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CONCISE REPORT

Trends in the first decade of 21st century healthcare utilisation in a rheumatoid arthritis cohort compared with the general population

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► Additional supplementary files are published online only. To view these files please visit the journal online (<http://dx.doi.org/10.1136/annrheumdis-2012-202571>).

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Received 27 August 2012

Revised 12 October 2012

Accepted 18 November 2012

Published Online First

8 December 2012



► <http://dx.doi.org/10.1136/annrheumdis-2012-202787>

ABSTRACT

Purpose To study 21st century trends in healthcare utilisation by patients with rheumatoid arthritis (RA) compared with the general population.

Methods Observational cohort study. Using Swedish healthcare register data, we identified 3977 Region Skåne residents (mean age in 2001, 62.7 years; 73% women) presenting with RA (International Classification of Diseases-10 codes M05 or M06) in 1998–2001. We randomly sampled two referents from the general population per RA patient matched for age, sex and area of residence. We calculated the year 2001–2010 trends for the annual ratio (RA cohort/referents) of the mean number of hospitalisations and outpatient clinic visits.

Results By the end of the 10-year period, 62% of patients and 74% of referents were still alive and resident in the region. From 2001 to 2010, the ratio (RA cohort/referents) of the mean number of hospitalisations for men and women decreased by 27% ($p=0.01$) and 28% ($p=0.004$), respectively. The corresponding decrease was 29% ($p=0.005$) and 16% ($p=0.004$) for outpatient physician care, 34% ($p=0.009$) and 18% ($p=0.01$) for nurse visits, and 34% ($p=0.01$) and 28% ($p=0.004$) for physiotherapy. The absolute reduction in number of hospitalisations was from an annual mean of 0.79 to 0.69 in male patients and from 0.71 to 0.59 in female patients. The corresponding annual mean number of consultations in outpatient physician care by male and female RA patients changed from 9.2 to 7.7 and from 9.9 to 8.7, respectively.

Conclusions During the first decade of the 21st century, coinciding with increasing use of earlier and more active RA treatment including biological treatment, overall inpatient and outpatient healthcare utilisation by a cohort of patients with RA decreased relative to the general population.

INTRODUCTION

Since late 20th century, there have been a number of new effective pharmacological treatment options for patients with rheumatoid arthritis (RA). This has led to better control of inflammation, less structural joint damage, and reduced symptoms. Thus, earlier diagnosis, earlier and more active pharmacological treatment,¹ 'treat to target' strategies,² and the implementation of new treatment guidelines,³ as well as the use of biological agents early in the disease course, has changed the treatment paradigm for RA over the

first decade of the 21st century.¹ This may potentially have changed the need for healthcare in patients with RA unrelated to other major changes in the healthcare system affecting all patients.

In Sweden, 77–92% of patients receiving disease-modifying antirheumatic drugs use methotrexate.⁴ On a national level, ~20% are receiving biological agents.⁵ Patients with early RA treated according to new regimens could be expected to have less impairment of function and work ability^{6–7} and fewer hospitalisations.^{8–9} However, screening and close monitoring of patients is also necessary when applying the new treatment regimens,¹⁰ which may impact on healthcare utilisation. Although there are several added benefits from the new treatments,^{11–13} it is difficult to predict what the future will bring in the long term in RA-related healthcare, since evidence on actual healthcare utilisation is scarce and to some extent conflicting.¹⁴

Our objective, using comprehensive observational register data, was to analyse healthcare utilisation with a focus on rheumatology and orthopaedics over the last decade in a closed cohort of patients with RA compared with a reference cohort from the general population.

METHODS**The Skåne Healthcare Register**

In Sweden, healthcare is based on a tax-financed system and is free of charge (except for a minor co-payment). All healthcare providers, both public and private, are required to submit information for reimbursement purposes. In the Region Skåne, the southernmost county of Sweden, with one-eighth of the Swedish population, all inpatient and outpatient visits are registered in the Skåne Healthcare Register (SCHR) by the patient's personal identifier.¹⁵ For all healthcare providers, date of visit and information on healthcare provider is recorded. For public care, diagnostic codes are registered according to the International Classification of Diseases (ICD) 10 system.

The national population register

Vital events (date of birth and death, marriage and change of residential address) of all inhabitants of Sweden are registered in the population register by the personal identification number.

Cohort definitions**RA cohort**

Using SCHR data for the period 1998 to 2001, we identified all adult (≥ 18 years) female or male residents of the Region Skåne who had received a diagnosis of seropositive or other RA (ICD-10 codes M05 and/or M06) on at least two separate occasions, at least one of which was by a specialist in rheumatology or internal medicine (or under specialty training in those disciplines).

Reference cohort

Using the population register at the end of the year 2000, we randomly sampled two referents from the general population per RA patient matched by birth year, sex and area of residence.

Survival and healthcare utilisation

Using the population register, we traced residence status and survival for each subject (in both the RA cohort and the reference cohort) in the period 2001–2010, and using the SCHR we studied healthcare utilisation by each individual including hospitalisations and outpatient visits to physicians, nurses and physiotherapists (both in general practice and specialised care). When a subject died or relocated out of the county, data were censored from that time.

Statistical analysis

We analysed the annual mean number of hospitalisations in total and at a clinic of rheumatology/internal medicine or orthopaedics during the 10-year time frame. We also analysed

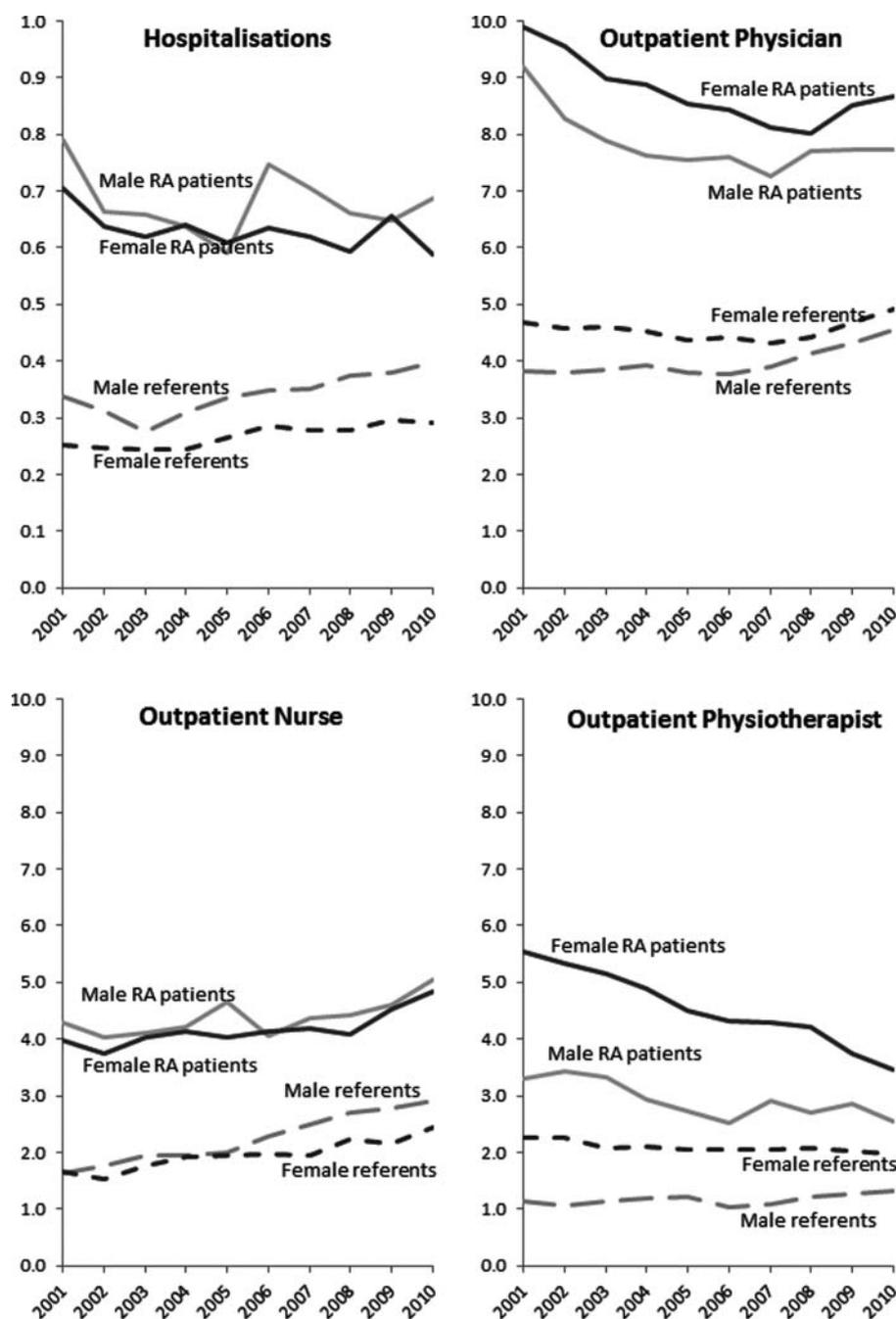


Figure 1 Healthcare utilisation in patients with rheumatoid arthritis (RA) and matched referents from the general population, hospitalisation and outpatient visits to physician, nurse and physiotherapist. The y-axes show the mean number of visits per subject per calendar year.

the mean number of outpatient clinic visits to physicians (including general practitioners), nurses and physiotherapists for each calendar year. To evaluate possible trends relative to the background population, we calculated the ratio of the mean number of visits between the RA cohort and reference cohort for each calendar year and performed a test for trend across ordered groups. We considered a two-tailed p value of 0.05 or less to be significant (Stata software V.11.2).

The study was approved by the regional ethics committee of Lund University.

RESULTS

General description of cohorts

At the beginning of the study period (1 January 2001), the RA cohort consisted of 3977 subjects (mean age 62.7 years, 72.7% women). By the end of the study period (31 December 2010), 2471 subjects (62.1%) were still alive and resident in the Region Skåne. During follow-up, 1417 (35.6%) subjects had died, 13 of whom had died after they had relocated, and 89 (2.2%) (still alive) had relocated out of the county (see online appendix A).

Of the 7954 matched referents, 1810 (22.8%) had died by end of the study period and 237 (3.0%) (still alive) had relocated from the Region Skåne. Hence, by the end of the study period, 5907 subjects (74.3%) remained alive and resident in the county (see online appendix B).

Hospitalisations

The annual mean number of hospitalisations in the RA cohort tended not to increase or decrease during follow-up (figure 1). However, there was a statistically significant trend for a reduced hospitalisation ratio between patients with RA and their reference subjects, both in men (-27%, p=0.01) and women (-28%, p=0.004) (table 1), suggesting a relative decrease in the number of hospitalisations among patients with RA compared with the general population.

The ratios for hospitalisations at a clinic of rheumatology or internal medicine displayed no trend in men (-16%, p=0.13),

but declined in women (-51%, p=0.004) (table 1, figure 2). The hospitalisation ratio to an orthopaedic clinic decreased in both male (-39%, p=0.006) and female (-36%, p=0.02) patients (table 1, figure 2).

Outpatient healthcare

Visits to a physician

During follow-up, the annual mean number of outpatient visits to a physician decreased by approximately one visit in both male and female patients with RA (figure 1). The ratios between patients with RA and reference subjects also decreased for both men (-29%, p=0.005) and women (-16%, p=0.003) (table 1).

The outpatient consultation ratio to a rheumatologist and/or specialist in internal medicine suggested no significant trends (table 1, figure 2). The consultation ratio to a specialist in orthopaedics tended to decrease in women (-19%, p=0.04) (table 1).

Visits to a nurse

The mean number of visits to nurses (primary care and specialised care) increased for both male and female patients with RA, as well as for reference subjects (figure 1). However, the consultation ratio between both male (-34%, p=0.009) and female (-18%, p=0.01) patients with RA and their reference subjects decreased during follow-up (table 1).

Visits to a physiotherapist

The total number of consultations with physiotherapists (primary care and specialised care) decreased from an annual mean of 5.5 per female patient in 2001 to 3.4 in 2010 (figure 1). The pattern in male patients was similar. The physiotherapy consultation ratios between patients with RA and reference subjects decreased during follow-up in both men (-34%, p=0.01) and women (-28%, p=0.004, table 1).

Table 1 Healthcare utilisation ratio: rheumatoid arthritis (RA) cohort compared with matched referents during the 10-year follow-up

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Change (%)*	p Value for trend†
Men												
Hospitalisations total	2.35	2.12	2.40	2.07	1.76	2.16	2.02	1.76	1.70	1.72	-27	0.01
Rheumatology/internal medicine	3.12	2.44	3.58	2.71	1.94	2.73	2.58	2.19	1.79	2.63	-16	0.13
Orthopaedics	3.82	3.74	4.51	3.66	3.26	2.86	2.54	2.91	2.75	2.33	-39	0.006
Outpatient physician total	2.41	2.18	2.06	1.94	1.98	2.01	1.86	1.87	1.79	1.70	-29	0.005
Rheumatology/internal medicine	4.36	5.00	4.75	4.45	4.50	5.10	4.73	4.52	4.11	3.56	-18	0.25
Orthopaedics	3.78	3.61	3.51	2.58	4.49	3.99	4.22	3.00	3.22	2.91	-23	0.39
Outpatient nurse total	2.63	2.30	2.12	2.17	2.32	1.77	1.75	1.64	1.66	1.73	-34	0.009
Outpatient physiotherapist total	2.92	3.28	2.92	2.47	2.24	2.46	2.67	2.24	2.23	1.94	-34	0.01
Women												
Hospitalisations total	2.79	2.58	2.54	2.62	2.30	2.23	2.23	2.13	2.20	2.02	-28	0.004
Rheumatology/internal medicine	4.77	3.60	3.50	3.62	2.94	2.99	2.80	2.74	2.50	2.36	-51	0.004
Orthopaedics	3.89	3.96	2.90	2.96	3.10	2.24	2.74	2.18	2.47	2.48	-36	0.02
Outpatient physician total	2.11	2.09	1.96	1.96	1.95	1.91	1.88	1.82	1.82	1.77	-16	0.003
Rheumatology/internal medicine	3.65	4.40	4.64	4.80	4.34	5.31	4.68	4.44	5.10	4.88	+34	0.055
Orthopaedics	3.65	3.63	3.88	3.96	3.85	3.78	3.57	3.28	3.11	2.96	-19	0.04
Outpatient nurse total	2.40	2.44	2.28	2.14	2.08	2.10	2.14	1.83	2.10	1.98	-18	0.01
Outpatient physiotherapist total	2.44	2.38	2.48	2.34	2.19	2.09	2.10	2.02	1.85	1.76	-28	0.004

Values are the mean number of visits per calendar year per RA patient divided by the corresponding mean for reference subjects. A ratio of >1 indicates more healthcare utilisation in patients with RA.

*Change in the ratio as a percentage from 2001 to 2010.

†p Value from test for trend, ordered by rank.

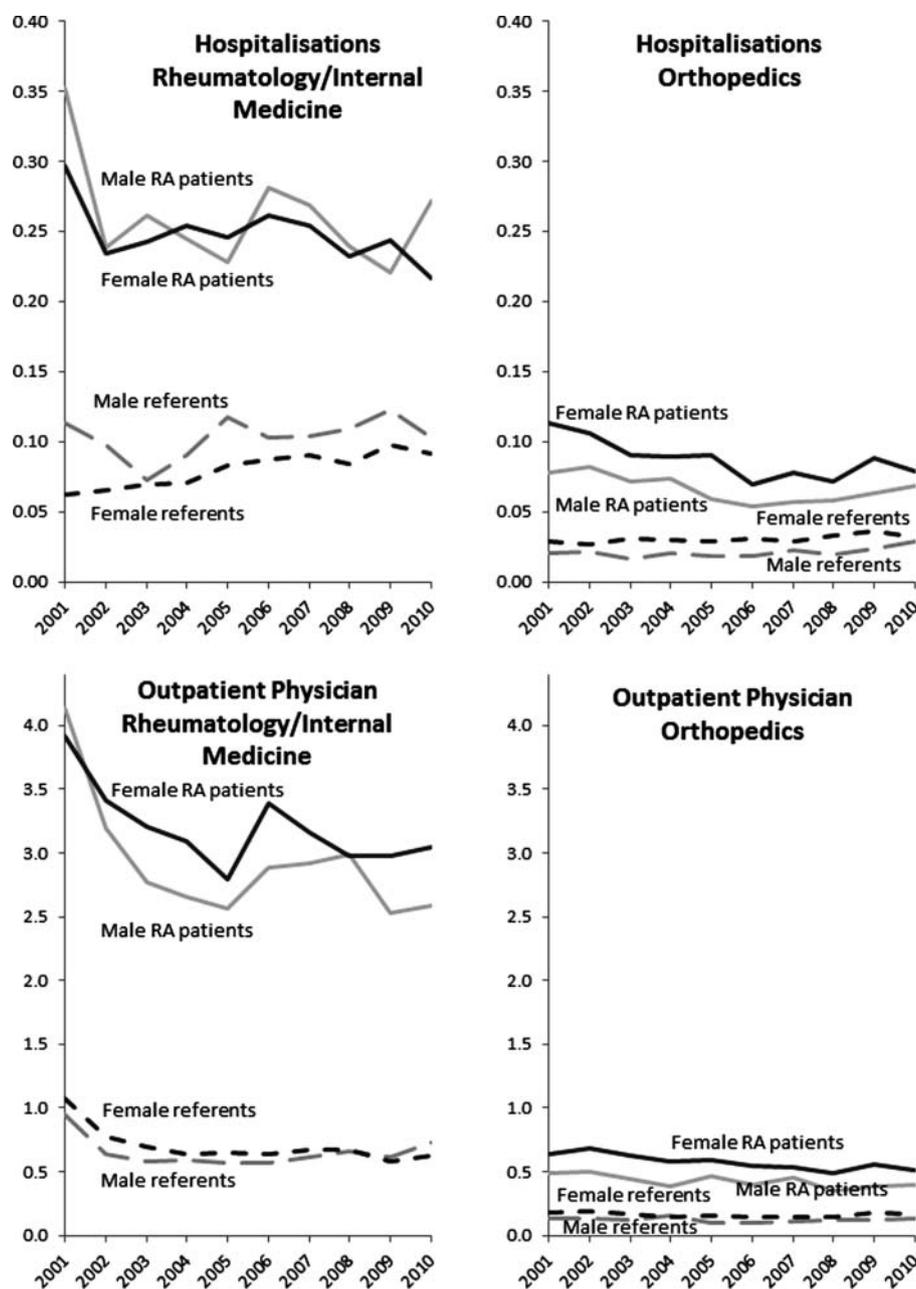


Figure 2 Healthcare utilisation in patients with rheumatoid arthritis (RA) and matched referents from the general population, specialised hospitalisation and outpatient visits to physician. The y-axes show the mean number of visits per subject per calendar year.

DISCUSSION

Major changes in the treatment of RA have occurred during the first decade of the 21st century. Using Swedish observational data, we found both inpatient and outpatient healthcare utilisation by a cohort of patients with RA to have decreased relative to the general population.

Increased need for healthcare is to be expected in an ageing group of people whether they have a chronic disease or not.¹⁶ We observed such tendencies in our reference subjects, but not to the same degree in the RA cohort. The decrease in the gap in healthcare utilisation between the RA cohort and referents seems largely to be explained by fewer visits by patients with RA to physicians outside the field of rheumatology, where we also saw fewer visits to physiotherapists and nurses. Less utilisation of physician care in the USA has previously been reported,¹⁷ and patients monitored closely in anti-TNF studies

have also been reported to have less frequent visits to physicians.¹³ However, the explanation for these findings was traced to administration of anti-TNF therapy, and visits to physicians increased slightly for patients receiving therapy subcutaneously.^{13 14} In our study setting, monitoring of eventual biological treatment is integrated into the specialised outpatient care by both rheumatologists and nurses. Previous studies on secular trends on utilisation of nurses and physiotherapists are lacking, although this kind of information is important to understand and monitor the burden of RA.

Earlier studies on healthcare utilisation in RA have mainly been based on investigation of cost of disease, analysis of the cost of pharmacological treatment, or burden of disease. Importantly, observational studies based on existing data from the healthcare system have been encouraged to add value and new perspectives.^{14 18} Our results are based on actual observed

healthcare utilisation and placed in context by comparison with reference subjects from the general population. However, there are also important limitations. In our cohort, we followed ~80% of the total expected number of patients with RA resident in the Region Skåne.⁵ The remaining 20% of patients with RA, not captured, were predominantly patients who were regularly seen by private practising rheumatologists or did not consult a rheumatologist during 1998–2001, and their disease activity was probably less severe.^{19 20} Further, there is a healthy survivor effect—that is, patients with RA who survive the study period are, in general, healthier than those who do not. However, we can expect the same phenomenon in the reference cohort. Ultimately, we would have preferred to study a dynamic RA cohort compared with a dynamic reference cohort. However, increased reporting of diagnostic codes to the register during the study period, primarily from primary care, precluded such a study design, as it would introduce selection bias (probably capturing more and less severe RA cases, which may have affected the results). Finally, it is plausible that changes in the healthcare system (eg, more ambulatory treatment of certain conditions) during this decade may have affected the healthcare utilisation by patients with chronic and non-chronic diseases differently.

To conclude, during the 21st century (representing modern rheumatology), we found reduced overall healthcare utilisation in a cohort of patients with RA compared with the general population.

Acknowledgements We would like to acknowledge statistical support from Ljuba Kedza, RC Syd, Sweden.

Contributors All authors participated in planning and performing this study. All authors confirm that they have read and approved the content presented in the final manuscript for submission.

Funding This work was supported by the Norrbacka-Eugenia Foundation, the Capiro's Research Foundation, the Swedish Research Council, the Region Skåne and the Faculty of Medicine, Lund University, Sweden.

Competing interests None.

Ethics approval The regional ethics committee of Lund University.

Provenance and peer review Not commissioned; externally peer reviewed.

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Web appendix A. Number of patients in the rheumatoid arthritis (RA) cohort (closed type), their survival, absolute number of hospitalisations, and outpatient clinic visits (physician) over 10-years of follow-up.

Year (Dec 31 st)	Men			Women			Total			Cumulative relocations*	Cumulative deaths†
	N	Hospit. visits	Outpatient visits	N	Hospit. visits	Outpatient visits	N	Hospit. visits	Outpatient visits	N (%)	N (%)
2000	1085	n/a	n/a	2892	n/a	n/a	3977	n/a	n/a	n/a	n/a
2001	1040	858	9962	2768	2043	28 620	3808	2901	38 582	14 (0.4)	155 (3.9)
2002	993	689	8607	2658	1763	26 469	3651	2452	35 076	33 (0.8)	293 (7.4)
2003	938	653	7837	2528	1644	23 886	3466	2297	31 723	46 (1.2)	465 (11.7)
2004	897	597	7157	2416	1621	22 460	3313	2218	29 617	57 (1.4)	607 (15.3)
2005	862	529	6764	2316	1473	20 602	3178	2002	27 366	65 (1.6)	734 (18.5)
2006	818	645	6563	2219	1471	19 560	3037	2116	26 123	73 (1.8)	867 (21.8)
2007	760	577	5947	2115	1375	18 044	2875	1952	23 991	77 (1.9)	1025 (25.8)
2008	722	502	5849	2006	1257	16 953	2728	1759	22 802	93 (2.3)	1156 (29.1)
2009	677	468	5579	1916	1315	17 067	2593	1783	22 646	100 (2.5)	1284 (32.3)
2010	642	466	5240	1829	1126	16 620	2471	1592	21 860	102 (2.6)	1404 (35.3)

* By December 31, 2010, 13 of the 102 RA patients (13%) who had relocated out of the Skåne County had died.

† By December 31, 2010, in total 1417 (35.6%) of the original 3977RA patients had deceased (i.e., also including patients who relocated before they died).

Web appendix B. Number of matched subjects in the reference cohort (closed type), their survival, absolute number of hospitalisations, and outpatient clinic visits (physician) over 10-years of follow-up.

Year (Dec 31 st)	Men			Women			Total			Cumulative relocations*	Cumulative deaths†
	N	Hospit. visits	Outpatient visits	N	Hospit. visits	Outpatient visits	N	Hospit. visits	Outpatient visits	N (%)	N (%)
2000	2170	n/a	n/a	5784	n/a	n/a	7954	n/a	n/a	n/a	n/a
2001	2103	735	8278	5648	1464	27 145	7751	7954	35 423	37 (0.5)	165 (2.1)
2002	2020	657	7990	5516	1395	25 847	7536	7752	33 837	71 (0.9)	347 (4.4)
2003	1939	554	7758	5393	1344	25 335	7332	7536	33 093	108 (1.4)	514 (6.5)
2004	1878	598	7635	5256	1321	24 437	7134	7331	32 072	144 (1.8)	676 (8.5)
2005	1820	628	7137	5124	1393	23 000	6944	7134	30 137	163 (2.0)	847 (10.6)
2006	1766	632	6884	4982	1458	22 706	6748	6944	29 590	185 (2.3)	1021 (12.8)
2007	1707	618	6891	4829	1384	21 564	6536	6748	28 455	206 (2.6)	1212 (15.2)
2008	1641	640	7038	4676	1346	21 305	6317	6536	28 343	222 (2.8)	1415 (17.8)
2009	1579	625	7089	4535	1390	21 850	6114	6317	28 939	238 (3.0)	1602 (20.1)
2010	1499	630	7195	4408	1318	22 241	5907	6114	29 436	257 (3.2)	1790 (22.5)

* By December 31, 2010, 20 of the 257 reference subjects (7.8%) who had relocated out of the Skåne County had died.

† By December 31, 2010, in total 1810 (22.8%) of the original 7954 reference subjects had died(i.e., also including reference subjects who relocated before they died).

Lay summaries for the non-clinician

Do better treatments mean fewer appointments for rheumatoid arthritis?

INTRODUCTION

Twenty-first-century treatments may be behind a drop in hospital and doctor visits for people with rheumatoid arthritis, according to a study in Sweden.

WHAT DO WE KNOW ALREADY?

In the first part of this century, a number of medicines have made a big difference to people living with the symptoms of rheumatoid arthritis, such as pain, stiffness, and swelling in the joints.

Most people with rheumatoid arthritis who take disease-modifying anti-rheumatic drugs (DMARDs for short) take methotrexate. But for people who find it doesn't suit them, there are various other options, including the so-called "biologic" DMARDs.

Doctors think that if people start taking these types of drugs very soon after they find out they need treatment, and if they are treated carefully using the right dose, it can result in big improvements in symptoms. This, in turn, might reduce the number of appointments people need, either at hospital or with a doctor or nurse, and help more people to work and do other everyday things. To find out more, researchers looked at information on about 4,000 people with rheumatoid arthritis in one region in southern Sweden. They looked at how many people needed to visit a doctor or go to hospital between 2001 and 2010, to see if there was any change.

WHAT DOES THE NEW STUDY SAY?

In 2010, visits to hospital for rheumatoid arthritis treatment were lower than in 2001 by more than a quarter.

Over the same period, the number of times people needed to see a doctor, a nurse, or a physiotherapist, either at their local GP practice or a specialist appointment, fell from around nine times a year to less than eight for men, and from around 10 times a year to around nine for women.

HOW RELIABLE ARE THE FINDINGS?

The Swedish healthcare register aims to record all of the information about illnesses people have and the prescribed treatments and operations they have for an illness. The researchers say they had information on about 80 in every 100 people in the region with rheumatoid arthritis. So in this sense, the information is reasonably complete. But the researchers didn't compare the information about people's appointments with the records of which drugs they took. So although they suggest the fall in appointments is linked with better medical treatments, we can't say for sure that this is the case. It's possible the reduction was caused by other factors, such as improvements in the standard of care, or that treating more people at home or with other types of treatments played a role.

WHAT DOES THIS MEAN FOR ME?

This study suggests that, over recent years, there have been improvements in the way that rheumatoid arthritis is treated, although we can't be sure what form those improvements have taken. But it does offer a reason to be hopeful that, if you have rheumatoid arthritis, it's likely that you will be better able to manage your symptoms and be less likely to need to see a doctor as time goes on. These findings support other studies suggesting modern treatment strategies are linked to less time off work, better health and less need for surgery.

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Date summary prepared: July 2013

Summary based on research article published on: 8th December 2012

From: Hagel S, Petersson IF, Bremander A, *et al.* Trends in the first decade of 21st century healthcare utilisation in a rheumatoid arthritis cohort compared with the general population. *Ann Rheum Dis* 2013;**72**:1212–16. doi:10.1136/annrheumdis-2012-202571

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