

# Development and validation of a measuring instrument for dry skin – the Xerosis Area and Severity Index (XASI)

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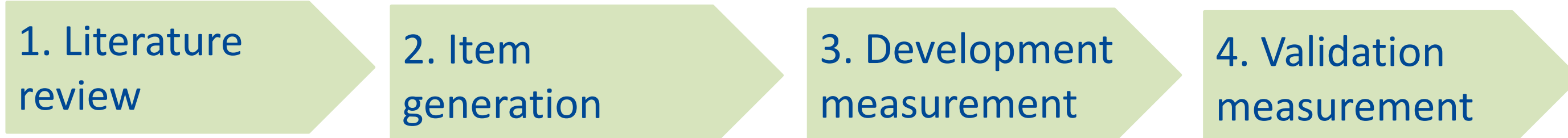
## INTRODUCTION & OBJECTIVES

Dry skin (xerosis cutis) is a frequent condition, affecting around 29.4% of the general population and up to 55.6% in the elderly population<sup>1,2</sup>. Xerosis is a common but unspecific symptom of many skin diseases such as atopic dermatitis, causing discomfort or even a loss of quality of life for the patient<sup>3</sup>. To support clinical practice during the diagnosis and treatment progress of patients with xerosis cutis, the Xerosimeter and the Expert consensus guidelines on xerosis cutis have been developed<sup>4</sup>. Nevertheless, no specific instruments for the quantification of dry skin beyond simple linear scales have been developed.

The aim of this study was the development and validation of a composite measuring instrument for the assessment of the extent and severity of dry skin in clinical practice and research.

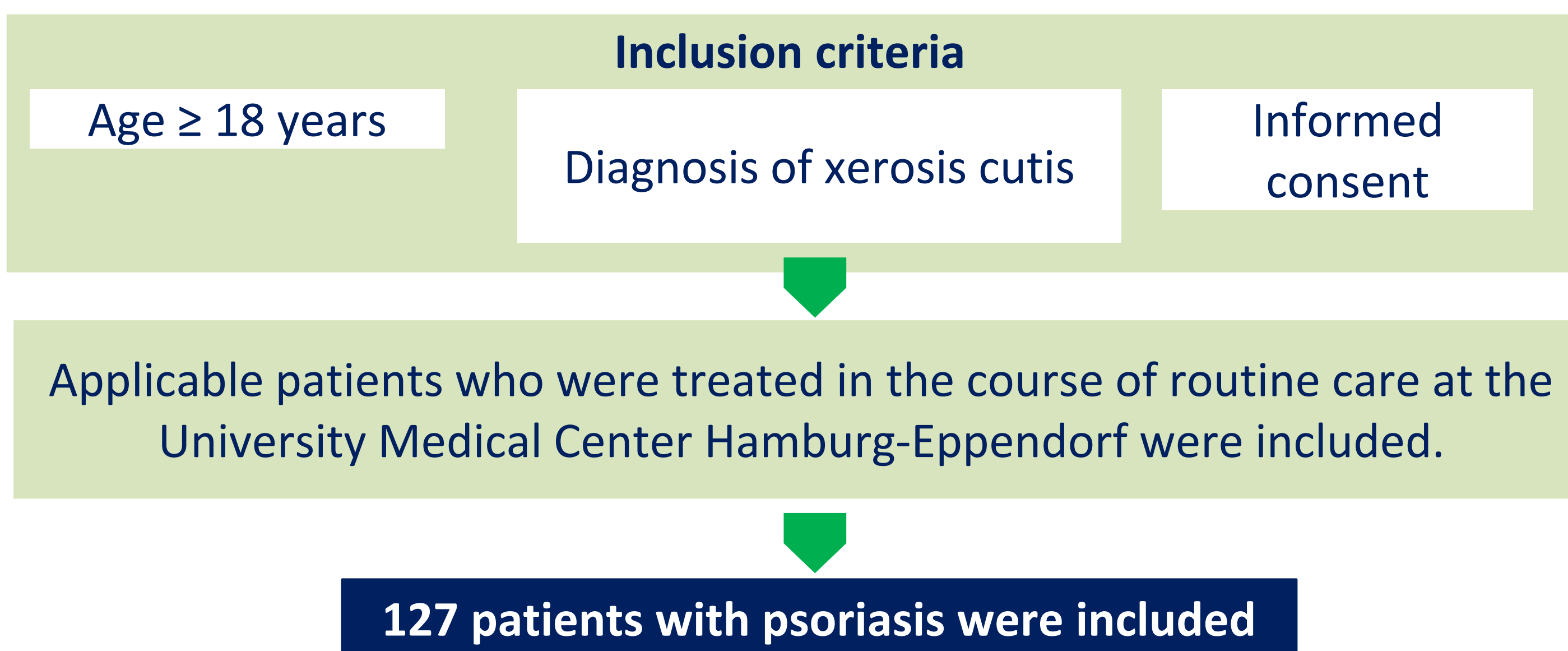
## METHODS

Overall, the study consisted of four phases:



## Study design and patient cohort

The data used in this validation study was collected during an exploratory healthcare study at the Institute for Health Services Research in Dermatology and Nursing (IVDP) at the University Medical Center Hamburg-Eppendorf. Approval was obtained from the ethics committee at the University Medical Center Hamburg – Eppendorf.



## Measures

- Quality of life** Dermatology Life Quality Index (DLQI): 0 (no impairment) to 30 (max. impairment)
- Wellbeing** World Health Organization Quality of Life (WHOQoL-8): 0 (max. impairment) to 100 (no impairment)
- Severity**
  - Xerosis Area and Severity Index (XASI): 0 (no lesions) to 72 (max. severity)
  - Body surface area (BSA): 0 (not affected) to 100 (max. affected)
  - Global clinical assessment (GCA): 0 (absent) to 4 (severe)
  - Physician global assessment (PGA): 0 (no lesions) to 10 (max. affected)
  - Squam Scan: depicts the desquamation index, which is related to the degree of dry skin

## Analyses

After a literature review, the evidence on measurement procedures for dry skin was identified and components of the condition dry skin were explored. Subsequently, leading indicators of dry skin were derived in an expert consensus and transferred into a measurement system. This measurement system is based on previously developed methods such as the PASI (Psoriasis Area and Severity Index) and the EASI (Eczema Area and Severity Index). Instrument properties in terms of validity, reliability and responsiveness were assessed.

## RESULTS

### Patient characteristics

A total of 127 participants were included. Of those, 86 were diagnosed with xerosis cutis (with and without atopic dermatitis) and 41 persons without xerosis (baseline only). Of those with xerosis cutis, 45 (52.3%) had underlying atopic dermatitis (AD) and 41 (47.7%) did not. The majority of participants, 75.6% in patients with xerosis without AD and 82.2% in patients with xerosis and AD, was female. Mean age in patients with xerosis with AD was  $M = 34.4 \pm 12.2$  and  $M = 44.6 \pm 16.8$  for patients with xerosis without AD (constitutional xerosis).

In terms of mean (M), standard deviation (SD), floor and ceiling effects scale characteristics of the XASI show to be acceptable. Cronbach's alpha measure of internal consistency was shown to be good with  $\alpha=0.83$  at t1 and excellent with  $\alpha=0.91$  at t2 (table 1).

Table 1

	N	Mean	SD	Floor %	Ceiling%	Skewness	Reliability t1 (n = 86)	Reliability t2 (n = 70)
XASI	86	7.28	5.62	1.2	0	1.93	0.829	0.906
BSA	86	32.01	24.95	1.2	2.3	0.86	-	-
GCA	86	1.51	0.65	2.3	5.8	0.36	-	-
PGA	86	2.77	1.54	2.3	0	1.04	-	-
DLQI	83	5.65	5.00	8.4	0	1.38	0.873	0.812
WHOQOL-8	83	24.72	5.12	0	0	-1.05	0.864	0.862

SD= standard deviation; t1=measurement time 1; t2=measurement time 2

Significant correlations in the mean range with the BSA ( $r = 0.739$ ), GCA ( $r = 0.466$ ) and PGA ( $r = 0.51$ ) as indicators of concurrent validity, were found for the XASI (table 2). In the XASI, significant differences between the two xerosis groups (constitutional xerosis and xerosis with AD) were found at t1 ( $M = 6.4 \pm 3.5$  xerosis without AD;  $M = 8.2 \pm 7.2$  xerosis with AD;  $p = 0.002$ ) and at t2 ( $M = 4.2 \pm 3.7$  xerosis without AD;  $M = 6.8 \pm 7.6$  xerosis with AD;  $p < 0.001$ ). Significant differences were also shown between patients with xerosis (both groups) and persons without xerosis at t1 ( $M = 7.3 \pm 5.6$  xerosis;  $M = 0.34 \pm 0.7$  without xerosis;  $p < 0.001$ ) confirming known-groups validity. Responsiveness proved to be satisfactory (table 3).

Table 2

Concurrent validity of the XASI with	T1			T2		
	r	p	n	r	p	n
BSA	0.739**	<0.001	86	0.815**	<0.001	70
GCA	0.466**	<0.001	86	0.549**	<0.001	70
PGA	0.510**	<0.001	86	0.531**	<0.001	70
SquameScan	0.198	0.072	84	0.053	0.665	70

Table 3

	Correlation with change (difference T2-T1) in XASI		
	r	p	n
DLQI	0.141	0.255	67
WHOQOL	-0.028	0.824	64
BSA	0.697**	<0.001	70
GCA	0.556**	<0.001	70
PGA	0.588**	<0.001	70
SquameScan	0.177	0.142	70

## DISCUSSION

The newly developed XASI for the assessment of dry skin is valid and useful in practice<sup>5</sup>. It is recommended to use it in conjunction with measuring aids, such as the Xerosimeter that provide a systematic introduction. Additional validation in other languages and transfer to electronic platforms are ongoing in order to allow a broad use of the XASI, which may facilitate a standardized diagnostic evaluation and, ultimately improve quality of life of people affected.

Severity of xerotic focus  
Please circle a number for each of the efflorescences and locations below.  
Characteristics of efflorescences: 0 = none 1 = mild 2 = moderate 3 = severe 4 = very severe

	Head	Trunk	Arms	Legs
1 Erythema	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
2 Lichenification	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
3 Scaling	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
4 Sum				

Affected body area with xerosis  
Please note the affected area for the respective localizations in line 6. Circle the respective numbers in front of the percentages.

	Head	Trunk	Arms	Legs
5 Affected area (Scale 0-6)	0 = none 1 = <10% 2 = 10-29% 3 = 30-49% 4 = 50-69% 5 = 70-89% 6 = 90-100%	0 = none 1 = <10% 2 = 10-29% 3 = 30-49% 4 = 50-69% 5 = 70-89% 6 = 90-100%	0 = none 1 = <10% 2 = 10-29% 3 = 30-49% 4 = 50-69% 5 = 70-89% 6 = 90-100%	0 = none 1 = <10% 2 = 10-29% 3 = 30-49% 4 = 50-69% 5 = 70-89% 6 = 90-100%

