Sentinel and alert approaches to detect new work-related diseases

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Overview of the project

Task 1. • Literature review

Task 2. • In-depth description of selected systems through interviews and qualitative analysis

Task 3. • Seminar to discuss outcomes 1 and 2

Task 4. • Final report including analysis and policy options

Task 5. • Workshop to disseminate findings to stakeholders
Objectives

1. Study six example systems in depth by desk research

2. Study six example systems in depth by interviews with three stakeholders

3. Finally, compare systems on facilitators and obstacles, links with prevention and ability to detect new/emerging WRDs
Selected systems for desk research study

1. Non-compensation-related system for all WRDs suitable for sentinel surveillance: **RAS (Norway)**
2. Non-compensation-related system for a subset of diseases: **Occupational Health Surveillance Program in Navarre (Spain)**
3. Non-compensation-related system aimed at one type of exposure (nanoparticles) **EpiNano (France)**
4. Sentinel system: **GAST - Groupe d’Alerte en Santé Travail (France)**
5. Sentinel system: **NIOSH HHE Health Hazard Evaluations (USA)**
Register for Arbeidsrelaterte Sykdommer (RAS)

Norwegian national registry run by the Norwegian Labour Inspectorate (NLI)

Non-compensation-related system, developed for sentinel surveillance
Main purpose: data collection and analysis for all WRDs

Suitable for sentinel surveillance: reports signal to the NLI for workplace interventions and prevention of hazardous exposures

Covering all sectors including SMEs, except offshore petroleum, aviation and marine sector

All physicians can report cases they suspect being work-related and advice further investigation; participation grade is low (3-5%)

Final decision on work-relatedness is made by OPs from the NLI.
Reporter gets feedback
NLI can take appropriate preventive and remedial action based on reported cases
Register for Arbeidsrelaterte Sykdommer (RAS)

- Physicians office
  - Reporting of work-related diseases with or without recommendation for intervention
    - NLI (Central office) Physician evaluation of all the reported cases
      - NLI Registration in the database of cases
        - Work-Related Diseases Registry
          - Current Data Applications
            - Preventive efforts (inspections)
            - Information newsletter (qtrly)
            - Epidemiological studies
            - Contributing to national work-life surveillance

- Workers report to a physician office
  - Occupational exposure to the worker at worksites
  - Feedback to the physicians on cases recommended for interventions
    - All reported cases are forwarded to the regional offices
      - Regional NLI offices Evaluation by the regional inspectors for purpose of further investigation and intervention

- Worksite intervention to prevent further exposures
Occupational Health Surveillance Program in Navarre (Spain)

Regional system run by Institute of Public and Occupational Health of Navarra

Non-compensation-related system for 7 diseases based on sentinel surveillance
Initially 5 diseases: elbow and wrist tendinitis, carpal tunnel syndrome (CTS), occupational asthma, airway reactive dysfunction syndrome (RADS), and dermatitis. Since 2013, shoulder disorders and voice disorders are included.

Voluntary reporting by mainly public health physicians through a computer application

Cases are investigated by an OH physician who can contact the employer and his OHS
If necessary initiate preventive measures and refer cases to the appropriate institutions to claim workers’ compensation for occupational disease.

Reporters get feedback on their cases and in annual meetings assessment is discussed

Incidence of ODs in Navarra is six times higher than the average incidence in the Spanish State (2009)
### Occupational Health Surveillance Program in Navarre (Spain)

Spain: Overview of incidence of reported work-related diseases in Navarra, 2014 and 2015

<table>
<thead>
<tr>
<th>Diseases</th>
<th>2015</th>
<th>Incidence per 100,000 workers</th>
<th>2014</th>
<th>Incidence per 100,000 workers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elbow and wrist tendinitis</td>
<td>571</td>
<td>186.3</td>
<td>537</td>
<td>171.0</td>
</tr>
<tr>
<td>CTS</td>
<td>182</td>
<td>59.4</td>
<td>151</td>
<td>48.1</td>
</tr>
<tr>
<td>Asthma RADS</td>
<td>15</td>
<td>4.9</td>
<td>11</td>
<td>3.5</td>
</tr>
<tr>
<td>Dermatitis</td>
<td>107</td>
<td>34.9</td>
<td>114</td>
<td>36.3</td>
</tr>
<tr>
<td>Shoulder disorders</td>
<td>424</td>
<td>138.4</td>
<td>339</td>
<td>107.9</td>
</tr>
<tr>
<td>Voice disorders</td>
<td>43</td>
<td>14.0</td>
<td>36</td>
<td>11.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1342</td>
<td>437.9</td>
<td>1188</td>
<td>378.2</td>
</tr>
</tbody>
</table>

Source: I.S.P.L.N. Sección de Medicina del Trabajo y Epidemiología Laboral.
EpiNano (France)

Non-compensation-related system aimed at one type of exposure (nanoparticles)

Developed by the former French Institute for Public Health Surveillance (Institut de Veille Sanitaire, InVS), which is now part of Santé Publique France

Aims to develop an epidemiological surveillance system of workers likely to be exposed to engineered nanomaterials (ENM).

The researchers who perform the onsite visits are epidemiologists and industrial hygienists

Method and tool (the Onsite technical logbook) for exposure assessment

- Enables collection of all the information necessary to identify and characterise workstations that might cause occupational exposure to carbon nanotubes (CNT) or titanium dioxide (TiO2) nanoparticles, aggregates, and agglomerates
- Validated semi-quantitative method to characterise potential exposure to intentionally produced nanomaterials in different workstations

The objectives of the prospective cohort study are to monitor the medium- and long-term possible health effects of nanomaterial exposure and to enable further research
Fig. 4B Distribution of workstations according to the type of operation performed: workstations classified as concerned with exposure to carbon nanotubes or TiO2 nanoparticles, aggregates and agglomerates (n=30)
Occupational Health Warning Groups, initiated in 2008
Run by Santé Publique France (former L'Institut de veille sanitaire, InVS)

Aim to provide an epidemiologic response to unusual health events at workplaces and to alert of new/emerging work-related health risks and diseases

Enables reporting of any type of unusual health event at workplaces (clusters of cancers or other diseases, non-typical exposures, etc.) to the regional platform for monitoring and health emergencies, the ARS (Agences régionales de santé)

Covers all economic sectors in France including SME’s in 10 regions (2016)

ARS will carry out a validation and evaluation and if the signal seems unusual direct it to the Regional Epidemiological Units (CIRE - Cellules interrégionales d’épidémiologie), which mobilises the GAST group of experts.

These experts have one month to confirm the signal, raise an alert, initiate an investigation if necessary, and make a decision, if necessary, regarding any consequent prevention measures to be implemented
Overview of reports to GAST sorted by category 2008-2015

- Non-valid
- Other pathology
- Unusual exposure

Graph showing the distribution of reports by year and category.
HHE Program identifies chemical, biological or physical hazards at the workplace
Run by the National Institute of Occupational Safety and Health (NIOSH)

A priority of the program is to evaluate and identify new and emerging hazards

The program operates from two locations in the USA
Acts upon request of employers, employees or employee representatives, other public-sector agencies
Multidisciplinary teams comprise industrial hygienists, physicians, and other occupational health specialists (including epidemiologists, psychologists, engineers, and statisticians).

Responses to requests: written or oral consultations on technical matters, full-scale onsite investigations.

Written reports containing recommendations of evaluations are shared with employer and employee representatives at the worksite that is the subject of the investigation.
## NIOSH HHE Health Hazard Evaluations (USA)

<table>
<thead>
<tr>
<th>Year</th>
<th>Request and follow-up</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>New requests</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td>Exposures to Pharmaceutical Dust at a Mail Order Pharmacy</td>
<td>269</td>
<td>230</td>
<td>209</td>
<td>185</td>
<td>259</td>
</tr>
<tr>
<td>2012</td>
<td>Ergonomic and Safety Climate Evaluation at a Brewery</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2012</td>
<td>Legionnaires’ Disease at an Automobile and Scrap Metal Shredding Facility</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td>Evaluation of Sensitization and Exposure to Flour Dust, Spices, and Other Ingredients Among Poultry Breading Workers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td>Evaluation of Environmental Controls at four Homeless Shelters Associated with a Tuberculosis Outbreak – Florida</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>2014</td>
<td>Evaluation of Exposures and a Potential Hydrogen Sulphide Release Event at an Aircraft Engine Services Facility, West Virginia</td>
<td></td>
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</tr>
<tr>
<td>2014</td>
<td>Evaluation of Musculoskeletal Disorders and Traumatic Injuries Among Employees at a Poultry Processing Plant.</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>2014</td>
<td>Lead exposure at a firing range and gun store</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>Evaluation of Potential Employee Exposures to Mycobacterium tuberculosis at an Elephant Refuge</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>Evaluation of Occupational Exposures at Dry-Cleaning Shops using SolvonK4 and DF2000 (new solvents)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>Evaluation of Respiratory Health at a Syntactic Foam Manufacturing Facility</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>Evaluation of Heat Stress, Heat Strain, and Rhabdomyolysis during Structural Fire Fighter Training</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2016</td>
<td>HHEs of Electronic Waste Workers (2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2016</td>
<td>HHEs in Coffee Processing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td>Technical consultation</td>
<td>118</td>
<td>126</td>
<td>118</td>
<td>124</td>
<td>184</td>
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<tr>
<td></td>
<td>Field investigations</td>
<td>53</td>
<td>34</td>
<td>33</td>
<td>39</td>
<td>41</td>
</tr>
<tr>
<td></td>
<td>Publications and presentations</td>
<td>36</td>
<td>51</td>
<td>73</td>
<td>102</td>
<td>47</td>
</tr>
</tbody>
</table>
Labour Force Surveys (Ireland and UK)

Both LFSs have modules in their national surveys for collecting information on work-related ill health. These are active surveillance systems. They have similar design with data collection in three-month periods, through interviews with workers (randomly selected) in households.

Main purpose is to estimate incidence and prevalence of work-related injuries and WRDs

- Ireland: QNHS survey (Quarterly National Household Survey) is carried out by the Central Statistics Office (CSO) of Ireland, covering 3000 households weekly
- UK: Self-Reported Work-Related Illness (SWI), is carried out by the Office for National Statistics (ONS), covering 50,000 households each trimester

Individuals are asked whether they have suffered any illnesses or disabilities in the past 12 months that they believe were caused or aggravated by their work and on factors at work that may adversely affect mental well-being or physical health.

No further evaluation of work-relatedness of the health problems

The LFSs provide information on WRDs from the workers' perspective
Labour Force Surveys (Ireland and UK)

United Kingdom

Estimated rates of prevalence (total cases) and incidence (new cases) of stress, depression or anxiety caused or made worse by work among working people in last 12 months; source

Ireland

Work-Related injury and illness (%) by occupational group, 2010–2012 (pooled)
Selected systems for interview study

1) Compensation based with the “open list” approach: **SUVA (Switzerland)**
2) Comprehensive system for all WRDs: **MALPROF (Italy)**
3) Comprehensive systems including disease-specific schemes: **THOR (UK)**
4) Comprehensive system with data mining: **RNV3P (France)**
5) Sentinel system for all WRDs: **SIGNAAL (Belgium and the Netherlands)**
6) Sentinel systems for specific type of WRDs: **SENSOR Pesticides (USA)**
SUVA reporting system is a compensation-based system
Initially directed towards occupational accidents, ODs gradually introduced

Created to provide insurance to workers, but over time expanded to include preventive workplace activities and publication of national OSH statistical data

Reporting based on voluntary participation of all types of physicians
Data mainly from two sources: compensation claims and medical examinations (screening) of workers

Work-relatedness evaluation is performed by SUVA's OH experts
Possibility to include detailed workplace inspections with exposure assessments

Even though the criteria for recognising an OD and its compensation are strict, preventive actions triggered by a reported case are implemented regardless of fulfilment of these criteria.

Strong point: direct link between the collected data and prevention aimed at individual workers at their workplace, or at specific groups of workers at high risk
Nanopartikel und Gesundheit am Arbeitsplatz

In der Schweiz ist die Schweizerische Unfallversicherungsanstalt (Suva) für die Vermeidung von Berufskrankheiten in den Betrieben zuständig. Daher beschäftigt sich die Suva unter anderem auch intensiv mit dem Thema der Nanopartikel am Arbeitsplatz.

Der Suva-Film (2009) zeigt, wie bei der Firma Bühler AG Uzwil mit den Gefahren der Nanotechnologie umgegangen wird.

Fallzahlen 2014: total 2152 Berufskrankheiten

(Quelle: SSUV Unfallstatistik 2016)
MALPROF (Italy)

Non-compensation-based system maintained by the National Institute for Insurance against Accidents at Work (Istituto nazionale Assicurazione Infortuni sul Lavoro, INAIL)

Built on the mandatory reporting of WRDs required by Italian legislation

A wide network of local prevention centres (Azienda Sanitaria Locale, ASLs) oversee the collecting of data on any type of work-related health complaints

Physicians in the ASLs perform a thorough work-relatedness evaluation of cases and transfer the data into a national database maintained by the INAIL

Strong point: in-depth analysis of each reported case, not only in terms of causal relationship with work, but also with regards to the quality of the collected data, which often indirectly affects the certainty of the work-relatedness evaluation

MALPROF data are used to guide national and local preventive actions, develop OSH policies, identify high-risk groups of workers and identify new/emerging risks and WRDs
SIGNAAL (Belgium and the Netherlands)

SIGNAAL is an online non-compensation-based sentinel system in place since July 2013.

Result of co-operation between the Netherlands Centre for Occupational Diseases (NCvB), the Centre of Environment and Health of KU Leuven (Belgium) and Group IDEWE (a Belgian External Service for Prevention and Protection at Work).

Main goal is to detect new OH risks and new ODs.

OH physicians mainly report diseases they suspect to be caused by an employee’s occupation.

Strong point: every reported case is evaluated in a structured manner by at least two independent OH experts. The experts assess whether the case could be a WRD and whether it is a new OH problem.

After the assessment, the reporting physician receives an elaborated report. This report contains supportive literary research, the relevance to the job in question, and suggestions regarding the next steps in the course of action.
## Some of the reports since July 2013

<table>
<thead>
<tr>
<th>Description</th>
<th>Country</th>
<th>Work-related?</th>
<th>New combination?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open angle glaucoma and playing saxophone (teacher)</td>
<td>NL</td>
<td>Yes</td>
<td>Not new, relatively unknown</td>
</tr>
<tr>
<td>Achilles tendon rupture in the assembly, dismantling and maintenance of cranes</td>
<td>NL</td>
<td>Yes</td>
<td>Not new, relatively unknown</td>
</tr>
<tr>
<td>Back pain in the care of dementia patients without available lifting aids</td>
<td>NL</td>
<td>Possible</td>
<td>Not new</td>
</tr>
<tr>
<td>Endotoxin fever after cleaning a polluted drain with high pressure</td>
<td>NL</td>
<td>Yes</td>
<td>Not new, not described in this work setting</td>
</tr>
<tr>
<td>Nosebleeds and formaldehyde exposure in aluminium production</td>
<td>B</td>
<td>Yes</td>
<td>New</td>
</tr>
<tr>
<td>Pulmonary alveolar proteinosis and exposure to hairspray in a hairdresser</td>
<td>B</td>
<td>Yes</td>
<td>Not completely new, but described rarely</td>
</tr>
<tr>
<td>Name of scheme</td>
<td>Report in parties</td>
<td>Start date</td>
<td>End date (if applicable)</td>
</tr>
<tr>
<td>----------------------------------------------------------</td>
<td>------------------------------</td>
<td>------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>SWORD – Surveillance of Work-related and Occupational</td>
<td>Consultant chest physicians</td>
<td>1989</td>
<td>/</td>
</tr>
<tr>
<td>Respiratory Disease</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPIDERM – Surveillance of Work-related Skin Disease</td>
<td>Consultant dermatologists</td>
<td>1993</td>
<td>/</td>
</tr>
<tr>
<td>OPRA – Occupational Physicians Reporting Activity</td>
<td>OH physicians</td>
<td>1996</td>
<td>/</td>
</tr>
<tr>
<td>SIDAW – Surveillance of Infectious Diseases at Work</td>
<td>Consultant infectiologists</td>
<td>1996</td>
<td>/</td>
</tr>
<tr>
<td>OSSA – Occupational Surveillance Scheme for Audiological</td>
<td>Consultant audiologists</td>
<td>1997</td>
<td>2006</td>
</tr>
<tr>
<td>Physicians</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MOSS – Musculoskeletal Occupational Surveillance Scheme</td>
<td>Consultant rheumatologists</td>
<td>1999</td>
<td>2009</td>
</tr>
<tr>
<td>SOSMI – Surveillance of Occupational Stress and Mental</td>
<td>Consultant psychiatrists</td>
<td>1999</td>
<td>2009</td>
</tr>
<tr>
<td>Illness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>THOR-ENT - Occupational Surveillance of Otorhinolaryngological Disease</td>
<td>Otorhinolaryngologists</td>
<td>2005</td>
<td>2006</td>
</tr>
<tr>
<td>THOR GP – THOR in General Practice</td>
<td>General practitioners</td>
<td>2005</td>
<td>/</td>
</tr>
<tr>
<td>THOR-EXTRA</td>
<td>Reporting parties from all</td>
<td>/</td>
<td></td>
</tr>
<tr>
<td></td>
<td>other schemes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The Health and Occupation Research network THOR (UK)

THOR is maintained by the University of Manchester
Currently presents the main national OSH data source

In addition, THOR-EXTRA is the most recently implemented scheme that allows all reporting physicians to report interesting cases or WRDs with a potentially novel cause

Experts at the University of Manchester constantly assess and analyse the data reported to the THOR monitoring schemes

In addition to identifying incidences and trends in work-related ill health in the UK, the collected data are used in numerous other ways: dissemination to stakeholders, informing of policies and links with prevention, identification of new/emerging WRDs, evaluation of preventive actions in place, etc.

Data quality is constantly improved through the system’s various innovative features
The National Network for Monitoring and Prevention of Occupational Diseases (RNV3P) is a network for monitoring and prevention in OH. It is grouping together the 32 Occupational Disease Consultation Centres (CCPPs) in mainland France and a sample of OH services (SSTs) associated with the network (n=9).

This network aims to collect data from each consultation into a permanent national database on ODs (patient’s demographic data, diseases, exposures, business sector, and profession).

It is up to the network’s university hospital experts to investigate the diseases and attribute them, if necessary, to an occupational origin (this ‘expert’ causality is also registered in the database).

The RNV3P is not only a platform for dialogue between clinicians and other OH professionals, but also a production system that co-ordinates knowledge for the purposes of monitoring, improving knowledge and preventing occupational risks.
SENSOR is the first OSH surveillance system to be designed according to the sentinel approach. Initial goal was to provide information on any identified work-related health problems. Main reporting parties were physicians across the USA.

SENSOR Pesticide Program is the only remaining system of the initial SENSOR, which has retained its original name, whereas schemes for other WRDs developed into independent systems with different names.

Three main sources of data information: 1) the State Department of Agriculture; 2) Poison Control Centers; and 3) the Workers’ Compensation System.

Main strong points of the SENSOR Pesticides Program is the existence of a clear case definition; a detailed description of cases through numerous standardised variables; and a thorough assessment procedure of the reported cases, including classification of cases, determination of case severity, case investigation, and follow-up.

Usage of SENSOR data is closely related to the activities of the Environmental Protection Agency (EPA), which enables the necessary link with prevention and pesticide-related policy.
Visibility of the system: raise awareness on system, publish results

Motivation of reporting parties: simplification/automation of reporting, two-way communication and feedback, legal obligation, reward reporting

Exposure assessment: include exposure description in reporting, exposure assessment after the report, tools for more standardized reporting of exposure

Standardization and quality control: clear case definitions, clear coding system, training and guiding in coding, code control
Awareness and detection on new/emerging WRDs: raise awareness, publish on new/emerging health risks, offer expert help with establishing work-relatedness, low reporting threshold, data mining in existing databases

Different levels of links with prevention: collaboration with governmental bodies, contact with companies/sectors, follow-up and follow-back activities

Financial support and resources: linked to appraised importance by government, raise awareness, publish cases, demonstrate significance
Thank you for your attention!