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OCCUPATIONAL DISEASES IN GERMANY - REPORTING, RECOGNITION, LATEST DEVELOPMENTS AND TRENDS

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Modernet 2020 meeting
Topic: Monitoring Occupational Diseases - figures and methodology
Keywords: Occupational diseases, Germany, List

The contribution provides an overview of the main characteristics of occupational diseases (OD) in Germany. ODs are indicated on the list of occupational diseases. If new scientific findings show that a disease fulfils all requirements and it is, therefore, likely that it will in future be part of the list, it can be recognized “as” OD. The presentation will focus on the reporting and recognition of OD within the German statutory accident insurance scheme. It will also address the latest developments and future trends.
Objectives The objective was to investigate trends in the incidence of recognized and suspected cases of occupational diseases in Finland from 1975 to 2013, including variations by industry – and describe and recognize factors affecting variations in incidence.

Design A register study.

Setting The data consisted of recognized and suspected cases of occupational diseases recorded in the Finnish Registry of Occupational Diseases (FROD) in 1975–2013.

Participants Altogether 240 000 cases of suspected and recognized ODs were analysed.

Primary and secondary outcome measures From the annual workforce statistics and FROD data, we calculated the incidence of ODs and suspected ODs per 10 000 employees. For time trends by industrial sector, we used a 5-year moving average and a Poisson regression analysis.

Results Annual average rates of ODs have varied from year to year. The total number was 25.0/10 000 employees in 1975 and 20.1/10 000 employees in 2013. Screening campaigns and legislative changes have caused temporary increases. When the financial sector was the reference (1.0), the highest incidence rates according to industrial sector were in mining and quarrying (9.87; 95% CI 8.65 to 11.30), construction (9.11; 95% CI 9.98 to 10.43), manufacturing (9.04; 95% CI 7.93 to 10.36) and agriculture (8.78; 95% CI 7.69 to 10.06). There is a distinct decreasing trend from 2005 onwards: the average annual change in incidence was, for example, −9.2% in agriculture, −10.3% in transportation and −4.7% in construction. The average annual decline was greatest in upper limb strain injuries (−11.1%).

Conclusion This study provides a useful overview of the status of ODs in Finland over several decades. These data are a valuable resource for determining which occupations are at an increased risk and where preventive actions should be targeted. It is important to study long-term trends in the statistics of ODs to see beyond the year-to-year fluctuations.

Keywords: occupational diseases, incidence, trends, register
Context and objectives Regular and structured observation of occupational health is a valuable aid for guiding prevention actions. In France, most regions produce dashboards describing the particular characteristics of their region. We present here the tools used in the regions and their potential to move towards an integrated process of observation and diagnosis in occupational health, from the individual level to the collective level.

Methods The research was carried out both from a work done by the National Federation of Health Observatories and complementary internet searches, by search engine and systematic search on the websites of Regional Health Observatories and Regional Labor Offices[1]. The lessons learned from this research also relied on a working group made up of representatives of the various regional occupational health actors in the Paris region.

Results The main used tools are: (i) national socio-economic statistics at sub-national level on the population of working age, their industrial sectors, occupations and employment status (salaried, self-employed); (ii) national surveys of occupational exposures (SUMER survey: Medical surveillance of salaried workers exposures, ECT: national survey on working conditions); (iii) tools for monitoring work-related diseases (MCP survey: on work-related diseases, Evrest observatory: trends and relations for work and health, RNV3P: the national network for monitoring and prevention of occupational diseases) and finally (iv) statistics on occupational accidents and diseases compensated by the social security[2]. At the regional level, the data produced by these various tools are most often juxtaposed and grouped together in a document called "dashboard" or "atlas". We will expose in this communication the barriers to their development in a real system of observation and diagnosis in health at work, multisource and integrated. We will also highlight the ability of some devices to propose an approach ranging from the individual situation of the worker to the collective level of the company, the sector of activity, the occupation or the territory.

Conclusion Observation and diagnosis in occupational health at a collective level requires the use of many sources of data. Their informative compilation for observation can only be made by a precise knowledge of their strengths and limits. The realisation of the first dashboard for the Paris region, in progress, allowed us to better understand these strength and limits. Following this work proposals will be made to improve these tools to better contribute to the observation, diagnosis and monitoring of occupational health at different levels.


Keywords occupational health, observation, monitoring, tools, multi-sources
SESSION: NEW AND EMERGING RISKS AND DISEASES IN OCCUPATIONAL HEALTH

Chair: Gerard Lasfargues

UPDATE ON MONITORING NEW WORK-RELATED DISEASES IN BELGIUM: THE STATUS OF SIGNAAL SENTINEL APPROACH

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SIGNAAL is a sentinel and alert systems for new work-related diseases (WRDs) implemented in Belgium in 2017. SIGNAAL is established as an online platform that allows physicians to report suspected cases of new WRDs (new exposure-disease combinations). Each reported case is evaluation in several steps, including a literature review on the existing evidence regarding exposure-disease association and assessment of work-relatedness by clinical experts. After the final decision on work-relatedness is made, a short summary of each case is reported on the official website. So far, 23 cases have been reported to the platform. Therefore, one of the main strong points is it seems that the system has been welcomed by all stakeholders, especially occupational health physicians, who are the main reporters. Moreover, efforts to disseminate information about SIGNAAL among occupational health physicians and other health care workers have been made, through articles, meetings and conferences. Currently, several cases reported in the recent period are being assessed. These include for instance potential link between car refresher and reduced alertness while driving, acoustic trauma in administration workers using a headset, a potential exposure to cytostatics in a pharmacy worker with diagnosed with melanoma, a cluster of workers in a household waste incineration plant who developed bladder cancer, etc. In addition, a link with the compensation-based system in Belgium has been established with the support of the Federal Agency for Occupational Risks (FEDRIS). All cases rejected for compensation will be screened by SIGNAAL experts in order to identify potentially new WRDs and these cases will further be assessed using the standard procedure applied in SIGNAAL. Finally, possibilities to implement SIGNAAL in Morocco are currently considered.

Keywords new and emerging risks, sentinel surveillance, work-related diseases, prevention
ON THE WAY TO RISK MANAGEMENT OF NEW AND EMERGING RISKS OF CHEMICALS

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A database of potential New and Emerging Risks of Chemicals (NERCs) is available on MODERNET.info/nerdb/ and is mainly based on the scientific literature. It is constantly updated by RIVM and NCOD, so that it plays a role in signal strengthening.

The causal relation between exposure and health effects of possible NERCs are discussed in a Dutch-Belgian expert group. In case of a causal relationship, risk management options and risk communication are being discussed. The Labour inspectorate will be informed in case of non-compliance with legislation (e.g. OEL). Professional societies focused on occupational health and safety are informed via symposia, conferences and the website “side effects of work”.

If a NERC is being evaluated by ECHA or one of the member states in one of the REACH processes, they will be informed about the information on the NERC. If the substance is not yet being evaluate, a risk management options analysis (RMOA) may be performed. This RMOA will reveal possible actions, such as deriving an OEL, one of the REACH processes, classification and labelling, and applying other legislation. Next, the RMOA is submitted to RiME for advice, and on that basis the Member State or ECHA decides what follow-up measures are needed.

The expert group is working on several NERCs simultaneously. For example, on Aerotoxic Syndrome (ATS), i.e. neurological symptoms reported by pilots and cabin crew. There is no consensus on diagnostic criteria. Substances in the cabin air, especially tricresyl phosphates (TCPs), released during fume events are suspected to cause ATS. To unravel a possible causal relationship several actions have been initiated:

- a substance evaluation under REACH of TCPs in order to get more information on exposure and toxicity of TCPs;
- exposure measurements of TCP’s and VOC’s in cabin air during a fume event initiated by DG MOVE;
- publication of papers on case reports and diagnostic criteria (Hageman, 2019a, 2019b);
- an enquiry among occupational physicians in aviation industry on health effects (reported and diagnosed) and exposure.

Another example is diacetyl (butter flavouring) that may cause bronchiolitis obliterans, a life-threatening disease, when inhaled. Although sometimes referred to as popcorn disease, it is also used in cookies, coffee, dairy products, and e-cigarettes, suggesting both worker and consumer exposure. For workers, an indicative OEL is in place, however cases are still being reported. RIVM started a RMOA to describe the various management options and making a proposal to RiME on that basis.

Last example is cobalt–tungsten carbide powders and hard metals which may cause hard metal lung disease. The clinical presentation is similar to hypersensitivity pneumonitis leading to lung fibrosis. There are indications that hard-metal dust behave as a specific toxic entity (potentiation of the effect). RIVM started a RMOA to explore the possible need for further risk management measures under REACH.

Keywords New and Emerging Risks of Chemicals, risk management, Aerotoxic syndrome, diacetyl, hard-metal lung disease

References:

Side effects of work: available via: [https://bijwerkingenvanwerk.nl/en/](https://bijwerkingenvanwerk.nl/en/)

Hageman, G. e.a. (2019a), Three patients with probable Aerotoxic syndrome, available: [https://doi.org/10.1080/15563650.2019.1616092](https://doi.org/10.1080/15563650.2019.1616092)

OBSERVATIONS OF NEW AND EMERGING HEALTH EFFECTS FOR PRIORITIES SETTING IN CHEMICALS REGULATION

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The characterisation and assessment of occupational health risks from handling of chemical substances or mixtures is a core task of BAuA - the Federal Institute for Occupational Safety and Health in Germany. This builds a scientific basis for an analysis of priorities and options for risk governance, e.g. with tailored regulation for OSH or chemical safety. In this framework picking up "raw signals" of new or emerging risks is indispensable to avoid "late lessons from early warnings" as in the case of asbestos. Two younger examples will elucidate why and how regulatory action was initiated from such signals (Chromium VI in cement, Diisocyanates). The aim of our presentation is to raise awareness and motivate the participants to contribute actively to an early identification of "raw signals" from new and emerging risks related to chemicals and materials at the workplace, using their observations and experiences from daily work in occupational settings.

Keywords New occupational diseases, Germany
OUTBREAK OF SEVERE PNEUMOCOCCAL DISEASE IN A NORWEGIAN SHIPYARD

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Although exposure to metal fumes is known to increase the risk of pneumococcal disease, outbreaks are quite rare. During nine weeks in 2019, 20 confirmed and probable cases of severe disease were identified among 1,900 shipyard workers at one shipyard in Western Norway. The affected workers were of different nationalities, most of them employed by different subcontractors. Sixteen were hospitalized. Isolates were available for serotyping for 17 cases, all isolates belonged to serotype 4. The same strain was found in an outbreak in a shipyard in Northern Ireland in 2015.

Our onsite inspection found a crowded shipyard in the process of finishing a new cruise ship. Many tasks were carried out in the same work space; like welding, cutting, painting, and finishing on surfaces. Immediate occupational hygiene measures were ordered with short notification. Regulations on tobacco smoking, air quality improvements, and the use of right personal protective equipment were all implemented. There were also given advice on measures for improving general hygiene.

The National Institute of Public Health recommended vaccination for the involved workers. Almost all the 1,900 workers were vaccinated by the shipyard’s occupational health services. After onsite inspection and vaccination, no new cases are identified. The local hospital initially detected the outbreak. This outbreak indicates that the occupational risk of severe pneumococcal disease is multi-factorial, and that metal fume exposure not only is limited to the occupational category welders.

In Norway, vaccination with the pneumococcal is recommended for welders after risk assessment. Recommendation of pneumococcal vaccination to broader occupational groups exposed to metal fumes should be considered, and the working and living conditions for migrant workers on short-term contracts ought to be monitored.

Author declared no conflict of interest.

Keywords pneumococcal infection, disease outbreak, welders, metal fume
SESSION: ASSESSING RECENT AND PREVIOUS EXPOSURE
Chair: Lode Godderis

QUANTIFICATION OF ALLERGENIC ENZYMES AT THE WORKPLACE USING IMMUNOASSAYS TO PREVENT OCCUPATIONAL RESPIRATORY DISEASES

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Since the epidemiological studies among employees of the detergent industry in the 1960/1970s it has been known that enzyme dusts represent a high risk for allergic respiratory diseases. These findings have been used to reduce inhalation exposure at the workplace by encapsulating enzymes. On the other hand, the application possibilities and the variety of industrially produced enzymes, as well as the quantities produced per year, have increased continuously worldwide.

Therefore, cases of occupational allergies to new or already known enzyme allergens can still be found in the medical literature [1]. Even when encapsulated or liquid enzymes are used, occupational allergies cannot be ruled out. Sensitive detection methods of allergen exposure at the workplace are an important tool for prevention. Either enzyme activity or immunoassays can be used to quantify inhalable enzyme exposure. Superior specificity and sensitivity make immunological methods, in particular two-sited immunoassays, the method of choice for the quantification of allergens [2].

Two-sided immunoassays have already been developed at IPA for the following allergenic enzymes: α-amylase from ASPERGILLUS ORYZAE, glucoamylase from ASPERGILLUS NIGER, xylanases from ASPERGILLUS NIGER, TRICHODERMA REESEI and BACILLUS SUBTILIS, cellulase and phytase from ASPERGILLUS NIGER [3]. Since enzymes of the same name and classification (EC number) and also the same CAS Registry Number often differ strongly in their primary structure, it must be tested whether the immunoassay recognises the enzyme used at the workplace.

For example, the sequence agreement of α-amylases (EC 3.2.1.1; CAS 900-90-2) with different origins from mammals, fungi or bacteria is low (~22%). Cross-reactions of specific antibodies are therefore not to be expected and were not observed in allergy diagnostics with α-amylases from evolutionary distant organisms [4]. On the other hand, the immunoassay against the phytase from A. NIGER could be successfully used for exposure measurement in the production of animal feed, although the phytase used was produced in TRICHODERMA REESEI [5].

Keywords Allergenic enzymes, immunoassays, occupational allergies, exposure assessment

References
RETROSPECTIVE ASSESSMENT OF ASBESTOS EXPOSURE: HOW RELIABLE ARE EXPERT OPINION AND ALGORITHMS? A VALIDATION THROUGH COMPARISON OF ESTIMATES WITH LUNG FIBER BURDEN MEASURED BY SEM-EDS

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Retrospective asbestos exposure assessment, especially in the context of causal attribution of lung cancer or pulmonary fibrosis, is usually based on elaboration of literature data and databases, but results are often questioned (1). The goal of this study is conducting a retrospective evaluation of asbestos exposure in a group of individuals deceased for asbestos related diseases and to investigate the consistency between retrospective estimate and tissue fibre burden, assessed with scanning electron microscope on lung samples collected during autopsy.

The subjects under study were 30 men and 10 women deceased in 2005-2011, randomly collected from a bigger group made of 188 deceased for asbestos related diseases. In each case, a forensic autopsy was performed, followed by histological and immunohistochemical examinations. All available anamnestic and circumstantial data were retrieved from trial records, clinical files, autopic and histological reports.

For retrospective exposure assessment, the following tools were used: Ev@lutll and DatAmiant databases, literature data collected in in similar exposure scenarios, literature data on general population for environmental and familiar exposure estimate. Then, a quantitative estimate of weighted average exposure was performed, according to a formula considering: mean fibres concentration for specific task; duration in hours/year; working hours per year.

The lung burden of fibres/gram of dry tissue was measured by Scanning Electron Microscopy and Energy Dispersive X-Ray Spectroscopy (SEM/EDS). Each lung sample, after digestion in sodium hypochlorite, was filtered through a polycarbonate membrane, that is then mounted in a pin stub and observed though SEM. An area of 2 mm² of the sample was observed at a magnification of 2000 x, using backscattered electrons. (2) The experts performing estimates were not aware of the results of SEM/EDS evaluation.

This study revealed a good concordance between estimates and lung fiber burden measured with SEM EDS (Pearson r: 0.735; p = 0.0018). Therefore, our results suggest that retrospective estimate of past exposure to asbestos is a reliable method when based on expert assessments. This study offers for the first time an objective basis that allows to validate a method adequate to investigate past exposures. Results confirm also that a very low amount of fibres is sufficient to provoke mesothelioma in susceptible individuals.

Overall, almost the totality of asbestos fibres observed so far belonged to the amphibole group, above all amosite and crocidolite, suggesting the hypothesis that chrysotile is cleared from the lungs in a relatively short time interval since the end of exposure (3).

Keywords asbestos exposure assessment; estimates; algorithms; asbestos fiber burden

References
Abstract Book

MEDICO-ADMINISTRATIVE DATA COMBINED WITH AGRICULTURAL PRACTICES DATA TO RETROSPECTIVELY ESTIMATE PESTICIDE USE BY AGRICULTURAL WORKERS

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Introduction. This work is part of a global project aiming to use medico-administrative big data from the whole French agricultural population (~3 millions), collected through their mandatory health insurance system (Mutualité Sociale Agricole), to highlight associations between chronic diseases and agricultural activities. At the request of the French Agency for Food, Environmental and Occupational Health & Safety (ANSES), our objective was to estimate which pesticides were probably used by each agricultural worker, in order to include this information in our analyses and search for association with diseases.

Methods. We selected five databases to achieve this objective: The Graphical Land Parcel Registration (RPG), the French Agricultural Census, "Cultivation Practice" surveys from the Agriculture ministry, the MATPHYTO crop-exposure matrix and the Compilation of Phytosanitary Indexes from the French Public Health Agency. A geographical grid was designed to use geographical location while maintaining worker anonymity, dividing France into square tracts of variable surface each containing a minimum of 1500 agricultural workers. We developed an automated algorithm to predict each individual potential exposure by crossing her/his occupational activity, the geographical grid and the RPG to deduce cultivation practices and use it as a gateway to estimate pesticides use.

Results. This approach allowed drawing, from administrative data, a list of substances potentially used by each agricultural worker throughout France. Results of the algorithm are illustrated at collective level (descriptive statistics for the whole population), as well as at individual level (some workers taken as examples).

Discussion. The generalization of this method in other national contexts is discussed. By linking this information with the health insurance databases, this approach could contribute to the agricultural workers health surveillance.

Key words: Occupational exposure, big-data, health insurance data, agricultural practices

Reference

Abstract Book

NANOTiO₂ SKIN ABSORPTION AND NO EFFECT TO PREVENT UV RADIATION OXIDATIVE STRESS

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Exhaled breath condensate (EBC) has emerged as a sensitive research technique for non-invasive monitoring of workers exposed to engineered nanoparticles. In our previous studies, several markers of oxidative stress were elevated in the EBC of 34 workers as compared with 45 controls (1). They included malondialdehyde, 4-hydroxy-trans-hexenal, 4-hydroxy-trans-nonenal, aldehydes C6-C12, 8-isoProstaglandin F2α, o-tirosine, 3-chlorotyrosine, 3-nitrotyrosine, 8-hydroxy-2-deoxyguanosine, 8-hydroxyguanosine, 5-hydroxymethyluracil, and leukotrienes measured by liquid chromatography-electrospray ionization-tandem mass spectrometry.

A significant dose-dependent association was found between exposure to TiO₂ and markers of lipid oxidation in the EBC and TiO₂ particles persisted in the EBC from previous shift(s) (2). The results were consistent with the oxidative stress hypothesis and lung injury at the molecular level.

Here we tested skin absorption and nanoTiO₂ effect using the same markers in 6 identical volunteers exposed to commercial nanoTiO₂ sunscreen for 3 days with and without ultraviolet (UV) radiation exposure in commercial tanning beds. The second aim was to verify sunscreens efficiency to prevent oxidative stress/inflammation caused by UV radiation using biomarkers in volunteers’ blood, urine, and EBC. First samples were collected on day 1 before the test and second after sunscreen application and/or UV exposure. On day 4, third samples were collected, and the sunscreen was washed off; fourth samples were collected on day 11.

Sunscreen alone did not increase the biomarkers in the EBC. Titania measured by inductively coupled plasma mass spectrometry and TiO₂ nanoparticles by transmission and scanning electron microscopy were found in the plasma (9.3±3.1 ng/ml) and urine (6.7±1.7 ng/ml) samples 2-4 in the women and samples 3-4 in men in the tests using the sunscreen.

The sunscreen used however did not inhibit the elevation of biomarkers caused by UV radiation. TiO₂ particles can be absorbed both by the inhalation (2) and by dermal exposure as TiO₂ nanoparticles were found in the plasma and urine samples. Negative nanoTiO₂ findings in the EBC excluded inhalational contamination.

Based on these results, the efficacy of the nanoTiO₂ sunscreen to prevent skin cancer may be questioned.

Keywords Nanoparticles, TiO₂, Inhalation, Dermal, Absorption

Acknowledgements: Progres Q25/1LF, Q29/1LF, and GACR 18-02079S.

References:

Abstract Book

CARBON FIBRES AS A SOURCE OF RESPIRABLE FIBRE DUSTS

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In the process chain from fibre through the textile and the composite material to recycling and reclamation, carbon fibres are subject to high mechanical stresses. Due to spall fracture biopersistent respirable fibre fragments can be released, which according to the WHO criteria (length > 5 microns, diameter < 3 microns, length: diameter > 3:1) can exhibit asbestos-like effects. So far, it is still unclear, which carbon fibres tend to splinter and in which concentration fragments are released.

Preliminary investigations have shown that the fibres themselves and the polymeric composite materials made from them have a pronounced tendency to spall fracture under mechanical stress. At machining and tensile testing workplaces of ultra-high modulus carbon fibre composites, intolerably high concentrations of airborne alveolar carbon fibre fragments were measured.

To gain further insights into the fracture behaviour of carbon fibres as well as to understand the release behaviour of alveolar fragments under mechanical stress are decisive with regard to occupational safety relevant issues as well as the “Safety by Design” aspect.
SESSION: NEW ASPECTS OF WELL-KNOWN HAZARDS

ADVANCED TECHNOLOGIES AND MATERIALS - NEW HEALTH HAZARDS AT WORKPLACES?

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Within the last years new technologies have been introduced at workplaces; at the same time, materials such as polymers and fibre-reinforced plastics have been processed with these technologies. These workplace factors as such are not always new, but in combination with each other they can lead to health hazards that may be hidden or less well known. Therefore, they may be neglected or underestimated in hazard and risk assessments.

One of the advanced technologies at workplaces is the application of lasers. Meanwhile, also class 4 lasers are used as hand-held devices and they are even applied in the customers’ areas for repairing machines etc. In these cases, it can be difficult to define an area that is under risk of over-exposure to coherent optical radiation and to identify the areas that are safe to bystanders. When applying lasers in an ultra-short mode, ionizing radiation may be generated; depending on the materials processed, the radiation may exceed the respective exposure limits for non-exposed staff. In the last years, lasers have also been used to process polymers.

Whereas in laser welding only small amounts of pollutants are evaporated, in particular in laser cutting high emissions of pyrolytic products are generated, which include strong irritants such as hydrogen chloride (from PVC) and aldehydes, other toxic substances such as aromatic hydrocarbons and carcinogens such as benzene and PAH. These emissions have to be considered in the hazard and risk analysis, in addition to the optical radiation.

Lasers are also used in upcoming additive manufacturing processes such as 3-D printing. Besides metals, also plastics are used in these processes. Although the temperatures are significantly lower compared to laser cutting, emissions of irritant pollutants such as aldehydes have been shown. As these printers are often used in rooms like offices, they need to be taken into account for adequate airing and ventilation.

Optical lenses in lasers can contain selenides, arsenic compounds, and thorium. In unfavourable situations, these lenses can be thermally destroyed. In these cases, substances like selenium hydrogen and arsenic trioxide may be emitted which are highly toxic to the airways even after a short period of inhalation. Also, radioactive thorium can be emitted. Therefore, an emergency stop of the laser is needed in such situations, and the staff shall leave the room immediately.

Recently, also the production and processing of reinforced polymers have become more and more popular. While it has been demonstrated that pyrolytic substances are formed from the polymer matrix, it is under discussion whether fibres that meet the characteristics of the WHO definition for hazardous fibres are also emitted; in laser processing with high local energy input, these fibres have been detected in the fume emissions; also, in recycling processes and waste deposition of reinforced polymers the emission of these hazardous fibres is currently under debate. The presentation will give examples of the respective processes, materials and health hazards.

Keywords: Material processing; Fibre-reinforced polymers; Laser; Additive manufacturing; 3-D printing
SHIFT WORK DISORDER - AN OVERLOOKED ISSUE

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Shift work disorder (SWD) is a circadian rhythm sleep disorder characterized by persistent and severe sleep disturbance during the sleep period and/or excessive sleepiness during the wake period. In comparison to normal sleep-wake characteristics of shift workers, SWD is marked by chronic and severe sleep-wake disturbances due to the inability to sufficiently adjust to shift work.

Depending on the studied population, its shift schedules, and the instruments used to define the SWD, as much as 20-60% of the shift worker population is considered to be affected. When considering that 21% of the workforce in the European Union does some form of shift work and is therefore potentially being exposed to disruption of circadian rhythms, the weight of the problem becomes evident.

Workers with SWD are at greater risk of workplace injuries, motor vehicle accidents, increased sick leave and absenteeism than other shift workers. Diagnostic criteria for SWD have been defined in the International Classification of Sleep Disorders for more than 20 years. Nevertheless, SWD has been poorly diagnosed and most likely under-recognized in primary care settings. This is partly due to the lack of validated instruments that identify workers with SWD. Moreover, some comorbidities, such as neuroticism, depression and sleep apnoea, have masking effects on SWD diagnosis. There is also a challenge in epidemiological research to reach an acceptable way to assess the symptoms of SWD in order to study its prevalence and associations with differential health problems and other relevant factors.

Different strategies have been purposed to counterbalance the impairment of sleep and sleepiness/alertness of patients with SWD. Among these are changes in the shift system guided by ergonomic criteria and respect for the individual vulnerability of the worker, as well as pharmacological and/or non-pharmacological interventions. Understanding potential risk factors is important in identifying shift workers at a higher risk of SWD and provides targets for interventions.

A high prevalence of SWD symptoms may call for a focus on the systemic solutions of work-related sleep disorders. As we increasingly become a 24-hour society and thus expect more workers to perform shift work, the prevalence of shift work disorder is likely to increase in the upcoming years. This presentation aims to present a case report of a worker with SWD and to discuss the role of occupational health in recognizing, managing and preventing sleep disorders related to work schedule.

We have no conflict of interest to declare.

Keywords Shift Work Disorder, Shift Work, Circadian Rhythm Disorders, Sleepiness, Insomnia
Abstract Book

OCCUPATIONAL HEALTH SURVEILLANCE OF FRENCH AGRICULTURAL WORKERS USING HEALTH INSURANCE DATABASES

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Introduction: Health surveillance and vigilance (identification of new risks in particular) represent a major challenge in the field of occupational health. In addition to classical epidemiological studies, the systematic analysis, without a priori, of data collected routinely could be an asset for the early detection of diseases related to work. In this context, the social protection scheme dedicated to French agricultural workers, known as “Mutualité Sociale Agricole” (MSA), wanted to develop its vigilance activity by exploiting its medico-administrative data, used for the reimbursement of health expenditures. In partnership with the French Agency for Food, Environmental and Occupational Health & Safety (ANSES), a data mining project has been set up in which this thesis work fits. The aim of the thesis is, more precisely, to test, without any prior assumptions, the existence of associations between agricultural activities and pathologies recognized as long-term disease (LTD).

Method: The work presented was conducted on self-employed population (heads of farms or enterprises) affiliated to the MSA. It relied on the one hand on a contributors’ database which includes, at the individual level, information about occupational activities, demographic and socio-economic characteristics, and on the other hand, on a medico-administrative database with declarations of long-term diseases (LTD) and associated information like ICD-10 diseases. Thanks to the agreement of the French Data Protection Authority (CNIL), a unique identifier was created so that, for the first time, these administrative and medico-administrative data could be merged and restructured to allow the application of models. Logistic regression models were performed, adapting variable selection for each ALD and using cross-validation to limit over-fitting of models. Several methods have been tested to better take into account potential confounders. These different models were evaluated via robustness measures and applied at two-level of precision for pathology (LTD and ICD-10). The statistical associations between each combination of occupational activity and LTD were characterized by p-values, corrected for multiple tests, and odds ratio.

Results: Data management allowed us to consider a population of 899 212 self-employed affiliated between 2006 and 2016. Among them, it was possible to identify 100 706 individuals with at least one declaration of LTD over the observation period. The applied methodology revealed 54 statistically significant associations between an occupational activity and an LTD, making it possible to capture already known or suspected health determinants but also to generate interesting hypotheses. After adjusting for confounding factors, the agricultural sectors most associated with LTD, among the self-employed, are viticulture, timber exploitations, landscaping and gardening or reforestation.

Discussion: This work provides a first demonstration of the feasibility and relevance of the systematic analysis of data collected routinely for insurance purposes, to search for health risks associated with occupational activities. The developed methodology will be extended by using complementary data to refine disease and exposure information. The statistical "signals" thus highlighted will then be investigated by a group of experts. This approach may thus be a valuable tool contributing to the health surveillance system dedicated to agricultural workers.

Keywords Medico-administrative databases, Health insurance, Data mining, Occupational risks, Agricultural workers
EMPLOYED PATIENTS FACE MORE BARRIERS TO COMPLETE CARDIAC REHABILITATION PROGRAM

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CARDIAC REHABILITATION COMPLETION STUDY: PREVALENCE, PREDICTORS AND POTENTIAL SOLUTIONS AMONG EMPLOYED AND NON-EMPLOYED PATIENTS.

QUALITATIVE ANALYSIS

Cardiovascular diseases (CVD) are among the leading cause of morbidity and mortality worldwide. Cardiac rehabilitation (CR) is a high cost-effective component of the continuum of care for patients with CVD that reduce mortality, morbidity and re-hospitalization. CR is a Class I recommendation in national clinical practice guidelines for cardiovascular care. However, despite all the benefits and evidence, utilization of CR is suboptimal for a variety of patient-, provider-, and system-based reasons.

However, there are few studies available that have explored barriers to CR completion and their potential solutions. In order to address this low participation, we conducted a focus group study in order to get information about the perceived barriers why patients do not complete CR program at Mayo Clinic (Rochester, MN) along with perspectives of patients regarding how to improve CR participation. We performed two focus group interviews to evaluate the attrition barriers that patients referred to stage II Mayo Clinic CR program, one group for completers (patients who enrolled and completed the CR program) and another one for non-completers (patients who enrolled but didn’t complete the CR program). The study was approved by the Institutional Review Board.

The collected data was recorded, transcribed, and coded by a qualified audio typist and analyst according to a qualitative analysis approach. A qualitative software analysis program (NVivo9 software) was used to facilitate data coding and sorting. Six patients who completed the CR program and seven patients who didn’t complete the CR program participated in the focus group. The mean age among all the participants was 60.91 +8.89 years. Four (33.3%) of the 12 final analysed participants were women and 6 (50%) employed, being half of those female.

We identified three major categories relating to barriers to complete the cardiac rehabilitation program: emotional, relational and logistical; along with facilitators and possible solutions to increase CR completion rate. Emotional barriers were the most frequent barriers reported among completers when compared to patients who didn’t complete the CR program, where logistical barriers were the most common. Emotional barriers included: perception of attending to CR as a sacrifice, anticipated anxiety to do exercise and being overwhelmed. However, when regarding logistical barriers, parking barriers and scheduling issues were frequently reported as a barrier by patients, overall among employed patients.

Facilitating the attendance to the CR program to the employed patients through an extension of opening hours as well as rescheduling might be a strategy to improve CR completion rates. Our findings provide a deeper understanding of the factors and processes that may affect CR completion in order to develop strategies including emotional considerations and increasing awareness of CR goals among healthcare providers as well as patients. Future investigations for solutions to promote CR completion among employed people are extremely needed because this population report higher number of barriers to attend.

Keywords Cardiovascular diseases, Cardiac rehabilitation, Employment
Abstract Book

SWORD - 30 YEARS OF SURVEILLANCE IN OCCUPATIONAL RESPIRATORY DISEASE

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SWORD (Surveillance of Work-Related and Occupational Respiratory Disease) is a voluntary surveillance scheme operated as part of The Health and Occupation Research (THOR) network at the University of Manchester. With more than 28,000 reported cases by chest physicians since the scheme’s inception in 1989, the reporting of occupational respiratory disease in the UK is now celebrating its 30th anniversary.

This report provides an overview of the information collected by SWORD over 30 years and describes the evolution of the scheme in terms of reporting changes and diagnostic categories. Updates on time trend estimations of disease incidence are provided with a focus on short-latency diagnoses and the most frequent occupations, industry sectors and causing agents.

Time trends are discussed considering variation in the number and characteristics of reporters and fluctuations in the UK working population over time. We also analyse the impact of zero returns on annual average disease incidence rates and discuss the adjustments for each reporter type and for combined core and sample reporters.

The data collected over three decades of SWORD has proved useful in minimising and preventing work-related respiratory diseases and has made and continues to make, an important contribution to epidemiological research.

Keywords occupational disease, respiratory, SWORD, THOR, time trend
SESSION: BUILDING EVIDENCE FOR CAUSAL RELATIONS

BETTER PREVENTION, IDENTIFICATION AND REPORTING OF WORK-RELATED AND OCCUPATIONAL DISEASES AND EMERGING RISKS

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Aims: To estimate incidence rates of occupational diseases (OD), work-related diseases (WRD) in the countries participating in the project. Second: to make an inventory of methods for improvement of detection registration and prevention of OD, WRD and Emerging Risks (ER).

Methods: Questionnaires were sent to national experts of the ten participating countries. During the project, several meetings were organized with the experts to discuss methods and provisional results. Calculations derived from the Realloc-study to estimate the underreporting of fatal and non-fatal work-related injuries, were used to estimate the underreporting of occupational and work-related diseases. We applied the figures of Finland as probably best in class figures to the benchmark countries to estimate the incidence of occupational diseases (Realloc-1 method). To estimate the incidence rate of work-related diseases we used the ratio between WRD and OD in the UK as best in class as the coefficient for multiplication (Realloc 2 method).

Results: Traditional national registries of occupational diseases have major shortcomings for the provision of information for preventive policy. Therefore, direct comparisons between countries are problematic to a great extent. Trend analysis within countries, however, can be useful to evaluate preventive policy. A rough estimate of the IR of occupational diseases for the benchmark countries is 5.5 cases per 10,000 workers. Rough estimates of work-related diseases have been made on the basis of the calculated rate between OD and WRD, which resulted in a coefficient of 67, meaning that the number of OD must be multiplied with 67 to get the estimate of the number of WRD.

We were unable to collect figures on ER, because there is no systematic recording of ER in the participating countries. Instead, we made an inventory of projects focussed on identifying ER to give recommendations for improvement of identifying ER.

Conclusions: As OD is considered as subcategory of WRD recognized by the national authorities as such, the primary focus of attention in policy should be on prevention of WRD. This means a twofold shift in policy attention:

- from OD to WRD: Only few participating countries report WRD. We need better information on WRD. Besides case reporting we need other (epidemiological) methods to get information on WRD. However, OD is still an important concept as basis for compensation and promoting fair international competitiveness (no competition on working conditions).

- from compensation to prevention: policy focus must be primarily on prevention, but a good practice for (fair) compensation remains important. Considering the workplace as the arena of prevention, workers and their supervisors should be trained and educated in continuous improvement of working conditions.

Keywords occupational diseases, work-related diseases, emerging risk, monitoring, prevention

Conflict of interests: None.
COLD CASES. MULTI-ELEMENTAL IMAGING OF TISSUES TO IDENTIFY THE OCCUPATIONAL AND ENVIRONMENTAL ORIGIN OF IDIOPATHIC PULMONARY PATHOLOGIES

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Some respiratory diseases such as interstitial lung diseases (ILDs) (especially sarcoidosis and interstitial pulmonary fibrosis) are considered as idiopathic by a lack of complementary investigations. Moreover, for some other lung diseases, such as emphysema, it is also difficult to assess the responsibility of occupational exposures. Even if environment is thought to be an important risk factor for some of these diseases, the evaluation of patients’ exposure usually only relies on « curriculum laboris » investigation (interview with the patient). Sometimes we may also rely on classical mineralogical analyses with electronic microscopy, but interpretation remains difficult, especially when analyses are not performed « in situ ».

For that reason, it is often more than difficult to authenticate the real complexity and intensity of contamination of terminal lung air spaces by mineralo-metallic aero-contaminants, and often impossible to explore the localisation of the aero-contaminants compared to histological lesions (such as granulomas) and then to really progress in the imputation procedure to an occupational or environmental cause.

Authors have adapted LIBS (Laser Induced-Breakdown Spectroscopy) technology for microscopic elemental imaging of biological tissues (1,2). In a new project, named MEDICO-LIBS (3), they evaluate the feasibility of using a LIBS-based instrument to image (i.e., identify, localize and possibly quantify) metals within selected human specimens with ILDs. At the same time, the procedure is applied on controls (autopsies of the forensic institute, with no lung diseases) in order to get references on normal tissues.

In this communication we will highlight the high interest of this innovative technology to read back some « cold cases » of patients with lung diseases investigated by Grenoble’s Occupational Diseases Centre and compare results with classical mineralogical analysis with electronic microscopy. Especially we will present the 3 following cases:

- patient who underwent in 2016 a lung transplant for emphysema, with no deficit in alpha-1 antitrypsine and a low cumulative smoking (<7 PA). At interview, she performed sandblasting during only one year during her professional career (1995-96). LIBS analysis highlighted a high concentration of silicium colocalizing with residual lung tissue. Thanks to this result, she could be compensated as an occupational disease.
- old case of environmental Berylliosis, with LIBS analysis identifying some pixels of Be in patient’s lung tissue.
- Case of sarcoidosis in a patient environmentally exposed to high level of dusts, with LIBS showing high concentration of alumino-silicates within the granulomas.

This technology seems very promising to help us identify occupational and environmental risk factors of lung diseases, when they are constituted of mineral or metallic particles. A validation study is underway.

Keywords lung diseases, LIBS, lasers, metals, pathology

References
MEDICO-LIBS : https://clinicaltrials.gov/ct2/show/NCT03901196?term=libs&rank=1
Workers may present their concerns on chemical exposure and health to occupational physicians (OPs). To provide an answer to these etiological questions, it is often necessary to search for information and evidence in the scientific literature. This can be difficult and requires some experience in collecting, assessing, and interpreting knowledge from scientific and other sources.

To assist Dutch OPs there is the possibility to consult with an Occupational Safety and Health (OSH) expert from the Netherlands Center for Occupational Diseases (NCOD) using the helpdesk. This NCOD helpdesk is an online tool, primarily aimed at OSH professionals, through which questions can be asked in several subject categories. The OSH experts of NCOD answer questions within their specific field of expertise.

Since the start of this Q&A tool in 2000, thousands of questions on a variety of subjects have been answered. A substantial part of the OSH content questions deals with causes or risk factors for occupational disease (36%). Rhebergen et al. (2012) demonstrated that OSH experts are able to provide quality answers in this type of online Q&A networks.

The objective of the presentation is to show how an OSH expert can answer questions on chemical exposure and health effects. Since the time OSH experts can spend on searching is limited, the approach should be as effective and efficient as possible. A real-life question on particular pesticide exposure and possible late sequelae is presented to show that it is feasible to answer etiological questions using the evidence from the literature.

The focus in this approach is on public available literature sources and the use of integrated sources of evidence. Although used here by OSH experts, the search approach can also be used by OPs, other physicians and OSH professionals, even with limited excess to scientific databases. It may help to find satisfying answers to the often-complicated questions raised by workers in their daily practice.

Keywords Occupational Physicians, Questions, Evidence, Search, Literature