

Teaching Interventions in Contact Dermatitis

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Prevention of occupational contact dermatitis is of utmost significance for both insurers and legislators because it can preserve the individual's ability to work and result in decreased costs for public health. In the last 20 years, many concepts for educational interventions and a multitude of teaching aids have been developed by insurance associations and public institutions from different countries (eg, the United States, Sweden, Denmark, Switzerland, and Germany). For didactic purposes, terms of different levels of prevention have been inaugurated in northern Europe in the context of occupational dermatology. This review presents different educational interventions in the fields of primary, secondary, and tertiary prevention as well as evaluation studies of these measures, especially among health care workers, hairdressers, metalworkers, and bakers' apprentices. Special emphasis is put on the prevention of allergic contact dermatitis.

In 1986, the World Health Organization (WHO) published the Ottawa Charter for Health Promotion, which proposed educational interventions (among other concepts) for improving the health of the world's population. This concept proved to be popular in various medical disciplines. Teaching interventions in the field of dermatology were also improved, especially those related to the prevention of allergic and irritant contact dermatitis. Prevention of occupational contact dermatitis is of utmost significance for both insurers and legislators because it can preserve the individual's ability to work and result in decreased costs for public health. More than 20 years after the Ottawa charter's publication, many concepts for educational interventions and a multitude of teaching aids have been developed by insurance associations and public institutions from different countries. Differences in national approaches and legislation make it difficult to maintain a general overview on this topic. This review attempts to offer some orientation in a jungle of different concepts. By presenting examples of teaching interventions derived from the United States, Scandinavia, Switzerland, and Germany, different national efforts in the prevention of occupational contact dermatitis are reviewed in this article to stimulate knowledge and application of existing tools and the development of further concepts.

Primary, Secondary, and Tertiary Prevention

For didactic purposes, terms denoting different levels of prevention have been inaugurated in northern Europe in the context of occupational dermatology. The concepts of primary, secondary, and tertiary prevention can be distinguished and increasingly appear in the literature. Measures on the primary prevention level aim to prevent healthy individuals from developing contact dermatitis, whereas secondary prevention aims at improving the early recognition of contact dermatitis and improving therapy for contact dermatitis in order to achieve the complete healing of a reversible disease (Table 1).¹ Nevertheless, there still are severe occupational skin diseases that are resistant to therapy or that relapse under therapy, thus threatening the individual's ability to continue working in his or her occupation. For these cases, interdisciplinary inpatient treatment as a tertiary individual prevention measure was introduced.²

Regardless of the particular target group and level of prevention, some rules are universally suitable for everyone at risk of endogenous or exogenous exposure leading to irritant hand dermatitis. These rules were summarized by Agner and Held (Table 2).³

Primary Prevention Measures

Prevention of occupational dermatitis should start as early as possible (ideally in elementary or secondary school) to engage large parts of the population. However, dermatologic topics are widely ignored, and only a few informational materials provided to teachers discuss topics such as skin anatomy, sunburn, the necessity of personal hygiene, or head lice.⁴ Contact dermatitis as a possible side effect of

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Table 1. Educational Aims of Skin Protection Seminars for Individual Secondary Prevention of Contact Dermatitis

Increase knowledge about skin diseases and their causes
Develop strategies for skin-protective work habits and reduction of risk factors
Improve protection measures (technical, organizational, personal) and practical guidance for the application of an effective skin protection program including gloves, skin cleansing, and skin care
Facilitate so-called side effects such as the passing on of acquired knowledge to co-workers, family members, and friends
Increase health consciousness; motivate to implement the measures suggested

Adapted from Weisshaar E et al.¹

intensive washing is only marginally mentioned. Primary prevention of contact dermatitis should be discussed in vocational schools at the latest. Teaching interventions must be adapted to the demands of young professionals by popular media such as MTV-style music videos and clearly designed overhead transparencies as described by Perrenoud and colleagues⁵ (available at <<http://www.2haende.ch>>). The following presents examples of primary prevention in particular occupational areas.

Primary Prevention for Hairdressers

In Germany, educational programs for apprentice hairdressers were intensively investigated by the University of Osnabrück, Germany (Department of Dermatology, Environmental Medicine and Health Theory).⁶ The program was validated by a longitudinal comparative intervention study from 1996 to 1999. A group trained by professional health educators in special seminars during vocational school (six lessons, totaling 15 hours) was compared with a matched control group from another school and without such training. Topics included care of the skin and the prevention of occupational skin diseases. The participants of the intervention group were supplied with skin protection and skin care products and were also

consulted at their workplaces. At the end of their apprenticeship, the incidence of eczema was lower for those in the trained group (19.5%) as compared with those in the control group (33.9%) (Wilcoxon test, $p < .05$). Data were collected with questionnaires.⁶

Another tool used for the prevention of contact dermatitis in hairdressers in Germany is a special starter kit containing skin protection products such as creams and gloves along with information on appropriate application. The kit is provided by German statutory accident insurance (Berufsgenossenschaft für Gesundheitsdienst und Wohlfahrtspflege [BGW]) and promotes the adoption of skin-protecting behavior by young professionals.

Primary Prevention for Health Care Workers

Trainees from the health care sector in Heidelberg, Germany, were provided with several skin seminars during their apprenticeship (three seminars the first year; two seminars per year later).⁷ Topics included skin anatomy and physiology, skin vulnerability, and protective strategies. The use of emollients, hand washing, and hand disinfection were monitored with the Dermalux System (KBD GmbH, Weinheim, Germany), which makes skin

Table 2. Key Information of Teaching Interventions for Contact Dermatitis Patients

Wash your hands in lukewarm water. Rinse and dry your hands thoroughly after washing.
Use protective gloves when starting wet-work tasks.
Protective gloves should be used when necessary but for as short a time as possible.
Protective gloves should be intact and clean and dry inside.
When protective gloves are used for more than 10 min, cotton gloves should be worn underneath.
Do not wear rings at work.
Disinfectant should be used according to the recommendations for the workplace.
Apply moisturizers on your hands during the working day or after work. Select a lipid-rich moisturizer free from fragrances and with preservatives having the lowest allergen potential.
Moisturizers should be applied all over the hands, including the finger webs, fingertips, and backs of the hands.
Take care also when doing housework. Use protective gloves for dishwashing and warm gloves when going outside in winter.

Adapted from Agner T, Held E.³

areas with inappropriate application visible with the use of a fluorescent test product under an ultraviolet light source.⁸ Special emphasis was put on the explanation of the optimal frequency of hand washing and disinfection. These efforts resulted in a lower prevalence of hand dermatitis in the intervention group (66.7%) when compared to the control group (89.3%) after 3 years. Interestingly, a multiple regression analysis revealed nonparticipation in the seminars to be a predictive marker for hand dermatitis (odds ratio: 2.8-fold increased risk in the control group without teaching intervention). Atopic skin diathesis played only a marginal role as a predictor of occupational hand dermatitis in this study.⁷ A general problem among health care workers is overestimation of the irritant and allergic potential of hand disinfectants.^{9,10} This opinion was shared by scientists previously. Indeed, a Danish group interpreted the reduction of disinfectant use as an indication of the success of an educational program for student auxiliary nurses.¹¹ More-recent publications presume a less skin-harming effect of hand disinfectants^{12,13} when compared to an equal use of hand-washing detergents.¹⁴ Thus, trainees should be encouraged to replace too-frequent hand washing with hand disinfection.

Primary Prevention for Bakers

Bauer and colleagues evaluated an educational intervention program for bakers' apprentices consisting of two 60-minute seminars in 4 weeks.¹⁵ The seminars included a standardized 15-minute video lecture, a 15-minute oral lecture, and 30 minutes of hands-on training in the correct application and use of protective gloves and barrier creams (supplied free of charge). The video (Turimed, Walisellen, Switzerland) provided general information about (1) skin hazards in specific professions, (2) common occupational skin diseases, and (3) skin protection, cleaning, and care. In the intervention group ($n = 39$), significantly more use of barrier creams was noticed at the end of the study (compared to a matched control group [$n = 55$]) (chi-square test, $p < .0001$). Another study demonstrated that the preventive measures taught by these two seminars were more effective than ultraviolet-B hardening.¹⁶

Secondary Prevention Measures

German, Australian, and Finnish Models

Using the routine of the "dermatologist's procedure," dermatologists in Germany can report hand dermatitis

patients to the responsible statutory accident insurance institution if the disease appears to be occupation related and if the patient agrees.¹⁷ The procedure was already implemented in 1972 and is internationally unique in its attempt to recognize and treat occupation-related cases of hand dermatitis at very early stages. The informed statutory accident insurance institution will take further steps, which include not only financing of well-directed personal protective equipment and training programs but also compensation of expenses for regular dermatologic treatment, including skin care. However, performing time-consuming consultations regarding skin protection at workplaces is difficult for dermatologists in private practices. Therefore, specialized institutions, such as the so-called skin protection centers, have been established in Germany. Run by private occupational dermatologists, these institutions offer counseling as a service to individual employees from various occupations. Patients affected by occupational skin problems can be assigned by the responsible statutory accident insurance institution. Counseling involves individual education and the instantaneous dispensing of a skin-protection kit that includes gloves and products for skin protection and care, adjusted to individual case history and exposure profile.

The so-called eczema school, a successful Finnish model implemented at the beginning of the 1990s, is similar in concept to the individual counselling performed in Germany. The lessons (30 minutes to 2 hours long) are given by nurses who provide information about skin care, allergen avoidance, and skin protection.¹⁸ The outcomes of patients who participated in such eczema schools proved to be significantly better than those of a control group of patients, 13% of whom suffered permanently from hand eczema (chi-square test, $p < .003$). In particular, patients with multiple contact allergies to metals benefited from the eczema school.

Interdisciplinary group seminars are additional important tools that have been established in Germany at the secondary prevention level. These group seminars are offered either by university centers or by statutory accident insurance institutions that have established their own institutional centers for skin protection and counseling, focusing on the particular needs of the employees of the insured industries (an example is the so-called Schuberz [acronym: Schulungs- und Beratungszentrum (German)] established nationwide by the BGW).

The idea of seminars on skin protection was implemented in Australia, where the so-called skin school was constituted as part of the Occupational Dermatology Research and Education Centre (established by Dr.

Rosemary Nixon, Victoria, Australia). This Skin School educates workers who suffering from occupational contact dermatitis from different businesses (compare with <www.occderm.asn.au/projects.html>).

Motivating people to participate in educational interventions is difficult. It may be helpful to combine personal invitations with positive case reports that exemplify the potential benefits of such seminars.¹⁹

Interdisciplinary Group Seminars: the Osnabrück Example

The University of Osnabrück played a leading role in the development of interdisciplinary group seminars in Germany. The interdisciplinary team is composed of dermatologists, pedagogues, and occupational therapists. A dermatologic examination and an explorative interview are followed by the first counseling interview,²⁰ which is designed to obtain the patient's view of the disease (Table 3). Interestingly, most patients have no explanation for the cause of their disease. Some explain the symptoms as being due to naturally sensitive skin, misfortune, stress, or changed bodily reactions due to aging. Only a small group claims occupation to be responsible for the skin disease. Almost one-half of affected persons consider red rough hands to be normal among hairdressers. The majority of patients are confident that skin protection measures can be stopped after the skin heals; they have to be convinced that the contrary is true.²⁰

The interview is followed by a seminar on the background and basics of skin diseases and skin protection (Table 4). The seminar may be followed by a workplace consultation carried out by educational staff. The prevention behavior of the affected person can thereby be optimized, and colleagues and executive employees can be involved, which is crucial to the implementation of effective skin care procedures.²¹ Final group discussions that take place some weeks or months later²² are used for repetition and for the discussion of problems related to skin-protective behavior.

Secondary Prevention for Hairdressers and Health Care Workers

A study at the University of Osnabrück that evaluated the efficacy of skin protection seminars for hairdressers found that 80% of the participants and only 60% of the matched control group remained at work 3 months after the intervention.⁶ A similar study that used questionnaires revealed that the concept worked as well for geriatric nurses; 96% of nurses belonging to the intervention group ($n = 102$) remained in their jobs, compared with 86% of the control group ($n = 107$) (chi-square test, $p = .019$). Members of the intervention group also used gloves more frequently and had less persistent skin symptoms (53% vs 82%; chi-square test, $p < .001$).²³

Encouraging results were also shown in an intervention study by the BGW.²⁴ The organization of the 2-day interdisciplinary-group courses was similar to those mentioned above. Additionally, the participants were instructed to create their own lectures adapted to the special situation of their workplaces. The lectures had to be presented to their colleagues in order to spread their knowledge to a wider audience ("participatory action research"^{3,25,26}). One year after they completed the course, participants were interviewed by telephone.²⁷ The overall proportion of persons reporting skin lesions had decreased (68%); 72% reported improvement of the skin lesions. Only 9% had changed their occupation. Skin-protective measures (eg, less-frequent hand washing) were implemented in a satisfactory manner.

Secondary Prevention for Metalworkers

Mertin and colleagues presented an intervention concept combining a clinical dermatologic investigation, a workplace visit, and a skin protection seminar for metalworkers, similar to the previously discussed programs for hairdressers and geriatric nurses.²⁸ Additionally, a special "marketplace" with information booths was organized after the seminar (Table 5).²⁸ Follow-up examinations were conducted 6 months after the teaching intervention.

Table 3. Topics of the Interview at the Beginning of the Skin Protection Seminar

Is the disease interpreted as uncontrollable or controllable?
What are the reasons for dermatitis in a patient's eyes?
Are mild signs of dermatitis recognized as abnormal or as normal by the patient and his colleagues?
Is the patient supported by the occupational and social environment in dealing with the dermatitis?
What is expected from the seminar?
What motivation (eg, satisfaction by work, financial dependency) has the patient for staying in the job?

Adapted from Wulfhorst B.²⁰

Table 4. Topics of the Seminar on Skin Diseases

• Health promotion • Employers’ Liability Insurance Associations • Occupational diseases • Anatomy and function of the skin • Risk factors	• Irritant contact dermatitis vs allergic contact dermatitis • Hazardous substances • Protective gloves • Practical training in working with gloves, etc
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Adapted from Wulforth B.²⁰

Using questionnaires, a study revealed that 92.3% of subjects had not changed their workplace and that eczema prevalence had decreased to 80.8% after 6 months (*n* = 90). The use of protective creams increased to 94.1% only 3 months after the start of the study whereas the frequency of hand washing decreased, as did the use of aggressive skin cleansers.²⁸

Tertiary Prevention Measures

The methods at the secondary prevention level are very similar to those at the tertiary prevention level. However, tertiary prevention in Germany is mostly implemented by inpatient activities at specialized rehabilitation centers.^{29,30} As early as 1987, the first programs to be especially focused on hairdressers were implemented in Germany at the University of Osnabrück. Aiming at the reintegration of diseased barbers, the rehabilitative inpatient period initially lasted 4 to 6 weeks. In an essential part of the seminars, the hairdressers were taught to use personal protective equipment (especially gloves and skin-protective products) by “training on the job,” arranged in hairdressers’ shops and under the supervision of professionals.²⁹ This concept has been modified, standardized, and extended to other professions in recent years and is currently being extensively evaluated in multicenter studies. In the meantime, hospitalization time has been reduced to 3 weeks, and the educational approach has been optimized by introducing skin protection seminars for small groups, conducted by an interdisciplinary team of

Table 5. Themes of the Postseminar Information Booths

Selection of the correct skin protection products
One-to-one appointment, pedagogue-to-patient (identification of deficits)
Dermatologic evaluation by dermatologist
Question time for clarification of individual questions

Adapted from Mertin M et al.²⁸

dermatologists, pedagogues, and ergotherapists who provide one-to-one consultations, group seminars, practical training, ergotherapy, and psychological advice.⁶ The intervention was evaluated 1 year after the participants’ hospitalization. At that time, 67% of the participants were still employed.⁶

Approaches to Allergic Contact Dermatitis Patient Education

Patients with known allergens have a better prognosis than those who have not undergone patch testing.³¹ However, it is difficult to facilitate the patient’s understanding of the allergy. Many misconceptions concerning contact dermatitis have to be corrected during the consultation (Table 6).^{21,32} The standard method of counseling patients used in different countries consists of handing out written information regarding the occurrence and nature of the allergens and cross-reactive substances. Standardized printouts are provided as a service by manufacturers of the patch-test preparations and are compatible with the usual allergy identification card (ID). Because of the confusing number of synonyms and cross-reactive substances, work groups in

Table 6. Common Misconceptions Held by Patients with Allergies

“All-natural” products are safer than synthetic ones.
The patient develops allergic contact dermatitis only after close contact with the allergen.
The term “hypoallergenic” on a label guarantees that the product is completely free of allergens.
The term “fragrance-free” means free of fragrance allergens.
Parabens are a major cause of skin allergy.
Baby products are always safe for sensitive skin.
Gloves protect against all allergens.
“Only women get rashes, not men.”
“I’ve never had it before, so there’s no reason to worry”
“I’m immune; I’m not an allergic-type person.”

Adapted from Mathias CG²¹; Katta R.³²

Scandinavia, the United States, and Belgium have developed national modes of instruction.^{33–35}

The Scandinavian Approach

In Sweden, information sheets providing allergen names and potential allergen sources were developed. The sheets also provide the trade names of the allergen sources and the names of their manufacturers.³³ The quality of this optimized educational method was assessed with questionnaires that were sent to patients who had lanolin allergy. Affected persons were asked whether their eczema had cleared. The analysis could not demonstrate the success of the prevention method; however, further subgroup analysis revealed that patients significantly benefited from showing the information to physicians or pharmacists. The study was weakened by some methodological problems. A better indicator for determining the success of the new educational setting might have been to measure corticosteroid consumption. Furthermore, the study was conducted only with patients sensitive to lanolin, which is of controversial relevance as a contact allergen.³⁶

The United States Approach

In the United States, a similar product sheet derived from a computerized database (the Contact Allergen Replacement Database [CARD]) was developed in the 1990s.³⁴ In contrast to the Scandinavian approach, the patient is provided with a positive list of products that do not contain the allergen. The list is updated periodically. (A preview of CARD is available at <<http://www.contactderm.org/i4a/pages/Index.cfm?pageID=3358>>).

The tool was evaluated in a randomized single-blind controlled study.³⁴ Nine patients from the CARD group were compared with 12 patients from a control group receiving the conventional explanation of allergens. Erythema scores as well as pruritus and scale scores were evaluated every month during a 3-month period by a blinded investigator. In addition, the participants were asked about their level of satisfaction. (Patients in the CARD group were asked, “Did the list help you to avoid the products to which you are allergic?” The control group was asked, “Do you think a specific list of products that are ‘okay to use’ would help you avoid the products to which you are allergic?”). The scores showed a reduction in both groups, indicating a positive effect of this procedure on eczema prognosis, but this effect was not statistically significant in the CARD group. The interrogation revealed the CARD users’ satisfaction and the desire of

control group members to have such a tool.³⁵ In 2007, the efficacy of the CARD system was reevaluated in a study with 1,453 participants using questionnaires. The patients were informed verbally about the allergens and then received allergy ID together with printouts from CARD. More than 50% reported improved contact dermatitis; nevertheless, patients forgot 40% of the identified allergens.³⁷

The Belgian Approach

Another computerized allergen database, developed by A. Goossens, provides extensive lists of approved and unapproved cosmetics and topical pharmaceutical products for patients affected by contact allergy.^{38,39} The database is available at <<http://www.cdeskpro.be/>>.

One general disadvantage of these lists is that they provide trade names instead of chemical names is the necessity for regular and extensive updates.

The declaration of ingredients on product packages also plays an important role. In the European Union (EU), cosmetic product ingredients must be labeled according to the International Nomenclature of Cosmetic Ingredients (INCI). However, 46% of the participants in one study found it difficult or extremely difficult to read the ingredient labeling.⁴⁰ This was linked to a low level of education; participants had difficulty reading the label because of the size of the letters or the complexity of the chemical names. The EU commission therefore suggested that INCI names be simplified in the future. Interestingly, patients with fragrance allergies had fewer problems identifying inappropriate products because of the smell of the ingredients.

Special Aspects of Glove Selection

In preventing the recurrence of allergic contact dermatitis, it is important to determine the correct glove for the sensitized patient. Since the market presents a multitude of different gloves, tools for choosing the right ones are of crucial importance. Online databases are used both in the United States and the European Union. The American Society of Contact Dermatitis provides a list presenting different examination gloves and providing information about allergens in the gloves (available at <<http://www.contactderm.org/files/public/GloveFV.pdf>>). Another list (available at <<http://www.contactderm.org/files/public/GloveCompanyContacts.pdf>>) provides the addresses of glove manufacturers.

In Germany, the BGW offers a special brochure (also available on the Internet, at <<http://www.bgw-online.de>>) that lists medical examination gloves and their content of latex protein and accelerators. Another online database on gloves is provided by the German statutory accident insurance institution for the building sector (Berufsgenossenschaft der Bauwirtschaft) and is available at <<http://www.wingisonline.de/handschuhe/frmStart.aspx>>. It offers systematic information about potential rubber allergens in a broad range of different dispensable and reusable gloves. Additional databases on occupational hazardous substances are accessible in Germany at <<http://www.wingis-online.de>>.

Special Aspects of Skin Protection in the Public Domain: the German "Skin Prevention Campaign"

In 2007 and 2008, a comprehensive skin prevention campaign ("Präventionskampagne Haut") was realized as a joint project between different German statutory accident insurance institutions and health insurance companies.^{41,42} The aim was to sensitize the public to various dermatologic issues. To promote the topic to the general public, a suitable slogan ("Your Skin. The Most Important 2 m² of Your Life.") was developed and printed on posters hung at different workplaces. These posters were designed to fit the requirements of the target groups. In addition, sports and music activities were provided: Marathon teams ran wearing the campaign slogan, and rap bands performed songs dealing with dermatologic topics. The events took place together with trade fairs, intra-company meetings, action weeks, or city festivals and included different educational activities such as information booths (featuring the topics of skin cancer, sun protection, tinea pedum, and skin protection). To attract interested persons, free skin cancer screenings were offered. To demonstrate the correct application of protective creams, the Dermalux System was used. In addition, videos showing correct skin protection behavior at the workplace were distributed.

Summary

Teaching interventions in the field of contact dermatitis are mainly linked to occupational dermatology. Here, education is inherent to activities at the primary, secondary, and tertiary prevention levels. Education into the prevention of non-occupational contact dermatitis is more diverse. More epidemiologic data regarding the prevalence of contact allergy in the general population

have been lacking up to now. Thus, one idea is to adapt schools to the demands of contact dermatitis prevention. The need for education as a preventive measure is increasingly important as several national health systems are faced with increasing financial difficulties. This review focused on examples from the United States, Switzerland, Germany, Belgium, and Scandinavia. More information from these countries is readily available. Other countries are encouraged to share their educational experiences.

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