

Accessing clinical trial data to advance research and the possibilities for using machine learning as a tool in clinical support for people with rheumatoid arthritis

BACKGROUND:

Inflammatory arthritis is the general term for a category of diseases which includes rheumatoid arthritis (RA), inflammatory bowel disease, and scleroderma, among others. These conditions appear consistently in populations worldwide; they are not fatal in most cases, but can significantly affect quality of life and activities of daily living, including the ability to work.

RESEARCHER QUESTION:

Elena Myasoedova, M.D., Ph.D., is a clinical rheumatologist with specialty interest in inflammatory arthritis. She is an associate professor of medicine and epidemiology and clinical practice, and leads research in rheumatology and specifically inflammatory arthritis at the Mayo Clinic.



For this project, Dr. Myasoedova's team sought to apply methods of artificial intelligence (AI) to integrate and process sociodemographic, clinical, and serological data obtained from patients with early RA, with the aim of developing and validating a clinically meaningful predictive algorithm of individual response to methotrexate, the most commonly prescribed first-line treatment.

“Working with Vivli datasets provided longitudinal data on hundreds of patients” - Dr. Elena Myasoedova

FINDINGS

Key findings from this research indicate that several clinical markers were predictors. In particular, a drop in DAS28-ESR from baseline to 12 weeks of at least 1 point was predictive of achieving remission or low disease activity at 24 weeks.

Using information gathered from this assessment, the team developed an algorithm and prediction model for response to methotrexate within 24 weeks. The algorithm has been externally validated in two independent trials, with good results.

Researchers also found that combining the assessment of different parts of the colon can be as accurate as the current method of scoring the endoscopic severity of Crohn's disease, and that assessing features other than ulceration does not significantly affect the accuracy of the scores.

IMPACT

This research has produced two journal publications, in *Arthritis Research and Therapy*, and in *Annals of the Rheumatic Diseases*

Dr. Myasoedova indicated in a conversation with Vivli that the team's research can help advance understanding of who are the most likely responders to methotrexate, and how clinicians should discuss with RA patients the likelihood of response at the very start of their treatment process.

RESEARCH PROCESS:

To answer the question of whether a machine learning approach could support individualized prediction of treatment response to methotrexate in RA patients, the research team was able to access data for 1400 patients in 13 trials, and to assess data from 775 participants in four clinical trials. Their assessment focused on clinical markers or clinical predictors of response to methotrexate. The team monitored response across a six-month timeframe, including a focus on people who did not respond to methotrexate initially, but demonstrated a response at 24 weeks. Dr. Myasoedova noted that using data from Vivli's repository gave the team access to longitudinal data collected at multiple points, providing a more comprehensive clinical overview.

NEXT STEPS:

READ MORE

[Clinical predictors of response to methotrexate in patients with rheumatoid arthritis: a machine learning approach using clinical trial data](#) (Arthritis Research and Therapy)

[POS0514 Prediction of response to methotrexate in patients with rheumatoid arthritis: a machine learning approach using clinical trial data](#) (Annals of the Rheumatic Diseases)

[Interview with Dr. Myasoedova](#)

[Find out more about requesting data from Vivli.](#)