

Prognosis and work absence due to occupational contact dermatitis

Outcome of cases reported to EPIDERM

A. ADISESH, J. D. MEYER AND N. M. CHERRY

Occupational Disease Intelligence Network, Centre for Occupational and Environmental Health, University of Manchester, Manchester, UK

The consequences of a diagnosis of occupational contact dermatitis (OCD) were investigated using cases available from the voluntary surveillance scheme, EPIDERM. Cases of OCD reported from November 1994 to September 1995 were identified and sampled to give at least 100 cases of allergic, irritant and mixed OCD reported by consultant dermatologists (344 cases) and occupational physicians (377 cases). A questionnaire was sent to the reporting physician to elicit further information. 512 completed questionnaires were returned, of which 510 were eligible for analysis. Among cases reported by dermatologists ($n = 286$) and occupational physicians ($n = 224$), 7% (6.3%) had been unemployed and 16.8% (20.1%) had taken sick leave. 3 factors independently predicted time off work in a logistic regression analysis: age OR = 1.25 (95% CI, 1.05–1.49), allergic dermatitis OR = 1.77 (95% CI, 1.13–2.79) and medicolegal assessment OR = 4.42 (95% CI, 2.20–8.89). Overall, 15.7% did not improve clinically between the first and last visit. Those who did not improve had been exposed to the agent for longer (mean 7.6 years) than those who did (5.3 years) ($p = 0.09$). In patients ≤ 45 years, those reported to be atopic failed to improve (25.4%) more often than those not atopic (13.4%) ($p = 0.04$). The substantial numbers (21%) with time off work and with persistent dermatitis suggest that OCD continues to have a significant impact on workers and their employers.

Key words: contact dermatitis; occupational disease; prognosis; absenteeism. © Blackwell Munksgaard, 2002.

Accepted for publication 29 January 2002

Occupational contact dermatitis (OCD) is a common cause of work-related morbidity, accounting for a fifth or more of all occupational disease reported to the UK Occupational Disease Intelligence Network (ODIN) (1–3). Although most people with OCD may remain in work, studies have shown that more than half change jobs and a substantial number lose a month or more from work (4, 5). Burrows reported that more than 10 years after being seen for medicolegal reports, 79% of these patients with OCD still required treatment from time to time (6). Knowledge of the prognosis of OCD and its consequences is important for workers, physicians, employers, insurers and governments, but analyses of the factors that influence the effects of OCD are sparse. The present study was designed to better define the prognosis

and work-related outcomes for cases of OCD reported to the ODIN scheme.

Materials and Methods

Cases for this study were identified from those reported to EPIDERM (2, 3), a voluntary, anonymous, physician-based surveillance scheme that monitors the incidence and causes of occupational skin disease. New cases have been reported to EPIDERM since January 1993 by consultant dermatologists throughout the UK. Occupational physicians were invited to join the scheme from May 1994. This study is based on cases reported for November 1994 to September 1995. At that time, both groups completed simple reporting cards at

3-month intervals. Participating physicians were asked to return cards even if they had not seen a case of occupationally related illness during the 3-month period. Changes were made to the system of reporting in January 1996 (2).

Consultant dermatologists and occupational physicians reporting to EPIDERM were asked to report any new case with a skin condition that was caused or made seriously worse by the patient's work, and to specify, for each case, the type of skin disease from among seven broad categories including contact dermatitis, which accounted for some 80% of cases (2). Of these, 44–46% were specified to be irritant, without an allergic component (3). Details on each case, including date of birth, sex, abbreviated postcode, occupation, and suspected agents were also requested. The physicians were not asked to carry out tests over and above those judged necessary for clinical management, but to report, without waiting for definitive results, the agents they believed to be responsible. These substances were coded using a classification developed for internal use by the UK Health and Safety Executive. We have previously reported the substance groups used (2).

For the present study, a total of 721 cases of OCD that had been reported from November 1994 to September 1995 were selected by stratified random sampling such that there were at least 100 cases of allergic, irritant and mixed OCD for each group of specialists, consultant dermatologists (344 cases) and occupational physicians (377 cases).

A questionnaire was sent to each reporting physician in March–May 1997. It was designed to allow the physician to extract the information directly from clinical records, without contacting the patient further. The questionnaire sought verification of the details initially reported; sex, date of birth, occupation, diagnosis, and the suspected causal agent. Information about first and last attendance at clinic, patch testing, duration of OCD at diagnosis and duration of exposure to the agent at diagnosis ('How long has he/she been working with the agent or in this type of work?') was also requested. Outcomes recorded from the questionnaire included the physician's opinion as to the patient's clinical status at the final visit and also the duration of sickness absence and unemployment. Information on atopy was sought by asking the physician 'Does the patient have an atopic tendency?'. Other information requested was on the advice given on work practices or modifications, and on whether or not the patient was seen for medicolegal purposes. The questionnaires were coded indepen-

dently by two separate researchers and any differences reconciled by discussion.

Statistical methods

Difference in outcome by diagnostic group, speciality of reporting physician, agent and atopic status were investigated using the chi square or Fisher's exact test for analysis of categorized data and *t*-tests for continuous data. Logistic regression analysis was used to assess possible explanatory factors relating to time off work (sickness absence or unemployment) and clinical improvement.

Results

A total of 512 questionnaires were completed and returned. For dermatologists the number returned completed was 287 (83%) of 344 distributed, occupational physicians 225 (60%) of 377. A further 30 (9%) of questionnaires sent to dermatologists and 87 (23%) sent to occupational physicians were returned but not completed. The non-return rate was low for both dermatologists ($n = 27$ (8%)) and occupational physicians ($n = 65$ (17%)). The proportions not returned and returned incomplete were higher for the occupational physicians than for the dermatologists largely because, if an occupational physician changed employer, he or she no longer had access to the files. Two cases were excluded from the subsequent analysis because attribution was to factors other than work. In the follow-up report, one was considered related to recreation rather than occupation and the other a fungal rash (tinea manum) felt not to be associated with work. The effective response rate was thus 71% (510/721).

At follow-up the agent identified in 41 cases differed from that originally reported to EPIDERM. Investigations since the time of the original report had resulted in identification of an agent in 6 cases where none had been recorded previously. In another 7 cases substances additional to those originally reported were given. A change of the substance reported was given for 28 cases, but amongst these were 6 where the change simply added precision rather than offering a different attribution, e.g. preservatives in cutting oil rather than the oil itself. Overall, there was a change in agents that altered the original coding in less than 6% of cases (28 of 510).

The final diagnosis was different in 2.6% (13) of the 512 cases (11 of the 510 in the analysis). Four originally thought to be irritant CD were given a final diagnosis of allergic and two of mixed contact dermatitis. 5 cases changed category from allergic, 3 to irritant and 2 to mixed. 1 case changed from

Table 1. Characteristics of subjects for whom questionnaires were completed

	Years (mean)	Range
Age		
Male	41.5	15.9–75.1
Female	33.4	15.8–62.2
	Cases (n)	Percent
Male	302	59.2
Female	207	40.6
Not known	1	0.2
Total	510	100.0
Exposure to agent		
< 6 months	86	16.9
6 months–3 years	114	22.4
3–10 years	136	26.7
> 10 years	90	17.6
Not known	84	16.5
Total	510	100.0
Atopic		
Yes	154	30.2
No	305	59.8
Not known	51	10.0
Total	510	100.0
Medicolegal		
Yes	38	7.4
No	445	87.3
Not known	27	5.3
Total	510	100.0
Exposure advice		
Stop exposure	133	26.1
Other advice	203	39.8
No advice	122	23.9
Not known	52	10.2
Total	510	100.0
Patch tested		
Yes	311	61.0
No	189	37.0
Not known	10	2.0
Total	510	100.0

mixed to irritant contact dermatitis. In this report, the final diagnoses and agents are used throughout.

Characteristics of patients included in the analysis are shown in Table 1.

Time off work

Among the 286 cases reported by dermatologists and included in the analysis, 7% had been unemployed as a result of this episode of dermatitis and 16.8% had taken sick leave. These proportions were very similar to those for 224 cases reported by occupational physicians (6.3% and 20.1%). In all, 4% of cases (20/510) had both taken sick leave and been unemployed. In the analysis that follows, a factor reflecting any time off work, either unemployed or sick, is used. Overall, 107/510 subjects were off work, 19.9% amongst cases reported by

dermatologists and 22.5% by occupational physicians. Amongst 83 cases where the length of time off work was specified, 14,486 days away from work (range 3 days to 6.5 years) were reported (or estimated) in total. Of these 83 cases, 29 (35%) had 3 weeks or less off work, whilst 9 (11%) had more than 1 year off work.

The type of dermatitis was related to time off work, those with irritant dermatitis having the lowest proportion with time off (15.8%). The highest proportion was found in those with allergic dermatitis (26.2%), while those with a mixed irritant and allergic pattern had intermediate rates (20.0%). The likelihood of time off work increased with age and, in each age group, those with allergic dermatitis were more likely to be off work than those with an irritant or mixed pattern (Fig. 1).

The overall mean time for which patients have been exposed to the agent (or in that type of work) was 6.8 years (median 4.0 years, range 7 days to 50 years). Patients judged to be atopic were no more likely to have time off (18.8%) than those not thought to be atopic (22.6%). The proportion of men with time off work (23.5%) was slightly higher than that for women (17.4%). Of the 38 cases known to have been seen for medicolegal assessment, 18 (47.4%) had spent some time not working.

The relation of each of these factors to time off work is shown in the logistic regression analysis in Table 2. 3 factors made independent contributions to the prediction of time off work. As age increased, the likelihood of time off was estimated to increase by 25% for each 10 years. Allergic dermatitis (compared with irritant or mixed) increased the likelihood of time away from work by 77%, while those assessed for medicolegal purposes were more than 4 times as likely to have been off work than other cases.

9 job categories were developed for assessment from the job titles reported. No relationship was found between occupation and time away from work for either group of specialists. In decreasing order of the proportion taking sick leave within a job category, the results were 'chemical and related operatives' 27%, 'cleaning and domestic work' 24% and 'healthcare' 24%, 'other manual' 22%, 'metal work and vehicle manufacture' 17%, 'hairdressing and beauticians' 15%, 'catering and food preparation' 12%, 'other-non-manual' 8%, 'natural scientists and technicians' 4%.

Exposure to preservative agents was associated with a greater likelihood of time off work amongst cases reported by occupational physicians ($p=0.01$), but no exposure was found to carry an excess risk in those reported by dermatologists.

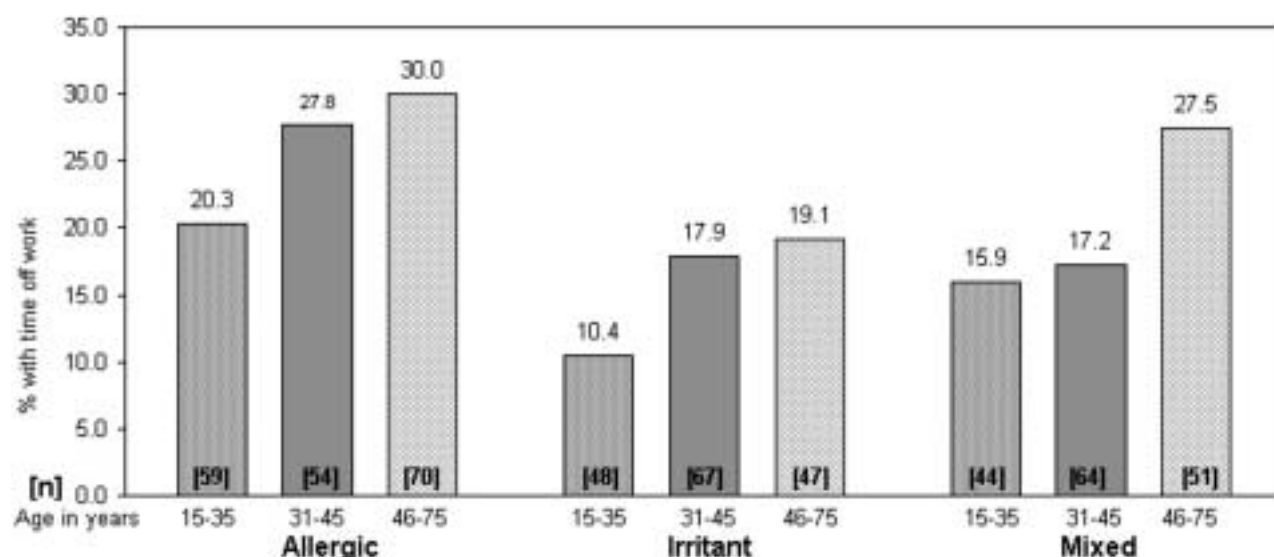


Fig. 1. Proportion (%) with time off work by age and type of dermatitis (age was missing in 6 subjects).

Improvement in clinical condition

The reporting physicians were also asked whether the patient's condition, when last seen, was the same, worse or better than when first seen for this episode at the clinic. For about 1 in 6 patients (85/510) the first visit was also the last and for these cases, improvement could not be assessed. A further 86 were followed-up within a week of the first visit; as many of these were seen only for patch testing and not for treatment, they have also been excluded from this analysis. Information on improvement was available on 313 of 339 remaining cases. Nearly 1 in 6 (49/313) showed no improvement between the initial and final visit.

Failure to improve was more frequent (22.4%) for those seen by dermatologists than for those seen by occupational physicians (8.1%). This may reflect, at least in part, the longer follow-up period for occupational physicians (a mean of 353 days) than dermatologists (a mean of 164 days). The follow-up period was longer for those who had not improved than those who had, by a substantial margin (103 more days) for cases seen by occu-

pational physicians, and by a much smaller one (11 days) for those seen by dermatologists.

There was no difference in the proportion of men and women failing to improve, for either dermatologists (21.6% men, 23.4% women) or occupational physicians (8.2% men, 7.9% women). No clear pattern was found for age. Patients over 45 years seen by occupational physicians were less likely to improve than younger patients, but older patients seen by a dermatologist more likely than younger patients to improve (Table 3).

Atopy was reported more frequently for workers aged 45 years or less, whether seen by dermatologists (34.0% atopic) or by occupational physicians (32.2% atopic), than for older patients (22.6% considered atopic by dermatologists; 20.3% by occupational physicians). In these younger patients, atopics were more likely not to improve (25.4%) than those not atopic (13.4%) ($p = 0.04$). Older patients (above 45 years) did better, in both groups, if they were reported by the physician as atopic (Table 3).

Overall, those who did not improve had been exposed to the agent for longer (mean 7.6 years)

Table 2. Factors associated with time off work: logistic regression analysis

	Univariate analysis		Multivariate analysis	
	OR	95% CI	OR	95% CI
Allergic dermatitis (vs mixed/irritant)	1.66	1.08–2.56	1.77	1.13–2.79
Age/10 years	1.25	1.06–1.49	1.25	1.05–1.49
Years exposed/10	1.06	0.82–1.37	—	—
Atopy	0.83	0.51–1.33	—	—
Male (vs female)	1.45	0.93–2.27	—	—
Medicolegal assessment	3.87	1.97–7.62	4.42	2.20–8.89

Table 3. Proportion failing to improve by age and atopic status

Age (years)	Dermatologist			Occupational physician			All		
	Atopic	Not	All	Atopic	Not	All	Atopic	Not	All
15-30									
%	35.3	19.7	24.4	16.7	0.0	5.9	27.6	10.0	16.5
n	17	28	45	12	22	34	29	50	79
31-45									
%	38.9	25.0	29.3	6.3	5.4	5.7	26.5	15.6	18.2
n	18	40	58	16	37	53	34	77	111
46-75									
%	7.1	16.7	14.5	0.0	14.9	11.7	3.9	15.7	13.2
n	14	48	62	12	47	59	26	95	121
Overall									
%	28.6	19.8	21.4	7.5	8.5	8.2	19.1	14.4	15.8
n	49	116	165	40	106	146	89	222	311

Table 4. Mean years exposed to the agent at first clinic visit by improvement at follow-up and atopic status

	Dermatologist			Occupational physician			Overall		
	Atopic	Not	All	Atopic	Not	All	Atopic	Not	All
Improved									
Mean	6.6	5.6	5.9	3.9	5.0	4.7	5.2	5.3	5.3
SD	9.3	8.7	8.8	5.2	8.3	7.6	7.6	8.5	8.2
n	35	93	128	36	99	135	71	192	263
Not improved									
Mean	5.3	8.2	7.1	1.7	11.4	9.0	4.7	9.1	7.6
SD	6.3	11.0	9.5	2.9	11.9	11.1	5.9	11.1	9.8
n	14	23	37	3	9	12	17	32	49
Overall									
Mean	6.3	6.1	6.2	3.7	5.8	5.1	5.1	5.9	5.7
SD	8.5	9.2	9.0	5.0	8.7	7.9	7.2	9.0	8.5
n	49	116	165	39	108	147	88	224	312

than those who improved (5.3 years) ($p = 0.09$) (Table 4). This difference was seen in both those reported by dermatologists and those reported by occupational physicians, and was particularly noticeable in those who were not atopic; in these patients, those who did not improve had been exposed for a mean of 9.1 years, while those who did had been exposed for only 5.3 years ($p = 0.03$). Patients who were atopic were seen (and reported) by occupational physicians after a shorter exposure (mean 3.7 years) than those who were not atopic (5.8 years). Atopic patients did not appear to reach the dermatologists any earlier; atopics reported by these physicians had a mean exposure of 6.3 years, very similar to that of nonatopics (6.1 years). Atopy was reported less often in cases of irritant (25.7%) than allergic (37.8%) or mixed (36.8%) contact dermatitis ($p = 0.05$).

The type of contact dermatitis was not clearly related to improvement. Amongst cases reported by dermatologists, those with an irritant component did less well (allergic 16.9% did not improve, irritant 27.3%, mixed 25.0%) but amongst those

seen by occupational physicians, patients with allergic contact dermatitis were least likely to improve (allergic 11.8%, irritant 5.6%, mixed 7.0%).

Failure to improve was not associated with a particular agent in cases reported by occupational physicians, but in cases reported by dermatologists, a poorer prognosis was found with aldehydes ($p = 0.02$), irritants ($p = 0.01$) and wet work ($p = 0.03$). All 16 cases seen for medicolegal assessments, who had a week or more of follow-up, were reported to have improved between the initial and final assessment.

Advice

Among those 303 cases who were followed for a week or longer, 241 (79.5%) were recorded as receiving advice as to work practices or modifications. Two thirds (64.7%) were advised to stop exposure, by changing jobs, substitution or avoidance of the agent. Other advice included the use of personal protective equipment or emollient creams, and changes in work practices. The type

of advice given was not related to either time off work or clinical improvement in the regression models.

Discussion

Time lost from work is one of the most significant consequences of OCD (4, 7). The accumulated days away from work for our study probably represent an underestimate of the true figure, as these are simply the absences known to clinicians. Nonetheless, for the 510 cases studied, the total days represent the equivalent of a working lifetime lost as a consequence of OCD. The identification of factors associated with time away is thus important. Allergic contact dermatitis was more strongly associated than other dermatitis with time off work, consistent with other reports indicating the relatively greater severity of this condition (5, 8). Higher proportions of patients had time off work with ACD in each age group than either irritant or mixed dermatitis (Fig. 1). However ICD should remain a prime target for primary prevention since progression to ACD may be avoided and the same measures will also help in the prevention of ACD. Diepgen & Coenraads (9) suggest that the worse prognosis generally reported for ACD studies may be due to 'contamination' by findings of chromate allergy in men and nickel allergy in women. We did not find any significant association between time off work or prognosis and reported exposure to chromate or nickel. Younger atopic workers were less likely to improve, but the strength of conclusions about atopy in this study is limited by the reliance on clinical judgement to identify an atopic tendency. The relatively short period of follow-up, the likelihood that serious cases would be followed more closely and the unvalidated reports of exposure duration are also limitations of the approach used.

Age was found to be a predictor of work absence, with older workers being more likely to take time away from employment. Duration of exposure was not an independent predictor of absence from work and thus it is unlikely that age is simply a surrogate for duration. Although older workers were no less likely than young ones to show clinical improvement in this study, older workers, once away from employment, may find it more difficult to return to work or, if out of work, to find a new job. It may be particularly important to encourage older workers to retain their employment during an episode of contact dermatitis, by redeployment or barrier methods. Age is said not to influence the prognosis of contact dermatitis (10). Whilst this may be true of clinical improve-

ment, it is not so for time off work, which few studies have examined.

The greater likelihood of time off work in medicolegal cases may reflect either the greater seriousness of these cases or a reluctance to return while compensation issues are outstanding. There is no information with which to distinguish between these hypotheses in the present data, but it is encouraging that all medicolegal cases showed clinical improvement at follow-up.

Whilst OCD is not a life-threatening disease, and the proportion of cases showing clinical improvement is high (9–11), it can be devastating to the worker and expensive for the employer (4). Mathias, writing in 1985, estimated that the annual costs of occupational skin disease in America were in excess of \$22 million (12). Clinical improvement in this study, as in previous ones (9), was less certain in cases with longer exposure, suggesting the need for early detection of OCD; the shorter time to treatment and greater success rate in cases reported by occupational physicians (compared to those from dermatologists) underlines the desirability of timely intervention. Cases that are not treated early, or which fail to respond, may eventually be referred to a dermatologist, with a more intractable condition.

The ideal is for primary prevention rather than early detection, and results of this study suggest that this may be particularly important for young atopic employees and for older workers, given the increased likelihood of time off work associated with diagnosis of OCD as age increases. The results of the present study indicate that substantial time off work and, by extension, economic loss arise from occupational contact dermatitis. The EPIDERM and OPRA surveillance schemes (2, 3) continue to provide important information needed to target prevention.

Acknowledgements

The questionnaires were completed, at a considerable expense of time, by voluntary reporters to EPIDERM. We are grateful to them, and particularly to Dr Mike Beck and Dr Richard Rycroft, who have been closely involved from the beginning with the reporting scheme. ODIN is supported by funding from the UK Health and Safety Executive. We also thank Dr Yiqun Chen, who assisted with double coding the questionnaires and helped to resolve any inconsistencies.

References

1. Cherry N. Occupational disease. *Br Med J* 1999; 318: 1397–1399.
2. Cherry N, Meyer J D, Adishes A et al. Surveillance of occupational skin disease: EPIDERM and OPRA. *Br J Dermatol* 2000; 142: 1128–1134.

3. Meyer J D, Chen Y, Holt D L, Beck M H, Cherry N M. Occupational contact dermatitis in the UK. A surveillance report from EPIDERM and OPRA. *Occup Med* 2000; 50: 265–273.
4. Burnett C A, Lushniak B D, McCarthy W, Kaufman J. Occupational dermatitis causing days away from work in U.S. private industry, 1993. *Am J Ind Med* 1998; 34: 568–573.
5. Holness D L, Nethercott J R. Work outcome in workers with occupational skin disease. *Am J Ind Med* 1995; 27: 807–815.
6. Burrows D. Prognosis in industrial dermatitis. *Br J Dermatol* 1972; 87: 145–148.
7. Cooley J E, Nethercott J R. Prognosis of occupational skin disease. *Occup Med State Art Rev* 1994; 9: 19–24.
8. Wall L M, Gebauer K A. A follow-up study of occupational skin disease in Western Australia. *Contact Dermatitis* 1991; 24: 241–243.
9. Diepgen T L, Coenraads P J. The epidemiology of occupational contact dermatitis. *Int Arch Occup Environ Health* 1999; 72: 496–506.
10. Goh C L. Prognosis of contact and occupational dermatitis. *Clin Dermatol* 1997; 15: 655–659.
11. Rosen R H, Freeman S. Prognosis of occupational contact dermatitis in New South Wales. *Australia Contact Dermatitis* 1993; 29: 88–93.
12. Mathias C G. The cost of occupational skin disease. *Arch Dermatol* 1985; 121: 332–334.

Address:

Dr Anil Adisesh
Occupational Disease Intelligence Network
Centre for Occupational and Environmental Health
University of Manchester
Stopford Building
Oxford Road
Manchester M13 9PT
UK
Tel: +44 161 275 7103
Fax: +44 161 275 5506
e-mail: Anil.Adisesh@hope.srht.nwest.nhs.uk