Registries of occupational diseases and their use for preventive policy
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Chapter 5

Sentinel surveillance of occupational diseases: a quality improvement project

Abstract

**Background:** Occupational diseases are generally underreported. The aim of this study was to evaluate whether a sentinel surveillance project comprising motivated and guided occupational physicians would provide higher quality information than a national registry for a policy to prevent occupational diseases.

**Methods:** A group of 45 occupational physicians participated in a sentinel surveillance project for two years. All other occupational physicians (n=1,729) in the national registry were the reference group. We compared the number of notifications per occupational physician, the proportion of incorrect notifications, and the overall reported incidence of occupational diseases.

**Results:** The median number of notifications per occupational physician during the project was 13.0 (IQR, 4.5-31.5) in the sentinel group versus 1.0 (IQR, 0.0-5.0) in the reference group (p<0.001). The proportion of incorrect notifications was 3.3% in the sentinel group and 8.9% in the reference group (p<0.001). The overall reported occupational disease incidence was 7 times higher (RR = 6.9, 95%CI: 6.5-7.4) in the sentinel group (466 notifications per 100,000 employee years) than in the reference group (67 notifications per 100,000 employee years).

**Conclusions:** A sentinel surveillance group comprising motivated and guided occupational physicians reported a substantially higher occupational disease incidence and a lower proportion of incorrect notifications than a national registry.
Introduction

Exposure to occupational health risks accounts for a significant proportion of the burden of diseases – a burden that could be substantially reduced through the application of proven risk-prevention strategies (1). Information about the incidence and distribution of occupational diseases is essential for preventive policy. Registries of occupational diseases are only one source, but mostly an authoritative one, of policy information.

As in the United States, most of the 27 EU countries maintain one or more registries of occupational diseases. Although these registries are mainly based on cases recognized in compensation systems related to social security legislation, the majority of registries also have the ambition to provide information for preventive policy (2-5). Only a limited number of registries are set up primarily to gather information for preventive policy, such as SENSOR in the US (6), THOR in the UK (7) and the Dutch National Registry (8). A point of debate is whether it might be better for the registration of occupational diseases to rely on health surveillance systems rather than on financial compensation schemes. Such a shift of approach might better support policymakers in their task to set priorities for prevention and research and to monitor whether preventive policy is effective (9,10).

There are large differences between the statistics on occupational diseases in the different EU countries. Although a European list of occupational diseases has been developed for the purposes of harmonization, the effectiveness of the list is limited (11). A number of reasons may explain this limited effectiveness, such as substantial differences in diagnostic guidelines and criteria for notification, and, more generally, in culture, legislation and social security regulations (2). One important aspect is the large variation in the degree of assumed underreporting of occupational diseases (12). For example, the incidence of all occupational diseases in Greece was 3.4/100,000 employee years in 2001 (13), while the incidence in Finland was 200/100,000 employee years in 2002 (14). By comparison, the mean incidence in the 15 EU countries in 2001 was an estimated 37/100,000 employee years (15). An overview of the different registries in Europe can be found on the website of the European Agency for Safety and Health at Work and in the European Health and Safety Database (HASTE) (16,17).

The reliability of most national incidence figures of occupational diseases is considered to be poor due to underreporting (18). This is caused by several factors, such as limited knowledge of occupational diseases in the working population, employees’ fear of reporting illness to supervisors or
physicians, limited access to medical care, impaired recognition by physicians and limited notification (12, 19). Since registries form an important source of information for policy makers, enhancement of completeness and quality can improve appropriate decision-making in preventive policy in Europe.

During the period in which this study was carried out, all companies in the Netherlands with at least one employee became legally obliged to have a contract with an occupational health service (OHS) and, therefore, nearly all employees had access to an occupational physician (20). Since 1999, OHS’s are obliged by law to notify occupational diseases but, in practice, it is occupational physicians who do the reporting. The Dutch government has appointed the Netherlands Center for Occupational Diseases (NCOD) as the institute responsible for the national registry. Since there is no compensation scheme for occupational diseases in the Netherlands, such diseases are notified only for preventive purposes.

Each year since 2000, about 6,000 notifications have been received and accepted by the NCOD; however, there are several indications of a considerable underreporting. For example, whereas the incidence of occupational dermatitis was estimated at 13,000 cases per year in the Netherlands (21), which corresponds to the incidence figures mentioned in the scientific literature (22), the actual number of notifications of occupational dermatitis by occupational physicians in the national registry is only about 250 per year. Another example is the number of notifications of occupational asthma in the national registry, which is about 15 times lower than would be expected on the basis of registrations of occupational asthma in several other countries that have assumed similar levels of relevant exposures at work (23).

Since most countries experience underreporting, projects to improve notification have been set up in various countries mostly for specified categories of occupational diseases (24,25). The results of these projects suggest that it is possible to obtain more reliable information on the incidence and distribution of occupational diseases from a sample of motivated and guided occupational physicians. We therefore decided to launch a sentinel surveillance project in the Netherlands. We began by recruiting motivated occupational physicians in 2002. The participants were urged to report every occupational disease they recognized in their practice over a two-year period. When necessary, we asked them for additional information about certain cases. We offered this group supplementary training and feedback on their notifications.
The aim of our study was to assess whether selecting motivated occupational physicians and providing them with supplementary training and feedback would increase the number and quality of notifications. We therefore formulated three research questions: 1) Do occupational physicians in the sentinel group notify occupational diseases more frequently than those in the reference group of all other occupational physicians in the national registry? 2) Is the proportion of incorrect notifications from the sentinel group different from the proportion of incorrect notifications from the reference group? 3) What is the difference between the estimated incidence of various occupational diseases reported by the sentinel group compared to the reference group, and does this difference vary across economic sectors?

Since underreporting is widely acknowledged to be a key problem, we considered the results provided by the sentinel group as being higher quality information for preventive policy if: a) the estimated overall incidence of occupational diseases was higher than that reported by the reference group, b) the number of notifications per occupational physician was higher than in the reference group and c) the proportion of incorrect notifications was lower than in the reference group.

Materials and Methods

Participants:

We recruited occupational physicians by placing announcements in the NCOD Newsletter, which is sent to all occupational physicians in the Netherlands. Participants in the sentinel group had to register themselves actively and agree to participate for at least one year in the two-year project. We designated the participants as motivated physicians, because they were prepared to attend the meetings and to do the extra administrative work required in the project. Moreover, most of the motivated physicians were already active reporters of occupational diseases. Accredited education and training were offered as an incentive for participation. All other occupational physicians in the Netherlands who could notify occupational diseases to the national registry served as a reference group (26).
We started the project January 2003 and urged participating occupational physicians to report every occupational disease they recognized in their practice over a two-year period. When necessary, we asked them for additional information about particular cases. We offered this group supplementary training and feedback on their notifications. After an introductory meeting in November 2002, in which the aim and the procedures of the project were explained, we organized four voluntary courses on the diagnostics of occupational diseases. The courses were in March, June, September and December 2003, and the topics were work-related psychiatric disorders, musculoskeletal disorders, skin diseases and respiratory diseases. We provided regular feedback by means of a special quarterly newsletter for the participants. Consultation of the help desk of the NCOD was promoted. The project continued through December 2004.

We asked the physicians in the sentinel group to provide information about the number of employees in the population covered and the distribution by economic sector at the start of the project, after one year, and at the end of the project. If occupational physicians did not reply, we imposed a ‘model population’ derived from the distribution by economic sector for the total Dutch workforce in 2002. We categorized the economic sectors according to the classification of the Netherlands Central Bureau of Statistics (27).

The total population size served by the sentinel group was 108,315 employees, while that of the reference group was 6,049,685 employees. To calculate the population size for the reference group, we used statistics on the Dutch workforce in 2002 provided by the CBS (28) and subtracted the population size of the sentinel group from the total workforce.

**Measurements:**

Physicians in the sentinel group used the notification form as prescribed by the national registry for all occupational physicians. The form includes the following items: name and code of the OHS and of the physician; date of notification; patient file number; sex and year of birth of the patient; occupation and economic sector; ICD-10 code and description of diagnosis; causes; pre-existent medical conditions; degree of certainty of diagnosis; the occupational healthcare activities associated with the diagnostic assessment of the occupational disease; the advice given.
Notifications from the sentinel group were processed in the same way as notifications under the regime of the national registry are processed. According to the Quality Handbook for the Dutch National Registry, the judgment of the correctness of a notification is a two-step procedure. First, an automatic filter check is carried out to establish whether all obligatory fields have been filled in; second, a quality judgment is made by an expert team comprising two experts in occupational diseases and two staff members of the registration office (29). If notifications are incomplete, the notifying physician is asked by email to complete the report. If the physician still does not complete the report after this request, the notification is considered as incorrect. We considered fewer incorrect notifications as a valid indication of a better quality of notification.

We analyzed the number of notifications and the proportion of incorrect notifications in the two years preceding the project for both the sentinel and the reference group in order to assess differences between the groups in the period before the intervention and changes in reporting behavior over time.

Statistical analysis:

We determined the median number of notifications per physician and the interquartile ranges (IQR) in both groups over the project period and over the preceding two years. Median numbers of notifications were used, since the distribution was skewed.

We used a Mann-Whitney U test to test the differences in the median number of notifications between the sentinel group and the reference group both during the study period and in the two preceding years. The differences in median number of notifications within the sentinel group and within the reference group between the project period and the two preceding years were tested with a Wilcoxon Signed Rank test. Further, we tested the difference in proportions of incorrect notifications between the sentinel and the reference group both during the project period and in the two preceding years with a chi-square test. For both the sentinel and the reference group, the differences in proportions of incorrect notifications between the project period and the preceding period were tested with the chi-square test.
We defined physicians who notified more cases than the mean plus two standard deviations as outliers. Since we do not know what motivates physicians to report considerably more cases than average, we checked whether excluding outliers made a difference to the results.

We calculated the incidence in both groups and the rate ratio with a 95% confidence interval for all occupational diseases and separately for the six most frequent categories of occupational diseases in four different economic sectors. We selected the six most frequently notified occupational diseases, namely: 1) occupational diseases of the upper limb, 2) occupational adjustment disorder, 3) post-traumatic stress disorder (PTSD), 4) work-related asthma, 5) occupational contact dermatitis, and 6) occupational hearing loss. Adjustment disorders (DSM-IV definition) are maladaptive reactions to identifiable psychosocial stressors. They are manifested by either impairment in social or occupational functioning or by symptoms (nervous exhaustion, nervous breakdown, surmenage, depressive thoughts etc.) that are in excess of a normal and expected reaction to the stressor. The presence of depressive disorders and anxiety disorders, for example, has to be excluded.

We selected the four largest economic sectors in terms of number of employees, that is, industry, repair and trade, business services, and healthcare and welfare. The repair and trade sector comprises the trade in and repair of cars and motorcycles, the wholesale business, and retail trade and repair for private persons. The business services sector comprises the rental of and trade in real estate, vehicles and machines, as well as agencies for computer service and information technology.

SPSS 11.5 was used for the statistical testing. We calculated rate ratios and 95% confidence intervals according to Rothman and Greenland (30).
Results

The sentinel group was comprised 45 occupational physicians, the reference group of 1729 occupational physicians. Both the population of workers covered by the sentinel group and that covered by the reference group formed a representative sample of Dutch workers. The populations of both groups were similar except for the repair and trade sector, which was represented relatively more in the reference group than in the sentinel group.

Twenty-four occupational physicians (64%) in the sentinel group attended one or more of the supplementary training courses. During the study period, the sentinel group notified 1,009 cases and the reference group 8,118 cases. Figure 1 shows the proportion of occupational physicians by notification frequency in the sentinel group and in the reference group. The median number of notifications in two years per occupational physician in the sentinel group was 13.0 (IQR 4.5-31.5) while the figure for the reference group was 1.0 (IQR 0.0-5.0), which is a statistically significant difference (Mann-Whitney U test: p<0.001).

One notifying occupational physician notified 197 cases in two years, and was, therefore, identified as an exceptional outlier in the sentinel group. In the reference group, 28 occupational physicians were identified as outliers: together they notified 2,003 cases in two years (range: 36 – 535 cases). Without the outliers, the median number of notifications in two years per occupational physician in the sentinel group was 12.5 (IQR 4.25-29.75) compared to 1.0 (IQR 0.0-5.0) in the reference group, which is a statistically significant difference as well (Mann-Whitney U test: p<0.001).

In the two years preceding the project, the median number of notifications per occupational physician in the sentinel group was 13.0 (IQR 1.0-26.0) compared to 2.0 in the reference group (IQR 0.0-5.5) (Mann-Whitney U test: p<0.001). The differences within the sentinel group and the reference group in the project period compared to the two preceding years were not statistically significant (Wilcoxon Signed Rank test: p = 0.406 and p = 0.478 respectively).
Figure 1: Proportion of physicians by number of notifications in the project period

<table>
<thead>
<tr>
<th>Number of notifications</th>
<th>Sentinel group</th>
<th>Reference group</th>
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<tbody>
<tr>
<td>0</td>
<td></td>
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<tr>
<td>1-5</td>
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<tr>
<td>6-10</td>
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<td>11-15</td>
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<td>16-20</td>
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<td>21-25</td>
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<td>26-30</td>
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<td>31-35</td>
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<td>36-40</td>
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<tr>
<td>41-45</td>
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<tr>
<td>46-50</td>
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<td>&gt;50</td>
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</tbody>
</table>

Proportion of physicians
In the sentinel group, 3.3% of the notifications were judged as incorrect according to the requirements of the Quality Handbook of the Dutch National Registry. For the reference group, this figure was 8.9%, a statistically significant difference (chi-square test: p<0.001). Excluding the outliers, 4.0% of the notifications were judged as incorrect in the sentinel and 9.8% in the reference group, a statistically significant difference (chi-square test: p<0.001). In the subgroup of the sentinel group that followed the supplementary training, the proportion of incorrect notifications was only 2%.

In the two preceding years, the proportion of incorrect notifications was 6.8% in the sentinel group compared to 8.8% in the reference group (chi-square test: p>0.05). The difference between the project period and the preceding period was statistically significant in the sentinel group (chi-square test: p<0.01), but not in the reference group (chi square test: p>0.1).

Table 1 shows the incidences of reported occupational diseases per 100,000 employee years for both the sentinel group and the reference group as well as the rate ratios with confidence intervals. The incidence of all occupational diseases was 466/100,000 employee years (95% CI: 438-495) in the population of the sentinel group and 67/100,000 employee years (95% CI: 66-69) in the population of the reference group. Without the outliers in both groups, the incidence in the sentinel group was 375/100,000 employee years (95% CI: 350-401) and in the reference group 51/100,000 employee years (95% CI: 49-52), which represents a rate ratio of 7.4 (95% CI: 6.9-8.0).

When we excluded the outliers in both groups, the rate ratios for PTSD and occupational hearing loss changed significantly. Without the outliers, the rate ratio for PTSD was 4.9 (95% CI: 3.1-7.7) compared to 11.3 (95% CI: 8.5-15.1) with the outliers included. Without the outliers, the rate ratio for occupational hearing loss was 6.2 (95% CI: 5.0-7.7) compared to 3.1 (95% CI: 2.5-3.8) with the outliers included.
Table 1: Incidence of reported occupational diseases per 100,000 employee years for the sentinel group and for the reference group. Rate ratio of reported incidences in the sentinel versus the reference group, national registry in the Netherlands

<table>
<thead>
<tr>
<th></th>
<th>Sentinel group</th>
<th>Reference group</th>
<th>RR</th>
<th>(95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N= 108,315</td>
<td>N= 6,049,685</td>
<td></td>
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<tr>
<td></td>
<td>IR</td>
<td>IR</td>
<td></td>
<td>(95% CI)</td>
</tr>
<tr>
<td>All occupational diseases</td>
<td>466</td>
<td>67</td>
<td>6.9</td>
<td>(6.5 - 7.4)</td>
</tr>
<tr>
<td>Occupational diseases of the upper limb</td>
<td>169</td>
<td>19</td>
<td>9.0</td>
<td>(8.0 - 10.0)</td>
</tr>
<tr>
<td>Occupational adjustment disorders</td>
<td>109</td>
<td>16</td>
<td>6.8</td>
<td>(5.9 - 7.8)</td>
</tr>
<tr>
<td>Post Traumatic Stress Disorder</td>
<td>25</td>
<td>2</td>
<td>11.3</td>
<td>(8.5 - 15.1)</td>
</tr>
<tr>
<td>Work-related asthma</td>
<td>1</td>
<td>&lt;&lt;1</td>
<td>3.5</td>
<td>(1.1 - 11.2)</td>
</tr>
<tr>
<td>Occupational contact dermatitis</td>
<td>15</td>
<td>3</td>
<td>5.6</td>
<td>(3.9 - 8.1)</td>
</tr>
<tr>
<td>Occupational hearing loss</td>
<td>43</td>
<td>14</td>
<td>3.1</td>
<td>(2.5 - 3.8)</td>
</tr>
<tr>
<td>Other occupational diseases</td>
<td>103</td>
<td>13</td>
<td>8.1</td>
<td>(7.0 - 9.3)</td>
</tr>
</tbody>
</table>

N = number of employees in the population under surveillance. IR = incidence density rate. 95%CI = 95% confidence interval. RR= rate ratio.

Table 2 shows the incidences of the six selected categories of occupational diseases for the four selected economic sectors for both groups and the rate ratios with confidence intervals.
The incidence of reported occupational diseases per 100,000 employee years by economic sector for the sentinel (N=45) and reference group (N=946,319). The ratio of reported incidences in the sentinel versus reference group. 95%CI = 95% confidence interval. N = number of employees in the population surveillance. IR = Incidence Density Rate. - = no RR possible due to empty cells.

<table>
<thead>
<tr>
<th>Industry</th>
<th>Repair and trade</th>
<th>Business services</th>
<th>Healthcare and Social services</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Sent. group</td>
<td>Ref. group</td>
<td>Sent. group</td>
</tr>
<tr>
<td></td>
<td>N= 19,681</td>
<td>N= 946,319</td>
<td>N= 7,002</td>
</tr>
<tr>
<td>IR</td>
<td>IR RR (95% CI)</td>
<td>IR IR RR (95% CI)</td>
<td>IR IR RR (95% CI)</td>
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<tr>
<td>358</td>
<td>28</td>
<td>12.8 (10.6-15.4)</td>
<td>300</td>
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<tr>
<td>175</td>
<td>15</td>
<td>12.0 (9.2-15.6)</td>
<td>50</td>
</tr>
<tr>
<td>25</td>
<td>1</td>
<td>30.1 (13.6-66.2)</td>
<td>93</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>2.3 (0.3-17.0)</td>
<td>0</td>
</tr>
<tr>
<td>33</td>
<td>6</td>
<td>5.1 (2.9-9.1)</td>
<td>21</td>
</tr>
<tr>
<td>150</td>
<td>26</td>
<td>5.8 (4.4-7.6)</td>
<td>7</td>
</tr>
<tr>
<td>188</td>
<td>16</td>
<td>12.0 (9.3-15.5)</td>
<td>150</td>
</tr>
<tr>
<td>932</td>
<td>92</td>
<td>10.1 (9.0-11.3)</td>
<td>621</td>
</tr>
</tbody>
</table>

Due to rounding off the figure for all occupational diseases sometimes differ from the sum of the figures in the same column.
The rate ratio of the incidence in the sentinel group and the reference group for the industry sector was 10.1 for all occupational diseases, 30.9 for the repair and trade sector, 3.9 for the business services sector and 4.9 for the healthcare and welfare sector. The rate ratio for all occupational diseases was significantly higher in the repair and trade sector than in each of the other three economic sectors. The rate ratio for all occupational diseases was significantly higher in the industry sector compared to the business services sector and the healthcare and welfare sector. Without the outliers, the difference in rate ratios for all occupational diseases between the economic sectors remained statistically significant. The outlier in the sentinel group was responsible for 45% of the notifications in the repair and trade sector. Without the outliers, in the sentinel group the overall incidence in the repair and trade sector was 414/100,000 rather than 621/100,000 employee years, which represents a rate ratio of 23.7 (95% CI: 17.5-32.3).

For all disease categories, the reported incidence rate was higher in the sentinel group than in the reference group. For some diseases, this difference was even more pronounced in certain economic sectors, as expressed in a significantly higher rate ratio. The rate ratio for occupational diseases of the upper limb between the project and the reference group was significantly higher in the repair and trade sector than in the other economic sectors. The rate ratio for occupational diseases of the upper limb was also higher in the industry sector compared to the business services sector and the healthcare and welfare sector. Without the outliers, the difference in rate ratios for occupational diseases of the upper limb between the economic sectors remained statistically significant.

The rate ratio of occupational adjustment disorders was significantly higher in the industry sector compared to the business services sector and the healthcare and welfare sector. The rate ratio of occupational adjustment disorders in the repair and trade sector was significantly higher than in the healthcare and welfare sector. Without the outliers, the difference in rate ratios between the industry sector compared to the business services sector and the healthcare and welfare sector remained statistically significant, while the difference in rate ratios between the repair and trade sector and the healthcare and welfare sector was no longer statistically significant.

In the repair and trade sector, the rate ratio for PTSD was 111.4, which is significantly higher than in the business services sector and the healthcare and welfare sector. The rate ratio for PTSD in the industry sector was significantly higher than in the healthcare and welfare sector. The outlier in the
sentinel group notified 35 of the 55 cases of PTSD (64%). All cases of PTSD in the sentinel group in the repair and trade sector, the business services sector and the healthcare and welfare sector were notified by the outlier. Without the outliers, the rate ratio of PTSD in the industry sector was 13.1 (95% CI: 3.7-47.0).

Discussion

The median number of notifications per occupational physician was 13 in the sentinel group versus 1 in the reference group. The number of incorrect notifications in the sentinel group was three times lower than in the reference group. Compared to the two preceding years, the sentinel group did not notify significantly more cases, although the quality of notification improved significantly. The overall incidence of occupational diseases as reported by the sentinel group was about seven times higher than by the reference group. For diseases of the upper limb, the difference was even larger, suggesting a differentiation in underreporting in the national registry. On the basis of these results, we conclude that this notification project led to the provision of more notifications per employee-year and that the notifications were of better quality than those in the national registry.

A strength of the study is that we knew both the denominator and the distribution over economic sectors in the source population of the sentinel group. The choice of denominator determines to a considerable extent the outcome of calculations of incidences (31). Information from surveys of the national workforce is often used as the denominator in the calculation of incidences for occupational diseases (32). Determining the population by adding up the populations of the participating occupational physicians might lead to a more precise determination of the source population than would be obtained by, for example, using surveys of the work population.

An advantage of using a sentinel group is the possibility to instruct and train the occupational physicians more intensively and to give them personal feedback. The results of our study suggest that the initial higher motivation provides a higher number of notifications per occupational physician and that better guidance can improve the quality of notifications. This study provided an exceptional
opportunity to include all the notifying occupational physicians of one country, rather than having to select a reference group.

A limitation of the use of a sentinel group to monitor occupational diseases is the risk that rare cases and cases restricted to a certain area, economic sector or occupation might be overlooked or overestimated due to their smaller numbers or uneven distribution. A national registry provides the chance to detect and investigate interesting solitary cases and, for example, cases that are present in only one area.

Another limitation is that a few very active participants can have a strong influence on the outcomes. As our results showed, one occupational physician who reported an outlying number of occupational diseases did have a significant effect on some incidence rates but not on all. Exclusion of outliers resulted in a marked decrease in the rate ratio for PTSD, yet had the opposite effect on the rate ratio for occupational hearing loss. The decrease in the rate ratio of PTSD was due to the high number of PTSD cases by the outlier in the sentinel group, whereas the increase in the rate ratio for occupational hearing loss was due to the fact that a high number of cases were reported by the outliers in the reference group. Results like the high number of reports of PTSD from the outlier of the sentinel group require further investigation. Close examination of the reported cases is important to establish whether diagnostic criteria have been applied correctly. A specific population of one physician or a current mass screening programme might be an explanation for a large number of notifications. One way to deal with this problem might be to identify outliers and either remove them from the figures or describe the effect on the figures explicitly. In addition, providing reporting physicians with feedback can improve their reporting behavior. However, the relatively wide variation in the number of notifications per physician could be due to real variations in the source population or differences in notification behavior. It might also indicate the relevance of different concepts among occupational physicians about the definition and importance of notification of occupational diseases (33). The rate ratio for occupational hearing loss was lower than for the other occupational diseases, probably because there are generally accepted and clear-cut criteria for the diagnosis, whereas criteria for work-relatedness of diseases of the upper limb and adjustment disorders are more open for interpretation of the reporting physician. Physicians of the sentinel group might be more inclined to recognize diseases of the upper limb and adjustment disorders as work-related. This could be an
issue for future research. Moreover, the influence of characteristics of physicians - for example age
and sex, experience or attitudes - on diagnostic and reporting behavior need further investigation.

Registries that use medical specialists’ reporting have been set up in various countries for
certain categories of occupational diseases. Examples of notification projects in the UK are the
schemes within the Occupational Diseases Intelligence Network (ODIN) and those within its
successor, The Health and Occupation Reporting network (THOR). Within this latter network there are
notification projects for occupational skin diseases (EPIDER), occupational respiratory diseases
(SWORD) and other occupational disease categories. Occupational physicians can report to the
OPRA scheme (7). The THOR network distinguishes core and sample reporters. Core reporters report
cases on a monthly basis, while sample reporters report cases during only one, randomly sampled
month per year. In general, core reporters are more motivated to join the reporting scheme, while
sample reporting is an option for those who might find the task of reporting every month too
burdensome. A trend analysis of the ODIN/THOR surveillance data 1996-2004 shows that the mean
number of notifications from the core reporters is higher than from the sample reporters (34). This
 corresponds with the results of our study in which we found that our sentinel group reported seven
times more occupational diseases.

The NCOD has also initiated notification projects focused on occupational skin diseases
(ADS) amongst dermatologists and on occupational respiratory diseases (PAL) amongst lung
specialists. These registries tend to provide different incidences than those provided by registries of
occupational physicians (21). This is partly because medical specialists have a position in the health
system that leads to a different category of visiting patients compared with the patients who consult an
occupational physician. On the basis of the ADS figures, we estimated the incidence for occupational
contact dermatitis at 180/100,000 employee years. The estimated incidence on the basis of the
sentinel surveillance project was 15/100,000 employee years. These findings suggest that for some
disease categories additional surveillance schemes can be useful. Because of the low response of the
lung specialists in PAL we did not calculate the incidence for work-related asthma. The reported
incidence of occupational asthma is very low in the sentinel group, the reference group as well as in
the PAL-group of lung specialists. This might indicate a poor recognition in primary and occupational
health care or a lack of specialised diagnostic facilities for this category of occupational diseases in the
Netherlands. This might be caused by the absence of a compensation system for occupational
diseases in the Netherlands. Diagnosing occupational asthma is often difficult and in many countries it
is diagnosed in specialized Centres for Occupational Diseases within the scope of a compensation
procedure.

For preventive policy, in addition to incidence figures from registries, other information must be
taken into consideration, for example information from epidemiological studies, case studies and
surveys. Information about the national legal and political context and about social security regulations
must also be taken into account in order to allow an adequate interpretation of the meaning of the
figures for preventive policy (18). One of the aspects that might affect registration activities is the
organization of OHS’s in a country. For instance, where OHS’s are absent or do not carry out frequent
health examinations to detect occupational diseases in an early phase, we expect lower figures for
occupational hearing loss because employees often visit their general practitioners only in a later
stage of the disease when there are overt complaints. Special occupational health arrangements in an
economic sector can influence the figures. For example, in the construction sector in the Netherlands,
the notification of work-related factors is linked to the invoice.

On a national level, sentinel projects as described can provide policy information on
occupational diseases of better quality in terms of a more accurate estimate of the true incidence.
Therefore, sentinel projects can be a valuable addition to national registries related to compensation
schemes. On the other hand, maintaining a national registry has the advantage of the involvement of a
large group of reporters. In an international perspective, the development and use of sentinel groups
in different countries, similarly instructed on the diagnostic criteria and the process of notification,
might be a promising step towards gathering more valid information and more comparable figures per
country, per economic sector and per year. The availability of valid information can be an important
impulse for a common European policy on the prevention of occupational diseases.

We conclude that a sentinel surveillance group comprising motivated occupational physicians
provides more notifications per employee year than a national registry and that intensive guidance can
improve the quality of notifications. A sentinel surveillance project as developed will provide incidence
estimates that are closer to the true incidence of occupational diseases than do data from national registries. For some disease categories, additional surveillance schemes might be considered useful.

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References


