1416 SAFETY CONSIDERATIONS FOR REMEDIATION WORKERS AFTER DISASTERS WITH INDOOR WATER DAMAGE, DAMPNESS AND BIOAEROSOLS

[1]E Johanning*, [2]P Auger, [3]S Viegas, [3]C Viegas. [1]*Columbia University; New York, New York, USA*; [2]*Department of Public Health Quebec City, Québec, Canada*; [3]*Lisbon School of Health Technology, ESTeSL/IPL, Portugal*

10.1136/oemed-2018-ICOHabstracts.547

Introduction Adverse health outcomes from bioaerosols encountered during the clean-up of indoor environments after disasters or flooding resulting in fungal growth and bio-contamination have been documented. The naive cleaning and restoration of salvaged buildings, furniture and personal items may result in skin contact and inhalation exposure to a mixture of biological compounds with infectious, allergenic, irritant or toxic properties (i.e., mycotoxins).
Methods Review of current safety practices and recommendations by governmental and professional organisations for hygiene and personal protective equipment (PPE) of remediation workers in North America and Europe.
Results A consensus exists that acceptable and safe threshold limits for fungal and bacterial indoor exposure cannot be established. It is generally recommended to control indoor bioaerosol exposures. The route of exposure and target organs of the biological agents may differ (infectious, allergic or toxic effects), is often complex and unpredictable. To capture fungal metabolites (mycotoxins) filters with small pore sizes, namely 0.2 µm are needed. Nevertheless, US governmental agencies focus on a recommendation of N-95 disposable respirator, for respiratory protection, besides gloves and eye protection, but no specific PPE is required. The adequacy, effectiveness and protective level of such a respirator has been questioned. In Canada, clean-up guidelines exist but are not mandated. In Germany, comprehensive rules exist and technical provisions for dust control and PPE are mandated. In Portugal no technical recommendations regarding the type of PPE exist. The medical fitness and surveillance of remediation workers has not been further addressed in any of the guidelines, although this would be prudent based on the pathological profile of bioaerosols.
Conclusion The release of bioaerosols should be controlled with proper containment similar to asbestos remediation projects. The goal of any PPE should be to protect from any contact to the bioaerosols. Medical fitness and monitoring for large scale projects would be prudent.

1687 INDOOR AIR QUALITY IN MODERN OFFICE BUILDINGS

[1]Paolo Carrer*, [2]Peder Wolkoff*. [1]*Dpt. of Biomedical and Clinical Sciences, University of Milan, Milan, Italy*; [2]*National Research Centre for the Working Environment, Copenhagen, Denmark*

10.1136/oemed-2018-ICOHabstracts.548

Aim of the special session To review the indoor air risks and the related health effects in modern office buildings in order to promote an integrated approach for indoor air quality risk assessment and management.

[1]Paolo Carrer, [2]Peder Wolkoff, [3]Markku Sainio, [1]Paolo Carrer
[1]Dpt. of Biomedical and Clinical Sciences, University of Milan, Milan, Italy
[2]National Research Centre for the Working Environment, Copenhagen, Denmark
[3]University of Milan, Milan, Italy

1687a INDOOR AIR QUALITY AND HEALTH EFFECTS IN EUROPEAN MODERN OFFICE BUILDINGS

Paolo Carrer. *Dpt. of Biomedical and Clinical Sciences, University of Milan, Milan, Italy*

10.1136/oemed-2018-ICOHabstracts.549

Introduction The European project OFFICAIR (funded from the European Union FP7) was aimed at broadening the existing knowledge regarding indoor air quality (IAQ) in modern office buildings, i.e., recently built or refurbished buildings, across Europe.
Methods A survey was performed in 167 modern office buildings (7440 office workers) from 8 European countries (ES, FI, FR, GR, HU, IT, NL and PT) by a self-administrated on line questionnaire and a walk-through into the building with compilation of checklists. The questionnaire mainly investigated the environmental perception and symptoms correlated to IAQ. In a subset of 35 buildings also IAQ air quality parameters were investigated.
Results Indoor air concentrations of volatile organic compounds and ozone were lower than their respective WHO air quality guidelines; those of acrolein, α-pinene, and d-limonene were lower than their estimated thresholds for irritative and respiratory effects; the indoor concentrations of PM2.5 appeared high when compared to the 24 hour and annual WHO air quality guidelines. Frequent negative environmental perceptions (>30%) for air too dry, air stuffy, air smelly, noise from inside building in modern office buildings and frequent eye symptoms (>20%) were reported. Environmental perceptions were associated to mould growth, acoustical solutions, cleaning activities; symptoms were associated to number of occupants, lack of operable windows, presence of carpet, and cleaning activities. Office workers with high efforts and low rewards had a higher risk of building related symptoms suggesting complex effects of psychosocial factors on symptoms.
Discussions In modern office buildings, the occupants often complain negative environmental perceptions and eye symptoms. A team approach in order to evaluate and manage indoor air quality is recommended, through an integration of building assessment, questionnaire survey, and indoor air quality measurements. Psychosocial environment should also be considered in order to provide a healthy work environment.

1687b INDOOR AIR HUMIDITY AND HEALTH – AN OVERVIEW

Peder Wolkoff. *National Research Centre for the Working Environment, Lersø Parkallé 105, 2100 Copenhagen, Denmark*

10.1136/oemed-2018-ICOHabstracts.550

Introduction It is salient to distinguish between ambient humidity (relative (RH) or absolute) near the breathing and ocular zone and phenomena caused by moisture-damage of the building construction and emissions therefrom. This paper summarises state-of-the-science knowledge about the impact of RH on a number of important health and comfort outcomes in indoor environments.
Methods The overview integrates studies about how 'extended' exposure to low RH (or absolute) impacts health, sensory effects in the eyes and airways (sensory symptoms), transmission and survival of influenza virus, work performance, sleep quality, and impact on the vocal cord. Effects by moisture damage of construction products are excluded.
Results There is evidence that humidified indoor air can positively impact eye symptomatology, but not sensory irritation in

the airways. Low humidity favours transmission and survival of influenza virus and is associated with an increase of infections in institutions. Slightly elevated humidity appears also to improve sleep quality, while low humidity may impact the vocal cord negatively.

Discussion Reporting of 'dry air' or 'dryness' or dry eyes and airways continues to be a major complaint in office environments, despite the continued efforts to develop low emitting building materials and better ventilation strategies. Some researchers continue to argue that the complaints of 'dry air' (semantically misleading, since we do not have an organ sensing humidity) are associated with indoor pollutants. However, measured concentrations of common VOCs, in general, are orders of magnitude below thresholds for sensory irritation effects, perhaps with the exception of formaldehyde and acrolein. The perception 'dry air' appears to be composed of different perceptions and associated causes.

Epidemiologic studies and intervention studies have shown associations between low RH and complaint rates; furthermore, aggravation of the eye tear film stability by low RH may result in desiccation, hyperosmolarity and inflammatory reactions. Thus, the merged information about the impacts of VOCs and particles indoors versus low RH favours the latter as an important risk factor to consider for assessment of eye and airway complaints, sleep quality, and vira transmission and survival. The impact of low RH on voice reduction is less clear. 'Dry air' should be replaced with a meaningful indoor air quality descriptor.

1687c INDOOR AIR RELATED ENVIRONMENTAL INTOLERANCE

Markku Sainio, Kirsi Karvala. *Finnish Institute of Occupational Health, Work Environment, Helsinki, Finland*

10.1136/oemed-2018-ICOHabstracts.551

Intolerance may develop to various everyday environmental exposures at levels that are well below those known to cause adverse health effects. Reactions initiate typically from odorous substances. Reactions range from unpleasant sensations and annoyance to multi-organ symptoms, severe disability, and major restrictions in daily life and work. Symptoms often lead to exposure assessments at work and may result in excessive actions to eliminate minor exposures. In environmental intolerance, occupational health care is the front line actor in primary and secondary prevention, and support of recovery.

Human reactions to indoor air can be explained by building-related, psychosocial and individual factors. The non-specific symptoms without a clear cause have also been called the sick building syndrome. In Finland, the prevalence of building-related intolerance is common and higher than elsewhere in Europe. Also, the 37% of working population perceives indoor air harmful to their health. Indoor air problems, especially moisture-damage and moulds are considered a major health risk in Finland.

The mechanisms of environmental intolerance have become more clear. The recognition of functional symptoms and environmental intolerance from indoor pollutant-related symptoms is not easy, but it is possible. The differential diagnosis of symptoms is necessary, because intervention may be the opposite considering e.g. avoidance.

The development, sustenance and perpetuation of environmental intolerance should be prevented. In less severe cases, psychoeducation at occupational services may be sufficient. In cases with severe indoor air -related idiopathic environmental intolerance, so far, results show resistance to other than avoidance and means reasoned by the toxic-hypotheses. However, the recognition of environmental intolerance as one among other functional disorders will open new promising intervention avenues. Studies on new therapeutic means are under investigation.

1687d ROLE OF OCCUPATIONAL HEALTH SERVICES IN THE ASSESSMENT AND MANAGEMENT OF INDOOR AIR QUALITY PROBLEMS

Paolo Carrer. *Dpt. of Biomedical and Clinical Sciences, University of Milan, Milan, Italy*

10.1136/oemed-2018-ICOHabstracts.552

The indoor air quality (IAQ) and its impact on health comfort, and work-performance is an issue of increasing concern in office workers. The role of the occupational health services in the assessment and management of IAQ problems has been discussed by experts of the Scientific Committee on Indoor Air Quality and Health of the ICOH and the following has been proposed.

- Collaboration in risk assessment – risk management. Information meeting and Inspection by walk–through of the workplaces. Questionnaire survey (see below) and assessment thereof. Collaboration at the technical building assessment, definition of the IAQ measurement protocol if required, and evaluation of the results. Evaluation of the combined results and definition of the risk management activities.
- Questionnaire survey. The questionnaire should cover questions about the indoor climate, symptoms and psychosocial working aspects. The results can be used for mapping the perceived IAQ and to prioritise the order in which the problems should be tackled.
- Health surveillance. Individual health surveillance in relation to IAQ is proposed only when periodical health surveillance is already performed for other risks or when specific clinical examination of workers is required due to the occurrence of diseases that may be linked to IAQ (e.g. Legionnaire's disease), recurrent inflammation, infections of eyes, respiratory airways effects, and sensorial disturbances.
- Health promotion. Workplace health promotion programs should include smoking cessation and stress management; programmes for a better IAQ management may also be considered.

A team approach with cooperation between medical and technical experts is recommended in the assessment and management of IAQ problems. Further, synergies with other risk factors, e.g. psychosocial stress may potentially also be important and need to be evaluated.