Supplementary Figure 1. Patient-administered survey to assess vaccination coverage and patient-reported barriers for non-vaccination.

MUHC RHEUMATOLOGY SURVEY   STUDY NUMBER_____

WE WOULD LIKE TO LEARN MORE ABOUT VACCINATIONS THAT OUR PATIENTS RECEIVE. THANK YOU FOR
COMPLETING THIS QUESTIONNAIRE.

How old are you? _____ years-old   Are you a: ___Female   ___Male

Do you have a primary care doctor that you see at least each year for routine care: ___YES ___No

Which disease are you seeing the doctor for and for how long have you had that disease? (CIRCLE ALL THAT APPLY)

Rheumatoid Arthritis - Year of diagnosis ___   Psoriatic Arthritis - Year of diagnosis ___

Ankylosing Spondylitis - Year of diagnosis ___   Lupus - Year of diagnosis ___

Vasculitis - Year of diagnosis ___

Other rheumatic disease (which one?) _____ - Year of diagnosis ___

Have you ever been diagnosed with any of the following conditions? (CIRCLE ALL THAT APPLY)
         Cancer   Diabetes   Alcoholism   HIV   Kidney disease

Which medications do you take? (CIRCLE ALL THAT APPLY)
Methotrexate   Dose per week:_____
Humira (Adalimumab), Cimzia (Certolizumab), Simponi (Golimumab), Remicade (Infliximab), Enbrel
(Etanercept)
Orencia (Abatacept), Rituxan (Rituximab), Actemra (Tocilizumab)
Arava (Leflunomide)
Azulfidine (Sulfasalazine)
Plaquenil (Hydroxychloroquine)
Imuran (Azathioprine)
Cytoxan (Cyclophosphamide)
Xeljanz (Tofacitinib)
Cellcept (Mycophenolate mofetil)   Dose per day:_____
Steroids (e.g., Prednisone) Dose per day:_____

Have you been told that any of the medicines you are taking make it easier for you to develop an infection?
         ___YES   ___No   ___NOT SURE

Flu Vaccine
Are you aware you can receive a shot (injection) to protect you against the flu each year? ___Yes ___No
Has a doctor ever recommended you get the flu shot? ___Yes ___No
Did you receive the flu shot this year? ___Yes ___No

Pneumonia Vaccine (Pneumovax)
Are you aware you can receive a shot (injection) to protect against pneumonia (lung infection)?__ Yes __No
Has your doctor ever recommended you get the pneumonia vaccination? ___Yes ___No
Which doctor? __Rheumatologist __My Primary Care __Both __Other (pharmacist, nurse) _____
Have you ever received the pneumonia vaccine? ___Yes ___No
If yes, how long ago: _____   Where (MUHC, CLSC, other medical office): _____

Hepatitis B vaccine (Twinrix, Engerix-B; Recombivax HB)
Are you aware you can receive a shot (injection) to protect you against hepatitis B? ___Yes ___No
Has a doctor ever recommended you get the hepatitis B shot? ___Yes ___No
Did you receive the three doses of hepatitis B vaccine? ___Yes ___No
Did you receive the 1 or 2 doses of hepatitis B vaccine? ___Yes ___No
If yes, where? (MUHC clinic, CLSC, other medical office): _____
If not, why not? _____

Zoster vaccine (Zostavax)
Are you aware you can receive a shot (injection) to protect you against zona/herpes zoster? ___Yes ___No
Has a doctor ever recommended you get the zona/herpes zoster vaccine? ___Yes ___No
Did you receive zona/herpes zoster vaccine? ___Yes ___No
If not, why not? _____
Have you ever had zona/herpes zoster? ___Yes ___No

Thank you for completing this survey. Please give this to the receptionist when completed.

Supplementary Table 1. Disease classification for RA, SARD, SpA, and OD groups

Disease Classification	Specific Condition	Patient Frequency
Rheumatoid arthritis (RA)	Rheumatoid arthritis	131
	Juvenile idiopathic arthritis (JIA)	4
	Seronegative arthritis	1
	Total	**136**
Systemic autoimmune rheumatic diseases (SARD)	Systemic lupus erythematosus (SLE)	69
	Vasculitis	25
	Sjögren's syndrome	7
	Inflammatory myositis	5
	Mixed connective tissue disease (MCTD)	4
	Systemic sclerosis	3
	Total	**113**
Spondyloarthropathies (SpA)	Ankylosing spondylitis	22
	Psoriatic arthritis	21
	Crohn's disease	1
	Reactive arthritis	1
	SAPHO	1
	Ulcerative colitis	1
	Total	**47**
Other diseases (OD)*	Osteoarthritis	27
	Fibromyalgia	12
	Crystal arthropathies	11
	Trigger finger	1
	Adhesive capsulitis	1
	Bursitis	1
	Hip calcification	1
	Irritable bowel syndrome	1
	Migraine	1
	Total	**56**

*Patients included in the OD group were not being treated with DMARD/biologics

Supplementary Table 2. Results of univariate logistic regression models for influenza vaccination (n = 312)

Variable	Frequency (%) or mean ± SD	% Vaccinated (Influenza 2014-2015 season)	OR (95% CI)	P-Value
Sex				0.25
Male	77 (24.7)	52.0	*ref*	
Female	235 (75.3)	44.4	0.74 (0.44 – 1.24)	
Age, years	52.2 ± 17.2	–	1.04 (1.03 – 1.06)	< 0.001
Followed by a Primary Care Physician				0.02
No	69 (22.8)	33.3	*ref*	
Yes	234 (77.2)	50.2	2.02 (1.15 – 3.54)	
Disease Duration (years)	9.0 ± 9.6	–	1.01 (0.99 – 1.04)	0.40
Comorbidities $^{\Psi}$				0.07
No	249 (79.3)	43.3	*ref*	
Yes	65 (20.7)	56.3	1.68 (0.97 – 2.93)	
Treatment				0.83
Neither	75 (23.9)	44.6	*ref*	
DMARD	172 (54.8)	48.2	1.16 (0.67 – 2.00)	
Biologics	27 (8.6)	40.7	0.85 (0.35 – 2.09)	
DMARD and Biologics	40 (12.7)	42.5	0.92 (0.42 – 2.00)	
Awareness of Benefits of Influenza Vaccination				0.001
No	29 (9.3)	11.5	*ref*	
Yes	282 (90.7)	49.6	7.56 (2.22 – 25.7)	
Influenza Vaccine Recommended by Physician				< 0.001
No	79 (25.8)	9.0	*ref*	
Yes	227 (74.2)	59.0	14.6 (6.44 – 33.2)	
Pneumococcal Vaccine				< 0.001
No	161 (61.7)	31.6	*ref*	
Yes	100 (38.3)	70.0	5.04 (2.93 – 8.68)	
Disease Group				0.004
OD	18 (5.7)	88.9	*ref*	
RA	136 (43.4)	48.5	0.12 (0.03 – 0.53)	
SARD	113 (36.0)	42.0	0.09 (0.02 – 0.41)	
SpA	47 (15.0)	31.9	0.06 (0.01 – 0.29)	

Patients in the RD groups are of any age, patients in OD group are ≥ 65 years-old. $^{\Psi}$ Comorbidities include cancer, diabetes, and renal disease. Note, renal disease was not considered a comorbidity in SLE patients (part of SARD). RA: rheumatoid arthritis; SARD: systemic autoimmune rheumatic diseases; SpA: spondyloarthropathies; OD: other diseases; DMARD: disease-modifying anti-rheumatic drugs; OR: odds ratio.

Supplementary Table 3. Results of univariate logistic regression models for pneumococcal vaccination (n = 312)

Variable	Frequency (%) or mean ± SD	% Vaccinated Pneumococcus	OR (95% CI)	P-Value
Sex				0.96
Male	77 (24.7)	38.3	*ref*	
Female	235 (75.3)	38.0	0.99 (0.55 – 1.79)	
Age, years	52.2 ± 17.2	–	1.03 (1.01 – 1.04)	0.001
Followed by a Primary Care Physician				0.77
No	69 (22.8)	37.3	*ref*	
Yes	234 (77.2)	39.4	1.09 (0.60 – 1.99)	
Disease Duration (years)	9.0 ± 9.6	–	1.01 (0.98 – 1.04)	0.52
Comorbidities $^{\Psi}$				0.27
No	249 (79.3)	36.6	*ref*	
Yes	65 (20.7)	44.6	1.40 (0.77 – 2.54)	
Treatment				0.11
Neither	75 (23.9)	29.3	*ref*	
DMARD	172 (54.8)	39.9	1.60 (0.83 – 3.08)	
Biologics	27 (8.6)	29.2	0.99 (0.35 – 2.83)	
DMARD and Biologics	40 (12.7)	52.2	2.70 (1.14 – 6.40)	
Awareness of Benefits of Pneumococcal Vaccination				–
No	117 (41.8)	0	–	
Yes	163 (58.2)	64.1	–	
Pneumococcal Vaccine Recommended by Physician				< 0.001
No	164 (60.3)	4.0	*ref*	
Yes	108 (39.7)	86.7	156 (57.9 – 421)	
Influenza Vaccine				< 0.001
No	168 (54.0)	21.7	*ref*	
Yes	143 (46.0)	58.3	5.04 (2.93 – 8.68)	
Disease Group				0.57
OD	18 (5.7)	33.3	*ref*	
RA	136 (43.4)	42.0	1.45 (0.47 – 4.50)	
SARD	113 (36.0)	37.8	1.21 (0.38 – 3.85)	
SpA	47 (15.0)	29.7	0.85 (0.23 – 3.06)	

Patients in the RD groups are of any age, patients in OD group are ≥ 65 years-old. $^{\Psi}$ Comorbidities include cancer, diabetes, and renal disease. Note, renal disease was not considered a comorbidity in SLE patients (part of SARD). RA: rheumatoid arthritis; SARD: systemic autoimmune rheumatic diseases; SpA: spondyloarthropathies; OD: other diseases; DMARD: disease-modifying anti-rheumatic drugs; OR: odds ratio.

Supplementary Table 4. Results of univariate logistic regression models for HBV vaccination (n = 352)

Variable	Frequency (%) or mean ± SD	% Vaccinated HBV	OR (95% CI)	P-Value
Sex				0.12
Male	86 (24.7)	54.5	*ref*	
Female	262 (75.3)	43.5	0.64 (0.37 − 1.12)	
Age, years	51.8 ± 16.7	−	0.96 (0.94 − 0.97)	< 0.001
Followed by a Primary Care Physician				0.81
No	76 (22.4)	45.6	*ref*	
Yes	264 (77.6)	47.4	1.08 (0.60 − 1.95)	
Disease Duration (years)	8.7 ± 9.4	−	0.97 (0.94 − 1.01)	0.09
Comorbidities $^{\Psi}$				0.04
No	277 (78.7)	49.5	*ref*	
Yes	75 (21.3)	33.9	0.52 (0.28 − 0.97)	
Treatment				0.85
Neither	113 (32.1)	46.6	*ref*	
DMARD	172 (48.9)	44.4	0.92 (0.52 − 1.63)	
Biologics	27 (7.7)	45.5	0.96 (0.37 − 2.49)	
DMARD and Biologics	40 (11.4)	53.3	1.31 (0.56 − 3.07)	
Awareness of Benefits of HBV Vaccination				< 0.001
No	85 (27.8)	3.0	*ref*	
Yes	221 (72.2)	61.3	51.4 (12.2 − 216)	
HBV Vaccine Recommended by Physician				< 0.001
No	194 (66.7)	18.5	*ref*	
Yes	97 (33.3)	87.1	29.8 (14.4 − 61.7)	
Disease Group				< 0.001
OD	56 (15.9)	36.8	*ref*	
RA	136 (38.6)	33.6	0.87 (0.40 − 1.88)	
SARD	113 (32.1)	55.6	2.14 (0.97 − 4.73)	
SpA	47 (13.4)	73.5	4.76 (1.74 − 13.0)	

$^{\Psi}$ Comorbidities include cancer, diabetes, and renal disease. Note, renal disease was not considered a comorbidity in SLE patients (part of SARD). RA: rheumatoid arthritis; SARD: systemic autoimmune rheumatic diseases; SpA: spondyloarthropathies; OD: other diseases; DMARD: disease-modifying anti-rheumatic drugs; HBV: hepatitis B virus; OR: odds ratio.

Supplementary Table 5. Multivariate analysis to identify predictors of influenza vaccine recommendation by a physician

Variable	Odds Ratio	95% CI	P-Value
Female	0.64	0.28 – 1.46	0.29
Age, years	1.02	1.00 – 1.05	0.06
Followed by a Primary Care Physician	3.41	1.62 – 7.20	0.001
Disease Duration	1.07	1.02 – 1.12	0.01
Comorbidities $^\Psi$	2.04	0.69 – 6.03	0.20
Awareness of Benefits of Influenza Vaccine	4.53	1.54 – 13.3	0.01
Treatment (Neither as reference group)			0.06
DMARD	2.86	1.07 – 7.66	
Biologics	2.26	0.57 – 9.05	
DMARD and Biologics	6.25	1.62 – 24.1	
Disease group (OD as reference group)			0.31
RA	0.18	0.02 – 2.05	
SARD	0.34	0.03 – 3.68	
SpA	0.26	0.02 – 2.88	

Patients in the RD groups are of any age, patients in OD group are ≥ 65 years-old. $^\Psi$ Comorbidities include cancer, diabetes, and renal disease. Note, renal disease was not considered a comorbidity in SLE patients (part of SARD). RA: rheumatoid arthritis; SARD: systemic autoimmune rheumatic diseases; SpA: spondyloarthropathies; OD: other diseases; DMARD: disease-modifying anti-rheumatic drugs; CI: confidence interval.

Supplementary Table 6. Multivariate analysis to identify predictors of pneumococcal vaccine recommendation by a physician

Variable	Odds Ratio	95% CI	P-Value
Female	0.36	0.11 – 1.15	0.09
Age, years	1.03	1.00 – 1.06	0.05
Followed by a Primary Care Physician	1.25	0.46 – 3.37	0.66
Disease Duration	0.99	0.95 – 1.04	0.74
Comorbidities $^\Psi$	1.19	0.40 – 3.51	0.76
Awareness of Benefits of Pneumococcal Vaccine	401	40.7 – 3952	< 0.001
Treatment (Neither as reference group)			0.02
DMARD	1.67	0.45 – 6.15	
Biologics	0.92	0.15 – 5.78	
DMARD and Biologics	18.2	2.50 - 132	
Disease group (OD as reference group)			0.95
RA	1.24	0.08 – 19.2	
SARD	1.61	0.11 – 24.4	
SpA	1.42	0.09 – 22.0	

Patients in the RD groups are of any age, patients in OD group are ≥ 65 years-old. $^\Psi$ Comorbidities include cancer, diabetes, and renal disease. Note, renal disease was not considered a comorbidity in SLE patients (part of SARD). RA: rheumatoid arthritis; SARD: systemic autoimmune rheumatic diseases; SpA: spondyloarthropathies; OD: other diseases; DMARD: disease-modifying anti-rheumatic drugs; CI: confidence interval.

Supplementary Table 7. Reasons for non-vaccination against influenza, HBV, and HZ

Reasons for Non-Vaccination	Influenza (n = 168)	HBV (n = 140)	HZ (n = 84)
	Frequency (%)		
No Clear Reasons	2 (3.5)	4 (7.5)	6 (13.6)
Not Interested	19 (33.3)	14 (26.4)	8 (18.2)
Not Recommended	7 (12.3)	21 (39.6)	19 (43.2)
Fear of Side Effects	9 (15.8)	—	—
Vaccine Misconceptions	19 (33.3)	13 (24.5)	9 (20.5)
Doubt about Vaccine Efficacy	1 (1.8)	0	0
HBV Positive	—	1 (1.9)	—
Vaccine Cost	—	—	2 (4.5)

HBV: hepatitis B virus; HZ: herpes zoster.