Q/ How do clinical prediction rules compare with joint fluid analysis in diagnosing gout?

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EVIDENCE-BASED ANSWER

A/ **CLINICAL PREDICTION RULES EFFECTIVELY DIAGNOSE GOUT** without joint fluid analysis. The American College of Rheumatology clinical prediction rules, the most accurate rules developed for research purposes, have a sensitivity of 92%, specificity of 89%, positive likelihood ratio of 8.36, and negative likelihood ratio of 0.09 (strength of recommendation [SOR]: **A**, prospective cohort studies).

The Netherlands criteria, developed for use in primary care, have a positive predictive value of more than 80%, a positive likelihood ratio of 3.48, and a negative likelihood ratio of 0.17 (SOR: **A**, prospective cohort study).

Evidence summary

In 2015, the American College of Rheumatology (ACR) redefined the clinical criteria for diagnosis of gout based on a 3-step system[1] that can be found at: http://goutclassificationcalculator.auckland.ac.nz. The ACR rule was derived from a cross-sectional study of 983 patients in 25 rheumatology centers in 16 countries who presented with a swollen joint.[2] Of the 983 patients, 509 had gout; the prevalence was 52%. Data from 653 of these patients were used to develop the rule and then validated in the remaining 330 patients.

Compared with the gold standard of monosodium urate crystals in synovial fluid, the ACR rule has a sensitivity of 92% and a specificity of 89%. The rule, designed for the research setting, involves using synovial fluid analysis, ultrasound imaging, and radiography, which makes it less useful in a primary care setting.

The Netherlands rule for primary care

A prospective diagnostic study in 328 family medicine patients (74% male; mean age 57) with monoarthritis tested the ability of multiple clinical variables to diagnose gout using monosodium urate crystals in synovial fluid as the gold standard.[3] The prevalence of gout in this population was 57%.

The best diagnostic rule (Netherlands rule) comprised the following predefined variables: male sex, previous patient-reported arthritis attack, onset within one day, joint redness, first metatarsophalangeal joint (MTP1) involvement, hypertension or cardiovascular disease (angina pectoris, myocardial infarction, heart failure, cerebrovascular accident, transient ischemic attack, or peripheral vascular disease), and serum uric acid level above 5.88 mg/dL. The rule gives one point for each item. A score >8 had a positive likelihood ratio for diagnosing gout of 3.48 (**TABLE**[1]) and a higher positive predictive value (PPV) than family physicians' clinical impressions (83% vs 64%).

The prevalence of gout in patients with scores of <4, 4 to 8, and >8 were 2.8%, 27%, and 80%, respectively. For scores of 4 to 8, the probability of gout is indeterminate, and synovial fluid analysis is recommended.

The Netherlands rule, validated in a secondary care practice of 390 patients with

TABLE

5 diagnostic rules for gout: A look at sensitivity, specificity[1]

	Sensitivity (%)	Specificity (%)	Positive likelihood ratio	Negative likelihood ratio
American College of Rheumatology	92	89	8.36	0.09
American Rheumatology Association (1977)	84	53	1.79	0.30
Netherlands	87	75	3.48	0.17
New York	57	87	4.38	0.49
Rome	60	86	4.29	0.47

monoarthritis, found that a score >8 had a PPV of 87% and a score <4 had a negative predictive value of 95%.[4] The probability of gout based on this rule can be calculated at http://www.umcn.nl/goutcalc.

In the study used to develop the Netherlands rule, no patients with a high probability of gout had septic arthritis. The ability of the rule to differentiate between gout and septic arthritis was tested retrospectively in 33 patients with acute gout (podagra excluded) diagnosed by the presence of monosodium urate joint crystals and 27 patients with septic arthritis diagnosed by positive bacterial culture.[5] Patients with gout had significantly higher scores than patients with septic arthritis (7.8 ± 1.59 vs 3.4 ± 2.3; $P<.001$).

American Rheumatology Association, New York, and Rome prediction rules

A study of 82 Veterans Administration patients compared the American Rheumatology Association (ARA), New York, and Rome prediction rules with regard to their ability to diagnose gout with synovial urate crystals.[6] The ARA criteria for gout diagnosis require either tophi or monosodium urate crystals in synovial fluid, or 6 out of a list of 12 other criteria.[7]

The New York prediction rule requires that patients meet 2 or more of the following criteria: at least 2 attacks of painful joint swelling with complete resolution within 2 weeks, podagra, tophi, and rapid response to colchicine treatment, defined as a major

reduction in the objective signs of inflammation within 48 hours.

The Rome prediction rule requires meeting 2 of 3 criteria: serum uric acid >7 mg/dL in men and >6 mg/dL in women, presence of tophi, and history of attacks of painful joint swelling with abrupt onset and resolution within 2 weeks.

The New York prediction rule had the highest positive likelihood ratio of 4.4 compared with the ARA (1.8) and Rome (4.3) rules.[6] The utility of the New York and Rome rules, although they have fewer criteria than ARA, is limited by the fact that they include a previous episode of joint swelling and tophi. These criteria increase their specificity but make them less useful in diagnosing a first episode of gout, when tophi are unlikely to have developed.

Prediction rules are more sensitive in established gout

The new ACR prediction rule was compared with the ARA, Rome, and New York clinical prediction rules using urate crystals as the gold standard in early (less than 2 years) and established disease (longer than 2 years).[8] All clinical prediction rules were more sensitive in established disease than early disease (95.3% vs 84.1%; $P<.001$) and more specific in early disease than established disease (79.9% vs 52.5%; $P<.001$).   **JFP**

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8. Taylor WJ, Fransen J, Dalbeth N, et al. Performance of classification criteria for gout in early and established dise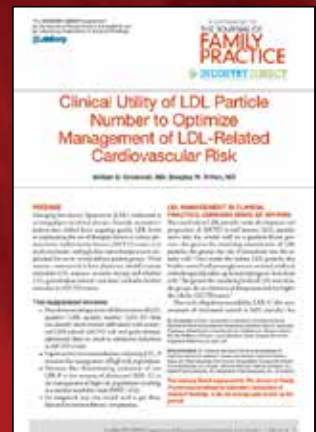ase. *Ann Rheum Dis.* 2016;75:178-182.