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# The Swedish Rheumatology Quality Register: optimisation of rheumatic disease assessments using register-enriched data

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J.K. Eriksson, J. Askling, E.V. Arkema

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Clinical Epidemiology Unit, Karolinska  
Institutet, Stockholm, Sweden.

Jonas K. Eriksson, MSc  
Johan Askling, MD, PhD  
Elizabeth V. Arkema, ScM, ScD

Please address correspondence to:

Elizabeth V. Arkema,  
Karolinska Institutet,  
Clinical Epidemiology Unit, T2,  
Stockholm 17176, Sweden.

E-mail: elizabeth.arkema@ki.se

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## ABSTRACT

*New therapeutic options are constantly emerging for the treatment of rheumatic diseases. To evaluate the safety and efficacy of newly introduced anti-rheumatic treatment alternatives, registers are an important source of information. The Swedish Rheumatology Quality Register (SRQ) collects clinical data on patients with rheumatoid arthritis, as well as other rheumatic diseases, and may be enriched with data on comorbid conditions, prescription drug dispensings, and mortality from national data sources in Sweden. In this setting, many different outcomes can be investigated over a long period of time in a diverse population of patients recruited in daily clinical practice.*

## Introduction

The Swedish Rheumatology Quality Register (SRQ) was started in 1995 by the Swedish Rheumatology Society to improve the healthcare and treatment for patients with rheumatoid arthritis (RA). SRQ followed on regional registry initiatives (1, 2), to enable a national real-world documentation of many different aspects of RA and developed over time into a harmonised national registry. SRQ was started mainly for patients with RA, but over time it has been expanded to cover several other rheumatic diseases including ankylosing spondylitis (AS) and psoriatic arthritis (PsA), myositis, systemic lupus erythematosus and additional conditions.

In the late 1990s, when the first biologic drug was approved for the treatment of RA in Sweden, the Swedish Biologics Register ARTIS (Anti-Rheumatic Treatment in Sweden) was started in collaboration with the Swedish Medical Products Agency. Built on the already existing SRQ, ARTIS serves as a national surveillance programme for

investigation of safety and efficacy of new biologic anti-rheumatic drugs.

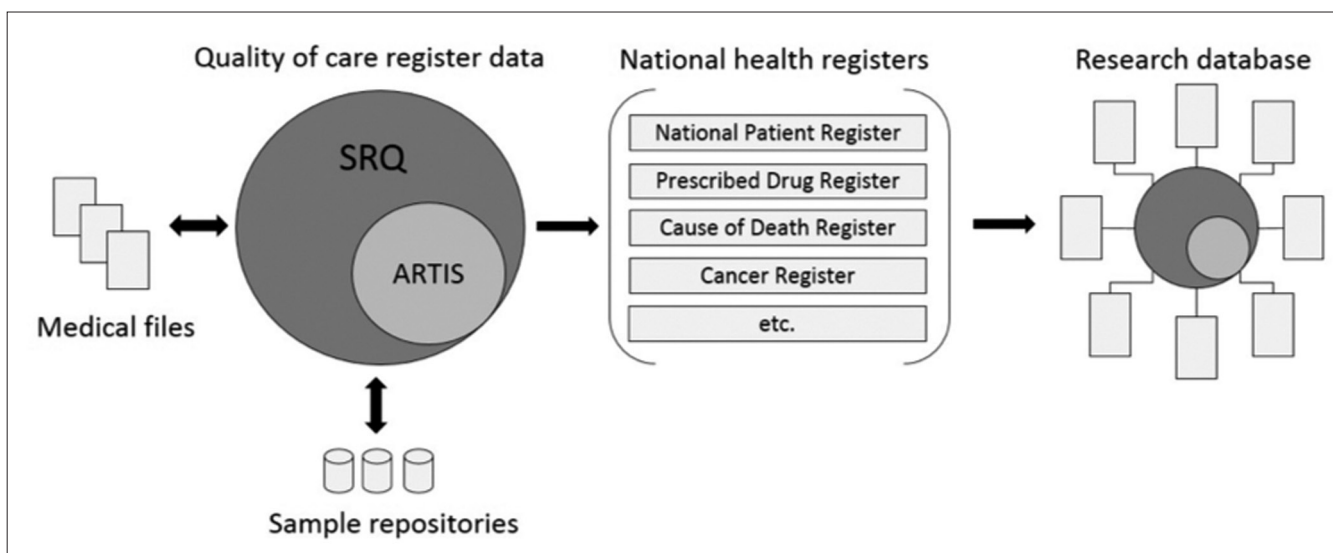
In Sweden, the healthcare system is tax funded and offers universal access, and prescription drugs are provided free of charge above a certain threshold of \$315/SEK 2200 in 2014. Patients with RA and other inflammatory diseases are typically diagnosed and treated by rheumatologists at non-primary outpatient and inpatient facilities, rather than by general practitioners. Today SRQ includes data from more than 60 clinics, and covers a high proportion (87–95%) of the patients with RA treated with biologics when compared to national health registers (3).

## Data collection in SRQ/ARTIS

A major strategic advantage of SRQ is that it is fully integrated in healthcare and used to improve care. Data are collected in SRQ to answer a range of clinical questions, which include but are not limited to the examination of the safety and effectiveness of biologics. Because SRQ is nationwide and population-based with ongoing data collection, it provides a large amount of clinically useful information on the real-world rheumatology patient population. The data reflect the changing state of the population making it possible to answer research questions that are relevant for today's patients. These features distinguish SRQ from many other registers internationally, which are often designed to answer one specific research question, rather than being a multipurpose and growing source of information.

Operated as part of routine care delivery, measurements collected in SRQ are the same as what would have been regularly obtained for caregiving purposes making SRQ feasible and useful in daily clinical practice. The register

Competing interests: none declared.



**Fig. 1.** Data enrichment procedure of the Swedish Rheumatology Quality Register (SRQ)/Anti-Rheumatic Therapies in Sweden (ARTIS) using unique personal identity numbers to link each data source.

enables patients to have access to their information in the registry and also to provide their own patient-derived information (nowadays often from a personal home computer or from a touch pad in the waiting room). The web-based interface is linked to the electronic medical record so that data is only entered once, thus reducing the burden of data collection for both the patient and the physician.

At registration into SRQ and at each subsequent visit, information is collected on disease activity (DAS-28 and its components), disability (HAQ), health-related quality of life (EQ5D), drug initiation (DMARD, corticosteroid use, NSAID, biologics), drug discontinuation and reason for discontinuation.

Through participation in the register, patients benefit by being involved in their own care, which leads to higher participation rates and increases the quality of the data obtained. Physicians also benefit, since the data aid in decision-making and can be fed back into the clinic to increase the quality of care given. Having an immediate longitudinal overview of disease activity, disability and treatment also facilitates discussion and decisions in the patient-clinician encounter. Furthermore, the registry framework provides a simple electronic reporting of adverse events. The contribution of both patients' and physicians' efforts as well as regulatory agency support have made

ARTIS one of the largest and most long-term biological treatment registers with over 26,000 participants as of December 31, 2013.

#### Data enrichment

Comorbid conditions before or after registration are not included in SRQ, but through linkage of each individual's personal identity number to national health registers as well as to other quality of care registers, we are able to enrich the clinical data with this information (Fig. 1).

Several nationwide health registers are available in Sweden, with the purpose of monitoring the health status, improving treatments and interventions, and performing epidemiological studies. The National Patient Register (4), including data on hospital discharges and non-primary outpatient care visits, together with the Cause of Death Register which contains all deaths in Sweden, provide information on non-rheumatologic conditions in the SRQ population. The Prescribed Drug Register enriches SRQ with prescription drug dispensings, including prescriptions from both the treating rheumatologist and other physicians.

Other quality of care registers similar to SRQ but focused on diseases such as stroke or cardiovascular disease, are also available, and serve as additional sources of high quality outcome

information. In addition, using the national demographics registers held at Statistics Sweden, comparisons to the general population can be made (5). Using this enriched research database with the clinical quality of care register as a foundation, the data collected from other registers is maximised, while the clinical data from SRQ can be minimised, and only data specific to the rheumatic disease is entered into the quality of care register.

#### Previous studies based on data in SRQ/ARTIS

The data in SRQ/ARTIS have been analysed to answer different types of research questions related to biologic treatment. For example, time to discontinuation of the most used TNF inhibitors in Sweden (6) (adalimumab, etanercept, and infliximab), effectiveness of TNF inhibitor switch (7), and time-trends in clinical characteristics of patients receiving biologics over 10 years (8).

With respect to research on safety, which is partly driven by drug companies' regulatory requirements, other data sources including comorbid conditions and concurrent drug treatments are needed. In such studies, as described, our approach is to enrich the database. With this design it is possible to follow patients registered in ARTIS, both backward and forward in time in relation to biologic treatment start,

to study outcomes such as cancer (9), cardiovascular disease (10), and mortality (11). For example, we and others have shown that the cancer risk with TNF inhibitors does not appear to be increased in the short to medium term (12) and that the risk of tuberculosis is increased (13) but has been mitigated since screening guidelines were introduced (14).

Linkage of ARTIS also to data on sick leave and disability pension compensation held at the Social Insurance Office permits evaluation of the economic burden of disease from a societal perspective (15). Furthermore, we have the opportunity to include randomised controlled trial (RCT) data in the quality of care register, where randomisation occurs within the enriched register framework. This has the potential of combining the generalisability of “real world data” recorded in daily clinical practice to the randomisation properties with reduced risk of selection bias (16). With the register-enriched RCT data, it is not only possible to analyse long-term effectiveness between treatments, but also to perform cost-effectiveness analysis based on observed and virtually complete data which can be collected over long-term and at low cost (17).

### The future for SRQ/ARTIS

The collection of an increasing number of observations on patients with AS and PsA in SRQ will allow us to examine these diseases more closely in the future. The establishment of a biological specimen repository is underway and blood samples are currently being stored for future investigations.

Over the past 15 years, the treatment landscape has changed dramatically for patients with rheumatic diseases. SRQ/ARTIS is an ideal source of on-market data that can increasingly be used for safety surveillance and contribute in the development of adaptive licensing

procedures. For comparing the efficacy of different treatment alternatives, a pragmatic RCT design where a randomisation module is incorporated in the SRQ, would optimise the clinical trial data collection and follow-up to a low cost. In the coming years, ARTIS will prove to be a rich source of information on the safety and efficacy of newly introduced anti-rheumatic treatments and biosimilars.

### Conclusion

The detailed clinical data necessary for follow-up and evaluation of quality of care together with the enrichment with other register sources makes SRQ/ARTIS a powerful research database. The versatility of SRQ/ARTIS allows us to answer an abundance of research questions in a real-world setting in a large number of patients over extended periods of time and at an affordable cost.

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