**Supplementary Text 1**.

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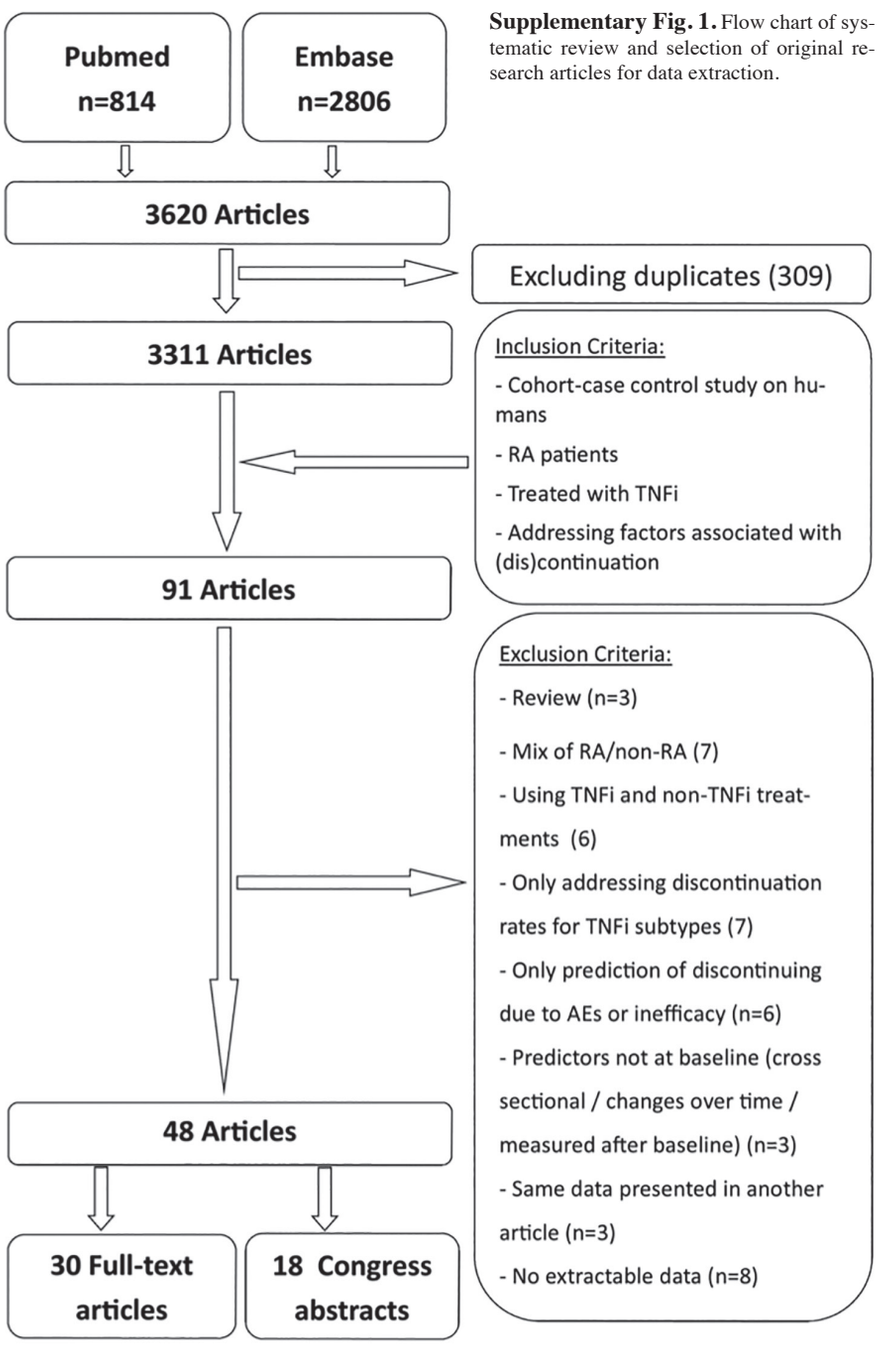
**Supplementary Table I.** Search syntax for PUBMED and EMBASE. The search was performed on title/abstract. The search string was designed according to the patients, intervention, comparison and outcome (PICO) method. No "comparison" was integrated in the search, since not all studies mention common descriptions such as "predictor", but rather the predictors found.

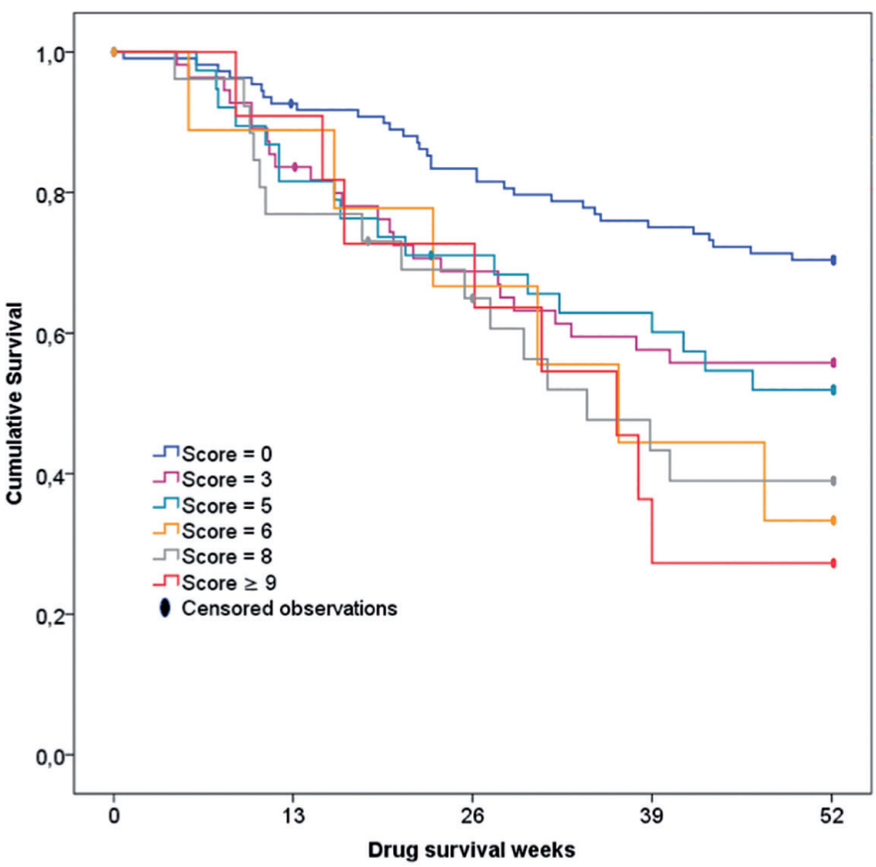
| | |
|---|---|
| Patients: | (rheumatoid AND arthritis) OR RA |
| Intervention: | (anti AND TNF-alpha) OR anti-TNF OR anti-TNF OR (TNF AND antagonist) OR (TNF AND antagonists) OR (TNF AND inhibitor) OR (TNF AND inhibitors) OR Adalimumab OR Etanercept OR Infliximab OR Golimumab OR Certolizumab |
| Outcome: | discontinuation OR discontinuing OR continuation OR continuing OR survival OR stopping OR retention OR attrition OR (treatment AND failure) OR (treatment AND success) |




**Supplementary Fig. 1.** Flow chart of systematic review and selection of original research articles for data extraction.

**Supplementary Table II.** Cut-offs for the simple prediction score and absolute chances on discontinuation. A cut-off of 9 met our predefined criterion of a PPV ≥70% and is able to classify 11/252 (=4.4%) of patients as high risk.

| Used cut-off for total prediction score | No. of patients defined as high risk by cut-off, n (%) | No. of patients discontinuing within high risk patients, n (%) |
|---|---|---|
| No cut-off | 252 (100) | 103 (41) |
| ≥3 | 141 (56) | 71 (50) |
| ≥5 | 86 (34) | 47 (55) |
| ≥6 | 47 (19) | 29 (62) |
| ≥8 | 37 (15) | 23 (62) |
| ≥9 | 11 (4) | 8 (72) |
| ≥11 | 7 (3) | 6 (86) |




**Supplementary Fig. 2.** TNFi survival curves for the selected cut-off of ≥9 (red) and lower scores in complete cohort (n=252).

**Supplementary Table III.** Complete overview of results from systematic review on investigated predictors for drug survival, drawn from 29 full-text articles (5-7, 38-41, 50-72) and 18 congress abstracts (8, 42-44, 73-86). Predictors were drawn from multivariable models if possible and a *p*-value <0.05 was considered an effect. A predictor from a study was assigned to either one of three categories: associated with continuation, discontinuation or not associated. Per category, the number of studies that mention the particular predictor is shown. The association with survival (*i.e.* conclusion) is based on the consistency of the predictor in predicting the 'same direction' in more than 1/3rd of the studies.

| Item (original articles) & (abstracts) | Original Articles | | | | | Original Articles + Abstracts | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | No. of studies investigated this item | Association with TNFi drug survival | | | Conclusion TNFi drug survival | No. of studies investigated this item | Association with TNFi drug survival | | | Conclusion TNFi drug survival |
| | | Continuation | No association | Discontinuation | | | Continuation | No association | Discontinuation | |
| Demographic and clinical parameters | | | | | | | | | | |
| Age* (7,38,40,41,50,52,55-57,60-66,68,71,72) & (8,43,73,76,83) | 19 | 0 | 16 | 3 | - | 24 | 1 | 19 | 4 | - |
| Female gender (38,40,41,50,52,55-57,59-66,71,72) & (76,84) | 18 | 1 | 16 | 1 | - | 20 | 1 | 17 | 2 | - |
| Disease-duration (7,38,50,55,56,59,60,62-65,72) & (76,83) | 12 | 2 | 10 | 0 | - | 14 | 2 | 11 | 1 | - |
| Comorbidity§ (7,52,56,57,59,60,63,64,72) & (8,84) | 9 | 1 | 7 | 1 | - | 11 | 1 | 8 | 2 | |
| RF positivity/levels (7,40,50,57,64,65,71) | 7 | 0 | 7 | 0 | - | | | | | - |
| Current smoking (5-7) & (8) | 3 | 0 | 2 | 1 | - | 4 | 0 | 2 | 2 | † |
| Pack years smoking (6,7,38) | 3 | 0 | 1 | 2 | † | | | | | |
| Ethnicity§ (38,64) & (79) | 2 | 0 | 1 | 1 | - | 3 | 0 | 1 | 2 | † |
| BMI§ (55,61) | 2 | 0 | 1 | 1 | - | | | | | |
| Nodules (7,38) | 2 | 0 | 2 | 0 | - | | | | | |
| Erosions (7,38) | 2 | 0 | 2 | 0 | - | | | | | |
| ACPA positivity (57,65) | 2 | 0 | 2 | 0 | - | | | | | |
| High education level (50,66) & (8) | 2 | 1 | 1 | 0 | - | | | | | |
| Weight (55) & (76) | 1 | 0 | 1 | 0 | - | 2 | 0 | 2 | 0 | - |
| Length (55) | 1 | 0 | 1 | 0 | - | | | | | |
| Extra articular manifestations (50) | 1 | 0 | 1 | 0 | - | | | | | |
| Employed (64) | 1 | 0 | 1 | 0 | - | | | | | |
| Socioeconomical status (50) | 1 | 0 | 1 | 0 | - | | | | | |
| Full pharmacy coverage (50) | 1 | 1 | 0 | 0 | - | | | | | |
| Assessments | | | | | | | | | | |
| DAS28* (7,38-40,54,55,57,59-63,65,67,72) & (82) | 15 | 1 | 11 | 3 | - | 16 | 1 | 12 | 3 | - |
| HAQ (1,8,10;14-18,20-22) & (76,84) | 11 | 0 | 8 | 3 | - | 13 | 0 | 8 | 5 | † |
| SJC (7,38,50,55,63,65) & (42,76) | 6 | 0 | 6 | 0 | - | 8 | 0 | 7 | 1 | - |
| ESR (7,50,57,59,60,63) & (37) | 6 | 1 | 4 | 1 | - | 7 | 1 | 5 | 1 | - |
| TJC (7,38,50,55,63,65) | 6 | 0 | 4 | 2 | - | | | | | |
| CRP (7,38,55,57,62,65) & (76) | 6 | 1 | 5 | 0 | - | 7 | 1 | 6 | 0 | - |
| ANA positivity (65,71) & (85) | 2 | 0 | 2 | 0 | - | 3 | 0 | 3 | 0 | - |
| RADAI (38,40) & (84) | 2 | 0 | 1 | 1 | - | 3 | 0 | 1 | 2 | - |
| VAS-general health (7,65) | 2 | 0 | 2 | 0 | - | | | | | |
| Patient global assessment (38,55) | 2 | 0 | 2 | 0 | - | | | | | |
| VAS-pain (7) & (8) | 1 | 0 | 1 | 0 | - | 2 | 0 | 2 | 0 | - |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Physician global assessment (38) & (76) | 1 | 0 | 0 | 1 | - | 2 | 0 | 1 | 1 | - |
| HADS distress score (7) | 1 | 0 | 0 | 1 | - | | | | | |
| Fatigue (38) | 1 | 0 | 1 | 0 | - | | | | | |
| Physical activity (38) | 1 | 1 | 0 | 0 | - | | | | | |
| CDAI (64) | 1 | 0 | 1 | 0 | - | | | | | |
| FANA positivity (53) | 1 | 0 | 1 | 0 | - | | | | | |
| anti-ssDNA positivity (53) | 1 | 0 | 0 | 1 | - | | | | | |
| anti-dsDNA positivity (65) | 1 | 0 | 1 | 0 | - | | | | | |
| IgG (65) | 1 | 0 | 1 | 0 | - | | | | | |
| anti-Ro/SSA positivity (65) | 1 | 0 | 0 | 1 | - | | | | | |
| anti-La/SSB positivity (65) | 1 | 0 | 1 | 0 | - | | | | | |
| HTLV-I–positivity (70) | 1 | 0 | 0 | 1 | - | | | | | |
| CF-USD in synovium (55) | 1 | 1 | 0 | 0 | - | | | | | |
| Peridontitis <5 year before start (51) | 1 | 0 | 0 | 1 | - | | | | | |
| Physical function (8) | 0 | 0 | 0 | 0 | - | 1 | 0 | 1 | 0 | - |
| Morning stiffness (76) | 0 | 0 | 0 | 0 | - | 1 | 0 | 1 | 0 | - |
| Treatments | | | | | | | | | | |
| Concomitant MTX (38,52,54-59,62,63,67,69,71,72) & (8,42,75-77,86) | 14 | 6 | 6 | 2 | ‡ | 20 | 10 | 7 | 3 | ‡ |
| Concomitant GCs (38,40,54,55,57,59,60,63,64,72) & (42,76,80,81,83,84) | 10 | 1 | 8 | 1 | - | 16 | 1 | 8 | 7 | † |
| Number of previously used DMARDs*(7,50,56,57,60,62,63,65) | 8 | 0 | 6 | 2 | - | | | | | |
| Any concomitant csDMARD (39,58-60,66,69) & (74,83,86) | 6 | 5 | 0 | 1 | ‡ | 9 | 8 | 0 | 1 | ‡ |
| Number previously used bDMARDs*§ (38-41,50) & (42-44) | 5 | 0 | 1 | 4 | † | 8 | 0 | 1 | 7 | † |
| Concomitant SSZ (55,69,72) & (8) | 3 | 0 | 2 | 1 | - | 4 | 1 | 2 | 0 | - |
| Concomitant NSAID (38,56) &(76) | 2 | 1 | 1 | 0 | - | 3 | 1 | 1 | 1 | - |
| Current MTX dose (mg/week) (65,72) | 2 | 0 | 2 | 0 | - | | | | | |
| Current GC dose (mg/week) (57,65) | 2 | 0 | 2 | 0 | - | | | | | |
| Concomitant LEF (69,72) | 2 | 0 | 1 | 1 | - | | | | | |
| Concomitant cyclosporine A (71,72) | 2 | 0 | 2 | 0 | - | | | | | |
| Concomitant HCQ (72) | 1 | 1 | 0 | 0 | - | 2 | 2 | 0 | 0 | - |
| Any prior csDMARD (38) | 1 | 1 | 0 | 0 | - | | | | | |
| Cumulative MTX use, yrs (38) | 1 | 1 | 0 | 0 | - | | | | | |
| Concomitant AZA (72) | 1 | 0 | 1 | 0 | - | | | | | |
| Concomitant D-PEN (72) | 1 | 0 | 1 | 0 | - | | | | | |
| Previous use of LEF (76) | 0 | 0 | 0 | 0 | - | 1 | 0 | 0 | 1 | - |
| Season of treatment initiation (78) | 0 | 0 | 0 | 0 | - | 1 | 0 | 1 | 0 | - |

*combination of numerical and categorical values for this parameter; §different categories of parameters per study investigated; ‡predicting continuation (associated in >1/3rd of studies with continuation; – no association with TNFi drug survival; †predicting discontinuation (associated in >1/3rd of studies with discontinuation).

ANA: anti-nuclear antibodies; anti-ss/dsDNA: anti single stranded/double stranded DNA antibodies; AZA: azathioprine; bDMARD: biological DMARD; BMI: body mass index; CDAI: Clinical Disease Activity Index; CF-USD: colour fraction measured by ultrasound Doppler; CRP: C-reactive protein; csDMARD: conventional synthetical DMARD; D-PEN: D-penicillamine;; DAS2: disease activity score based on 28 joints; DMARDs: disease-modifying anti-rheumatic drugs; ESR: erythrocyte sedimentation rate; FANA: fluorescent antinuclear antibodies; GCs: glucocorticoids; HADS: Hospital Anxiety and Depression Scale; HAQ: Health Assessment Questionnaire; HCQ: hydroxychloroquine; HLTV-I: human T lymphotropic virus type I; IgG: immunoglobulin G; LEF: leflunomide; MTX: methotrexate; NSAID: non-steroidal anti-inflammatory drugs; RADAI: Rheumatoid Arthritis Disease Activity Index; RF: rheumatoid factor; SJC: swollen joint count; SSZ: sulfasalazine; TJC: tender joint count; VAS: visual analogue scale.

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