1.20	0.62	2.33	0.59
Use of GC at week 0		1.43	0.70	2.95	0.33

b/tsDMARD: biological and targeted synthetic disease modifying anti-rheumatic drug, RF: rheumatoid factor. CCP: cyclic citrullinated peptide, CKD: chronic kidney disease, ILD: interstitial lung disease, csDMARD: conventional synthetic disease modifying anti-rheumatic drug, HAQ-DI: health assessment questionnaire disability index, VAS: visualised analogue scale, EGA: evaluator's global assessment, CDAI: clinical disease activity index, LDA: low disease activity, MDA: middle disease activity, HDA: high disease activity, TNFi: tumour necrosis factor inhibitor, IL6i: interleukin-6 inhibitor, CTLA4-Ig: cytotoxic T-lymphocyte-associated antigen 4 immunoglobulin, JAKi: Janus kinase inhibitor, MTX: methotrexate, GC: glucocorticoid, OR: odds ratio, CI: confidence interval

Additional file 10. Sensitivity analysis of Table 5 including only those who achieved CDAI remission (< 2.8).

		Pain VAS reduction by ≥ 40 mm (N = 272, 43.7%)			
		OR	95%CI		p
Age	<40	1 (Reference)			
	40-49	0.67	0.12	3.86	0.66
	50-59	0.22	0.04	1.14	0.07
	60-69	0.69	0.15	3.17	0.63
	70-79	0.36	0.07	1.89	0.23
	80-	0.16	0.01	2.35	0.18
Female		1.42	0.50	4.07	0.51
Disease duration	<1y	1 (Reference)			
	1-2y	0.51	0.12	2.08	0.35
	2-5y	0.41	0.12	1.42	0.16
	5-10y	1.02	0.23	4.54	0.98
	10-20y	0.59	0.16	2.20	0.43
	20y-	0.27	0.04	1.73	0.17
Overweight		1.21	0.42	3.53	0.72
CKD		1.38	0.45	4.23	0.57
Glucose intolerance		0.77	0.26	2.32	0.65
RF or anti-CCP positive		3.13	1.04	9.46	0.04
ILD		1.40	0.49	4.05	0.53
Past history of fracture		1.01	0.23	4.34	0.99
Past history of cancer		0.94	0.24	3.70	0.93
≥ 2 classes of b/tsDMARD failure		0.63	0.19	2.06	0.44
≥ 2 csDMARD failure		0.68	0.21	2.19	0.52
HAQ-DI at week 0		0.97	0.47	1.98	0.92
PainVAS at week 0		1.21	1.15	1.26	<0.01
EGA at week 0		0.99	0.95	1.02	0.41
Global Health at week 0		1.02	0.99	1.05	0.31
Disease activity at week 0	LDA	1 (Reference)			
	MDA	0.52	0.08	3.37	0.49
	HDA	0.95	0.12	7.53	0.96
Class of b/tsDMARD	TNFi	1 (Reference)			
	IL6i	0.77	0.23	2.56	0.67
	ABT	0.46	0.14	1.53	0.21
	JAKi	1.84	0.47	7.21	0.38
Dose of MTX		0.89	0.82	0.97	0.01
Dose of GC		1.00	0.79	1.26	0.98

factor. CCP: cyclic citrullinated peptide, CKD: chronic kidney disease, ILD: interstitial lung disease, csDMARD: conventional synthetic disease modifying anti-rheumatic drug, HAQ-DI: health assessment questionnaire disability index, VAS: visualised analogue scale, EGA: evaluator's global assessment, CDAI: clinical disease activity index, LDA: low disease activity, MDA: middle disease activity, HDA: high disease activity, TNFi: tumour necrosis factor inhibitor, IL6i: interleukin-6 inhibitor, CTLA4-Ig: cytotoxic T-lymphocyte-associated antigen 4 immunoglobulin, JAKi: Janus kinase inhibitor, MTX: methotrexate, GC: glucocorticoid, OR: odds ratio, CI: confidence interval

Additional file 11. Change in clinical variables within 6 months by HAQ-DI improved (> 0.22) or not.

	Total (N = 1474)			HAQ-DI improvement (N = 839, 57%)			HAQ-DI non-improvement (N = 635, 43%)			p*	OR	95%CI		p**
	Mean	SE	Median	Mean	SE	Median	Mean	SE	Median					
Δ Pain VAS	-27.63	0.73	-24	-36.62	0.94	-35	-14.70	0.96	-11	<0.01	0.98	0.97	0.99	<0.01
Δ TJC	-9.47	0.20	-8	-10.89	0.28	-9	-7.46	0.29	-6	<0.01	0.98	0.96	1.00	0.08
Δ SJC	-8.07	0.17	-7	-9.39	0.24	-8	-6.23	0.22	-5	<0.01	0.98	0.95	1.01	0.15
Δ GH	-25.07	0.69	-22	-32.42	0.93	-32	-13.64	0.91	-10	<0.01	0.99	0.98	1.00	0.02
Δ MS	-97.27	10.15	-25	-128.87	13.43	-50	-61.01	15.86	0	<0.01	1.00	1.00	1.00	0.53
Δ ESR	-25.74	0.77	-20	-31.59	1.05	-26	-17.33	1.07	-12	<0.01	0.99	0.98	1.00	<0.01
Δ EGA	-35.90	0.53	-35	-40.53	0.71	-40	-28.99	0.77	-29	<0.01	0.99	0.98	1.00	0.05

HAQ-DI: health assessment questionnaire disability index, VAS: visualised analogue scale, TJC: tender joint counts, SJC: swollen joint counts, GH: patient's global health, MS: morning stiffness, ESR: erythrocyte sedimentation rate, EGA: evaluator's global assessment.
*simple comparison using t-test
** logistic regression test using all the variables in the table

Additional file 12. Variance inflation factors (VIF) for each variable in the multiple regression test for HAQ-DI improvement.

		VIF	1/VIF
Age	<40	Reference	
	40-49	2.07	0.48
	50-59	2.7	0.37
	60-69	3.39	0.29
	70-79	3.61	0.28
	80-	2.05	0.49
Female		1.09	0.92
Disease duration	<1y	Reference	
	1-2y	1.46	0.69
	2-5y	1.73	0.58
	5-10y	1.82	0.55
	10-20y	1.99	0.50
	20y-	1.68	0.60
Overweight		1.04	0.96
CKD		1.32	0.76
DM		1.17	0.85
RF or anti-CCP positive		1.06	0.94
ILD		1.16	0.87
Past history of fracture		1.14	0.88
Past history of cancer		1.09	0.92
≥ 2 classes of b/tsDMARD failure		1.44	0.69
≥ 2 csDMARD failure		1.27	0.79
HAQ at week 0		1.63	0.61
Pain VAS at week 0		3.09	0.32
EGA at week 0		2.06	0.49
Global Health at week 0		2.91	0.34
Disease activity at week 0	LDA	Reference	
	MDA	4.01	0.25
	HDA	5.48	0.18
Class of b/tsDMARD	TNFi	Reference	
	IL6i	1.49	0.67
	ABT	1.45	0.69
	JAKi	1.52	0.66
Use of MTX		1.41	0.71
Use of GC		1.12	0.89
		Mean VIF : 1.95	

CKD: chronic kidney disease, RF: rheumatoid factor, CCP: cyclic citrullinated peptide, ILD: interstitial lung disease, b/tsDMARD: biological and targeted synthetic disease modifying anti-rheumatic drug, csDMARD: conventional synthetic disease modifying anti-rheumatic drug, HAQ-DI: health assessment questionnaire disability index, CDAI: clinical disease activity index, VAS: visualised analogue scale, EGA: evaluator's global assessment, LDA: low disease activity, MDA: moderate disease activity, HDA: high disease activity, TNFi: tumour necrosis factor inhibitor, IL6i: interleukin-6 inhibitor, CTLA4-Ig: cytotoxic T-lymphocyte-associated antigen 4 immunoglobulin, JAKi: Janus kinase inhibitor, MTX: methotrexate, GC: glucocorticoid