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THU0556 MISSING DATA AND MULTIPLE IMPUTATION IN RHEUMATOID ARTHRITIS REGISTRIES USING SEQUENTIAL RANDOM FOREST METHOD

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Background: Missing data in clinical epidemiological researches violate the intention to treat principle,

reduce statistical power and can induce bias if they are related to patient's response to treatment. In multiple imputation (MI), covariates are included in the imputation equation to predict the values of missing data.

Objectives: To find the best approach to estimate and impute the missing values in Kuwait Registry for Rheumatic Diseases (KRRD) patients data.

Methods: A number of methods were implemented for dealing with missing data. These included *Multivariate imputation by chained equations (MICE)*, *K-Nearest Neighbors (KNN)*, *Bayesian Principal Component Analysis (BPCA)*, *EM with Bootstrapping (Amelia II)*, *Sequential Random Forest (MissForest)* and mean imputation. Choosing the best imputation method was

judged by the minimum scores of *Root Mean Square Error (RMSE)*, *Mean Absolute Error (MAE)* and

Kolmogorov-Smirnov D test statistic (KS) between the imputed datapoints and the original datapoints that were subsequently set to missing.

Results: A total of 1,685 rheumatoid arthritis (RA) patients and 10,613 hospital visits were included in the registry. Among them, we found a number of variables that had missing values exceeding 5% of the total values. These included duration of RA (13.0%), smoking history (26.3%), rheumatoid factor (7.93%), anti-citrullinated peptide antibodies (20.5%), anti-nuclear antibodies (20.4%), sicca symptoms (19.2%), family history of a rheumatic disease (28.5%), steroid therapy (5.94%), ESR (5.16%), CRP (22.9%) and SDAI (38.0%). The results showed that among the methods used, MissForest gave the highest level of accuracy to estimate the missing values. It had the least imputation errors for both continuous and categorical variables at each frequency of missingness and it had the smallest prediction differences when the models used imputed laboratory values. In both data sets, MICE had the second least imputation errors and prediction differences, followed by KNN and mean imputation.

Conclusion: MissForest is a highly accurate method of imputation for missing data in KRRD and outperforms other common imputation techniques in terms of imputation error and maintenance of predictive ability with imputed values in clinical predictive models. This approach can be used in registries to improve the accuracy of data, including the ones for rheumatoid arthritis patients.

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THU0557 QUALITY ASSESSMENT OF CLINICAL PRACTICE GUIDELINES IN AXIAL AND PERIPHERAL SPONDYLOARTHRITIS: A SYSTEMATIC APPRAISAL

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Background: Clinical practice guidelines (CPG) in spondyloarthritis (SpA) serves as a tool for rheumatologists, health-care providers and patients in the selection of appropriate treatment framework in common clinical scenarios guiding decision-making processes. However, the quality of these guidelines has not yet been evaluated systematically in the field.

Objectives: The aim of the study was to evaluate the quality of the CPG available for the treatment of axial and peripheral SpA.

Methods: A systematic and scientific literature search between 2014 and 2019 was performed in order to identify and select CPG focused on the treatment of axial and peripheral SpA. The authors systematically searched the main guideline databases and guideline developer websites completing the search in PUBMED/MEDLINE and EMBASE. Four independent reviewers with methodological and clinical expertise in the field of SpA, assessed the eligible guidelines using the Appraisal of Guidelines for Research and Evaluation (AGREE II) instrument. Their degree of agreement was evaluated with the intra-class correlation coefficient (ICC). The statistical analyses as done using the R psych package.

Results: Twelve CPG were selected for evaluation. The scores for each of the AGREE II domains were: scope and purpose 86% (range: 67–99%); stakeholder involvement 71% (range: 22–93%); rigour of development 61% (range: 29–82%); clarity and presentation 79% (range: 68–86%); applicability 48% (range: 21–71%); and editorial independence 72% (range: 19–92%). Most of the appraised guidelines could be recommended (n=12) or recommended with limitations (n=2) for use in clinical practice. The overall agreement among reviewers was moderate (ICC: 0.40; 95% CI 0.16 to 0.82). The CPG with the best quality assessment using the AGREE II instrument was the NICE guideline developed by the National Institute for Health and Care Excellence. A slightly higher quality assessment of CPG developed by research agencies or guideline developers was observed, in comparison to those developed by scientific societies. Figure 1. Assessment of clinical practice guidelines for the treatment of axial and peripheral SpA is good with an average of 69%. However, a cut-off point has not been clearly established. Measures should be taken to assure that CPGs are based on the best available evidence and rigorously developed and reported. Additional efforts are needed to provide high-quality guidelines that serve as a useful and reliable instrument for clinical decision-making process in the field of SpA.

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THU0558 ANTI-CCP NEGATIVE PATIENTS WITH NEW MUSCULOSKELETAL SYMPTOMS: IMPROVING REFERRALS FROM PRIMARY CARE

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Background: The presence of anti-cyclic citrullinated peptide antibodies (anti-CCP antibodies) is associated with progression to inflammatory arthritis (IA) [1]; however, most patients attending primary care with a new non-specific musculoskeletal (MSK) complaint and no clinical synovitis have a negative result for this test (CCP-). Considering that only a small proportion of these individuals will be diagnosed with an IA within the next 12 months, predicting disease progression in these patients appears to be more challenging.

Objectives: To investigate factors that could be associated with disease progression in patients testing CCP- in order to optimise primary care referrals to Rheumatology.

Methods: A prospective observational study recruiting patients over 16 years old with a new MSK complaint and no clinical synovitis was conducted. Patients recruited from primary care centres across the UK from July 2007 until November 2018 were included in this analysis. Those testing negative for the anti-CCP2 assay (initially phadia, later bioplex) were sent questionnaires 1 year later, and GPs were contacted in November 2019 to confirm their disease status.

Results: 7521 eligible patients were recruited from primary care. 7290 (97%) of them were CCP- and 5678 returned the questionnaire after 1 year. 239 patients (4.2%) of these CCP- reported progression to IA; however, this diagnosis was only confirmed in 53 of them (0.93%). In another 38 patients, the IA diagnosis could not be confirmed and therefore they were not included in the analysis. 21 patients progressed to rheumatoid arthritis (RA), 13 to spondyloarthritis, 11 to polymyalgia rheumatica (requiring disease-modifying anti-rheumatic drugs), 3 to polymyositis, 3 to systemic lupus erythematosus and 2 to systemic sclerosis. Table 1 describes the most troublesome joints and table 2 other concomitant MSK diagnoses of the non-progressors/ progressors; and among the last ones, the RA group. Multivariable analysis showed that pain in specific joints was associated with development of IA within the following 12 months: hand odds ratio (OR) 2.1 [95%CI (1.09-4.16), p=0.027], knee OR 2.0 [95%CI (1.13-3.91), p=0.02], and shoulder OR 1.8 [95%CI (1.02-3.45), p=0.043]. Smoking exposure, having a first degree relative with RA and gender were not predictive for progression. Older age showed only a slightly higher risk for IA [OR 1.04, 95%CI (1.01-1.06) p=0.001].

Table 1. Characteristics, troublesome joints of the participants

	NON-PROGRESSORS (n=5588)	PROGRESSORS (n=52)	RA progressors (n=21)
Female %	72	58	57
Mean age y.o.	53 (16-91)	60 (30-82)	60 (30-82)
FDR with RA %	38	33	33
Ever Smoked %	38	43	40
Neck pain %	30	29	14
Shoulder pain %	41	58	52
Elbow pain %	29	38	29
Wrist pain %	38	46	48
Hand pain %	53	71	76
Thumb pain %	36	48	57
Back pain %	33	25	24
Hip pain %	36	29	19
Knee pain %	55	71	62
Ankle pain %	30	23	24
Foot pain %	34	40	33

Table 2. Concomitant MSK diagnosis

	NON-PROGRESSORS (n=5588)	PROGRESSORS (n=52)	RA progressors (n=21)
Carpal tunnel syndrome %	13	17	30
Rotator cuff %	12	19	20
Trigger finger %	5	4	0
Tennis elbow %	15	10	5
Osteoarthritis %	18	25	20

Conclusion: In CCP- patients without clinical synovitis, hand, knee and shoulder pain should be investigated more carefully as these involve a higher risk of progression to IA. Patient reported outcomes regarding rheumatic diseases are not reliable; the distribution of joint pain seems to be a more useful tool than the family history when assessing the need for referral to Rheumatology.

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Figure 1. Study participants and outcome

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THU0559 IMPLEMENTATION OF A TRIAGE SYSTEM IN A HOSPITAL WITH HIGH DEMAND FOR CARE

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Background: Our hospital has 4 Rheumatologists and is in charge of 425.000 inhabitants (1 rheumatologist per 106.250 inhabitants). In November 2017, there were 503 referrals from primary care waiting for a first visit with the rheumatologist. Given the impossibility of covering this number of waiting patients through normal operation, it was decided to implement a rapid access polyclinic that started in December of 2017.

Objectives: To evaluate the effectiveness of a triage system in a center with high demand for care.

Methods: Patients referred by the general practitioner were evaluated by a senior rheumatologist in a 10-minute consultation using a predefined interrogation, expanded case-by-case based on the criteria of each rheumatologist. According to the results of the interview, the situation of the patient was categorized into: urgent, normal rheumatology control or control in primary care. For urgent consultations, an early control polyclinic was created to evaluate these patients within the following 15 days. The usual consultations entered into the usual scheduling system. The pathologies that were considered to require control in primary care were assigned to a coordination polyclinic where the patients were evaluated by an internist, in charge of confirming the diagnosis, educating the patient, and, if applicable, refer to primary care. No patient was discharged immediately after the triage. We report the data of the first 136 patients.

Results: The waiting time was reduced from a median of 275 days (IQR 66-591) to 46.5 (23-140). Refer to table 1 for full results. In 52.2% of referred patients the suspicion of a chronic autoimmune or inflammatory disease was described in the referral note. In these patients, when comparing with patients whose referral notes did not refer to an inflammatory or autoimmune disease, the waiting time for triage was significantly shorter, the percentage of patients who were discharged from rheumatology was significantly lower, and the percentage of patients in whom a chronic autoimmune or inflammatory disease was confirmed in the first control was significantly higher.