Development and initial validation of a screening questionnaire for psoriatic arthritis: The Toronto Psoriatic Arthritis Screen (ToPAS)

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Abstract

Objective: To develop and validate a Psoriatic Arthritis screening questionnaire (ToPAS).

Methods: The ToPAS was developed through review of items seen in patients with Psoriatic Arthritis (PsA) and evaluation by patients with PsA and other rheumatology patients, and was administered to consecutive consenting patients attending 5 clinics: PsA; Psoriasis; General dermatology; General rheumatology (excluding PsA patients); and Family medicine. All patients were assessed by a rheumatologist according to a standard protocol. A three-step analysis strategy was adopted: A stepwise logistic regression to identify the questions most important in discriminating between those with and without PsA; a logistic model was fitted to three clinically relevant domains for PsA: skin, joints and nails; a simpler weighting of each of the domains used in step 2. ROC curves were obtained based on these various models.

Results: There were 134 patients from the PsA clinic; 123 with psoriasis; 118 from dermatology; 135 from rheumatology; 178 from family medicine. A simplified discriminatory score based on the skin, joint and nail domains gave results comparable to other methods with an observed overall sensitivity and specificity, based on a single cut point, of 86.8% and 93.1%. When the PsA patients were compared with each of the other 4 patient groups individually, the sensitivity and specificity of the ToPAS were: psoriasis 89.1%, 86.3%; dermatology 91.9%, 95.2%; rheumatology 92.6%, 85.7%; and family medicine 90.4%, 100%.

Conclusion: Our simplified index is very good at classifying both those who are not diagnosed with PsA and those who are diagnosed with PsA.
Psoriatic arthritis (PsA) has been defined as an inflammatory arthritis associated with psoriasis, and is usually diagnosed based on criteria proposed by Moll and Wright. While a number of classification criteria have been developed, none had been validated until recently. Taylor et al. have reviewed the classification criteria and their deficiencies. The CASPAR criteria for the classification of PsA were developed through an international effort, and demonstrated 98.9% sensitivity and 91.2% specificity in patients with longstanding PsA against other inflammatory forms of arthritis. These criteria proved to be quite sensitive in patients with short duration of PsA and demonstrated excellent sensitivity and specificity in a family medicine setting. Since the CASPAR criteria have a high sensitivity and specificity, they might perform well as diagnostic criteria. However, since the CASPAR criteria are applied only to patients with inflammatory musculoskeletal disease, an assessment by a physician for the presence of inflammatory musculoskeletal disease in the joints, spine or entheses is crucial. Therefore, it may be difficult to use these criteria in the context of epidemiological or family investigations when it is impossible to have all patients reviewed by a physician. We therefore sought to develop a screening questionnaire that would identify individuals with a high likelihood of having PsA for use in clinical settings and for epidemiological studies.

PATIENTS AND METHODS
Development of a screening questionnaire: The Toronto PsA screening questionnaire (ToPAS) was developed through the review of items seen among patients with PsA. The questions that were selected were based on expert opinion of rheumatologists and dermatologists. The questionnaire was patterned after an earlier questionnaire which we had used to identify the presence of arthritis among patients with HIV. The proposed questionnaire was then evaluated by patients with PsA as well as by patients attending a rheumatology clinic, to assure that the items were easily understood and relevant. In addition, other investigators, including rheumatologists, epidemiologists and scientists evaluated the questionnaire for face validity. Once the questions were selected a test questionnaire was produced and tested among patients with psoriatic arthritis and patients with other rheumatological conditions and it performed very well in identifying those with psoriatic arthritis. Once the format of the questionnaire was finalised, it was administered to several patient groups. The final questionnaire included 12 questions (see appendix)

Patients: Five groups of patients completed the questionnaire. Group 1 included patients with PsA followed at the University of Toronto PsA Clinic at Toronto Western Hospital, a university teaching hospital in Toronto, Canada. Group 2 included patients with psoriasis followed in the Psoriasis Education and Research Centre (PERC) at Women’s College Hospital, Toronto, where patients attend to receive phototherapy, other day treatments, and education. Group 3 included patients from a general dermatology clinic at Toronto Western Hospital. Group 4 included patients followed in a general rheumatology clinic at Toronto Western Hospital and excluded patients diagnosed with PsA. Group 5 included patients seen for regular follow-up at the family medicine clinics at the Toronto Western Hospital and Women’s College Hospital. The patients were approached to participate in the study while in the waiting room of the respective clinics. If they consented verbally they provided a written consent, and completed the ToPAS prior to being clinically evaluated by the rheumatologist so that the assessment would not impact the response to the questionnaire. The study was approved by the Ethics Boards of the University Health Network and Sunnybrook Women’s College Health Sciences Centre.
**Clinical assessments:** All patients were assessed by a rheumatologist according to a standard protocol, including a complete history and physical examination, routine laboratory tests, rheumatoid factor and antinuclear factor. Aside from patients attending the PsA Clinic where radiographs are performed according to a standard protocol, radiographs were performed only if there was a clinical suspicion of arthritis (joint or back pain or limitation of movement, or joint deformities). There were 4 rheumatologists who assessed the patients, but the majority (77%) were carried out by a single rheumatologist. All assessors were all trained by the same supervisor and have used the same method to assess the patients. The reproducibility of the assessments within this Clinic has previously been demonstrated.[7] The assessment of enthesitis was proven to be reproducible among observers in the INSPIRE study.[8]

**Diagnosis of PsA:** Based on the protocol and radiographs, where indicated, the rheumatologist diagnosed a patient with PsA if they had an inflammatory arthritis in the presence of psoriasis. The diagnosis of psoriatic arthritis was confirmed by review of all the data collected and was finalized by consensus. Subsequent application of the CASPAR classification criteria proved them to be very sensitive and specific in this group of patients. [4, 5]

**Statistical analyses:** Analyses based on logistic regression models and receiver operating characteristic (ROC) curves were performed to investigate the association between the response variable, whether or not diagnosed with PsA, and 11 questions (excluding Question 12A which asked whether the patient had been diagnosed with PsA) from the ToPAS for the five different patient groups together. [9, 10] Patients were included in a model fit if they answered all questions included in the model. A three-step analysis strategy was adopted. The first step used a stepwise regression approach, based on Akaike’s Information Criterion (AIC) to identify a model with the questions seen to be most important in discriminating between those who were diagnosed with PsA and those who were not.[11] The second step adopted a more clinically oriented approach, for which we fitted a logistic regression model to variables based on three clinically relevant domains for identifying PsA. These three domains were related to the skin, the joints and the fingernails. The third step considered a simplification of the model obtained from step 2. Specifically, we looked at a simpler weighting for each of the domains derived from step 2. ROC curves were calculated for each step of the analysis and used to identify possible discriminatory cut-points for the corresponding measures.

**RESULTS**

**Samples of Patients**

There were 134 patients in group 1 (PsA clinic), all of whom had PsA. While these patients were diagnosed on the basis of inflammatory arthritis and psoriasis, they also all fulfilled the CASPAR criteria and all had a score of at least 3. Of the 123 patients from group 2 (psoriasis clinic), 30 (24.4%) were diagnosed with PsA. Among 118 from group 3 (general dermatology clinic), 2 (1.7%) were diagnosed with PsA. None of the 135 patients in group 4 (general Rheumatology clinic) had PsA. Group 5 (family medicine clinic) had 178 patients of whom 3 (1.7%) were diagnosed with PsA. Table 1 provides demographic characteristics for these patients.
Table 1: Demographic characteristics of patients completing the ToPAS

<table>
<thead>
<tr>
<th></th>
<th>PsA</th>
<th>Psoriasis</th>
<th>Dermatology</th>
<th>Rheumatology</th>
<th>Family Medicine</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. patients</td>
<td>134</td>
<td>123</td>
<td>118</td>
<td>135</td>
<td>178</td>
</tr>
<tr>
<td>Male / female</td>
<td>80/54</td>
<td>79/24</td>
<td>50/68</td>
<td>36/99</td>
<td>65/113</td>
</tr>
<tr>
<td>Mean Age (SD)</td>
<td>49.6 (13.1)</td>
<td>48.6 (13.4)</td>
<td>45.4 (15.7)</td>
<td>54.4 (14.9)</td>
<td>42.0 (14.7)</td>
</tr>
</tbody>
</table>

**Initial Logistic Regression**
Starting with a logistic model incorporating binary (yes/no) variables corresponding to the 12 questions and sub-parts (Q1A to Q11, excluding Q12) above, the use of backward selection, based on an AIC selection criterion, led to the final model given in Table 2. Note that questions 7 and 8 (related to neck and back) were deemed to be answered yes only if both pain and accompanying stiffness were recorded since this is the presentation associated with inflammatory back pain. The estimated coefficients for the selected variables were then used to generate a discrimination score, corresponding to the linear predictor part of the logistic model minus the intercept term. Figure 1 displays the ROC curve for this score which has an area under the curve of 0.97. The sensitivity, specificity, positive and negative predictive values are highlighted for a discrimination score cut-point of 7.71.
Table 2: Logistic Regression Model obtained from Backward Stepwise Selection using AIC.

<table>
<thead>
<tr>
<th></th>
<th>Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-8.56</td>
<td>1.09</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Q1A</td>
<td>1.02</td>
<td>0.54</td>
<td>0.060</td>
</tr>
<tr>
<td>Q2A</td>
<td>0.84</td>
<td>0.43</td>
<td>0.051</td>
</tr>
<tr>
<td>Q4A</td>
<td>2.53</td>
<td>0.54</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Q5A</td>
<td>3.05</td>
<td>0.94</td>
<td>0.001</td>
</tr>
<tr>
<td>Q6</td>
<td>1.89</td>
<td>0.41</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Q8</td>
<td>0.77</td>
<td>0.41</td>
<td>0.060</td>
</tr>
<tr>
<td>Q10</td>
<td>2.34</td>
<td>0.70</td>
<td>0.001</td>
</tr>
<tr>
<td>Q11</td>
<td>-1.36</td>
<td>0.43</td>
<td>0.002</td>
</tr>
<tr>
<td>Residual deviance (df)</td>
<td>572.73 (469)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AIC</td>
<td>192.62</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Logistic Regression Based on Domains

Our alternative approach involved creating three variables linked to domains based on subsets of questions. The three domains were: a skin domain, including 3 questions, (1A, 3, and 4A), which can take the values from 0 to 3 (where 3 indicates answers of yes to all three questions and 0 three answers of no); a joint domain also including 3 questions (5A, 6, 10), again with values from 0 to 3 (where 3 indicates answers of yes to the three questions and 0 three answers of no), and a finger nail domain, including 2 questions (2A or 2B) which took the value 1 if either question was answered yes and 0 otherwise. Table 3 presents the fit of a logistic regression analysis when these three variables are included in the model. Figure 2 presents the ROC curve for the discrimination score derived from this logistic model which has an area under the curve of 0.95. The sensitivity, specificity, positive and negative predictive values are highlighted for a score cut-point of 7.76.
Table 3: Logistic Regression Model for the Domain Variables (Skin, Joint and Nail)

<table>
<thead>
<tr>
<th></th>
<th>Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-8.23</td>
<td>0.75</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Skin domain</td>
<td>1.30</td>
<td>0.18</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Joint domain</td>
<td>1.94</td>
<td>0.23</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Nail domain</td>
<td>1.00</td>
<td>0.35</td>
<td>0.004</td>
</tr>
<tr>
<td>Residual deviance (df)</td>
<td>247.20 (537)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AIC</td>
<td>255.2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note that this approach excluded Q11 which asked about the diagnosis of other forms of arthritis which represents a different type of question.

This approach excluded the questions related to the spine, since the questions related to the spine (questions 7 and 8) were only marginally associated with the diagnosis of PsA based on the initial model. When this domain, defined by a positive response to either question 7 or 8 (if both sub-parts of the question had an affirmative/positive response), was added to the analysis provided in table 3 it did not add discriminatory power (p=0.46) and the results for the other domains did not change.

On examining the frequency distributions of the three domains (i.e. joint, skin and nail) across the five clinics, it was found that 81% of patients in the psoriatic arthritis clinic scored three on the joint domain compared to 25.6% of patients in the general rheumatology clinic. For the skin domain, 86% and 87.5% of patients in the psoriatic arthritis and psoriasis clinics scored three on the skin domain compared to only 12% of the patients in the general dermatology clinic. Finally, 82.6% of patients in the psoriatic arthritis clinic scored one on the nail domain, compared to 63.5% in the psoriasis clinic, 32.9% in the general rheumatology, 14.5% in the general dermatology and 9.3% in the family medicine clinics.

**Simplified scoring for the ToPAS**

Examination of the estimated coefficients in Table 3 suggests that a simplified discriminatory score might give weights of 1 to the skin and nail domains and 2 to the joint domain. In this case a score can be calculated as (skin domain) + (nail domain) + (2 x joint domain). Figure 3 presents the ROC curve for this score which has an area under the curve of 0.95, the same as that based on the earlier analyses. The highlighted sensitivity, specificity, positive and negative predictive values correspond to a score cut point of 8. The overall sensitivity and specificity
based on this simplified score, and a cut point of 8, were 86.8% (80.5%, 91.9%) and 93.1% (90.1%, 95.2%). Note that choosing a cut point of 8 as a basis for screening positive on the simplified index for ToPAS has certain consequences. The first being that only patients who score at least two on the joint domain variable have the potential to screen positive on the simplified index. For those who score two on the joint domain, a further score of 3 on the skin domain and a score of 1 on the nail domain are required to screen positive. If a score of three is obtained on the joint domain, then a patient can either score two or above on the skin domain, irrespective of the score on the nail domain, to screen positive, or can score one on the skin domain and one on the nail domain to screen positive. Thus only the aforementioned combinations of scores on the three domains will lead to a patient attaining or surpassing the cut point of 8 required to screen positive.

**ToPAS in various patient groups**

Since the frequency of PsA in each of the patient groups (other than the PsA clinic) was very low, we analysed how the index would perform for each of the four patient groups when each was separately combined with the PsA group. We based our assessment on calculating the sensitivity and specificity for each of these “combined clinics” based on a cut-point of greater than or equal to 8 for classifying a patient as suffering from PsA and where diagnosed PsA patients were those from both patient groups. From Table 4 it can be seen that the index was highly sensitive and specific for all patient groups.

**Table 4: Sensitivity and specificity of the ToPAS**

<table>
<thead>
<tr>
<th>Patient Groups</th>
<th>Sensitivity</th>
<th>Specificity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psoriasis and PsA</td>
<td>89.1% (83.0%, 93.2%)</td>
<td>86.3% (76.4%, 92.5%)</td>
</tr>
<tr>
<td>General Dermatology and PsA</td>
<td>91.9% (85.7%, 95.6%)</td>
<td>95.2% (88.0%, 98.2%)</td>
</tr>
<tr>
<td>General Rheumatology and PsA</td>
<td>92.6% (86.4%, 96.1%)</td>
<td>85.7% (76.9%, 91.5%)</td>
</tr>
<tr>
<td>Family Medicine and PsA</td>
<td>90.4% (83.9%, 94.5%)</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Discussion**

Epidemiological studies in PsA have been hampered by the lack of screening tools. In the clinical setting the development of the CASPAR classification criteria should help identify patients with PsA, since they have the potential to be used as diagnostic criteria. However, it is often not possible for a clinician to review all patients suspected of having PsA. Therefore a screening questionnaire would be helpful for screening a large number of subjects to identify probable cases with PsA. While this approach does not replace the need for rheumatologist’s diagnosis and evaluation of individual patients, it helps in identifying subjects for epidemiological studies and perhaps in identifying individuals who should be referred for
rheumatological consultation. The present study is the first attempt at developing a screening questionnaire for PsA for a broad setting not just among patients with psoriasis. We developed a short questionnaire which includes 12 questions and which proved to be highly sensitive and specific in identifying patients with PsA in various clinical settings. Although this is the first questionnaire that aims to identify patients with PsA for a wider setting than among patients with psoriasis, two other questionnaires developed to identify the presence of arthritis among patients with psoriasis have been published. Peloso et al developed a 12-item questionnaire, which they titled Psoriasis and Arthritis Questionnaire (PAQ). [12] In their study 108 psoriasis patients completed the questionnaire and 70 patients, 37 with low PAQ scores (3/12) and 33 with high PAQ scores (>7/12) were invited for clinical evaluation by a rheumatologist. The PAQ score predicted PsA with a sensitivity of 0.85 and a specificity of 0.88 for a score of 7 or higher. They concluded that the PAQ was useful in detecting PsA among patients with psoriasis. However, they found that there was poor correlation in identifying nail lesions between physicians and patients. Alenius et al. evaluated the PAQ in a study of prevalence of joint disease in patients with psoriasis. [13] The PAQ was completed by 202 of 276 eligible patients (73%) and all underwent a clinical examination. The majority (82%) of the patients with joint or axial complaints also had radiographs, as did 20 individuals without musculoskeletal complaints. While a large proportion of their patients (48%) turned out to have joint manifestations, they did not find the PAQ to be as sensitive in identifying patients with PsA as was detected in the first study. They identified 4 out of 8 as the best cutoff providing a sensitivity of 0.60 and a specificity of 0.62. They then weighted the questions and the weighted score did not provide better sensitivity although the specificity increased to 73%. They concluded that the use of that questionnaire was not helpful in identifying arthritis in their group of psoriatic patients. The Psoriatic Arthritis Screening and Evaluation (PASE) questionnaire was recently published by Husni et al. [14] This questionnaire was developed primarily as a screening tool for dermatologists to identify patients with PsA as it was recognized that to have every patient with psoriasis evaluated by a rheumatologist would be impossible. PASE consists of two subscales, a symptom subscale and a function subscale. The instrument was tested in 69 patients, including 17 patients with PsA and 52 patients with psoriasis without arthritis. PsA was diagnosed by a rheumatologist on the basis of the Moll and Wright criteria. There were statistically significant differences in scores between patients with and without PsA, both in terms of symptoms and function components. Patients with PsA had higher scores than patients with psoriasis and osteoarthritis (OA). Patients with more severe PsA had higher scores than those with milder disease. PASE scores ranged from 28 to 63. A cut-off of 47 proved to be optimal for differentiating patients with and without PsA. Using this cut-off, the sensitivity of PASE for PsA was 82% (95% CI 57-96) and the specificity was 73% (59-84).

The ToPAS was designed as a screening tool for PsA regardless of whether or not a patient was followed for psoriasis. It was found to be highly sensitive and specific in all groups of patients in whom it was tested. It differs from previous questionnaires in that it includes pictures of psoriasis and nail lesions. The latter were a major issue for the PAQ, as the agreement between physician and patient was very poor. [11]. The other questions, while similar, are more direct in the ToPAS. The ToPAS differs from the PASE in that it does not include any questions regarding function as its purpose is primarily for case definition. Moreover, the PASE asks questions about current status, whereas the ToPAS asks about ever having joint symptoms or skin lesions. It is
not clear how sensitive and specific this instrument is to identify patients with isolated enthesitis, as there were no patients with isolated enthesitis among the patients reviewed in this study. Thus our simplified index derived from the ToPAS is very good at classifying those who are diagnosed with PsA, and those who are not. This instrument is now ready for further validation and should be tested in other centres to confirm its usefulness in screening for PsA, as well as in family investigations.

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References


Figure 1: ROC curve for step 1

Area under the curve: 0.973

Sens: 94.2%
Spec: 91.5%
PV+: 81.6%
PV-: 97.5%
Figure 2: ROC curve from step 2

Sens: 90.8%
Spec: 90.5%
PV+: 78.9%
PV-: 96.2%

Area under the curve: 0.954
Figure 3: ROC curve from step 3

Sensitivity

1-Specificity

Area under the curve: 0.954

Sens: 86.8%
Spec: 93.1%
PV+: 83.0%
PV-: 94.8%
The Psoriatic Arthritis Clinic, Centre for Prognosis Studies in the Rheumatic Diseases
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PSORIATIC ARTHRITIS SCREENING QUESTIONNAIRE

PLEASE TICK (✓) EACH CORRECT RESPONSE OR FILL IN THE BLANK FOR ALL QUESTIONS ON BOTH SIDES OF THE PAGE.

Date of Birth: ___ ___ / ___ ___ / ___ ___
Gender: [ ] Male [ ] Female
Ethnic Background: [ ] White
[ ] East Indian
[ ] Black
[ ] Filipino
[ ] Chinese
[ ] Other (specify) ____________
[ ] Mixed (specify) ____________

Figure 1
Skin rash on the elbows

Figure 2
Pits in the nail

Figure 3
Lifting of the nail

1. Have you ever had a skin rash consisting of red AND silvery-white scaly areas particularly on the elbows, knees or scalp as shown in FIGURE 1?
   [ ] Yes [ ] No
   IF YES → At approximately what age did you first notice this skin rash?
   ______ years old
   → Do you have this skin rash now?
   [ ] Yes [ ] No

2. Have you ever noticed any of these changes in your fingernails:
   • Pits in the nails as shown in FIGURE 2.
   • Lifting of the nail from the nail bed as shown in FIGURE 3.
   [ ] Yes [ ] No
   IF YES → At approximately what age did you first notice them?
   ______ years old
   → Do you have either of these nail changes now?
   [ ] Yes [ ] No

3. Have you ever seen a doctor about a skin rash?
   [ ] Yes [ ] No

4. Has a doctor ever diagnosed you with psoriasis?
   [ ] Yes [ ] No
   IF YES → At approximately what age were you diagnosed?
   ______ years old

5. Have you ever had joint pain, joint stiffness or swollen red joints that was not the result of injury?
   [ ] Yes [ ] No
   IF YES → At approximately what age did you first notice these symptoms?
   ______ years old
   → Do you have any symptoms now?
   [ ] Yes [ ] No

6. Have you ever had a “sausage shaped” swollen finger or toe that was not the result of an injury?
   [ ] Yes [ ] No

PLEASE TURN OVER AND COMPLETE THE OTHER SIDE OF THE PAGE
7. Have you ever had **neck pain** lasting at least 3 months that was not injury related?  
   IF YES → Was the neck pain accompanied by stiffness?  
   → Do you have any neck pain now?  

   ☐ Yes ☐ No  

8. Have you ever had **back pain** lasting at least 3 months that was not injury related?  
   IF YES → Was the back pain accompanied by stiffness?  
   → Do you have any back pain now?  

   ☐ Yes ☐ No  

9. Have you ever had a skin rash on any part of your body at the same time as joint pain, joint-stiffness or swollen red joints?  
   IF YES → At what age did you first notice these symptoms?  
   → Do you have these symptoms now?  

   ☐ Yes ☐ No  

10. Have you ever seen a doctor about any joint pain?  

   ☐ Yes ☐ No  

11. Have you ever been diagnosed with any form of arthritis other than psoriatic arthritis?  
   IF YES → What kind of arthritis was it? (Check all that apply)  
   Rheumatoid Arthritis ☐ Yes ☐ No  
   Osteoarthritis ☐ Yes ☐ No  
   Lupus (SLE) ☐ Yes ☐ No  
   Fibromyalgia ☐ Yes ☐ No  
   Ankylosing Spondylitis ☐ Yes ☐ No  
   Scleroderma ☐ Yes ☐ No  
   Other (specify) _______ ☐ Yes ☐ No  

12. Has a doctor ever diagnosed you with psoriatic arthritis?  
   IF YES → At what age were you first diagnosed?  

   ☐ Yes ☐ No  

13. For each family member below, indicate if they have **psoriasis** or not:  
   Mother ☐ Yes ☐ No ☐ do not know ☐ not applicable  
   Father ☐ Yes ☐ No ☐ do not know ☐ not applicable  
   Brother ☐ Yes ☐ No ☐ do not know ☐ not applicable  
   Sister ☐ Yes ☐ No ☐ do not know ☐ not applicable  
   Grandparent(s) ☐ Yes ☐ No ☐ do not know ☐ not applicable  
   Uncle/Aunt ☐ Yes ☐ No ☐ do not know ☐ not applicable  
   Son ☐ Yes ☐ No ☐ do not know ☐ not applicable  
   Daughter ☐ Yes ☐ No ☐ do not know ☐ not applicable  
   Other (specify) _______ ☐ Yes ☐ No ☐ do not know ☐ not applicable  

14. For each family member below, indicate if they have **psoriatic arthritis** or not:  
   Mother ☐ Yes ☐ No ☐ do not know ☐ not applicable  
   Father ☐ Yes ☐ No ☐ do not know ☐ not applicable  
   Brother ☐ Yes ☐ No ☐ do not know ☐ not applicable  
   Sister ☐ Yes ☐ No ☐ do not know ☐ not applicable  
   Grandparent(s) ☐ Yes ☐ No ☐ do not know ☐ not applicable  
   Uncle/Aunt ☐ Yes ☐ No ☐ do not know ☐ not applicable  
   Son ☐ Yes ☐ No ☐ do not know ☐ not applicable  
   Daughter ☐ Yes ☐ No ☐ do not know ☐ not applicable  
   Other (specify) _______ ☐ Yes ☐ No ☐ do not know ☐ not applicable
Development and initial validation of a screening questionnaire for psoriatic arthritis: The Toronto Psoriatic Arthritis Screen (ToPAS)


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