



# **The development of risk reduction strategies for the prevention of dermatitis in the UK printing industry**

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# **The development of risk reduction strategies for the prevention of dermatitis in the UK printing industry**

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In collaboration with

University of Nottingham

Graphical, Paper and Media Union

British Printing Industries Federation

The primary objectives of this study were:

To identify a range of low cost, practicable and acceptable interventions to reduce occupational dermatitis in the UK printing industry;

To carry out preliminary testing of the acceptability and efficacy of the interventions so identified on a small scale;

To use the preliminary testing of the selected interventions to provide information on the variability of the outcome measures, which would aid sample size calculations for a future largescale intervention trial;

To develop appropriate methodologies for the identification of intervention strategies for use in other occupational and non-occupational situations.

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# Executive Summary

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The Institute for Environment and Health (IEH) received funding from the Health and Safety Executive (HSE) and the British Skin Foundation to undertake a study to develop risk reduction strategies for the prevention of dermatitis in the UK printing industry. The study was carried out in collaboration with Professor Hywel Williams and Dr John English, Dermatology Department, Queen's Medical Centre, Nottingham, the Graphical, Paper and Media Union and the British Printing Industries Federation.

The primary objectives of this study were:

- To identify a range of low cost, practicable and acceptable interventions to reduce occupational dermatitis in the UK printing industry;
- To carry out preliminary testing of the acceptability and efficacy of the interventions so identified on a small scale;
- To use the preliminary testing of the selected interventions to provide information on the variability of the outcome measures, which would aid sample size calculations for a future large-scale intervention trial;
- To develop appropriate methodologies for the identification of intervention strategies for use in other occupational and non-occupational situations.

The first part of the study involved: (i) a review of the literature of preventative intervention studies for dermatitis in the workplace to identify successful procedures in other industries, which might be considered transferable to the printing industry; (ii) identification of risk reduction interventions specific to the printing industry through qualitative research, using a series of observation studies and focus groups. For the observational studies, companies in Leeds and Leicester were identified from various sources. A member of the research team visited each company that agreed to participate. During the visit members of staff in all areas (pre-press, printing and finishing) were shadowed during a typical work-shift to observe and record current work practices, both overt and covert, and record information on substances used during work.

For the focus groups, separate discussions were held with managers, health and safety officers and print workers to explore:

- Opinions and beliefs on the causes of skin problems;
- Changes in practices which would improve skin care;
- Effectiveness of health and safety advice and personal protective equipment;
- Attitudes towards health and safety culture; and
- Occupational health provision and work organisation.

The information gathered through the literature review, observational studies and focus groups enabled four potentially effective and acceptable interventions to be identified: Provision of skin checks by a health professional, plus advice on how to treat any problems found;

- Provision of gloves of the correct size and type for the chemicals used, with strong encouragement from management for their use. An after-work hand cream was also provided for the printers to apply at the end of a shift;

- Provision of leaflets, posters and other educational material to highlight the problem of occupational dermatitis; and
- Development of best practice skin care policy by the company, with some assistance from the investigators. These interventions were then tested through a small pilot study lasting approximately three months. Eight companies (two per intervention) were (non-randomly) selected to participate in the intervention phase. In both companies in the first intervention and in one company in each of the other three, skin checks were carried out at the beginning and end of the intervention period to evaluate the effectiveness of the interventions. At the end of the intervention period each company was revisited and a questionnaire administered to print workers and management. The effectiveness and acceptability of each intervention, plus any difficulties encountered, were explored.

Although the pilot intervention phase was short, all the interventions were acceptable to some extent. No single intervention appeared to be completely effective, but all were found to have some effect on skin problems and awareness in the workplace.

Printers found that having their skin checked by a health professional was acceptable. A general improvement in the condition of printer's hands was seen. For the gloves intervention, the companies accepted the advice of experts and purchased the correct gloves for the chemicals being used. The workforce also regularly used the after-work cream provided. An improvement in the condition of the skin was observed both by the workforce and the health professional. In the information intervention, some print workers did not receive the information provided to the company. It was generally agreed that more information should be provided, with greater detail on the possible effects that chemicals could have on health. Three months proved to be too short a period to develop a skin care policy; other issues, both commercial and health and safety, tended to take priority.

Dermatitis is still not a priority in the printing industry, despite being a major problem. This qualitative research approach forms an essential first stage to improving our understanding of the ways in which occupational dermatitis may be reduced among workers in the printing industry.

Skin checks alone would not be sufficient to influence systematic change in work practices or the use of personal protective equipment. A policy about how best to promote affordable occupational health services needs to be developed by the HSE in collaboration with industry organisations and trade unions. Small to medium sized businesses need to be targeted as they maybe unclear of their needs and unaware of the availability and affordability of an occupational health service.

The most practical intervention appears to be the regular use of gloves, but these must be of the correct type for each particular task, the correct size, readily accessible, and replaced regularly. In addition to gloves the provision and use of after work moisturising cream should be encouraged. It was evident that the advice on glove selection was welcomed. The HSE should continue to improve on the advice given. Glove manufacturers need to be educated and encouraged to collaborate with their customers on correct glove selection for the chemicals used, and how to take care of gloves and to notice signs of deterioration. They should also be encouraged to participate in the development of more specific glove selection tables.

Provision of information is important but needs to be in an appropriate form and widely disseminated throughout the workplace. The HSE needs to review the type of information appropriate for different sections of the workforce and must investigate suitable methods of distribution to ensure that it reaches not only managers but also print workers, who are the people who need it most.

The development of a skin care policy within a general health and safety policy should be encouraged for all printing companies. It was clear that the development of a best practice skin care policy is not suitable for small companies. This should, therefore, be targeted at larger organisations and groups of companies who have the resources and authority to see the process through, and probably get the most benefit. However, many companies would benefit from 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. The results from this study can be used to inform future, large-scale intervention trials, in printing and other industries, perhaps using a combination of the interventions trialled.

# 1 Introduction

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## 1.1 Background

### 1.1.1 Occupational Dermatitis – Size of the Problem

Dermatitis is a common condition that is reported to affect between 15 and 20% of the UK population (English, 1999). Occupational skin disease accounts for 30 to 40% of all cases of occupational illness in industrialised countries (Diepgen *et al.*, 1994; Coenraads & Smit, 1995), and the Health and Safety Executive (HSE) estimated in 1995 about 66,000 people in Great Britain were suffering from a skin disease caused by their work (Health and Safety Executive, 2001). The incidence rate of registered occupational skin diseases in most countries is around 7 cases per 10,000 full-time workers per year (Coenraads & Smit, 1995). More recently, the overall annual incidence of occupational contact dermatitis (OCD) from reports by dermatologists and occupational physicians to a UK national occupational skin disease scheme called EPIDERM estimated levels at about 1.3 cases per 10,000 workers (Meyer *et al.*, 2000), manufacturing industries accounting for the greatest number of cases seen by both sets of reporting physicians, followed by health care employment. The economic impact of OCD is considerable. Approximately 4 million working days are estimated to be lost every year due to absenteeism resulting from work-related skin diseases (English, 1999). This can be costed at approximately £200 million. During 1996, dermatological problems accounted for 23.4% of all work-related health problems reported to UK occupational physicians (English, 1999). In addition to its economic impact, OCD has an appreciable impact on the quality of the sufferer's life (Hutchings *et al.*, 2001).

### 1.1.2 Occupational Dermatitis - Printers

Printers have also been reported to have a high incidence of dermatitis, of around 75 cases per 10,000 workers, with solvents, soaps, petroleum products, epoxies and resins, aldehydes and wet work suggested as the main causative agents (Meyer *et al.*, 2000). A study of newspaper pressroom workers in the US revealed that 8.5% had eczematous dermatitis, the sites most affected being the hands and arms (Yakes *et al.*, 1991), exposure to solvents being given the reason for the problem. However, EPIDERM does not record cases from sources such as general practitioners. In a recent survey 1495 members of the Graphical, Paper and Media Union in Nottinghamshire, UK (Livesley *et al.*, 2002), the prevalence of OCD was shown to be about 11%, much higher than those reported by EPIDERM (12.9 cases per 100,000) (Meyer *et al.*, 2000), about 11%. In this study the most commonly affected parts of the body were the hands, especially the fingers and finger webs, and forearms. The study found that 41% of respondents had suffered a skin complaint at some time. Prevalence was highest in workers involved in printing processes, although over 90% of them wore personal protective equipment such as gloves. Workers on other processes were also affected. A large proportion of those suffering also reported that work-related substances appeared to aggravate a skin condition. A number of participants with self-reported current dermatitis and controls were seen at skin clinics. Of cases diagnosed with a skin complaint, 58% were thought to be occupationally related. In addition, 28% of controls not complaining of a skin problem were diagnosed with a skin problem by an occupational dermatologist that was probably associated with their occupation.

## 1.2 Aims and Objectives

The study by Livesley *et al.* (2002) concluded, that there was a need for further research to quantify the extent and exact nature of dermatitis in the printing industry and to develop risk reduction strategies.

The aim of this study was to provide essential information with a view to planning future large formal intervention trial to evaluate the efficacy of intervention strategies to reduce occupational dermatitis among print workers.

The primary objectives of this study were:

- To identify a range of low cost, practicable and acceptable interventions to reduce occupational dermatitis in the UK printing industry;
- To carry out preliminary testing of the acceptability and efficacy of the interventions so identified on a small scale;
- To use the preliminary testing of the selected interventions to provide information on the variability of the outcome measures, which would aid sample size calculations for a future large-scale intervention trial;
- To develop appropriate methodologies for the identification of intervention strategies for use in other occupational and non-occupational situations.

This was achieved through a three-stage process:

- A review of the literature of preventative intervention studies for dermatitis in the workplace in order to identify successful procedures in other industries, which might be considered transferable to the printing industry;
- The identification of risk reduction interventions specific to the printing industry through qualitative research, using a series of observation studies and focus groups;
- The preliminary testing of intervention strategies developed from the first two stages by means of pilot studies.

## 2 Literature Review

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A search of the online literature databases was undertaken including MEDLINE, BIDS, and PubMed, and the Cochrane Library. These were searched for papers on Occupational Dermatitis, Irritant Contact Dermatitis and Prevention using the search terms in Table 1.1. In addition the bibliographies of relevant text books on occupational dermatitis (Elsner *et al.*, 1996; English, 1999; Rycroft *et al.*, 2001) and references obtained were reviewed. Additional advice was also sought from experts in the field (Dr JSC English and Prof. H Williams).

Table 1.1 Search terms used to identify papers from literature databases

---

DERMATITIS
AND
Occupation\$
AND
(prevent\$ OR interven\$ Or protect) WITHIN 10 WORDS OF
(program\$ OR trial OR stud\$)

---

### 2.1 Risk Factors for Occupational Contact Dermatitis

Identification of risk factors for OCD can give an improved understanding of the aetiology of a disease and inform preventive strategies. The development of OCD might be influenced by a combination of exposure characteristics (exposure to wet work, friction, handling of chemicals and working practices) and individual susceptibility. Skin contact with irritants and/or allergens is a required condition for the development of OCD, but the probability and severity of a reaction depend on the type and intensity of exposure. The use of safe working methods and personal protective equipment (PPE) may also vary. Substantial dermato-epidemiological research has also assessed the role of endogenous factors in the susceptibility to OCD. In general, it is believed that skin irritancy and sensitivity decreases with age (Diepgen & Coenraads, 1999), and this is supported by a decrease in incidence of cases in older workers seen at a London contact dermatitis clinic (Smith *et al.*, 2000). More women also presented at the contact dermatitis clinic, and their mean age was significantly lower than men at that clinic. However, the male to female ratio for occupational cases was 1.1 and for non-occupational cases 0.7.

It has been shown that the relative risk for atopic subjects (i.e. those with a tendency to asthma, hay fever or atopic dermatitis) to develop OCD ranges between 4.6 and 18.8, depending on the frequency of atopy within the general population (Tacke *et al.*, 1995).

The most important risk factor is the exposure to irritants (substances that cause abnormal sensitivity or inflammation). Within the printing industry there are many potential skin irritants including alcohols, alkalis, developers, etching solutions, greases, waxes and inks, varnishes, cleaning solvents, detergents and water. The processes identified as having a high occurrence of OCD include plate-making, correction of litho plates, cleaning of litho rollers and cylinders, guillotining and handling of pressroom consumables (Livesley *et al.*, 2002). In addition, allergens such as potassium dichromate, dyes, formaldehyde, hydroquinone glues and gums are also found in the industry, and which a few individuals would be sensitised to. Many studies have investigated the association between specific printing chemicals or substances and dermatitis. Individual case reports have also described many different chemicals and chemical fractions in the printing industry that irritate the skin and cause dermatitis (Livesley *et al.*, 2002).

## 2.2 Options for Prevention

In many occupational studies it has been found that the symptoms of OCD tend to decrease when some study subjects were away from work, although it persisted in others. Recurring symptoms in populations varied between 35% and 80%. In addition, healing of OCD may or may not be influenced by a change in occupation. Because patients with OCD notably have a poor prognosis for clearing their skin diseases (Diepgen, 1996), the primary prevention of OCD is most important. Table 1.2 gives the range of prevention measures for OCD in order of priority.

**Table 1.2 Range of prevention measures for occupational contact dermatitis.**

- 
- 1 Elimination or replacement of harmful substances (irritants, allergens)
  - 2 Technical measures (e.g. encapsulation of the process, automation)
  - 3 Organisation (e.g. wet work distributed to all employees)
  - 4 Personal protection (e.g. gloves, barrier creams, after-work creams, soaps)
  - 5 Pre-employment screening
- 

Taken from Diepgen (1996)

Methods of eliminating and replacement of harmful exposures include, in order of priority: substitution of chemicals that are less irritating or allergenic; introduction of engineering controls; and the organisation of work in a way that all employees are exposed to the same degree. The use of personal protection, for example gloves and barrier creams, along with the selection of less susceptible individuals (if these can be identified), are believed to be the last possible measures.

There is also a lack of formal intervention studies to evaluate the effectiveness of preventive measures and interventions for the reduction of OCD (Diepgen, 1996). Agner and Held (2002) suggest that protective measures such as the use of moisturisers and gloves have been shown to be effective in a number of experimental studies, but this has not been convincingly confirmed in studies in the workplace. They suggest several reasons for this including the need for multiple rather than single interventions; the complexity of exposure in the workplace, e.g. exposure to several irritants and allergens; and the need to provide detailed information about skin care with a skin protection programme.

### 2.2.1 Elimination or Replacement of Harmful Exposures

The replacement or elimination of harmful substances is the primary aim of any prevention strategy. This may be achieved by using less noxious substances that are still suitable for the task (Adams & Fisher, 1986), for example, replacement of chemicals in water-cooling systems with a less sensitising agent such as zinc borate. Ferrous sulphate has been successfully added to cement in Sweden and Denmark to inhibit potentially sensitising chromate (Fregert *et al.*, 1979; Avnstorp, 1992). In the printing industry the effectiveness of replacing organic solvents with vegetable oil-based cleaning agents (VCA) for cleaning offset lithographic printing presses (Bartlett *et al.*, 1999) and newspaper printing sector<sup>1</sup> has been evaluated. However, although the VCAs functioned adequately and had a lower environmental impact than the organic solvents, suitable protective equipment is still required as they cause skin, eye, and mucous membrane irritation. Whether their use would bring about a reduction of OCD needs further investigating. The HSE have provided guidelines as part of their “UK Printing Solvent Substitution scheme”<sup>2</sup>, which gives a series of principles that could be referred to when health and safety inspectors seek to secure compliance and demonstrate good practice. The

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<sup>1</sup> Korinth G, Goen Th and Drexler H. The action of alternative detergents and solvents on the skin. Unpublished report (Department of Occupational Medicine, University Hospital, Aachen).

<sup>2</sup> <http://www.hse.gov.uk/pubns/solvent.pdf>

aim of the scheme is to reduce the use of low boiling point organic solvents in the industry and to substitute safer alternatives where practicable. By following these principles the HSE hope most companies will be taking the first steps towards compliance with the Control of Substances Hazardous to Health Regulations 1999 (COSHH).

## 2.2.2 Technical Control Measures

The use of technical control measures to enclose, contain, or isolate potential irritants depends on the physical form and route of exposure (Mathias, 1990). If exposure occurs directly from a solid or liquid, enclosure and containment by equipment design or ancillary devices such as splashguards are necessary. If skin exposure occurs primarily through the air in the form of a particulate mist, dust, fume, or vapour, ventilatory controls may be sufficient. There appear to have been no studies that have examined the impact of these measures on the incidence of OCD. However, the use of automatic blanket washes in modern lithographic print machines reduces the possibility of contact with irritants. The installation of extraction systems on print machines that cut the paper during a run also reduces the chance of dust exposure.

An example of a simple engineering control has been described (Packham, 1998b). The screens of a screen-printer become clogged with ink and debris from time to time and required cleaning. This was usually carried out with a rag and solvent, the operator wearing a rubber glove. Considerable contact with the solvent, both dermal and respiratory, occurred. By replacing the rag with a paint pad on an arm, direct contact between the operator's hand and the solvent could be avoided. Since the operator was also now more distant from the actual workplace, respiratory exposure was also reduced to an acceptable level.

## 2.2.3 Personal Protection

The use of PPE is widely recommended in the printing industry, particularly the use of barrier creams and gloves. The correct selection of gloves, and also other PPE, must be guided by considering the chemical and physical resistance properties of the gloves, their flexibility in relation to job tasks, and skin surfaces most likely to be exposed (Mathias, 1990). PPE should be checked regularly and replaced if holes and tears are found, or if there is obvious degradation of the material.

Whilst many printing presses now have automatic roller cleaning, it is still common for printers to use a rag soaked with blanket wash to clean rollers and other equipment (personal communication). Blanket wash presents a special problem of control since, in order to reduce costs, mixed reclaimed solvents are often used. Thus it may be a mixture of aromatic, aliphatic and chlorinated hydrocarbons, ketones and even alcohols. There are few gloves that will provide more than a transitory protection against such a mixture, particularly when cleaning is carried out using a hand-held rag soaked in the solvent.

### *Gloves*

Gloves are important in the prevention of OCD, but may contribute to an increased risk of OCD, because the microenvironment inside gloves is drastically changed and faulty gloves may cause more problems than no gloves at all (Diepgen & Coenraads, 1999). Non-specific irritation can occur from sweat entrapment and friction of the clothing against the skin; accidental occlusion of chemical irritants and allergens beneath the protective clothing can occur, thus enhancing cutaneous absorption and substance toxicities; and contact allergy can develop due to additives in protective clothing. Cotton gloves that allow the skin to 'breathe' could be used for dry work. For wet work thin cotton gloves that absorb sweat may be worn inside rubber or vinyl gloves and can be removed or replaced as required.

Before any glove goes on the market it is subject to various European Directives (89/686/EEC) and UK regulations, which are often supported by British or European Standards. There are three basic tests carried out on gloves:

- Determination of resistance to water penetration;
- Determination of resistance to permeation by chemicals; and
- Determination of resistance to mechanical damage (tear, puncture and abrasion).

There have been many reported studies on the effectiveness of gloves to the above tests. However, it should be noted that most of these studies undertake the above tests using laboratory equipment, or patches of glove material on the skin, to test permeability to various chemicals (Huggins *et al.*, 1987; Tobler & Freiburghaus, 1992; Chadwick *et al.*, 1993; Graves *et al.*, 1995; Andersson *et al.*, 1999). Not many have studied the effect of chemicals on the glove as a whole or under the normal working conditions where the glove is being worn. In a study of dental hygienists the use of a new low-chemical, low-protein, powder-free latex medical glove significantly reduced the number of dermatological signs and symptoms (Boyer, 1995). Selection of chemical protective gloves for use against industrial liquids should be accomplished by risk analysis, in which the appropriate and chemical glove properties needed by the worker to perform the job are determined.

The HSE have developed a glove selection table for the printing industry (Annex 1). This has been developed with the assistance of glove manufacturing companies and the British Safety Council. The HSE state “Glove selection is a complicated process and employers should always seek expert help from the manufacturer or supplier of the chemical agent or glove.” They state, there are four basic requirements that must be met for any protective glove to be suitable (HSE, 2002):

- It must be appropriate for the risk(s) and conditions where it is used;
- It must take into account the ergonomic requirements and state of health of the wearer;
- It must fit the wearer correctly; and
- It must prevent or control the risk involved without increasing the overall risk.

Of course, this assumes that gloves are being worn regularly.

### ***Barrier Creams***

Creams are designed to form protective films in the skin to provide additional protection when wearing PPE. They are not an alternative to protective clothing. They are formulated for use only on normal skin and may occasionally cause secondary aggravation of dermatitis if applied to inflamed skin. Water-resistant creams contain hydrophobic, film-forming substances such as silicone, which provide protection against water-soluble substances such as acids, alkalis, and dyes. Oil- or solvent-resistant creams protect against a variety of dusts, resins, inks, oils, greases, and organic solvents. Barrier creams have been shown to be protective against various substances (Komp, 1985) including epoxy resins (Blanken *et al.*, 1987); metal salts (Schliemann *et al.*, 1999); metal powders, paints and cutting oils (Pantini *et al.*, 1990); and against standard irritants<sup>1</sup> (Frosch & Kurte, 1993; Frosch *et al.*, 1993; Schluter-Wigger & Elsner, 1996; Elsner *et al.*, 1998). However, they need to be applied regularly to provide a continuous effective barrier. The required time between applications varies according to the chemicals being handled and the environmental conditions of the workplace. Improvement was also seen in people with various dermatological problems (Draelos, 2000), and in a group of health care workers with severe hand irritation (McCormick *et al.*, 2000), when they used a barrier cream. In a randomised controlled trial of textile dyeing and printing plant workers with OCD in Italy, the randomised group for treatment with barrier creams had a significantly lower cumulative incidence of objective skin lesions than a group in which no particular recommendation of use was made (Duca *et al.*, 1994). The same study also observed that the use of a hydrocarbon cream was significantly more effective than using a silicone cream. A double-blind, cross-over study of Swiss

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<sup>1</sup> 10% sodium lauryl sulphate, 1% sodium hydroxide, 30% lactic acid, toluene

hairdressers with skin problems demonstrated the efficacy of a new barrier creams to prevent hand irritation caused by repeated shampooing and exposure to hair-care products (Perrenoud *et al.*, 2001).

However, although several studies have shown barrier creams to have some protective effect against the acute irritative and locally toxic actions of solvents (Mahmoud.G. *et al.*, 1985; Mahmoud.G., 1985), for more extended exposure times they do not seem to be effective (Frosch & Kurte, 1993; Frosch & Kurte, 1994). The barrier properties against systemic absorption of solvents also appeared to be no more effective than bare skin (Lauwerys *et al.*, 1978; Boman & Mellstrom, 1989). Others have also shown them to be ineffective against either cutting fluid dermatitis or have any significant effect on trans-epidermal water loss in machinists exposed to cutting fluid (Goh & Gan, 1994). Lack of protection could be caused simply by uneven or patchy application of the product (Wigger-Alberti *et al.*, 1997a; Wigger-Alberti *et al.*, 1997b). Some studies have shown that barrier creams could concentrate the irritant skin response (Schluter-Wigger & Elsner, 1996). Others have postulated that irritants and allergens may adhere to the barrier cream and thus be transferred into the skin (Baur *et al.*, 1998). In a survey of physicians who treated patients suffering from OCD of the hands, 98% felt that barrier creams were no more effective than bland emollients in the prevention of hand dermatitis (Hogan *et al.*, 1990).

Although the 'barrier' aspect remains controversial from a scientific viewpoint, many barrier creams facilitate the removal of sticky oils, greases, resins and inks from the skin, thus decreasing the need to wash with potentially irritating abrasives and waterless cleansers. Despite experimental data demonstrating the efficacy of barrier creams, their potential value is still viewed with scepticism (Lachapelle, 1996).

### ***After-work Creams***

In addition to barrier creams there are also emollient creams and ointments that can be used during and after work. These are designed to be effective in preventing OCD of the irritant type, but the epidemiological evidence for this is scarce (Diepgen & Coenraads, 1999). However, a study by (Draelos, 2000) showed better skin improvement in OCD sufferers using a new hydrogel barrier/repair cream, as did (McCormick *et al.*, 2000) in health care workers using an oil-containing lotion. Randomised controlled trials have shown that eczematous skin heals faster when treated for several days with a moisturiser compared to untreated, symmetrical, control skin (Loden, 1997; Ramsing & Agner, 1997; Held & Agner, 1999). A randomised controlled trial found six commonly used moisturisers accelerated the regeneration of the skin barrier function when compared to irritated non-treated skin (Held *et al.*, 2001a). The most lipid-rich moisturisers tended to improve barrier restoration more rapidly than the less lipid-rich moisturisers. These and other moisturising creams are gaining a lot of interest nowadays in skin protection and their regular and thorough application are said to be an important guard for the secondary prevention of OCD (Schwanitz & Uter, 2000). Their mode of action is not based upon shielding the skin, but claims to offer a restoration of the horny layer of the epidermis (Lachapelle, 1996) by forming a semi-occlusive protective layer that prevents the evaporation of water from the skin, thereby accelerating the healing process (Held, 2001). However, it has been suggested that long-term treatment with moisturising cream on normal skin progressively reduced the barrier efficiency of the stratum corneum (Baker, 1986; Held *et al.*, 1999), and therefore increases the susceptibility of the skin to irritants. In a randomised controlled trial, Held *et al.*, (1999) applied a moisturiser to the forearm of subjects for 4 weeks and found electrical capacitance and trans-epidermal water loss significantly increased on the treated arm, when challenged with sodium lauryl sulphate.

### ***Hygiene and the use of Cleansers***

Cleanliness is also another measure to consider for the prevention of dermatitis and the use of approved industrial skin cleansers should be encouraged (Ortonne, 1990). Adequate washing facilities should also be provided for workers. There are several basic requirements for an "efficient" skin cleanser to prevent occupational skin diseases (Adams, 1983). The cleanser should be soluble in hard, soft, cold and hot water; it should remove fats, oils and other foreign matter without harming the



skin; it should not de-fat the skin or contain harsh abrasives; it should not deteriorate during storage or become infected with bacteria or infested with insects; and it should flow easily through dispensers and not clog the plumbing. It is clear that this “ideal” situation differs from the reality. Appropriate information on skin cleansing products is not always provided to people at risk, and more effort should be made by dermatologists and industrial physicians to teach workers the best way to use appropriate skin cleansing agents (Ortonne, 1990). Application of this advice would be the most effective prophylaxis for OCD. Prompt rinsing with water or washing with mild soap is enough to remove many allergens and irritants from the skin. However, abrasive soaps and waterless hand cleaners are sometimes necessary. Abrasive soaps work by peeling away the stratum corneum, to which various oils, greases, and resins may stubbornly cling. Waterless hand cleaners contain organic solvents formulated in cream bases, which ‘dissolve’ oily substances from the skin. Overuse or misuse of these skin-cleaning agents can cause or aggravate contact dermatitis (Mathias, 1986).

Personal hygiene should include regular washing or cleaning of protective clothing, because inadvertent skin contact often occurs when clothing is put on or removed, or when clothing becomes excessively soiled (Mathias, 1990).

Environmentally, inadvertent skin contact with irritants may sometimes occur via contaminated work surfaces. Care should be taken to ensure spills do not occur and surfaces do not get dirty. If they do they should be promptly cleared with the correct equipment and chemicals. Workers should be responsible for environmental hygiene (Mathias, 1990).

#### **2.2.4 Pre-Employment Screening**

Workers may also be screened for increased predisposition to develop contact dermatitis. For job assignments that involve potential exposure to contact allergens or irritants, medical screening should specifically elicit symptoms of possible past skin reactions to the same or similar substances, because re-exposure is likely to provoke dermatitis (Mathias, 1990). Patch testing for specific chemicals can also be carried out, although some authors do not recommend the testing of healthy people, which accords with the World Health Organisation (WHO, 1986). They claim the method is unreliable, that ethical legislative and economic problems are involved, and that sensitisation may occur as a result of testing (Prystowsky *et al.*, 1979; van der Walle, 1994). This last hypothesis has not been proved (Milkovic-Kraus & Macan, 1996), and possibly the introduction of standard pre-employment screening procedures could eliminate the more negative viewpoints (Adams, 1988). It has been stressed that in general, the number of registered cases of OCD is increasing, which has been suggested indicates the need to include patch testing in the pre-employment examination of persons prior to employment in occupations involving the risk of contact sensitisation (Milkovic-Kraus & Macan, 1996). Studies have shown sensitisation to a wide range of contact allergens in subjects with no history of contact dermatitis from various occupations, including the metal (Milkovic-Kraus & Muselinovic, 1991) and pharmaceutical industries (Milkovic-Kraus & Macan, 1996). Thus, during screening, if any sensitisation is detected, or previous history of hand dermatitis or atopy, people can be excluded from occupations involving risks of the development of allergic contact dermatitis, or be made aware that they need to take special precautions. However, it has been suggested that this should not be used as a basis for dismissal or not engaging in employment (Milkovic-Kraus & Macan, 1996).

#### **2.2.5 Work-Related Educational Programmes**

Half of all OCDs have been observed to appear in the first two years of employment, which usually includes the training period (Dickel *et al.*, 2001). Lack of awareness of any potential health hazards may lead to complacency in the workplace. Educational efforts should promote awareness and identify work activities in which exposure to irritants are likely. Job training should teach recognition of early signs and symptoms of OCD, proper use of protective clothing and barrier creams, and personal and environmental hygiene. Training may involve the use of instructional pamphlets, videotapes, lectures and other traditional educational tools (Mathias, 1990). Worker education should

be initiated before placement in jobs with potential exposure to irritants and should be repeated periodically. Employers should also receive training and act as on-the-job teachers, reinforcing safety lessons and highlighting dangerous chemicals.

Two studies have investigated whether an educational programme was efficient in preventing work-related skin problems. In a fine chemicals manufacturing site, after a general introduction to occupational skin disease, posters were displayed in key areas throughout the company and amended frequently over a one-year period (Heron, 1997). The incidence of new cases of OCD fell from 5.5% to 2.1% before and after the intervention, respectively. In a case-control study of student auxiliary nurses undergoing ten weeks of training, 40% of those receiving education had aggravation of skin problems compared to 58% of those that did not (Held *et al.*, 2001b). Trans-epidermal water loss was also greater in the control group, indicating they had a more compromised barrier function of the skin. Both these studies show the benefits of simple education programmes, and others have stressed their importance especially at the beginning of an apprenticeship (Rustemeyer & Frosch, 1996; Itschner *et al.*, 1996).

A study of hairdressers proposed a prevention strategy based on improvement of the safety of ingredients and packaging, use of vinyl gloves and introduction of safe hairdressing practice (van der Walle, 1994). Introduction of the strategy in hairdressing salons greatly reduced the number of cases of active dermatitis from 16 to 3 within 4 months.

A similar programme in Germany introduced individual skin care and protection regimes and the provision practical training to a group of employees in the catering industry (Bauer *et al.*, 2001). Skin care and protection products were supplied, and seminars were offered to volunteering participants. They found that in the majority of affected employees their skin condition either stabilised or improved. A study of first-year baker's apprentices was also undertaken by the same authors to evaluate the uptake and maintenance of standard prevention techniques (barrier creams, protective gloves) and skin care (moisturiser) (Bauer *et al.*, 2002a). The apprentices were split into two groups, the intervention group receiving skin protection training at the beginning and after four weeks of training. The correct application and use of protective gloves, barrier creams and skin care was also practised intensively. The intervention group incorporated barrier cream into their daily routine very well compared to the control. The acceptance level of protective gloves was considerably lower than that of barrier creams. The initial level of skin care was high in both groups, but after the trial period the acceptance of skin care rose to a higher level in the intervention group compared to the control group. A further comparison by the authors showed skin protection training was also more effective at preventing dermatitis than UV light hardening of the skin, which in turn was more effective than no intervention (Bauer *et al.*, 2002b).

The introduction of legislation is also seen as an important step in the process. A population-based study in Northern Bavaria, Germany, observed a reduction in the incidence of OCD in 24 occupational groups between 1990 and 1999. It was hypothesised that this was the result of increased intensity in preventive measures such as the German Approved Codes of Practice (Dickel *et al.*, 2001). A study of hairdressers over the same time period saw the number of cases fall from 194 to 18 cases per 10000 workers. This was again attributed to improvements in working conditions due to new legislation and intensified preventive measures rather than a change in the natural history of OCD (Dickel *et al.*, 2002). It was suggested that cooperation between dermatologists, government physicians, employers, employees, trade unions, insurance companies, manufacturers and legislative authorities led to a reduction in OCD in hairdressing.

An unpublished review of skincare was carried out at a large newspaper printer (Ward, personal communication). The health and safety officers sought the opinions of staff after receiving many complaints, including:

- 'Sticky' barrier cream causing a reduction in manual dexterity to unacceptable levels;

- Ineffective cleanser;
- Too perfumed moisturiser; and
- Inadequate provision of products in key areas.

The company then trialled a range of products provided by two companies on a sample of the workforce health and safety representatives. All selected the same barrier cream/cleanser/after-work cream regime. These were approved by the company doctor and trialled on 76% of all the company's health and safety representatives. Feedback was received, and 94% were in favour of the new barrier cream, all were happy with the cleanser, and 91% were positive about the after-work cream. 97% were in favour of the total regime. Calculations made by the company indicated that the introduction of the proposed products would involve a small increase in costs. However, they believed it would be far outweighed by the improvements in the quality and fitness for purpose of skincare products, which in turn should minimise the occurrence of skin problems among staff in production areas. The company already provided a wide range of gloves, and even supplied individuals with specialised gloves if required. They also supplied a bagful of new gloves to every work shift when they start work. This simple programme shows how a company can be more proactive in their prevention of OCD.

In the current tight financial climate, few employers or regulatory agencies will implement injury prevention interventions unless the cost of implementation can be offset by either a reduction in the direct costs of injuries or a higher productivity. Workplace owners require reliable information for decision-making regarding the allocation of resources for work injury prevention programmes (Zwerling *et al.*, 1997). In a study of health interventions in the metal working industry education was found to be as the most cost-effective intervention. Training was a very expensive intervention, but presented the best effectiveness outcome and the second best cost-effectiveness ratio, i.e. the ratio of the estimated cost of the programme over the total healthy life years gained, compared to medical care and the use of safety helmets, gloves, and goggles (Salinas *et al.*, 2002). Protective devices such as gloves did not show favourable cost-effectiveness ratios, mainly due to very low intervention effectiveness. The cost-effectiveness ratio of medical care was third place; it was the third most expensive intervention and the second most effective.

## 2.3 Summary of Key Points

From the literature it is evident that:

- There have been no systematic reviews of interventions to prevent occupational dermatitis published. However, there is an ongoing systematic review registered with the Cochrane Skin Group (<http://www.nottingham.ac.uk/~muzd/about/about.htm>).
- Randomised controlled trials have investigated the protective effect of creams and gloves in experimental conditions and shown them to be effective in the prevention of occupational contact dermatitis.
- Randomised controlled trials in field studies have not convincingly shown any beneficial effects.
- Results from less rigorous studies (before and after interventions) have shown that a variety of interventions have had an effect on the prevention of occupational dermatitis in the workplace
  - Replacement of harmful exposures;
  - Application of barrier-creams;
  - Application of after-work creams;

- Introduction of pre-employment screening;
  - Educational programmes;
  - Wearing of gloves.
- No single intervention has appeared to give an outstanding improvement in the incidence of occupational contact dermatitis.
  - The majority of studies have looked at effectiveness of single interventions on small samples.
  - There is a need to study multiple interventions, including the provision of information, to influence skin care behaviour.

# 3 Identification of Occupational Dermatitis Risk Reduction Strategies

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## 3.1 Introduction

The aim of the initial phase of the study was to use qualitative methods to gather information for the development of intervention strategies for testing in a pilot intervention trial, through a series of focus groups and observational studies that would address:

- Work practices;
- Work organisation; and
- Safety culture.

## 3.2 Methodology

### 3.2.1 Identification of Printing Companies

A previous study (Livesley *et al.*, 2002) was a successful collaboration between researchers at the Universities of Leicester and Nottingham and the Health & Safety Executive (HSE), Graphical, Paper and Media Union (GPMU) and employers, through the Printing Industry Advisory Committee (PIAC). For the current study these same groups were asked to facilitate access to workplaces with a range of printing processes. In Leicester and Leeds, the British Printing Industries Federation (BPIF) was also asked to provide access to their members. Lists of potential companies in the two areas were also obtained from the local Yellow Pages and from two websites. "Find a Printer"<sup>a</sup> website developed by PrintNET was used to identify printers in Yorkshire. The Dotprint Directory<sup>b</sup> search engine for printers was used to identify printers in both areas. Companies were selected from the lists and contacted by telephone about the study.

### 3.2.2 Observational Studies

The HSE offices in Leeds and Nottingham facilitated visits to six companies in their areas (three each), to provide an overview of the processes carried out in the industry. These six companies were also later visited, as were a further 15 companies to carry out the observational stage of the study. A total of 50 companies were identified through the various searches and 35 were contacted and requested to participate (Yellow Pages 15; "Find a Printer 11, Dotprint 6; BPIF 2; HSE 1). Of these 12 refused to take part and there was no reply from 8. The aims and objectives of the study were explained to each company manager. It was stressed that all information collected would be strictly confidential. For the majority of the companies we were allowed to walk freely around the workplace and talk to the printers. In the other companies a member of staff accompanied us, usually because certain areas had restricted access or were very large.

The aim of these visits was to shadow members of staff in all areas (pre-press, printing and finishing) during a typical work-shift to observe and record current work practices, both overt and covert. During the visits the printers were also asked about their beliefs about dermatitis, its possible causes, working practices, company health and safety, provision of personal protective equipment, and other issues. In addition, information was collected on the range of substances (including chemicals) used

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<sup>a</sup> <http://findaprinter.org.uk/>

<sup>b</sup> <http://dir.dotprint.com/>

during the work processes, the organisational structure of the company, the health and safety policies and implementation, including skin care and health care provision.

Each visit began with a general tour of the work area to establish the range of processes used and tasks carried out. Observations were then carried out of work practices and selected employees were informally interviewed in all areas of the printing process. Notes were taken during each visit, as well as a taped description of the observations and any discussions held. The tapes were later transcribed.

### 3.2.3 Focus Groups

Focus groups allow groups rather than individuals to explore topics and express opinions in an open-ended manner (McNally *et al.*, 1998). The focus groups held for this study included discussion of issues such as:

- The tasks and jobs carried out in the company and the variability due to individual work practices;
- Changes in processes, substances and practices, which would improve the work, environment relating to skin care;
- The use of personal protective equipment and the acceptability and opinions of the effectiveness of this;
- Attitudes to health and safety (safety culture) - who should be responsible, who actually takes responsibility, tolerance of unsafe practice;
- Provision of health and safety advice, including information packs and leaflets and opinions on its effectiveness;
- Opinions on occupational health provision - what is/should be provided;
- Beliefs on occupational causes of skin complaints;
- What is/should be done about this by management and workers; and
- Structure of the work organisation, and attitudes on the strengths and dissatisfactions with this.

#### *Protocol*

To achieve the aims above a prompt list was developed, with the assistance of members of the study steering committee. The prompt list was developed during a meeting of the steering committee and after discussion with other interested parties who were unable to attend the meeting. It was agreed to begin the focus group discussion with a general introduction to the study and an outline of the type of work each representative's company undertakes. Then it was felt that there should be some discussion about general health and safety at the company and the provision of occupational health facilities. This would then be followed by a discussion about skin-related issues, whether dermatitis was perceived to be a problem, what areas of printing are the most dangerous, what chemicals cause most problems, what PPE is provided, and what advice is available. The focus group would finish with discussion of who should be responsible for protecting against dermatitis in the industry and possible ways of going about reducing the problem. General issues were first discussed followed by skin-related problems. At each focus group one research team member acted as a facilitator to prompt and encourage discussion, and to ensure that opinions on and attitudes to relevant issues were obtained. A second researcher was also present to take notes and also ensure that all issues were addressed. All focus group participants were given written information about the study and asked to sign a participation consent form (Annex 2). The confidentiality of the discussion was emphasised by the researcher. Each focus group discussion lasted approximately one hour and was taped, and later transcribed. Transcriptions were subsequently destroyed.

A total of five focus groups were held. It was originally planned to hold ten, but there were difficulties in obtaining permission from companies to allow printers' time off work, and also arranging times outside working hours for printers. Originally, it had been planned to carry out observations on 20 print workers, but in the end 21 companies were visited with a number of employees in each being observed. The steering committee agreed that as more observations had five focus groups would be sufficient. Table 3.1 outlines who arranged each focus group, the main participants, how many were present, the type of printing or work the company's represented undertook, and the size of the companies.

**Table 3.1 Details of focus groups**

Arranged by <sup>a</sup>	Participants	Number	Type of Printing/Work	Size of Company
BPIF	Company Managers BPIF	9	Lithographic Flexographic PPE Supplier Machine Supplier	Medium to Large
BPIF	Health & Safety Officers BPIF	7	Lithographic	Medium to Large
NPMG	Company Managers College Tutor	5	Lithographic Flexographic Screen	Small to Medium
Corrugated Packaging Association	Print Workers Chemical Supplier	6 1	Lithographic	Large
Company/Authors	Print Workers Finishers	5 2	Lithographic Dot Matrix	Large

<sup>a</sup> BPIF - British Printing Industries Federation; NPMG - Nottingham Print and Media Group, South Nottingham College

### 3.2.4 Analysis

The transcriptions of the focus groups and observational studies were analysed by standard qualitative methods (Pope & Mays, 2000) to identify common and related themes. These enabled a small number of potentially effective and acceptable interventions to be identified.

The analytic process of qualitative research begins during the data collection phase as the data already gathered are analysed and fed into, or shape, the ongoing data collection. This is referred to as sequential or interim analysis. It allows the researcher to check and interpret the data being collected continually and to develop tentative conclusions on the data already collected, or hypotheses for subsequent investigation in further data collection.

The first stage of the main analytical process involves annotating or marking up themes in the transcripts. This is sometimes referred to as 'indexing'.

All the data relevant to each category are identified and examined using a process constant comparison, in which each item is checked and compared with the rest of the data to establish analytical categories. The process of indexing the data creates a large number of 'fuzzy' categories. At this stage, there is likely to be considerable overlap and repetition between categories. Informed by the analytical and theoretical ideas developed during the research, these categories are further refined and reduced in number by grouping them together. It is then possible to select key themes or categories for further investigation. Eventually, a 'saturation' of themes is reached, when the researcher becomes confident about the meaning and importance of the concepts arising from the study (Pope *et al.*, 2000).

## 3.3 Results and Discussion

### 3.3.1 Observations

A total of 21 companies were visited, of which:

- 12 were sheet-fed lithographers;
- 3 were a combination of web-fed and sheet-fed lithographers;
- 1 was a web-fed lithographer;
- 1 was a sheet-fed lithographer printing labels;
- 1 had facilities for sheet-fed/web-fed lithography, screen-printing and dot-matrix printing;
- 1 was a flexographic printer; and
- 2 were screen-printers.

The lithographic printers had machines of various sizes (one to six colour). The companies ranged in size from small (1-5 employees) to large (>200), but the majority were medium-sized. At each company the researcher was allowed to walk round the shop floor, observing all the workers carrying out their duties.

It was evident that although some employees were aware of the dermatitis, the majority did not perceive it to be a major problem within the industry. It was clear when shaking hands with various individuals that their skin was dry. Printers complained of having dry hands, but accepted it, being “something that came with the job”. Some even suggested that their dry hands were a consequence of doing work around the home. However, a large number clearly felt that it was the solvents used to clean the blankets and rollers that caused their hands to dry. Workers in finishing areas were also aware that handling paper dried out their skin.

Although employees were aware of some of the potential causes of their skin problems, their work practices did not always reflect this knowledge. The availability, choice and use of PPE varied greatly between companies, independently of the size of the company. The majority of companies supplied disposable surgical gloves and heavier green nitrile gloves, with a few also supplying a linen glove and a more heavy-duty type. However, although they supplied them they did not provide a variety of sizes. It was also unclear whether anyone at any of the companies had assessed whether the gloves supplied actually provided protection against the chemicals used. At one company a printer was observed requesting a latex glove that he found comfortable to wear. This was not the correct type of glove for the job he wished to undertake. No latex gloves were found, and the printer was later seen wearing a heavier-duty glove that was actually more suited to the task. Workers who used latex gloves commented that they ripped easily. Some individuals wore two pairs of latex gloves because as the chemicals tended to degrade the glove and cause holes to appear during lengthy tasks.

The availability of gloves also varied between companies. Some made gloves freely available, allowing workers to take what they required. However, some companies said this policy was open to abuse by the workers who took more than required for use at home. Gloves were therefore kept locked away and access only gained with the consent of a “responsible person”. However, when this person was absent, for example during night shifts, it would be difficult to obtain replacement gloves. The location of the store of gloves was sometimes a long distance from the machines. This also contributed to inaccessibility to gloves.



Even when the supply of gloves was good and the type available correct, the work practices of individuals varied considerably. Some printers refused to wear any gloves at all, saying the chemicals had no effect on them, and they did not suffer any skin problems. It was clear though that many had very dry skin, which was not confined to their hands. Some men who needed to do a quick clean of the blanket (used to transfer the print image from the plate to the paper) or plate would sometimes not bother to wear a glove if one was not conveniently available. It was observed that two men doing the same job (for example, cleaning a blanket) on the same machine might wear different types of glove (for example, green nitrile and waxed surgical). Workers said it was a “matter of choice”.

When using a gauntlet-type glove some printers would roll the cuff up to prevent the blanket wash dripping down onto their forearms. It was also noticeable that at some companies gloves were equally dirty on the inside and outside. In addition when gloves were removed, contamination of the skin occurred because one gloved hand would remove the first glove and then the bare hand would remove this glove. Printers were also observed wearing only one glove to clean a machine whilst using the other hand to hold on as they leaned over the machine. Individuals were even observed squeezing out a solvent-soaked rag with one gloved and one bare hand. Individuals were also observed leaning over to clean or service a machine, increasing the possibility that any spilt chemicals would get onto their clothes and soak through to the skin, and a number of workers commented they sometimes had a reaction to these chemicals on their thighs and legs. A few print workers complained some of their colleagues were bad housekeepers, that is they did not clean up any spillages before they finished working on a machine. The next worker would then come along not knowing the machine was dirty.

Linen gloves were sometimes used inside a nitrile glove. This, workers said, was because their hands sweated a lot and the linen glove allowed the hand to breathe more. It also prevented any solvent getting onto the skin if splashes did occur.

When handling paper in the printing area, surgical gloves were worn to keep the paper clean. Some wore linen gloves to do the same job. These two types of glove were also worn in the finishing area to handle paper. Some workers had cut the finger tips off the linen gloves and put rubber thimbles on to enable them to handle and sort large quantities of paper. However, the majority of workers in the finishing areas did not wear any gloves and were observed to have very dry hands and many paper cuts. Individuals also said that dust got into the cuts and irritated the skin further.

The availability of barrier creams varied between companies. Many printers thought that the barrier creams prevented chemicals from coming into contact with the skin. However, others said that they only applied the cream because at the end of the day they did not have to use a heavy-duty soap to remove the ink from their hands. At one company printers were observed liberally rubbing the cream into their hands and under their fingernails every time they walked past the container bucket.

Access to wash-up areas at some large companies was remote from the print machine, so if a printer was required to wash their hands they had to ensure they were covered by a colleague. Some companies did provide alcohol wipes for minor cleaning. The soaps supplied varied in their degree of harshness. Some contained pumice which printers believed damaged their hands. Others contained other substances such as plastic beads and walnut shell. These substances facilitated the removal of ink, grease, oil and other substances from the skin. Some companies had tried a variety of soaps before choosing the one currently used. The printers usually decided which one they preferred. Some companies supplied soaps that also contained a moisturiser. Some printers were known to use the solvents to get the ink off their hands at the end of the day, and then use an ordinary soap to wash their hands. Some felt it would be more convenient to have taps that could be turned off easily, without having to get them dirty.

After work creams were not freely available at most companies, although a number of employees believed they should be supplied. The companies that did supply an after-work cream usually did so as part of the equipment for a general wash-up station. Some printers reported using moisturisers when they got home.

In a number of companies the blanket wash for cleaning the machines was kept in an open bucket. Rags were dipped into the buckets, squeezed and then used to clean the machines. Gloved hands were therefore immersed in the solvent, with the possibility that the solvent could get inside the glove and onto the forearm also. As the gloves are immersed in the solvent the breakthrough time will probably be shortened. Many printers are not aware of this, especially if they are not wearing the appropriate gloves for the job. In some companies the cleaner is applied to a rag via a small bottle. Thus, there is less chance of the solvent getting onto the skin and the gloves do not get immersed and hence probably last longer. At no company were gloves cleaned once a job was completed. The buckets were filled from larger containers, usually by pouring with the potential for splashes to occur. Sometimes a hand pump was used. Similarly, the smaller bottles were either filled directly from larger ones, or by using a pump. Isopropyl alcohol (used as a dampening agent) was also poured from large containers into machine reservoirs in some situations. Again, splashes and spills could occur.

All the printers were aware of the potential dangers of UV curable inks and said they always ensured they wore PPE when using them. They were also aware that the starch-based powder used to separate paper and the solvents caused their hands to dry. Although these problems were known, workers indicated they would like more information on the chemicals used, especially the long-term health effects of continuous exposure, e.g. cancer.

The availability of general information was poor. Material Safety Data Sheets (MSDS) were available, but the majority of them were not up to date and in some companies the file containing them was not complete. The file was also not immediately available. Comments were also made about how unclear they were, and the need for simplification for a layman to understand.

### ***Summary of key points***

- Few workers were aware dermatitis is a major problem within printing industry.
- Dry hands were accepted as part of the job.
- Workers were aware what caused hands to dry out.
- Gloves provided by companies were generally okay, but not always readily available.
- The correct glove for the job being undertaken was not always worn.
- Some print workers refused to wear gloves, wore only one glove, or had cuffs rolled up (exposing the forearm) when undertaking cleaning jobs.
- Gloves were not always worn when plates/blankets required small/quick clean.
- In the finishing area, the majority of workers did not wear gloves, and many suffered with dry hands, paper cuts and irritation.
- The availability of barrier creams varied between companies, and many workers thought they were a substitute for gloves. A few workers stated that they use them to help remove ink at the end of the day.
- Wash-up facilities in most companies were away from the print machines, thus not allowing workers to clean their hands regularly.
- The soaps provided by companies varied, but usually selected because workers found they removed ink best.
- After-work creams were not supplied by majority of companies. However, some workers provided their own, although their use was thought not to be a “man thing”.

- The application of blanket wash was mostly done with a soaked rag, which had been dipped into a bucket and squeezed. However, some used squeegee bottles to apply the wash to the rag, reducing chance of exposure.
- Workers knew that UV curable inks were dangerous to handle.
- The availability of information was generally poor. Material safety data sheets were available, but not always on display, up-to-date, or complete, and workers commented they were too technical.

### 3.3.2 Focus Groups

It was clear from the focus groups that the views of managers and health and safety officers with regards to various issues differed significantly from those of printers in a number of areas.

#### *Health and Safety Issues*

The most important health and safety issue was to ensure the machines were running smoothly and safely, and all safety guards were in place. Most companies used checklists regularly to ensure machines were in operational order. The focus group participants also felt it was important that workers know how to operate the machines safely to prevent any physical injury to the worker. Injuries to the hand were felt to be the most likely to occur. Occupational dermatitis was not perceived as a major priority in the printing industry by any of the focus groups, partly because it is not regarded by any as a litigation/compensation issue.

The focus group participants appeared to have little awareness about the risk of chemicals. Although they were aware that the use of strong chemicals has declined over the years, some printers were still worried about the long-term effects of the chemicals, particularly the solvents. Managers felt that the chemical suppliers should provide more practical information about possible harmful effects, over and above information required for the material safety data sheet (MSDS). They felt that suppliers had a responsibility to their customers to provide this information and perhaps training packages also.

#### *Health and Safety Arrangements*

Larger companies tended to have a specific person trained and employed to be responsible for the overall health and safety of the company, with health and safety (H&S) representatives from the workforce in different areas of the company. The latter are the first point of contact when any problem or issue arises, and also disseminate health and safety advice. However, the majority of printing companies do not have full-time H&S managers. Although most companies have a designated worker responsible for H&S, the tendency is to react to situations rather than being proactive. Examples given included: only reacting when an accident occurred, or a worker had developed dermatitis; treating a minor injury without investigating the cause; and instigating preventive measures.

Risk assessments have been carried out within some of the companies involved in the study, but printers participating in the focus group felt that sometimes no action is taken. As a result management sometimes tolerated unsafe working practices, e.g. blocked pathways.

Managers participating in the focus groups felt that a lot of time and effort was taken to find out what is required with regards to all aspects of health and safety. This is then passed on to printers as memorandums, leaflets or by word of mouth. However, there was often very little opportunity to hold training sessions after an individual's induction period. Some of the printers said that sometimes no formal induction was given. The printers also reported that very little information was distributed by managers, especially HSE literature, although this would be read especially if it was thought to be to their benefit. In contrast however, managers reported that the printers would rarely read anything given to them. Information passed on mainly related to safe handling and machine operations, with very little in the way of health matters being circulated. According to managers, data sheets are

available and simple to read, but printers are not compelled to read them and print workers commented that they are “boring”. Manager and printers alike had seen very little publicity about skin problems within the industry prior to this study. Printers, especially, stressed that more information on the health effects of working in the industry needed to be produced. However, the managers felt that the simple provision of information would be only a first step. The information needed to be incorporated into an effective training programme, which would require follow-up and checking. The managers felt that companies are doing their best but that they needed help in developing health and safety policy, including skin care. Colleges now include skin care as part of their general training courses in health and safety for new recruits in the industry, but for those already working, there is nothing. None of the BPIF short-courses include skincare as a topic. BPIF forums have brought up the issue of dermatitis, and at these meetings printers are encouraged to discuss this and various other H&S topics, and ways of improving the situation.

The print workers participating in the focus groups felt that management do not care and are not interested in their employees, in that they do not receive good information, proper induction training or any on-the-job training. They are told to get on with it. It is different if you have a good immediate supervisor who will provide some training/advice on various issues, and take things higher if problems arise. But generally, printers say they have to look after themselves.

### ***Occupational Health Provision***

Occupational health services are generally only provided in large companies. Smaller companies see this as a luxury they could not afford, even if it only involves a nurse visiting once a month or every six months. Companies who do employ an occupational nurse and/or a physician felt that this was an invaluable service, particularly for detecting problems early. Workers were also able to visit them on-site, thereby reducing time off work. The service generally provides medical check-ups and regular hearing tests, and also skin checks. All companies have, or should have, First Aiders. However, they are only trained to react to a situation rather than being proactive in promoting health and providing skin checks. All focus group participants agreed that an occupational health service would be desirable. It was suggested that smaller companies could group together, perhaps through organisations like the BPIF, to obtain access to a nurse and/or physician.

### ***Risky Activities***

There was general agreement about the processes and work practices within the industry that could give rise to skin problems. These included:

- The use of deletion fluid in plate-making;
- Solvent use to clean blankets;
- Exposure to UV inks and light;
- Exposure to starch powder (used to prevent paper sticking together);
- Handling of paper;
- Use of harsh soaps, and continual washing of hands; and
- Not rinsing and drying hands thoroughly.

Participants felt that these risk factors either dried the skin out or removed oils from the skin, thus making it more vulnerable to damage.

## *Skin Care Provision*

Skin care was not generally a matter of concern to most of the printers participating in the focus groups “it’s not a limb or an eye”. However, some said they were “brought up with the fear of dermatitis”. Not many knew the symptoms of dermatitis, how to treat it, or how to prevent it recurring.

The issue of PPE was then raised. The managers reported that everything that was required was provided, including barrier creams, gloves and after-work creams. In addition, if a specific item was required then it could be provided. However, this was not the view of the print workers.

Barrier creams (BC) were supplied by most companies, but both managers and printers tend to regard them as complete protection against exposure to chemicals. Some perceived the use of BCs as a ‘female thing’ and therefore would not use them. Managers and printers both agreed that BCs helped to remove ink allowing less harsh soap to be used. However, some indicated they could not use them as they caused irritation, especially ones containing lanolin.

Gloves are used throughout the industry, but questions were raised by various individuals about the type and size provided, and their availability. Managers reported that gloves of various types, including linen, disposable latex, nitrile, etc. were freely available for their employees to use. Print workers were advised on the type of glove to wear for specific tasks, but this advice was not always needed. For example, some printers chose to wear latex gloves when cleaning the machines when a more durable glove should be used. Managers also reported that gloves were sometimes overused, even when they contained holes. Managers felt that printers believed that gloves provided total protection against chemicals. Although it was noted that some printers refused to wear gloves at all, managers did not generally enforce the use of gloves.

Participating printers had particularly different views of the availability of gloves. Some reported that they could always get a pair of gloves when required, as the stores were always open and no questions were asked. However, others reported that gloves were kept in a central store, which was not easily accessible, especially if the key holder was absent. In some companies the store was also remote from the print machines, so a printer would have to leave his machine to get a new pair; a small supply was not provided near the machines. Printers commented that there were occasions when the store had run out or did not have the correct size, and in these situations the printer would simply use an old pair or not use any at all.

Some companies provided different types of gloves but the managers participating in the focus groups admitted that they were not always sure a correct decision had been made on the appropriate type. The advice of their supplier was usually taken, although the supplier did not always know what chemicals were being used. Printers, on the other hand, reported that companies might switch to a much cheaper glove than previously used, which could cause problems. However, a lot of the printers agreed that the correct glove for a specific job was not always used, and it was a “matter of choice”. A large number would mainly select a disposable latex glove to wear as these make their tasks more dextrous. Managers said it was a matter of educating the printers on the appropriate type of glove to use for each specific job.

The soaps used varied between companies, but all had an added abrasive ingredient that scrubbed the hand clean. One manager reported that his company had tested a variety of brands before they arrived at the one currently used, because previously used soaps containing pumice, although removing stains, also removed a layer of skin. In the past, printers were often seen using sand from fire buckets to clean their hands. Some printers preferred to use a mild soap and put up with the ink stains on their fingers.

Washing facilities varied between companies. One company provided “Stations” close to each print machine, but in most the toilets/changing rooms were all that was available and often some distance

from the machines. Printers would have liked facilities nearer to the workplace with taps that could be turned on and off without getting them dirty. Hand towels were preferred by many to electric dryers, because the latter tended to dry the skin out more.

After-work creams were rarely provided by the company, and most printers did not use them (“a macho thing”) or would admit to using them. Some provided their own or used one at home. All printers said it would be helpful if the company provided a cream for use at the end of the day.

### 3.4 Discussion and Recommendations for Preliminary Testing

After analysing the transcription of the focus groups and observations, a number of points were highlighted by both print workers and management. The majority of participants knew the dangers of the chemicals that were used in the industry and how they dried the skin. However, they were not all aware that the dryness could lead to dermatitis. They were also unaware of the early signs of the problem, how it progresses and the actual size of the problem within the industry. Also, they did not know the best way to go about treating the problem if detected. There was general agreement that more information is required to cover these subjects. This information should be simple but informative and made available to everyone from management down to the print worker. It was also felt that all workers needed educating, and the provision of **better information** would be a start in the process.

After visiting companies and talking to print workers there was some concern shown as to the **type of gloves** being used and their availability. Although management said they provided the gloves required for the job, print workers were not too sure. It was clear that at most companies visited no one had undertaken a risk assessment of the chemicals being used and whether the gloves supplied provided protection against these chemicals. The availability of gloves varied considerably from company to company, and did not relate to the size of the operation. Some companies had an open policy, where gloves were freely available; a worker could simply go to the stores and get what they required. All other gloves were kept in a locked cupboard, because, it was said workers tended to take more than was required to use at home. **Accessibility to gloves stores** was also varied; at some companies stores were kept by machines whereas at others they were on the other side of the shop floor and only open during the day.

The **use of creams, barrier and after-work**, was also variable. The majority of print workers believed that barrier creams were an alternative to gloves providing protection against the chemicals used. Their true function could therefore be discussed in any information provided. Some print workers knew they did not provide protection function, but did aid in the removal of dirt, oil and ink. Very few companies provided, or print workers used an after-work cream to replace moisture lost from the skin at the end of the working day. Most workers said it wasn't a “man thing” to apply a cream. Those workers that did use a cream said it helped in preventing their hands drying out.

**Wash-up facilities** and the soaps were generally believed to be adequate, although some print workers at some companies felt that they should be located nearer the print machines.

Few of the companies visited provided an **occupational health service (OHS)** that incorporated skin checks of their employees. Those that did and these were the larger companies said it was an invaluable service and helped in the detection of early signs of not only skin disease but also other health problems. The majority of companies, medium to small, said that cost was the main reason for not providing or getting access to an OHS.

All of the companies visited, or those represented at the focus groups had health and safety policies dealing with machine safety and most had a policy that stated that workers should wear ear defenders where appropriate. The Flexographic printer visited also had a policy that insisted print workers wear

white coats and hats with hairnets to reduce the possibility of contaminating the food packaging they produced. However, **none of the companies had a policy in place that dealt with skin care.**

From these points it was decided in discussion with the steering group that the three key interventions to be evaluated further were:

- Use gloves of the correct type.
- The provision of information about the problem of dermatitis, and
- Provision of a service to check skin condition.

# 4 Preliminary Testing of Risk Reduction Strategies

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## 4.1 Introduction

From the recommendations from the qualitative research, four interventions were developed to test in a small intervention study representing a range of approaches and varying cost implications:

- A. Provision of skin checks by a health professional, plus advice on how to treat any problems found;
- B. Provision of gloves of the correct size and type, plus use of an after-work cream;
- C. Provision of information to highlight the problem of OCD; and
- D. Development of a best practice skin care policy by the company, with some assistance from the investigators.

## 4.2 Methodology

### 4.2.1 Company Selection

Eight companies were selected to take part in the intervention phase: six offset lithographers, one flexographic printer and a screen printer. Although it would have been ideal to randomly select the companies from a large sampling frame, this was not possible because it was difficult to find companies willing to participate. Similarly, it was not possible to randomly allocate each company to one of the interventions because of the logistics involved, e.g. it was difficult for the health professional to make sufficient time available for some of the more distant companies.

#### *Analysis of the Baseline Questionnaires*

At the beginning of the intervention period each company was asked to complete a questionnaire (Annex 3). This gathered baseline information on the size of the company, health and safety provision, medical care, whether COSHH assessments have been undertaken, chemicals used, PPE used and literature provided. Table 4.1 provides basic information about the companies from the questionnaire.

Six of the companies were lithographic printers, with a mixture of web- and sheet-fed machines. The other two companies were a flexographic printer and a screen printer. They ranged in size from the small screen printer (P1) to the large lithographic (I2, P2) and flexographic (I1) companies.

All the companies provided suitable hand-washing material and barrier creams, but only half provided an after-work cream. These were of various types and supplied by a number of companies.

They all stated that they provided suitable gloves and used a variety of suppliers. All supplied a standard cotton glove, disposable vinyl gloves and industrial nitrile gloves, similar to the marigold blue and Nitri-tech green types. Companies I1 and P2 also supplied heavier duty rubber gloves for employees to wear when handling more dangerous chemicals. The larger companies also supplied other PPE, e.g. shirts, trousers, safety boots, etc., which they also laundered.



All the companies stated that they had undertaken assessments on the handling of chemical substances. Chemicals used were supplied by a number of the major companies (Ultrachem, Litho Supplies, Openshaw, etc.). The screen printer (P1) used a local company to supply their chemicals, and also their gloves and other consumables. They all used hard ink removers containing dichloromethane; blanket and plate cleaners/washes containing naphtha as the basic ingredient, with other chemicals added (e.g. 1,2,4-trimethylbenzene), depending on the supplier; and isopropanol. Company I1 also used blends of solvents, which were: methylated spirits and naphtha; dowanol<sup>1</sup> and naphtha; and methylated spirits and ethyl acetate. All the companies provided the material safety data sheets produced by the supplier, but it is not known whether they had considered the gloves provided were suitable for handling these chemicals.

All the companies followed HSE guidelines for safety, e.g. machinery maintenance and the provision and use of machine guards. Most have also established International Standards Organisation (ISO) working practices.

The information provided by the companies to their employees covered general health and safety issues, especially noise control and protection, lifting and back problems, and general items (e.g. slips and trips). Information on skin problems was not provided by any company, although company P2 had just received copies of the latest HSE pamphlet "Skin Problems in the Printing Industry" (HSE, 2002), and were about to distribute it amongst their employees. None of the companies provided specific training in relation to skin problems for their employees. The three large companies provided general health and safety training, and first aid, for interested employees. In contrast, the small companies had at the most one or two employees with similar training.

Two of the companies (I2 and P2) were aware that some of their employees had dermatitis, but none had any written rules about avoiding skin problems. Only one company (P2) had access to occupational health advice. The other two larger companies knew where and how to get advice if required, but the rest did not.

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<sup>1</sup> Propylene glycol monomethyl ether

Table 4.1 Basic information about the companies participating in the intervention phase.

	Intervention and Company Number							
	Skin Checks		Glove		Information		Policy Development	
	S1	S2	G1	G2	I1	I2	P1	P2
Type of Printing <sup>a</sup>	Litho (S)	Litho (S)	Litho (S)	Litho (S)	Flexo.	Litho (S/W)	Screen	Litho (W)
Size of Company								
Pre-Press	3	5	6	5	20	30	1	20
Printing	8	16	5	7	50	150	8	100
Finishing	10	16	3	7	50	250		50
Others	10	30	16	15	150	150	1	100
Provision of Information on Skin Problems	N	N	N	N	N	N	N	N
Provide:								
Hand Washing Material	Y	Y	Y	Y	Y	Y	Y	Y
Barrier Cream	Y	Y	Y	Y	Y	Y	Y	Y
After-Work Cream	N	N	N	N	Y	Y	Y	Y
Suitable Gloves	Y	Y	Y	Y	Y	Y	Y	Y
Skin Checks	N	N	N	N	N	N	N	N
Any Dermatitis	N	N	N	N	N	N	N	Y
Rules & Skin Problems	N	N	N	N	N	N	N	N
Chemical Handling Assessments	Y	Y	Y	Y	Y	Y	Y	Y
Access to Occupational Health Advice	N	N	N	N	N	N	N	Y
Where/How to Get Advice	N	N	N	N	Y	Y	N	Y

a : Litho – Lithographic; Flexo – Flexographic; S – Sheet-Fed; W – Web-Fed  
N – No; Y – Yes

## 4.2.2 Intervention Protocols

Two companies were selected to take part for each intervention. In addition, one company from interventions A, B and D also received skin checks at the beginning and end of the trial period. Each intervention was trialled for approximately three months with regular visits and contact via telephone.

### *Intervention A: Skin Checks*

Skin checks were undertaken by a qualified health professional with an interest in occupational dermatitis (Dr John English) at the beginning of the three-month intervention period and upon its completion. During each visit, checks were undertaken on those employees present who had given their consent to take part. Advice was given to individuals found to have a problem on selecting which creams to use and measures that would help to 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 individual's hands (Annex 4). Digital photographs were also taken of hands of some individuals thought to have a problem. These will be used later to develop a photographic scale of severity for occupational dermatitis that can be used in subsequent studies.

The print workers examined worked for two medium-sized lithographic printers using sheet-fed machines, one employing about 30 people (approx. 8 print workers), the other about 70 people (approx. 16 print workers)

### *Intervention B: Gloves and After-Work 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. A recently published document "Skin Problems in the Printing Industry" outlines the types of gloves to be used for different chemicals (Annex 1). However, it was thought that this might be too complex for a company to decide on the correct glove to use. Therefore, the list of chemical substances used by the company, obtained from the baseline questionnaire, was reviewed by the research team and a member of the British Safety Industry Federation to determine the correct glove for each substance. The company were then provided with a list and requested to purchase and provide the suggested gloves in sufficient quantity and correct sizes for the period of the intervention phase. The company management was then 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<sup>1</sup> was supplied to the companies. E45 is a light emollient used to treat and soothe dry, itching and flaking skin conditions, and is recommended for more serious dry skin conditions, such as eczema, dermatitis and ichthyosis. 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.

### *Intervention C: Provision of Information*

For this intervention a folder was put together containing information on general health and safety, chemical safety, COSHH regulations and assessment, dermatitis, use of chemicals in the industry, guidance sheets for printers and the new HSE pamphlet "Skin Problems in the Printing Industry" (HSE, 2002). A full list is given in Annex 5.

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 to occupational skin disease prepared by the research team (Annex 5). This was followed by the HSE videos "Safe Use of Printing Chemicals: COSHH and Substitution" and "Rash Decisions". The first video aims to help employers

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<sup>1</sup> Crookes Healthcare Limited, Nottingham, UK

and printers to understand the Control of Substances Hazardous to Health Regulations (COSHH) and how to protect the health of those employed in the printing industry. It is aimed mainly at smaller firms, but may also be of use to larger organisations, particularly for training purposes. The second video aims to raise the awareness of the cause of occupational dermatitis and the steps employers should take to prevent it by demonstrating that managing the risk makes good business sense and prevents unnecessary suffering.

The company was then asked to read the literature provided, and to distribute the new HSE pamphlet to employees, and to put all other documents on display in communal areas. Copies of the videos were also left to allow the companies to show them to other members of staff. Both companies were large, employing over 200 people a large number of which are directly involved in printing. One company was a flexographic printer producing packaging for food and retail sector, the other a lithographic printer using web and sheet-fed machines.

### ***Intervention D: Development of Best Practice 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); the other a small screen-printer employing about 10 people (8 printers). The companies were requested first to undertake a risk assessment exercise to determine the areas where printers were thought to be most at risk, and the chemicals used that could increase the chance of developing dermatitis. They were also asked to determine what work practices were likely to increase the development of dermatitis. They were then asked to develop ways of reducing the risk of developing dermatitis, including any or all of the following:

- Reducing contact with the dangerous chemicals;
- Chemical substitution;
- Engineering controls;
- Changing worker practices;
- Changing the practices in certain areas;
- Provision of different gloves for different jobs, and different sizes;
- Provision of pre-work/barrier and after-work creams;
- Personal hygiene;
- Environmental hygiene;
- Provision of an occupational nurse (or similarly trained person) to carry out regular checks; and
- Education of employees into the danger of dermatitis, discussing the signs, symptoms and ways of treating it.

An outline “Action Plan” based on the Corrugated Packaging Association’s Musculo-Skeletal Disorder Management Plan was provided to assist in the development of the policy. For each step of the management plan, the action required, aim or target and benchmark were changed to be more relevant to the printing industry. A draft version was circulated around the project’s steering committee and after some minor alterations finalised (Annex 7).

The first steps of the plan are to obtain the commitment of senior management and to by outline their responsibilities to the staff and to develop the basis of a policy. Next, it is recommended that the workers or their representatives should be involved, to discuss and develop the policy. In the next

stage, the person responsible for the development of the policy, as discussed above, should undertake a risk assessment exercise. As a result of the assessment a series of control measures can then be introduced to reduce the highlighted risk areas; an educational and training programme can also be developed for existing staff and new recruitments. Lastly, a system should be established to report, promptly, any OD cases and a procedure developed to manage these cases and assess reasons why a particular case occurred. At each step worker involvement (at all levels) should be encouraged. For each step there was also a variety of literature available that can assist in the process, which was made available.

## 4.3 Post-Intervention

To evaluate the effectiveness and efficacy of the interventions a prompt list was developed, in consultation with the steering committee, of general questions about dermatitis in the printing industry followed by more specific questions related to each intervention (Annex 8). It was originally proposed to hold further focus groups at each of the participating companies using the prompt list as the basis for the discussion. However, as in the pre-intervention phase, this proved difficult to arrange with the companies being particularly reluctant to release printers during work hours. It was decided that short interviews with representatives of the workforce during quiet periods of work would be acceptable to the companies and for collecting the required information. Notes were taken during these interviews where possible, or a portable tape recorder was used to dictate notes immediately following the interview. All taped notes were later transcribed. Those who were unavailable for interview were handed a questionnaire, relevant to their intervention, to complete in their own time, containing a series of open-ended questions adapted from the prompt list. The company were also requested to distribute the questionnaires amongst the print workers. The printers were asked to return the completed questionnaires to the company contact for forwarding on to the research team.

## 4.4 Results

Generally, about half of those contacted were aware that dermatitis was a problem in the printing industry, and knew about the main causes relating to printing processes and substances used. Most individuals were unaware that handling paper and washing hands could frequently lead to skin problems. Most, if not all, of those interviewed wore gloves during their working day, with some using barrier and after-work creams.

### 4.4.1 Skin check intervention (Intervention A)

All workers said they had never previously had their skin checked as part of any medical they received. As a result of having the skin check as the beginning of the intervention period, printers said they made sure they wore gloves when handling the chemicals. However, only at one of the two companies did printers heed the advice of the OH professional to use an after-work cream if they had dry skin, or signs of dermatitis. Although there was only a small sample and not all employees were contacted post-intervention the change in prevalence seen at both companies supports this. In company 1 the pre-intervention prevalence of damaged skin was 50% (3/6), with 2 workers having frank dermatitis. At the end of the three-month intervention period the prevalence was 70% (7/10), all of whom had dry skin although there was only one case of frank dermatitis. In company 2 the pre-intervention prevalence was 93% (13/14), all of whom had dry skin, 3 having frank dermatitis (Table 4.1). After the intervention, the prevalence had fallen to 23% (3/13), with no cases of frank dermatitis.

The attitude of company 1 workforce was 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 good thing for the industry, as it would inform people if they had a problem, which could then be treated. However,

they were less certain as to whether the advice and skin checks would result in a change of working practice.

All employees felt the company should provide a service if requested. However, the majority felt management would say they could not justify the cost involved. Suggestions were made to involve other organisations in providing a service, e.g. trade unions, BPIF, etc.

**Table 4.1 Summary of skin survey at companies taking part in the interventions**

	Intervention									
	Skin Check				Glove		Information		Policy	
	Company 1 (N≈30) <sup>a</sup>		Company 2 (N≈70)		(N≈30)		(N>200)		(N≈10)	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Number Seen	6	10	14	13	7	8	24	21	5	5
Damaged Skin	3	8	13	3	6	4	12	9	0	0
Dry	2	6	13	2	6	4	9	7		
Cracks	1	0	3	1	3	0	0	1		
Cuts	3	0	7	0	1	0	1	1		
Other	0	0	0	0	1	0	1	1		
Frank Dermatitis	2	1	3	0	3	0	0	0		
Mild	2	1	3		3					
Affected areas										
Finger	1	1	1		2					
Palms	0		0		1					
Wrists	0		0		0					
Back of hand	1		1		2					
Web	1		2		1					

NB. Pre- and Post-Intervention samples were not always the same people

<sup>a</sup> Company Size

#### 4.4.2 Glove Intervention and After-Work Cream (Intervention B)

The majority of print workers said they had heeded the advice given to them on the use of the correct glove type for specific chemical. One company even purchased a much more heavy-duty glove to wear when using hard ink remover, and continued to use their existing gloves for more routine work. All print workers interviewed said they used the E45 cream at the end of their working day. At the company that also received skin checks, the prevalence of damaged skin fell from 86% pre-intervention (6/7) to 50% post intervention (4/8) (Table 4.1). At the pre-intervention check all cases had dry skin and 3 had mild dermatitis, compared to all with dry skin and no dermatitis at the end of the intervention.

Prior to the intervention some print workers said they sometimes did not wear gloves if they had to quickly clean a plate or roller during a run. Those in the finishing area never wore gloves. They also admitted that although they wore gloves they were not sure whether they were the correct type for the job. They said it was helpful to receive the advice of an expert on what gloves to wear with each chemical, and that a similar service, or information should be provided for all print workers. However, they were unsure whether guidelines provided would be followed, 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 their hands felt a lot better since they started using it. They also said they would consider using a cream all the time now.

#### **4.4.3 Information Intervention (Intervention C)**

The prevalence of damaged/dry skin fell from 50% pre-intervention (12/24) to 43% post intervention (9/21) at the company who received skin checks, the majority of whom just had dry skin (Table 4.1). There were conflicting viewpoints from print workers between and within each company on the various issues raised in the prompt list. Some said the communication between management and staff was good and all relevant health and safety information was passed on to them. Information was passed on in various formats: memoranda, leaflets, newsletters, posters, data sheets, and notice board. However, there was a comment at one company that there were too many memoranda. Both companies had awareness campaigns, but limited training, although one was just about to introduce a new training programme.

Nobody was aware of the problem of dermatitis in the industry prior to this study, although a new recruit said it was mentioned during their course at college. Similarly, they were not aware of any literature available. Some managers had, apparently, seen some information. Of the literature left at each company, print workers at one company had not seen any of it during the intervention period, whereas most at the other company had. None of the printers said it has significantly changed their working practices, but company 2 had just introduced a new glove policy.

There was a general consensus that more information should be introduced, especially with regards to the chemicals used and their possible effects on the skin and also long term health effects. They said more facts and figures should be produced, posters depicting early signs of dermatitis and possible consequences published and preventive measures also highlighted. It was suggested that information should be posted around the workplace, for example above washbasins, educating people how to wash their hands properly and encouraging the use of barrier and after-work creams. Various bodies were suggested to produce this information including the government, HSE, GPMU, BPIF, management and specialists, although this should be coordinated. This information should be made available to everyone, and if in an acceptable format would be universally read. All those interviewed agreed that the information could potentially have a beneficial effect on working practices and would give individuals an informed choice.

#### **4.4.4 Skin Policy Intervention (Intervention D)**

For those companies involved in developing their own skin care policy there was mixed success, mainly due to the short time period of the pilot study. The two companies were different; one was a large web-fed offset lithographer, the other a small screen printer. At the larger company the “team leader” in the policy development was a person whose job duties included health and safety, whereas at the smaller company this person’s main job was a printer who had taken on a health and safety role. Both had encountered different problems. Neither had a policy written down prior to the study, and both found it difficult to develop one because other priorities arose during the intervention period. The first company had to start implementation of the new ISO environmental management standard, whereas the second company was in the process of being incorporated into a much larger one. Despite competing priorities, the first company had gone some way in the development of the policy. Both management and print workers became involved in the process. Although the more senior managers did not want any direct involvement in the development of the policy, they allocated this responsibility to the team leaders. Print workers were also involved in the development of the policy. The company has also carried out a survey of the health of print workers. Individuals asked if they were aware of dermatitis being a potential problem, if they knew the possible risk factors and how best to prevent the problem occurring. The company had previously carried out a COSHH assessment four years ago, and therefore updated it as part of the policy development.

As a result of this assessment and the survey the company had begun to introduce a number of measures:

- A review of the types of glove used, and the sizes available, and the location where new gloves are kept.
- A review of the location of hand-care stations, and what barrier creams, soaps and after-work creams were provided.
- A discussion with the occupational health nurse, who visited them on a weekly basis, as to whether skin checks could be included as part of the routine medical examination.
- Introduction of a series of instruction and training programmes on all aspects of health and safety, including skin care.
- Involvement of line managers, i.e. a senior print worker from each shift, to act a supervisor to more junior members of staff. The line managers would receive health and safety training (including skin care) from the team leader, and then pass on this information to the rest of their shift. They would also be expected to ensure their colleagues not only operated machines properly, but also wore gloves of the correct type when cleaning the machines and handling chemicals.

The company have also begun a process of introducing a system of “Total Productive Manufacturing”, which they have adopted from the Japanese “5S System”. The system is based on the principles of sort, set-in order, shine, standardise and sustain.

The team leader believed that the development of the policy would progress, but the timescale would depend upon whether other health and safety issues arose and took precedence. Skin problems were not seen as a high priority at the senior management level. He also felt that once it was developed it would not have any problems being ratified by senior management and therefore implemented.

In the second company the new management were keen to have a health and safety policy in place, and want to include skin care within this. As the company is small no problems were envisaged in involving the workforce. The team leader also felt that as the company is small, any problems that occur could be discussed and solved easily on an informal basis. He said that this contrasted to a large company where an individual with a problem had to go through many levels of management before approval was given to find a solution. No formal risk assessment has taken place, but the risk areas are known and precautions taken. Control measures were already in place, and there are readily available supplies of gloves (various types), barrier and after-work cream, and soaps. The company is planning to move away from the traditional methods of screen-printing to digital printing, which is much cleaner and safer. There is general health and safety training in place, and plans to include skin care in the training, after the company takeover has gone through. As yet there is no OH service, or plans to start the provision of one. The company believe a policy of some sorts will be implemented in the near future.

## 4.5 Discussion of Intervention Studies

The original aims of the study were to identify a range of low cost, practicable and acceptable interventions to reduce OCD in the printing industry, and to carry out preliminary testing of the feasibility of these interventions. Although the pilot intervention phase was short, all the interventions were found to be acceptable to some extent. No single intervention appeared to be completely effective, although this was not the primary aim of the pilot study. If the effectiveness were to be rigorously tested a much larger study would need to be undertaken, probably involving up to 20 companies per intervention. The interventions would include the use of gloves of the correct type, the use of creams, the provision of skin checks, and delivery of information and training. It may



be prudent to combine one or two of these, thus only giving us two or three interventions to test. The results for the preliminary testing of interventions were very encouraging.

Efficacy is a measure of the capacity of an intervention to produce a desired effect. Its measurement, in the assessment of interventions to reduce job-related health risks in the occupational setting, is hindered by the lack of a rigorous study design (Goldenhar & Schulte, 1994). Therefore, because of the small sample size and the non-randomisation of interventions, the efficacy of the interventions in this study could not be established.

#### 4.5.1 Skin Check Intervention (Intervention A)

In the skin check intervention there was a mixed response, some workers reporting that they acted upon the advice of the health professional, others reporting that they did not. All print workers found the visit from an OH professional **acceptable** and there was a general feeling that a service should be provided on a regular basis. However, managers of small- to medium-sized companies felt that **cost** would be a potential barrier to implement a service. In a recent survey of the use of occupational health (OH) support (Pilkington *et al.*, 2002) cost was more likely to be reported as a reason for not providing OH support in medium and large companies compared to small and micro companies. The survey also found that in most industry sectors, approximately one third of companies reported that more important priorities were preventing them from providing OH support. In addition, less than half of these companies were interested in a national help-line to provide initial support about OH issues. Concern for the health, safety and well being of employees was the main reason quoted for having OH support, regardless of company size, sector, or region. However, concerns about litigation and the costs of absence were also commonly reported. The report concluded there was a recognised lack of knowledge about how to deal with health issues, and was particularly true for small companies which were more willing to consider sharing OH support services than companies of other sizes. Similar comments were made in the printing industry study.

A survey of UK industries found that the provision of an OH service was related to company size with larger companies more likely to provide this than smaller ones (Douglas *et al.*, 1999). However, relatively few of the companies who had their own professional occupational health staff carried out regular skin checks.

The HSE have recognised that the majority of printing companies do not provide an OH support service and have begun to promote the use of NHSPlus. NHSPlus, as part of the Government drive to make services affordable and accessible to all sizes of business, provides access to the OH department of local hospitals\*.

#### 4.5.2 Glove Intervention and After-Work Cream (Intervention B)

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 affect**, in that new gloves were purchased and used. In addition, all the print workers said 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 (Mellstrom, 1985; Berardinelli, 1988). For example, a print worker should not use a disposable latex glove for a long time whilst cleaning the blankets of a print machine, as the solvent being used would quickly break through the latex and contaminate the skin. Advice therefore needs to be given on the correct choice of glove. The new HSE pamphlet "Skin Problems in the Printing Industry" provides some information on glove type and chemicals handled, but may be difficult for some workers to understand. It might be

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\* <http://www.nhsplus.nhs.uk>

appropriate for new simplified guidance to be developed linking glove type and process. The glove manufacturers also need to become involved more with companies in providing the advice and also undertaking more tests on the effects of solvent blends on glove properties. Despite the availability of gloves the responsibility still rests with the employees to wear them. However, to ensure that gloves are worn when necessary a monitoring system needs to be set up. They need to be encouraged to wear them and wear the correct type also. A number of print workers commented that they did not wear gloves because they believed they did not have a problem. In the survey of UK companies 69% of these companies that had a glove policy monitored glove use in the some way (Douglas *et al.*, 1999). However, one respondent in the study pointed out that glove use was monitored only in terms of cost. This comment was also made by many print workers. In contrast print works managers stated that they supplied all the gloves required by the workers. Glove inaccessibility and unavailability was a major discussion point amongst the majority of print workers.

At some companies gloves were easy to obtain, whereas at others they were kept under lock and key at all times. Management said this was necessary to stop theft. However, not being able to get gloves when required could lead to unnecessary chemical exposure. Print workers must take some responsibility and ensure they have a pair of gloves when they start work and that they are in good condition.

The **correct use of gloves** is also very important. In a survey of UK companies 71% had procedures for which policy required that gloves were worn (Douglas *et al.*, 1999), but only 64% of these provided training in the correct use of gloves. At only one of the companies visited in this printing study was some sort of glove policy in place, whilst another one, involved in the information intervention, had just instigated such a policy. At none of the companies was there any training in the correct use of gloves. Thin cotton gloves that absorb sweat and any accidental occlusion of chemical irritants may be worn inside rubber or vinyl gloves and will reduce the possibility of non-specific irritation and cutaneous absorption, as they can be replaced as necessary (Mathias, 1990). This procedure was also undertaken by some print workers. Gloves should always be worn over clean hands to avoid accidental occlusion of irritants against the skin. On a number of occasions during the observation visits gloves left lying by machines were noticed to be just as dirty on the inside as the outside. Thus training in the correct type of glove to use, how and when to wear the glove and care of the glove is an important aspect in preventing OCD.

### 4.5.3 Information Intervention (Intervention C)

In the information intervention there was general agreement that **more informative, evidence-based literature on OCD was required**. Literature that gives details of the extent of the problem, why it happens, what to look for and how to treat it, was believed to be needed. Print workers felt that this information should be **made available to everyone**, and that managers should ensure they pass it on to print workers. However, although the information was given to management some print workers said it had not been passed on to them. In a survey of OH support it was considered that relevant information on OH should be included in all induction programmes carried out by companies, and should be a component of all syllabuses in higher education (Pilkington *et al.*, 2002).

In a study looking at the HSE's ability to communicate with small firms (McKinney, 2002) the usefulness of existing HSE materials was felt to be low to medium. Similarly, all sectors studied believed the need for information and publications to be of low to medium priority, in contrast to the results for the printers study.

In this intervention, a number of documents were given to the companies to circulate. Among them was the Printer's Guide to Health and Safety. This was first published in 1998, and only 4566 copies were sold, with 3500 of these being sold in the first two years. There are about 15,000 printing companies in the UK, employing around 340,000 workers, which suggests that the advice in the guide is not being widely disseminated. The second edition of the Guide was published in April 2002, and

in the first six months about 700 copies have been sold. The uptake of the new HSE leaflet 'Skin Problems in the Printing Industry' has also been slow.

COSHH Essentials for Printers was first published in 2000, and like the Guide, has only sold a few copies, a mere 450 by the latter half of 2002. In a recent survey of firms purchasing COSHH Essential guidelines (Wiseman & Gilbert, 2002) small firms, of which the printing industry largely consists, make up a smaller proportion of purchases of COSHH Essentials, and appeared to perceive the guidance as aimed at larger firms. The survey found that these smaller firms may be less likely to have an employee with dedicated responsibility for health and safety, a situation similar to that seen in the printing companies visited, and hence lack the broader awareness of larger firms of Health and Safety issues and support. Most companies found the guidance useful, but less than half progressed through the assessment system. Leaflets were the most important source of awareness of the guidance, with no more than a fifth of respondents citing any other source. This, they state, may indicate that there is scope to increase the impact of advertising for the guidance.

The HSE have recognised the need to raise awareness of health and safety and communicate effectively with small printing firms, which is confirmed to some extent by the results for the printing study. They have consequently decided to target these companies through a network of intermediaries and local business forums, with the assistance of the BPIF. By working together with these intermediaries, who represent a large percentage of the printing population, the HSE are endeavouring to improve communications and command the support of all interested parties within the industry and HSE. HSE plan to hold a seminar in early 2003 to discuss the effectiveness or otherwise of these initiatives. During this process it is important for the HSE to ensure that the material reaches the print workers, not just managers.

#### 4.5.4 Skin Policy Intervention (Intervention D)

Three months proved to be too short a period to develop a skin care policy. Other issues, both commercial and health and safety, tended to take priority. Nevertheless, the team leaders at both companies stressed that both management and print workers were eager to be included and complete the process using a 'bottom up' approach.

Other studies have definitely found the development of a policy to be beneficial. In a study of wet work employees, a skin care policy including written instructions was established at each workplace as part of an intervention to prevent work-related skin problems (Held *et al.*, 2002). After five months, the intervention group had a significantly higher information level on skin care, had significantly changed their behaviour (use of gloves, moisturisers, etc.) and had significantly fewer skin symptoms when compared to a control group. The authors stated that any intervention at the workplace **should include both employees and management**; the implementation of a skin care programme should focus on frontline employees and the **formation of participatory teams**; and that **intervention studies are necessary** to prove the effectiveness of preventive measures.

It has been suggested that an effective skin management system will almost inevitably show itself to be an excellent investment (Packham, 1998a). Not only will productivity improve through the reduction in lost time from OCD, but morale in the workplace will also improve. The improved workplace conditions will help retain experienced workers and attract a quality workforce.

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 (Douglas *et al.*, 1999). This ranged from 15% in small companies (<100 employees), to 27% in medium companies (100-499) to 41% in large companies (500+). Only 19% of companies who had a skin care strategy for their policy said it was very 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 that dermatitis is a problem, but there appear to be few that have a skin care policy in place.

## 5 Project Conclusions

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Occupational contact dermatitis (OCD) has previously been shown to be an important issue in the printing industry. This study has been a collaboration between the Institute for Environment and Health, the Health and Safety Executive, the British printing Industries Federation, the Graphical Paper and Media Union and Health professionals from Queen's Medical Centre, Nottingham.

In relation to the study objectives, the study has:

- Identified a range of low cost, practical and acceptable interventions to reduce occupational dermatitis in the UK printing industry;
- Conducted preliminary testing of the acceptability of the interventions on a small scale;
- Provided information on the variability of the outcomes to inform sample size calculations for subsequent large-scale intervention trials; and
- Developed appropriate methodologies for the identification of intervention strategies for use in other occupational and non-occupational situations (e.g. new skin severity scale).

Qualitative methods, namely focus groups, interviews and observations, were used to identify a range of preventative methods for the reduction of OCD. Four interventions were developed from the qualitative phase of the study and carried out for a period of three months in eight companies (two per intervention) to evaluate their acceptability and feasibility. For one company from each intervention, skin checks were also carried out by a consultant dermatologist at the beginning and end of the trial period to provide an idea of efficacy.

The qualitative methods employed in this study were well suited to the study of attitudes and experiences of printers in respect of dermatitis. Focus groups allowed groups to explore topics in a liberal and protected manner. The fact that no management staff were present during the discussions with workers allowed them to speak freely. The observational studies of print workers during their normal work-shift allowed for the identification of work practices that would not otherwise have been admitted to during a focus group. They also facilitated face-to-face interviews on the shop floor. Objective observations are always difficult to achieve, but the combination of these with other methods, such as focus groups, provide verification of both observed and reported events, behaviours and attitudes.

It is clear that OCD appears not to be considered a major priority for most companies and their workers. It was therefore difficult to recruit companies to take part in the various stages of the study and required considerable effort on behalf of the research team. In addition, it also proved difficult to recruit individuals to take part in focus groups. This was partly due to a reluctance by companies to interrupt normal working procedures. These recruitment problems, both of companies and individuals, will need to be taken into account in the design of any future intervention study.

Although the pilot intervention study was of short duration some improvement was observed in the skin condition of those workers examined by the consultant dermatologist. The prevalence of frank dermatitis generally fell together with the prevalence of those with damaged skin. Skin problems reduced by some extent with all interventions, and, all were practical to some extent.

The skin check intervention was partially successful in reducing skin problems but probably had a less consistent effect on influencing the use of PPE than other interventions. The less successful company in this intervention was that which felt that the workforce did not experience skin problems.

The question of occupational health service provision in general should also be highlighted in the printing industry. Companies should be made aware that it is important to ensure the welfare of their employees. NHSPlus should be publicised as much as possible as a source of expertise. If companies feel it necessary, skin checks should be included in the training of health and safety officers, enabling them to carry out routine skin checks.

The intervention using gloves and creams succeeded in altering the attitude of management to some extent, in that one company took the initiative to purchase appropriate gloves. It also resulted in raising awareness of skin care problems and many more of the workforce wore gloves and used moisturising cream. Glove selection at most companies currently does not appear to be based on any risk assessment carried out. The new HSE leaflet "Skin Problems in the Printing Industry" will assist companies to select the correct glove type for the chemical used. However, some companies would find the selection tables difficult to interpret, and it would perhaps help to provide a new table, linking glove type and process. Print workers would also need to be encouraged by management to wear their gloves when handling chemicals. It is not sufficient to just supply the workers and leave them to make their own selection. The provision and use of barrier creams should be encouraged, but it should be stressed that they are not an alternative to gloves for hand protection. The use of after-work creams should also be encouraged.

The intervention providing information highlighted the problem of effective dissemination of material in that in one company not all workers received the information. Different types of information, such as posters and leaflets, also need to be developed and a method established for ensuring these are available at appropriate areas in the workplace. The information needs to be clear and concise, and inform workers about: the extent of the problem, the main causes, signs to look for, and ways to treat and prevent it. The HSE need to reconsider their methods of publicising and disseminating their literature. PIAC have suggested that small and medium size enterprises should be targeted through a network of intermediaries and local business forums to facilitate the sharing and development of health and safety expertise and good practice solutions.

Some difficulties were encountered by those companies asked to develop a skin policy mainly because of other business priorities. However, both companies involved in this intervention became keen to develop such a policy. The intervention highlighted the fact the development process takes considerable time and commitment and involves meetings and discussion between management and workforce. The research team produced an action plan to guide the companies in developing their skin policy. Wider use of this type of intervention would require refinement and testing of similar guidelines. The development of a best practice skin care policy would probably best suit larger companies or groups of companies, who have a dedicated health and safety officer. These individuals would have more time, and probably a larger budget, to enable them to develop and implicate a policy. Small and medium size companies would require more guidance and assistance.

In conclusion:

- 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 PPE;
- The most practical intervention appears to be the regular use of gloves but these must be:
  - of the correct type for each particular task
  - the correct size
  - readily accessible

- replaced regularly
- In addition to gloves the provision and use of 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 workplace; and
- The development of a skin care policy within a general health and safety policy should be encouraged for all printing companies. However, many companies would require guidance and assistance.

## 6 Recommendations

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The results from this study allow a number of recommendations to be made. A policy about how best to promote affordable occupational health services needs to be developed by the HSE in collaboration with industry organisations and trade unions. Small to medium sized businesses need to be targeted as they may be unclear of their needs and unaware of the availability and affordability of an occupational health service. Companies should be made aware of and encouraged to use NHSPlus.

It was evident that the advice on glove selection was welcomed. The HSE should continue to improve on the advice given in the new pamphlet “Skin Problems in the Printing Industry” (HSE, 2002), and possibly link gloves and processes or trade name chemicals. Glove manufacturers need to be educated and encouraged to train their customers on correct glove selection for the chemicals used, and how to take care of gloves. They should also be encouraged to participate in the development of more specific glove selection tables.

Companies should be urged to purchase the correct gloves for the chemicals they use, and print workers should also be encouraged to wear the gloves provided.

Print workers should also be encouraged to use simple after-work creams, and to view these as an integral part of a skin care programme.

The HSE needs to review the type of information appropriate for different sections of the workforce and must investigate suitable methods of distribution to ensure that it not only reaches managers but also print workers, the people who need it most. In addition, the HSE should encourage companies to seek the advice of the HSE on skin care and other protective measures for their workforce without fear of recrimination.

It was clear that the development of a best practice skin care policy is not suitable for small companies. It should, therefore, be targeted at larger organisations and groups of companies who have the resources and authority to complete the process, and who would probably benefit most.

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 study would be required, carried out under more controlled and formal conditions. A large sample of companies would be required to allow for random selection and allocation of interventions. The study would be expensive to undertake and might include multi-national partners to increase the possibility of funding.

A workshop is therefore being planned to discuss the possibility of setting up a large intervention study. Partners from Germany and The Netherlands have been invited to discuss the current state of knowledge of the problem of occupational contact dermatitis, recent research findings, barriers to effective prevention and elements for the design and undertaking of a large-scale, multi-centre, randomised controlled intervention study.

# References

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- Adams RM (1983) *Occupational Skin Disease*, London, Academic Press
- Adams RM (1988) medicolegal aspects of occupational skin diseases. *Dermatologic Clinics*, 6, 121-129
- Adams RM & Fisher AA (1986) Contact allergens alternatives. *Journal of the American Academy of Dermatology*, 14, 951-969
- Agner T & Held E (2002) Skin protection programmes. *Contact Dermatitis*, 46, 253-256
- Andersson T, Bruze M & Bjorkner B (1999) In vivo testing of the protection of gloves against acrylates in dentin-bonding systems on patients with known contact allergy to acrylates. *Contact Dermatitis*, 41, 254-259
- Avnstorp C (1992) Cement eczema: an epidemiological intervention study. *Acta Dermato-Venereologica, Supplement 179*, 1-22
- Baker H (1986) The Skin as a Barrier. In: *Textbook of Dermatology* (4th Edition), Oxford, Blackwell Scientific Publications, pp 355-365
- Bartlett IW, Dalton AJP, McGuinness A & Palm H (1999) Substitution of organic solvent cleaning agents in the lithographic printing industry. *Annals of Occupational Hygiene*, 43, 83-90
- Bauer A, Kelterer D, Bartsch R, Pearson J, Stadeler M, Kleesz P, Elsner P & Williams H (2002a) Skin protection in bakers' apprentices. *Contact Dermatitis*, 46, 81-85
- Bauer A, Kelterer D, Bartsch R, Schlegel A, Pearson J, Stadeler M, Kleesz P, Grieshaber R, Schiele R, Elsner P & Williams H (2002b) Prevention of hand dermatitis in bakers' apprentices: different efficacy of skin protection measures and UVB hardening. *International Archives of Occupational and Environmental Health*, 75, 491-499
- Bauer A, Kelterer D, Stadeler M, Schneider W, Kleesz P & Elsner P (2001) The prevention of occupational hand dermatitis in bakers, confectioners and employees in the catering trades. *Contact Dermatitis*, 44, 85-88
- Baur X, Chen Z, Allmers H & Raulf-Haimsooth M (1998) Results of wearing test with two different latex gloves with and without the use of skin-protection cream. *Allergy*, 53, 441-444
- Berardinelli SP (1988) Prevention of occupational skin disease through use of chemical protective gloves. *Dermatologic Clinics*, 6, 115-119
- Blanken R, Nater JP & Veenhoff E (1987) Protective effect of barrier creams and spray coating against epoxy resins. *Contact Dermatitis*, 16, 79-83
- Boman A & Mellstrom G (1989) Percutaneous absorption of 3 organic solvents in the guinea pig. III. Effect of barrier creams. *Contact Dermatitis*, 21, 134-140
- Boyer EM (1995) The effectiveness of a low-chemical, low-protein medical glove to prevent or reduce dermatological problems. *Journal of Dental Hygiene*, 69, 67-73
- Chadwick RG, Traynor N, Moseley H & Gibbs N (1993) Blue light curing units - a dermatological hazard? *British Dental Journal*, 176, 17-21
- Coenraads PJ & Smit J (1995) Epidemiology. In: Rycroft RJG, Menne T, Frosch PJ & Benezra C, eds, *Textbook of Contact Dermatitis*, Berlin, Springer, pp 133-149
- Dickel H, Kuss O, Blesius CR, Schmidt A & Diepgen TL (2001) Occupational skin diseases in Northern Bavaria between 1990 and 1999: a population-based study. *British Journal of Dermatology*, 145, 453-462
- Dickel H, Kuss O, Schmidt A & Diepgen TL (2002) Impact of preventive strategies on trend of occupational skin disease in hairdressers: population based register study. *British Medical Journal*, 324, 1423
- Diepgen TL (1996) Epidemiological Studies on the Prevention of Occupational Contact Dermatitis. In: Elsner P, Lachapelle JM, Wahlberg JE & Maibach HI, eds, *Prevention of Contact Dermatitis*, Basel, Karger, pp 1-9
- Diepgen TL & Coenraads PJ (1999) The epidemiology of occupational contact dermatitis. *International Archives of Occupational and Environmental Health*, 72, 496-506
- Diepgen TL, Schmidt A, Schmidt M & Fartasch M (1994) Demographic and legal characteristics of occupational skin diseases. *Allergologie*, 17, 84-89
- Douglas E, Rushton L & Williams HC (1999) Is occupational dermatitis being taken seriously by UK industries? *Occupational Medicine*, 42, 85-91
- Draeos ZD (2000) Hydrogel barrier/repair creams and contact dermatitis. *American Journal of Contact Dermatitis*, 11, 222-225



- Duca PG, Pelfini G, Ferguglia G, Settini L, Peverelli C, Sevosi I & Terzaghi G (1994) Efficacy of the use of barrier creams in the prevention of dermatological disease in textile dyeing and printing plant workers: results of a randomized trial (Italian). *Medicina del Lavoro*, 85, 231-238
- Elsner P, Lachapelle JM, Wahlberg JE & Maibach HI (1996) *Prevention of Contact Dermatitis (Current Problems in Dermatology)*, Berlin, Karger
- Elsner P, Wigger-Alberti W & Pantini G (1998) Perfluoropolyethers in the prevention of irritant contact dermatitis. *Dermatology*, 197, 141-145
- English JSC (1999) *A Colour Handbook of Occupational Dermatology*, London, Manson Publishing
- Fregert S, Gruvberger B & Sandahl E (1979) Reduction of chromate in cement by iron sulfate. *Contact Dermatitis*, 5, 39-42
- Frosch PJ & Kurte A (1993) Efficacy of skin barrier creams. I. The repetitive irritation test (RIT) in the guinea pig. *Contact Dermatitis*, 28, 94-100
- Frosch PJ & Kurte A (1994) Efficacy of skin barrier creams. IV. The repetitive irritation test (RIT) with a set of 4 standard irritants. *Contact Dermatitis*, 31, 161-168
- Frosch PJ, Kurte A & Pilz B (1993) Efficacy of skin barrier creams (III). The repetitive irritation test (RIT) in humans. *Contact Dermatitis*, 29, 113-118
- Goh CL & Gan SL (1994) Efficacies of a barrier cream and an afterwork emollient cream against cutting fluid dermatitis in metalworkers: a prospective study. *Contact Dermatitis*, 31, 176-180
- Graves CJ, Edwards C & Marks R (1995) The effects of protective occlusive gloves on stratum corneum barrier properties. *Contact Dermatitis*, 33, 183-187
- Health and Safety Executive Assessing and Managing Risks at Work from Skin Exposure to Chemical Agents. (2001) Sudbury, Suffolk: HSE Books,
- Held E (2001) So moisturizers may cause trouble! *International Journal of Dermatology*, 40, 12-13
- Held E & Agner T (1999) Comparison between two test models in evaluating the effect of a moisturizer on irritated human skin. *Contact Dermatitis*, 40, 261-268
- Held E, Lund H & Agner T (2001a) Effect of different moisturizers on SLS-irritated human skin. *Contact Dermatitis*, 44, 229-234
- Held E, Myging K, Wolff C, Gyntelberg F & Agner T (2002) Prevention of work related skin problems: an intervention study in wet work employees. *Occupational and Environmental Medicine*, 59, 556-561
- Held E, Sveinsdottir S & Agner T (1999) Effect of long-term use of moisturizer on skin hydration, barrier function and susceptibility to irritants. *Acta Dermato-Venereologica*, 79, 49-51
- Held E, Wolff C, Gyntelberg F & Agner T (2001b) Prevention of work-related skin problems in student auxiliary nurses: an intervention study. *Contact Dermatitis*, 44, 297-303
- Heron RJL (1997) Worker education in the primary prevention of occupational dermatoses. *Occupational Medicine*, 47, 407-410
- Hogan DJ, Dannaker CJ, Lal S & Maibach HI (1990) An international survey on the prognosis of occupational contact dermatitis of the hands. *Occupational and Environmental Dermatoses*, 38, 143-147
- HSE Skin Problems in the Printing Industry. (2002) IACL 101. Sudbury: HSE Books,
- Huggins R, Levy N & Pruitt PM (1987) Testing of gloves for permeability to UV-curable acrylate coatings. *American Industrial Hygiene Association Journal*, 48, 656-659
- Hutchings CV, Shum KW & Gawkrödger DJ (2001) Occupational contact dermatitis has an appreciable impact on quality of life. *Contact Dermatitis*, 45, 17-20
- Itschner L, Hinnen U & Elsner P (1996) Prevention of hand eczema in the metal-working industry: risk awareness and behaviour of metal worker apprentices. *Dermatology*, 193, 226-229
- Komp B (1985) Protective skin ointments. Their value in preventing occupational dermatoses (German). *Occupational and Environmental Dermatoses*, 33, 20-26
- Lachapelle JM (1996) Efficacy of Protective Creams and/or Gels. In: Elsner P, Lachapelle JM, Wahlberg JE & Maibach HI, eds, *Prevention of Contact Dermatitis*, Basel, Karger, pp 182-192
- Lauwerys RR, Dath T, Lachapelle JM, Buchet J-P & Roels H (1978) The influence of two barrier creams on the percutaneous absorption of m-xylene in man. *Journal of Occupational Medicine*, 20, 17-20
- Generic. Livesley EJ, Rushton L, English JS & Williams HC The prevalence of occupational dermatitis in the UK printing industry. (2002) pp.487-492 *Occupational and Environmental Dermatoses*, 59, Anonymous

- Loden M (1997) Barrier recovery and influence of irritant stimuli in skin treated with a moisturizing cream. *Contact Dermatitis*, 36, 256-260
- Mahmoud.G. (1985) Evaluation of the protective value of an antisolvent gel by laser Doppler flowmetry and histology. *Contact Dermatitis*, 13, 14-19
- Mahmoud.G., Lachapelle JM & van Neste D (1985) Histological assessment of skin damage by irritants: Its possible use in the evaluation of a 'barrier cream'. *Contact Dermatitis*, 11, 179-185
- Mathias CGT (1986) Contact dermatitis from use and misuse of soap, detergents, or cleansers in the workplace. *Occupational Medicine*, 1, 208-218
- Mathias CGT (1990) Prevention of occupational contact dermatitis. *Journal of the American Academy of Dermatology*, 23, 742-748
- McCormick RD, Buchman TL & Maki DG (2000) Double-blind, randomized trial of scheduled use of a novel barrier cream and an oil-containing lotion for protecting the hands of health care workers. *American Journal of Infection Control*, 28, 302-310
- McKinney P (2002) *Expanding HSE's ability to communicate with small firms: A targeted approach.*, Didcot, AEA Technology
- McNally NJ, Phillips DR & Williams HC (1998) Focus groups in dermatology. *Clinical and Experimental Dermatology*, 23, 195-200
- Mellstrom G (1985) Protective effect of gloves - compiled in a data base. *Contact Dermatitis*, 13, 162-165
- Meyer JD, Chen Y, Holt DL, Beck MH & Cherry NM (2000) Occupational contact dermatitis in the UK: a surveillance report from EPIDERM and OPRA. *Occupational Medicine*, 50, 265-273
- Milkovic-Kraus S & Macan J (1996) Can pre-employment patch testing help to prevent occupational contact allergy? *Contact Dermatitis*, 35, 226-228
- Milkovic-Kraus S & Muselinovic Z (1991) Pre-employment screening for contact dermatitis among pupils of a metal industry school. *Contact Dermatitis*, 24, 342-344
- Ortonne J-P (1990) Skin cleansing: an important problem in occupational dermatology. *Wiener Medizinische Wochenschrift*, 108, 19-21
- Packham CL (1998a) *Essentials of Occupational Skin Management.*, Southport, Limited Edition Press
- Packham CL (1998b) Exposure Control - Engineering. In: *Essentials of Occupational Skin Management*, Southport, Limited Edition Press, pp 167-197
- Pantini G, Forestieri R, Brunnetta F & Bencini PL (1990) Treatment of irritant contact dermatitis in workmen with perfluoropolymethylisopropyl ether (Fomblin HC). *International Journal of Cosmetic Science*, 12, 273-279
- Perrenoud D, Gallezot D & van Melle G (2001) The efficacy of a protective cream in a real-world apprentice hairdresser environment. *Contact Dermatitis*, 45, 134-138
- Pilkington A, Graham MK, Cowie HA, Mulholland RE, Dempsey S, Melrose AS & Hutchinson PA (2002) *Survey of Use of Occupational Health Support.*, Edinburgh, Institute of Occupational Medicine
- Pope C & Mays N (2000) *Qualitative Research in Health Care.* (2nd Edition), London, BMJ Publishing Group
- Pope C, Ziebland S & Mays N (2000) Analysing Qualitative Data. In: Pope C & Mays N, eds, *Qualitative Research in Health Care* (2nd Edition), London, BMJ Publishing Group
- Prystowsky SD, Allen AM, Smith RW, Nonomura JH, Odom RB & Akers WA (1979) Allergic contact hypersensitivity to nickel, neomycin, ethylenediamine, and benzocaine. relationships between age, sex, history of exposure, and reactivity to standard patch tests and use tests in a general population. *Archives of Dermatology*, 115, 959-962
- Ramsing DW & Agner T (1997) Preventive and therapeutic effects of a moisturizer. An experimental study on human skin. *Acta Dermato-Venereologica*, 77, 335-337
- Rustemeyer T & Frosch PJ (1996) Occupational skin diseases in dental laboratory technicians. (I). Clinical picture and causative factors. *Contact Dermatitis*, 34, 125-133
- Rycroft RJG, Menne T, Frosch PJ & Lepoitten JP (2001) *Textbook of Contact Dermatitis.*, Berlin, Springer-Verlag
- Salinas AM, Villarreal E, Nunez GM, Garza ME, Briones H & Navarro O (2002) Health interventions for the metal working industry: which is the most cost-effective? A study from a developing country. *Occupational Medicine*, 52, 129-135
- Schliemann S, Wigger-Alberti W & Elsner P (1999) Effectiveness of protective creams in preventing allergic contact dermatitis: do they really work? *Schweiz Med Wochenschr*, 129, 996-1001
- Schluter-Wigger W & Elsner P (1996) Efficacy of 4 commercially available protective creams in the repetitive irritation test (RIT). *Contact Dermatitis*, 34, 278-283

- Schwanitz HJ & Uter W (2000) Interdigital dermatitis: sentinel skin damage in hairdressers. *British Journal of Dermatology*, 142, 1011-1012
- Smith HR, Armstrong D, Wakelin SH, Rycroft RJG, White IR & McFadden JP (2000) Descriptive epidemiology of hand dermatitis at the St John's contact dermatitis clinics 1983-97. *British Journal of Dermatology*, 142, 284-287
- Tacke J, Schmidt A, Fartasch M & Diepgen TL (1995) Occupational contact dermatitis in bakers, confectioners and cooks: A population-based study. *Contact Dermatitis*, 33, 112-117
- Tobler M & Freiburghaus AU (1992) A glove with exceptional protective features minimizes the risks of working with hazardous chemicals. *Contact Dermatitis*, 26, 299-303
- van der Walle HB (1994) Dermatitis in hairdressers (II). Management and prevention. *Contact Dermatitis*, 30, 265-270
- WHO (1986) *Early Detection of Occupational Diseases.*, Geneva, WHO
- Wigger-Alberti W, Maraffio B, Wernli M & Elsner P (1997a) Self-application of a protective cream: pitfalls of occupational skin protection. *Contact Dermatitis*, 33, 861-864
- Wigger-Alberti W, Maraffio B, Wernli M & Elsner P (1997b) Training workers at risk for occupational contact dermatitis in the application of protective creams: efficacy of a fluorescence technique. *Dermatology*, 195, 129-133
- Wiseman J & Gilbert F (2002) *COSHH essentials: Survey of firms purchasing this guidance.*, Birmingham, Bostock Marketing Group
- Yakes B, Kelsey KT, Seitz T, Hashimoto D, Feldman HA & Christiani DC (1991) Occupational skin disease in newspaper pressroom workers. *Journal of Occupational Medicine*, 33, 711-717
- Zwerling C, Daltroy LH, Fine LJ, Johnston JJ, Melius J & Silverstein BA (1997) Design and conduct of occupational injury intervention studies: a review of evaluation strategies. *American Journal of Industrial Medicine*, 32, 164-179

# Annex 1

## Health & Safety Executive Printing Industry Glove Selection Table (From: "Skin Problems in the Printing Industry" HSE, 2002)

Table 1 A guide to choosing glove materials

Chemical group	Glove material					
	Natural rubber	Nitrile rubber	Neoprene™	PVC	Butyl	Viton™
Water-based substances, weak acids-alkalis	✓	✓	✓	✓	-	-
Oils	-	✓	-	-	-	-
Chlorinated hydrocarbons	-	-	-	-	-	✓
Aromatic solvents	-	-	-	-	-	✓
Aliphatic solvents	-	✓	-	-	-	✓
Strong acids	-	-	-	-	✓	-
Strong alkalis	-	-	✓	-	-	-
PCBs	-	-	-	-	-	✓

**Table 2 A guide to choosing glove materials for specific solvents**

Solvent	First Choice	Second Choice
Acetone	Butyl	<i>See note 1</i>
Butanol	Nitrile	Neoprene™
Ethyl acetate	Butyl	Nitrile <i>see note 2</i>
Ethylene glycol	Butyl	Natural rubber/ Neoprene™ <i>see note 2</i>
n-Hexane	Viton™	Nitrile <i>see note 2</i>
Isopropyl acetate	Butyl	Nitrile
Methanol	Butyl	Nitrile
Methyl ethyl ketone	Butyl	Neoprene™
Methylene chloride	Viton™ <i>see note 3</i>	
Perchloroethylene	Viton™	Nitrile
Styrene	Viton™	Butyl
Toluene	Viton™	Nitrile <i>see note 2</i>
Trichloroethylene	Viton™	Nitrile <i>see note 2</i>
White spirit (Stoddard solvent)	Nitrile	Neoprene™
Xylene	Vitron™	Nitrile <i>see note 2</i>

Notes

- 1 No other material suitable for selection.
- 2 Severe degradation will occur to this material and will limit the use of gloves to short periods only.
- 3 No material will provide more than short-term protection against methylene chloride. For exposures to a combination of methylene chloride and methanol as found in paint stripper, there are no materials to offer more than short-term protection.
- 4 The importance of using a material from the 'first choice' column depends on the extent of the chemical contact. If workers' gloves are significantly contaminated for extended periods then the 'first choice' glove material may be required. If, however, there is only occasional splashing of chemicals onto the glove, then the 'second choice' glove material may be adequate. The extent of exposure will be different in each workplace and should be identified as part of your risk assessment.
- 5 Other factors which also must be considered are the manual dexterity required for the job and how long the glove needs to be (i.e. will gauntlets be necessary). If workers cannot do their job because the gloves are too thick or stiff, then they may decide not to wear them.

# Annex 2

## Pre-intervention focus group prompt list

<p><b>Introduction by facilitator</b></p> <ol style="list-style-type: none"> <li>1. Introduce the topic for discussion and background to the project.</li> <li>2. Run through the ethical issues of confidentiality and anonymity.</li> <li>3. Explain that any individual can withdraw from the group at any time without penalty or can refuse to answer any question.</li> </ol>
<p><b>Questions</b></p>
<p>1. Can each person please describe the company that he/she runs or works in? Please can you provide brief details about the size of the company and the types of printing that it undertakes?</p>
<p>2. Within the company what are the key job tasks and activities that are undertaken? For example, what are key tasks are undertaken during the pre-press, printing and finishing activities?  <i>Probe:</i> Do specific individuals undertake these activities or do individuals tend to undertake a range of activities/tasks?</p>
<p>3. What do you consider to be the most important health and safety issues within the printing industry in general and more specifically in relation to the activities that your company undertakes?  <i>Probe:</i> By health and safety issues we mean, for example, the safe use of machinery or the handling of chemical substances.  <i>Probe:</i> Do you consider skin care and dermatitis to be a problem within the printing industry?</p>
<p>4. Can you describe the health and safety arrangements that are in place within your company?  <i>Probe:</i> Who is responsible for ensuring compliance with health and safety requirements within the company?  <i>Probe:</i> How is health and safety advice provided, for example, are leaflets, information packs and/or training available? To whom is this type of information available?  <i>Probe:</i> Do attitudes towards health and safety vary within the company? For example, is there a strong health and safety culture across the company as a whole or is there a general feeling that each individual can choose what health and safety measures to adopt?  <i>Probe:</i> Is there any tolerance of unsafe practices?</p>
<p>5. Are there arrangements for occupational health provision within the company? Do you consider these arrangements to be adequate?  <i>Probe:</i> Provision of occupational health could include, for example, the requirement for a medical when somebody new starts at the company, regular medical check-ups or the provision of an on-site occupational nurse.</p>
<p>6. In relation to skin protection, which types of printing, activities and tasks (pre-press, printing, finishing) do you consider being most important?  <i>Probe:</i> For example, you may think that activities such as cleaning down the press may expose individuals to chemicals that might harm the skin.  <i>Probe:</i> Are skin problems always associated with exposure to chemicals or are there other activities that have the potential to cause problems.  <i>Probe:</i> Are there any particular chemicals that cause problems?</p>
<p>7. In your opinion do you think that people who work in the printing industry worry about skin care and dermatitis?  <i>Probe:</i> Is skin-care more important to younger workers than older ones  <i>Probe:</i> If people do experience skin problems in the company do they know what causes the problem? Do people who suffer seek treatment?  <i>Probe:</i> Do people show much interest in relation to skin care and health safety advice in this area?</p>
<p>8. Within the company can you describe the types of measures that are undertaken to protect workers from dermatitis?  <i>Probe:</i> Do people wear PPE or take other measures, how effective are they?  <i>Probe:</i> Are gloves available for use by workers? What types of gloves are provided and do people know how to use them? How often do people change their gloves? Does wearing gloves help to protect skin?  <i>Probe:</i> Is there provision of hygiene measures such as hand washes and barrier creams? Do people make use of these? Do they think they are effective?</p>

**Probe:** Are you aware of any health and safety advice (e.g. leaflets) in relation to dermatitis in the printing industry. Do you have any views on the effectiveness of such advice?

9. In relation to skin protection measures do people experience any difficulties in using them?

**Probe:** For example, does glove wearing hinder certain printing activities and tasks?

**Probe:** How do people respond to feeling hindered? For example, do they use different types of gloves for different activities; do people choose not to wear gloves?

**Probe:** Are there any changes that can be made to make it easier for people to protect their skin while still working efficiently?

10. Who should have responsibility for protecting against dermatitis in the printing industry?

**Probe:** Should the management be responsible for enforcing the wearing of gloves etc. or should it be down to individual choice?

11. Following on from this discussion, do you think there are any changes that could be made within the industry which would improve the work environment in relation to skin care?

**Probe:** For example are there any changes in processes or the substances used that might help to reduce dermatitis. Could certain activities be changed

# Annex 3

## Intervention phase company baseline characteristics questionnaire

Name and Address of Company ..... .....		
Contact .....		
Type of Printing .....		
Number of Employees  Pre-Press: ..... Printing: ..... Finishing: ..... Others: ..... Total: .....		
	<b>Yes</b>	<b>No</b>
1 Do you provide information to your staff on the causes and prevention of occupational dermatitis? Please specify .....	<input type="checkbox"/>	<input type="checkbox"/>
2 Do you provide suitable hand washing material? Please specify .....	<input type="checkbox"/>	<input type="checkbox"/>
3 Do you provide barrier cream? Please specify .....	<input type="checkbox"/>	<input type="checkbox"/>
4 Do you provide after work cream? Please specify .....	<input type="checkbox"/>	<input type="checkbox"/>
5 Do you provide suitable gloves? Please specify company and type .....	<input type="checkbox"/>	<input type="checkbox"/>
6 Do you conduct routine checks on the skin condition of press operators?	<input type="checkbox"/>	<input type="checkbox"/>
7 Are there any cases of dermatitis amongst your employees? If yes, how many? .....	<input type="checkbox"/>	<input type="checkbox"/>
8 Are there any rules about avoiding skin problems? If yes, are they written down?	<input type="checkbox"/>	<input type="checkbox"/>



9 Have any assessments on the handling of chemical substances been done?

10. What are the processes involved?  
.....  
.....  
.....

11. What chemical substances are used by the company for cleaning blankets, plates, etc.? (Please list)  
.....  
.....  
.....

12. Who supply your chemicals?  
.....

13. Do they provide adequate information about the danger of the chemicals? (Data Sheets; Gloves Required, etc.)  
.....  
.....  
.....

14. What engineering controls exist?  
.....  
.....  
.....

15. What work practices exist?  
.....  
.....  
.....

16. What type of equipment and clothing is provided for personal use? (not just gloves but also overalls, etc.)  
.....  
.....  
.....

17. Where do you purchase the equipment for personal use?  
.....

18. What posters/literature have you got regarding health & safety in printing? (please list)  
.....  
.....  
.....

19. What training, in relation to skin problems, has been provided for your employees? (e.g. self-reporting, skin inspections, work practices, use of equipment)  
.....  
.....  
.....

20. Is there any access to any occupational health advice? **Yes** **No**

21. Would you know where or how to get advice?

# Annex 4

## Skin Check Checklist

Factory reference:  
Worker reference:  
Photograph Number:

1. CATEGORY A:

NORMAL SKIN

Yes

No

If No, Go To Q.2

2. CATEGORY B:

DAMAGED SKIN

Yes

No

If Yes, Is This

Dryness , Cracks ,

Minor Cuts & Abrasions

Other  (Please Specify: .....)

3. CATEGORY C:

FRANK DERMATITIS

Yes

No

If Yes, In Your Global Estimation Is It

Mild

Moderate

Severe

Where Is It

Fingers  Palms  Wrists

Back Hands  Finger Webs

Is It Present on the Forearms

Yes

No

If No, Go To Q.4

4. OTHER SKIN PROBLEMS:

PLEASE SPECIFY

## Annex 5

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### List of leaflets, books, information sheets given to printers

- Health & Safety Executive (2002). Skin Problems in the Printing Industry. Sudbury: HSE Books. (IACL101)
- Health & Safety Executive (2001). An Introduction to Health and Safety. Sudbury: HSE Books. (INDG259)
- Health & Safety Executive (????). A Guide to Risk Assessment Requirements.
- Health & Safety Executive (2000). Good Neighbour Scheme: A Guide for Employers.  
(<http://www.hse.gov.uk/events/gnscheme.htm>)
- Health & Safety Executive (2001). Understanding health surveillance at work. An introduction for employers.  
Sudbury: HSE Books. (INDG304)
- Health & Safety Executive (2000). Consulting Employees on Health and Safety: A Guide to the Law. Sudbury: HSE Books. (INDG232)
- Health & Safety Executive (2000). 5 Steps to Information Instruction and Training. Sudbury: HSE Books. (INDG213)
- Health & Safety Executive (1998). Five Steps to Risk Assessment. Sudbury: HSE Books. (INDG163)
- Health & Safety Executive (2001). Director's Responsibilities for Health and Safety. Sudbury: HSE Books (INDG343)
- Health & Safety Executive (2002). Working Safely with Solvents. Sudbury: HSE Books (INDG273)
- GMB (????). Chemical Safety. London: GMB
- Health & Safety Executive (1999). COSHH: A Brief Guide to the Regulations. Sudbury: HSE Books. (INDG136)
- Health & Safety Executive (1999). Good Health is Good Business: Employers' Guide. Sudbury: HSE Books (MISC196)
- Health & Safety Executive (1993). Solvent Safety in Printing.
- Health & Safety Executive (1992). Monitoring for Health and Safety in Print.  
(<http://www.hse.gov.uk/pubns/iacl65.htm>)
- Health & Safety Executive (2000). Control Guidance Sheet for Printers. P100-P113; P200-P214; P300-302; P400; S100-S101
- Health & Safety Executive (2000). Safe systems of work for cleaning sheet-fed offset lithographic printing presses (Printing Information Sheet No 1). Sudbury: HSE Books (PIS1)
- Health & Safety Executive (2000). Safe systems of work for cleaning web-fed offset lithographic printing presses (Printing Information Sheet No 2). Sudbury: HSE Books (PIS2)
- Health & Safety Executive (2000). Safe systems of work for cleaning flexographic, rotary letterpress and gravure printing presses (Printing Information Sheet No 3). Sudbury: HSE Books (PIS3)
- Health & Safety Executive (2000). UK Printing Solvent Substitution Scheme.
- Health & Safety Executive (2000). Control of Chemicals in Printing: COSHH Essentials for Printers. Sudbury: HSE Books.
- Printing Industry Advisory Committee (1988). Safe Handling of Materials in the Printing Industry. London: HMSO
- Printing Industry Advisory Committee (1993). Safety in the Use of Inks, Varnishes and Lacquers Cured by Ultraviolet Light or Electron Beam Techniques. London: HMSO
- Printing Industry Advisory Committee (1997). Safe Use of Isocyanates in Printing and Laminating. Sudbury: HSE Books
- Health & Safety Executive (2002). The Printer's Guide to Health and Safety. Sudbury: HSE Books
- Health & Safety Executive (1994). Why Do I Need a Safety Data Sheet? Sudbury: HSE Books (INDG182L)
- Health & Safety Executive (2000). The Employment Medical Advisory Service and You. Sudbury: HSE Books (HSE5)
- Health & Safety Executive (2001). Assessing and Managing Risks at Work from Skin Exposure to Chemicals Agents. Sudbury: HSE Books

# Annex 6

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## Introduction to Occupational Skin Disease Handout



Medical Research Council

**Institute for Environment  
and Health**

# Preventing Occupational Dermatitis

By Terry Brown & Lesley Rushton



Written as part of the study "The Development of Risk Reduction Strategies for the Prevention of Dermatitis in the Printing Industry"

# Preventing Occupational Dermatitis

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## Skin Structure

The skin is the largest organ of the body, covering approximately 1.8 square metres of surface area and comprising about 15% of the body weight. The skin is composed of three main layers, the epidermis, the dermis and the subcutaneous layer (Figure 1). Each square cm of skin contains:

- 3,000,000 cells
- 10 hairs
- 15 sebaceous (oil) glands
- 12 heat sensors
- 2 cold sensors
- 200 pain sensors
- 25 pressure sensors
- 3,000 nerve endings
- 100 sweat glands
- 4 yards of nerves
- 1 yard of blood vessels.

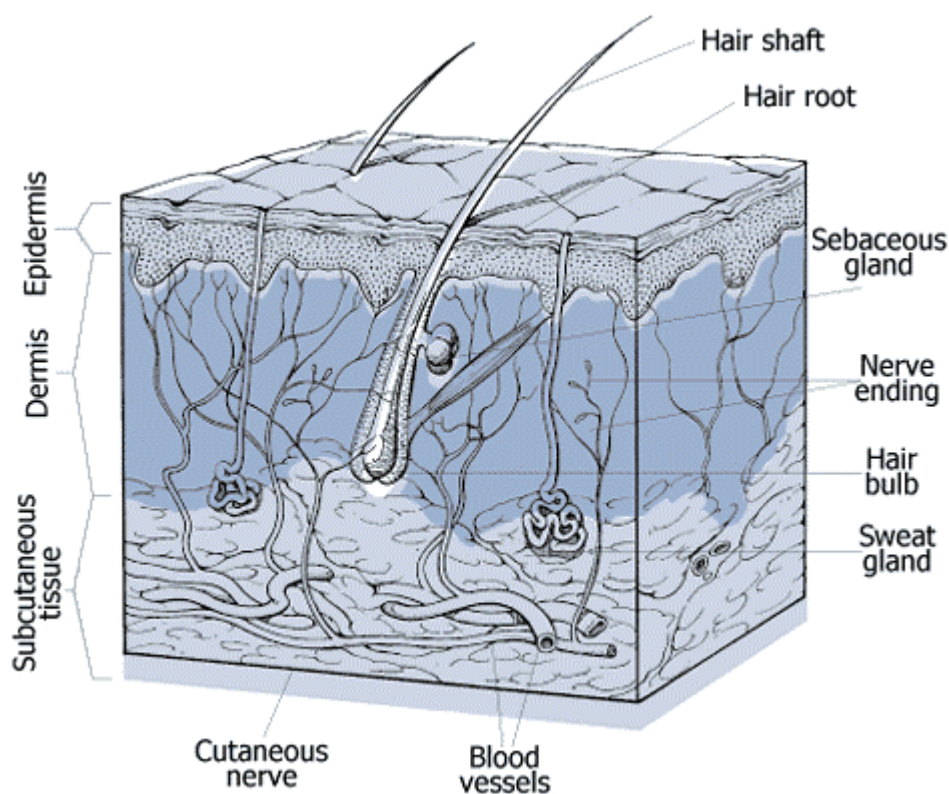


Figure 1: Cross-sectional schematic diagram of the skin showing the various layers and elements within the skin.

## Epidermis

The epidermis is the outer layer of the skin. The outer most part of the epidermis consists of flat cells that form a thin protective layer. These flat cells continually slough off, being replaced by new cells that are pushed up by cells constantly forming deeper in the epidermis. The epidermis offers some protection but is not effective at protecting against fat soluble chemicals (organic solvents), or against gasses.

## Dermis

The dermis is the layer of skin just under the epidermis and is the main structure of the skin. It is tough and resilient, and forms scar tissue after injury. It contains collagen fibres and is strong and elastic. It is laced with blood vessels, nerve fibres, hair and hair follicles, sweat glands, and sebaceous (oil) glands. Its main function is to protect the internal structures against injury.

## Subcutaneous Layer

The subcutaneous layer is located at the base of the skin. This layer contains fat cells, parts of hairs, sweat glands and blood vessels. It acts as a cushion for the layers above it, and also as an insulator.

## Skin Glands

Sweat glands are important for temperature regulation of the body through evaporation. The sebaceous, or oil, glands secrete sebum, a lubricant for the hair and the skin.

## Protective Functions of the Skin

The skin serves several protective functions:

- protecting the body from invasion by micro-organisms
- protecting the body against some types of chemicals
- protecting internal organs
- protecting against rays of the sun
- serving as temperature regulator.

## DERMATITIS

### Causes of Dermatitis

So how does dermatitis develop? In simple terms dermatitis occurs when a substance penetrates the surface layer of the skin and provokes a reaction from the vulnerable skin beneath. Early symptoms are redness and irritation, which can progress to swelling, scaling, blistering, cracking and bleeding. Intact skin is more able to fend off attacks by compounds capable of causing dermatitis. Broken skin (either from cuts, scrapes, or burns) allows these compounds to reach deeper into the skin layers. Once the surface of the skin is broken, infection can develop, making the condition worse. The areas most affected are the hands and forearms, but skin exposure via contact with contaminated clothing or hand transfer of chemical agents can result in other parts of the body, such as the chest, legs and face being affected. How quickly dermatitis develops depends on the strength of the substance and the degree of exposure. Some substances might affect people on the first day they use them, others might take months, weeks or even years to cause dermatitis. The fact that nothing may appear to be happening for a time can result in printers being lulled into a false sense of security and becoming lax about wearing gloves or taking care of their hands.

There are many substances and conditions capable of inducing a skin disorder in the workplace. Most of the cases of occupational dermatitis come from the following hazards:

Chemical  
Mechanical  
Physical  
Biological  
Botanical

### ***Chemical***

Chemical exposure is the main cause of work related skin problems. The list of hazardous chemicals that can damage the skin is immense and always increasing because new chemicals are constantly produced and used. These agents are divided into two groups: primary irritants and sensitisers.

#### **Primary Irritants**

Most occupational dermatitis is caused from contact with primary irritant chemicals. They alter the chemistry of the skin and destroy its protection abilities. After the skin's surface has been damaged, irritant contact dermatitis can occur. This reaction can cause tissue destruction (chemical burn) or inflammation (dermatitis) depending on the strength of the chemical and the duration of exposure. Many irritants are water-soluble and can react with certain components of the skin. Water-soluble chemicals, including many solvents, react with the fatty elements of the skin. Primary irritants act directly on the skin in one of the following ways:

chemically reacting with it,  
dissolving or abstracting from it some of its essential components,  
denaturing (breaking down) the proteins of the skin, or  
disturbing the skin's membrane and its ability to retain moisture.

Primary irritants include:

Keratin solvents – soaps, alkalis, and most organic solvents  
Fat & Oil solvents – detergents and most organic solvents  
Protein denaturers – alcohol, formaldehyde, phenol, and heavy metal salts  
Dehydrators – inorganic acids, anhydrides and alkalis  
Oxidizers – nitrates, chlorine, bromine, ammonia and hydrogen peroxide  
Reducers – tar, aromatic & aliphatic hydrocarbons, formic & oxalic acids  
Keratin stimulants – petroleum products, arsenic, some chlorinated hydrocarbons

There are two major classes of primary irritants. They are absolute irritants, which are corrosive substances that injure the skin immediately following first contact, and relative irritants that are less toxic substances and require either repeated or prolonged contact to produce inflammation.



**Table 1: List of chemicals found in the printing industry known to affect the skin.**

<b>Chemical</b>	<b>Primary Irritants</b>	<b>Sensitisers</b>	<b>Selected Skin Manifestations</b>
<b>ACIDS</b>			
Acetic	X	?	Dermatitis & ulceration
Hydrofluoric	X		Severe chemical burn with blisters, erosion, or ulceration
Nitric	X		Severe skin burns & ulcers
Sulphuric	X		Corrosive action on skin, severe inflammation of mucous membranes
<b>ALKALIS</b>			
Ammonia	X		Irritation including airborne dermatitis of face
Potassium hydroxide	X		Severe corrosion of skin, deep-seated persistent ulcers, loss of fingernails
Sodium hydroxide	X		Severe corrosion of skin, deep-seated persistent ulcers, loss of fingernails
<b>SALTS</b>			
Chromates & its compounds	X	X	Pit like ulcers (chrome holes) on skin, perforation of nasal septum, dermatitis
<b>SOLVENTS</b>			
Acetone	X		Dry (defatted) skin
Toluene & Xylene	X		Dry (defatted) skin
Turpentine	X	X	Dermatitis
Alcohols (e.g. ethanol)	X	X	Dermatitis
<b>OTHERS</b>			
Soaps & Soap Powders	X	X	Dermatitis, dry skin, paronchia (inflammation around finger-nails); allergy from fragrance, germicides, or dyes
Formaldehyde	X	X	Dermatitis
Isocyanates	X	X	Dermatitis

### **Allergic Contact Sensitisers**

Sensitisers may not cause skin reactions on initial contact; however, repeated exposures can cause an allergic reaction in some people. These reactions can occur within days or years of the initial exposure. Once a person becomes sensitised (allergic), small amounts of the sensitiser can cause reactions.

Chemicals that cause skin sensitisation are far fewer than those that cause primary irritation. Examples include poison ivy, epoxy, formaldehyde, ammonia, nickel compounds, mercury compounds, cobalt compounds and coal tars, and more pertinent to the printing industry acrylates.

Workers can also become sensitised by latex in rubber gloves; latex allergies can develop and in some cases create serious health problems.

### ***Mechanical***

Trauma at work can be mild, moderate, or severe and occur as a single or repeated event. Friction results in the formation of a blister or callus. Other skin injuries can occur from contact with sharp objects or from being struck by a hard object. An example of a material that can cause dermatitis is

fibreglass, which can cause irritation, itching, and scratching. Secondary infection may complicate blisters, calluses, or breaks in the skin.

### ***Physical***

Physical agents such as heat, cold, and radiation can cause occupational dermatitis. Heat can soften the outer layers of skin, leading to heat rash. Burns can result from electric shock, contact with hot objects, molten metal and glass, and solvents or detergents used to elevate temperatures.

Exposures to cold temperatures can cause frostbite and result in permanent blood vessel damage. Cryogenic gases and liquids can also cause frostbite and deep skin cell damage. Some cryogenic liquids include nitrogen, argon, and helium.

Sunlight is the greatest source of skin-damaging radiation and can lead to skin cancer if the skin is repeatedly burnt. Casual or prolonged contact with artificial ultra violet (UV) light sources such as molten metals and glass, welding, and plasma torches can also burn the skin.

### ***Biological***

Bacteria, viruses, fungi, and parasites can also cause infections and occupational skin disorders. Animal breeders, agricultural workers, tannery workers, bakers, culinary employees, florists, and laboratory technicians are among those at greater risk of developing infections. Examples include anthrax in hide processors, yeast infections of the nails of dishwashers, bartenders, and others engaged in wet work, and animal ringworm in agricultural workers and veterinarians.

### ***Botanical***

Many plants and woods, such as poison ivy and poison oak, can cause contact dermatitis. Many weeds and flowers can cause both irritant contact dermatitis and allergies.

## **Predisposing Factors**

There are many predisposing factors that make a person more likely to develop occupational dermatitis, and should be considered before assigning workers to tasks that have the potential for the development of dermatitis. They should also be used for developing protective measures. Predisposing factors include age and experience, skin type, sweating, gender, seasons and humidity, personal hygiene, and pre-existing skin disease.

### ***Age and Experience***

Younger, inexperienced and inadequately trained workers have a higher prevalence of occupational skin disorders than older ones. However, older workers may be prone to chronic skin irritation because their skin is usually drier.

### ***Skin Types***

Heavily pigmented skin appears to resist the harmful effects of external irritants more effectively than light skin. Workers with naturally dry skin are less able to tolerate the action of solvents and detergents. Those with oily skin are predisposed to developing acne-like lesions.

### ***Sweating***

Increased sweating can irritate the skin and increase the risk for developing dermatitis. Sweating softens the skin and opens it up for the development of secondary fungal and bacterial infection. Sweating can also be beneficial in diluting concentrations of toxic substances on the skin.

### ***Gender***

Women usually report fewer occurrences of dermatitis than men; this could be because of better hygiene practices and less exposures to toxic substances. However, women are usually more easily sensitised.

### ***Seasons and Humidity***

Occupational dermatitis is generally more common during warm weather. During warmer weather workers tend to wear less clothing and are more likely to have skin exposed to external irritants. Also when workers are hot they are less likely to wear personal protective equipment (PPE). Climates with low humidity dry out the skin making it easier for toxic agents to attack it.

### ***Personal Hygiene***

Poor personal hygiene is a major factor in the cause of occupational dermatitis. Unwashed skin and unchanged clothes can cause prolonged contact to chemicals. Adequate facilities for maintaining personal cleanliness should be provided at the workplace. Employees need to be aware of the role personal hygiene plays in preventing dermatitis.

### ***Pre-existing Skin Disease***

Pre-existing skin diseases can be easily aggravated at the workplace by exposure to chemicals.

## **Occupational Dermatitis**

### **Types of Dermatitis**

There are two types of dermatitis most associated with occupational exposures, allergic contact dermatitis and irritant contact dermatitis. These forms of dermatitis are difficult to distinguish from one another, often requiring specific medical tests to differentiate between the two. As the names suggest, these forms of dermatitis are caused by skin contact with a causal agent. As with all occupational disease, prevention is the key, and with most cases of occupational dermatitis, preventing skin contact with chemicals or other skin damaging agents will prevent the disease.

#### ***Irritant Contact Dermatitis***

Irritant contact dermatitis is the most prevalent form of contact dermatitis. A compound acting directly on the skin at the contact site causes irritant contact dermatitis. The compound may act immediately (such as strong acids or alkalis) or may act over a longer time (such as soaps and detergents).

#### ***Allergic Contact Dermatitis***

Sensitising agents cause allergic contact dermatitis. In this form of dermatitis, the skin's reaction is allergic, in that an antigen elicits an antibody immune reaction (a foreign substance that causes the body to create an antibody).

#### ***Others***

Other occupationally related skin conditions include *Occupational Acne* usually caused by petroleum-based products; *Contact Urticaria* or hives; and *Photosensitivity* where the skin becomes more sensitive to sunlight.



Nationally, dermatitis is the second most commonly reported occupational disease. In 1995, it was estimated about 66,000 people in the UK were suffering from a skin disease caused by their work (HSE, 2001). The incidence varies between occupation, being high amongst hairdressers, barbers, and health and agriculture workers. Results from EPI-DERM, the surveillance scheme for work-related disorders, indicated the incidence in the printing industry to be approximately 7.5 cases per 10,000 workers (EPI-DERM, 1995). However, a more recent study of printers in Nottinghamshire revealed that 41% of the 1,189 printers involved had suffered from a skin complaint at some time during their working life and that 11% had a current problem, far higher than previously observed (IEH, 2001). Some 58% of those that said they had a current problem were diagnosed as occupationally related. Perhaps the most startling finding was that this situation had arisen despite the fact that 68% of the printers reported using gloves. The research also highlighted the uncomfortable truth that dermatitis is far more widespread in printing than was previously thought. A possible indicator that the use of gloves alone was not sufficient protection was that something like 75% of those who had ever had a skin complaint found the problem cleared up away from work.

The economic impact of occupational dermatitis is considerable; approximately 4 million working days are estimated to be lost every year owing to absenteeism (English, 1999), which approximates to about £200 million.

In addition to its economic impact occupational dermatitis has an appreciable effect on the quality of the sufferer's life (Hutchings *et al.*, 2001). The debilitating effects on individuals are usually out of sight, hidden by the withdrawal from work and social life of those most acutely harmed by it.

In the IEH report, the most commonly affected areas were the fingers and webs between the fingers, closely followed by the back of the hands, particularly for press workers, then the forearms and face. Press workers also generally had more problems on the wrist, forearm and elbows than other workers.

The IEH report identified some of the work substances in printing that can aggravate a skin condition and the printing processes that had a high occurrence of dermatitis. These were: wash up solutions, inks and cleaning solvents; UV varnishes; UV inks; developers; thinners; and hands cleansers. Many print workers will come into contact with at least some of these substances. Printing processes having a high occurrence of dermatitis are plate-making, correction of litho plates, solvent use, UV cured ink use, materials containing isocyanates, cleaning litho rollers and cylinders, guillotining and handling press room consumables. Handling of paper, constant washing and contact with water can all lead to dryness, itchy and sore skin conditions. Washing powders, cleaning agents and personal soaps both at work and in the home can also cause problems.



## Preventing Dermatitis

It is always better to prevent a disease rather than have to cure it. Ideally, a skin care program should communicate the following information to employees at risk of developing dermatitis:

The structure of skin and its susceptibility to various compounds.

Specific compounds, processes, or areas in your facility that can cause dermatitis

Controls in place to prevent dermatitis

What to do if a worker develops dermatitis.

Preventing occupational skin disorders can increase work productivity, as well as decrease worker's compensation cost and lost time. Through the combined effort of management and workers, occupational skin disorders can be largely prevented. The control measures that can be used are classified as environmental, medical, and personal.

The first step that should be taken is to determine where and how workers are being exposed to hazardous agents. By doing an effective “Risk Assessment” employers can determine what changes should be made to protect the worker and what possible hazardous agents they are exposed to. Any chemical that is used needs to be carefully identified, by generic name. All harmful ingredients must be determined, and appropriate protection provided to protect against them.



## **Hierarchy of Controls**

The primary function of any programme developed to prevent occupational dermatitis is to reduce the possibility of contact with offending agents. The hierarchy of controls often referred to by occupational health and safety professionals is simply a ranking of exposure controls from the most effective to the least effective. The way to think about exposures is to visualise a source and the pathway along which the compound travels to reach the worker. We think of controlling exposure by eliminating the source (product substitution), capturing the contaminant along the pathway (engineering controls and tools), and finally controlling exposures at the worker (personal protective equipment, [PPE], administrative controls, personal hygiene). This ranking of controls applies to all occupational exposures from airborne chemicals to noise exposures and can be applied to other hazards in the workplace.

### ***Control at the Source: Product Substitution***

The most effective method of control is to eliminate the exposure to the compound or product causing the skin condition. In the real world, we all know this is often impracticable and ways must be found of substituting with another compound of lower skin reactivity. The substitution of one key compound may require a full evaluation of the process with modifications in work practices down the line. The HSE have provided guidelines as part of their “UK Printing Solvent Substitution Scheme” (<http://www.hse.gov.uk/pubns/solvent.pdf>), stating a series of principles. By following them HSE hope most companies will be taking the first steps towards compliance with the COSHH Regulations. Suppliers have put a lot of effort into the development of less harmful substances, largely driven by environmental concerns. These often have health and safety benefits too.

### ***"Zero Contact"***

The best way to prevent dermatitis whilst working with a skin damaging material is to avoid any direct skin contact with it. You can prevent direct skin contact in a number of ways:

Product Substitution – substituting one product capable of causing dermatitis with one that does not cause dermatitis.

Engineering Controls – such as local exhaust ventilation, or process isolation.

Tools – that eliminate the need for workers to touch dermatitis causing materials.

Personal Protective Equipment – such as gloves and shop coats.

### ***Control along the Path: Engineering Controls***

Prevention by elimination and substitution is not always possible and the next step is to introduce controls to reduce the risk of exposure. Engineering controls such as ventilation, isolation booths, etc. can prevent dermatitis causing compounds from contacting workers' skin. Local exhaust ventilation is most commonly associated with reducing respiratory exposures, but can be effective at preventing agents such as metal working fluid mists, glass fibres and dust from reaching the workers' skin. Engineering controls include:

Automation: automate processes that could expose workers.

Closed Processes: enclose processes entirely.

Ventilation: ventilate to remove hazardous agents from workplace air.

Housekeeping: frequently clean floors, walls, windows, and machinery.

Proper labelling and packaging: clean and labelled containers for shipment to prevent contact for other workers such as truckers and warehouse workers. All containers storing hazardous material must be labelled so that workers know what is in them.

Barriers: use curtains or shields to restrict the spread of chemicals that are sprayed.

A Printing Industry Advisory Council (PIAC) working group used the step-by-step approach to identify the relevant control approach to produce a series of 34 task-specific control guidance sheets. These sheets, which are divided into the main printing sectors (offset litho, screen, flexo and rotary letterpress and gravure) to make it easier for workers to find, were tested to ensure they resulted in adequate control in reality.

### ***Control at the Worker: Personal Protective Equipment (PPE), Administrative Controls, and Personal Hygiene***

**PPE**: This final layer of control stops the exposure at the worker. Because these controls rely on workers to implement, they require greater oversight to be effective. PPE includes gloves, shop coats or overalls, boots, aprons, face shields, hair covers, and chemical-resistant coveralls. Protective clothing acts as a barrier between the skin and irritating chemicals. Manufacturers provide a large selection of protective garments made of various materials, including rubber, plastic film, leather, cotton, or synthetic fibre that are designed for specific purposes.

Because workers' families can develop contact dermatitis from contact with clothing worn home from work, clothing worn on the job should not be worn at home. Clothing contaminated with chemicals

should always be thoroughly laundered before they are worn again. Wearing dirty contaminated clothing can be worse than the actual exposure itself.

Many printers rely heavily on protective gloves. They have a role in preventing harm but must be carefully selected, maintained and replaced. The HSE are developing guidelines for the correct selection of gloves for the use in the printing industry, similar to that published for all industries (<http://www.hse.gov.uk/pubns/indg330.pdf>). The workplace is a demanding environment and the gloves will be affected by physical and chemical damage, aging, flexing, and stretching. It is important to work out which gloves will be most effective, how long they will remain so and replace them before the protection is lost altogether.

The example of glove selection and use can demonstrate the problems encountered when choosing to control exposures at the worker as the primary form of exposure control. This may require the stocking of several types of gloves. Workers must understand the types of skin hazards in the facility and the proper glove for each hazard. Workers need to know how to inspect gloves before each use and when to dispose of them. Each worker must wear the correct gloves whenever exposed to the hazard.

Managers must obtain and stock the proper gloves for the types of hazard encountered; ensure employees get training, and wear the proper gloves. Managers should also be aware that the gloves themselves might cause dermatitis (natural rubber latex is an example of this). There should be a clear policy on glove use and the consequences of not wearing gloves under the specified conditions. Finally, management must be committed to enforcing these policies.

If protective gloves are selected or worn incorrectly then they can actually increase the wearer's risk. Most often this is because contaminant gets inside the glove and stays next to the skin, or a glove worn for a period causes excessive sweating which can act as an irritant. If, for example, a printer has to take off contaminated gloves temporarily, then the hands may become contaminated from handling the gloves. A simple solution is to wash the gloves before taking them off.

Under the Control of Substances Hazardous to Health (COSHH) Regulations 1999 and the Management of Health and Safety at Work regulations 1999, employers must make an assessment of the risks to any employee liable to be exposed to substances hazardous to health. This must be completed before employees are required to use PPE. A hazard assessment identifies all workplace hazards and the types of PPE that are needed. There is also a requirement that employees be effectively trained on use of any required PPE.

It is important that all PPE be worn only when safely possible. Protective clothing, especially gloves, can be caught in machinery, resulting in injury.

Quite often PPE is the first choice to control exposures. This practice may be appropriate for the time it takes to implement other forms of exposure control.

Barrier creams can often be used where protective clothing is inadequate or not feasible. However, barrier creams are considered the least effective way of protecting the skin. There are a variety of different types of barrier creams; some have an effect against wet materials and some against dry materials, and when selecting a barrier cream it is important to consider the materials that the worker will be exposed to. But, they should not be relied on for primary protection, because it is not known how fast chemicals can get through the creams. On top of that most when applying the cream people miss areas of skin and it is tricky if not impossible to tell when the barrier has been removed, damaged or thinned. The advantage of barrier creams is that they can help with the removal of dirt, this requiring less abrasive soaps to be used. The use of after-work creams are also particularly beneficial as they help restore that 10% moisture content you need in the tissue-thick surface layer of the skin, which was lost during work.



**Personal Hygiene:** Personal hygiene may seem exclusively the workers' responsibility. The importance of personal cleanliness in the prevention of dermatitis cannot be overemphasized. In order to minimize contact with harmful agents, workers must have access to facilities for washing hands and be furnished with other means of keeping clean. It is the employer's responsibility to provide adequate washing facilities, good cleansing materials, and education on hygiene practices. Washbasins should be well designed, conveniently located, and kept clean; otherwise they will be rarely used. The farther workers must walk to clean up, the less likely they are to do so. Inconveniently located washbasins invite such undesirable practices as washing with more easily available solvents, mineral oils, or industrial detergents, all of which can be harmful to the skin.

Employees should wash their hands before eating, drinking, smoking, and using the restroom. Workers must also wash their hands before leaving the worksite. Frequent hand washing will also reduce the risk of chemicals being accidentally ingested. The type of soap used is also important. Even good soaps can irritate certain types of skin. Try to choose a soap that has the following characteristics:

- Removes industrial soil quickly and effectively
- Should not dehydrate or irritate the skin under normal applications
- Should flow easily through dispensers
- Should provide protection against microbial contamination
- Should have aesthetic appeal (colour and odour)

Where washing facilities are not available, waterless cleansers can be used. However, overuse of waterless cleansers can irritate and dry the skin. Workers should use a moisturizing hand lotion after applying waterless cleansers.

**Administrative controls:** Administrative controls are those policies established to educate workers, define work practices, and establish the consequences of not following the policies. Adequate information should be provided on the risks an employee is likely to encounter during their normal work. This should be included as part of their standard health and safety training programme.

## What to do when an Employee Develops Dermatitis

If a worker develops dermatitis, he or she should seek the advice of a medical professional. Occupational physicians are specifically trained on diseases caused by work. Dermatologists specialise in disorders of the skin.

Workers may be inclined to treat the condition with over-the-counter medications. However, these medications may not help the symptoms, and the underlying condition may worsen. It is important to ensure that workers get proper medical attention and that the exposure causing the skin condition is controlled or eliminated.

## Further Reading

Health and Safety Executive. *Preventing Dermatitis at Work*. HSE leaflet INDG233.

Health and Safety Executive. *Skin Problems in the Printing Industry*. HSE leaflet IACL101.

Health and Safety Executive. *The Printers Guide to Health and Safety*. London: HSE Books.

Health and Safety Executive. *Control of Chemicals in Printing: COSHH Essentials for Printers*. London: HSE Books.

Health and Safety Executive. Safety in the use of inks, varnishes and lacquers cured by ultraviolet light or electron beam techniques. London: HSE Books

Health and Safety Executive. Control Guidance Sheets for Printers.

Institute for Environment and Health (2001). *The Prevalence of Occupational Dermatitis Amongst Printers in the Midlands*. Client Report 3/6/4 written by Livesley E, Rushton L.

## References

English JSC (1999). *A Colour Handbook of Occupational Dermatology*. London: Manson Publishing.

EPI-DERM (1995). Cases of contact dermatitis and urticaria by Sesi, May 1994-December 1995, UK.

Health and Safety Executive (2001). *Assessing and managing Risks at Work from Skin Exposure to Chemical Agents*. Sudbury, Suffolk: HSE Books.

Hutchings CV, Shum KW and Gawkrödger DJ (2001). Occupational contact dermatitis has an appreciable impact on quality of life. *Contact Dermatitis*, **45**, 17-20.

Institute for Environment and Health (2001). *The Prevalence of Occupational Dermatitis Amongst Printers in the Midlands*. Client Report 3/6/4 written by Livesley E, Rushton L.

Photos courtesy of Dr J.S.C. English, Queen's Medical Centre, Nottingham

# Annex 7

## Management action plan for occupational dermatitis (OD)

Step	Action	Aim or Target	Benchmark	Person(s) responsible and action date
1. Senior management commitment	Develop a policy at board level Business case preparation	As a minimum adoption of the Revitalising Health and Safety Strategic targets: Interim to reduce the incident rate of work-related OD by 20% and the number of working days lost due to worked-related OD by 30% by 2010 (12% & 15% by 2004)	A policy that promotes the management of OD issues as an integral part of the day-to-day management of the business HSE leaflet INDG343 - Directors Responsibilities for Health and Safety Securing Health Together ( <a href="http://www.ohstrategy.net">http://www.ohstrategy.net</a> )	Chief Executive and senior management at board level
2. Worker involvement	Nominate a joint team including a senior manager to lead on the issue and involve both management and workforce representatives	Building confidence and trust in the programmes Add value to the programmes from employee knowledge and practical experience Making the most of the valuable contribution the workforce can make in the identification of both problems and practical solutions	Involvement of the workforce in as many areas of the OD management system as possible  HSE leaflet INDG232 - Consulting employees on health and safety,	Team leader and senior manager
3. Risk assessment	Examine records and talk to employees to gather data about skin health Conduct an initial assessment to identify hazards and risk factors associated with skin problems Conduct a detailed assessment unless the risks, prevention and controls are straightforward	Identify the scope of any existing problems, the number of OD cases, sickness absence, reported early symptoms, etc. to provide a baseline for targeted action and performance measurement and to inform risk assessment. Identify tasks that present a significant risk and people most at risk Clarify risks and identify methods of prevention and control. Where risks are straightforward and the controls obvious, take action	An assessment which is fit for purpose – which reflects how work is done, identifies OD hazards, risks and sets out action to be taken to eliminate or reduce the risk, or controls for residual risks. HSE leaflet INDG233 - Preventing Dermatitis at Work HSE leaflet IACL101 - Dermatitis in Printing HSE Book The Printers Guide to Health and Safety (ISBN 0 7176 1486 7)	Team leader with the involvement of workforce representatives and other employees. For some detailed assessments the involvement of someone with more in depth competence such as an occupational physician or nurse may be required.
4. Control measures	Employ control measures	Introduce control measures in a hierarchy Eliminate the risk by the selection and use of safe equipment, including automated equipment using	Control measures that eliminate the risks or control the residual risks HSE 'Control of chemicals in printing: COSHH	Team leader Supervisors Safety advisor to monitor

		<p>resources agreed and provided by senior management.</p> <p>Eliminate the risk by reducing the amount of chemicals used</p> <p>Eliminate the risk by substituting less hazardous chemicals.</p> <p>Eliminate risk by wearing the correct PPE</p> <p>Manage the residual risk through effective SSOW, supported by instruction and training.</p>	<p>essentials for printers’ (ISBN 0 7176 1835 8)</p> <p>HSE ‘Safety in the use of inks, varnishes and lacquers cured by ultraviolet light or electron beam techniques’ (ISBN 011 882045 1)</p> <p>HSE ‘Safe use of isocyanates in printing and laminating’ (ISBN 0 7176 1312 7)</p> <p>Control of Health Hazards in Screen printing (ISBN 0 11 88 3973)</p> <p>HSE ‘Control Guidance Sheets for Printers’</p> <p>HSE video ‘Safe Use of Printing Chemicals: COSHH and Substitution’</p>	<p>suitability and implementation</p>
5. Instruction and training	<p>Implement an educational and training programme.</p>	<p>Educate the workforces in the importance of early reporting and about their own health.</p> <p>Teach the workforce to identify risk factors and to avoid hazards that can lead to OD so they understand the importance of early reporting and identify tasks that put them at risk.</p> <p>Train the workforce in safe systems of work, including the use of control measures provided.</p> <p>Train line management to identify risk factors and ensure day-to-day implementation of intended systems of work, etc.</p>	<p>Instruction, training and education that enables the workforce to identify hazards, risks, use control measures and implement safe systems of work</p> <p>HSE leaflet INDG163 - Five Steps to Risk Assessment</p>	
6. Management of OD cases	<p>Arrange a reporting system with prompt access to occupation health services where needed</p> <p>Management of individuals</p> <p>Management of teams and co-workers</p>	<p>Establish a system for early reporting of symptoms</p> <p>Obtain the services of an occupational health professional with adequate knowledge of industrial activity</p> <p>Development of realistic treatment and rehabilitation programmes</p> <p>Effective communication arrangements between the occupational health professional and senior management (respecting confidentiality)</p> <p>Referral to a range of therapies (avoiding those untried and untested)</p> <p>Individual rehabilitation programmes</p> <p>Career and other counselling provision</p> <p>Continued education, awareness and good supervision to ensure that affected individuals do not come under pressure from co-workers</p>	<p>Effective reporting system, treatment and rehabilitation programmes</p> <p>Examples of occupational health services include:</p> <p>NHS Plus (<a href="http://www.nhsplus.nhs.uk">www.nhsplus.nhs.uk</a>)</p> <p>Good Neighbour schemes (<a href="http://www.hse.gov.uk/events/goodn1.htm">www.hse.gov.uk/events/goodn1.htm</a>)</p> <p>Other joint schemes with local businesses</p> <p>Individual schemes</p> <p>British Printing Industry Federation</p>	<p>Team leader and senior manager</p> <p>Occupational health professional in conjunction with the management team, workforce representatives and other employees, both individuals and teams</p>

# Annex 8

## Post-intervention prompt list

### **Introduction**

Introduce the topic for discussion and background to the project.  
Run through the ethical issues of confidentiality and anonymity.  
Explain that any individual can withdraw from the group at any time without penalty or can refuse to answer any question.

### **Introduction Questions**

Do you think that dermatitis is a problem in the printing industry?  
Do you know what the main causes of dermatitis are?  
Did you take any precautions to reduce these?

### **Glove Intervention**

Did you always wear gloves when coming into contact with chemicals?  
How did you know whether these gloves were of the correct type for the chemical being handled?  
Did you consider what glove to use when using certain chemicals, or just used the ones that are available to you?  
How easy was it for you to find out which gloves to use for particular chemicals?  
This study included advice from glove manufacturers about which gloves to use. Did you act on the advice given?  
Do you believe that printers would follow guidelines that told them which gloves to use for particular tasks?  
What else do you think could be done to encourage printers to use the right gloves?  
Would the company supply every type of glove required to prevent harm from any of the chemicals used? If not, why not?  
Would the company change a glove type if individuals encountered problems?  
If one individual had a specific glove requirement, would the company buy gloves specifically for that person?  
Did you previously use creams of any sort before starting work or after work?  
Have you used the cream provided?  
Do you feel it has achieved anything?  
Would you consider using an after-work cream regularly from now on?

### **Information Intervention**

What kind of communication exists between management and staff?  
Do management pass on all health and safety information relevant to you?  
How do they pass it on, e.g. during training sessions, in writing or in some other ways?  
Do the company have health & safety campaigns?  
Have you been made aware of the problem of dermatitis within the industry?  
Were you aware of any literature that was published that highlighted the problem?  
A couple of months ago I gave some literature to management. Have you seen any of this?  
If you have – has it changed any printer's working practices – and has it changed managements approach to skin problems?  
Do you think more information should be produced? If so what would be helpful?  
Who should produce it?  
Should it be made available to all staff?  
Would you read it?  
Would this information change printer's working practices? Would they use the right glove for the chemical being handled? Would they apply protective creams correctly? Would they use the correct soaps, and not use solvents? Would they use after-work creams?

### **Skin Check Intervention**

Before the study, had anyone checked your skin to determine whether you had a problem?  
Has having your skin checked made you aware you have a problem? (If yes, consequently have you changed your ways, i.e. taken greater care when using chemicals, used pre-work or after-work creams?)  
Do you think that regular skin checks help in preventing dermatitis in the industry?

Would you be willing to pay into an occupational health scheme to have regular health checks, which would include a skin check but offer other services too?

**Policy Intervention**

Was there any company policy with regards to skin care prior to the start of the intervention?

How easy has it been to develop a policy?

Did you find the action plan helpful? If so, in what respect?

Have there been, or do you think there might be, any problems with getting (a) senior management, (b) middle management, or (c) printers involved?

Have you undertaken the risk assessment exercise to determine who is at most risk?

What did you identify you could do to reduce the risks?

Have you implemented all or any elements of the policy?

Will you see through the implementation of the policy?

For the company that also had skin checks conducted – did the prospect of skin checks provide additional impetus to the development of the policy?

**General Questions**

Has the company considered any alternatives to rags to clean blankets? (e.g. pad with a handle)?

Has the company eliminated or introduced safer chemicals

Have there been any changes to work practices that you think printers generally would benefit from?

If you were going to recommend a national policy to reduce dermatitis in the printing industry, what would it be and why?

Reinforce anonymity and say what will happen next.

# Annex 9

## E45 Cream Data Sheet

<b><i>Crookes Healthcare Limited</i></b>		
D80 Building Nottingham Nottinghamshire NG90 1LP		
Telephone:	+44 (0)1159 539 922	
Facsimile:	+44 (0)1159 688 722	
Medical Information direct line:	+44 (0)1159 688 922	
Medical Information e-mail:	<a href="mailto:info.UK@crookes.co.uk">info.UK@crookes.co.uk</a>	
Medical Information facsimile:	+44 (0)1159 688 923	
1. NAME OF THE MEDICINAL PRODUCT		<input type="checkbox"/>
E45 Cream		
2. QUALITATIVE AND QUANTITATIVE COMPOSITION		<input type="checkbox"/>
Anhydrous Lanolin 1.0% w/w White Soft Paraffin BP 14.5% w/w Light Liquid Paraffin Ph Eur 12.6% w/w		
3. PHARMACEUTICAL FORM		<input type="checkbox"/>
A cream		
4. CLINICAL PARTICULARS		<input type="checkbox"/>
<b>4.1 Therapeutic indications</b>		<input type="checkbox"/>
For the symptomatic relief of dry skin conditions, where the use of an emollient is indicated, such as flaking, chapped skin, ichthyosis, traumatic dermatitis, sunburn, the dry stage of eczema and certain dry cases of psoriasis.		
<b>4.2 Posology and method of administration</b>		<input type="checkbox"/>
For topical application. Adults, Children and Elderly - Apply to the affected part two or three times daily.		
<b>4.3 Contraindications</b>		<input type="checkbox"/>
Hypersensitivity to any of the ingredients.		
<b>4.4 Special warnings and precautions for use</b>		<input type="checkbox"/>
<u>The labelling states:</u>  For external use only		

If symptoms persist, consult your doctor.  
Keep all medicines out of the reach of children.

**4.5 Interaction with other medicinal products and other forms of Interaction**

No clinically significant interactions known.

**4.6 Pregnancy and lactation**

The safety of E45 Cream in pregnancy and lactation has not been assessed but is thought unlikely to constitute a hazard.

**4.7 Effects on ability to drive and use machines**

No adverse effects known.

**4.8 Undesirable effects**

Occasionally, hypersensitivity reactions, otherwise adverse effects are unlikely, but should they occur, may take the form of an allergic rash. Should this occur, use of the product should be discontinued.

**4.9 Overdose**

E45 cream is of low toxicity. If accidental ingestion occurs, conservative treatment only is required.

**5. PHARMACOLOGICAL PROPERTIES**

**5.1 Pharmacodynamic properties**

Lanolin, light liquid paraffin and white soft paraffin have emollient moisturising properties.

**5.2 Pharmacokinetic properties**

Not applicable.

**5.3 Preclinical safety data**

There are no preclinical safety data of relevance to the consumer.

**6. PHARMACEUTICAL PARTICULARS**

**6.1 List of excipient(s)**

Empilan GMS, cetyl alcohol, sodium cetostearyl sulphate, carbomer, methyl hydroxybenzoate, propyl hydroxybenzoate, sodium hydroxide, citric acid monohydrate, purified water.

**6.2 Incompatibilities**

Compatibility problems may be encountered with the stronger acids, calcium, magnesium and aluminium salts, quaternary compounds, acridines, basic dyestuffs and alkaloids.



**6.3 Shelf-life** 

Aluminium tubes and polypropylene tubs: 3 years.  
All other containers: 2 years.

**6.4 Special precautions for storage** 

Store below 25°C for polyethylene tubes and pump pack, made of polypropylene and polyethylene and consisting of a plastic bottle and a pump system with a dip tube.  
None for aluminium tubes and polypropylene tubs.

**6.5 Nature and contents of container** 

A polyethylene tube with membrane seal and plastic screw cap. Pack sizes 50g.  
A polypropylene securipot with a white polythene pilfer-proof screw cap. Pack sizes: 125g, 350g, 500g.  
A polypropylene securipot with a polythene pilfer-proof screw cap fitted with a HDPE or polypropylene dispenser having a polythene covered follower plate. Pack sizes: 500g.

**6.6 Instructions for use and handling** 

None.

**7. MARKETING AUTHORISATION HOLDER** 

Crookes Healthcare Limited  
1 Thane Road West  
Nottingham NG2 3AA

**8. MARKETING AUTHORISATION NUMBER(S)** 

PL 0327/5904R

**9. DATE OF FIRST AUTHORISATION/RENEWAL OF THE AUTHORISATION** 

25.9.91

**10. DATE OF REVISION OF THE TEXT** 

August 2001





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