Minimum Standards on Prevention, Diagnosis and Treatment of Occupational and Work-related Skin Diseases in Europe – Position paper of the COST Action StanDerm (TD 1206)


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Running head: WRSD/OSD, management standards
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ABSTRACT

Background Skin diseases constitute up to 40% of all notified occupational diseases in most European countries, predominantly comprising contact dermatitis, contact urticaria, and skin cancer. Whilst insufficient prevention of work-related skin diseases (WRSD) is a top-priority problem in Europe, common standards for prevention of these conditions are lacking.

Objective To develop common European standards on prevention and management of WRSD and occupational skin diseases (OSD).

Method Consensus among experts within occupational dermatology was achieved with regard to the definition of minimum evidence-based standards on prevention and management of WRSD/OSD.

Results By definition, WRSDs/OSDs are (partially or fully) caused by occupational exposure. The definition of OSD sensu strictu additionally includes diverging national legal requirements, with an impact on registration, prevention, management, and compensation. With the implementation of the classification of WRSD/OSD in the International Classification of Diseases (ICD) 11th Revision in future, a valid surveillance and comparability across countries will be possible. Currently, WRDS and OSD are still under-reported. Depending on legislation and regulations, huge differences exist in notification procedures in Europe, although notification is crucial to prevent chronic and relapsing disease. Facilities for early diagnosis, essential for individual patient management, should be based on existing guidelines and include a multidisciplinary approach. Patch testing is essential if contact dermatitis persists or relapses. Workplace exposure assessment of WRSD/OSD requires full labeling of product ingredients on material safety data sheets helping to identify allergens,
irritants and skin carcinogens. Comparable standards in primary, secondary and tertiary prevention must be established in Europe to reduce the burden of WRSD/OSD in Europe.

**Conclusion.** The adoption of common European standards on prevention of WRSD/OSD will contribute to reduce the incidence of OSD and their socio-economic burden.

**Abbreviations**

BCC: basal-cell carcinoma  
CHD: [chronic hand] dermatitis  
CHE chronic hand eczema  
CU: contact urticaria  
ESCD: European Society of Contact Dermatitis  
EU: European Union  
ICD: International Classification of Diseases  
ILO: International Labour Organization  
MM: malignant melanoma  
MSDS: material safety data sheet  
NRL: natural rubber latex  
OD: occupational disease  
OSC: occupational skin cancer  
OSD: occupational skin disease  
SCC: squamous-cell carcinoma  
UVA: ultraviolet A radiation  
UVB: ultraviolet B radiation  
WRD: work-related disease  
WRSC: work-related skin cancer  
WRSD: work-related skin disease  
WEA: workplace exposure assessment  
WHO: World Health Organization
INTRODUCTION

Skin diseases constitute up to 40% of all notified occupational diseases (OD) in most European countries involving contact dermatitis, contact urticaria, and in some countries, skin cancer.\(^1\) In general, national registries are often incomplete as a result of a high under-diagnosing and under-reporting. The average incidence rate of registered occupational contact dermatitis is around 0.5-1.9 cases per 1,000 full-time workers per year, with a significant social and economic impact.\(^1\)

OSD assessment in European countries is not homogeneous, mainly because of differences between the health systems across countries.\(^2\) It should be noted that OSD patients do not differ with regard to their disease across Europe. Hence, they should be treated and assessed in the same way, based on scientific evidence-based criteria. However, only few countries in Europe have hitherto established recommendations for the diagnosis and management of OSD.\(^3\)

To tackle this challenge, the COST Action TD 1206 “Development and Implementation of European Standards on Prevention of Occupational Skin Diseases (StanDerm)” was launched in 2013. Based on the identification of the differences on prevention and management of occupational dermatoses between European countries,\(^2\) StanDerm aimed to develop common European standards.

In this context, standards – a minimum acceptable benchmark-\(^4\) have been developed by consensus by applying the Delphi methodology\(^5-7\) (Fig. 1). A 95% consensus was obtained amongst 81 experts from 28 European countries, representing dermatologists, occupational physicians, health educators, and further experts in the field of OSD (Fig. 1) (See supplementary material).
This position paper provides a blueprint of how to deal with prevention and management of WRSD and OSD. We recommend the adoption of these standards, and make them available to all specialized physicians involved in occupational care, stakeholders, organizations and industry involved in preventing WRSD and OSD (http://standerm.eu/no_cache/standerm/standerm.html).

DEFINITION OF WORK-RELATED SKIN DISEASE (WRSD) AND OSD
A classical definition for occupational dermatoses was given in the 1930s by the American Medical Association considering “all dermatologic conditions where it can be demonstrated that the work is its fundamental cause or a contributing factor to it”\(^8,9\). In 1983, at the X\(^{th}\) Ibero-Latin American Congress of Dermatology, occupational dermatoses were defined as “any affection of the skin, mucous or skin adnexa directly or indirectly caused, conditioned, maintained or worsened by anything that is used in professional activity or exists in the work environment”\(^10\). The main component in both definitions is that diseases are related directly or indirectly to work.

So far, no international official agreement on the best reliable and applicable definition exists, but this would be most desirable. Such a definition would guarantee optimal health care for the worker based on medical criteria. Any economic or social consideration should be built over clinical criteria-based evidence.

The definition of occupational diseases (OD) in general and OSD in particular, is much more complex than it seems at first sight. Indeed, a definition of OSD could include medical criteria, consider legal, and even political, aspects. It is therefore important to decide what the definition is intended for.
Furthermore, “work-related disease” and “occupational disease” are differently defined. “Work-related diseases” (WRD) are defined as diseases, which have multiple causes, including factors of the work environment. WRD include diseases with solid scientific evidence concerning a possible occupational origin which may, however, not fulfill all given criteria for recognition of an OD according to the official list of ODs (see below). Therefore, when making the diagnosis of an OD or WRD, it is necessary to establish a causal link between exposure to a risk factor and development of the disease, since definitions for both conditions are based on the notion of occupational risk.

Moreover, definitions may be different according to the context (prevention or compensation). For prevention, the definition should be sufficiently broad and include a pure scientific (medical) approach. For compensation, the definition is used differently in each country in Europe: legal and political differences are apparent.2

The World Health Organization (WHO) defines OD as “any disease contracted primarily as a result of an exposure to risk factors arising from work activity”.11-13 The International Labour Organization (ILO) defines the two main elements requirements of an OD as follows:

- the causal relationship between exposure in a specific working environment or work activity and a specific disease, and
- the fact that the disease occurs among a group of exposed persons with a frequency above the average morbidity of the rest of the population.14
Most European countries have an ILO/EU recommendation-based list of ODs.¹⁵ Only a few of them have an “open” list of ODs. All OD lists depend on the national legal system and on how the OD recognition process is formally implemented in the given country. Hence, European countries have different criteria to recognize and compensate ODs. Generally, criteria for recognition and compensation of an OD are the following: a) the disease has to be listed in the official national list of OD, b) the occupational risk factor has to be present in the patient's job, and c) individual exposure to the occupational risk factor has to be proven.

According to the ILO, the causal relationship is established based on clinical and pathological data, and epidemiological evidence. Moreover, both the occupational background and evaluation of occupational and non-occupational risk factors have to be considered. The recognition of a disease as being occupational is a specific example of clinical decision-making and application of evidence from clinical epidemiology.

Based on the ILO recommendation, the evaluation of occupational causation should take into consideration the following criteria: association, consistency, specificity, time course, biological dose effects, biological plausibility and coherence.¹⁵ In addition, the formal definition of “cause” is also a legal matter. This position paper will only consider medical knowledge and not legal aspects.

**Key message:** Work-related as well as occupational diseases comprise entities/conditions with an occupational contribution. However, occupational diseases are additionally defined by diverging national legal definitions. These definitions have an impact on prevention, management and compensation.
CLASSIFICATION OF WRSD AND OSD

Skin diseases represent 10-40% of all recognized ODs in the EU. Contact dermatitis accounts for 70-90% of all OSDs, and contact urticaria for <10% - 29% depending on the series. Recently, occupational UV-induced skin cancer has been recognized as an OD in some countries. Other OSDs include folliculitis/acne, infections, neoplasia, hyperpigmentation, vascular disorders or vitiligo.

In view of the above and corollary to a definition of WRSD and OSD, a classification of both entities in the ICD-11 revision remains necessary, especially from a clinical point of view, as it will help establish a precise diagnosis. Moreover, a clear classification is mandatory when a medico-legal opinion (expert assessment) is required. The updated classification included in Table 1 will be useful for definition and classification purposes.

Please insert table 1 about here

| Key message: The implementation of the proposed ICD-11 classification of WRSD/OSD is recommended. It will enable a comprehensive identification of WRSD/OSD and thereby valid surveillance. |

DIAGNOSIS OF WRSD AND OSD

Since contact dermatitis, contact urticaria and skin cancer are common WRSDs and OSDs, the correct etiological diagnosis is a prerequisite for successful treatment and prevention. The diagnosis of a skin disease is based on the patient’s history, physical examination and appropriate diagnostic tests (e.g. allergy testing, skin biopsy). This
also holds true for any WRSD and OSD, including an accurate documentation of all work-related factors linked to the dermatoses. Correlation of skin lesions (clinical type, localization and development) and exposure to physical agents, chemicals or other potential hazards in the work environment and leisure time have to be taken into consideration by every clinician, knowing that for some agents the latency period to induce skin lesions varies (minutes in contact urticaria, days in allergic contact dermatitis and years in skin cancer) and that there may be indirect effects, apart from direct skin exposure.

Occupational skin diseases are managed by different medical and paramedical disciplines, e.g. physicians, specialized nurses and occupational hygienists who help to assess the occupational relevance and implement preventive measures (see next section). Indeed, the minimum standards required for a correct diagnosis in the occupational setting should follow common standards of dermatology and occupational medicine.

**Diagnosis of occupational contact dermatitis**

The diagnosis of occupational contact dermatitis, the most frequent OSD, is based on a medical history and physical examination. Careful correlation of exposure with localization of skin lesions and their evolution is mandatory. The gold standard for diagnosing allergic contact dermatitis is epicutaneous patch testing,\(^2\) complemented with prick testing in case of immediate symptoms. Differential diagnosis should also address irritant contact dermatitis by assessing in addition the exposure to irritants (see also section “workplace exposure assessment”). Concomitant exposure to contact allergens and irritants increases the risk of sensitization, emphasizing the need to identify irritant factors.\(^2\) Relevant aspects of the specific occupational history are addressed in the next section on “work exposure assessment”. The physical
examination should include the entire skin and not only the sites presented by the patient. Affected anatomical sites should be documented carefully, with emphasis on primary locations, extent, severity and clinical characteristics. The evolution of the dermatitis in relation to the workplace, namely improvement during periods off work, and, conversely, in relation to leisure activities, has to be considered. Photographic documentation provided by the patients and by the attending physician is useful in documenting disease evolution.

Skin allergy testing has to include epicutaneous patch testing according to the European Society of Contact Dermatitis (ESCD) guideline. Patch testing (and further skin testing as required) is indicated in all cases with work-related relapsing or persisting (>3 months) contact dermatitis. Only trained and qualified specialists such as dermatologists, occupational physicians or allergologists should perform skin tests.

The diagnosis of contact urticaria or protein contact dermatitis requires, as diagnostic tool, cutaneous provocation tests for immediate reactions such as the prick test or the prick-by-prick test. The clinical relevance of positive skin test reactions is assessed based on past and present exposures and contact eczema locations. Positive reactions without current clinical relevance can be important in terms of pointing to former unknown exposures. If patch tests with strongly suspected working materials are negative, several aspects need reappraisal, namely possible changes in composition of working materials or inappropriately low concentrations of the allergens in the working materials, which have to be diluted for patch testing.
Fig. 2 shows the algorithm for diagnosis, management and prevention of occupational dermatoses.

Please insert Figure 2 about here

**Diagnosis of UV-related occupational skin cancer**

In some European countries, actinic (solar) keratosis, squamous cell carcinoma (SCC), basal cell carcinoma (BCC) or melanoma can be recognized as OSD. The diagnosis of UV-related skin cancer needs to follow the usual procedures of dermatological diagnosis, including a good clinical examination often complemented with dermoscopy, skin biopsy and dermato-pathology.

| Key message 1 | Comprehensive and early diagnosis is key for prevention and management. |
| Key message 2 | The diagnosis of WRSD/OSD should be based on existing guidelines and should include a multi-disciplinary approach. |
| Key message 3 | Patch testing is essential if contact dermatitis persists longer than 3 months or relapses. |

**ASSESSMENT OF OCCUPATIONAL EXPOSURE**

Workplace exposure assessment (WEA) is a prerequisite for making a correct diagnosis of WRSD/OSD and essential for effective treatment and prevention (Fig. 2). The occupational history and assessment of occupational exposure, exploration of product labels and Material Safety Data Sheet (MSDS) will help establishing the occupational relevance of the cutaneous disease.
A workplace visit is recommended, if possible, to correctly identify relevant exposure and perform a complete assessment. In more than 80% of cases with occupational allergic contact dermatitis WEA in terms of medical history, assessment of product labels and MSDS has been contributory to a correct diagnosis.\textsuperscript{26,27}

The incompleteness of MSDS is a major challenge; occasionally not giving the full information about allergens and irritants in a product.\textsuperscript{28} Errors and omissions in the MSDS have recently been suggested as the main reason for the delay in WEA. The most frequent shortcoming is "\textit{Missing H317}" (labels for skin sensitizers) while a known contact allergen was present.\textsuperscript{28} Often, the allergen is not listed because its concentration is under the mandatory labeling concentration, which is usually too high in relation to common elicitation threshold levels. Thus, if the composition of the implicated product still remains (partially) unknown or not fully known in the case of commercial products and complex mixtures, the manufacturer should be contacted to provide a detailed description of a product in question. Unfortunately, information by manufacturers or importers is voluntary and a legal basis is lacking to support full diagnostic work-up. Some spot test for detection of nickel, cobalt, chromium, and formaldehyde release are available.\textsuperscript{20} Conducting a workplace visit is a challenge as in many countries there is no legal basis of who is going to perform a workplace visit and how it has to be performed.\textsuperscript{26,27,29}

Currently, and to the best of our knowledge, there are no guidelines published in English addressing the issue of WEA in the diagnosis of work-related skin diseases. Consequently, minimum requirements for WEA as part of the diagnostic process for OSD/WRSD are proposed in Table 2.

\textit{Please insert Table 2 about here}
When conducting a WEA, a checklist covering the most frequent occupational and non-occupational exposures will help decide on work-relatedness of a skin disease as presented in Table 3.

Please insert Table 3 about here

| Key message 1: Workplace exposure assessment is an essential part of the assessment and management of patients with WRSD/OSD. |
| Key message 2: Minimum requirements for workplace exposure assessment in diagnosis of WRSD/OSD include worker's medical and occupational history, physical examination and product labels/material safety data sheets assessment. |
| Key message 3: Full labeling of product ingredients should be made mandatory on MSDS in Europe. |

REPORTING OF WRSD AND OSD

Physicians are encouraged to notify WRSD/OSDs in most European countries; in four of 28 surveyed European countries this is mandatory. However, due to the different national definitions, legal regulations, responsibilities of authorities, access to health professionals dealing with ODs, compensation schemes etc., notification rates differ significantly within Europe. In many countries, OSDs rank in the upper third of the notified diseases in official registries. Yet, registries are usually incomplete because cases are under-diagnosed, misdiagnosed, under-reported, or ignored by patients and/or physicians.

Given that prognosis is correlated with prolonged skin symptoms and severity, early intervention after notification should be mandatory. The German “Dermatologist’s
procedure” may serve as a model on how to identify early work-related skin problems and prevent psychological and socio-economic consequences. Upon suspicion of a WRSD, namely after having notified the case by using the “Dermatologist’s report”, dermatologists are able to conduct diagnostic and therapeutic procedures on behalf of, and at the expenses of, the statutory accident insurance. Moreover, the insurance provider at the workplaces, including training in skin care and protection measures, implements secondary prevention measures. Severe OSD cases are admitted to a 3-week inpatient medical rehabilitation. An additional financial incentive for physicians for early reporting has been created, which significantly helped reducing under-reporting and under-treatment. These preventive efforts have led to a dramatic reduction of costs for medical care, retraining and compensation, and to a reduction in job losses due to OSDs in Germany.

### Key message 1:
Current registries are usually incomplete. Accurate and complete reporting is important for monitoring and effective allocation of resources.

### Key message 2:
Reporting procedures should be transparent, simple and easily accessible to provide optimal care for affected workers. They contribute to preventing chronic and relapsing disease courses.

### Key message 3:
The investment in reporting systems offers a substantial reduction of cost related to medical care, retraining and compensation.

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**TREATMENT OF WRSD/OSD WITH A FOCUS ON CHRONIC HAND DERMATITIS (CHD) AND WORK-RELATED SKIN CANCER (WRSC)**
Treatment of WRSD/OSD does not, in principle, differ from the same non work-related dermatosis. The treatment of chronic hand dermatitis, the most common WRSD, has been systematically reviewed on the basis of an ESCD guideline.47

For treatment of WRSC or Occupational Skin Cancer (OSC) - mainly due to exposure to UVA and UVB radiation - common national and international guidelines should be applied.48-51

**Key message 1:** The therapeutic treatment of work-related chronic hand dermatitis and skin cancers does not differ from the corresponding non work-related dermatosis. In addition, avoidance of the trigger factors as e.g. skin contact with irritants and allergens or sun exposure at the workplace, by technical and/or organizational measures is essential.

**Key message 2:** The use of available guidelines for treatment of chronic hand dermatitis and non-melanoma skin cancers is recommended.

**PREVENTION STRATEGIES FOR WRSD AND OSD WITH A FOCUS ON CHRONIC HAND DERMATITIS AND WORK-RELATED SKIN CANCER**

**Primary prevention**

Primary prevention strategies are implemented to avoid WRSD and decrease OSD incidence. This is achieved through a risk management process based on proper risk assessment.52 Such a process should be reviewed and updated regularly.

Occupational risk assessment, a crucial step in the prevention process,53 is based on hazard identification and measurement of exposure to substances at the workplace and on risk classification to define the most appropriate preventive actions. Strategies
focus on human, technical and organizational prevention measures as well as on avoidance/limitation of exposure to allergic substances or irritants at the workplace according to legislation, on regular training of the use of personal protective measures, adapted to the needs of the employees (Fig. 2). In addition to legislation, continuous surveillance is needed to identify new work-related risks e.g. by occupational dermatoses case-reports or sufficiently detailed registries.54

**Secondary prevention**

Secondary prevention measures are implemented to detect and treat early stages of the disease, to prevent relapses or chronicity, to induce behavioral change, train employees to protect their skin properly, and change hazardous workplace situations.

**Tertiary prevention**

Tertiary prevention measures offer medical and occupational rehabilitation to employees suffering from established WRSD, who are at risk of losing their job or even had to give up their job because of the disease. All return to work measures, including compensation of WRSD, aim at promoting the social rehabilitation and quality of life of the workers.

**Prevention strategies**

Chronic Hand Dermatitis (CHD)

Prevention strategies used in the prevention of occupational hand dermatitis follow a common hierarchy (Table 4) of recommendations in work safety, and are supplemented with specific OSD prevention strategies for risk occupations44,47,55-77. Prevention strategies aimed at reducing allergen exposure at the workplace have
been successful in reducing chromate sensitization in building trades and glycercyl monothioglycolate sensitization in hairdressers, as well as contact urticaria to latex protein in health care workers\textsuperscript{78-80}. These successful interventions should guide future prevention strategies in Europe, and target other occupational allergens causing occupational allergic contact dermatitis most frequently, such as rubber accelerators, epoxy resins and preservatives. \textsuperscript{79,81-84} Intervention studies in the primary and secondary prevention of occupational irritant hand dermatitis have been conducted over the last decades. However, especially for primary prevention, the actual benefit of each measure, when used singly or in combination under real conditions at the workplace, is still unclear.\textsuperscript{47, 60, 63-76} For tertiary prevention strategies, the “Osnabrück model” in Germany might serve as a blueprint for the development of strategies in other European countries.\textsuperscript{72,77}

UV-related Occupational Skin Cancer (OSC)

Focusing on UV-related OSC, a recent meta-analyses has shown that occupational UV-exposure to natural sunlight is a significant risk factor for SCC\textsuperscript{85}, and to a lesser extent also for BCC.\textsuperscript{86} To prevent skin tumors caused by occupational UV exposure, a significant reduction of occupationally acquired UV dosages in outdoor workers is mandatory. Relevant factors influencing cumulative or intermittent sun exposure in outdoor workers are technical and organizational prevention measures, the amount of UV exposure, the specific tasks to be performed in the sun, as well as the UV protection habits of the workers. Besides adequate behavior, textile protection by headgear and clothing as well as the regular use of sunscreens (SPF 50+) and sun glasses are important.\textsuperscript{87,88}
Table 4 summarizes the measures for the prevention of chronic hand dermatitis and occupational skin cancer.

*Insert table 4 here*

**Key message 1:** The aim of primary prevention is maintaining a worker healthy by creating safe workplaces. This includes risk assessment and early intervention.

**Key message 2:** The aim of secondary prevention is to avoid disease chronicity and/or progression by early diagnosis and intervention.

**Key message 3:** The aim of tertiary prevention is medical and occupational rehabilitation of workers with an established disease.

**Key message 4:** Minimum requirements for the prevention of work-related/occupational hand dermatitis and occupational skin cancer include regular use of personal protective equipment and regular provision of health and safety information in vocational schools and workplaces.

**UNMET NEEDS IN PREVENTION, DIAGNOSIS AND TREATMENT OF OCCUPATIONAL AND WORK-RELATED SKIN DISEASES IN EUROPE**

There are still several unmet needs related to the standards presented in this position paper. The essential areas listed below have to be urgently addressed to achieve a standardized prevention of WRDS and OSD in Europe.

**Research**

- Achieve and use a common case definition of occupational contact dermatitis.
• Assess true epidemiology of OSD (occupational contact dermatitis and work-related skin cancer, respectively) in population-based studies at European level.
• Evaluate data on current and proposed work safety measures.
• Identify and undertake more intervention studies for good practice examples.
• Identify and review existing workplace interventions, and perform intervention studies to generate good practice examples.

Knowledge Transfer

• Include OSD-related topics in the (national) curricula and continuing medical education of dermatologists and occupational physicians.
• Educate general practitioners to include occupational history into the case history.
• Raise awareness of general practitioners concerning referral of patients with suspected work-related skin disease to specialist care to reduce under-diagnosis.
• Increase communication between the different stakeholders (dermatologists, occupational physicians, general practitioners, employers, workers, insurances).
• Establish prevention programs and support the implementation of minimum protection standards at national level (e.g. standardization of safety measures).

Legal action/socio-political approach

At the legal and socio-political level, the following areas need to be tackled:
• Implementation of a (EU wide) legal basis for mandatory information to physicians etc. by manufacturers/importers of products

• Ideally, full labeling of ingredients of products independently of concentration to improve completeness and accuracy of information in MSDS

• Tackle under-diagnosing and under-reporting

• Establish incentives for reporting system and adequate diagnosis of occupational skin disease

• Fast access or referral of patients with WRSD/OSD to experts (dermatologist/occupational physician)

• EU science officers should include the topic into future EU calls

• Address EU institutions with the challenges related to OSD

• Recognition of work-related skin cancer as OSD in countries where it is not yet recognized

• Establish (or “Apply”) Standard operating procedures for workplace visits

**Harmonization/Global approach**

• Increase harmonization of OSD definition amongst countries

• Consideration of the ILO list by national authorities

• Implementation of ICD-11

**CONCLUSION**

While prevention of WRSD and OSD has been identified as a top priority problem at the EU level, there are still only scattered efforts in some countries to improve the situation. There is no coordinated action involving all stakeholders at national and international level. The timely implementation of minimum common standards for
prevention of WRSD/OSD as proposed by StanDerm with this position paper would significantly contribute to reduce the economic burden caused by loss of productivity and help reduce the needless suffering of so many affected workers.
REFERENCES


46. www.dguv.de/de/zahlen-fakten/bk-geschehen/index.jsp


52. OSHAhttps://oshwiki.eu/wiki/Occupational_safety_and_health_risk_assessment_methodologies


54. Report on the current situation in relation to occupational diseases’ systems in EU Member States and EFTA/EEA countries, in particular relative to Commission Recommendation 2003/670/EC concerning the European Schedule of Occupational Diseases and gathering of data on relevant related aspects.


### Table 1. Proposal of OSD classification based on the work done for the International Classification of Diseases (ICD)-11 (clinical purposes utility)

*Kindly provided by Robert J G Chalmers MB FRCP Consultant Dermatologist Co-Chair and Managing Editor Dermatology Topic Advisory Group WHO ICD Revision Project*

<table>
<thead>
<tr>
<th>Occupational skin diseases as in ICD-11 Foundation draft 21.02.2015</th>
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<tbody>
<tr>
<td><strong>Dermatoses arising through work or occupation</strong></td>
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<td><strong>Occupational contact dermatitis, contact urticaria and allergy</strong></td>
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<td>Occupational allergic contact dermatitis</td>
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<td>Allergic contact dermatitis due in part to occupational exposure to allergen</td>
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<td>Occupational photo-allergic contact dermatitis</td>
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<td>Occupational protein contact dermatitis</td>
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<td>Exacerbation of constitutional dermatitis due to occupational exposure to skin irritants</td>
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<td>Occupational phototoxic reaction to skin contact with tar or tar derivatives</td>
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<td>Occupational halogen acne</td>
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<td>Raynaud phenomenon caused or exacerbated by occupation</td>
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<td><strong>Occupationally-acquired dermatoses due to exposure to cold or heat</strong></td>
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<td>Occupationally-acquired parasitic skin infestation, classified elsewhere</td>
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<td><strong>Skin manifestations of work-related poisoning</strong></td>
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Skin disorder resulting from occupational exposure to poison

**Occupationally-acquired disorders of skin pigmentation**
Occupational leukoderma
Occupational melanosis

**Miscellaneous occupationally-acquired skin disorders**
Occupational callosities
Interdigital pilonidal sinus

**Occupational skin cancer**
Skin cancer due to occupational exposure to polycyclic hydrocarbons
Skin cancer due to occupational exposure to other chemical carcinogens
Skin cancer due to occupational exposure to ultraviolet radiation
Skin cancer due to occupational exposure to ionizing radiation
Skin cancer, classified elsewhere attributable to occupation

* In this position paper we only focus on UV-related OSC

### Table 2. Minimum requirements for workplace exposure assessment (WEA) in diagnosis of WRSD/OSD

<table>
<thead>
<tr>
<th>Tool</th>
<th>Information to be collected</th>
</tr>
</thead>
</table>
| **Worker’s medical and occupational history** | Profession, industrial sector  
Previous and present workplaces and work tasks (type and duration, skin hazards, collective and personal protective equipment)  
Actual skin disorder (time of appearance, relation with workplace and non-occupational exposures as well as times off work)  
Other previous or present skin problems  
Leisure time activities involving skin hazards |
| **Clinical examination** | Skin findings: localization (correlated with exposure) |
| **Product labels and material safety data sheets** | Objective data about chemicals with relevant work-related epidermal and dermal contact |
| **Spot test** | Spot test for detection of cobalt, nickel, chrome and formaldehyde. |
Table 3. Example for WEA checklist in diagnosis of WRSD (26)

<table>
<thead>
<tr>
<th>Exposure</th>
<th>Occupational</th>
<th>Non-occupational</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact with water without detergents</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contact with detergent, cleaning (except hand washing; see below)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contact with other liquid or non-solid chemicals (paint, coolant, solvent, oil etc)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contact with food</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gloves, plastic or rubber (e.g. NRL, nitrile, PVC)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gloves, other:   ........................................................</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(specify)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dusts:   ........................................................</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(specify)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cold</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heat</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Friction:   ........................................................</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(specify)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Special environmental conditions (e.g., low RH).....</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(specify)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Care of children &lt; 4 years of age or handicapped persons</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other hobbies:   ........................................................ (Specify)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hand washing (Times per day)</th>
<th>1-10</th>
<th>11-20</th>
<th>&gt; 20</th>
<th>1-10</th>
<th>11-20</th>
<th>&gt; 20</th>
</tr>
</thead>
</table>

Abbreviations: NRL, Natural Rubber Latex; PVC Polyvinyl chloride; RH, Relative humidity
### Table 4. Prevention strategies for work-related/occupational hand dermatitis and skin cancer

<table>
<thead>
<tr>
<th>Prevention strategy</th>
<th>Hand dermatitis</th>
<th>Skin cancer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Technical/organizational measures</strong></td>
<td>Replacement, modification, or inactivation of hazardous substances. Regulation of exposure by legislation on threshold values. Proper labeling and storage of chemicals and regular maintenance of tools.</td>
<td>Roofing of permanent outdoor working places (e.g. pay kiosks in parking areas) Use of mobile sun panels or sun shades Use of UV absorbing window glass for vehicles Provision of shaded places for breaks or indoor break rooms Avoidance of UV-exposure during midday by early start of work and prolonged lunch break.</td>
</tr>
</tbody>
</table>
| **Personal protection** | Good hand hygiene regimes should include:  
- Alcohol hand rubs, or  
- Hand washing with lukewarm water, rinsing the liquid soap thoroughly, and drying hands carefully with single use paper towels.  
Protective gloves (powder-free):  
- Should be worn on dry and clean hands for wet work and work with hazardous substances for as short a time as possible;  
- Cotton glove liners should be used if gloves have to be worn longer than 10 min.;  
- Single use glove should be worn only once;  
- Defect gloves must be removed immediately.  
Moisturizers:  
- Should be used to prevent and support the treatment of irritant hand dermatitis;  
- Should be applied all over the hands including the finger webs, fingertips and back of the hand;  
- Should not contain fragrances, coloring agents and preservatives. | Sunglasses for occupational use must fulfill the requirements of DIN EN 172. Appropriate clothing is long-sleeved shirts and trousers from light-proof fabrics (cotton wool or synthetic fibers) with UPF 50 at least in the shoulder area. Appropriate headgears are broad-brimmed helmets or broad-brimmed hats supplied with sun shields and neck guard. The standard safety helmet provides no sufficient sun protection for the face, ears and neck. Sunscreens must be applied on all uncovered skin areas. Appropriate sunscreens must contain very high, broad-spectrum, photostable filters for both UVB and UVA (SPF 50+, UVA-PF > 1/3 SPF). They must be easy to apply and sweat resistant and, finally, should not irritate the eyes and the skin. |
| **Educational programs** | Health and safety information should be implemented in the curriculum of vocational schools and provided regularly at the workplaces. In secondary and tertiary prevention occupation specific skin protection workshops and individual counseling are helpful for behavior change and implementation of good hand care regimes. |  |
| **Access to experts** | Dermatologists, occupational physicians, or other specialists trained in WRSD/OSD should be available for pre-employment and pre-school examination and counseling of high-risk groups for WRSD/OSD development, as well as for employees for early diagnosis and treatment to prevent chronicity. |

* Minimal requirements for the prevention of work-related/occupational hand dermatitis and skin cancer.
Figure 1. Protocol to reach consensus for development of minimum standards

Assessment of differences in the management of WRSD and OSD in 28 European countries

Definition of minimum standards for prevention and management of WRSD/OSD by a multidisciplinary group (authors of the paper)

Delphi technique

First round
- Participation frequency: 91.6%
- Consensus higher than 95% for 16 out of 18 key messages; except for key message on treatment (90.4%) & algorithm (90.2%)
- Consensus higher than 95% for unmet needs

Second round
- Participation frequency: 96.5%
- Consensus for the key message on treatment: 100%
- Consensus for algorithm: 95%

Third round
- Participation frequency: 98%
- Consensus for algorithm: 95.5%

Consensus on minimum European standards on prevention and management of WRSD/OSD
Figure 2. OSD flow-chart

Primary prevention
- Preventive policies
  - Safety at work legislation
  - Substitution, technical and organisational measures at the workplace
  - Personal protective equipment
  - Pre-employment counselling
  - Focus on high-risk occupations
  - Education

Secondary Prevention
- Reduce disease impact
  - Early disease detection: screening
  - Substitution, technical and organisational measures at the workplace
  - Personal protective equipment
  - Education

Reporting/Notification
- to relevant organisation
  - Surveillance
  - Initiate preventive actions
  - Evaluate efficacy of prevention

Healthy worker → Worker with skin problems → Diagnosis
- Workplace exposure assessment
- Skin test:
  - Patch testing
  - Prick testing
  - Others
- Biopsy

Work-related/Occupational skin disease → Tertiary prevention
- Treatment
- Education
- Exposure control (work and leisure time)
- Rehabilitation

Return to work
Steps for the development of minimum European standards on the prevention of work-related skin diseases/occupational skin diseases (WRSD/OSD).

**Step 1: Assessment of differences in the management of WRSD/OSD**

A structured survey requesting information on management, prevention and compensation practices for WRSD and OSD in 28 European countries was developed by the authors in September 2013.¹

**Step 2: Definition of minimum standards**

Bearing in mind national differences between systems (step 1), minimum evidence-based standards for prevention and management of WRSD/OSD were defined. Unmet needs and perspectives for future research were additionally identified.

For the two first steps experts met at eight occasions during the period 2013 – 2016.

**Step 3 Delphi technique Consensus-building process**

The Delphi technique, mainly developed by Dalkey and Helmer (1963) at the Rand Corporation in the 1950’s is a widely used and accepted method for consensus building by using a series of questionnaires to collect data from experts within certain topic areas.²

The experts answer questionnaires in two or more rounds. After each round, a facilitator (first and last authors) provides an anonymous summary of the experts’ forecasts from the previous round as well as the reasons they provided for their judgments.³ Thus, experts are encouraged to revise their earlier answers in light of the replies of other members. It is believed that during this process, the range of the answers will decrease and the group will converge towards a consensus. Finally, the process is stopped after a predefined stop criterion (e.g. number of rounds, achievement of consensus, and stability of results).⁴

For the purpose of this paper, the predefined stop criterion was a response frequency of at least 85%. The minimum level of consensus for each key message
and unmet research needs was initially set to 95%. Three different rounds were necessary to achieve such level of consensus for all key messages.

**Participants**

The 133 “StanDerm” members were *a priori* classified according to their participation status. Thus, active participants were defined as those experts participating in at least two meetings from the first Action workshop on 19 September 2013 to the last working group meeting on 22 April 2016 prior to the launch of the Delphi survey (n=95).

**The survey**

This survey was designed in SurveyMonkey.com and distributed to active participants of the HORIZON 2020 COST Action TD 1206 “StanDerm” during the period July-November 2016. In the first round, the Survey consisted of 39 statements divided into two parts where the experts had to express agreement, disagreement and possibly make suggestions or comments. The first part requested feedback regarding the most important key messages pertaining to WRSD/OSD, starting with definition and classification up to prevention measures. The second part requested feedback with regard to a number of unmet needs in four areas, namely research, knowledge transfer, legal action and harmonization. Subsequent rounds included only the key messages that did not reach a consensus of at least 95%.

**Participation frequency**

Participation frequency was 91.57%, 96.51%, and 97.59% for the first, second and third round.

**Level of consensus**

In the first round, the level of consensus was higher than 95% for 16 out of 18 key messages, whereof the lowest level of consensus was for the key message on treatment (90.4%) and for the algorithm (90.24%). The level of consensus for the 20 unmet needs was higher than 95%.

During the second round, the level of consensus for the key message on treatment was 100%, and for the modified version of the algorithm 95%. As new suggestions for the algorithm arose during the second round, the algorithm was modified accordingly. Hence, the level of consensus for the suggested algorithm in the third round was 95%.
References


