Validation of the electronic version of the Dermatology Life Quality Index (DLQI)

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INTRODUCTION

There has been increasing use and validation of electronic patient reported outcome measures (ePROs) in digital formats, such as tablets¹. However, not all ePROs are adequately tested, raising concerns of reliability. The aim of this study was to compare the conventional paper-based and novel iPad® versions of the Dermatology Life Quality Index (DLQI)² in terms of score equivalence and patient preference.

METHODS

The study used a randomized cross-over design using a within-subjects comparison of the two formats of the DLQI questionnaire (Fig. 1). International Society for Pharmacoeconomics and Outcomes Research (ISPOR) guidelines were followed. Subjects aged over 18 years with any confirmed skin condition were recruited from a teaching hospital dermatology outpatient clinic. Hypothesised Intra-class correlation coefficient (ICC) was 0.9 ($\alpha = 0.05$).

Figure 1 Flow diagram of the study procedure

THE DLQI

The DLQI consists of 10 items concerning a dermatological patient’s perception of the impact of their skin disease on different aspects of their quality of life (QoL) over the last week. The items of the DLQI include symptoms and feelings, daily activities, leisure, work or school, personal relationships and the side effects of treatment. Each item is scored on a 4-point scale: not at all/not relevant, a little, a lot and very much. Scores of individual items (0-3) are added to yield a total score (0-30); higher scores mean greater impairment of a patient’s QoL. The DLQI has been shown to be a strong instrument with respect to its internal consistency, reproducibility, validity and sensitivity to change³⁻⁵. The DLQI is the most widely used patient-reported outcome measure in dermatology worldwide⁶.

THE IPAD APPLICATION

The DLQI was developed into an electronic application (Fig. 2) on the iPad® by Janssen EMEA® in conjunction with the Dermatology team in Cardiff University. Only this particular iOS version was tested for the purpose of studying equivalence. The individual items and their response categories/scale were unchanged, allowing users to select options using touch. The application (Psoriasis 360©) is available without charge and may be downloaded from the Apple App Store or Google (Android) App Store.

RESULTS

A total of 104 patients took part and completed the study, median age=53.5 years (IQR=37.3-67.8, 43% male). The most common diagnoses were psoriasis (39%), ‘skin lesion’ (19%) and eczema (13%). The majority of patients (61%) had their highest level of education at school. 17% of patients had never used a tablet before and 46% stated that they were “a little” or “not” comfortable with a tablet prior to participating in this study. The Intraclass Correlation Coefficient (ICC) showed high concordance between the total DLQI scores from paper and iPad® versions (ICC = 0.98; 95% CI 0.97-0.99). Patients took a median of 78 seconds to complete the electronic version and 73 seconds for paper (Table 1, p=0.008): 76% preferred the electronic version and perceived completion to take a shorter time. On a scale of 1 to 10, where 1 is very uncomfortable/uneasy and 10 is very comfortable/easy, patients found both paper and iPad® versions were easy (mean 9.4 ± 1.3 for paper and 9.6 ± 1.3 for iPad®) and comfortable to use (mean 9.4 ± 1.1 for paper and 9.6 ± 1.4 for iPad®).

Figure 2 ‘Psoriasis 360’: Screenshot of the iPad App

	All (n=104)	Paper First (n=57)	iPad® First (n=47)
Paper Score: Median (IQR) Min and max	5 (1-12) 0 – 30	5 (1-12.5) 0 - 26	6 (1-12) 0 – 30
iPad® Score: Median (IQR) Min and max	4 (1-11) 0 - 27	4 (0.5-10) 0 - 26	6 (1-12) 0 – 30
Paper Time (mins:seconds): Median (IQR) Min and max	01:13 (00:56-01:36) 00:28 – 04:15	01:24 (01:06-01:40) 00:28 – 04:15	01:03 (00:50-01:29) 00:30 – 02:49
iPad® Time (mins:seconds): Median (IQR) Min and max	01:18 (01:03-01:39) 00:35 – 08:24	01:13 (00:58-01:27) 00:35 – 08:24	01:25 (01:09-01:53) 00:49 – 02:49
Score difference: Median (IQR) Min and max p value Carryover effect	0 (0-1) (-3) – 11 0.006†	0 (0-1.5) (-2) -11	0 (0-0) (-3) – 5 0.56†
Time difference (mins:seconds): Median (IQR) Min and max p value Carryover effect	-00:09 (-00:25-00:13) (-06:45) – 00:58 0.008†	00:09 (-00:09-00:23.5) (-06:45) – 00:58	-00:26 (-00:46- -00:11) (-01:53) – 00:16 0.76†

Table 1 Equivalence and carryover analysis of paper and electronic DLQI

CONCLUSIONS

The results demonstrate score equivalence between the iPad and paper versions of the DLQI⁷ and a clear patient preference for the iPad version. This has wider and reassuring implications for PROs within dermatology, across other medical specialties and within research where electronic PROs are often implemented without proper validation. It is hoped these results further encourage the development and utility of electronic applications, especially in routine clinics⁸, with the medium’s inherent advantages having the potential to significantly impact medical practice.

Conflict of Interest: AYF is joint copyright holder of the DLQI. Cardiff University and AYF receive royalties.
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