

When Occupational Cancer Recognition Falters

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SUMMARY

There are differences between epidemiology and legal medicine in addressing the problem of under-reporting occupational cancers. Epidemiology focuses on systematically gathering data and identifying patterns of under-reporting, which is not deemed to pose ethical dilemmas, as its goal is to improve public health outcomes. Conversely, legal medicine investigates individual cases and ensures compliance with legal standards, presenting more complex ethical challenges. Considering workers' frustrations when dealing with unrecognized occupational diseases is essential. These workers experience significant physical and emotional distress and should not have to face a complicated compensation claims process. There is a need for ethical approaches that support workers in navigating their rightful claims for compensation, not challenging their mental and emotional well-being.

Under-reporting and under-compensation of occupational cancers are well-known issues in occupational medicine, which could be partly due to the lack of expertise of physicians in the assessment of occupational exposures and the long latency period between exposure and cancer occurrence, resulting in very scanty knowledge of past exposures.

In this journal issue, two articles, one in France and the other in Italy, aim to address the problem. They are both based on the advanced use of occupational history in cancer cases. The French study deals with hematopoietic neoplasms, while the Italian one deals with lung cancer. There are remarkable differences in the outcomes of the studies. The Italian research resulted in compensation by the responsible authority (INAIL) for 18 out of 82 cases identified in the surveillance evaluation (21.9%) [1]. The proportion of compensated cases was much higher in the French paper (14 out of 18 cases, or 77.8%) [2]. However, a direct comparison between the two studies is impossible because of the different cancers being evaluated. To overcome such a problem, we compared the Italian research with a French paper published in 2023 by the same authors dealing with underreporting occupational lung cancers using the

same methodology [3]. In the study, 1251 patients were asked to complete a validated questionnaire on occupational exposure to carcinogens. The response rate was 33.5%. Out of the 462 respondents, occupational physicians interviewed 150, 88 of them received a certificate of occupational disease. Of the 65 patients who had forwarded it to the responsible authority, 38 were compensated (57%), a proportion much more significant than the one shown in the Italian study. It should be mentioned that 36 out of the 38 compensated cases in the French study were attributed to asbestos exposure, compared to the 7 (possibly 8) cases reported in the Italian study.

Results were not dissimilar in another, more extensive Italian study on 1522 thoroughly interviewed patients; in 395 cases, causation was attributed to their occupation (26% of interviewed patients). The main etiological agents were silica, asbestos, polycyclic aromatic hydrocarbons, truck driving, painting, and multiple exposures, with a compensation rate of 39% [4].

The compensation rate (No. of compensated cases/No. of study participants x 100) was 8.2% (38/462) in the French study compared to 3.9% (18/453) in the Italian study, more than 2-fold. A possible

explanation of such striking difference could be due to more stringent criteria adopted by the Italian INAIL or, considering that 36 out of 38 compensated cases in the French study were attributed to asbestos exposure, the prevalence of such exposure could be different in the study areas. In both countries, asbestos-related occupational cancers are included in an official list, and the compensation is easily recognized without any further exposure assessment. On the contrary, workers must prove the cause-effect relationship between exposure and disease for carcinogens not included in the official list to get compensated. This is hard to establish, given the scant information about occupational exposure (sufficiently intense and prolonged) to relevant risk factors.

The OCCAM project developed another approach aimed at reducing the underreporting of occupational cancers based on the record linkage between the cohort of exposed workers (defined according to their job and the job-related Ateco code) and the database of incident cancers provided by the Italian cancer registries' network [5]. This procedure would be cost-effective because it is fully computerized and does not require additional steps, such as the involvement of consulting occupational physicians. However, it did not gain the scientific community's support, as many professionals remained skeptical about its implementation due to the frequent misclassifications occurring when extrapolating occupational exposures from job titles.

While the OCCAM project can be considered just an exploratory tool, inadequate for occupational cancer recognition, a substantial improvement could be based on the record linkage between the cancer registry database and the database held by INAIL, which contains data on occupational exposure to carcinogens [6]. Such a registry (named SIREP) was prescribed in art. 70 of DLgs 626/94 (eventually canceled and replaced by art. 243 of the DLgs 81/2008). INAIL released the first SIREP report in 2023 [7]. In the database, around 200,000 workers exposed to selected carcinogens are reported; herein, only exposures involving more than 7000 workers are listed: 74,003 to wood dust, 33,922 to benzene, 22,383 to hexavalent chromium, 15,165 to formaldehyde, 12,413 to PAH, 10,600 to 1,3 butadiene, 7,754 to silica, 7,057 to asbestos, etc.). The authors explicitly acknowledged the presence of a reporting bias,

indirectly indicated by the substantial geographical difference, with very few data related to the southern regions. Nevertheless, linking the SIREP database with the network of regional cancer registries will result in reporting many occupational cancers otherwise bound to be lost. It is worth pointing out that in France, such a national database of occupational exposures to carcinogens is not available, and the only chance of improving the reporting of occupational cancer relies uniquely on *ad-hoc* screening programs, such as the one reported in the French papers [2, 3].

A specific procedure applies to radiation-induced occupational cancers [8]. The rule adopted by INAIL is based on the so-called probability of causation. Namely, if the likelihood of being occupationally related exceeds 50%, the occupational cancer is compensated. It is based on the use of NIOSH-IREP software, which "uses the upper 99 percent credibility limit to determine whether the cancer of employees was caused by their radiation doses" (User's guide for the interactive radio-epidemiological program NIOSH-IREP. August 2024). The 50% probability of causation is based on a relative risk of 2. The probability of causation is equal to the attributable risk among the exposed, which derives from the relative risk $(RR-1)/RR$. Using at the individual level, a principle (the relative risk) that applies to population data is questionable. Assuming that the claimant is randomly selected from the population that provides the relative risk is entirely arbitrary. One of the hidden assumptions (no interaction with background risk) cannot hold in all cases and is not necessarily recognized by using the upper 99 percent credibility limit. In addition, it seems unfair not to compensate for cancer, whose probability of causation is 49%, whereas, for other types of exposure (e.g., asbestos), compensation is recognized for any degree of exposure [9, 10]. The limit for using the probability of causation is well indicated, and caveats are well described in the updated Preamble to IARC monographs, underpinning a stronger and more transparent method for identifying carcinogenic hazards, the essential first step in cancer prevention, neither necessary nor sufficient in recognizing the occupational origin of a diagnosed cancer [11].

Going back to the papers published in this issue of the journal, in conclusion, while there is some

advantage in using surveillance methods to detect occupational cancer otherwise lost, it would be advisable to use record linkage between existing databases, if available, to be able to identify many more cases of occupational cancer. As mentioned before, for exposures not included in the official list, it is up to the worker to prove the cause-effect relationship between her/his exposure and cancer. Under the current regulations, such an effort is likely to fail, contributing to the underreporting of occupational cancers.

Critical ethical issues become more or less stringent when undertaking a program to tackle the underreporting and under-compensation of occupational cancers, depending on the context. Epidemiology focuses on identifying and quantifying patterns of under-reporting in occupational medicine through systematic data collection and statistical analysis, aiming to improve public health outcomes and, therefore, does not pose ethical issues. In contrast, legal medicine addresses underreporting by investigating individual cases, ensuring compliance with legal standards, and assessing causality in the framework of occupational health regulations. Therefore, workers' frustration when suffering from unrecognized occupational diseases should be considered in this context. These workers, already grappling with the physical and emotional toll of their conditions, should not be forced to navigate a complicated claims process for compensation. This prolonged struggle can cause them to experience self-doubt, even leading them to believe that they are imposters in their own right unfairly. Alternatively, they may think that occupational physicians encouraging them to claim compensation are incompetent, which is also unfair.

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