

Intervention implementation research: an exploratory study of reduction strategies for occupational contact dermatitis in the printing industry

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Background: Occupational dermatitis is a problem in the printing industry but can be avoided through adequate protective measures. Research into intervention implementation is fundamental to the success of a formal intervention effectiveness trial.

Objectives: The preliminary testing of four risk reduction strategies for occupationally caused dermatitis, which represent a range of approaches and cost implications.

Patients/Methods: The strategies, the provision of (i) skin checks plus treatment advice; provision of (ii) gloves of the correct type/size plus use of an after-work cream; provision of (iii) information highlighting the problem of occupational dermatitis and (iv) development of a best practice skin care policy, were evaluated over 3 months in two non-randomly selected companies. A post-intervention evaluation into the effectiveness and efficacy of the intervention was also carried out.

Results and Conclusions: All interventions were found to be acceptable to some extent. No single intervention appeared to be completely effective. The most practical intervention appeared to be the regular use of gloves of the correct type and size. This preliminary intervention study has demonstrated an improvement in the skin condition of workers examined and points towards the need for further testing of risk reduction strategies for the prevention of dermatitis in the printing industry on a much larger scale.

Key words: intervention implementation; occupational contact dermatitis; occupational research; printers. © Blackwell Munksgaard 2007.

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Occupational dermatitis is a major health problem in many countries and a particular problem for the printing industry (1). It can be largely avoided through adequate protective measures, such as the use of personal protective equipment and replacement of harmful substances. Such interventions have been shown to be effective in a number of industries (2–10), although their success is dependent heavily on the co-operation of employers and employees and their awareness of the particular risk within their industry.

Research into intervention implementation is fundamental to the success of a formal intervention effectiveness trial. An exploratory phase facilitates refinement of the interventions and improvements in the overall study design and aids interpretation of the findings. Such preliminary work can also be useful for testing adaptations of an intervention that has been shown to be effective in another

context (11). This article describes the preliminary testing of a series of risk reduction strategies for occupationally caused dermatitis in the printing industry previously described in a related paper (12). This was an exploratory study to evaluate the efficacy and practicality of the interventions to inform any future large randomized intervention study.

Methods

As a result of qualitative research on the knowledge, attitudes and beliefs of print workers on the causes of occupational skin disease and observation of working practices (12), 4 interventions were developed for evaluation in this preliminary intervention study. They represented a range of approaches and varying cost implications.

Detailed description of the four interventions

Skin checks. Skin checks were undertaken by a qualified health professional with an interest in occupational dermatitis (J. S. C. E.) at the beginning of the 3-month intervention period and upon its completion. During each visit, checks were undertaken on all those employees present, who had given their consent to take part. Advice was given to individuals who were found to have a problem in selecting which creams to use and measures that would help prevent the problem from spreading or recurring. A simple checklist was used to assess the diagnosis and severity of the skin condition by examination of an individual's hands. The print workers who were examined worked for 2 medium-sized lithographic printers using sheet-fed machines, one employing about 30 people (8 print workers) and the other about 70 people (16 print workers).

Gloves and cream. The selected companies were asked to provide gloves of the correct type for the various jobs that might be performed during a normal day's work and to provide a variety of sizes. Each company was asked to list the chemicals and gloves they used (four main types used – vinyl, nitrile, rubber and cotton; in addition to these, a nitrile synthetic rubber glove was recommended), which was reviewed by the research team and a member of the British Safety Industry Federation to determine the correct glove for each substance. The companies were then provided with a list and advised to purchase and provide the suggested gloves in sufficient quantity and correct sizes for the period of the intervention phase. They were also requested to encourage their employees to wear the correct glove for all relevant tasks. In addition to the gloves, the employees were asked to apply an after-work cream at the end of each work-day/shift. E45 cream (Crookes Healthcare Limited, Nottingham, UK) (anhydrous lanolin 1.0% w/w; white soft paraffin BP 14.5% w/w and light liquid paraffin Ph Eur 12.6% w/w) was supplied to the companies. Both companies were offset lithographers using sheet-fed machines, employing approximately 30 people in total, of whom about 7 were involved with printing on a daily basis.

Information. For this intervention, a folder was assembled containing information on general health and safety, chemical safety, dermatitis, use of chemicals in the industry, guidance sheets for printers and the UK Health and Safety Executive (HSE) pamphlet 'Skin Problems in the Printing Industry' (13) (a full list is available on request). At the beginning of the trial period, both companies in this intervention group were visited, and all employees finishing a single shift were

given a general introduction on occupational skin disease by T. P. B. This was followed by the HSE videos 'Safe Use of Printing Chemicals: COSHH and Substitution' and 'Rash Decisions', which were also left behind. The company was then asked to read and distribute the literature provided and the new pamphlet to employees and to put all other documents on display in communal areas. Both companies were large, employing over 200 people, a large number of whom are directly involved in printing. One company was a lexographic printer producing packaging for the food and retail sector, and the other was a lithographic printer using web-fed and sheet-fed machines.

Skin care policy. The selected companies were asked to develop their own skin care policy. One company was a large lithographic (web-fed) printer, employing over 200 people (50+ printers), and the other was a small screen-printer, employing about 10 people (8 printers). An outline 'action plan' was developed for the study by the authors, who also provided assistance and guidance in the development of the policy. The plan included the following steps: (i) obtain the commitment of senior management, outline their responsibilities to the staff and develop the basis of a policy; (ii) involve the workers or their representatives to discuss and develop the policy; (iii) undertake a risk assessment exercise to determine the work areas, chemicals and work practices that could increase the development of dermatitis; (iv) introduce a series of control measures to reduce the highlighted risk areas; (v) develop an education and training programme for existing staff and new recruitments; (vi) establish a system to report and manage cases of dermatitis and (vii) encourage worker involvement (at all levels) and make available a variety of relevant literature.

Selection of companies

Random selection of companies from a large sampling frame and random allocation to one of the interventions was not achievable due to a lack of companies willing to participate and for logistical reasons. This may have introduced some bias into the study. One company from the last three interventions also received skin checks at the beginning and end of the trial period. Each intervention was trialled for approximately 3 months with regular visits and contact by means of telephone.

Post-intervention evaluation

To evaluate the effectiveness and efficacy of the interventions, a list of general questions about dermatitis in the printing industry followed by

more specific questions related to each intervention was developed. Short interviews with representatives of the workforce were undertaken, during which time notes were taken or immediately following the interview. Those who were unavailable for interview were handed a questionnaire, relevant to their intervention, to complete, containing a series of open-ended questions adapted from the prompt list. The companies were also requested to distribute the questionnaires among the print workers.

Results

Skin checks

All workers ($n = 22$) said that they had never had their skin checked previously as part of any medical examination. As a result of having the initial skin check, printers reported that they made sure they wore gloves when handling the chemicals. However, only at one of the companies did printers ($n = 12$) heed the advice to use an after-work cream if they had dry skin or signs of dermatitis. At the other company, their attitude was generally that they 'did not have a problem', their hands were always dry and as the condition did not get any worse, they saw no reason for change. Employees at both companies believed that having skin checks would be a positive move but were less certain as to whether the advice and skin checks would result in a change of working practice. All employees felt that the company should provide a service if requested, although the majority felt that management would say that they could not justify the cost involved. Suggestions were made to involve other organizations in providing a service, e.g. trade unions or industry federations.

Gloves and cream

The majority of print workers (9 out of 11 questioned) said that they had followed the advice given to them to use the correct glove type for a specific chemical. Print workers said that it was helpful to receive the advice of an expert on what gloves to wear with each chemical because previously they were not sure whether the gloves they wore were the correct type for the job. Some ($n = 3$) had said that they sometimes do not wear gloves if they had to quickly clean a plate or roller during a print run, and those in the finishing area never wore gloves ($n = 2$). They said a similar service or information should be provided for all print workers but were unsure whether companies would follow guidelines provided, especially if it involved a large additional expenditure. Prior to the study, neither company provided after-work

creams, and none of the printers used them at home. However, all the employees used the E45 cream provided and said that the condition of their hands had improved and would consider using a cream all the time in future.

Provision of information

There were conflicting views from print workers ($n = 29$) both between and within the companies on information dissemination and communication between management and staff. Some (55%) reported that all the health and safety information that had been passed on to them was relevant. Both companies had awareness campaigns but limited health and safety training. The majority (70%) were unaware neither of the problem of dermatitis in the industry nor of any of the provided literature prior to this study, although some managers (2 out of 3 questioned) had, apparently, seen some information. Of the literature left at each company, print workers at 1 company (6 out of 10 questioned) reported that they had not seen any of it during the intervention period. At the other company none of the printers said that the literature had significantly changed their working practices, but the company reported that they had just introduced a new glove policy. There was a general consensus that more information should be introduced, especially with regards to the long-term health effects of using chemicals, and disseminated effectively. In addition, it was said that all stakeholders should be involved, which would need co-ordination to avoid information overload and fatigue. All those interviewed agreed that the information could potentially have a beneficial effect on working practices and would give individuals an informed choice.

Skin care policy

There was mixed success for the two companies (10 workers; 3 managers) involved in developing their own skin care policy mainly due to the short time period of the pilot study and also other competing priorities that arose during the study period. The larger of the two companies had made significant progress towards the development of the policy, and both management ($n = 2$) and print workers ($n = 4$) were involved in the policy development process. They had carried out a health survey of print workers asking if they were aware of dermatitis being a potential problem, the possible risk factors and how best to prevent the problem occurring. The company had subsequently begun to introduce a number of measures, including a review of the types and sizes of glove available, where they were kept, the location of hand-care stations and

what barrier creams, soaps and after-work creams were provided. It was believed that the development of the policy would progress and envisaged no problems with it being ratified by senior management and therefore implemented, but the time-scale would depend upon whether other health and safety issues arose and took precedence.

Skin examinations

Although the sample size was small at each company and different employees were examined pre- and post-intervention, the change in the prevalence of skin problems was quite dramatic. All those examined were male; however, other personal details were not collected. The prevalence of damaged skin fell between the pre- and post-intervention in nearly all companies from about 56% to 39% overall, and the severity of problems also decreased (overall number of cases of frank dermatitis fell from 8 to 1).

Discussion

Main findings

The aim of the study was to carry out preliminary testing of a range of low-cost, practicable and acceptable interventions to reduce skin disease in the printing industry. Although the exploratory intervention phase was short, the results were very encouraging, and all the interventions were found to be acceptable to some extent. The response rate to the evaluation was also low, although the views expressed were consistent among employees and employers. Although, the pre- and post-evaluation of different individuals may have introduced some bias into the study, it was not our objective to undertake a fully randomized study, as the aim was to evaluate the efficacy and practicality of the interventions to inform a future formal trial. Using both interviews and questionnaires to evaluate the intervention may have also introduced some bias but responses tended to be consistent between the two methods. No single intervention appeared to be completely effective, although this was not the primary aim of the study. Any conclusions made from this study should be drawn with some caution, and a much larger study would need to be undertaken to rigorously evaluate comparative effectiveness, when it may be prudent to combine one or two of the interventions. Similarly, efficacy could not be firmly established because of small sample size and the non-randomization of interventions (14).

Lessons learnt from the four main interventions

In the skin check intervention, there was a mixed response; some workers reported that they acted

upon the advice of the health professional but others did not. All workers found the visit from an occupational health professional acceptable, and there was a general feeling that a service should be provided on a regular basis, although cost and other more important priorities were given as reasons why such a service might not be provided, as found in other studies (15).

For the glove and cream intervention, the simple process of advising the company on what gloves should be provided for the chemicals in use and passing the advice onto the print workers had an almost immediate positive effect. In addition, all the print workers said that they applied the after-work cream provided at the end of the shift and commented that their hands felt much better than before.

The selection of the correct glove type to use for handling a particular chemical is an important issue and must be guided by the chemical and physical resistance properties (16, 17). The HSE pamphlet 'Skin Problems in the Printing Industry' (13) provided some information for this study on glove type and chemicals handled but may have been difficult for some workers to interpret. Simplified guidance could be developed with involvement of glove manufacturers. However, the onus is still on employees to wear gloves of the correct type, for which encouragement and monitoring is recommended.

There was a general agreement that more informative, evidence-based literature on occupational skin disease that gives details of the extent of the problem, why it happens, what to look for and how to treat it was required. Print workers felt that this information should be made available to everyone and that managers should ensure that they pass it on to the entire workforce. It has been recommended that this information on occupational health should be considered for inclusion in all induction programmes carried out by companies and be a component of all training courses (15).

3 months proved to be too short a period to fully develop a skin care policy. Other issues, both commercial and health and safety, took priority. Nevertheless, the team leaders at both companies stressed that both management and print workers were eager to be included and to complete the process using a 'bottom-up' approach. Other studies have found the development of a policy to be beneficial (18) and shown that any intervention at the workplace should include both employees and management. However, in a survey of 741 UK companies that investigated how UK industry addresses the problem of occupational dermatitis, only 27% said that they had a skin care policy (1), of which only 19% said it was effective. In addition, the study found that 47% of companies who did not have a skin care policy reported being aware of

a skin problem in the workforce, suggesting there was clearly a need for a policy in these companies. In printing, there is a similar recognition among trade unions, stakeholders and regulators that dermatitis is a problem, but there appear to be few companies that have a skin care policy in place.

Recommendations for a definitive study

Although this preliminary intervention study was of short duration and methodologically limited, some improvement was observed in the skin condition of those workers examined by the health professional. No single intervention was completely successful, but all were found to have some effect on skin problems and awareness in the workforce. Skin checks alone would not be sufficient to influence systematic change in work practices or the use of personal protective equipment. The most practical intervention appears to be the regular use of gloves of the correct type and size, which must be readily accessible. In addition, the provision and use of an after-work moisturising cream should be encouraged. Provision of information is important but needs to be in an appropriate form and widely disseminated throughout the workforce. The development of a skin care policy within a general health and safety policy should be encouraged for all printing companies but may require some guidance and assistance. The study findings point towards the need for further testing of risk reduction strategies for the prevention of dermatitis in the printing industry. To test these strategies conclusively, a much larger randomized controlled study would be required. It is proposed to undertake a cluster-randomized trial with two intervention arms. One arm would receive advice on the correct type of gloves to use and encouragement to use an after-work cream, the other would be asked to develop their own skin care policy. Both interventions would also receive information about the prevention, detection and treatment of skin disease, and individuals would receive skin checks. The control arm of the study would only receive the information and skin checks.

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