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Background: Interstitial lung disease (ILD) is a common extra-articular manifestation of RA and is associated with increased morbidity and mortality.¹⁻³ Studies have shown variability in the prevalence and mortality rate of patients with RA-associated ILD (RA-ILD).⁴ Further studies are needed to better characterise the epidemiology of RA-ILD.

Objectives: To estimate the prevalence and incidence of clinical RA-ILD in France and to compare mortality rates between patients with RA-ILD and patients with RA without clinical ILD (RA-noILD).

Methods: A historical cohort study was conducted using data from the French national claims database (SNDS) between 1 January 2013 and 31 December 2018. Adults with an RA diagnosis (International Classification of Diseases, Tenth revision [ICD-10] codes M05, M06.0, M06.8 and M06.9) and ≥2 distinct dates of DMARD delivery were included. Onset of RA was defined as the first date of occurrence between RA codes and the first known DMARD reimbursement. ILD diagnosis was defined as having ICD-10 code J84 and ≥1 computed tomography scan after, but within 1 year of, the first date of ILD occurrence. All patients had ≥6 months' reimbursement after RA-ILD onset. The prevalence and incidence (2014–2018) of RA-ILD were estimated. The mortality rate was calculated, comparing patients with RA-ILD and patients with RA-noILD, matched 1:1 for age, sex, age at RA-ILD onset, duration of RA and presence of diabetes, arterial disease, dyslipidaemia and cardiac disease. Mortality was compared between patients with RA with and without clinical ILD in the matched population using Cox proportional hazards regression.

Results: The prevalence of RA-ILD was 6.52 per 100,000 inhabitants (incidence=1.04 per 100,000 person-years). Of the 173,138 patients with RA included in the overall population, 4330 (2.5%) had clinical ILD. Patients with RA-ILD were older at RA diagnosis (mean [SD] age: 63.3 [13.7] vs 56.9 [15.2] years) and were more likely to be male (39.8% vs 27.0%) compared with patients with RA-noILD. Patients with RA-ILD were more likely to have cardiac disease (84.9% vs 63.1%), arterial disease (38.0% vs 19.3%), diabetes (21.4% vs 12.5%) and dyslipidaemia (44.7% vs 32.9%) compared with those with RA-noILD. The mortality rate in patients with clinical RA-ILD was 1.71 per 100,000 inhabitants. The mortality rate increased according to age (0.28 per 100,000 inhabitants for patients aged <65 years, 4.60 per 100,000 inhabitants for patients aged 65–74 years and 11.4 per 100,000 inhabitants for patients aged ≥75 years). After matching, the adjusted mortality risk was three times higher (HR [95% CI]: 3.1 [3.1, 3.9]) in patients with RA-ILD than in those with RA-noILD (Figure 1).

Conclusion: This is the largest epidemiological study of RA-ILD in France. The prevalence of clinical RA-ILD in this population was towards the lower end of

Figure 1. Mortality risk in patients with RA with versus without ILD in the matched population*

*Patients with RA-ILD and RA-noILD were matched for age, sex, age at RA-ILD onset, duration of RA and presence of diabetes, arterial disease, dyslipidaemia and cardiac disease. HR=hazard ratio; ILD=interstitial lung disease; RA-ILD=RA-associated interstitial lung disease; RA-noILD=RA without ILD.

previous estimates (1–58%),³ possibly due to under-reporting of claims data. However, the occurrence of clinical ILD was associated with a strong increase in mortality compared with patients with RA-noILD.

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Acknowledgements: This study was funded by Bristol Myers Squibb. Claire Line, PhD of Caudex provided medical writing support, funded by Bristol Myers Squibb.

Disclosure of Interests: Pierre-Antoine Juge Consultant of: Bristol Myers Squibb, Lidwine Wemeau Stervinou Consultant of: Boehringer Ingelheim, Bristol Myers Squibb, Roche, Sanofi, Sebastien Ottaviani Consultant of: AbbVie, Bristol Myers Squibb, Lilly, Merck Sharp & Dohme, Novartis, Roche-Chugai, SOBI, UCB, Guillaume Desjeux: None declared, Joe Zhuo Shareholder of: Bristol Myers Squibb, Employee of: Bristol Myers Squibb, Bruno Bregman Shareholder of: Bristol Myers Squibb, Employee of: Bristol Myers Squibb, Virginie Vannier-Moreau Shareholder of: Bristol Myers Squibb, Employee of: Bristol Myers Squibb, Rene-Marc Flipo Speakers bureau: AbbVie, Bristol Myers Squibb, Janssen, Lilly, Medac, Merck Sharp & Dohme, Novartis, Pfizer, Roche-Chugai, Grant/research support from: Amgen, Janssen, Novartis, Pfizer, Bruno Crestani: None declared, Philippe Dieudé Consultant of: Boehringer Ingelheim, Bristol Myers Squibb, Chugai, Lilly, Medac, Novartis, Pfizer, Sanofi, Grant/research support from: Bristol Myers Squibb, GlaxoSmithKline, Pfizer
DOI: 10.1136/annrheumdis-2021-eular.871

OP0100-HPR THE INFLUENCE OF COMORBIDITY ON MORTALITY IN PATIENTS WITH RHEUMATOID ARTHRITIS 1980-2015: A LONGITUDINAL POPULATION-BASED STUDY IN WESTERN AUSTRALIA

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Background: Rheumatoid arthritis (RA) contributes to excess morbidity and mortality in RA patients compared with the general population (1). In Australia, there is a paucity of published literature on the mortality and morbidity rates in RA patients, despite the significant morbidity and mortality burden on health care costs due to RA. Linked data is the preferred method to estimate morbidity and mortality outcomes as they provide the best case-ascertainment.

Objectives: To describe temporal changes in mortality rates for patients with RA in relation to comorbidity accrual from 1980-2015 in Western Australia (WA).

Methods: Using population-level linked data from WA health administrative datasets (hospital morbidity, emergency department and death data) we followed 17,125 RA patients (ICD-10-AM M05.00–M06.99, ICD-9-CM 714) from 1980-2015. Comorbidity was ascertained using the Charlson Comorbidity Index (CCI). Mortality rate ratios (MRR) were calculated per decade between the RA cohort and the WA general population by direct age standardisation method, while temporal trends of comorbidities and in-hospital mortality were estimated per 1000 hospital separations in three consecutive decades.

Results: During 356,069 patient-years, a total of 8955 (52%) deaths occurred in the RA cohort. The leading causes of deaths were cardiovascular diseases 2386 (26.6%), cancer 1511 (16.8%), rheumatic diseases 519 (5.8%), chronic pulmonary disease 491 (5.5%), dementia 269 (3.0%) and diabetes 235 (2.6%). The highest prevalence of comorbidity (688.6 per 1000 separations) was in the period 1991-2000 following a 1.3% average annual increase since 1980. In-hospital mortality rate was also highest (26.7 deaths per 1000 separations) in the same

Table 1. Mortality rates observed among patients with rheumatoid arthritis, based on Charlson Comorbidity Index, per 1000 hospital separations, Western Australia hospitals (1980-2015).

Time period	1980-1990	1991-2000	2001-2010	2011-2015
Total number of hospital separations	82099	107731	185398	80410
Number of deaths	1620	2875	3183	1277
CCI score				
0	481 (29.7%)	1024 (35.6%)	1197 (37.6%)	565 (44.2%)
1	838 (51.7%)	1271 (44.2%)	1358 (42.6%)	467 (36.6%)
2	273 (16.8%)	518 (18%)	581 (18.3%)	232 (18.2%)
3	1 (0.1%)	4 (0.2%)	2 (0.1%)	0 (0%)
6	27 (1.7%)	58 (2%)	45 (1.4%)	13 (1%)
In-hospital RA mortality per 1000 hospital separation	19.7	26.7	17.2	15.9
Percentage of average annual change per annum in the period	0	3.8	-4.8	-2.6
Percentage of average annual change since 1980	0	1.5	-1.4	-0.2

CCI= Charlson Comorbidity Index.

period. After 2001, both RA comorbidity and mortality rates decreased annually by -0.5% and -4.8%, respectively, with annual changes of -4.4% to -2% and from 2011-2015, respectively. The overall mortality rate in RA patients after age adjustment was 2.5-times (95%CI: 2.52-2.65) higher than the general population between 1980-2015 and 1.5-times (95%CI: 1.39-1.81) for the period 2011-2015.

Conclusion: The annual comorbidity prevalence and mortality rates in WA have decreased significantly since 2001 reflecting improvements in the management of RA and comorbidity. Nonetheless, the mortality rate in RA patients in WA remains 1.5-times higher than their community counterparts suggesting that there is room to achieve further improvements.

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Acknowledgements: Khalid Almutairi was supported by an Australian Government Research Training Program PhD Scholarship at the University of Western Australia.

Disclosure of Interests: Khalid Almutairi: None declared, Johannes Nossent Speakers bureau: Janssen, David Preen: None declared, Helen Keen Speakers bureau: Pfizer Australia, Abbvie Australia, Charles Inderjeeth Speakers bureau: Eli Lilly.

DOI: 10.1136/annrheumdis-2021-eular.340

OP0101

RHEUMATOID ARTHRITIS DISEASE ACTIVITY OVER TIME AND SUBSEQUENT CARDIOVASCULAR RISKS.

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Background: Rheumatoid arthritis (RA) patients have an increased risk of cardiovascular (CV) events not fully explained by traditional CV risk factors. The relationship between fluctuating inflammation due to RA disease activity and CV events is of interest.

Objectives: To examine the influence of time-varying disease activity on the subsequent risks of CV disease.

Methods: We followed patients from a large US registry of clinically diagnosed RA patients, starting at their first visit with a Clinical Disease Activity Index (CDAI) through the end of follow-up or first CV event. Exposure of interest was disease activity measured by categorical CDAI (high, moderate, low, and remission) averaged within each 6-month window. The outcome of interest was major adverse CV events (MACE) defined as non-fatal myocardial infarction, non-fatal stroke (excluding transient ischemic attacks), and CV death. For baseline confounders we considered age, gender, race, disease duration, Health Assessment Questionnaire, hypertension, diabetes, hyperlipidemia, family history of premature (age<50) CV events, and RF/ACPA seropositivity. For time-varying variables we considered tumor necrosis factor inhibitor (TNFi), non-TNFi biologic, methotrexate, oral glucocorticoid, non-steroidal anti-inflammatory drugs, statin, and aspirin use. We used the marginal structural model (MSM) framework to examine the impact of CDAI at each 6-month interval on MACE. We estimated time-varying hazard ratios (HRs) comparing high CDAI during follow-up to CDAI remission. Several predicted survival curves were constructed under different hypothetical CDAI scenarios, such as early and late transition to CDAI remission.

Results: 40,721 patients were eligible for our analyses. 77% were female and 84% were Caucasian. The mean age was 58 (SD 13) years with mean disease duration of 8.8 (median 5) years. Mean CDAI at their first registry visit was 14 (SD 13; remission 19%, low 31%, moderate 28%, and high 22%). Other baseline characteristics include: 41% current/former smokers, 31.5% with hypertension, 8.6% with diabetes, 18% with hyperlipidemia, and 52% seropositive. The average follow-up duration after baseline was 4.4 (median 3.3; max. 17.6) years. The crude event count of MACE was 1,050 events / 180,402 person-years.

In the MSM analysis, the average HRs, assuming a constant HR, were 1.31 [0.90, 1.90] for low, 1.46 [1.01, 2.10] for moderate, and 1.43 [0.89, 2.31] for high CDAI disease activity categories during each 6-month interval. When approximating time-varying HR with linear trends, the highest estimates during the first 6 months of follow up were 1.61 [0.93, 2.77] for low CDAI, 1.97 [1.13, 3.43] for moderate CDAI, and 2.11 [1.13, 3.96] for high CDAI. These HRs gradually diminished during the follow up (Table). When we constructed hypothetical survival curves with transition to CDAI remission at different time points, earlier transition to CDAI remission was related to better event-free survival (Figure).

Table 1. Time-varying hazard ratio estimates [95% confidence intervals] by duration in study

Year	Disease activity measured by CDAI			
	Remission	Low	Moderate	High
0.5	1.00 [ref]	1.61 [0.93, 2.77]	1.97 [1.13, 3.43]	2.11 [1.13, 3.96]
1	1.00 [ref]	1.54 [0.97, 2.44]	1.85 [1.17, 2.93]	1.94 [1.13, 3.31]
2	1.00 [ref]	1.42 [1.00, 2.01]	1.63 [1.16, 2.29]	1.62 [1.04, 2.54]
3	1.00 [ref]	1.31 [0.90, 1.90]	1.43 [0.97, 2.11]	1.36 [0.80, 2.31]
4	1.00 [ref]	1.20 [0.72, 2.02]	1.26 [0.72, 2.21]	1.14 [0.55, 2.36]
5	1.00 [ref]	1.11 [0.54, 2.26]	1.11 [0.51, 2.42]	0.96 [0.36, 2.53]

Figure 1. MACE-free survival curves under hypothetical CDAI scenarios

Conclusion: High and moderate CDAI were associated with higher hazard of MACE during the earlier period of follow-up, but the increased hazard diminished over time. In hypothetical scenarios, earlier transition to CDAI remission would improve MACE free-survival.

Acknowledgements: This study was sponsored by Corrona, LLC. Corrona is supported through contracted subscriptions with multiple pharmaceutical companies. The analysis was financially supported by Amgen Inc.

Disclosure of Interests: Kazuki Yoshida Consultant of: OM1, Inc., Grant/research support from: Corrona, LLC., Hongshu Guan: None declared, Scott Stryker Shareholder of: Amgen, Inc., Employee of: Amgen, Inc., Elaine Karis Shareholder of: Amgen, Inc., Employee of: Amgen, Inc., Leslie Harrold Consultant of: AbbVie, Bristol-Myers Squibb, Genentech/Roche, Grant/research support from: Pfizer, Daniel Solomon Grant/research support from: DHS receives salary support from research contracts through Brigham and Women's Hospital with AbbVie, Amgen, Corrona, Genentech and Janssen.

DOI: 10.1136/annrheumdis-2021-eular.28

OP0102

DECLINE IN EXCESS RISK OF HEART FAILURE IN PATIENTS WITH RHEUMATOID ARTHRITIS IN RECENT YEARS

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Background: Heart failure (HF) is one of the most common cardiovascular conditions in patients with rheumatoid arthritis (RA). Previous studies showed a 2-fold excess risk of HF in RA versus the general population (1). Whether this has changed over time is not known. Longitudinal studies on trends in occurrence of HF in RA patients over time, and studies comparing trends in HF in RA versus the general population are lacking.

Objectives: 1) To assess trends in incidence of HF in patients with incident RA in 1980-2009; and 2) To compare incidence of HF in RA patients and population-based comparators without RA with RA incidence/ index date in 1980-2009.

Methods: The study population comprised Olmsted County, Minnesota residents with incident RA (age ≥18 years, 1987 ACR criteria met in 1980-2009) and non-RA subjects from the same underlying population with similar age, sex and calendar year of index. All subjects were followed until death, migration, or 04/30/2019. Incident HF was defined using Framingham criteria. Patients with HF prior to RA incidence/index date were excluded. Cox proportional hazards models were used