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## **Appendix S1**

### **Table S1**

#### Screening interview and physical examination

Screening was done using a structured interview. Patients were asked about:

- Joint pain and location
- Time of day with worst complaints
- Worsening or improvement on exertion
- Joint swelling and location
- Rubor and calor of joints
- Swelling of Achilles tendon
- Inflammatory back pain according to ASAS criteria (36)
- Morning stiffness in minutes

Physical examination entailed:

- 68 tender joint count
- 66 swollen joint count
- dactylitis count
- SPARCC enthesitis index (37)
- Leeds enthesitis index (38)

**Table SII. Possible predictors for concomitant PsA in Pso patients**

		Pos only	Pso+PsA
N		225	78
Treatment history			
Non-systemic	UV-therapy	184/225 (82%)	67/78 (86%)
	Dithranol	77/148 (34%)	32/78 (41%)
Conventional Systemic drugs	All	170/225 (76%)	73/78 (94%)
	Methotrexate	140/225 (62%)	70/78 (90%)
	Acitretin	50/175 (22%)	27/78 (35%)
	Fumaric Acid	92/225 (41%)	34/78 (44%)
	Cyclosporin	38/225 (17%)	18/78 (23%)
Biologicals/ small molecule inhibitors	All	72/225 (32%)	50/78 (64%)
	TNF-inhibitor	56/225 (25%)	44/78 (56%)
	IL17-inhibitor	10/225 (4%)	14/78 (18%)
	IL23-inhibitor	1/225 (1%)	2/78 (3%)
	IL12/IL23 p40 inh.	31/225 (14%)	20/78 (26%)
	PDE4-inhibitor	4/225 (2%)	4/78 (5%)
Skin disease			
At start	Scalp <sup>a</sup>	67/206 (33%)	23/71 (32%)
	Inverse <sup>a</sup>	9/206 (4%)	2/78 (3%)
Ever	Scalp	208/225 (93%)	75/78 (96%)
	Inverse	125/225 (56%)	43/78 (55%)
	Erythroderma	20/225 (9%)	11/78 (14%)
Current	Scalp <sup>b</sup>	102/224 (46%)	36/78 (46%)
	Inverse <sup>b</sup>	49/224 (22%)	14/78 (18%)
Nail disease			
Ever	All <sup>b</sup>	107/224 (48%)	53/78 (68%)
	Pitting	134/225 (60%)	56/78 (72%)
	Oil drop	64/225 (28%)	36/78 (46%)
	Onycholysis	108/225 (45%)	55/78 (71%)
	Crumbling	84/225 (37%)	44/78 (56%)
	Splinter haemorrhage	47/225 (21%)	15/78 (19%)
Current	Pitting <sup>c</sup>	95/181 (53%)	38/71 (54%)
	Oil drop <sup>c</sup>	89/181 (49%)	34/71 (48%)

	Onycholysis <sup>c</sup>	118/181 (65%)	48/71 (68%)
	Crumbling <sup>c</sup>	67/181 (37%)	23/71 (32%)
	Splinter haemorrhage <sup>c</sup>	146/181 (81%)	53/71 (75%)
Joint complaints			
Ever	Non-trauma joint pain	164/225 (73%)	75/78 (96%)
	Swollen joints <sup>b</sup>	75/224 (34%)	60/78 (77%)
	Swollen digit	48/225 (21%)	43/78 (55%)
	Heel pain <sup>b</sup>	55/224 (25%)	26/78 (33%)
	Heel swelling	22/225 (10%)	11/78 (14%)

PDE = phosphodiesterase; IL = interleukin; PsA = psoriatic arthritis; Pso = psoriasis; TNF = tumour necrosis factor; UV= ultraviolet.

a = missing in 19 patients with Pso only, and 7 patients with Pso+PsA; b = missing in 1 patient with Pso only; c = missing in 44 patients with Pso only, and 7 patients with Pso+PsA

**Table SIII. Odds ratios of possible predictors for concomitant PsA in Pso patients, univariable logistic regression analysis**

		Odds ratio	95% CI	P
Demography				
Female sex		1.07	0.63 – 1.83	0.80
Smoking ever		0.74	0.43 – 1.28	0.28
Physically taxing job		1.25	0.66 – 2.36	0.49
Trauma past year		1.14	0.67 – 1.96	0.63
Family history	Pso	1.15	0.68 – 1.94	0.60
	PsA <sup>a</sup>	1.22	0.62 – 2.42	0.57
Comorbidity	MACE	1.09	0.48 – 2.46	0.83
	Depression	1.31	0.61 – 2.81	0.48
Treatment history				
Non-systemic	UV-therapy	1.36	0.66 – 2.79	0.41
	Dithranol	1.34	0.79 – 2.27	0.28
Conventional Systemic drugs	All	4.72	1.82 – 12.28	0.01
	Methotrexate	5.31	2.44 - 11.58	<0.001
	Acitretin	1.85	1.06 – 3.25	0.03
	Fumaric Acid	1.12	0.66 – 1.88	0.68
	Cyclosporin	1.48	0.79 – 2.78	0.23
Biologicals/ small molecule inhibitors	All	3.80	2.21 – 6.52	<0.001
	TNF-inhibitor	3.91	2.28-6.70	<0.001
	IL17-inhibitor	4.70	1.99 – 11.09	<0.001
	IL23-inhibitor	5.90	0.53 – 65.93	0.15
	IL12/IL23 p40 inh.	2.16	1.15 – 4.07	0.02
	PDE4-inhibitor	2.99	0.73 – 12.24	0.13
Current therapy				
	No systemic	0.39	0.21 – 0.73	0.73
Conventional systemic drugs	All	0.78	0.45 -1.34	0.37
	Methotrexate	0.72	0.39 – 1.32	0.29
	Acitretin	1.09	0.28 – 4.20	0.91
	Fumaric Acid	0.60	0.17 – 2.16	0.44
Biologicals/	All	3.81	2.23 – 6.54	<0.001
	TNF-inhibitor	2.27	1.18 – 4.35	0.01

small molecule inhibitors	IL17-inhibitor	4.36	1.76 – 10.81	0.01
	IL12/IL23 p40 inh.	2.91	0.18 – 47.07	0.45
Skin disease				
At start	Scalp <sup>b</sup>	0.99	0.56 – 1.77	0.98
	Inverse <sup>b</sup>	0.63	0.13 – 3.01	0.57
Ever	Scalp	2.04	0.58 – 7.17	0.27
	Inverse	0.98	0.59 – 1.65	0.95
	Erythroderma	1.68	0.77 – 3.69	0.19
Current	Scalp <sup>a</sup>	1.03	0.61 – 1.72	0.93
	Inverse <sup>a</sup>	0.78	0.40 – 1.51	0.46
Nail disease				
Ever	All <sup>a</sup>	2.32	1.35 – 3.99	0.01
	Pitting	1.73	0.99 – 3.03	0.06
	Oil drop	2.16	1.27 – 3.67	0.01
	Onycholysis	2.83	1.63 – 4.92	<0.001
	Crumbling	2.35	1.40 – 3.93	0.01
	Splinter haemorrhage	0.90	0.47 – 1.72	0.75
Current	Pitting <sup>c</sup>	1.04	0.60 – 1.81	0.88
	Oil drop <sup>c</sup>	0.95	0.55 – 1.65	0.85
	Onycholysis <sup>c</sup>	1.11	0.62 – 2.00	0.72
	Crumbling <sup>c</sup>	0.82	0.46 – 1.46	0.49
	Splinter haemorrhage <sup>c</sup>	0.71	0.37 – 1.35	0.29
Joint complaints				
Ever	Non-trauma joint pain	9.30	2.83 – 30.59	<0.001
	Swollen joints <sup>a</sup>	6.62	3.65 – 12.01	<0.001
	Swollen digit	4.53	2.62 – 7.84	<0.001
	Heel pain <sup>a</sup>	1.54	0.88 – 2.69	0.13
	Heel swelling	1.52	0.70 – 3.29	0.29
Current	Joint pain	2.53	1.26 – 5.09	0.01
	Back pain	1.52	0.90 – 2.54	0.12
	Morning stiffness $\geq$ 30 min	2.47	1.28 – 4.77	0.01

Possible predictors for concomitant PsA were studied using univariable logistic regression. Groups consisted of patients with Pso only (N=225) and patients with Pso+PsA (N=78).

PDE = phosphodiesterase; IL = interleukin; MACE = major adverse cardiovascular event; PsA = psoriatic arthritis; Pso = psoriasis; TNF = tumour necrosis factor.

a = missing in 1 patient with Pso only; b = missing in 19 patients with Pso only, and 7 patients with Pso+PsA; c = missing in 44 patients with Pso only, and 7 patients with Pso+PsA.

**Table SIV. Sensitivity analysis reclassifying suspected patients without referral**

	Univariable	Multivariable
Therapy history: All conventional systemic	7.84 (2.38 – 25.87)	5.42 (1.48 – 19.89)
Therapy history: All biologicals/small molecule inhibitors	3.87 (2.23 – 6.71)	2.70 (1.40 – 5.19)
Current therapy: No systemic	0.31 (0.16 – 0.61)	
Current therapy: Methotrexate	0.71 (0.38 – 1.33)	
Nail disease ever: Pitting/holes	2.24 (1.29 – 3.88)	
Joint complaints ever: Non-trauma joint pain	13.37 (3.18 – 56.13)	5.83 (1.31 – 25.91)
Joint complaints ever: Swollen joints	7.11 (3.83 – 13.19)	4.44 (2.21 – 8.92)
Joint complaints ever: Swollen digits	4.82 (2.76 – 8.42)	2.56 (1.32 – 4.96)
Joint complaints ever: Heel pain	1.57 (0.89 – 2.77)	
Joint complaints current: Joint pain	2.32 (1.15 – 4.68)	
Joint complaints current: Back pain	1.52 (0.90 – 2.57)	
Joint complaints current: Morning stiffness	2.70 (1.39 – 5.23)	
Intercept		-5.87
AUC		0.92

Patients with suspicion of PsA, who were unable to visit a rheumatologist, were categorized as Pso only for this analysis. Parameters with  $P < 0.20$  in univariable logistic regression were entered in a multivariable model. Odds ratios (Pso only versus Pso+PsA) are depicted with 95% confidence intervals.

**Table SV. Results of multivariable logistic regression analysis, active PsA versus Pso only/inactive PsA**

	Univariable	Multivariable	
		Backward	Forward
Comorbidity: depression	2.83 (1.11 – 7.22)		
Treatment history: UV-therapy	6.15 (0.82 – 46.29)		
Treatment history: methotrexate	2.17 (0.80 – 5.88)		
Treatment history: biological/smi	3.53 (1.54 – 8.08)	3.33 (1.44 - 7.71)	2.92 (1.24 – 6.88)
Nail disease ever: holes/pits	2.91 (1.20 – 7.08)		
Joint complaints current: Joint pain	10.31 (1.38 – 77.22)	9.60 (1.27 – 72.38)	7.80 (1.02 – 59.72)
Joint complaints, current: Back pain	2.40 (1.07 – 5.38)		
Joint complaints, current: Morning stiffness	3.81 (1.63 – 8.92)		2.34 (0.96 – 5.70)
Intercept		-4.91	-4.85
Area under curve		0.73	0.75

Possible predictors for active PsA in Pso patients were tested using multivariable logistic regression. After elimination of overlapping variables, predictors with a p-value  $\leq 0.20$  were inserted in the multivariable model. Odds ratios (Pso only/inactive PsA versus active PsA) are depicted with 95% confidence intervals.



**Table SVI. Test performance of referral tool for *active* PsA at different cut-off points**

	2 variable test	3 variable test
Cutoff $\geq$ 1	Sens: 95% Spec: 18%	Sens: 96% Spec: 17%
Cutoff $\geq$ 2	Sens: 50% Spec: 72%	Sens: 71% Spec: 67%
Cutoff $\geq$ 3		Sens: 32% Spec: 93%

The questions in the 2 variable test are:

1. Have you ever used biologicals or small molecule inhibitors for your psoriasis? (i.e. TNF-alpha-inhibitors, IL-17-inhibitors, IL-23-inhibitors, ustekinumab or apremilast)
2. Are you currently having pain in your joints?

In the 3 variable test, an extra question is added:

3. Are you currently experiencing stiffness in joints and muscles upon arising in the morning, that lasts for more than 30 minutes?

**Table SVII. Regression formula**

$$\begin{aligned} \text{Logit(P)} = & -4.89 \text{ (intercept)} \\ & + (1.09 * \text{treatment history with conventional systemics}) \\ & + (1.06 * \text{treatment history with biologics/small molecule inhibitors}) \\ & + (1.44 * \text{patient-reported history of non-trauma joint pain}) \\ & + (1.45 * \text{patient-reported history of swollen joints}) \\ & + (0.87 * \text{patient-reported history of swollen digits}) \end{aligned}$$