H.3 Diagnostic tools for psoriatic arthritis

H.3.1 ToPAS vs clinical diagnosis by rheumatologist

<table>
<tr><th>Reference</th><th>Study type</th><th>Number of patients</th><th>Patient characteristics</th><th>Index test</th><th>Reference standard</th><th>Outcome measures</th><th>Source of funding</th></tr>
<tr>
<td>D. D. Gladman, C. T. Schentag, B. D. Tom, V. Chandran, J. Brockbank, C. Rosen, and V. T. Farewell. Development and initial validation of a screening questionnaire for psoriatic arthritis: the Toronto Psoriatic</td>
<td>Diagnostic cohort study (following initial development of the questionnaire)

Five clinics (PsA, psoriasis, general dermatology, general rheumatology (excluding PsA patients) and family medicine)

• Patient selection: consecutive patients; some patients already had a known diagnosis when the index test was performed and so would not be directly applicable to our question regarding an initial screen for</td>
<td>N: 688

(257 relevant to our population)

134 patients from the PsA clinic, 123 with psoriasis, 118 from dermatology, 135 from rheumatology and 178 from family medicine</td>
<td>Inclusion criteria: Patients attending clinics for PsA, psoriasis (attending for phototherapy, other day therapy or education), general dermatology or rheumatology or family medicine

Exclusion criteria: not stated

<table>
<tr><th></th><th>PsA clinic (n=134)</th><th>Psoriasis clinic (n= 123)</th></tr>
<tr><td>Mean age (years)</td><td>49.6 ± 13.1</td><td>48.6 ± 13.4</td></tr>
<tr><td>M/F (%)</td><td>59.7/40.3</td><td>64·2/35.8</td></tr>
</table>
</td>
<td>Toronto PsA Screening Questionnaire (ToPAS); not designed solely for a psoriasis population

Based on simplified weighted scoring omitting questions 7,8 and 11: the questions are grouped into 3 domains: score calculated as:</td>
<td>Clinical diagnosis by trained rheumatologists

according to standard protocol: complete history, physical exam, routine lab tests, rheumatoid factor, anti-nuclear factor

Radiographs performed in all in PsA clinic but only if a clinical suspicion of arthritis in other clinics (ie. Joint or back pain or limitation of movement, or</td>
<td>Primary outcomes measures:

Sensitivity and specificity

Secondary outcomes measures:

PPV and NPV (only reported for the total patient group – not our population)</td>
<td>Krembil Foundation</td>
</tr>
</table>

Arthritis Screen (ToPAS). Ann.Rheum.Dis. 68 (4):497-501, 2009. Ref ID: GLADMAN 2009	psoriasis patients to identify potential PsA for referral to a rheumatologist • **Index test:** post-hoc selection of threshold could have been to maximise sensitivity and/or specificity and may lead to overoptimistic measures of test performance; also, post-hoc weighting and question selection used to optimise results • **Reference standard:** rheumatological assessment according to standard protocol; unclear if blinded to index test results • **Flow and timing:** index test prior to reference test; all patients analysed by index and reference test (but not all had radiographs); time between tests unclear but likely to			*(skin domain) + (nail domain) + (2× joint domain)* **Domain scores** Skin: 0-3; joint: 0-3; nail: 0 or 1 Threshold of ≥8 for classifying as PsA means that a patient must score ≥2 on the joint domain	joint deformities) Assessments performed by 4 rheumatologists but the majority (77%) were conducted by a single rheumatologist **Diagnosis** of PsA: inflammatory arthritis in the presence of psoriasis **Note**: subsequent application of CASPAR criteria proved them to be sensitive and specific in these patients		

	be the same day as patients recruited during clinic visit						

Effect Size

Clinical diagnosis, n	**PsA**	**No PsA**
PsA clinic (N=134)	134	0
Psoriasis clinic (N= 123)	30	93

Sensitivity and specificity of ToPAS in a combined patient group from PsA and psoriasis clinics (based on a threshold score of ≥8 for classifying as PsA):

- Sensitivity: 89.1 (83.0-93.2)% => 10.9% of those **with** PsA would not be detected
- Specificity: 86.3 (76.4-92.5)% => 13.7% of those **without** PsA would be inappropriately referred

2 x 2 table

	Reference test +ve	**Reference test -ve**
Index test +ve	TP: 146	FP: 13
Index test -ve	FN: 18	TN: 80

Summary statistic	
Pre-test probability/prevalence	0.64
PPV	91.8%
NPV	81.6% (18.4% probability of having PsA)
LR +	6.37
LR-	0.13

Authors' conclusion:

- The simplified ToPAS index is very good at classifying those who are and are not diagnosed with PsA

H.3.2 PASE vs clinical diagnosis by rheumatologist

Reference	Study type	Number of patients	Patient characteristics	Index test	Reference standard	Outcome measures	Source of funding
M. E. Husni, K. H. Meyer, D. S. Cohen, E. Mody, and	Diagnostic cohort study (following initial development of the questionnaire)	**N: 69** Patients	**Inclusion criteria:** diagnosis of psoriasis	Psoriatic Arthritis Screening and Evaluation	Clinical diagnosis on the basis of joint exam (including	**Primary outcomes measure**	Bringham and Women's Hospital

<table>
<tr>
<td>A. A. Qureshi. The PASE questionnaire: pilot-testing a psoriatic arthritis screening and evaluation tool. J.Am.Acad.Dermatol. 57 (4):581-587, 2007.

Ref ID: HUSNI2007</td>
<td>Patient selection: difficult diagnoses based on clinical assessment excluded from the study; unclear if patient selection method is appropriate; unclear if PsA diagnosis already known prior to selection for PASE testing
Index test: post-hoc selection of threshold to optimise sensitivity and/or specificity and may lead to overoptimistic measures of test performance
Reference standard: rheumatological assessment according to standard protocol; unclear if blinded to index test results
Flow and timing: all patients received index and reference test (but unclear if all results analysed/if all questionnaires were adequately completed); time between tests unclear (reference standard may have been performed at variable times prior to index test if diagnosis made before clinic visit)</td>
<td>with missing data on >1 question excluded from analysis</td>
<td>Exclusion criteria: patients on systemic therapy; concomitant PsA and OA

<table><tr><th>Mean baseline</th><th>All (n=69)</th></tr><tr><td>Mean age (years)</td><td>51</td></tr><tr><td>M/F (%)</td><td>49/51</td></tr></table></td>
<td>(PASE); self-administered

Possible range 15-75 (each of 15 questions scored as either 1: strongly disagree; 2: disagree; 3: neutral; 4: agree; 5: strongly agree)</td>
<td>presence of dactylitis and/or synovitis and/or nail pitting), clinical history including history of morning stiffness and radiographs based on Moll and Wright Criteria; plus evaluation by a rheumatologist</td>
<td>s:

Sensitivity and specificity

Secondary outcomes measures:

Median scores in subgroups</td>
<td></td>
</tr>
</table>

Effect Size

Clinical diagnosis	**N (%)**
PsA (N=69)	
PsA	17 (24.6%)
Non-PsA	52 (75.4%)
OA only	24 (34.8%)
Severe* PsA (n=17)	
PsA	10 (58.8%)
Severe PsA	7 (41.2%)

**Defined as PsA of the mutilans type or those who required immediate DMARD therapy based on erosions found on imaging*

There was a statistically significant difference in median scores (total, symptom and function) between:

- patients with and without PsA; all 3 scores were higher in PsA cases ($p<0.001$)
- patients with PsA and OA; all 3 scores were higher in PsA cases (symptom and function scores: $p=0.01$; total score: $p=0.007$)
- patients with non-severe PsA and severe PsA; all 3 scores were higher in severe PsA cases (symptom score: $p=0.02$; function score: $p=0.051$ (NS); total score: $p=0.02$)

Sensitivity and specificity of PASE in psoriasis population (based on a threshold score of 47 for classifying as PsA):

- **Sensitivity**: 82.4 (57-96)% => 17.6% of those **with** PsA would not be detected

- **Specificity**: 73.1 (59-84)% => 26.9% of those **without** PsA would be inappropriately referred
- **AUC** for *total* score = 0.84
- **AUC** for *function* score = 0.84
- **AUC** for *symptom* score = 0.80

	Reference test +ve	**Reference test -ve**
Index test +ve	TP: 14	FP: 14
Index test -ve	FN: 3	TN: 38

Summary statistic	
Pre-test probability/prevalence	0.25
PPV	50.0%
NPV	92.7% (7.3% probability of having PsA)
LR +	3.06
LR-	0.24

Authors' conclusion:

- The PASE questionnaire is a self-administered tool that can be used to screen for PsA among patients with psoriasis.

- PASE can distinguish between symptoms of PsA and osteoarthritis.
- A larger study is needed to validate PASE in dermatology clinics in the community.

H.3.3 PASE vs clinical diagnosis by rheumatologist using Moll and Wright criteria

Reference	Study type	Number of patients	Patient characteristics	Index test	Reference standard	Outcome measures	Source of funding
P. L. Dominguez, M. E. Husni, E. W. Holt, S. Tyler, and A. A. Qureshi. Validity, reliability, and sensitivity-to-change properties of the psoriatic arthritis screening and evaluation questionnaire. Archives of Dermatological Research 301 (8):573-579, 2009. Ref ID: DOMINGUEZ2009	Diagnostic cohort study Brigham and Women's Hospital dermatology clinic, arthritis clinic, and a dermatology–rheumatology combined clinic (MA, USA) • **Patient selection:** unclear if patient selection method is appropriate (approached by study staff – may not be consecutive); PsA diagnosis new in the majority of participants and if not no Tx for PsA received (applicable) • **Index test:** post-hoc selection of threshold to optimise sensitivity and/or specificity and may lead to overoptimistic measures of test performance	**N: 194** 4 patients with missing data on >1 question excluded from analysis (if one item left blank it was scored as 0)	**Inclusion criteria:** psoriasis or PsA; 18-85 years; **Exclusion criteria:** patients on systemic therapy; concomitant PsA and OA **Note**: concomitant diagnosis of other arthritides not excluded **Description** **Category** M/F (%) 57.8/42.1 Race/ethnicity (n) Caucasian 138 African– 8	Psoriatic Arthritis Screening and Evaluation (PASE); self-administered while waiting to be seen by physician Possible range 15-75 (each of 15 questions scored as either 1: strongly disagree; 2: disagree; 3: neutral; 4: agree; 5: strongly	Clinical diagnosis by rheumatologist on the basis of Moll and Wright Criteria: the patient's history and clinical exam, including tender and swollen joint count, the presence of dactylitis, and/or nail pitting, as well as history of morning stiffness, and review of radiographs when available. A rheumatologist who employed the Moll and Wright criteria reviewed	**Primary outcomes measures:** Sensitivity and specificity **Secondary outcomes measures:** Test-retest reliability; sensitivity to change	National Institute of Arthritis and Musculoskeletal and Skin Diseases

	• **Reference standard:** rheumatological assessment according to standard protocol; unclear if blinded to index test results • **Flow and timing:** 4 patients with missing data on >1 question excluded from analysis; time between tests unclear (reference standard may have been performed at variable times prior to index test if diagnosis made before clinic visit)		American Hispanic 3 Asian 1 Multiracial 3 Other 25 Unknown 12 PsA diagnosis (n) Non-PsA 153 PsA 37 Co-morbid conditions (n) Rheumatoid arthritis 7 Gout 13 Osteoarthritis 29	agree) Usually completed within 4-6 min	all cases to determine case from non-case. The majority of PsA cases were new. Existing cases of PsA had not received therapy.		
Effect Size • Total PASE score ranged from 15-74							

There was a statistically significant difference in median scores (total, symptom and function) between:

- patients with and without PsA; all 3 scores were higher in PsA cases ($p<0.001$)
- patients with PsA and OA; all 3 scores were higher in PsA cases (symptom score: $p=0.014$; function score: $p=0.082$ (NS); total score: $p=0.039$) – *Note: 6 participants with **both** PsA and OS excluded from this analysis*

Sensitivity and specificity of PASE in psoriasis population (based on a threshold score of 44 for classifying as PsA):

- **Sensitivity**: 76 (59-88)% => 24% of those **with** PsA would not be detected
- **Specificity**: 76 (68-82)% => 24% of those **without** PsA would be inappropriately referred
- **AUC** for *total* score = 0.797
- **AUC** for *function* score = 0.759
- **AUC** for *symptom* score = 0.814

	Reference test +ve	**Reference test -ve**
Index test +ve	TP: 28	FP: 37
Index test -ve	FN: 9	TN: 116

Summary statistic	
Pre-test probability/prevalence	0.195
PPV	43.1%
NPV	92.8% (7.2% probability of having PsA)
LR +	3.13

LR-	0.32

Sensitivity and specificity of PASE in psoriasis population (based on a threshold score of 47 as determined in the Husni study for classifying as PsA):

- **Sensitivity**: 70 (53-84)% => 30% of those **with** PsA would not be detected
- **Specificity**: 80 (73-86)% => 20% of those **without** PsA would be inappropriately referred

	Reference test +ve	**Reference test -ve**
Index test +ve	TP: 26	FP: 31
Index test -ve	FN: 11	TN: 122

Summary statistic	
Pre-test probability/prevalence	0.195
PPV	45.61%
NPV	91.7% (8.3% probability of having PsA)
LR +	3.47
LR-	0.37

Sensitivity and specificity of PASE in psoriasis population excluding those with quiescent or asymptomatic PsA (n=180; 10 excluded) (based on a threshold score of 47 for classifying as PsA):

- **Sensitivity**: 93 (78-99)% => 7% of those **with** PsA would not be detected
- **Specificity**: 80 (73-86)% => 24% of those **without** PsA would be inappropriately referred

	Reference test +ve	**Reference test -ve**
Index test +ve	TP: 25	FP: 31
Index test -ve	FN: 2	TN: 122

Summary statistic	
Pre-test probability/prevalence	0.15
PPV	44.6%
NPV	98.4% (1.6% probability of having PsA)
LR +	4.57
LR-	0.09

Note: The PASE questionnaire missed nine participants with PsA because their total PASE score was below the 44 score cut-off for PsA. Of these nine participants, four had limited disease, two had quiescent disease, one had axial involvement, one participant received multiple intra-articular injections 10 days prior to PASE administration and another participant had been off systemic therapy for 5 months but began flaring at the time of PASE administration.

Another 37 participants were screening test-positive for PsA but did not have the disease. Of these 37 participants, 18 had a history of other musculoskeletal conditions such as severe osteoarthritis/degenerative joint disease, spinal stenosis, carpal tunnel syndrome, chondromalacia, muscle

strain, and muscle sprain. Another seven participants had undifferentiated arthritis, four had gout, two had fibromyalgia, one had peripheral neuropathy, one had spondyloarthropathy, and one had lupus. The authors did not have access to the medical records of the three remaining individuals.

Authors' conclusion:

- Administration of a well-designed and validated screening tool can increase detection of PsA in psoriasis patients, determine the prevalence of PsA in a given population; capture clinical data for genotype–phenotype studies, and monitor response to therapy.
- The PASE questionnaire is a valid and reliable tool to screen for active PsA among individuals with psoriasis and may be used as a marker of therapeutic response after systemic therapy.

H.3.4 PAQ vs clinical diagnosis by rheumatologist

<table>
<tr><th>Reference</th><th>Study type</th><th>Number of patients</th><th>Patient characteristics</th><th>Index test</th><th>Reference standard</th><th>Outcome measures</th><th>Source of funding</th></tr>
<tr>
<td>G. M. Alenius, B. Stenberg, H. Stenlund, M. Lundblad, and S. R. Dahlqvist. Inflammatory joint manifestations are prevalent in psoriasis: prevalence study of joint and axial involvement in psoriatic patients, and evaluation of a psoriatic and arthritic questionnaire. J.Rheumatol. 29 (12):2577-2582, 2002.

Ref ID: ALENIUS200</td>
<td>Diagnostic cohort study

Hospital and community-based population

• Patient selection: patient selection appropriate (invited all eligible from register); patients with known arthritic disease excluded to assess relevant screening population
• Index test: prior to reference standard; post-hoc selection of threshold to optimise sensitivity and/or specificity and may lead to overoptimistic</td>
<td>N: 276

74 patients (22.8%) dropped out (46 did not answer the questionnaire; 28 did not wish to participate in follow-up study)</td>
<td>Inclusion criteria: diagnosis of psoriasis by dermatologist or GP; >16 years

Exclusion criteria: patients with known arthritic disease

<table>
<tr><th>Mean</th><th>Peripheral arthritis and/or axial disease (n=67)</th><th>Non-arthritic (n=135)</th></tr>
<tr><td>Age (years)</td><td>54.4 ± 14.4</td><td>50.4 ± 14.4</td></tr>
<tr><td>Duration of skin</td><td>29.7 ± 14.3</td><td>24.8 ± 13.9</td></tr>
</table>
</td>
<td>Psoriatic and Arthritic Questionnaire (PAQ); self-administered

Question 3 removed because not relevant when selected patients known not to have diagnosed arthritis

Possible</td>
<td>Clinical diagnosis by rheumatologist : the patient's history and clinical exam

Diagnostic criteria:

Peripheral arthritis: tender and swollen joint >6 wk, located outside the spine and/or SI joints

Sacroiliitus: radiological grading of SI joints according to New York Criteria (≥grade 2)

Note: radiographic assessment</td>
<td>Primary outcomes measures:

Prevalence, sensitivity and specificity

Secondary outcomes measures:

PPV, NPV</td>
<td>Swedish psoriasis association, Medial Faculty of University of Umea and King Gustav V 80-year foundation</td>
</tr>
</table>

2	measures of test performance • **Reference standard:** rheumatological assessment according to standard protocol; unclear if blinded to index test results • **Flow and timing:** 74 patients (22.8%) dropped out (46 did not answer the questionnaire; 28 did not wish to participate in follow-up study); time between tests unclear (but index test appears to have been sent out by post so would have been some delay)		disease (years)			range 0-8 Modified PAQ; weighted scoring giving the questions that most strongly predicted arthritis a double score Possible range 0-9	performed in patients with any history of back pain and/or decrease mobility of the spine; and those with peripheral arthritis (but not all consented to radiography) Axial disease: radiological sacroiliitis and/or syndesmophytes, ligamentous ossification, vertebral squaring and shining corners of the spine Undifferentiated SpA: inflammatory back pain and decreased mobility of the spine in at least 2 directions without fulfilling criteria for sacroiliitis or axial disease		

					Enthesitits: signs of tenderness, swelling, redness, warmth, loss of function, and/or radiographic destruction at the insertion site of the Achilles tendon, plantar fascia and lateral or medial epicondoyle Blood as collected to measure erythrocycte sedimentation rate, CRP, orosomucoid, haptoglobin and RF		
Effect Size **Clinical diagnosis**							

	All (N=202) n (%)	Active disease n (%)
No joint disease	78 (38.6)	
Peripheral arthritis	45 (22.3)	23 (51.1)
Axial disease	9 (4.5)	4 (44.4)
Peripheral + axial disease	13 (6.4)	11 (84.6)
Undifferentiated SpA	12 (5.9)	5 (41.7)
Peripheral enthesitis/tenosynovitis	18 (8.9)	8 (44.4)
Other joint complaints	27 (13.4)	

Moll and Wright Classification

	All (N=202) **n (%)**	**Female (n=100)**	**Male (n=102)**	**Active disease** **n (%)**
DIP joint disease, exclusively	0	0	0	
Axial disease	15 (7.4)	15	15	10 (66.7)
Mono/oligoarthritis	30 (14.6)	12	15	15 (50)
Polyarthritis	21 (10.4)	0	9	12 (57.1)
Mutilans arthritis, exclusively	1	0	1	1 (100)

Sensitivity and specificity of PAQ in psoriasis population (based on a threshold score of ≥4 for predicting **peripheral arthritis and/or axial disease**):

- **Sensitivity**: 60% => 40% of those **with** PsA would not be detected
- **Specificity**: 62.2% => 37.8% of those **without** PsA would be inappropriately referred
- **AUC =** 0.640
- **OR =** 2.343 (1.224-4.482; p = 0.010)

Note: Only 30 of the 67 with PsA were newly diagnosed and included in analysis

	Reference test +ve	**Reference test -ve**
Index test +ve	TP: 18	FP: 51
Index test -ve	FN: 12	TN: 84

Summary statistic	
Pre-test probability/prevalence	0.182
PPV	26.09%
NPV	87.50% (12.5% probability of having PsA)

LR +	1.59
LR-	0.64

PAQ score	Sensitivity		Specificity		PPV (%)		NPV (%)	
	Population A	Population B	Population A	Population B	Population A	Population B	Population A	Population B
≥3	73.3	83.6	44.4	52.6	22.7	46.7	88.2	86.6
≥4	60.0	82.1	62.2	57.0	26.1	48.7	87.5	86.5
≥5	46.7	77.6	72.6	65.9	27.5	53.1	86.0	85.6
≥6	30.0	68.7	83.0	77.8	28.1	60.5	84.2	83.3
≥7	16.7	53.7	91.1	86.7	29.4	66.7	83.1	79.1
≥8	10.0	41.8	97.0	94.1	42.9	77.8	82.9	94.1

Population A: *PAQ score excluding patients with known arthritis and the third question*

Population B: *Total population including all patients and all questions*

Sensitivity and specificity of PAQ in psoriasis population (based on a threshold score of ≥4 for predicting **any inflammatory manifestation**):

- **Sensitivity**: 55% => 45% of those **with** PsA would not be detected
- **Specificity**: 65.7% => 34.3% of those **without** PsA would be inappropriately referred
- **AUC =** 0.647
- **OR =** 2.471 (1.100-5.548; p = 0.028)

	Reference test +ve	**Reference test -ve**
Index test +ve	TP: 33	FP: 36
Index test -ve	FN: 27	TN: 69

Summary statistic	
Pre-test probability/prevalence	0.364
PPV	47.83%
NPV	71.88% (28.12% probability of having PsA)
LR +	1.60
LR-	0.68

Sensitivity and specificity of **modified PAQ** (with weighted scoring giving the questions that most strongly predicted arthritis a double score) in psoriasis population (based on a threshold score of ≥5 for predicting **peripheral arthritis and/or axial disease**):

- **Sensitivity**: 50% => 50% of those **with** PsA would not be detected
- **Specificity**: 73.3% => 26.7% of those **without** PsA would be inappropriately referred
- **PPV**: 29.4%
- **NPV**: 86.8%

	Reference test +ve	**Reference test -ve**
Index test +ve	TP: 15	FP: 36
Index test -ve	FN: 15	TN: 99

Summary statistic	
Pre-test probability/prevalence	0.182
PPV	29.41%
NPV	86.84% (28.12% probability of having PsA)
LR +	1.88
LR-	0.68

Sensitivity and specificity of **modified PAQ** (with weighted scoring giving the questions that most strongly predicted arthritis a double score) in psoriasis population (based on a threshold score of ≥5 for predicting **any inflammatory manifestation**):

- **Sensitivity**: 45% => 55% of those **with** PsA would not be detected
- **Specificity**: 77.1% => 22.9% of those **without** PsA would be inappropriately referred

- **PPV**: 52.9%
- **NPV**: 71.1%

	Reference test +ve	**Reference test -ve**
Index test +ve	TP: 27	FP: 24
Index test -ve	FN: 33	TN: 81

Summary statistic	
Pre-test probability/prevalence	0.364
PPV	52.94%
NPV	71.05% (28.95% probability of having PsA)
LR +	1.97
LR-	0.71

Authors' conclusion:

- The PAQ did not discriminate for arthritis in this population with psoriasis.

H.3.5 PEST and PAQ vs clinical diagnosis by rheumatologist

Reference	Study type	Number of patients	Patient characteristics	Index test	Reference standard	Outcome measures	Source of funding
G. H. Ibrahim, M. H. Buch, C. Lawson, R. Waxman, and P. S. Helliwell. Evaluation of an existing screening tool for psoriatic arthritis in people with psoriasis and the development of a new instrument: the Psoriasis Epidemiology Screening Tool (PEST) questionnaire.	Diagnostic cohort study plus extra pre-diagnosed cases Hospital and community-based populations • **Patient selection:** patient selection of main sample from GP database (all eligible were sent the questionnaire by post and 1 in 2 sample of respondents clinically examined); separate series of consecutive patients with known PsA also invited to complete the questionnaire • **Index test: PEST –** prior to reference standard; unclear method of selection of threshold • **Comparator test: PAQ –** no details of when administered or to whom	**N: 168** questionnaire returned (27% response rate) 1 in 2 sample of alternate respondents invited for hospital examination = **93** examined Plus separate sample of **21** known PsA cases	**Inclusion criteria:** diagnosis of psoriasis by dermatologist or GP **Exclusion criteria:** not stated **Mean** / **Newly diagnosed PsA (n=12)** Age (years): 54.9 ± 9.2 Duration of skin disease (years): 31.8 ± 17.9	Psoriasis Epidemiology Screening Tool (PEST) and the Alenius modified Psoriatic and Arthritic Questionnaire (PAQ); self-administered	Clinical diagnosis by rheumatologist: the patient's history and clinical exam (tender/swollen/damaged joint count) similar to CASPAR criteria Skin also assessed using PASI Blood as collected to measure CRP and RF, plus x-ray of hand, feet, pelvis and	**Primary outcomes measures:** Sensitivity and specificity **Secondary outcomes measures:** PPV, NPV	None stated

<table>
<tr>
<td>*Clin.Exp.Rheumatol.* 27 (3):469-474, 2009.

Ref ID: IBRAHIM2009</td>
<td>• Reference standard: rheumatological assessment according to standard protocol (similar to CASPAR criteria); unclear if blinded to index test results
• Flow and timing: 168 sent questionnaire; 1 in 2 sample of alternate respondents invited for hospital examination = 93 examined

Separate sample of 21 known PsA cases (used for assessment of diagnostic performance) also included; time between tests unclear (but index test sent out by post so would have been some delay); not all patients included in the analysis of PAQ (108/114) and unclear why the 6 were excluded</td>
<td>(unclear if these were just used for questionnaire design or also for assessment of diagnostic performance)</td>
<td><table><tr><td>Duration of joint disease (years)</td><td>19.2 ± 15.1</td></tr><tr><td>PASI</td><td>2.1 ± 2.0</td></tr></table></td>
<td></td>
<td>lumbar spine in first 20 patients found to be normal, so subsequent participants only had these tests if thought to have PsA</td>
<td></td>
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<tr>
<td colspan="7">Effect Size

Clinical diagnosis
<table><tr><th></th><th>All (N=93)</th></tr><tr><td>No joint disease</td><td>12</td></tr><tr><td>PsA</td><td>12</td></tr></table></td>
</tr>
</table>

OA	26
Mechanical low back pain	18
Unclassified polyarthralgia	12
Hypermobility syndrome	3
Regional pain syndrome	5
Other	5

PEST manikin results

- Median number of joints ticked: PsA = 8; other diagnosis = 4

	AUC (95% CI)	**Sensitivity**	**Specificity**
Alenius modified PAQ (threshold ≥4)	0.76 (0.69-0.85)	0.63	0.72
PEST (threshold ≥3)	0.91 (0.86-0.97)	0.92	0.78

2 x 2 table for PEST (N=114)

	Reference test +ve	**Reference test -ve**
Index test +ve	TP: 30	FP: 19
Index test -ve	FN: 3	TN: 62

Summary statistic	
Pre-test probability/prevalence	0.289
PPV	61.22%
NPV	95.38% (4.62% probability of having PsA)
LR +	3.88
LR-	0.12

2 x 2 table for mPAQ (N=108)

	Reference test +ve	**Reference test -ve**
Index test +ve	TP: 20	FP: 21
Index test -ve	FN: 12	TN: 55

Summary statistic	
Pre-test probability/prevalence	0.296
PPV	48.78%
NPV	82.09% (17.91% probability of having PsA)

LR +	2.26
LR-	0.52

Authors' conclusion:

- A new screening tool for identifying people with psoriatic arthritis has been developed. Five simple questions demonstrated good sensitivity and specificity in this population but further validation is required.