Example of a national monitoring approach for work-related diseases, including diseases due to biological agents: rnv3p in France

("French occupational disease surveillance and prevention network")

Gerard Lasfargues, Isabelle Vanrullen on behalf of rnv3p
rnv3p: Main goals

- to search for new aetiologies and emerging risks
- to detect and describe occupational situations in France that involve health risks
- to provide a forum for clinicians and other occupational health professionals
- to work with the national health insurance fund (directorate for occupational risks) in defining priority actions for prevention or monitoring at the national or regional levels
- to guide choices in risk assessment and prevention, and to promote research
## rnv3p partners

| ![Anses Logo] | National Agency for Food, Environmental and Occupational Health & Safety *(rnv3p Network coordination)* |
| ![French Society of Occupational Medicine Logo] | French Society of Occupational Medicine *(all leaders/members of OD clinics belong to)* |
| ![Assurance Maladie Logo] | Health insurance for salaried workers «of the general regime» by its occupational risks department |
| ![MSA Logo] | Health Insurance for agricultural workers |
| ![RSI Logo] | Health Insurance for independant workers |
| ![INRS Logo] | Reference body for occupational health prevention |
| ![Santé publique France Logo] | National Public Health Agency *(includes previous InVS)* |
rnv3p organisation

- Steering committee (representatives of all partners)
- 2 Working Groups (Emergence; Methodology)
- Scientific board

+ Forum on the Information System
+ Coding school / club (once every 2 years)
+ General Assembly
Physician: occupational, specialist, GP

Question/ work-relatedness or work-fitness....

All cases since 2001

30 OD clinics located in the teaching Hospitals

+ Some OHS report all incident WRDs

Individual anonymized data at the national level

Patient / worker

symptoms or disease
rnv3p: yearly number of consultations

N = 384351

<table>
<thead>
<tr>
<th>Year</th>
<th>SST</th>
<th>CCPP</th>
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<tbody>
<tr>
<td>2001</td>
<td>16728</td>
<td>18511</td>
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<td>2002</td>
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<td>2003</td>
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<td>27459</td>
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<td>2008</td>
<td>28533</td>
<td>28532</td>
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<td>2009</td>
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<td>2011</td>
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<td>2012</td>
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<td>2013</td>
<td>30070</td>
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<tr>
<td>2014</td>
<td>30353</td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>31707</td>
<td></td>
</tr>
</tbody>
</table>
2015 activity report: some figures

**CONSULTATIONS**

<table>
<thead>
<tr>
<th>Total Number in the Whole Database</th>
<th>Mean Yearly Number</th>
<th>% of Work-Relatedness Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>384,351 consultations</td>
<td>25,623</td>
<td>53.8%</td>
</tr>
<tr>
<td>Don't novel consultations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean yearly consultations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% of work-relatedness assessment</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**PATIENTS**

<table>
<thead>
<tr>
<th>Total Number in the Whole Database</th>
<th>% of New Patients</th>
<th>Total Number of Work-Related Issues in the Whole Database</th>
</tr>
</thead>
<tbody>
<tr>
<td>236,426 patients</td>
<td>78%</td>
<td>232,983</td>
</tr>
<tr>
<td>Don't new patients</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% of new patients</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total number of work-related issues in the whole database</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Typology of work-related issues recorded in rnv3p by OD clinics vs. OHS in 2015

Figure 7: Répartition des nouveaux problèmes de santé au travail (PST) 2015 selon les premiers chapitres de la CIM-10

Dans les CCPP
- Maladies du système ostéo-articulaire, des muscles et du tissu conjonctif (M00-M99) + Syndrôme canal carpien (G56)
- Troubles mentaux et du comportement (F00-F99) + Surmenage (Z73.0) + Stress (Z73.3)
- Maladies de l'oreille et de l'apophyse mastoïde (H60-H95)
- Maladies de l'appareil respiratoire (J00-J99) + Dyspnée (R06) + Toux (R05)
- Maladies de la peau et du tissu cellulaire sous-cutané (L00-L99)
- Maladies de l'appareil digestif (K00-K93)
- Maladies de l'appareil circulatoire (I00-I99)
- Maladies du système nerveux (G00-G99) (sauf G56)
- Autres chapitres CIM-10
- Certaines maladies infectieuses et parasitaires (A00-B99)
- Maladies du sang et des organes hématopoïétiques et certains troubles du système immunitaire (D50-D89)
- Tumeurs malignes ou in-situ (C00-D99)
- Maladies de l'oeil et de ses annexes (H00-H59)
- Symptômes, signes et résultats anormaux d'examens cliniques et de laboratoire, non classés ailleurs (R00-R99)
- Tumeurs bénignes (D10-D48)
- Facteurs influant sur l'état de santé et motifs de recours aux services de santé (Z00-Z99) (sauf Z73.0, Z73.3)

Dans les SST

OD CLINICS
- MSD
- CANCER
- LUNG
- skin

OHS
- MSD
- STI
- 50%
rnv3p web-based information system (IS)
rnv3p database: information coded for each case

Information coded by administrative:
- Administrative data: Identification, GP, occupational physician, who referred, Entreprise, + addresses etc
- Consultation date, specific medical investigations...

Coded by the physician:
- Disease(s) (ICD-10)
- Activity sector (NAF code)
- Job (ILO code)
- Exposures (chemical, physical, biological, organizational and psychosocial) & circumstances of exposures (“TEP CODE”)
- Imputability (causality) for each exposure
- Free text zone
- -> all variables available for queries
Use of international codes when they exist
For example: diseases with ICD-10 coding
A French thesaurus for exposures & circumstances of exposure

Code: XXXXXXXX

1 - agent chimique inorganique
2 - agent chimique organique
3 - agent biologique
   31000000 - microbiologique
      31100000 - bacterie
      31200000 - champignon, moisissure
      31300000 - parasite
   31400000 - virus
      31410000 - adenoviride
      31420000 - arenaviride
      31430000 - astroviride
      31440000 - bunyavirus
      31450000 - calicivirides
      31460000 - coronaviride
      31470000 - filoviride
      31480000 - flaviviride
   31490000 - hepadnaviride
      31490100 - virus de l'hépatite b hbv vhb

31490200 - virus de l'hépatite d
31490300 - virus de l'hépatite du canard
31492200 - autre virus hepadnaviride
314A0000 - herpesviride
All kinds of exposures might be coded, including Psychosocial & Organisational Factors.
Work-related diseases (WRD) due to biological agents recorded by the rnv3p network
Main work-related diseases (ICD-10) due to exposure to biological agents

- Contact dermatitis, no other detail
- Irritant contact dermatitis
- Tuberculosis, without biological nor...
- Other chronical obstructive pulmonary...
- Hypersensitivity pneumonitis from...
- Rhinitis, pharyngitis, and chronic...
- Malignant tumour of the bronchi and...
- Allergic contact dermatitis
- Allergic rhinitis and chronic vasomotor...
- Asthma
Industry sectors with reported work-related diseases due to exposure to biological agents (NAF-08)

- Food industries: 400
- Health and social action: 364
- Farming, hunt, ancillary services: 258
- Retail trade and repair of household goods: 227
- Construction: 184
- Public administration: 159
- Recherche and development: 143
- Hotels and restaurants: 124
- Education: 100
- Services to buildings and landscape activities: 81
### Occupations related to the main work-related diseases due to exposure to biological agents (CITP-08)

<table>
<thead>
<tr>
<th>Rank</th>
<th>Occupation</th>
</tr>
</thead>
<tbody>
<tr>
<td>72</td>
<td>Skilled workers of metallurgy, mechanical construction, and assimilate</td>
</tr>
<tr>
<td>81</td>
<td>Fixed plant and machine operators</td>
</tr>
<tr>
<td>32</td>
<td>Intermediate health and social workers</td>
</tr>
<tr>
<td>52</td>
<td>Service and sales workers</td>
</tr>
<tr>
<td>71</td>
<td>Building and related trades workers, excluding electricians</td>
</tr>
<tr>
<td>51</td>
<td>Direct services and support to individuals</td>
</tr>
<tr>
<td>31</td>
<td>Technicians and associate professionals of sciences and engineering science</td>
</tr>
<tr>
<td>91</td>
<td>Domestic helpers</td>
</tr>
<tr>
<td>61</td>
<td>Farmers and skilled workers of commercial farming</td>
</tr>
<tr>
<td>75</td>
<td>Food, wood, clothing and other occupations concerning industry and handicap</td>
</tr>
</tbody>
</table>

The numbers represent the frequency or impact of these occupations in relation to work-related diseases caused by biological agents.
Biologicals agents associated with the main WRD (Occupational Exposure Thesaurus)

- Plant material
- Invertebrate
- Fungi
- Vertebrate
- Bacteria
- Parasite
- Miscellaneous

WRD - Weak imputability
WRD - Middle imputability
WRD - High imputability
rnv3p’s approach for the detection, investigation and handling of potentially new WRD
Searching for new work-related diseases

1. Definition: a potential new WRD is...

- Either a **NEW COUPLE** associating a well defined **DISEASE** to a well documented **EXPOSURE**
  - (NEW means scientific literature is «silent » or non conclusive, whereas there seem to be a rather strong evidence for the expert)

- Or a **NEW TRIO** « Disease x Exposure x Occupational setting »
  - means a couple disease x exposure *already known in the literature*, but observed in a different occupational setting

2. A 3-step methodology was elaborated

- **Detection**
- **Investigation**
- **Action**
DETECTION

= SUSPICION OF NEW PAIRS /NEW TRIOS THROUGH:

« CLINICAL EMERGENCE »

= Suspicion of NEW WRD by a physician of a rnv3p OD clinic

DATA MINING

Data Mining of rnv3p database with disproportionality metrics...

+ EXTERNAL SOURCES identifying new WRD

Publications (bibliographic watch), Modernet, NIOSH...

Search for similar cases in rnv3p (create new codes if relevant) + OD clinics information
2 APPRAISAL of a new couple or new trio by the “Emergence” WG

• For each case
  • Confirmation of diagnosis
  • Coding of Severity (S)
  • Discussion about Exposure
  • Coding of Imputability (I)
    (= intrinsic and extrinsic attributability)

• For each pair or trio (composed of 1 to n validated cases)
  • Attribution of an ‘emergence score’
  • (= sum of individual cases)

Several algorithms have been tested on previous new WRD (PubMed).
Cf rnv3p scientific report
Clinical emergence: Asthma among coffee-machines maintenance workers due to the fungus *Chrysonilia Sitofila*

- Number of RNV3P cases: $n=2$
- Calculated **work-attributability** for each case: \(I_4\) (Specific IgE)
- Acute severity for each case: \(S_1\)
- Emergence score: $2 \times 27 = 54$ : transitional zone
- Bibliography: High Extrinsic Imputability
  - C. Sitofila already an asthma risk factor in woodworkers
  - cases published at the same time in Spain and Italy

**ACTION:** large dissemination, and back to prevention with activity sector
Selection of variables to identify the corresponding couples. For example, disease « X » to identify all couples exposure - disease « X ».

Free text zone for each case of the couple identified.

Number of cases per couple.

Sorting of the couples according to the disproportionality measure.

rnv3p data mining software.

OD clinics which reported such cases.
Example Bibliographic Watch: New WRD related to artificial stones

Artificial Stone Silicosis

Disease Resurgence Among Artificial Stone Workers

Mordechai R. Kramer, MD, FCCP; Paul D. Blanc, MD, MSPH, FCCP;

Outbreak of silicosis in Spanish quartz conglomerate workers

Aránzazu Pérez-Alonso¹, Juan Antonio Córdoba-Doña²,³,

Exposição a altos níveis de Sílica e ocorrência de Silicose – novas roupagens de um velho problema
3 GRADUATED (+) ACTIONS
according to decisional algorithm

LEVEL 0  no action

LEVEL 1  Information to OD clinics (only)

LEVEL 2  + search for similar cases outside the network
+ exchanges with some rnv3p partners

Transitional zone: LEVEL 2 or 3 according to bibliography (ie for toxicological issues: biological plausibility, animal data, etc)

LEVEL 3: + wide dissemination / necessary actions to be taken

For admissible cases: Tracability and tracking of alerts + optimization of thesaurus if necessary
Summary of the rnv3p approach for detection and handling of new WRD

1. DETECTION
   - CLINICAL EMERGENCE
   - DATA MINING
   - EXTERNAL SOURCES
     - IDENTIFYING NEW WRD
     - search for similar cases in the database
     - information of OD clinics
   - SUSPICION OF NEW PAIRS / NEW TRIOS

2. APPRAISAL
   - Transparency and reproducibility in the decision process
   - Analysis of each case: diagnosis, severity, exposure, intrinsic and extrinsic attributability, search for similar cases in the database, conclusion
   - For each pair or trio: attribution of an ‘emergence score’

3. GRADUATED ACTIONS according to decisional algorithm
   - LEVEL 0
     - No action as cases not relevant
   - LEVEL 1
     - Information to OD Clinics only
   - LEVEL 2
     - Search for similar cases outside rnv3p
   - LEVEL 3 Dissemination
     - optimization of thesaurus if necessary + traceability
Conclusions

• rnv3p = network of French OD clinics with strong Anses support
• rnv3p’s information system offers a « real-time database » available for queries anytime by all OD clinics
• rnv3p’s database includes today more than 250,000 individual cases of work-related issues recorded (mostly WRD but also work-fitness issues)
• a procedure was set up in order to facilitate the identification and investigation of new WRDs
• longstanding cooperation with Modernet’s actors. Among the projects: sharing expertise with EU colleagues through a web-based platform, « OccWatch »