CRD summary
The authors concluded that clinical findings identify patients with peripheral monoarticular arthritis who might have septic arthritis; synovial white blood cells and percentage of polymorphonuclear cells from arthrocentesis are necessary to assess the likelihood before other results are available. Since the results do not necessarily substantiate these conclusions and given the review’s limitations, the conclusions have to be regarded with caution.

Authors’ objectives
To evaluate the accuracy and precision of the clinical evaluation for the diagnosis of nongonococcal bacterial arthritis.

Searching
PubMed and EMBASE were searched to January 2007 for English language publications; the search terms, which were reported, included a diagnostic filter. In addition, the references of identified articles were screened.

Study selection
Study designs of evaluations included in the review
The review did not specify inclusion criteria relating to the study design. The included studies were of diagnostic cohort and case-control designs and included both prospective and retrospective studies.

Specific interventions included in the review
Studies that evaluated the diagnostic value of history, physical examination, blood or synovial fluid laboratory test results for distinguishing septic arthritis from other conditions were eligible for inclusion. The included studies evaluated: a number of risk factors, such as age above 80 years or diabetes mellitus; varying definitions of fever, abnormal peripheral white blood cell (WBC) counts, erythrocyte sedimentation rate and C-reactive protein amongst the serum laboratory values; symptoms and signs (joint pain, history of joint oedema, fever, sweats, rigors); synovial fluid characteristics with various cut-offs; and other synovial fluid laboratory tests such as low glucose, protein above 3 g/dL and lactate dehydrogenase above 250 U/L.

Reference standard test against which the new test was compared
Studies that included any of the following as the reference standard were eligible for inclusion: synovial fluid culture, positive Gram stain, positive blood cultures, no organism isolated but macroscopic pus aspirated from joint, or response to antibiotics.

Participants included in the review
Studies with participants presenting with an acutely painful or swollen joint were eligible for inclusion. The included patients were all adults, either in rheumatology clinics, presenting to emergency departments or hospitalised patients.

Outcomes assessed in the review
Studies that reported accuracy or precision were eligible. The primary outcomes were likelihood ratios (LRs) for all symptoms or signs used to distinguish septic arthritis from other causes of acutely painful or swollen joints. Sensitivity and specificity were also reported.

How were decisions on the relevance of primary studies made?
One reviewer screened the titles and abstracts and three reviewers independently screened the selected articles for relevance; any differences were resolved by consensus.

Assessment of study quality
Three independent reviewers performed the quality assessment; any differences were resolved by consensus. The studies were categorised with regard to inclusion of consecutive patients, inclusion of only patients with a diagnosis of septic arthritis, independent and/or blind comparison with the reference standard, and sample size above 50. The highest quality score was score 1, level 1: studies with consecutive patients with both negative and positive test results; no application of established clinical criteria for septic arthritis used as inclusion criterion; diagnosis established through synovial fluid culture, Gram stain, blood culture, or clinical response to antibiotics; independent, blind comparison with a 'gold' standard among more than 50 patients.

Data extraction
Three reviewers independently abstracted the data; any differences were resolved by consensus. Data from each study were used to calculate the sensitivity, specificity, and positive and negative LRs.

Methods of synthesis
How were the studies combined?
Pooled LRs and their 95% confidence intervals (CIs) were estimated using a random-effects model.

How were differences between studies investigated?
Heterogeneity was not formally assessed. Some differences were highlighted in the text.

Results of the review
Fourteen studies (n=6,242) were included in the review. The sample size ranged from 41 to 4,889.

Only 3 studies were classified as quality score 1, level 1; most studies used an adequate reference standard.

Risk factors (2 studies).
The following risk factors were found to be associated with septic arthritis: age, diabetes mellitus, rheumatoid arthritis, joint surgery, hip or knee prosthesis, and skin infection in combination with joint prosthesis. Infection with the human immunodeficiency virus (HIV) increased the probability of septic arthritis.

 Signs and symptoms (7 studies).
The only symptoms with sensitivity greater than 50% were joint pain (sensitivity 0.85, 95% CI: 0.78, 0.90; 2 studies), a history of joint swelling (sensitivity 0.78, 95% CI: 0.71, 0.85; 2 studies) and fever (sensitivity 0.57, 95% CI: 0.52, 0.62; 7 studies). None of these studies assessed specificity.

Serum laboratory values (2 studies).
Abnormal peripheral WBC count, erythrocyte sedimentation rate and C-reactive protein had limited accuracy (the positive LRs ranged from 1.3 to 1.6).

Synovial WBC counts (5 studies).
WBC counts above 100,000/microL showed good accuracy for ruling in septic arthritis but poor accuracy for ruling out the condition: the sensitivity ranged from 13 to 40% and specificity from 93 to 100%. As the threshold to define a positive WBC count decreased, sensitivity increased but at the expense of specificity.

Polymorphonuclear cells (4 studies).
The presence of 90% or more polymorphonuclear cells showed poor accuracy, both for ruling in and ruling out septic arthritis: the sensitivity ranged from 57 to 92% and specificity from 68 to 83%.

Other synovial fluid laboratory test results (3 studies).
Low glucose had poor sensitivity (38 to 64%) and moderate specificity (85%). The presence of protein in synovial fluid showed very poor sensitivity and specificity (pooled sensitivity 48%, pooled specificity 46%; 2 studies). The presence of lactate dehydrogenase in synovial fluid showed excellent sensitivity (100%) but poor specificity (51%).

Authors’ conclusions
Clinical findings identify patients with peripheral monoarticular arthritis who might have septic arthritis; synovial WBCs and percentage of polymorphonuclear cells from arthrocentesis are necessary to assess the likelihood of septic arthritis before Gram stain and culture test results are available.

CRD commentary
The review addressed a complex question with clearly defined inclusion criteria. The search was limited, included a diagnostic filter, was restricted to English language publications and demonstrated little attempts to locate unpublished material, thus it is possible that pertinent studies have been missed and that language and publication bias were introduced into the review. The reviewers undertook some measures to reduce reviewer errors and bias, but only limited efforts were reported for the screening of titles and abstracts.

There was very little information about the pooling of the data, so it is not possible to determine whether appropriate methods were used. Statistical heterogeneity was not formally assessed, making it very difficult to evaluate the validity of the pooled results. It is noteworthy that WBC and polymorphonuclear cell data do not appear to be very useful diagnostic tests according to the presented results: although the WBC count does have a very good positive LR, the negative LR was very poor, and the polymorphonuclear cells had fairly poor positive and negative LRs. Given the outlined limitations, the conclusions have to be regarded with caution.

Implications of the review for practice and research
Practice: The authors did not state any implications for practice apart from the (problematic) conclusions (‘Clinical findings identify patients with peripheral, monoarticular arthritis who might have septic arthritis... synovial WBC and percentage of polymorphonuclear cells from arthrocentesis are necessary to assess the likelihood of septic arthritis before the Gram stain and culture test results are known’).

Research: The authors stated that future studies should evaluate the test characteristics of the history, physical examination and novel synovial fluid laboratory test results.

Bibliographic details
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Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.