

The validity and reliability of the occupational contact dermatitis disease severity index

NATHAN CURR¹, SHYAMALI DHARMAGE², TESSA KEEGEL³, ADRIENE LEE¹, HELEN SAUNDERS¹ AND ROSEMARY NIXON¹

¹Occupational Dermatology Research and Education Centre, Skin and Cancer Foundation Inc., and ²Centre for Molecular, Environmental, Genetic and Analytic Epidemiology, School of Population Health and ³Centre for Health and Society, School of Population Health, The University of Melbourne, Melbourne, Victoria, Australia

Background: The occupational contact dermatitis disease severity index (ODDI) was designed to assess the severity and importantly the functional disability caused by occupational contact dermatitis (OCD) of the hands in patients attending our occupational dermatology clinic.

Objectives: To investigate the accuracy of the ODDI.

Patients/Methods: Of 205 patients, 95 were assessed as having OCD of the hands. Content validity was assessed by content mapping and expert opinion. Construct validity was examined through comparing the ODDI against global clinical dermatology severity assessment (GCDSA). Intraobserver reliability, interobserver reliability, internal consistency, acceptability and convenience were also assessed.

Results: The ODDI was found to have content validity by the experts and was moderately correlated with GCDSA, supporting construct validity (Pearson's $r = 0.54$; $P \leq 0.01$). The ODDI was shown to be reliable with substantial agreement for both intraobserver reliability [intraclass correlation coefficient (ICC) = 0.62] and interobserver reliability (ICC = 0.75). Internal consistency within the ODDI was almost perfect (ICC = 0.94–0.99) and user survey showed the ODDI to be acceptable, easy and quick to use.

Conclusions: The ODDI is a valid and reliable instrument to assess the severity and functional limitations caused by OCD, in patients who have had treatment or modified work duties, associated with some improvement of their dermatitis.

Key words: allergy; disability; functional limitations; hand eczema; irritation; persistent; severity scale; work. © Blackwell Munksgaard, 2008.

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Occupational skin disease is a major health and safety issue and has been reported to be responsible for almost 15% of total workplace injuries (1), with contact dermatitis of the hands comprising of 90–95% of all occupational skin disease (2). Currently, the impact of occupational contact dermatitis (OCD) on an individual may be measured in terms of days lost from work or the cost of a workers' compensation claim. However, many workers with OCD do not take time off work (3). In Australia, there is evidence that a significant proportion of workers with OCD do not claim workers' compensation (4). Therefore, there is a need to assess the occupational impact of this

condition on an individual, with a formal and reproducible measurement of both its severity and associated functional limitations. This is especially relevant in view of reports suggesting that almost half of all patients with OCD of the hands develop persistent dermatitis, causing time off work and job changes (2). We have recently described a case series of workers with persistent post-occupational dermatitis (PPOD) (5).

There are no published, validated indices that measure both the severity and the functional limitations associated with OCD of the hands. Existing and validated measures of disease severity, such as the psoriasis area and severity index

(PASI) (6) and the scoring atopic dermatitis (SCORAD) index (7), rely heavily on body surface involvement, while OCD is usually limited to the hands. These indices were primarily developed for other skin diseases, psoriasis and atopic eczema, respectively, and are therefore not validated for use in OCD of the hands. Of the recently published severity scales for use by the physician in the assessment of hand eczema, the hand eczema severity index (HECSI) (8), the photographic guide for assessing severity of chronic hand dermatitis (9), and the Osnabrueck hand eczema severity index (OHSI) (10), although well developed, have only been examined in respect to reliability, not validity. Also, all these scales (8–10) are limited in their ability to assess functional limitations and therefore overall disease severity, which we find to be important in our clinic.

The aim of this study was to develop an index for the measurement of the disease burden of OCD involving the hands among patients attending a tertiary referral OCD clinic. We report on the development and both the validity and reliability of the occupational contact dermatitis disease severity index (ODDI) and show its preliminary usage in 95 workers with OCD attending our clinic.

Patients and Methods

Instrument development

The ODDI was based on the 'Impairment Classes and Percents for Skin Disorders' in the Guides to the Evaluation of Permanent Impairment, 4th Edition (American Medical Association) (11). This was adapted and developed from discussion of expert members of a tertiary OCD clinic, including an Australian dermatologist/occupational physician, an overseas trained dermatologist, a dermatology research fellow, the project epidemiologist and a dermatology/occupational health nurse. Permission for this adaptation was granted from Copyright Permissions of the American Medical Association.

Clinical assessment

The ODDI (Appendix) includes assessment in four areas: disease course, response to treatment, clinical signs at the time of assessment and work-related activities. These four areas are split into two sections to create both a clinical assessment of disease severity (disease course, response to treatment and clinical signs) and an assessment of the impact of OCD on work-related activities. Both sections are scored from 1 through to 5. To create an ODDI score, the two scores are added

together to give a score range of 2–10. The ODDI was assessed after workers had attended the OCD clinic for patch testing.

Patient selection

All patients participating in the study had been referred to a tertiary OCD clinic, in Melbourne, Australia, from a source population of approximately 5 million. From the 205 patients assessed at the clinic during the project period October 2002 through to November 2004 and on whom an ODDI had been performed, 95 patients were assessed to have OCD of the hands that were significantly aggravated by work and so were used as the sample population. Patients excluded were those whose dermatitis was assessed as not work related ($n = 37$), or partially work related ($n = 28$), those in whose OCD was not hand related ($n = 35$) and those who did not give consent to participate ($n = 10$). Of the sample population ($n = 95$), there were 48 males and 47 females, and 56 had a background of atopy.

Statistical analysis

The aim of this study was to evaluate the validity and reliability of the ODDI and two techniques were used for this purpose: validity was assessed with Pearson's product moment correlation coefficient (Pearson's r) and reliability was assessed with intraclass correlation coefficient (ICC).

Pearson's product moment correlation coefficient (Pearson's r) measures the agreement between two measures for continuous data. The coefficient value varies between 0 and 1 and the higher the coefficient the higher the agreement between the two measures. A coefficient greater or equal to 0.70 is considered to be high (12).

ICC is conceptualized as the amount of variance in the patients' scores that is attributable to the true variance among patients. ICC value can vary between 0 and 1. The higher the value the lower the variance between the raters, and ICC will approach 1 when there is no variance within patients (e.g. all raters give the same score). There are no universally applicable standard values for the ICC that represent adequate agreement (13). However, a coefficient of equal or greater to 0.61 can be interpreted as substantial agreement (13). A variety of ICCs are available depending on the design of the study (14). The appropriate model selected will depend on the source of variance (patients and/or raters), the scores (any two rater scores versus the average rating for k judges) and the type of reliability (consistency versus agreement) required.

We used a two-way analysis of variance to obtain the variance components used to calculate the ICC. The following formula was used to calculate the absolute agreement between any two ratings:

$$\text{ICC} = (\text{MS}_R - \text{MS}_E) / [\text{MS}_R + (k - 1)\text{MS}_E + k/N(\text{MS}_C - \text{MS}_E)]$$

where MS_C is the mean square for columns (raters); MS_R , mean square for rows (patients); MS_E , mean square error; k , number of raters and N , number of patients.

All results of statistical analysis in this paper were gained from either SAS/STAT, version 8.2 (SAS Institute Inc., 1999–2001, Cary, NC, USA) or SPSS version 11 (SPSS Inc., Chicago, IL, USA).

Ethics

This study was approved by the Human Research Ethics Committee based at St Vincent's Hospital, Melbourne, Victoria, Australia (HREC 027/02). All patients used in this study gave their consent at initial presentation.

Validity

To ensure the ODDI measured what it was intended to measure, content and construct validity were assessed.

Content validity

Content validity addresses the question whether the scale includes features that are deemed to be important features for that disease (15). Content validity was considered in the formation of the ODDI. Mapping of content area (Table 1) and the expert opinion of the staff ($n = 5$) of a tertiary referral OCD clinic were used to provide content validity (16).

Construct validity

Construct validity addresses whether the scale agrees with other measures of the same disease con-

struct (15). It appraises the appropriateness of an index to fulfil its intended role (17). To this purpose, construct validity was assessed by comparing the ODDI against global clinical dermatology severity assessment (GCDSA) also referred to as physician global assessment, which is a four-tier rating scale (no disease = 0, mild = 1, moderate = 2, and severe = 3) (18). Thirty one randomly selected clinic files from the sample population ($n = 95$) were selected to assess the construct validity. The patients were rated by an Australian dermatologist/occupational physician using GCDSA (18). The same dermatologist/occupational physician, using the ODDI, then independently rated the files. Agreement was calculated between the two using Pearson's r .

Reliability

To ensure there were similar measurements for the same patient when using the ODDI, internal consistency, interobserver and intraobserver agreement were assessed.

Internal consistency

Internal consistency addresses whether the different items of a scale correlate with each other and with the total score, so that they measure the same attribute (15).

To assess the internal consistency of the ODDI, the two sections of the ODDI (the clinical assessment of disease severity and the assessment of work-related activities) were assessed for correlation against each other and with the total ODDI score. The correlation was examined using ICC.

Interobserver agreement

This addresses how well two measurements performed on the same person agree when recorded by different observers (15). From the sample population ($n = 95$), 15 randomly selected files were used to test for interobserver reliability of the ODDI. Three observers of varying dermatological experience participated. They included an Australian dermatologist/occupational physician, an overseas trained dermatologist, and a dermatology/occupational health nurse. The observers independently rated the same study participant at a single point in time for severity and functional impairment associated with OCD of the hands.

Intraobserver agreement

This addresses how well two measurements performed by the same observer agree (15). Intraobserver reliability was assessed by re-assessment of

Table 1. Content mapping of the occupational contact dermatitis disease severity index

Occupational	
Function	✓
Gloves	✓
Change of duties	✓
Change of occupation	✓
Clinical severity	
History of disease course	✓
Treatment	✓
Clinical signs at time of assessment	✓
Function	✓

31 randomly selected cases from the sample population ($n = 95$) by the Australian dermatologist/occupational physician who was blinded to their initial assessment scores using ICC.

Acceptability/convenience

This addresses how acceptable in terms of time or convenience or comfort is the instrument to those using it and to those being measured (15).

Acceptability/convenience was assessed using a questionnaire, which was given to the three assessors that participated in the assessment of the interobserver reliability of the ODDI. The questions were the average time taken for assessment and the ease of use (excellent, good, average or poor).

Results

Study population

Among the 95 subjects, ODDI scores ranged from 2 to 8 with a mean of 5.6 and a standard deviation (SD) of ± 1.4 . The scores were fairly normally distributed. Figure 1 presents the box plot of the ODDI scores of the 95 subjects included in the study.

Validity

Content validity. Table 1 shows how content mapping helped to provide content validity to the ODDI, displaying mapping of both the occupational and severity content.

Construct validity. The population description and their mean ODDI and GCDSA scores are given in Table 2. Among the 31 subjects who participated in the construct validity component, the

Table 2. Description of ODDI and GCDSA scores^a

	Whole sample ($n = 31$)	Men ($n = 13$)	Women ($n = 18$)	<i>P</i> value
Age	32 $\pm$ 10.6	36.8 $\pm$ 11.4	29.1 $\pm$ 9.2	0.04
ODDI score	5.71 $\pm$ 1.52	5.63 $\pm$ 1.51	5.78 $\pm$ 1.68	0.79
GCDSA score	2.07 $\pm$ 0.63	2.23 $\pm$ 0.60	1.94 $\pm$ 0.64	0.21

ODDI, occupational contact dermatitis disease severity index; GCDSA, global clinical dermatology severity assessment.

^aValues are given as mean $\pm$ SD.

ODDI scores ranged from 2 to 8 with a mean of 5.71 and an SD of ± 1.52 . The mean global clinical severity assessment score was 2.07 with an SD of ± 0.63 . Pearson's r was 0.54 ($P = 0.002$) suggesting moderate correlation, thus supporting construct validity for the ODDI.

Reliability

Internal consistency. The correlation of scores between the two sections of the ODDI and then between each section and the total ODDI score ranged from 0.94 to 0.99 (all $P < 0.001$) as can be seen in Table 3.

Interobserver agreement. The ICC ($n = 15$) for interobserver reliability of the ODDI was 0.62 with 95% confidence interval of 0.38–0.81 ($P = 0.0001$), therefore suggesting substantial interobserver agreement of the ODDI.

Intraobserver agreement. The ICC ($n = 95$) between the observers was 0.75 with 95% confidence interval of 0.32–1 ($P = 0.0001$) showing substantial intraobserver reliability of the ODDI.

Acceptability/convenience. The average time taken was 2 min. Two assessors thought the ODDI was good and one assessor thought the ODDI was excellent in terms of ease of use.

Discussion

In this study, we have developed and investigated the accuracy of a tool for the assessment of overall disease severity and functional limitations caused

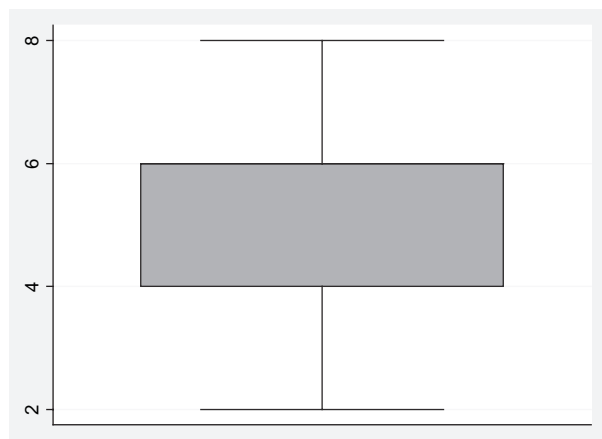


Fig. 1. The box plot of the ODDI scores of the total sample ($n = 95$).

Table 3. Internal consistency of the ODDI

	Sample number	ICC (confidence intervals)	<i>P</i> value
ODDI total versus ODDI ^a	$n = 95$	0.99 (0.95–1.00)	0.0001
ODDI total versus ODDI ^b	$n = 95$	0.99 (0.94–1.00)	0.0001
ODDI ^a versus ODDI ^b	$n = 95$	0.94 (0.80–1.00)	0.0001

ODDI, occupational contact dermatitis disease severity index; ODDI total, total ODDI score.

^aThe clinical assessment of disease severity.

^bThe assessment of work-related activities.

by OCD of the hands for use in a clinic population. The instrument had high content validity and was found to be acceptable and easy to use. The construct validity of the instrument was moderate (Pearson's $r = 0.54$, $P < 0.002$) and reliability of the instrument was moderate (ICC = 0.62–0.75, $P < 0.001$). Internal consistency was almost perfect (ICC = 0.94–0.99, $P < 0.001$). Using the attributes suggested by Williams (15) for the assessment of a new measurement scale, we have shown this scale to be reliable and reproducible. The scale has been validated in terms of content and construct.

Unfortunately there is no 'gold standard' for the measurement of severity in OCD, and criterion validity was not assessed for the ODDI. Other validated disease constructs of dermatological disease severity, the PASI (6), the SCORAD (7), the six area, six sign and atopic dermatitis severity score (19) and the eczema area and severity index (20) have not been compared with the ODDI as they are designed for diseases other than OCD.

In terms of criterion validity, it could be argued that it would be useful to compare the ODDI with the three other existing scales of severity: the HECSI (8), the photographic guide for assessing severity of chronic hand dermatitis (9), and the OHSI (10). However, none of these scales are 'gold standards' or 'widely used references' and none has been assessed for validity. In the absence of a 'gold standard' reference, however, we believe that using GCDSA validates the ODDI as it was used by an expert in the field of occupational dermatology and has been used in the assessment of chronic hand dermatitis as physician global assessment (21).

OCD is often an intermittent condition with variation according to current exposures to irritants and allergens, the effect of treatments and job modification. This complicates the measurement of severity at a specific point in time. By stipulating a temporal window of 2 months, the ODDI can be sensitive to intrasubject improvements and deteriorations. However, formal testing of how sensitive the ODDI is over time to 'detect clinical significant changes' (15) has not been assessed to date. We are currently embarking in a large follow-up study of patients that will address this issue. The HECSI (8), the photographic guide for assessing severity of chronic hand dermatitis (9), and the OHSI (10) assess at one temporal point only.

The ODDI assesses the patient's functional limitations, not just clinical parameters, which no other existing scales assess. We believe the assessment of work capabilities to be particularly important in the practical use of a severity scale

in an OCD clinic. Because of the consideration of these functional aspects, we believe that the ODDI will in time prove useful as a determinant of prognosis. We have already used the scale in this context, although we collapsed the 10-point scale to a 5-point scale for convenience (22). Scores of 10 have rarely been achieved when using the scale, and only by patients with severe PPOD (5).

Clinical signs have been found to be poorly correlated between observers in numerous studies involving disease severity scales (7, 20, 23–25). Erythema has been shown to have the poorest correlation between observers (8), especially when the effect of skin colour is considered (26). By placing less reliance on the single, subjective use of clinical signs, we believe the ODDI to be a more objective index. In the ODDI, the clinical signs of dryness, redness, scaling, flaking, peeling, blistering, weeping, and fissuring are grouped and rated as mild, moderate or severe.

Data collection occurred over 2 years. It could be argued that this has caused problems in the assessment of intraobserver reliability of the ODDI's validity and reliability. Patients were, therefore, selected randomly over the project period to reduce the effects of the bias of time.

The patients included in this trial were referrals to a tertiary OCD centre because of hand dermatitis, which was assessed to be substantially work related. Therefore, the ODDI is not yet validated for use outside this setting and for OCD that does not involve the hands. Analysis of our population showed that 12% of the OCD did not involve the hands. While slightly higher than reported by one study in which 5–10% of all OCD does not involve the hands (2), it correlates well with another study performed in South Carolina in which 88% of all claimants said their hands were affected (27).

Disease severity is conventionally evaluated from a clinical perspective rather than from a patient's perspective (18). To further explore this, it would be interesting to observe the correlation of the ODDI with a validated quality-of-life (QOL) measure. The generic Short Form-36 (SF-36) (28), the speciality-specific Dermatology Life Quality Index (DLQI) (29) and Skindex (30) have been shown to fit this description in a variety of studies (31–36). It would add to the validity of the ODDI if it were to be compared with any or all these QOL measures, although there is some evidence that QOL scales do not always correlate well with disease severity scales (18, 37–39). As suggested by Charman and English, what is measured is not only what doctors presume to be important but what is of relevance to the patients themselves (40). This comparison is currently underway in our clinic.

The ODDI is a one-page scoring scale that is simple to use and scoring of the ODDI is straightforward. Although the ODDI is self explanatory, it would be interesting to note the effect of prior education of users of the ODDI in assessment of interobserver reliability. Some studies have shown an increase in interobserver reliability with familiarity or formal education (9, 41, 42).

In a recent review of the management of chronic hand eczema, it was noted that severity assessment is important, yet complex, and that there is a great need for well-designed randomised clinical trials to assess treatments (21). We believe that the ODDI will be useful to characterize patients participating in future clinical trials.

In conclusion, we have produced an objective, easily used, reliable and validated scale of severity and functional limitations for the assessment of OCD of the hands in the tertiary OCD clinic setting. The advantage of this index over previous scales is that it is specific to OCD of the hands in a tertiary referral clinic population where the clinical signs may have lessened with treatment or job modification before assessment. It includes an assessment of both visual changes and of functional impact. It allows for fluctuations in disease activity and, therefore, provides a better overall assessment of disease severity than previously published scales. There is always further adjustment that can be performed with a new scoring system, but we believe that the ODDI is a useful addition to the assessment of OCD of the hands in the context of a tertiary referral clinic.

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References

- McCall B P, Horwitz I B, Feldman S R, Balkrishnam R. Incidence rates, severity, and work-related factors of occupational dermatitis. *Arch Dermatol* 2005; 141: 713–718.
- Skoet R, Olsen J, Mathiesen B, Iverson L, Duss Johansen J, Agner T. A survey of occupational hand eczema in Denmark. *Contact Dermatitis* 2004; 51: 159–166.
- Holness D L, Nethercott J R. Work outcomes in workers with occupational skin disease. *Am J Ind Med* 1995; 27: 807–815.
- Hendrie L, Driscoll T. Work-related presentations to general practitioners in Australia. *J Occup Health Saf* 2003; 19: 133–143.
- Sajjachareonpong P, Cahill J, Keegal T, Saunders H, Nixon R. Persistent post-occupational dermatitis. *Contact Dermatitis* 2004; 51: 278–283.
- Fredriksson T, Pettersson U. Severe psoriasis – oral therapy with a new retinoid. *Dermatologica* 1978; 157: 11–18.
- European Task Force on Atopic Dermatitis. Severity scoring of atopic dermatitis; the SCORAD index. *Dermatology* 1993; 186: 23–31.
- Held E, Skoet R, Johansen J D, Agner T. The hand eczema severity index (HECSI): a scoring system for clinical assessment of hand eczema. A study of inter- and intraobserver reliability. *Br J Dermatol* 2005; 152: 302–307.
- Coenraads P J, Van Der Walle H, Thestrup-Pederson K et al. Construction and validation of a photographic guide for assessing severity of chronic hand dermatitis. *Br J Dermatol* 2005; 152: 296–301.
- Skudlik C, Dulon M, Pohrt U, Appl K C, John S M, Nienhaus A. Osnabrueck hand eczema severity index – a study of the interobserver reliability of a scoring system assessing skin diseases of the hand. *Contact Dermatitis* 2006; 55: 42–47.
- American Medical Association. Impairment classes and percents for skin disorders. In: *Guides to the Evaluation of Permanent Impairment*, 4th edition. Chicago, IL, American Medical Association, 1996: 23–27.
- Sarantakos S. *Social Research*, 2nd edition. South Yarra, Macmillan: 2003: 392–398.
- Montgomery A A, Graham A, Evans P H, Fahey T. Inter-rater agreement in the scoring of abstracts to a primary care research conference. *BMC Health Serv Res* 2002; 2: 8.
- McGraw K O, Wong S P. Forming inferences about some intraclass correlation coefficients. *Psychol Methods* 1996; 1: 30–46.
- Williams H. Objective measures of atopic dermatitis severity: in Search of the Holy Grail. *Arch Dermatol* 2003; 139: 1490–1492.
- Streiner D L, Norman G R. *Health Measurement Scales: A Practical Guide to Their Development and Use*, 2nd edition. New York, Oxford Medical Publications, 1996.
- Feinstein A. *Clinimetrics*. Boston, MA, Yale University Press, 1987.
- Emerson R M, Charman C R, Williams H C. The Nottingham Eczema Severity Score: preliminary refinement of the Rajka and Langeland grading. *Br J Dermatol* 2000; 142: 288–297.
- Berth-Jones J Six Area, Six sign atopic dermatitis (SASSAD) severity score: a simple system for monitoring disease activity in atopic dermatitis. *Br J Dermatol* 1996; 135 (Suppl. 48): 25–30.
- Hanifin J M, Thurston M, Omoto M, Cherill R, Tofte S J, Graeber M, the EASI Evaluator Group. The Eczema Area and Severity Index (EASI): assessment of reliability in atopic dermatitis. *Exp Dermatol* 2001; 10: 11–18.
- Diepgen T L, Agner T, Aberer W, Berth-Jones J, Cambazard F, Elsner P, McFadden J, Coenraads P J. Management of chronic hand eczema. *Contact Dermatitis* 2007; 57: 203–210.
- Cahill J, Keegel T, Dharmage S, Nugriarty D, Nixon R. Prognosis of contact dermatitis in epoxy resin workers. *Contact Dermatitis* 2005; 52: 147–153.
- Charman C R, Venn A J, Williams H C. Reliability testing of the Six Area, Six Sign Atopic Dermatitis Severity Score. *Br J Dermatol* 2002; 146: 1057–1060.
- Sprickelman A B, Tupker R A, Bugerhof H, Schouten J P, Brand P L P, Heymans H S A, van Aalderen W M C. Severity scoring of atopic dermatitis: a comparison of three scoring systems. *Allergy* 1997; 25: 944–949.

25. Harari M, Shani J, Hristakieva E, Stanimirovic A, Seidl W, Burdo A. Clinical evaluation of a more rapid and sensitive Psoriasis Assessment Severity Score (PASS), and its comparison with the classic method of Psoriasis Area and Severity Index (PASI), before and after climatotherapy at the Dead-Sea. *Int J Dermatol* 2000; 39: 913–918.
26. Ben-Gashir M A, Hay R J. Reliance on erythema scores may mask severe atopic dermatitis in black children compared with their white counterparts. *Br J Dermatol* 2002; 147: 920–925.
27. Keil J E, Schmunnes E. The epidemiology of work-related skin disease in South Carolina. *Arch Dermatol* 1983; 119: 650–654.
28. Ware J E Jr, Sherbourne C D. The MOS 36-item short-form health survey (SF-36). I. Conceptual framework and item selection. *Med Care* 1992; 30: 473–483.
29. Finlay A Y, Khan G K. The Dermatology Life Quality Index: a simple practical measure for routine use. *Clin Exp Dermatol* 1994; 19: 210–216.
30. Chren M M, Lasek R J, Quinn L M, Mostow E N, Zyzanski S J. Skindex, a quality-of-life measure for patients with skin disease: reliability, validity and responsiveness. *J Invest Dermatol* 1996; 107: 707–713.
31. Hahn H B, Melfi C A, Chuang T Y, Lewis C W, Gonin R, Hanna M P, Farmer E R. Use of Dermatology Life Quality Index (DLQI) in a Midwestern US urban clinic. *J Am Acad Dermatol* 2001; 45: 45–48.
32. Herd R M, Tidman M J, Ruta D A, Hunter J A A. Measurement of quality of life in atopic dermatitis: correlation and validation of two different methods. *Br J Dermatol* 1997; 136: 502–507.
33. Skoet R, Zachariae R, Agner T. Contact dermatitis and quality of life: a structured review of the literature. *Br J Dermatol* 2003; 149: 452–456.
34. Halioua B, Beumont M G, Lunel F. Quality of life in dermatology. *Int J Dermatol* 2000; 39: 801–806.
35. Hutchings C V, Shum K W, Gawkrödger D J. Occupational contact dermatitis has an appreciable impact on quality of life. *Contact Dermatitis* 2001; 45: 17–20.
36. Chren M M, Lasek R J, Flocke S A, Zyzanski S J. Improved discrimination and evaluative capability of a refined version of Skindex, a quality-of-life instrument for patients with skin diseases. *Arch Dermatol* 1997; 133: 1433–1440.
37. Salek M S, Finlay A Y, Luscombe D K et al. Cyclosporin greatly improves the quality of life of adults with severe atopic dermatitis: a randomized, double-blind, placebo-controlled trial. *Br J Dermatol* 1993; 129: 422–430.
38. Barbier N, Paul C, Luger T et al. Validation of the Eczema Area and Severity Index for atopic dermatitis in a cohort of 1550 patients from the pimecrolimus cream 1% randomized controlled clinical trials programme. *Br J Dermatol* 2004; 150: 96–102.
39. Touw C R, Hakkaart-Van Roijen L, Verboom P, Paul C, Rutten F F H, Finlay A Y. Quality of Life and clinical outcome in psoriasis patients using intermittent cyclosporin. *Br J Dermatol* 2001; 144: 967–972.
40. Charman C R, English J S. Getting to grips with hand eczema: measuring skin disease severity objectively. *Br J Dermatol* 2005; 152: 199–201.
41. Brorson S, Bagger J, Sylvest A, Hrobjartsson A. Improved interobserver variation after training of doctors in the Neer system. A randomised trial. *J Bone Joint Surg Br* 2002; 84: 950–954.
42. Alcott D, Swann R, Grafham A. The effect of training on rater reliability on the scoring of the NART. *Br J Clin Psychol* 1999; 38: 431–434.

Address:

Dr Rosemary Nixon

Occupational Dermatology Research and Education Centre
Skin and Cancer Foundation

PO Box 132

Carlton South

Victoria 3053

Australia

Tel: + 61 3 9623 9400

Fax: + 61 3 9639 3575

e-mail: rnixon@occderm.asn.au

Appendix

The occupational contact dermatitis disease severity index (ODDI)

Total score ☐

Please tick level (1-5) which best fits the patient, over the last 2 months

Level 1 ☐	Level 2 ☐	Level 3 ☐	Level 4 ☐	Level 5 ☐
Disease course (including reported history)				
Signs and symptoms of skin disorder are only <i>intermittently</i> present	Mild signs and symptoms of skin disorder are present or only <i>improve</i> when <i>away from work</i> . Usually symptoms will have been present for less than 6 months	Moderate signs and symptoms of skin disorder are present or only <i>improve</i> when <i>away from work</i> . Usually symptoms will have been present for over 6 months	Severe signs and symptoms of skin disorder are present or only <i>improve</i> when <i>away from work</i>	Signs and symptoms of skin disorder are constantly present
Treatment				
No treatment or <i>intermittent</i> treatment is required	<i>Intermittent</i> treatment may be required. Oral steroids will not usually have been prescribed	<i>Intermittent</i> to constant treatment may be required	<i>Intermittent</i> to constant treatment may be required. Usually oral steroids will have been prescribed	<i>Constant</i> treatment may be required. Phototherapy or systemic treatment will usually have been prescribed
Clinical signs				
No abnormality detected or <i>Mild</i> dryness	<i>Mild</i> dryness or <i>moderate</i> , including redness, scaling, flaking, peeling, itching, blistering	<i>Moderate</i> , including redness, scaling, flaking, peeling, itching, blistering or <i>severe</i> – as for moderate plus weeping, fissuring	<i>Moderate</i> , including redness, scaling, flaking peeling or <i>severe</i> – as for moderate plus weeping, fissuring	<i>Severe</i> – as for moderate plus weeping, fissuring
Work-related activities				
There is <i>no</i> limitation or there is limitation in the performance of <i>few</i> work-related activities, (<i>although</i> exposure to certain chemical or physical agents might increase limitation temporarily)	There is mild limitation in the performance of <i>some</i> work-related activities, necessitating the use of gloves or a change in the type of gloves used.	There is moderate limitation in the performance of <i>many</i> work-related activities, necessitating the use of gloves or change of work practices or duties	There is severe limitation of work-related duties, resulting in a change of occupation	There is severe limitation in the performance of many activities, resulting in an inability to work