Table 1. Agreement on patient level

	Baseline	Week 6	Delta W6-BL
	ICC (95% CI)	ICC (95% CI)	ICC (95% CI)
Synovitis	0.59 (0.26-0.76)	0.58 (0.24-0.77)	0.18 (0 - 0.40)
Effusion	0.84 (0.66-0.92)	0.84 (0.75-0.89)	0.34 (0.12-0.53)
Osteophytes	0.82 (0.50-0.92)	0.78 (0.56-0.88)	ND
Doppler	0.86 (0.75-0.92)	0.91 (0.85-0.94)	0.80 (0.70 -0.87)

ICC: intra-class correlation coefficient linear mixed model (random patient, fixed rating), absolute agreement. ND: Not Determined

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Figure 1 Ultrasonography synovial thickening score of patients treated with prednisolone versus placebo.

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POS0259

ULTRASOUND AS AN IMAGING BIOMARKER OF EARLY RESPONSE TO TOCILIZUMAB AND METHOTREXATE IN VERY EARLY RHEUMATOID ARTHRITIS, TOVERA – A LONGITUDINAL STUDY

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Background: The combination of methotrexate (MTX) and tocilizumab (TCZ) has been proven to be superior to MTX alone in early rheumatoid arthritis (RA)¹ and was able to prevent radiographic progression. Ultrasound (US) has become a valid imaging modality in managing RA. Together with clinical examination, US may allow a comprehensive monitoring of response to therapy. So far, few data are available concerning the early response to TCZ plus MTX in very early RA (VERA).

Objectives: In this study we aimed to assess the early US response to TCZ plus MTX in VERA, DMARD-nave patients.

Methods: In this open-label, single-arm study, VERA patients received TCZ (162mg/week, subcutaneously) and MTX (15-20mg/week, per os) for 24 weeks as induction therapy, followed by MTX as maintenance therapy. RA was diagnosed according to the 2010 ACR/European league against rheumatism (EULAR) criteria. All patients who fulfilled the inclusion criteria (ClinicalTrials.gov: NCT02837146) underwent blood tests, clinical and ultrasound examinations at the predefined time-points: 0,2,4,8,12,24,32,48,54 weeks (w). Ultrasound examination of 34 joints (elbows, wrists, MCP [1-5, bilateral], PIP [2-5, bilateral], knees, ankles and MTP [2-5, bilateral]) was performed blindly to clinical data. Gray-scale (GS), power-Doppler (PD) scores, and the global OMERACT-EULAR synovitis score (GLOESS) were assessed in each joint. The sum of individual scores was calculated for 17-joint score (JS) (whole joint set), 10-JS (wrists, MCP, ankles and MTP joints), 12-JS², and 7-JS³.

Results: Forty-four patients (77% women), aged 46.7 ± 12.4 years, completed the 24-week period. Two-thirds (72.7%) were positive for anti-citrullinated protein antibody (ACPA) and 18.2% had bone erosions. At baseline, the mean 28 swollen joints count (28-SJC) was 7.55 ± 4.5, mean disease activity score (DAS28)-CRP score was 5.2 ± 0.15, mean simplified clinical activity score (SDAI) was 31.4 ± 1.9, mean clinical activity score (CDAI) was 29.1 ± 1.8 and mean health assessments questionnaire (HAQ) score was 1.3 ± 0.1. The C-reactive protein (CRP) decreased significantly at 2w (p<0.05) and, accordingly DAS28-CRP score decreased significantly at 4w (p<0.05). The 28-SJC and CDAI scores decreased significantly at 8w (p<0.05). The HAQ and visual analogue scale (VAS) disease activity reported by patients decreased significantly at 8w (p<0.05) and VAS fatigue at 12w (p<0.05).

The GLOESS and GS scores allowed us detecting the earliest significant treatment response at 2w and PD scores at 4w (p<0.05). Among US joint subsets, 17-JS (p<0.01), 12-JS (p<0.05) and 10-JS (p<0.05) were able to detect the earliest treatment response at 2w. The 7-joint score detected the earliest response at 4w, both in GS and PD (p<0.05).

Conclusion: US scores were able to detect therapeutic response to TCZ plus MTX earlier than clinical scores and may therefore be a promising imaging biomarker.

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POS0260

ULTRASOUND ASSESSMENT OF HANDS AND FEET FOR SYNOVITIS PRIOR TO FIRST CLINICAL VISIT MARKEDLY REDUCES TIME TO DIAGNOSIS - EXPERIENCE FROM ROUTINE CARE

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Background: All patients referred to our Rheumatology department suspected of having arthritis are scheduled for a visit in the out-patient fast track clinic (FTC) for arthritis. Routine blood samples including C-reactive protein (CRP), anti-CCP, IgM RF, and x-ray of hands and feet are available at the first clinical visit where the medical history and clinical examination is obtained by rheumatologists or rheumatologists-in-training under supervision. The role of ultrasound (US) in routine care for diagnosing arthritis is not fully elucidated but US is more sensitive than clinical joint examination for detecting synovitis. Therefore, US may facilitate diagnosis of arthritis.

Objectives: To assess whether US examinations of hands and feet in relation to the first clinical visit impact the time to diagnosis and number of clinical visits needed.

Methods: From Oct. 2017 to June 2018, US examination of hands and feet (wrist, metacarpophalangeal and proximal interphalangeal joints, ankle, and metatarsophalangeal joints) were performed prior to the first clinical visit by ultrasound-experienced rheumatologists. Using the OMERACT scoring system for grey-scale (GS) and Doppler, synovitis was defined as GS score >1 with or without Doppler score ≥1. Examination time was 20 minutes.

Time from the first clinical visit to the final clinical diagnosis and the number of clinical visits needed in the FTC was assessed and compared to a similar patient cohort the previous year (Nov. 2016 to June 2017) where ultrasound was performed ad hoc. Number of revised diagnoses and the number of patients re-referred after 12 months was noted. Local ethics committee ruled that approval was not needed.

Results: From 2017- 2018, 163 referred patients had US prior to first clinical visit. 76(47%) were diagnosed with inflammatory arthritis (IA), 12(7%) with crystal-related arthritis, 39(24%) with other Rheumatic Diseases (RMDs) and 36(22%) with no RMD diagnosis. The comparative cohort comprised of 109 patients of whom 29(27%) were diagnosed with IA, 16 (15%) with crystal-related arthritis, 31(28%) with other RMDs and 33 (30%) with no RMD diagnosis. Adding US to the first clinical visit reduced the time to diagnosis from mean 31 (standard deviation(SD) ±32.2) days to mean 12 (±17.3) days. The number of clinical visits needed was reduced from mean 2.8(±1.1) to 2.1 (±1.3) corresponding to a reduction of 114 visits in the period from 2017–2018. The mean number of all US examinations in the FTC was 1.1 (±0.3) in the US cohort versus 0.8(±0.7) in the comparative cohort. In the US cohort vs. comparative cohort 8 (4.9%) vs. 17

(15.7%) patients had a revised diagnosis at 1 year-follow-up, and 7 (4%) vs. 12 (11%) were re-referred, respectively. For demographics, clinical, US, and laboratory characteristics see Table 1 where median values and inter-quartile range (IQR) for all parameters.

Conclusion: Adding routine US examination to the first clinical visit reduces time to diagnosis markedly, lowers the number of clinical visits needed thereby reducing the time patients spent away from work, and freeing time for visits in the FTC to be used for other patients

Table 1.

		Comparative cohort	US cohort	P
		(n=109)	(n=163)	
Age	Median [IQR]	55.5 [42;69]	53 [40;67]	0.44
	Mean $\pm$ SD	54.7 $\pm$ 16.1	53.2 $\pm$ 17.2	
Time to diagnosis days	Median [IQR]	12.4 [10;42]	0 [0;25]	<0.01
	Mean $\pm$ SD	30.6 $\pm$ 32.2	12.4 $\pm$ 17.3	
Visits in FTC	Median [IQR]	3 [2;3]	2 [1;2]	<0.01
	Mean $\pm$ SD	2.8 $\pm$ 1.1	2.1 $\pm$ 1.3	
US assessments in the FTC	Median [IQR]	1 [0;1]	1 [1;1]	<0.01
	Mean $\pm$ SD	0.8 $\pm$ 0.7	1.1 $\pm$ 0.27	
Swollen joint count (0-28)	Median [IQR]	0 [0;1]	0 [0;2]	0.19
	Mean $\pm$ SD	1.1 $\pm$ 2.1	1.8 $\pm$ 3.1	
Tender joint count (0-28)	Median [IQR]	1 [0;5]	1 [0;5]	0.06
	Mean $\pm$ SD	3.1 $\pm$ 3.7	3.1 $\pm$ 5.2	
Grey-scale US sum score (0-72)*	Median [IQR]	1 [0;3]	4 [1;8]	<0.01
	Mean $\pm$ SD	2.8 $\pm$ 5.9	6.3 $\pm$ 7.9	
Colour Doppler US sum score (0-36)*	Median [IQR]	0 [0;0]	0 [0;2]	<0.01
	Mean $\pm$ SD	1.2 $\pm$ 4.0	2.8 $\pm$ 5.9	
CRP (mg/l)	Median [IQR]	4 [1;16.5]	3 [1.75;12]	0.42
	Mean $\pm$ SD	13.4 $\pm$ 23.1	9.6 $\pm$ 14.6	

P, p-value for Mann-Whitney U test for comparing independent data.* US sum score for both hands and feet.

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POS0261 DIAGNOSTIC PERFORMANCE AND CLINICAL UTILITY OF TWO REFERRAL RULES FOR INFLAMMATORY ARTHRITIS

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Background: The Rotterdam Early Arthritis Cohort (REACH) rule [1] and Clinical Arthritis RuE (CARE) [2] are both evidence-based and easy-to-use methods developed to identify the presence of inflammatory arthritis (IA) in patients suspected by their general practitioner (GP). However, the clinical utility of both models in daily clinical practice in an independent primary care setting has not yet been established. While developed for recognizing IA, we believe that it is also important that the broader spectrum of inflammatory rheumatic diseases (IRDs) is correctly classified from primary care, to facilitate appropriate referral towards outpatient rheumatology clinics.

Objectives: The primary objective was to determine the diagnostic performance and clinical utility of the REACH and CARE referral rules in identifying IA in an independent population of unselected suspected patients from primary care. Secondly we will assess the diagnostic performance and clinical utility of both models in identifying IRDs.

Methods: This prospective observational diagnostic study consisted of adults newly suspected by their GP for the need of referral to the rheumatology outpatient clinic of the Maasstad Hospital in Rotterdam. Primary outcome was IA, consisting of rheumatoid arthritis, axial spondylitis and psoriatic arthritis. Secondary outcome was IRD, defined as IA plus arthritis in systemic disorders such as systemic lupus erythematosus, systemic sclerosis and morbus sjögren. Rheumatologist diagnosis was used as gold standard. To evaluate the clinical performance of the REACH and CARE referral rules in this population, diagnostic accuracy measures were investigated using the Youden index (J) [3]. Moreover, a

net benefit approach [4] was used to determine clinical utility of both rules when compared to usual care.

Results: This study consisted of 250 patients (22.8% male) with a mean age of 50.8 years (SD 13.9 years). In total 42 (17%) patients were diagnosed with IA and 55 (22%) with an IRD. Figure 1 presents the diagnostic performance in IA (Figure 1A) and in IRD (Figure 1B). For the primary outcome, the REACH model shows an AUC of 0.72 (95% CI 0.64-0.80) and the optimal cut-off point is indicated (J). The CARE model shows an AUC of 0.82 (95% CI 0.75-0.88) and at J there is a somewhat higher sensitivity and specificity. When taking the broader spectrum of IRDs as outcome, the AUC was 0.66 (95% CI 0.58-0.74) for the REACH and 0.76 (95% CI 0.69-0.83) for the CARE model. The net benefit analysis with either IA or IRD as outcome showed that the CARE was of the highest clinical value when compared to usual care.

Figure 1: ROC curves; blue lines indicating the REACH model and red lines indicating the CARE model

Conclusion: Both the REACH and CARE model showed a good diagnostic performance for detecting IA in an independent population of unselected suspected patients from primary care. Although not specifically developed to recognize the entire spectrum of IRDs, the CARE shows a good performance in doing so. When evaluating clinical utility, we see that both rules have a net benefit in recognizing IA as well as IRDs compared to usual care, however the CARE shows superiority over the REACH. By using the CARE, over half of all suspected patients can be withheld from expensive outpatient rheumatology care, implied by the high specificity of 70%. These results support the idea that incorporating these easy-to-use methods into primary care could lead to providing patients the right care at the right place and improving value based health care.

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POS0262 IDENTIFYING EROSION DISEASE FROM RADIOLOGY REPORTS OF VETERANS WITH INFLAMMATORY ARTHRITIS USING NATURAL LANGUAGE PROCESSING

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Background: The presence of erosive disease influences diagnosis, management, and prognosis in inflammatory arthritis (IA). Research of IA in large datasets is limited by a lack of methods for identifying erosions.

Objectives: To develop methods for identifying articular erosions in radiology reports from veterans with IA.

Methods: Included veterans had ≥ 2 ICD codes for ankylosing spondylitis (AS), psoriatic arthritis (PsA), or rheumatoid arthritis (RA) between 2005- 2019, in Veterans Affairs Corporate Data Warehouse. Chart review & annotation of radiology notes produced the reference standard, & identified erosion terms that informed classification rule development. A rule-based natural language processing (NLP) model was created & revised in training snippets. The NLP method was validated in an independent reference sample of IA patients at the snippet & patient levels