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Validation of the electronic Psoriasis Area and Severity Index application: Establishing measurement equivalence



To the Editor: Despite its many shortcomings, the Psoriasis Area and Severity Index (PASI) remains the standard method worldwide for psoriasis assessment.¹ Several studies have implemented electronic versions without evidence of formal validation, raising the possibility of lack of equivalence with the paper counterpart.² This study compared the conventional paper-based and a novel electronic application version of the PASI (Fig 1). International Society for Pharmacoeconomics and Outcomes Research (ISPOR) guidelines³ were followed to assess rater preference and consistency of scores.

The study used a randomized cross-over design using a within-subjects comparison of the 2 formats of the PASI. The study was conducted at the dermatology outpatient department, University Hospital of Wales, Cardiff, United Kingdom.

Inclusion criteria were patients aged 18 years or older with a clinical diagnosis of chronic plaque psoriasis from a dermatologist and the ability to read and understand English. Raters ranged from medical students to senior trainees and received standardized clinical training for the PASI assessment to ensure uniformity of rating. The study power was 80%, with an expected intraclass correlation coefficient (ICC) of 0.9 ($\alpha = 0.05$), resulting in a target sample size of 44 patients.

All 3 raters showed high correlation in test scores (Pearson correlation, 0.949; $P < .05$; $n = 5$) demonstrating standardization of the assessment criteria. Forty-four patients (59.1% male) were recruited, with a mean \pm standard deviation (SD) age of 45 ± 16 years. The mean duration of chronic plaque psoriasis diagnosis was 19.2 ± 14.8 years (interquartile range, 8-30 years), with PASI severity ranging from 0.7 to 28.5. The ICC showed high concordance between the total PASI scores from paper and the iPad (Apple Inc, Cupertino, CA) format (ICC, 0.993; 95% confidence interval, 0.988-0.996; Table 1). The median difference in PASI scores was also within the hypothesized difference of $CC = 0.993$ ($P = .72$). The lower and higher limits of agreement were -1.4 and 1.4 , respectively.

The PASI iPad version demonstrated reduced interrater variability compared with the paper version (Pearson correlation, 0.982 vs 0.949; 5 patients assessed). There was no carryover effect demonstrated with scores ($P = .82$) or time to completion ($P = .16$) regardless of which format of the PASI was used first.

The raters, using a stopwatch, took a median of 147 seconds (iPad) vs 152 seconds (paper), not including calculation time ($P = .81$). Raters reported that the iPad version was easier to use compared with the paper version due to the visual nature of the application allowing accurate assessment and calculation of severity scores, although suggestions were made to improve the user interface.

The future of medical practice is intricately anchored within the evolution of digital technology. There is high correlation, and thus equivalence, between the PASI iPad and paper versions. The raters preferred the iPad version due to the visual nature of the scoring process and the reduced likelihood of calculation errors. The higher interrater reliability and the inherent advantages of electronic tools⁴ further reinforces the superiority of the digital format. The validated Psoriasis 360 (Janssen EMEA, Beerse Belgium) application, together with the previously validated Dermatology Life Quality Index⁵ component, has the potential to be of considerable value to clinicians, researchers, and patients.

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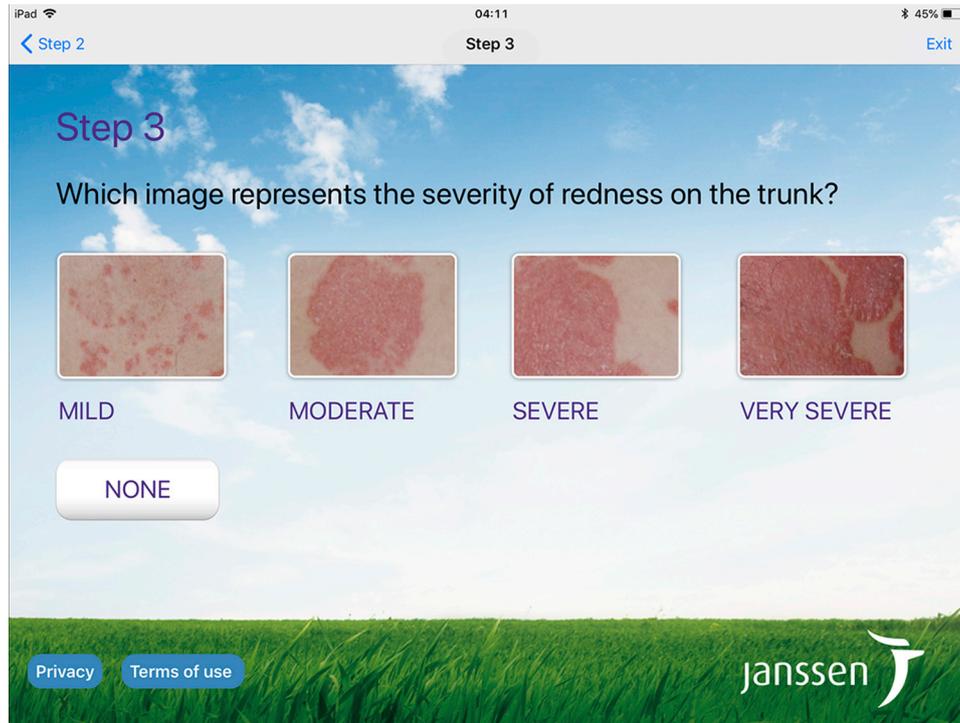


Fig 1. Example screenshot from the Psoriasis Area and Severity Index (PASI) application (Janssen, Beerse Belgium) for the iPad (Apple, Cupertino, CA). Psoriasis 360 is no longer supported by Janssen EMEA. The screenshot is for illustrative purposes only.

Table I. Equivalence analysis of paper and electronic Psoriasis Area and Severity Index (PASI) overall mean scores and mean completion time

Variable	Paper	iPad*	ICC† (95% CI)	Difference (Paper – iPad)	Limits of agreement‡	
	Median (IQR)	Median (IQR)			Lower	Upper
PASI scores (n = 104)	5.7 (2.1-10.7)	5.8 (2.7-9.3)	0.993 (0.988-0.996)	0.0 (–0.3 to 0.4)§	–1.4	1.4
PASI times (min:sec)	2:32 (01:55-03:07)	2:27 (01:54-03:00)	0.444 (0.148-0.665)	–00:10 (–00:31 to 00:40)§		

CI, Confidence interval; ICC, intraclass correlation coefficient; IQR, interquartile range.

*Apple, Cupertino, CA.

†Hypothesizing coefficient of ≥ 0.9 .

‡Limits of agreement calculated from Bland-Altman plots.

§P value > .05 calculated by Wilcoxon signed rank test.

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Conflicts of interest: Dr Ali has received travel expenses for attending American Academy of Dermatology meetings from Janssen-Cilag Limited and has received lecture fees from Leo

Pharmaceuticals. Dr Finlay is joint copyright owner of the Dermatology Life Quality Index, and he and Cardiff University receive royalties. Dr Finlay is a member of a Novartis advisory board and has received lecture fees and travel expenses from Novartis. Dr Piguet undertakes personal advisory work for Pfizer, AbbVie, Janssen, UCB, Novartis, Almirall, and Celgene and has received departmental support from AbbVie, Bausch Health, Celgene, Janssen, LEO Pharma, Lilly, NAOS, Novartis, Pfizer, Pierre Fabre, and Sanofi. Dr Salek has no conflicts of interest to disclose.

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An increase in sunscreen use in a population resistant to sun protection



To the Editor: Keratinocyte carcinoma (KC) is the most common malignant neoplasm diagnosed in the United States. Its incidence is increasing, and sunscreen use is a key tool to prevent it.¹ In this study, we describe sunscreen use among patients who were enrolled in the randomized, controlled Veterans Affairs Keratinocyte Carcinoma Chemoprevention (VAKCC) Trial.² Participants had heavily sun-damaged skin, defined as having at least 2 KCs in the 5 years before the trial. The study enrolled 932 patients with a mean age of 70 years. Most were male (98%) and white (99%). The median duration of follow-up was 2.8 years.

Characteristics of the participants were obtained by interview and examination at enrollment. They had semiannual counseling and visits, received free sunscreen, and were encouraged to use it. Analysis was performed with Stata 14.2 software (StataCorp LLC, College Station, TX).

Sunscreen use was significantly more common among participants who reported inability to tan, freckles, history of severe sunburns, age younger than 70 years, and residence in southern states. Of the sunscreen users, 90% reported using sun



Fig 1. Proportion of participants who reported never using sunscreen while outside during peak hours during the past week.

protection factor ≥ 30 . Our findings confirm that people who are more sun sensitive are more likely to use sunscreen.

At baseline, 71% of participants reported no sunscreen use while outside during peak hours during the past week, and only 19% reported using sunscreen 75% to 100% of the time during the week before enrollment (Fig 1). At 6 months, the proportion of patients who never used sunscreen dropped from 71% to 47%, and the number who almost always used sunscreen doubled from 19% to 37%.

Prior literature reports significant increases in sun protection after a history of skin cancer.³ Only 19% of our population reported sunscreen use at baseline.

Another study observed only a 12% increase in sunscreen users after their consult intervention.⁴ Their population was younger and mainly female.⁴ We consider the increase we observed to be important, because our population was male and older, both of which have been associated with less sun protection.

Sunscreen use is affected by socioeconomic factors.⁵ In our study, sunscreen provision was free, suggesting that no cost might have contributed to the noted increase.

Limitations include the homogenous veteran population and that the effects might not be observed outside of the setting of this trial.

Our results suggest that the combination of no cost with the follow-up and counseling involved in the participation of our trial may have been responsible for the increase in sunscreen use even in a population resistant to sun protection.

Appendix: Key personnel of the VAKCC Trial is available at <https://data.mendeley.com/datasets/8w3cy2txw6/draft?a=81889ed9-415a-4620-b37d-26b2a6d8e305>.

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