Integration of Critically Appraised Topics Into Evidence-Based Physical Therapist Practice

Physical therapists frequently encounter patients whose conditions require complex differential diagnosis and screening decisions. These diagnostic challenges appear to be independent of direct access to physical therapy or referral by another provider. The ability of physical therapists to identify pathology that mimics musculoskeletal conditions has been well documented. 

By applying an advanced competency standard of musculoskeletal examination, evidence-based screening strategies, and response to intervention to test diagnostic hypotheses, physical therapists are in an excellent position to facilitate a high standard of diagnosis and screening. The patient examination provides details important to the diagnosis, such as the onset, quality, location, behavior, and progression of symptoms; the patient’s general health status; and the presence of red flags. Using an advanced clinical reasoning process, the physical therapist may develop and prioritize hypotheses from the patient interview, tests and measures, and the patient’s response to intervention. Competency gained by routinely completing this advanced clinical reasoning process can provide unique insight to the presentation of typical musculoskeletal problems. Atypical symptoms, red flags, tests and measures indicating serious pathology, and a lack of response to intervention provide important details that may be helpful in prioritizing hypotheses and determining when additional screening and medical treatment are required. Using advanced clinical reasoning and an evidence-based approach to screening and diagnosis, physical therapists can accurately identify patients who require physician referral.

A traditional method for clinicians to discover new diagnostic or screening strategies is by subscribing to a number of journals in the field, skimming the table of contents of each issue, and reading the relevant articles. This method, however, is not efficient and seldom reveals patient-centered best evidence. The process of performing highly focused searches to answer a clinical question on therapy, diagnosis, prognosis, or harm may align clinical strategies with current best evidence. As stated by Straus et al, incorporating evidence into clinical practice is by routinely completing this advanced clinical commentary is as follows: (1) to describe the clinical reasoning process of 3 orthopaedic physical therapists that led to the development of specific clinical questions related to screening for nonmusculoskeletal pathology, (2) to describe the search and triage strategy that led each physical therapist to the current best evidence needed to rule out nonmusculoskeletal pathology in the patient, and (3) to discuss the advantages and disadvantages of a critically appraised topic, the implementation of this process, and the tailoring of search strategies to find diagnostic and screening strategies.

SYNOPSIS: Physical therapists frequently encounter situations that require complex differential-diagnosis decisions and the ability to consistently screen for serious pathology that may mimic a musculoskeletal complaint. By applying the evidence-based-practice process to diagnosis, screening, and referral, physical therapists can identify diagnostic and screening strategies that positively influence clinical decisions. A critically appraised topic document (a standard 1-page summary of the literature appraisal and clinical relevance in response to a specific clinical question) is a valuable tool in evidence-based practice. The creation of a critically appraised topic makes the educational process cumulative instead of duplicative, allowing the individual clinician to assimilate and consolidate knowledge after a search effort and improving search and appraisal skills.


KEY WORDS: critically appraised topic, evidence-based practice, screening
tice typically involves 5 steps: (1) developing a patient-oriented clinical question, (2) efficiently searching the professional literature for best evidence to answer the question, (3) critically appraising that evidence for validity, impact, and applicability, (4) integrating that evidence with provider expertise and the patient’s values, and (5) evaluating the effectiveness and efficiency of the process. Multiple resources are available to assist in appraising the validity of published evidence.14,17,22

Barriers to the implementation of evidence-based practice include lack of time, high volume of new research, poor search and appraisal skills, inability to apply current research to specific patients, and insufficient access to web-based resources.20,31 Of these, time limitations and the rapidly increasing volume of new research may be the most significant barriers. Lack of protected time to search and appraise research literature was cited by 82% of respondents as a barrier to evidence-based practice in a survey of 270 physical therapists.29 Additionally, between 1978 and 1985, and between 1994 and 2001, the annual number of MEDLINE articles increased by 46% and the percentage of randomized controlled trials increased from 1.9% of the published professional literature to 6.2%.7

The third step of the evidence-based practice process provides an opportunity to create a critically appraised topic (CAT), which is a standardized, 1-page summary of evidence organized around a clinical question. CATs provide both a critique of the literature and a statement of the clinical relevance of the results.31 By creating CATs and keeping the results of answers to clinical questions on file, physical therapists reinforce the value of using best evidence to answer clinical questions, while creating a valuable resource to align clinical practice and streamline subsequent searches.24

In an effort to align clinical screening processes with current best evidence, 3 board-certified specialists in orthopaedic physical therapy, who are currently in orthopaedic manual physical therapy fellowship training, developed specific clinical questions related to screening for nonmusculoskeletal pathology, based on clinical situations. In each situation, evidence was available to assist in establishing evidence-based clinical screening processes.

CLINICAL SCENARIO 1: FIRST METATARSOPHALANGEAL JOINT PAIN

A 40-YEAR-OLD MAN WITH FIRST METATARSOPHALANGEAL PAIN AND SWELLING WAS REFERRED FROM PRIMARY CARE WITH A DIAGNOSIS OF TURF TOE (APPENDIX A). THE PATIENT DESCRIBED AN INSIDIOUS ONSET OF RIGHT FOOT PAIN AND SWELLING. HIS SYMPTOMS WERE POSSIBLY RELATED TO AN INCREASE IN PHYSICAL FITNESS ACTIVITIES, ALTHOUGH HE HAD NOT PERFORMED THESE ACTIVITIES IN THE PAST WEEK. NO SPECIFIC MECHANISMS OF INJURY, PRIOR INJURIES, OR EPISODES OF SIMILAR SYMPTOMS WERE REPORTED. THE PATIENT’S PAST MEDICAL HISTORY INCLUDED HYPERTENSION, PRIMARILY CONTROLLED BY A THIAZIDE DIURETIC. PHYSICAL EXAMINATION REVEALED NORMAL VITAL SIGNS, AN ANTAGIC GAIT WITH DECREASED STANCE PHASE, AND LIMITED PUSH-OFF ON THE INVOLVED LOWER EXTREMITY. THE PATIENT DESCRIBED A SEVERE ACHING, BURNING-QUALITY PAIN THAT INCREASED SHARPLY WITH PALPATION OF THE SWOLLEN AND RED FIRST MTP JOINT. ACTIVE AND PASSIVE RANGE OF MOTION AT THE GREAT TOE WAS LIMITED BY PAIN IN ALL PLANES OF MOVEMENT.

Based on the sudden onset of pain, location of symptoms, and swelling, an acute inflammatory disorder needed to be ruled out. The physical therapist’s differential diagnosis included gout, rheumatoid arthritis, pseudogout, psoriatic arthritis, septic arthritis, and reactive arthritis. To assist in prioritizing hypotheses, the physical therapist systematically determined that the patient did not appear to be immunocompromised, had not had any recent infections, and did not have a history of an arthritic disorder or involvement at any other joints. Based on age, gender, location, and sudden onset of symptoms, the physical therapist hypothesized that an acute episode of gout was a likely diagnosis, resulting in the following clinical question: What is the most effective way to screen for gout in a 40-year-old man with an acute onset of swelling and pain diffusely within the first MTP joint?

Search databases included PubMed, CINAHL, the Cochrane Database of Systematic Reviews, and the National Guideline Clearinghouse, which identified no systematic reviews or clinical guidelines pertaining to the clinical question. The search phrase “gout AND diagnosis AND rule/criteria” within PubMed Clinical Queries identified 44 results. After review of each article title, the physical therapist reviewed the results and conclusion sections of 5 abstracts and isolated 2 articles that addressed diagnostic screening. The critical-appraisal process followed criteria for diagnostic test studies described by Guyatt et al.21 The first article was a retrospective validation of 3 consensus criteria. The authors reported that each consensus criterion had poor sensitivity and poor specificity.22

The second article used a prospective design, collecting clinical criteria derived from a much larger subject pool, resulting in the development of a clinical decision rule for acute gout screening.25 The resulting multivariate logistic regression model predicted the presence of synovial monosodium urate crystals, the gold standard for diagnosis of gout.23 These derived clinical criteria provide a noninvasive strategy for ruling out gout and are also helpful in identifying potential risk factors (TABLE 1).

This study provided an evidence-based strategy to screen for acute gouty arthritis. A score of 4 or less ruled out gout in nearly 100% of patients (sensitivity, 0.99). The decision-rule variables are easily obtained from the patient interview, the physical examination, and simple laboratory tests. The patient population in this study was similar to that
of an outpatient physical therapy practice setting. The criteria can be used to assist with diagnosis, treatment, patient education, and consultation efforts (TABLE 1).

The prevalence of gout is 0.9% to 2.6%,19 accounting for approximately 3.9 million ambulatory care visits each year.18 In this case, the patient presented with several gout risk factors (TABLE 1): acute, within 1 day, onset of first MTP pain, joint redness, and hypertension. By placing the risk factors into an online calculator provided by the Radboud University Nijmegen Medical Centre,19 this patient had a 44% posttest probability of gout. After communicating with the referring provider, the patient underwent a serum uric acid laboratory test, revealing a serum level greater than 5.88 mg/dL. When the positive laboratory result was added into the online clinical decision calculator, the posttest probability of gout increased to 84%.

Further diagnostic testing for this patient included additional laboratory testing and synovial fluid examination, resulting in the definitive diagnosis of an acute gouty arthritis. The physician initiated targeted therapy for inflammation in addition to medication to reduce serum urate levels in an attempt to limit future flares and potential morbidity associated with chronic gout.

**CLINICAL SCENARIO 2: PERSISTENT BONE STRESS INJURY**

An 46-year-old female long-distance runner self-referred to a physical therapist for evaluation of chronic bilateral pain and swelling of the distal tibia (APPENDIX B). An orthopaedic surgeon had recently diagnosed these symptoms as a stress fracture, based on plain-film radiographs that showed increased radiodensity bilaterally at the medial distal tibia. The patient described the progression of her training program, which included recovery periods that appeared adequate to prevent overuse musculoskeletal injury. The patient was a fit, postmenopausal Caucasian woman weighing approximately 47.5 kg (body mass index, 18.6 kg/m²). She reported no history of tobacco use, malnutrition, or estrogen replacement therapy. The patient denied general health changes, other areas of symptoms, and recent infection. Examination revealed a normal gait pattern and sharp and localized tenderness to palpation bilaterally of the medial distal tibia. There was normal range of motion and strength of the lower extremities, except for 4+/5 strength of the ankle dorsiflexors, hip abductors, and hip extensors bilaterally.

Due to the bone stress changes evident on radiographs and the fact that these injuries had persisted despite what appeared to be an appropriate progression of her training program over a 6-month period, the physical therapist decided to rule out metabolic bone disease in the form of osteoporosis as a cause of the stress-related bone changes. Another hypothesis for the origin of this patient’s disorder was metabolically normal bone with tissue overload and high repetitive impact due to the identified muscle weakness. Based on these concerns, the physical therapist developed the following clinical question: What is the best test or cluster of tests to rule out osteoporosis in a 46-year-old female long-distance runner with chronic bilateral stress reactions of the distal tibia?

Search databases included PubMed Clinical Queries, the Cochrane Database of Systematic Reviews, and the Cochrane Register of Controlled Trials. The search phrase “osteoporosis AND diagnosis AND screening tools” in PubMed Clinical Queries identified 19 systematic reviews. The physical therapist screened all the abstracts and critically appraised the 3 most relevant review articles12,20,23 according to the criteria for systematic reviews and clinical practice guidelines described by Guyatt et al.14 The first article developed a clinical practice guideline for the American College of Preventive Medicine.20 Although these guidelines provided clear and concise clinical guidance, they did not offer any grading for strength of recommendations and did not disclose how the guidelines were developed, which weakened the validity of their recommendations. The second article was an evidence-based clinical scenario that reviewed the accuracy and precision of physical examination findings for the diagnosis of osteopenia, osteoporosis, or spinal fracture.13 Although this review reported sensitivity, specificity, and likelihood ratios for various clinical variables, it was older (published in 2004) and did not identify recently published screening tools. The third article, a systematic review published in 2009, was judged to be the most relevant, as it ranked highest on the hierarchy of evidence14,22 and reported sensitivity, specificity, and likelihood ratios for multiple studies.23 Although this study did not disclose the review criteria or pool data into a meta-analysis, consistent results reported across numerous studies with large samples provided con-

### TABLE 1

<table>
<thead>
<tr>
<th>Gout Variables</th>
<th>Clinical Score*</th>
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<tbody>
<tr>
<td>Male</td>
<td>2.0</td>
</tr>
<tr>
<td>Previous patient-reported arthritis attack</td>
<td>2.0</td>
</tr>
<tr>
<td>Onset within 1 d</td>
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<tr>
<td>Joint redness</td>
<td>1.0</td>
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<tr>
<td>First metatarsophalangeal joint involvement</td>
<td>2.5</td>
</tr>
<tr>
<td>Hypertension or more than 1 cardiovascular disease</td>
<td>1.5</td>
</tr>
<tr>
<td>Serum uric acid level over 5.88 mg/dL</td>
<td>3.5</td>
</tr>
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*Scores range from 0 to a maximum of 13.
fidence in the diagnostic properties of the studied screening tools.

The best osteoporosis screening tools were the Simple Calculated Osteoporosis Risk Estimation and the Osteoporosis Self-Assessment Screening Tool (OST) (TABLE 2). TABLE 3 shows the sensitivity, specificity, and likelihood ratios for each tool. Although the diagnostic test profiles are similar, the recommended OST is easier to use for clinical osteoporosis screening. Dual-emission X-ray absorptiometry evaluation of bone mineral density is recommended in any postmenopausal Caucasian woman younger than 65 years, whose OST score is less than or equal to 1.20 In general, the tools were more sensitive than specific, which is appropriate for screening tests that seek to minimize the chance of a false-negative test result. These screening tools were developed in postmenopausal Caucasian women, making the results generalizable to the patient in the clinical question.

Based on her OST score of zero and a pretest probability of osteoporosis of 14.8% in a postmenopausal 50-year-old Caucasian woman,13 this patient’s posttest probability of osteoporosis was 1% to 3%. With a low posttest probability of osteoporosis, additional testing for the presence of osteoporosis was not indicated and physical therapy care for this condition was continued. Patient education included recommended daily calcium intake (based on guidelines prior to those published in 2012 by the US Preventive Services Task Force,22 which did not recommend daily calcium supplementation of less than 1000 mg in postmenopausal women and stated that the benefit of larger doses is not known) and crosstraining to reduce current bone stresses and to gradually promote the development of bone able to withstand the stresses of long-distance running. By reducing and then carefully progressing her training volume, in combination with physical therapy, this patient was asymptomatic and able to complete her first marathon 1 year after her initial session with the physical therapist. Through the use of a best-evidence screening strategy in this case, possible additional medical visits and procedures were avoided.

### CLINICAL SCENARIO 3: ATYPICAL LOW BACK PAIN

A 23-YEAR-OLD MAN CONSULTED A physical therapist for a 2-week history of low back pain, located on the right side, between the 12th rib and the right posterior superior iliac spine (APPENDIX C). He could not identify a specific mechanism of injury or a change in activity that could account for his symptoms. Running, jumping, and sudden changes in trunk direction, such as those required to play basketball, aggravated his symptoms. Although his symptoms would increase with activity, they were not relieved by rest or change in position. He experienced moderate difficulty falling asleep, but symptoms did not awaken him at night. His past medical history was significant for renal calculi, and his current symptoms were similar to those of previous episodes. The patient reported low stream during urination and alleviation of symptoms by sitting with his elbows resting on his knees. Baseline pain increased with percussion (a sensitive test to rule out infection as a cause of low back pain) over the right lower quadrant of the back. Lumbar spine flexion and extension range of motion were normal, with end-range pain that did not reproduce the patient’s primary symptom. Central posterior-to-anterior passive accessory intervertebral movements from T12 and L3 increased the symptoms, consistent with his primary complaint.

Considering the increased pain with activity and the examination of his lumbar spine, the physical therapist hypothesized that the patient most likely had

### TABLE 2

<table>
<thead>
<tr>
<th>Screening Assessment</th>
<th>Threshold Score</th>
<th>Risk Factors</th>
<th>Scoring</th>
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<tbody>
<tr>
<td>SCORE</td>
<td>6 or greater</td>
<td>Age, body weight (lb), race, hormone therapy, fracture history, history of rheumatoid arthritis</td>
<td>• Race other than black: 5 points</td>
</tr>
<tr>
<td></td>
<td>−1 or less</td>
<td>Age, body weight (kg)</td>
<td>• Never used hormone therapy: 1 point</td>
</tr>
</tbody>
</table>

**Abbreviations:** OST, Osteoporosis Self-Assessment Screening Tool; SCORE, Simple Calculated Osteoporosis Risk Estimation.

### TABLE 3

<table>
<thead>
<tr>
<th>Screening Assessment</th>
<th>Sensitivity Range</th>
<th>Specificity Range</th>
<th>+LR Range</th>
<th>−LR Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCORE</td>
<td>0.80–1.0</td>
<td>0.10–0.51</td>
<td>11.21</td>
<td>0.07–0.32</td>
</tr>
<tr>
<td>OST</td>
<td>0.83–0.95</td>
<td>0.37–0.71</td>
<td>15.31</td>
<td>0.12–0.32</td>
</tr>
</tbody>
</table>

**Abbreviations:** −LR, negative likelihood ratio; +LR, positive likelihood ratio; OST, Osteoporosis Self-Assessment Screening Tool; SCORE, Simple Calculated Osteoporosis Risk Estimation.
After reviewing the titles, the most clinical approach to renal calculi, or renal colic, was identified. The search was restricted to renal calculi and renal colic, using the phrase “renal calculi AND clinical examination,” with the controls set for diagnosis and narrow, yielding 11 results. A search in the Cochrane Database using the phrase “renal colic OR renal calculi” identified 43 results. EBSCO, searched with the phrase “renal colic OR renal calculi AND clinical examination,” identified 21 results. After reviewing the titles of the 76 articles, the physical therapist reviewed the abstracts of 18 articles and determined that the published clinical diagnostic strategies did not have sufficient sensitivity to rule out renal calculi, although risk factors were identified. The presence of hematuria has a sensitivity of 84% and urinalysis, which includes testing for other chemical abnormalities, has a sensitivity of 69%. The focus of the search shifted from clinical strategies to diagnostic imaging, as 2 of the 18 abstracts referred to computed tomography (CT) as the gold standard for the diagnosis of renal calculi. A subsequent search in the National Guideline Clearinghouse, using the phrase “renal colic OR renal calculi,” yielded 11 results. After reviewing the titles, the most clinically applicable result was the American College of Radiology Appropriateness Criteria for acute onset flank pain with suspicion of stone disease, which lists CT of the abdomen as the most appropriate radiologic procedure, with excellent sensitivity (95%-96%) and specificity (98%). However, the American College of Radiology criteria also state that low-dose CT techniques are preferred over standard CT, as standard CT is the radiologic procedure with the highest relative radiation level. Within the American College of Radiology criteria, a cited meta-analysis of 7 studies assessed the diagnostic performance of low-dose (less than 3 mSv) CT for detecting renal calculi, reporting a pooled sensitivity of 97%, pooled specificity of 95%, positive likelihood ratio of 19.4, and negative likelihood ratio of 0.03.

To form the basis for pretest probability of renal calculi in this patient, stone formation in the urinary tract affects about 5% to 10% of the population in industrialized countries. The presence of flank pain, a previous history of stone formation, and low-stream urination without a specific mechanism of injury elevated the clinician’s pretest probability of renal calculi to 25%. Therefore, a positive finding with the use of low-dose CT provides a posttest probability of renal calculi of 90%. A negative finding estimates the posttest probability to be less than 1%

Based on this information, the physical therapist referred the patient back to his primary care physician with a recommendation for low-dose CT to rule out renal calculi, and continued physical therapy treatment pending the results of those tests. The patient showed minimal improvement after 3 visits of physical therapy. Subsequent evaluation with multiple low-dose axial CT images of the abdomen and pelvis revealed a 3-mm nephrolith within the midpole of the right kidney. A best-evidence recommendation for advanced imaging, combined with continual reassessment of response to physical therapist intervention, led to timely and appropriate medical management of this patient’s kidney stone.

**DISCUSSION**

The cases in this commentary illustrate a method for finding current best evidence related to screening for nonmusculoskeletal disorders. Efficient triage and critical-appraisal skills are essential when large volumes of evidence are retrieved during the search process. Although comparison of multiple screening strategies is required the first time a clinical question is answered, subsequent refinement involves a comparison of the current clinical standard with any evidence that has been published since the last search. In the scenarios described in this commentary, which were comparisons of multiple screening strategies, each physical therapist spent 2 to 3 hours from initiation of the search to creation of the CAT. Frequent searches and appraisals of the literature will likely become more efficient and streamline the overall process.

Because questions will reappear frequently in individual practice settings, maintaining a file of CATs provides a readily available preprocessed evidence source. Maintenance of a CAT database may be best accomplished within a local health system, increasing the likelihood that the results will align with similar populations and clinical practices. Although it may be of some use to create a national CAT database, these best-evidence summaries can quickly become outdated. Moreover, in the absence of a rigorous peer-review process, a CAT potentially introduces reviewer bias or the possibility of simply missing best evidence with inadequate search and triage processes. Each CAT summary (in any database) should be periodically reviewed and updated for content and compared with emerging evidence. Physical therapists need to be critical consumers of the literature, including evidence summaries such as a diagnostic CAT. They should also be sharply aware of the methods...
used to generate the recommendations.31

Existing evidence may not exactly fit a
clinical question based on an actual
patient. Therefore, the best-evidence
answer to a clinical question requires
clinical judgment in addition to efficient
search strategies and accurate critical-
appraisal skills. Selective use of search
terms, as shown in these scenarios, may
maximize the number of useful results.
The World Health Organization defines
screening as “the systematic application
of a test in an asymptomatic population.”36
Therefore, the term screening
may not yield results relevant to physi-
therapist practice when searching the
larger body of medical literature. Clinical
diagnosis is a search term that is most
appropriate for ruling out nonmusculo-
skeletal pathology with clinical tests and
measures commonly used in the physical
therapist examination. The search term
diagnosis will also include results pert-
aining to imaging studies, such as plain-
film radiographs or magnetic resonance
imaging, in addition to clinical tests and
measures.

In evidence-based practice, physi-
tical therapists must choose the strongest
evidence to support their clinical decision
making. Systematic reviews, as level 1 ev-
idence, may provide the highest-quality
evidence to answer a clinical question.25
At other times, particularly with respect
to emerging evidence, the best fit to a
particular clinical diagnostic question
may come from a single valid cross-section-
study with a consistently applied reference
standard and blinding.28 Clinical
practice guidelines can also be a valu-
able tool for diagnostic decision making,
but may create confusion when tests from
different organizations or groups conflict.
In the case involving osteoporosis screen-
ing, the physical therapist determined
that the current best evidence was based
on a systematic review. In subsequent
searches, the results of newly published
cross-sectional studies would need to be
compared to the findings of the system-
atic review to determine if they would
better answer the clinical question.

At this time, the majority of physical
therapists are not able to independently
order relevant diagnostic screening tests,
as these tests fall outside of their typical
delineated practice privileges. These sit-
uations, in which pathologies and condi-
tions requiring medical treatment must
be ruled out, necessitate the ability of
the physical therapist to provide sound,
evidence-based screening recommenda-
tions to physicians. This requires either
current knowledge of the best evidence
or the ability to quickly search and ap-
praise the literature to find the best
evidence. In the case involving gout, the
physical therapist identified multiple
risk factors and determined that furt-
ther testing was required. The therapist
recommended a test of serum uric acid
level, which increased the likelihood of
the pathology beyond the clinical thresh-
old for further, invasive testing (joint
aspiration).

In the case involving renal calculi,
no acceptable clinical screening stra-
genies were identified and the search
transitioned to the most effective im-
aging modality. Even with evidence-based
screening and diagnostic strategies, ad-
equate screening depends on a compre-
ensive patient interview and physical
examination tailored to the patient pre-
sentation and the resulting diagnostic
hypotheses. There must be careful inves-
tigation of any red flags, general health
changes, or signs and symptoms of seri-
ous injury, pathology, or systemic disease.
Persistent symptoms and a response to
treatment that are not consistent with
evidence for prognosis suggest the need
for further diagnostic work-up and medi-
cal evaluation.

**CONCLUSION**

A CAT is a standardized, 1-page
summary of evidence organized
around a clinical question. Al-
though lengthy reviews of the literature
are not always practical in a typical physi-
therapy practice setting, performing
focused searches of specific clinical ques-
tions culminating in the creation of a CAT
summary allows the clinician to prioritize
and address specific gaps in knowledge
of the current best evidence for diagno-
sis and screening. Physical therapists
frequently encounter situations requir-
ing complex differential diagnosis and
should be able to either directly apply
or recommend evidence-based diagnos-
tic and screening to medical colleagues.
Creating CATs may align individual and
organizational clinical practices with best
evidence and enhance learning through
the search-and-appraisal process. When
questions are well defined, the overall
process is timely and clinically useful,
the search and triage are accurate and ef-
cient, and the results are appropriately
documented and disseminated.

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Clinical Commentary


Clinical Bottom Lines

1. Seven key predictor variables include: male, previous reported arthritis attack, onset within 1 day, joint redness, first metatarsophalangeal joint involvement, hypertension or 1 or more cardiovascular diseases, and serum uric acid greater than 5.88 mg/dL.

2. Clinicians should use caution with implementation of this decision rule until validation studies are completed in other healthcare settings.

Citation

Three/Four-Part Clinical Question
What is the most effective way to screen for gout in a 40-year-old man with an acute insidious onset of swelling and pain unilaterally in the first metatarsophalangeal joint who was referred to physical therapy for turf toe?

The Study
Prospective diagnostic study, clinical prediction/decision rule derivation

The Study Patients
Subjects were recruited from family practice clinics across the eastern part of the Netherlands (n = 381; mean ± SD age, 57.7 ± 13.6 years; 74.8% men). Inclusion criteria: signs and symptoms consistent with monoarthritis, as diagnosed by family physicians, irrespective of initial or recurrent episode. Exclusion criteria: none. Clinical variables (including the presence of synovial monosodium urate crystals) were collected within 24 hours. Variables were entered in a multivariate logistic regression model to predict the presence of synovial monosodium urate crystals.

Gold Standard
Synovial fluid aspiration for monosodium urate crystal analysis.

The Evidence

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<tr>
<td>Maximum score</td>
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<table>
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<tr>
<th>Total Clinical Score</th>
<th>Condition Present</th>
<th>Condition Absent</th>
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<tbody>
<tr>
<td>Positive test, &gt;4</td>
<td>True positive, 214</td>
<td>False positive, 94</td>
</tr>
<tr>
<td>Negative test, ≤4</td>
<td>False negative, 2</td>
<td>True negative, 70</td>
</tr>
</tbody>
</table>

Sensitivity: 0.99 (0.97, 0.99)
Specificity: 0.43 (0.35, 0.50)
Positive likelihood ratio: 1.7 (1.5, 2.0)
Negative likelihood ratio: 0.02 (0.01, 0.09)

Probability of Gout
Score of 4 or less, 2.8% (ruled out gout almost 100%); score of greater than 4 to less than 8, 27%; and score of 8 or higher, 80.4%. An online calculator is available at www.umcn.nl/goutcalc to compute the diagnostic rule score. The reviewer calculated statistics from cutoff scores provided in the study (assuming a score of greater than 4 as being positive) and by using the PEDro calculator.

Comments
The criteria are helpful in identifying potential risk of gout and facilitate prompt noninvasive determination of ruling out of gout. Early initiation of nonsteroidal anti-inflammatory drugs limits the symptoms, whereas ruling out the disorder prevents unnecessary administration of nonsteroidal anti-inflammatory drugs and associated complications. Among patients with a score of 8 or higher, gout was confirmed in more than 80%, indicating gout-specific management options, such as systemic corticosteroid use rather than nonsteroidal anti-inflammatory drugs. This study increases confidence in the clinical assessment of patients with suspected acute gouty arthritis. The decision-rule variables are easily obtained from patient interview, examination, and laboratory assessment. The study patients were similar to those who would be found in a primary care clinic or outpatient practice setting. The clinical criteria can be used to assist clinicians with diagnosis, treatment, patient education, and consultation efforts. A score of 4 or less ruled out gout in nearly 100% of patients. This decision rule would help in the decision making for this clinical scenario, with good internal validity and reasonable external validity. Diagnoses such as rheumatoid arthritis, pseudogout, psoriatic arthritis, septic arthritis, and reactive arthritis must be considered in these patients.

Date appraised: 10/22/2011
Update by: 10/22/2012
SCREENING WOMEN FOR LOW BONE MASS

Clinical Bottom Line
There is good evidence to support using the Simple Calculated Osteoporosis Risk Estimation or Osteoporosis Self-Assessment Screening Tool (OST) to identify women who would benefit from additional testing with dual-emission X-ray absorptiometry screening. Based on ease of use and similar diagnostic profiles, the OST may be the most useful tool in routine clinical practice.

Level of Evidence
1a

Citation

Three/Four-Part Clinical Question
What is the best test or cluster of tests to rule out osteoporosis in a 46-year-old, active-duty Army, female long-distance runner with chronic bilateral stress reactions of the distal tibia?

The Study
Systematic review

Review Search Methods
A literature search of PubMed, MEDLINE, and the Cochrane Library from 1990 to January 2008 using the key words osteoporosis screening tool, clinical assessment tool, postmenopausal women, validation, and osteoporosis. Forty-six articles were retrieved and reviewed by 2 independent individuals, with 22 articles included in the review.

Gold Standard
A t score of less than 2.5 standard deviations below peak young-adult bone mass on the dual-emission X-ray absorptiometry scan. The most common sites for bone mass assessment were the femoral neck and the lumbar spine.

The Evidence

<table>
<thead>
<tr>
<th>Screening Assessment</th>
<th>Sensitivity Range</th>
<th>Specificity Range</th>
<th>+LR Range</th>
<th>–LR Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCORE</td>
<td>0.80-1.0</td>
<td>0.10-0.51</td>
<td>1.1-2.1</td>
<td>0.07-0.32</td>
</tr>
<tr>
<td>OST</td>
<td>0.83-0.95</td>
<td>0.37-0.71</td>
<td>1.5-3.1</td>
<td>0.12-0.32</td>
</tr>
</tbody>
</table>

Abbreviations: –LR, negative likelihood ratio; +LR, positive likelihood ratio; OST, Osteoporosis Self-Assessment Screening Tool; SCORE, Simple Calculated Osteoporosis Risk Estimation.

Comments
1. To calculate an OST score: subtract age from body weight (kg), multiply by 0.2, and truncate to an integer.
2. OST threshold score of –1 or less to recommend additional dual-emission X-ray absorptiometry screening.
3. OST chosen over the Simple Calculated Osteoporosis Risk Estimation due to much more simple and clinically useful algorithm.
4. In general, all screening tools for osteoporosis are more sensitive than specific.
5. The authors did not report the quality of the studies that were included in the review and did not give an adequate description of the eligibility criteria for included studies. Two separate individuals screened articles, which lessens potential bias.
6. Major strength of this review is the large study populations, with numerous studies reporting results of over 2000 patients.
7. Although we are unsure of the precision of the results because confidence intervals were not reported, the consistent results across all studies and the large study samples give confidence that the results are truly reflective of the population.
8. The majority of screening tools were developed in postmenopausal Caucasian women. As such, we are unsure of the applicability of these tools in races other than Caucasian.
9. The prevalence of BMD-defined osteoporosis at the spine, wrist, or hip in Caucasian women in the United States by decade is as follows: 50 to 59 years, 14.8%; 60 to 69 years, 21.6%; 70 to 79 years, 38.5%; and 80 years or older, 70.0%.
10. The benefit of screening with the OST or Simple Calculated Osteoporosis Risk Estimation appears to outweigh any associated harm.

Date appraised: 10/22/2011
Update by: 10/22/2012
ADVANCED IMAGING IN THE DIAGNOSIS OF RENAL CALCULI

Clinical Bottom Line
Low-dose computed tomography (CT) is equivalent to standard CT in diagnosis of renal calculi, with less patient radiation exposure.

Citation

Three/Four-Part Clinical Question
What is the best way to rule out or screen for renal colic in a 45-year-old Caucasian man with low stream during urination and thoracolumbar pain?

The Study
Meta-analysis

The Meta-analysis
The medical literature from 1995 to 2007 was searched using PubMed, MEDLINE, and Cochrane Library databases for articles on studies that used low-dose CT (less than 3 mSv) as a diagnostic test for the detection of urolithiasis. Seven studies met the inclusion criteria and could be included in the study.

Gold Standard
Standard-dose CT

The Evidence

<table>
<thead>
<tr>
<th></th>
<th>Reference Standard Positive</th>
<th>Reference Standard Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-dose CT positive</td>
<td>True positive, 702</td>
<td>False positive, 17</td>
</tr>
<tr>
<td>Low-dose CT negative</td>
<td>False negative, 25</td>
<td>True negative, 317</td>
</tr>
</tbody>
</table>

Abbreviation: CT, computed tomography.

Sensitivity: 0.97 (0.95, 0.98)
Specificity: 0.95 (0.92, 0.97)
Positive likelihood ratio: 19.0 (11.9, 30.1)
Negative likelihood ratio: 0.04 (0.03, 0.05)

Data pooled from Table 1 from Niemann et al.

Comments
1. The specific risk factors for renal colic have been identified, but there are no guidelines on the clinical diagnosis of renal colic at this time.
2. Compared to standard-dose CT, radiographs had a sensitivity of 69% and specificity of 82%, ultrasound had a sensitivity of 76% and specificity of 78%, and urinalysis had a sensitivity of 69% and specificity of 27%.
3. The American College of Radiology Appropriateness Criteria for acute onset of flank pain with suspicion of stone disease (last updated in 2011) list CT of the abdomen as the most appropriate radiologic procedure. CT of the abdomen was listed as the radiologic procedure with the highest relative radiation level, which is why the American College of Radiology criteria have listed low-dose CT techniques as preferred over standard-dose CT.

Date appraised: 10/22/11
Update by: 10/22/12