Background: Flare, relapse from status of treat-to-target (T2T, DAS28c<3.2), is hard predicted. We try to make it predictable by applying machine learning to a database from smart system of disease management (SSDM). SSDM is an interactive mobile disease management APPs.

Objectives: To develop and validate machine learning algorithms for flare prediction in RA.

Methods: Patients were trained using SSDM and input their data, including demographic, comorbidities (COMBs), lab test, medications and monthly self-assessments, including DAS28, HAQ, SF-36, Hospital Anxiety and Depression Scale (HADS). The data was uploaded to cloud and synchronized to the mobile of authorized rheumatologists. The COMBs were by ICD-9, and medications were listed as cDMARDs, Bio (BioDMARDs), NSAIDs, Steroid, FS (food supplements), MC (medicine for COMBs), TCM (Traditional Chinese Medicine), and combinations.

Results: From Jan of 2015 to Jan of 2020, 8811 RA patients, 85% female and 15% male, used to reach T2T. 4556 were flare-free and 4255 suffering at least one flare. The average 160 attributes were extracted from each flare-free patient at time of reaching T2T, and each flare patients at time of 3 months before the flare. Patients were randomly assigned as model setup (training) group (70%) and validation (testing) group(30%).

For training, data were processed using Python with statistical analyses in R. In R, random forests were applied to predict the presence of pro/flare and anti-flare using machine learning algorithms. The testing showed model performance for prediction windows are 0.78 for AUC (95% CI), 0.71 for Recall (sensitivity), 0.195 for Brier score, and 0.68 for precision (true positive 893, false positive 417, false negative 367, true negative 966).

Based on the flare type, the top 10 pro-flare attributes were CRP, swollen joint count (SJC), tender joint count (TJC), HAQ, DAS28, morning stiffness, gout, MCTD, OA, duration; while top 10 anti-flare attributes were cDMARDs+Bio, cDMARDs+steroid+NSAIDs, stable on HAQ, on morning stiffness, on SJC, medicine on COMBs, cDMARDs+TCM, stable on TJC, on ESRI, income at 100-200k (Fig.1). The top weighing COMBs for pro-flaring were gout (0.81), MRD (0.75), OA (0.56), AS (0.48). The monotherapies with either Bio or NSAIDs, or steroid, or TCM were pro-flare; while with cDMARDs was anti-flare (-0.21).

Conclusion: The model performed highly accurate for both pro-flare and anti-flare are identified, which may inspire the proactive actions. The testing showed model performance for prediction windows are 0.78 for AUC (95% CI), 0.71 for Recall (sensitivity), 0.195 for Brier score, and 0.68 for precision (true positive 893, false positive 417, false negative 367, true negative 966).

Acknowledgments: SSDM was developed by Shanghai Gothic Internet Technology Co., Ltd.

Disclosure of Interests: None declared.

DOI: 10.1136/annrheumdis-2020-eular.5458
Results: From 2014 to 2017, 21,993 SLE patients were identified. Women represented 87.4% of the cases, and 5428 patients were selected to make up the sample of SLE patients. The number of patients without diagnosis of SLE was 19,419,540. From this population was drawn randomly a 10% size sample, to make up the potential control sample. To estimate the incremental cost of having SLE it was used multivariate regression through a GAM model. The estimated average annual total cost of a patient with SLE was $6,139,046 COP vs. non-SLE patient cost of $4,113,191 COP. Meanwhile the adjusted incremental cost of SLE vs non-SLE was $2,025,855 COP. Subsequently, adjusted incremental cost was estimated taking into account the levels of severity. In the Table 1 are presented the mean values of incremental costs and 95% confidence intervals.

Conclusion: Although the prevalence of SLE in Colombia is relatively low, the direct costs generated for this disease might be very high. The annual cost for a SLE patient was $2,025,855 COP greater than the cost of a non-SLE patient. When considering the severity levels of the disease, it was found a $19,930,931,67 incremental cost estimate for high level of severity. In the medium level, the estimate was $7,248,201,04. Meanwhile, a patient in the low severity level had a $885,300,40 incremental cost.

References:

Disclosure of Interests: None declared

DOI: 10.1136/annrheumdis-2020-eular.5785