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Epidemics of asbestos-related diseases – something old, something new

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Epidemics of asbestos-related diseases – something old, something new

At the beginning of the 21st century, the world is still confronted with some well-recognized major occupational and environmental health hazards, such as the continuing use of asbestos fibers in various industrial products and processes. This in spite of authoritative statements from UN bodies (the World Health Organization, the International Labor Organization, and the UN Environment Program) and various NGO (1). These organizations have called on countries throughout the world to eliminate asbestos-related diseases. They point to the great potential for prevention through banning new applications of asbestos and availing of effective hygienic tools for diminishing exposures where asbestos is already in use. Although the use of asbestos has been banned or strongly restricted in Western and North Europe, North America, and Australia, the annual production and global use of asbestos has remained at a high level of over two million metric tons. The largest producers currently are Russia, China, Kazakhstan, and Brazil.

Recent decisions to ban asbestos use in most of Europe and North America have shifted manufacturing and its attendant hazards to emerging economies where millions of workers can be exposed to serious risks (2, 3). In India, for example, the use of asbestos has more than doubled in the last decade to more than 300,000 tons a year in an industry which now employs more than 100,000 workers (4). While there is a broad consensus among health researchers that all types of asbestos are both fibrogenic and carcinogenic in humans, powerful lobbies (who have an interest in the continuing use of asbestos) often argue that chrysotile is safe if it is used safely. However, epidemiological studies have unequivocally indicated that chrysotile exposure does increase the rate of pulmonary cancer in humans, and it is the recommendation of international health agencies that only a total ban – covering all asbestos types – would represent a sustainable preventive policy for the future (5). The challenge is to have bans introduced in all parts of the world, and this means an obligation to continue the fight against lobbyists with commercial interests in upsetting the consensus that all forms of asbestos are carcinogenic.

According to WHO estimates, more than 107,000 people die each year from asbestos-related lung cancer, malignant mesothelioma, and asbestosis due to occupational exposure. This figure is most likely an underestimate as the increased use in the newly industrialized countries has not yet been fully taken into account. The asbestos epidemic continues, and it is even increasing in strength in many emerging parts of the world. At present, Europe carries the majority of the global asbestos-related disease burden as a result of heavy asbestos use in earlier decades (6). Based on the past use of asbestos, it is to be expected that the peak of asbestos-related diseases will occur in 2015–2030 in industrialized countries. For countries, which have banned asbestos use early on, the future burden will most likely decrease. With the current data, we can estimate that the total toll of the asbestos epidemic globally may well be over ten million lives before asbestos is banned worldwide and exposures brought to an end, as LaDou (3) predicted already ten years ago.

The epidemic of asbestos-related diseases is not over. The disease burden numbers attributed to asbestos use are large in comparison with any other occupational hazard. In many industrialized countries, asbestos remains the most important occupational lung carcinogen, where 5–7% of all lung cancers can be attributed to occupational exposures to asbestos. In exposed groups, mesothelioma (pleural or peritoneal) may account for up to 9% of the total deaths (7).

In recent years, there has been several epidemic outbreaks of communicable diseases (such as cholera, Ebola, and the plague) where pathogens have posed a threat to public health in nations and even globally. Without undermining the impact of any of these dreadful diseases, we should not lose perspective from the continuing, and even increasing, burden that so-called "old" non-communicable hazards may pose to workers' health and safety. An asbestos epidemic is clearly preventable through currently available tools and government policies. If there is a will, there is a way.

Every world citizen is exposed to asbestos at some time during his/her life. Low levels of asbestos are present in the air, water, and soil. However, most people do not become ill from their exposure. People who become ill are usually exposed to asbestos on a regular basis, most often in a job where they work directly with the material or through substantial environmental contact.

Occupations associated with heavy asbestos exposure include jobs in the shipbuilding trade, asbestos mining and milling, manufacture of asbestos textiles, cement and other asbestos-based products, construction and building trades, work on brake linings, and a variety of other trades. Demolition workers, asbestos-removal workers, firefighters, and automobile workers may also be exposed to asbestos fibers at work.

Although it is clear that the health risks from asbestos exposure increase with heavier exposure and longer exposure time, investigators have found asbestos-related diseases among individuals with only brief exposures. Generally, the latency periods are quite long. It can take 10–50 years or more for the symptoms of an asbestos-related condition to appear.

Family members of workers heavily exposed to asbestos may also face an increased risk of developing cancer. This risk results either from exposure to asbestos fibers, brought into the home on the clothing, shoes, skin, and hair of workers, or it is the consequence of the family living close to the industrial site with releases into the ambient air of asbestos fibers. However, household contacts infrequently sustain exposure levels needed to generate asbestosis and/or lung cancer.

Several factors determine how asbestos exposure affects the individual. The dose is important (ie, how much asbestos fibers an individual has inhaled) and so is the duration (ie, how long the individual worked in the exposing job). The type of fiber also determines the risk; however, there is now a wide international consensus that all the common asbestos types are associated with increased risk of cancer, particularly mesothelioma. There are obvious variations in the carcinogenic potency between different forms of asbestos, but these issues do not, however, alter the fundamental conclusion that the epidemiologic evidence indicates that all forms of asbestos, including chrysotile, are carcinogenic to humans. In addition to mesothelioma and lung cancer, asbestos also causes cancers of the larynx and ovaries (5, 8).

The consensus report "Asbestos, asbestosis, and cancer. Helsinki criteria criteria for diagnosis and attribution 2014; recommendations" has been published in this issue of *The Scandinavian Journal of Work, Environment & Health* (9) and is based on a more extensive report available in its entirety on the internet (10). The current consensus report updates the state-of-the-art-criteria for diagnosis and attribution with respect to asbestos from the earlier Helsinki criteria of 1997 (11, 12) and the 2000 update (13). Since asbestos-related diseases are generally rare and difficult to diagnose, special attention needs to be placed on the continuing education of medical personnel involved in the control of asbestos-induced health outcomes. The diagnostic complexity of mesothelioma may lead to underreporting. Autopsy series studies have suggested that a sizeable proportion of mesotheliomas (eg, 45% in Trieste, Italy) may remain undiagnosed (14).

Since 1997, the diagnosing, detecting, reporting, and compensation have improved considerably in countries which have taken action on asbestos. For many industrialized countries, the mesothelioma numbers have doubled in 20 years, obviously partly due to a real increase but also partly through better detection.

Past exposure to asbestos has not always been recognized early on, and, as mentioned previously, the symptoms of asbestos-related diseases may not become apparent for many decades after the initial exposure. Computed tomography (CT) is more effective (ie, sensitive) than conventional chest X-rays at detecting the possible consequences of asbestos exposure. The current Helsinki criteria update recommends that individuals with a history of past exposure to asbestos, who meet the absolute lung cancer risk criteria set by randomized trials and existing lung cancer screening guidelines, should be offered screening with low-dose CT (9, 10, 15, 16).

The diagnosis of asbestosis, defined by the Helsinki criteria in 1997 as “diffuse pulmonary fibrosis secondary to the inhalation of asbestos fibers” (11, 12), is often made without histological examination of the lung tissue. The diagnosis is then based on the exposure history, clinical features of interstitial fibrosis, radiographic studies, and pulmonary function tests with restrictive physiology.

A histological assessment for asbestosis is helpful if the aforementioned features are atypical or non-diagnostic. A lung biopsy, which detects microscopic asbestos fibers in pieces of lung tissue, is the most reliable test to confirm the presence of asbestos-related abnormalities. A histologic assessment of asbestos exposure requires identification of asbestos bodies, defined as “iron-coated asbestos fibers with a thin translucent core” (17). The consequences of asbestos exposure can also be studied in bronchial lavage, where the cells are rinsed out of the lungs. It is important to note that a “negative” non-effect outcome in these studies excludes neither potential past exposure nor the likelihood of asbestos-related disease to develop. With “positive” results, the probability of a serious health consequence is increased.

Soluble biomarkers in pleural fluid effusions have been evaluated for the early diagnosis of malignant mesothelioma. However, none of the markers studied in pleural fluid or in serum have so far exhibited sufficient sensitivity and specificity for the diagnosis of malignant mesothelioma.

Many studies have shown that the combination of asbestos exposure and smoking is particularly hazardous. Smokers who are also exposed to asbestos have a risk of developing lung cancer that is greater than the individual risks from asbestos and smoking combined (18). There is evidence that quitting smoking will reduce the risk of lung cancer among asbestos-exposed workers. Smoking combined with asbestos does not appear to increase the risk of mesothelioma.

In spite of the progress done with new techniques in diagnosis of asbestos-related diseases and asbestos exposure monitoring at the tissue/cellular level, the importance of a good anamnesis on exposure and the potential availability of any exposure data is of primordial importance for the assessment of the cases for medicolegal and insurance purposes. Trained occupational physicians and industrial hygienists are in a key position to determine the estimations for the past exposure. The role of pathologists and molecular toxicologists remains still at the secondary level, ie, to verify the exposures if uncertainties in the documented exposure history persist and to provide additional auxiliary data for diagnosis and any assessment of attribution.

Over 20 experts attended the meeting in Helsinki in February 2014. In today’s biomedical and epidemiological research, we are increasingly confronted with potential issues of conflict of interest and the mixing of science and advocacy. Consequently, all the participants were asked to sign a written Declaration of Interest form, with the purpose of having transparency about any potential conflict of interests. Relevant declarations of interest are available in the Acknowledgment section of the consensus report (9).

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