Sentinel systems in occupational health and detection of new occupational diseases

The history of the relationship between health and work is punctuated by the description of new diseases, which then raise questions about their prevalence and incidence, primary prevention (identification and consideration of their risk factors), secondary prevention (screening and diagnosis), and possible recognition under occupational disease regulations.

The number of people affected by diseases that have only recently been linked to work (or whose link to work had not previously been demonstrated) is related to three different time factors: 1) the time needed to formulate the hypothesis that a given exposure constitutes a risk of inducing a disease, 2) the time needed to substantiate this hypothesis if necessary (experimental studies, epidemiology, risk assessment), 3) the time needed to take the risk into account and implement effective preventive measures. Actions that identify early relevant signals should therefore help reduce more effectively the number of diseases associated with emerging occupational risks.

Over the last decade, the issue of emerging occupational health risks has regularly been on the agenda of the European Union's occupational health strategy [1,2]. This has enabled the European Agency for Safety and Health at Work (EU-OSHA) to set up an observatory on emerging risks. For several years, this observatory has been advocating an a priori approach working on the drivers of emergence, such as globalisation and its consequences, new technologies (e.g. nanoparticles), emergence of the green economy ("green jobs"), or more recently additive manufacturing ("3D printing"), surveillance technologies in the workplace, etc. Relying on expert forecasts commissioned by EU-OSHA, this observatory considers emerging risks to be those that are both new and whose importance increases over time. The concept of "new" is quite broad and includes psychosocial risks and musculoskeletal disorders. This approach is ill-equipped to accurately predict the emergence of new diseases, and is certainly unable to identify them.

In addition to this first essential risk-based approach, therefore, another approach should be developed that focuses primarily on investigating the occupational origin of certain diseases that seem to be associated with new occupational settings. This approach, based on sentinel and alert systems, has been promoted by the European Modernet network, one of whose most active partners in this area is the National Network for the Monitoring and Prevention of Occupational Diseases (RNV3P), run by ANSES. The RNV3P has the most extensive experience in developing an approach to detecting, assessing and taking into account emerging risks, and has been leading the discussions on the subject within Modernet. The RNV3P's approach, detailed in its 2014 scientific report [3,4], consists of three stages: signal detection, expert appraisal and action. The detection of suspected emerging cases is based on: 1) either the reporting by clinicians of diseases that seem to reveal new risks, 2) or the identification, by statistical non-targeted data mining methods applied to the RNV3P database (containing more than 250,000 observations), of similar cases that are not known to be occupational diseases, 3) or lastly, by literature monitoring (as in the situation of silicosis related to the machining of new types of quartz surface materials, presented in the previous issue of Vigil'Anses) [5]. After undergoing expert appraisal, the situations are then analysed using a three-dimensional algorithm (severity1, causality and number of cases). This enables the type of action to be taken to be defined in a transparent and reproducible manner. Out of nearly 50 situations investigated to date, four have led to national alerts [6-9].

EU-OSHA commissioned and supervised a summary of the sentinel and alert networks working to identify new occupational diseases, the first volume of which has been available on the EU-OSHA website since late August 2017. This is a review of the systems for collecting occupational diseases, or suspected occupational diseases, identified at the international level.

A total of 75 systems from 26 countries were identified. Of these, 22 are linked to a reporting process with a view to redress/compensation, 16 of which are at least partially open to non-listed diseases in a restrictive manner and which could therefore, theoretically, be used to identify new diseases. On the other hand, 34 other systems are designed for the epidemiological monitoring of certain families of diseases (e.g. respiratory diseases), usually without any expert appraisal of occupational causality, which may limit their ability to identify new work-related diseases.

Only 12 "sentinel" systems were identified, whose objective is to highlight situations requiring intervention or even alerts. Four of these systems are capable of identifying new occupational diseases of any kind.

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1. Estimated severity according to the Poison Severity Score (PSS)

These include the new SIGNAAL system to enable field occupational physicians in the Netherlands and Belgium to report suspected new occupational hazards, and the US SENSOR (Sentinel Event Notification System on Occupational Risks), which is only currently in operation for effects attributed to pesticides. The second volume of EU-OSHA's review, which should be available soon, is a qualitative study of 12 of these systems, three of which are French: the RNV3P run by ANSES, as well as the occupational health alert groups (GASTs) and the EpiNano cohort run by *Santé Publique France*. Other systems are detailed, including the Norwegian RAS sentinel system, which is unique in that it is led by the labour inspectorate and directly linked to a response in the field.

The way these systems assess occupational exposure and ensure feedback to assist with prevention are also compared.

Lastly, this work highlights the importance of international cooperation. In this regard, ANSES developed for the Modernet consortium the prototype of a tool enabling partner occupational disease experts to share anonymised cases of suspected new diseases online, in order to conduct joint expert appraisals (OccWatch platform). The report welcomed this as an opportunity. The platform, funded and supervised by ANSES, will be available on 1 January 2018.

In conclusion, several European initiatives are coming together to help identify new occupational diseases. These initiatives are not yet as well structured and permanent as the well-established pharmacovigilance and toxicovigilance schemes, but are likely to become so, and should improve responsiveness to emerging health issues likely to affect workers.

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