

## Impact case study (REF3)

<b>Institution:</b> Cardiff University		
<b>Unit of Assessment:</b> Clinical Medicine (1)		
<b>Title of case study:</b> Global adoption of the Dermatology Life Quality Index into clinical practice		
<b>Period when the underpinning research was undertaken:</b> 2005 – 2017		
<b>Details of staff conducting the underpinning research from the submitting unit:</b>		
<b>Name(s):</b>	<b>Role(s) (e.g. job title):</b>	<b>Period(s) employed by submitting HEI:</b>
Finlay, Andrew Ali, Faraz Piguet, Vincent	Professor Clinical Research Fellow Clinical Professor	01/01/1999 – present 02/01/2013 – present 01/08/2010 – 31/7/2017
<b>Period when the claimed impact occurred:</b> 2014 – 2020		
<b>Is this case study continued from a case study submitted in 2014?</b> Yes		
<p><b>1. Summary of the impact</b> (indicative maximum 100 words)</p> <p>Dermatological conditions cause patient suffering and poor quality-of-life. Prior to Cardiff research, no standard method existed to assess the impact of skin diseases on patient wellbeing. The Cardiff-developed Dermatology Life Quality Index (DLQI) is now a vital clinical assessment tool, licensed for use 1601 times in the current REF period. The DLQI is also part of 15 new NICE Technology Appraisals and has been included in clinical practice guidelines in a further 31 countries worldwide. DLQI licence revenues currently stand at £3.5 million during this REF period, complementing extensive use (free of charge) by the NHS and other non-profit organisations.</p>		
<p><b>2. Underpinning research</b> (indicative maximum 500 words)</p> <p>Skin conditions, such as eczema, psoriasis and atopic dermatitis, affect around 60% of the adult population in the UK at some point in their lifetime (<i>British Skin Foundation</i>), and these can severely impact quality-of-life, as well as patient wellbeing. To support enhanced consideration of patient disability and wellbeing, the Dermatology Life Quality Index (DLQI) was developed by researchers at Cardiff University, via research published in 1994. This simple-to-use questionnaire focuses on patients' perception of the impact of skin diseases on different aspects of their health-related quality-of-life over the previous week.</p> <p><b>2.1 The history of the Dermatology Life Quality Index</b></p> <p>Between 2002 and 2004, the DLQI was further developed by research undertaken in almost 2,000 patients, with the publication of validated score bandings designed to enhance its use with patients, specifically with a score above 10 reflecting a major impact of disease on quality-of-life [3.1]. As stated in the prior REF2014 impact case on the DLQI, “<i>This breakthrough meant that the DLQI could be used to enhance appropriateness of clinical decisions, to audit dermatology services, to assess new drugs and to inform resource allocation</i>”. The Cardiff research also ensured that psoriasis severity could be usefully defined using DLQI scores [3.2].</p> <p><b>2.2 New research enhancing global reach and clinical applicability</b></p> <p>Subsequent to these DLQI publications, the Cardiff team undertook additional extensive research designed to enhance the utility of the DLQI in clinical settings, broadening its global reach and variety of clinical applications, including into clinical trials and drug development studies. Specific research outcomes from these studies included:</p> <p><b>a. Improved sensitivity</b></p> <p>To enhance the sensitivity of the DLQI to meaningful improvements in quality-of-life reported by patients, the Cardiff team refined the interpretation of the DLQI's Minimal Clinically Important Difference (MCID) score [3.3]. The MCID is the smallest change in the clinical assessment that can be used to determine response to therapy or a need to alter patient</p>		

management. Refinement of the DLQI altered the MCID from 5 to 4, which improved the DLQI's validity, reliability and interpretation of change. Specifically, this outcome meant that a treatment intervention scoring 4 (rather than 5) on the DLQI would be considered to have made a difference to a patient's quality-of-life. This improved the utility of the DLQI as a clinical management tool and prevented an underestimate of the clinical response to therapy [3.3].

#### **b. Digital delivery of the DLQI**

The Cardiff team noted that clinicians were increasingly using non-validated electronic versions of the DLQI, in line with a general increase in the use of patient-reported measures in electronic format. There was a concern about whether underlying data from the electronic versions were comparable with those from the validated paper DLQI. In a study of patients from a hospital dermatology outpatient clinic [G3.1], the Cardiff team validated the digital delivery and completion of the DLQI on iPads in comparison to paper format, demonstrating that patients answered both questionnaires in a similar way [3.4]. In addition to providing patients with an alternate validated version of the DLQI, the e-format DLQI provides opportunities for real-time monitoring of quality-of-life and an easier transfer of data to patient records.

#### **c. Linking the DLQI to health utility estimates**

Health utility estimates provide a measure of a patient's preference for a given health-related outcome. These are often used in health economic models and by pharmaceutical companies to demonstrate the value of a health intervention. Previously it wasn't possible to calculate health utility values from the DLQI. Instead, to calculate these for skin conditions, a generic health instrument, such as the European Quality of Life-5 Dimension (EQ-5D), was required. Use of multiple measures can be burdensome for patients and clinicians, however, and there are often challenges integrating data from more than one measure.

The Cardiff team developed a new validated method to calculate EQ-5D data and utility values from DLQI scores, removing the need to administer multiple measures [3.5]. They used data from a multicentre European study investigating more than 24 skin diseases and involving over 4,000 participants, on which Finlay acted as a Study Advisor [3.6]. The new validated method [3.5] enables disease-specific DLQI data to be mapped onto health utility measures, which can then be used in economic analyses, increasing the value of DLQI data (e.g., in the evaluation of drug efficacy in clinical trials (see section 4), and in regulatory approvals by European and international agencies).

In summary, Cardiff research enhanced the applicability of the DLQI in clinical and health economic settings by improving the DLQI's sensitivity in identifying meaningful differences in quality of life for patients, by validating the utility of an electronic version of the DLQI as an alternative to the paper format and enabling health economic measures to be calculated directly from DLQI data.

### **3. References to the research** (indicative maximum of six references)

[3.1] Hongbo Y, Thomas C L, Harrison M A, Salek M S, **Finlay A Y**. (2005) Translating the science of quality of life into practice: what do Dermatology Life Quality Index scores mean? *Journal of Investigative Dermatology* 125: 659-664. PMID: 16185263. DOI: 10.1111/j.0022-202x.2005.23621.x

[3.2] **Finlay A Y**. (2005) Current severe psoriasis and the Rule of Tens. *British Journal of Dermatology* 152: 861-867. PMID: 15888138. DOI: 10.1111/j.1365-2133.2005.06502.x

[3.3] Basra MK, Salek MS, Camilleri L, Sturkey R, **Finlay AY**. (2015) Determining the minimal clinically important difference and responsiveness of the Dermatology Life Quality Index (DLQI): Further data. *Dermatology* 230(1): 27-33. DOI: 10.1159/000365390

[3.4] **Ali FM**, Johns N, **Finlay A**, Salek MS, **Piguet V**. (2017) Comparison of the paper-based and electronic versions of the Dermatology Life Quality Index (DLQI): evidence of equivalence. *Br J Dermatol* 117: 1306-15. DOI: 10.1111/bjd.15314

**[3.5]** Ali FM, Kay R, Finlay AY, Piguet V, Kupfer J, Dalgard F, Salek MS. (2017) Mapping of the DLQI TO EQ- 5D Utility Values using ordinal logistic regression. *Quality of Life Research* 26(11): 3025-3034. DOI: 10.1007/s11136-017-1607-4

**[3.6]** Dalgard FJ, Gieler U, Tomas-Aragones L, Lien L, Poot F, Jemec GB, Misery L, Szabo C, Linder D, Sampegna F, Evers AW, Halvorsen JA, Balieva F, Szepietowski J, Romanov D, Marron SE, Altunay IK, Finlay AY, Salek SS, Kupfer J. (2015) The psychological burden of skin diseases: A cross-sectional multicenter study among dermatological out-patients in 13 European countries. *J Invest Dermatol* 135(4): 984-91. DOI: 10.1038/jid.2014.530

#### Selected grant:

**[G3.1]** Finlay AY and Piquet V. *Comparison of the paper-based and web-based application versions of the Dermatology Life Quality Index (DLQI) and Psoriasis Area and Severity Index (PASI)*, Janssen, £41,038.

#### 4. Details of the impact (indicative maximum 750 words)

Prior to Cardiff's development of the DLQI, including the generation of validated score bands for enhanced clinical use **[3.1]**, there was no simple, and standardised quality-of-life measure for the clinical assessment of dermatological conditions. Highlighting the vital importance of the DLQI, the World Health Organisation notes that the questionnaire "*is currently the most frequently used method of evaluating quality of life for patients with different skin conditions*" **[5.1, p.18]**. Further systematic review validated the DLQI as the most commonly used instrument for quality-of-life assessment in psoriasis **[5.2]**.

The 2005 publication of new, simple, quality-of-life assessment bandings accelerated DLQI's use in clinical settings, including increased use of the DLQI by the pharmaceutical industry as part of drug development studies. Inclusion of the DLQI in critical national and international guidelines, as well as the successful move towards a digital format (see section 4.2), further extended the reach of the tool, across multiple countries, generating new income for Cardiff University.

##### 4.1 Increased use of the DLQI in drug development and clinical trials

During this REF period, 1601 licences for the DLQI were issued, of which 826 were for commercial use, generating revenue of over £3.5 million (with annual revenue increasing year on year) **[5.3]**. Since Cardiff's validation of the e-format DLQI in 2017 **[3.4]**, 314 requests were granted for use of an e-format DLQI between 2018 and 2020, compared to 82 requests between 2013 and 2016 prior to validation **[5.4]**. Licenses purchased by pharmaceutical companies are typically used for clinical trials, contributing to the successful development approval of novel biologics for dermatological conditions. For example, the DLQI was a key patient reported outcome measure in the Sanofi funded Phase III trials SOLO 1 and 2, CHRONOS and CAFÉ, which tested the effectiveness of dupilumab in patients with moderate to severe atopic dermatitis **[5.5]**. Based on successful trial outcomes, dupilumab was approved for use by NICE with the DLQI recommended as the sole quality of life measure for treatment efficacy **[5.6]**. Furthermore, the trials made use of the new Cardiff-led MCID score of 4 rather than 5 **[3.3]**, ensuring patient benefit from dupilumab intervention was accurately recorded.

The Cardiff team's new validated method to calculate EuroQol (EQ-5D) data and utility values from DLQI scores **[3.5]**, which then feed into health economics analyses, has been requested 15 times by pharmaceutical companies and researchers undertaking clinical trials in this REF period (detailed information cannot be provided due to confidentiality agreements) **[5.4]**.

##### 4.2 Inclusion of the DLQI in national and professional guidelines

The DLQI is utilised worldwide and forms part of national guidelines and treatment registries for a diversity of dermatological conditions in 45 countries. Thirty-one of these country guidelines/registries are new recommendations added between 2014 and 2019, a more than 100% increase from the last REF period. Additional countries since the prior REF 2014 case,

with national guidelines that recommend use of DLQI for skin diseases, include the USA, New Zealand, China, Germany, France, as well Brazil, Chile, and Venezuela [5.7].

As noted in the REF 2014 case, NICE recommended the use of the DLQI for clinical monitoring and informing clinical decisions of patients with severe psoriasis and hand eczema in England and Wales. Within the current REF period, the DLQI score was additionally included as part of recommendations in 15 further NICE Technology Appraisals and Evidence Summaries, as a clinical threshold for treatment decisions or sensitive indicator of response for other dermatological conditions (e.g., atopic dermatitis, hidradenitis suppurativa, psoriatic arthritis, hyperhidrosis and rosacea) [5.6]. Additionally, the NICE clinical guideline for psoriasis (CG153) was reviewed in late 2017, with the DLQI the single assessment measure noted for use in the condition, specifically as a “*validated tool to assess the impact of any type of psoriasis on physical, psychological and social wellbeing*” [5.6].

#### 4.3 Establishing global use of the DLQI

Over the REF period, there have been a further 34 validated translations of the DLQI, and it is now available in 125 languages [5.8]. As a result, the DLQI has now been used in research studies and clinical trials in 62 countries, covering over 70 diseases.

The DLQI was recommended as a core outcome measure for all clinical research studies and in the assessment and management of atopic eczema by the Harmonizing Outcome Measures for Eczema (HOME) group [5.9]. HOME includes over 300 members across the world (e.g., patients, healthcare professionals, journal editors, regulatory authorities and pharmaceutical companies) and focuses on identifying the best consensus-based outcome measures for clinical research and management of atopic eczema [5.9].

The critical importance of the DLQI is further illustrated by its wide use as the “gold standard” with which to cross validate new measures, with 44 published new measures validated against the DLQI within the 2014-2019 period [5.10]. These measures include both patient-reported outcome measures and other disease activity measures, and cover conditions such as alopecia, atopic dermatitis, albinism, and non-melanoma skin cancer.

Since REF2014, the DLQI has become a widely used international assessment tool, benefiting a wide range of stakeholders, including patients, clinicians and pharmaceutical companies. This is reflected in its inclusion in a large number of guidelines worldwide. As a critical outcome measure for drug development and clinical trials, licensing revenue increased over the REF period. The critical role DLQI plays in routine clinical practice is well-evidenced, with an editorial from the Journal of the European Academy of Dermatology and Venereology stating: “*Andrew Finlay and his team have given a voice to all our patients in everyday consultation. This contributes to a new way of practicing medicine and dermatology, putting the patient in the centre, making a person-centred consultation*” [5.11].

#### 5. Sources to corroborate the impact (indicative maximum of 10 references)

[5.1] Michalek M, Loring B. *WHO Global Report on Psoriasis*. WHO Press, Geneva 2016

[5.2] Ali F, Cueva A, Vyas J, Atwan A, Salek S, Finlay A, Piquet V (2017) A systematic review of the use of quality-of-life instruments in randomised controlled trials for psoriasis, *British Journal of Dermatology*: 176: 577-593

[5.3] Licensing numbers and values for the DLQI: Spreadsheet for 2013-14 and letter from University College Cardiff Consultants Ltd for 2014-2020 years

[5.4] Letter confirming use of e-format DLQI and use of validated method to calculate EuroQol (EQ-5D) data

[5.5] 3 papers describing the DLQI use in Sanofi dupilumab clinical trials SOLO 1, SOLO 2, CAFÉ, CHRONOS, LIBERTY AD CHRONOS, and LIBERTY AD CAFÉ

[5.6] DLQI features in NICE Technology Appraisals and Evidence Summaries TA511, TA521, TA534, TA419, TA180, TA475, TA575, TA574, TA350, TA392, TA442, TA340, TA596, ESNM68, ES10, and CG153

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- [5.7]** Singh RK, Finlay AY. DLQI use in skin disease guidelines and registries worldwide. *J Eur Acad Dermatol Venereol*. 2020 June; online ahead of print. doi: 10.1111/jdv.16701
- [5.8]** DLQI webpage confirming numbers of language translations of the DLQI within current REF period
- [5.9]** DLQI recommendation by HOME as a core outcome measure for skin specific quality of life
- [5.10]** Use of the DLQI for the validation of new measures (44 examples)
- [5.11]** Poot F. Broader concepts of quality-of-life measurements, encompassing validation-AY Finlay. *J Eur Acad Derm Venereol* 2017; 31(8): 1247-1247