Annals of Global Health
VOL. 82, NO. 1, 2016

ISSN 2214-9996
http://dx.doi.org/10.1016/j.aogh.2016.01.019

COMMENTARY

The Global Health Dimensions of Asbestos and Asbestos-Related Diseases

Ken Takahashi, MD, PhD, MPH, Philip J. Landrigan, MD, MSc, on behalf of the Collegium Ramazzini

Abstract

The Collegium Ramazzini (CR) reaffirms its long-standing position that responsible public health action is to ban all extraction and use of asbestos, including chrysotile. This current statement updates earlier statements by the CR with a focus on global health dimensions of asbestos and asbestos-related diseases (ARDs). The ARD epidemic will likely not peak for at least a decade in most industrialized countries and for several decades in industrializing countries. Asbestos and ARDs will continue to present challenges in the arena of occupational medicine and public health, as well as in clinical research and practice, and have thus emerged as a global health issue. Industrialized countries that have already gone through the transition to an asbestos ban have learned lessons and acquired know-how and capacity that could be of great value if deployed in industrializing countries embarking on the transition. The accumulated wealth of experience and technologies in industrialized countries should thus be shared internationally through global campaigns to eliminate ARDs.

KEY WORDS asbestos, chrysotile, lung cancer, mesothelioma, ovarian cancer

BACKGROUND

Every asbestos fiber that is mined is indestructible, which repeatedly exposes many individuals during its life cycle from mining and extraction of asbestos-containing rocks to manufacturing of asbestos-containing products (ACPs), and further during use, repair, demolition, and abatement of ACPs. Since 1993, the Collegium Ramazzini has repeatedly called for a global ban on all mining, manufacture, and use of asbestos.[1-4] The Collegium has taken this position based on well-validated scientific evidence finding that all types of asbestos, including chrysotile, the most widely used form, cause cancers such as mesothelioma and lung cancer, and finding additionally that there is no safe level of exposure. The Collegium has continued to criticize as fallacious and unachievable the so-called controlled use of chrysotile advocated by the asbestos industry. Unfortunately, despite these concerns and abundant scientific evidence, global usage of chrysotile has remained at around 2 million metric tons per year in recent years. Most of this current use is concentrated in low- and middle-income countries.[5]

The Collegium reaffirms its position that, given the well-documented availability of safer, cost-effective alternative materials, the responsible public health action is to ban all extraction and use of asbestos. State-of-the-art technologies must be employed in asbestos removal and disposal. This current statement updates earlier statements with a focus on the global health dimensions of asbestos and asbestos-related diseases (ARDs).

UN ORGANIZATIONS

In 2006, the World Health Organization (WHO) called for the elimination of ARDs,[6] taking the position that the most efficient way to eliminate ARDs is to cease using all types of asbestos. The 2014 update of this statement, which was attached to the WHO document "Chrysotile Asbestos,[7]" published in response to the continuing widespread

From the University of Occupational and Environmental Health, Kitakyushu, Japan (KT); and the Icahn School of Medicine at Mount Sinai, New York, NY (PL).

Annals of Global Health, VOL. 82, NO. 1, 2016
January–February 2016: 209–213

production and use of chrysotile, emphasized that all forms of asbestos, including chrysotile, are causally associated with an increased risk of cancer of the lung, larynx, and ovary; mesothelioma; and asbestosis. These observations are in line with the recent evaluation by the International Agency for Research on Cancer.[8] In its 2014 update, the WHO reiterated the call for global campaigns to eliminate ARDs. These efforts have been joined by other UN agencies, including the International Labour Organization and the United Nations Environment Programme. The Chemical Review Committee of the Rotterdam Convention has repeatedly recommended that chrysotile asbestos be put on the Convention's list of hazardous substances, thus requiring exporting countries to obtain prior informed consent from the importing countries. A handful of countries have opposed that recommendation, thus preventing this basic safety protection from coming into effect. The Collegium calls on all parties to the Rotterdam Convention to support the listing of chrysotile asbestos.

GLOBAL BURDEN OF ARDS

Occupational exposure to asbestos causes an estimated 107,000 deaths each year worldwide. These deaths result from asbestos-related lung cancer (ARLC), mesothelioma, and asbestosis.[6,7] When the global burden of each type of ARD was considered separately, the estimated number of deaths per year was 41,000 for ARLC,[9] 43,000[10]-59,000[7,9,11] for mesothelioma, and 7000[12]-24,000[13] for asbestosis. No estimate is available for the annual numbers of deaths as a result of asbestos-related cancers of the larynx or ovary. Because asbestos is more likely to cause lung cancer than mesothelioma, the total burden of ARDs will differ substantially with the estimated magnitude of ARLC. The WHO recently advanced a risk ratio of 6:1 for contracting lung cancer versus mesothelioma after chrysotile exposure.[7] Because these estimates are derived by different methods, inconsistencies might be eliminated through a cross-verification of the various estimation methods used. Regardless, the ARD burden is more likely to be underestimated than overestimated because ARDs are well known to be underdiagnosed and under-reported.

NATIONAL BANS

Since Iceland first introduced a ban on all types of asbestos in 1983, more than 50 countries have implemented similar bans.[14] However, the pace of countries adopting bans has slowed in the past decade. Indeed, the governments of several industrializing countries have withdrawn bans, and others have prescribed long periods over which to move toward a ban. Such actions are likely a consequence of the corrupting influence of pro-chrysotile lobbies, whether foreign or domestic. Asbestos industry lobbyists employ "product defense" science to foment uncertainty to sway the opinions of industrializing countries, a delaying tactic that, unfortunately, has often succeeded. Nine of the 10 most populous countries in the world, all of which use or have used substantial amounts of asbestos, have yet to adopt bans. Coverage of the world population by bans thus remains low and is biased toward industrialized countries.

ALTERNATIVES TO ASBESTOS

In countries where asbestos has been banned, safer, cost-effective substitute materials have been successfully introduced. Polyvinyl alcohol fibers and cellulose fibers can be used instead of asbestos in building products such as flat and corrugated fiber-cement sheets, which are used in roofing, interior walls, and ceilings. Polypropylene and cellulose fibers have been used instead of asbestos to make fiber-cement products in Brazil. Virtually all of the polymeric and cellulose fibers used instead of asbestos in fiber-cement sheets are >10 microns in diameter and hence are nonrespirable. For roofing in remote locations, lightweight concrete tiles can be fabricated using cement, sand, and gravel and, optionally, locally available plant fibers such as jute, hemp, sisal, palm nut, coconut coir, kenaf, and wood pulp. Galvanized iron roofing and clay tiles are other alternative materials. Substitutes for asbestos-cement pipe include ductile iron pipe, high-density polyethylene pipe, and metal-wire–reinforced concrete pipes.[15,16] Although these materials are considered safer than asbestos, good work practices should be observed for the protection of those working with these materials.

PATTERNS OF THE ARD EPIDEMIC

Countries continuing to use asbestos will shoulder the burden of ARDs in proportion to their prior levels of asbestos use.[17] Countries where asbestos has been banned or greatly limited invariably exhibit a sustained epidemic of ARDs. Age-adjusted mortality rates of mesothelioma are increasing in most industrialized countries,[18] but the rate of increase

has slowed in only the few industrialized countries that started to reduce asbestos use decades ago. With the known synergy of asbestos and smoking, it can be expected that the many industrializing countries with high smoking prevalence and continued use of asbestos will shoulder a substantial burden of asbestos-related lung cancer. The ARD epidemic will likely not peak for at least a decade in most industrialized countries and for several decades in industrializing countries. Asbestos and ARDs will therefore continue to present challenges in the arena of occupational medicine and public health as well as in clinical research and practice. Hence, asbestos and ARDs are global health issues.

INDUSTRIALIZING COUNTRIES

Many industrializing countries have been slow to reduce, let alone ban, the use of asbestos. The multiple factors at play include the low price and easy accessibility of asbestos, demand from the construction sector in emerging economies, scarcity of medicosocial resources, and fierce propaganda by the asbestos industry and other parties with conflicting interests. These factors are interrelated and converge uniquely in each country, presenting significant challenges to concerned parties. For example, a number of rapidly growing industrializing countries in Asia and former Soviet Union countries currently sustain a high level of asbestos use or production, and they fail to provide even minimal protection to workers; they have a serious lack of expertise and resources required to diagnose and report ARDs. Furthermore, several industrializing countries that were importers (but not exporters) of asbestos were among the countries that opposed the inclusion of chrysotile into the aforementioned prior informed consent procedure of the Rotterdam Convention. This is a blatant reflection of the corrupt influence of the asbestos industry and crude trade pressures of asbestos-exporting countries. Advocates for banning asbestos must continue to strive to overcome the reluctance, denial, and antagonism of their opponents.

INDUSTRIALIZED COUNTRIES

The highest priority in reducing ARDs is primary prevention; that is, banning asbestos use in countries where it remains legal and preventing exposure to in situ sources in all countries with historical asbestos use. In industrialized countries, large quantities of asbestos remain as a legacy from past construction practices in many thousands of schools, homes, and commercial buildings. Significant quantities of asbestos also remain in various industrial applications. It is of importance to document and mark existing asbestos in buildings and industrial applications to avoid exposure during maintenance, repair, and demolition. As the materials weather, erode, break, or are cut by power tools, asbestos fibers are released into the air, soil, and water, where they become a source of community-wide exposure. Policies, regulations, and practices should safeguard workers engaged in the removal of asbestos-containing structures and the handling of the resulting waste material, via schemes for specialized training and licensing.[19]

Secondary and tertiary prevention are also assuming vital importance in industrialized countries. In particular, workers exposed to asbestos in current or past occupations should be identified, registered, and followed-up for health monitoring and surveillance.[19] The unfolding ARD epidemic in these countries poses costly challenges in the arenas of basic and clinical medicine. In medical practice, such challenges include the development of biomarkers for the early detection of mesothelioma, as well as effective modalities for its treatment. It is imperative to design and implement just compensation schemes for people with ARDs and their families. Industrialized countries should provide assistance to industrializing countries on issues related to asbestos and ARDs.

In countries having banned asbestos, as well as in countries still using asbestos, a large number of workers remain at high risk of developing ARDs from past exposure, in particular lung cancers and mesotheliomas. Most of these previously exposed people remain in the general population without any ongoing health monitoring. The Collegium recommends that countries develop strategies for identifying their previously and currently asbestos-exposed workers, to quantify their exposure, and register them, subsequently developing methods for continuous health surveillance and secondary prevention.[20] In addition to workers there should be monitoring of household members of workers if they bring asbestos into their homes.

INTERNATIONAL COOPERATION

The accumulated wealth of experience and technologies in industrialized countries should be shared internationally through global campaigns to eliminate ARDs. Industrialized countries have

Annals of Global Health, VOL. 82, NO. 1, 2016
January–February 2016: 209–213

experience in primary, secondary, and tertiary prevention, with the strengths of any given country depending on its particular stage in their epidemic of ARDs. The knowledge and technological developments that have emerged from these experiences could be of great benefit to countries in which asbestos continues to be used. The statement[21] on asbestos by the International Commission on Occupational Health describes a broad range of activities at each of the 3 levels of prevention. For optimum effect, the resources of industrialized countries should be combined and distributed in a manner tailored to the needs of the beneficiaries. Scientific expertise is an important resource to be shared, including capacity building and surveillance of ARDs. Given the wide range of problems encountered at the global level, the development of regional initiatives should be particularly valuable.[22]

Industrialized countries that have already gone through the transition to an asbestos ban have learned lessons and acquired know-how and capacity (ie, "soft" technology) that could be of great value if deployed in industrializing countries embarking on the transition. Collaboration between industrialized and industrializing countries can be led by international organizations, the scientific community, and grass roots nongovernmental organizations and should involve practitioners, researchers, administrators, and civil society. For example, through fora such as international workshops or conferences, countries with bans in place can outline how they implemented a ban and provide practical guidance on how countries currently using asbestos can move toward a ban.

CONCLUSIONS: THE NEED FOR A GLOBAL HEALTH APPROACH

Asbestos and ARDs have emerged as global health issues. All countries with a history of asbestos use are experiencing an epidemic of ARDs, with the stage of the epidemic being a function of a country's past asbestos use, whether and when it implemented a ban, and, if no ban is in place, at what levels it continues to use the material. Gaps in human capital and technology available to countries warrant international cooperation. The expansion of national bans in industrializing countries and reducing the burden of ARDs in industrialized countries are the short-term targets. Given that ARDs are 100% preventable, zero new cases of ARDs should be the ultimate goal for both industrializing and industrialized countries. The pandemic of ARDs is an urgent international priority for action by public health workers.

REFERENCES

1. Collegium Ramazzini. Third Collegium Ramazzini Statement. Chrysotile as a Carcinogen. Bologna, Italy: Collegium Ramazzini. Available at: http://collegiumramazzini.org/download/3_ThirdCRStatement(1993).pdf; 1993. Accessed March 4, 2016.
2. Collegium Ramazzini. Sixth Collegium Ramazzini Statement. Call for an International Ban on Asbestos. Bologna, Italy: Collegium Ramazzini. Available at: http://collegiumramazzini.org/download/6_SixthCRStatement(1999).pdf; 1999. Accessed March 4, 2016.
3. Collegium Ramazzini. Eleventh Collegium Ramazzini Statement. Call for an International Ban on Asbestos: Statement Update. Bologna, Italy: Collegium Ramazzini. Available at: http://collegiumramazzini.org/download/11_EleventhCRStatement(2004).pdf; 2004. Accessed March 4, 2016.
4. Collegium Ramazzini. Collegium Ramazzini Statement. Asbestos is Still with Us: Repeat Call for a Universal Ban. Bologna, Italy: Collegium Ramazzini. Available at: http://collegiumramazzini.org/download/15_FifteenthCRStatement(2010).pdf; 2010. Accessed March 4, 2016.
5. United States Geological Survey. 2013 Minerals Yearbook: Asbestos [Advance Release]. Reston, VA: USGS. Available at: http://minerals.usgs.gov/minerals/pubs/commodity/asbestos/myb1-2013-asbes.pdf; 2013. Accessed March 4, 2016.
6. World Health Organization. Elimination of Asbestos-related Diseases. Geneva, Switzerland: WHO. Available at: http://whqlibdoc.who.int/hq/2006/WHO_SDE_OEH_06.03_eng.pdf?ua=1; 2006. Accessed March 4, 2016.
7. World Health Organization. Chrysotile Asbestos. Geneva, Switzerland: WHO. Available at: http://www.who.int/ipcs/assessment/public_health/chrysotile_asbestos_summary.pdf; 2014. Accessed March 4, 2016.
8. International Agency for Research on Cancer. IARC Monographs Volume 100C: Arsenic, Metals, Fibres and Dusts; A Review of Human Carcinogens. Lyon, France: IARC. Available at: http://monographs.iarc.fr/ENG/Monographs/vol100C/mono100C.pdf; 2012. Accessed March 4, 2016.
9. Prüss-Üstün A, Vickers C, Haefliger P, Bertollini R. Knowns and unknowns on burden of disease due to chemicals: a systematic review. Environ Health 2011;10:9.
10. Driscoll T, Nelson DI, Steenland K, et al. The global burden of disease due to occupational carcinogens. Am J Ind Med 2005;48:419–31.
11. World Health Organization. Global Health Risks: Mortality and Burden of Disease Attributable to Selected Major Risks. Geneva, Switzerland: WHO. Available at: http://www.who.int/healthinfo/global_burden_disease/GlobalHealthRisks_report_full.pdf; 2009. Accessed March 4, 2016.

12. Driscoll T, Nelson DI, Steenland K, et al. The global burden of non-malignant respiratory disease due to occupational airborne exposures. Am J Ind Med 2005;48:432–45.
13. GBD 2013 Mortality and Causes of Death Collaborators. Global, regional, and national age-sex specific all-cause and cause-specific mortality for 240 causes of death, 1990-2013: a systematic analysis for the Global Burden of Disease Study 2013. Lancet 2015;385:117–71.
14. Kazan-Allen L. Chronology of National Asbestos Bans. London, UK: International Ban Asbestos Secretariat. Available at: http://www.ibasecretariat.org/chron_ban_list.php; 2016. Accessed March 4, 2016.
15. World Bank Group. Good Practice Note: Asbestos: Occupational and Community Health Issues. Washington, DC: World Bank Group. Available at: http://siteresources.worldbank.org/EXTPOPS/Resources/AsbestosGuidanceNoteFinal.pdf; 2009. Accessed March 4, 2016.
16. World Health Organization Regional Office for Europe. National Programmes for Elimination of Asbestos-Related Diseases: Review and Assessment 07-08 June 2011, Bonn. Annex 4: Review of substitutes for asbestos construction products by a WHO temporary advisor. Copenhagen, Denmark: WHO Regional Office for Europe:22–9. Available at: http://www.euro.who.int/__data/assets/pdf_file/0005/176261/National-Programmes-For-Elimination-Of-Asbestos-related-Diseases-Review-And-Assessment.pdf; 2011. Accessed March 4, 2016.
17. Lin RT, Takahashi K, Karjalainen A, et al. Ecological association between asbestos-related diseases and historical asbestos consumption: an international analysis. Lancet 2007;369:844–9.
18. Delgermaa V, Takahashi K, Park E-K, Le GV, Hara T, Sorahan T. Global mesothelioma deaths reported to the World Health Organization between 1994 and 2008. Bull World Health Organ 2011;89:716–724C.
19. Finnish Institute of Occupational Health and International Commission on Occupational Health. The Helsinki Declaration on Management and Elimination of Asbestos-Related Diseases. Adopted by the International Conference on Monitoring and Surveillance of Asbestos-Related Diseases, 10–13 February 2014, Espoo, Finland. Helsinki, Finland: FIOH. Available at: http://www.ttl.fi/en/international/conferences/helsinki_asbestos_2014/Documents/20%20March%202014%20Final%20Signed%20Declaration%20for%20website.pdf; 2014. Accessed March 4, 2016.
20. Langård S. Identification and prevention of work- and environment-related individual á priori disease risks. In: Mehlman MA, Upton A, eds. The Identification and Control of Environmental and Occupational Diseases. Part II. New Jersey: Princeton; Advances in Modern Environmental Toxicology 1994;Vol. 23:21–32.
21. International Commission on Occupational Health. ICOH Statement: Global Asbestos Ban and the Elimination of Asbestos-Related Diseases. Rome, Italy: ICOH. Available at: http://www.icohweb.org/site_new/multimedia/news/pdf/ICOH%20Statement%20on%20global%20asbestos%20ban.pdf; 2013. Accessed March 4, 2016.
22. Marsili D, Comba P, Pasetto R, Terracini B. International scientific cooperation on asbestos-related disease prevention in Latin America. Ann Glob Health 2014;80:247–50.