Alternatively, PAF can be estimated if the incidence of the disease in the population, and the incidence of the disease in the unexposed, are known. Improved disease surveillance can make an important contribution in areas where exposure prevalence measures are not good and difficult to improve. Good estimates of disease that can reliably be connected to work (e.g. occupational asthma, occupational dermatitis) in specific study populations would allow the estimate of incidence in the unexposed if the incidence in the population was known. This approach would be more difficult in circumstances where the direct connexion to work is harder to establish (e.g. many musculoskeletal disorders and noise-induced hearing loss). Alternatively, since estimates of the incidence of the disease in the general population will often be available, probably the key area of additional information required would actually be the incidence in unexposed persons. This isn't the typical focus of occupational disease surveillance but could provide a useful contribution to the understanding of occupational disease and its burden on the community.

Thirdly, surveillance systems that cover disorders that are virtually uniquely occupational, such as a register of cases of malignant mesothelioma, can provide a direct estimate of the number of cases of a particular occupational disorder.

Conclusions Occupational surveillance systems can potentially contribute to estimations of burden of disease studies using several different approaches.

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201 | **HOW USING GEOGRAPHICAL INFORMATION SYSTEMS (GIS) COULD ALLOW US TO IMPROVE OCCUPATIONAL DISEASES (OD) SURVEILLANCE?**

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Objective To show and illustrate to what extent, GIS could be an opportunity for work-related and occupational diseases surveillance, in combining relevant "spatialisable" information from different data sources, in order to help analyse and present existing data in a systematic, and easily understandable way; which might be of great help for surveillance, vigilance, and prevention purposes.

Methods Cases of Work related diseases ("numerator") from different and complementary sources, as well as data related to underlying industrial tissue and working population according to activity sectors ("denominator") are to be georeferenced and projected (mapped together) with GIS software. For the purpose of our illustration, numerator data are those from the French National Surveillance Scheme on OD Surveillance and Prevention rnv3p, and data from a compensated scheme; data from the denominator are files of enterprises from Chambers of Commerce and Industry as well as from the French National Health insurance company for salaried workers.

Supplementary qualitative knowledge might also be gathered, georeferenced and mapped to increase the level of information produced (here: data from "on the ground" by occupational physicians). We used ArcGIS (9th and 10 th version) software and basemaps from the National Geographic Institute (IGN) and OpenStreetMap (OSM).

Results Results are illustrated by maps derived from analyses concerning one specific activity sector. The differences and complementarities in case capture between the work-related diseases surveillance scheme and the compensated OD register are highlighted. The spreading of some toxicological risks from companies to their subcontractors is also shown.

Conclusion This methodology, by combining different data sources and a convenient visualisation of the results, is of a great help to adopt a systemic and integrate point of view on OD. Furthermore, it might help surveillance systems to better analyse some issues of concern (capture, shading zone, geographical patterns of referrals or reporting, etc[3DOTS]).

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202 | **INFORMING PUBLIC POLICY IN OCCUPATIONAL HEALTH THROUGH DISEASE SURVEILLANCE DATA - THE 'THOR' EXAMPLE. (MINISYMPOSIUM: OCCUPATIONAL DISEASE SURVEILLANCE)**

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Objectives To discuss how voluntary occupational health surveillance can help informing public policy in relation to health at work.

Methods and Results The Health and Occupation Research Network (THOR) collects incidence data on occupational disease and work related ill health (WRI).

Incidence data from THOR has been used to inform and direct UK policy and priorities in relation to occupational asthma and dermatitis such as in bakers and spray painters. THOR played an important part in measuring the UK's "Revitalising Health and Safety" targets: It was the main UK data source used to report the statistically significant decrease in both work-related asthma and skin disease in the decade after 2009. The effects of interventions, such as implementation of statute, relating to chromate, latex, and glutaraldehyde were studied using incidence data and demonstrated the value of these public policy initiatives. 'Before and after' comparisons were made to investigate changes in sickness absence certification following the introduction of the 2010 'fitnote' which assisted GPs to recommend workplace adjustments. In the first year the new category certified as 'fit' with recommended adjustments was almost exclusively limited to that proportion of workers previously certified as 'fit'. However after the first year there was evidence that the GPs were also making rehabilitation recommendations in those who would previously have been certified as 'sick'.

A collaborative international consortium entitled MODERNET (Monitoring trends in Occupational Diseases and tracing new and Emerging Risks in a Network) has been established with EU funding. MODERNET is developing improvements in data quality, trends analysis and disease vigilance, intended to influence public policy at a supra-national level.

Conclusions Data from voluntary occupational health surveillance schemes are valuable in informing public policy for example by monitoring trends in WRI incidence, and in evaluating the benefits of interventions.

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203 | **INTERVENTIONS FOR REDUCING THE UNDERREPORTING OF OCCUPATIONAL DISEASES - MINISYMPOSIUM 'IMPROVING THE IMPACT OF OCCUPATIONAL DISEASE SURVEILLANCE'**

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Objectives Underreporting of occupational diseases (OD) is an important issue worldwide. To address this problem, we projected a Cochrane review to evaluate the effect of interventions aimed at reducing the underreporting of OD by physicians.
Methods We will include randomised controlled trials (RCT), cluster-RCT, controlled before-and-after (CBA) and interrupted time-series (ITS) studies. We will include any type of intervention acting directly or indirectly to influence the behaviour of physicians. As primary outcome, we will define the reporting of OD either measured as the number of physicians reporting or as the number of OD reported per physician. Pairs of authors will independently screen the titles and abstracts of the search strategy results. Potentially relevant articles will be obtained in full text and independently assessed for inclusion.
Results A preliminary search to locate RCT was conducted in Medline (through Pubmed) up to November 2012. The search strategy identified 137 potentially pertinent articles. Of these, three articles met the inclusion criteria. Two RCT were conducted in high income countries (the Netherlands and United States), while the other one was conducted in Nigeria. Two studies evaluated the effect of informative interventions, the third one evaluated the effect of a training programme. Results indicate insufficient evidence for the effect of informative interventions for reducing the underreporting of OD (1 RCT on occupational physicians, not effective - 1 RCT on physicians, effective). On the other hand, training had a positive effect on health personnel knowledge, reporting requirement and the timeliness and completeness of the disease surveillance and notification system.
Conclusions These preliminary results, not including data from future searches regarding CBA and ITS, highlight the widespread problem of underreporting of OD. More high quality RCT are needed to evaluate the effect of interventions which could be applied to increase the reporting of OD in different contexts and countries.

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204 SEARCHING FOR SIGNALS OF POTENTIALLY NEW DISEASE-EXPOSURE ASSOCIATIONS: INTEREST OF SCREENING WORK-RELATED DISEASES SURVEILLANCE DATABASES WITH DATA MINING APPROACHES?

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Objective We defined potential new work-related diseases as either new couples "disease x agent", or new triads "disease x agent x occupational setting" ("old friends in new places") with, at least, a reasonably strong causality presumption. Before such cases have been reported a high number of times and raise clinicians' concern, they will have been encountered only a few times, sometimes by different physicians. Some cases might have been captured by surveillance networks. Thus, it is for interest for these networks to develop tools trying to highlight pro-actively these kinds of early potential signals within their growing databases (rather than waiting to be asked, after clinician concern was expressed, how many cases they have been recorded the previous years). The objective of this communication, is to show and illustrate to what extent, a Data Mining approach could help identifying such cases of interest for vigilance purposes.
Methods Databases from the French National Surveillance Scheme on occupational diseases Surveillance and Prevention (rnv3p), and from the UK team of occupational diseases surveillance (THOR) have been explored (both schemes being part of a wider Modernet consortium, whose networking is currently funded by EU-COST program).

Analyses of the existing couples and triads and identification of those generating a signal with disproportionality measures used in pharmacovigilance (ex PRR: Proportional Reporting Ratio).
Results New couples and triads already derived from these analyses conducted on rnv3p and THOR schemes will be presented.
Conclusion These methods stand at the frontier of conventional epidemiological surveillance of work-related diseases, and might be beneficial for vigilance in highlighting similar cases, in order to investigate them as early as possible. The higher the "background noise" in the database, the more efficient they are to highlight disproportionalities.

Session: Mini symposium V: Shift work and cancer

205 BIOLOGICAL MECHANISMS THAT UNDERLIE SHIFTWORK AS A RISK FACTOR FOR BREAST CANCER

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Objectives We investigated hypotheses for the association between shiftwork and breast cancer based on our a priori theoretical framework of five biological mechanisms which might be operational in shiftwork: light at night; phase shift (when central cycles have adjusted to night work, but peripheral cycles have not); sleep disruption; lifestyle factors (diet, physical activity and alcohol intake) and low vitamin D.
Methods We conducted a population-based case-control study with 1205 breast cancer cases, identified from 2009 to 2011 identified through the Western Australian Cancer Registry, and 1789 age-matched controls from the Western Australian electoral roll. An occupational history was collected by self-completed questionnaire for every job a woman had held for at least six months (job title, main tasks, year started, duration, hours per week and weeks per year worked, and whether the job involved night work, shift work, or work at unusual hours). Using the web application OccIDEAS, we obtained further details about the shiftwork by telephone interview. Automatic assessments with manual reviews were used to assess occupational exposure to the hypothesized factors.
Results We found a 22% increase in breast cancer risk (OR 1·22, 95% CI 1·01–1·47) for phase shift with a statistically significant dose response relationship (p = 0.04). For the other hypothesized mechanisms, risks were marginally elevated and