## Supplements

Supplement Table 1. ICD codes for rheumatic disease

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| **Disease** | **ICD-9** | **ICD-10** |
| rheumatoid arthritis | 714.0, 714.1, 714.2, 714.3 | M05.1, M05.2, M05.8, M05.9, M06.0, M06.1, M06.2, M06.3, M06.8, M06.9, M05.0, M05.3, M08.0, M08.2, M08.3 |
| systemic lupus erythematosus | 710.0 | M32.0, M32.1, M32.8, M32.9 |
| sicca syndrome | 710.2 | M35.0 |
| systemic sclerosis | 710.1 | M34.0, M34.1, M34.2, M34.8, M34.9 |
| other diffuse diseases of connective tissue | 710.8,710,9,710.3,710.4 | M35.1, M35.4, M35.6, M35.8, M35.9, M33.0, M33.1, M33.2, M33.9 |
| polymyalgia rheumatica | 725 | M35.3 |
| vasculitis | 446.0, 446.2, 446.4, 446.5, 446.6, 446.7, 136.1 | M30.0, M30.2, M30.8, M31.0, M31.1, M31.3, M31.4, M31.5, M31.7, M35.2 |

Supplement Table 2. ICD codes for comorbidities.

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| **Disease** | **ICD-9** | **ICD-10** |
| COPD (Chronic obstructive pulmonary disease) | ICD-9-CM: 491.21, 491.22, 491.8, 491.9, 492.8, 493.2X, 496 | J41.8, J42, J43X, J44.0, J44.1, J44.9 |
| asthma | 493\* | J45\* |
| chronic renal disease | 581, 582, 583, 585, 586, 587 | N03, N04, N05, N06, N07, N18,  N19 |
| diabetes mellitus | 249, 250 | E10, E11, E12, E13, E14 |
| hypertension | 401\*, 402, 403, 404, 405 | I10\*, I11\*, I12\*, I13\*, I15\* |
| congestive heart failure | 428, 428.0, 428.1, 428.2, 428.3, 428.4, 428.9 | I50, I50.1, I50.9 |
| CVD (Cardiovascular disease) | 410, 412, 413, 414, 433, 434, 436, 437.0, 437.1 | I20, I21, I22, I25, I63, I64, I65, I66,  I67.2, I63.9 |
| osteoporosis | 733.0 | M80, M81, M82 |

Supplement Table 3. Variables for regression and survival analysis.

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| **Variable category** | **Variable details** |
| demographic | age, sex, race |
| comorbidities | COPD, asthma, chronic renal disease, diabetes mellitus, hypertension, congestive heart failure (CHF), CVD, osteoporosis, chronic anemia |
| biologic DMARDs | adalimumab, etanercept, certolizumab, golimumab, infliximab, abatacept, rituximab, tocilizumab, secukinumab, anakinra, ustekinumab, tofacitinib, baricitinib |
| nonbiologic DMARDs | hydroxychloroquine, methotrexate, sulfasalazine, leflunomide, cyclophosphamide, azathioprine, cyclosporine A, mycophenolate mofetil, tacrolimus, thalidomide |
| GCs | prednisone, prednisone acetate, prednisolone, methylprednisolone,  dexamethasone, budesonide(oral), cortisone acetate |
| other | average BMI, infection before the index |