

Review Article

Current Status of the Occupational Health and Safety Countermeasures in Beijing, China

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Abstracts: This paper describes the current status of occupational health and safety countermeasures in Beijing, China. It includes the network and organization of occupational health, occupational health personnel, the refitting of industrial structures, hazardous agents at workplaces, the classification and incident rates of occupational diseases. The management of occupational health and safety, new challenges and opportunities for occupational health and safety are also discussed. Countermeasures for occupational health and safety have been formulated by the government of Beijing. At present, they are being implemented and enforced by: (1) strengthening the management of occupational hygiene; (2) encouraging and supporting employment units establishing the occupational health quality management system; (3) promoting research on the prevention and treatment of occupational diseases; (4) improving the transparency in occupational health and safety; (5) motivating the government to improve regulation and standards and (6) developing external occupational health and safety aid programs.

Key words: Occupational health and safety, Occupational hazardous agent, Law for prevention and control of occupational diseases, Occupational health and safety management

Introduction

Beijing is the capital of the People's Republic of China (PRC) and a municipality directly under the jurisdiction of the central government. Because it serves as the national political and cultural center and the center of financial decision-making and international exchange, it is also the window that opens China to the outside. Beijing stands in north China as the most advanced city in terms of commerce, technological industry, and knowledge-intensive services. The enterprise structures have undergone drastic changes under the policy of reform and openness to the outside world

since 1978. In 1997, the Eighth Municipal People's Congress of Beijing clarified its intent to face the challenge of the Olympic Games to be held in Beijing in 2008 by stepping up the pace of economic globalization. Under the planning of the Central Government, Beijing, while continuing its reputation as a center of ancient culture, is to develop into a modern international metropolis with a booming economy and stable social order where public utilities, infrastructure, environmental and ecological conditions, health care and safety all meet the best international standards.

The striving goal of building a moderately prosperous society was formulated by the Third Congress of Sixteenth Central Communist Party Committee in China in 2003. Safety, health and environmental protection are among the

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most important tasks facing Beijing if a consummate modernized enterprise system, market economy system, and labor and social security system are to be fully realized.

Current Status of Occupational Health (OH) in Beijing

The network and organizations

The network and organizations of OH have been in place in Beijing since 1994. The network consists of five branches: (1) the primary health care system, i.e., departments of occupational diseases (ODs) in hospitals for workers and institutes for prevention and control of ODs in enterprises; (2) the secondary system, i.e., departments of OH at the Centers of Disease Control and Prevention (CDC) in districts and counties, and the institute of OH, in Beijing Center of Disease Control and Prevention (BCDC) and departments of ODs at big hospitals and health care facilities; (3) the tertiary system, i.e., government authorities, the Bureaus of Health in districts and counties, the Beijing Municipal Health Bureau, and the Ministry of Health, PRC; (4) the occupational injury security system; and (5) the trade union system. In addition, there are Institutes of Occupational Health Surveillance (OHS) and Institutes of Hazardous Factors Evaluation for Occupational Diseases in Construction Projects. The networks of OH are shown in Fig. 1.

An organization for the diagnostic identification of ODs

The Beijing Municipal Health Bureau approved formation of the Beijing Identification Committee for the Diagnosis of Occupational Diseases (BICDODs) in 1994. This committee has two main responsibilities: the first is the resolution of disputes over diagnoses between the departments of ODs, the institution diagnosing ODs and the individual worker and his or her relatives or employment unit. The second is diagnoses and detection of important occupational accidents. There are four groups for the identification of ODs: an occupational poisoning diagnostic identification group; an occupational injury diagnostic identification group caused by physical factors; a pneumoconiosis diagnostic identification group, and a radiation disease diagnostic identification group. BICDODs serves in making the final diagnosis and identification according to the Law for the Prevention and Control of Occupational Diseases (LPCOD). There have been about 60–70 ODs identification events in Beijing every year since 2000.

OH, OHS and ODs personnel - classifications and numbers

There are about 1,100 OH, OHS, and OD personnel in

Beijing. They fall into eight categories: OD physicians, OD nurses, OHS physicians, hygienists, specialists for the detection of occupational hazardous agents (OHA), specialists for Hazardous Factors Evaluation for Occupational Diseases in Construction Projects (HFEODCP), and OH engineers of engineering technology and OH practitioners, see Table 1¹.

The New Workplaces in Beijing

The refitting of industrial structures

The drastic economic and social changes occurring over the last 20 yr in Beijing and China are unprecedented. No country has ever undergone such rapid transition from a rural agricultural way of life to an urban industrial way of life. This industrialization is thus just now beginning to undergo rigorous and sustained examination in terms of its impact on the environment and OH.

The refitting of industrial structures has been processing in Beijing since 1980s. The focus has been on new-high technology industries, knowledge-intensive services and foreign direct investment (FDI) enterprises, and these have developed rapidly, as shown in Table 2².

The main hazardous agents at workplaces in Beijing

I. Classification and regulation of hazardous agents based on the LPCODs

According to lists provided for “classification management methods for occupational hazardous agents”, such agents are divided into two main types, those of moderate toxicity and those of high toxicity. The later include agents that can cause acute serious poisoning or death, cancer, reproductive or developmental disorders, strong allergic reaction, and delayed immunological reaction and so on. There are about 660,000 workers exposed daily to hazardous agents in workplaces in Beijing.

II. The sources of hazardous agents at the workplaces

As a result of refitting various industrial structures and of technology transfer, many hazardous agents have been introduced from developed countries into developing countries, and from large scale industries into small scale industries, from city to the countryside near Beijing, and from the coastal cities of the eastern China to the western regions of the country. The main causes are a lack of (1) the occupational health and safety laws and standards; (2) effective enforcement of occupational health and safety laws by local and municipal governments; (3) the identification, detection and control of harmful raw materials and products

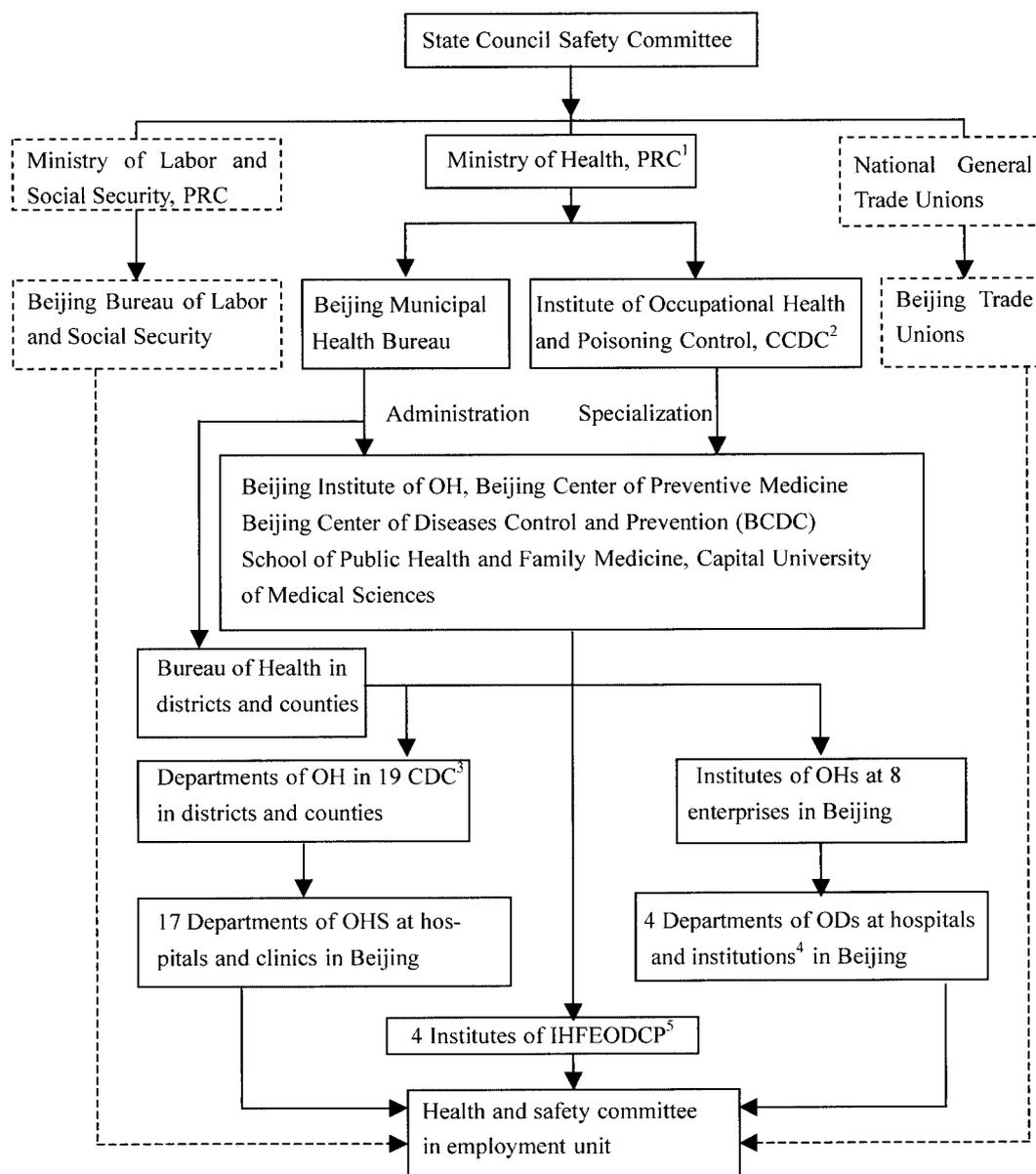


Fig. 1. The network and organizations of OH in Beijing, China.

1 PRC: The people Republic of China, 2 CCDC: China Center of Diseases Control and Prevention, 3 CDC: Center of Diseases Control and Prevention, 4 Institutions: Institutes for the Diagnosis and Treatment of Occupational Diseases, 5 IHFEODCP: Institutes of Hazardous Factors Evaluation for Occupational, Diseases in Construction Projects.

containing them; (3) an occupational health and safety management system in enterprises; (4) the measures and rules for prevention and control of hazardous agents in technology transfer; (5) the efficiency of engineering techniques in hygiene; and (6) training of occupational health and safety for workers exposed to hazardous agents at the workplaces.

III. New occupational hazards in the new-high technology industries

The new occupational hazards may include the followings.

- (1) Psychosocial pressures caused by mental stresses in production and work organization processes. Conditions that spawn these pressures are automatization, simple and repetitive work, and increased mental load, and competition among enterprises, increasing social pressure, for example.

Table 1. OH, OHS, and OD personnel - classifications and numbers (2002)

Classifications	Numbers	Percentage
OD Physicians	85	7.7
OD Nurses	136	12.3
OHS Physicians	288	26.2
Hygienists	212	19.3
Specialists for the Detection of OHA	112	10.2
Specialists for HFEODCP	86	7.8
OH Engineers of engineering technology	35	3.2
OH practitioners	146	13.3
Total	1100	100.0

OH: Occupational Health, OHS: Occupational Health Surveillance, OD: Occupational Diseases, OHA: Occupational Hazardous Agents, HFEODCP: Hazardous Factors Evaluation for Occupational Diseases in Construction Projects.

- (2) Ergonomic and other physiological problems at visual display terminals (VDT), electronic communication, and information technology workplaces.
- (3) Ionizing radiation (x-ray, γ -ray, radon, for example) and non-ionizing radiation (microwave, ultraviolet, electromagnetic, high frequency, for example) cause adverse effects on the central nervous system, circulation, immune system, reproductive system and development of fetus in information technology, aviation and spaceflight industries.
- (4) Exposure to formaldehyde, ammonia, organic solvents, and volatile organic compounds (VOC), for example, at the factories of furniture, wood block materials, coatings and paints, chemical bonds, and home chemicals, or decoration, construction and remodeling sites.
- (5) Exposure to agents with potential and/or long term adverse effects, such as occupational carcinogen (arsenic, chromium, benzene, for example), reproductive and developmental toxins (2-ethoxyethane, butoxyethanol, methoxyethanol, 1-bromopropane, 2-bromopropane, for example), and strong allergens (toluene diisocyanate).

Today, diseases, such as tuberculosis, diabetes, hypertension, heart disease, cerebrovascular disease, and even some tumors are thought to arise due to multiple adverse factors, namely occupational and environmental risk factors together with social pressures, as well as genetic susceptibility factors.

IV. Occupational hazards at traditional workplaces in Beijing

There are more than 10,000 enterprises in Beijing, quietly

Table 2. New industrial structures in Beijing (2002)

Classifications	Numbers	Percentage
Large scale and state-owned enterprises	328	0.2
New high technology industries	6,650	5.8
Knowledge-intensive services	7,060	14.2
FDI enterprises	6,400	9.0
Traditional industries	4,320	2.9
Middle and small scale enterprises	10,952	67.9
Total	148,710	100.0

FDI: Foreign Direct Investment.

distributing harmful or toxic substances. These include old traditional industries, small private factories, downtown and village enterprises and some FDIs. Hazardous agents found by institutes of OH, in Beijing, in 1998-2003 are shown in Table 3.

Incident rate and Classification of ODs in Beijing (1998–2003)

According to the most recent reports in Beijing, the total number of individuals suffering an OD in Beijing was 16315 during the period 1998-2003, as shown in Table 4.

The management of occupational health and safety

Occupational health and safety laws

The Government of China is aware of problems in employment units (including state-owned, private, and foreign-investment industries), and it has been written a number of laws, regulations, and decrees that codify workers' rights and protect their health and safety. The new PRC Labor Law came into effect on Jan. 1, 1995. The revised Trade Union Law was announced on Oct. 28, 2001. The new LPCOD became effective on May 1, 2002. The Safe Production Law came into effect on Nov. 1, 2002. The government has also advanced specific regulations and standards for health and safety in industrial operations. The Regulation on Occupational Injury Security came into effect on Jan. 1, 2004. Regulations for Safe Management of Dangerous Chemicals, Regulation on Labor Protection for Using Toxic Substances in the Workplace, Regulation on Protection Against Radioisotopes and Radiation-Emitting Apparatuses, Regulation on Occupational Injury Security were also promulgated and implemented in May, 2002–Jan, 2004. In addition, a new occupational health and safety

Table 3. The monitoring results of the OHA in Beijing in 1998–2003

Hazardous agents		Number of workplaces	OEL* exceeded (%)	OEL-TWA
1 Physiological	Noises	21,656	55	85 dB
2 Chemical				
2.1 Organic solvents:	Benzene	8,456	32	6 mg/m ³
	Toluene	27,896	41	50 mg/m ³
	Xylene	16,457	43	50 mg/m ³
	Trichloroethylene	891	36	30 mg/m ³
	Tetrachloroethylene	726	28	200 mg/m ³
	1,1,1-Trichloroethane	967	35	900 mg/m ³
	n-Hexane	1,643	29	100 mg/m ³
2.2 Metal:	Lead	2,495	35	0.03 mg/m ³
	Mercury	1,784	23	0.02 mg/m ³
	Chromium	478	56	0.05 mg/m ³
	Manganese	967	30	0.15 mg/m ³
2.3 Dust:	Silica dust	662	34	1 mg/m ³
	Coal dust	1,521	36	(total dust)
	Carbon black dust	3,345	28	10–50% free
	Foundry dust	567	31	SiO ₂)
				0.7 mg/m ³
				(respiratory dust)

*: OEL, Occupational Exposure Limits.

Table 4. Classifications, numbers and incident rates of ODs in Beijing in 1998–2003

Occupational disease classifications	Patient numbers	Incident rates (‰)
Pneumoconiosis	6,326	2.3
Chemical Poisonings	3,896	
Metal poisoning	895	1.2
Organic solvent poisoning	2,562	2.6
Gas poisoning	1,134	1.8
Pesticide poisoning	305	1.5
Disorders caused by physical factors	3,752	
Heat stroke	145	0.3
Local vibratory diseases	262	0.1
Occupational skin diseases	3,345	3.2
Diseases caused by biological factors	48	
Brucellosis	12	3.1
Anthrax	13	0.06
Occupational tumors	23	0.02
Occupational eye injuries	318	
Radiation pearl eye	6	0.01
Trinitrotoluene pearl eye	56	0.2
Electrooptic ophthalmia	256	0.42
Occupational radiation injuries	8	0.01
Occupational Hearing loss	1,657	6.5
Other occupational diseases	587	
Asthma	553	0.3
Cotton pneumoconiosis	34	0.02
Total	16,315	1.6

standards system was set up in 2002, including mainly the Occupational Exposure Limits for Hazardous Substances at Workplaces, the Industrial Design Hygienic Standards, the Diagnostic Criteria for ODs, Basic Occupational Health Standards.

A formal framework has been set up whereby workers can act directly to protect their own health and safety via two key workplace institutions: trade unions and workers' representative congress.

Enforcement of occupational health and safety

In 1998, the Government of China voted to respect core labor standards of International Labor Organization (ILO), and it is currently working with the ILO to implement a capacity-building project, "Improved Human Resources Development and Management and Labor Management Zones". China is a signatory power in the International Covenant on Economic, Social and Cultural Rights, which protects workers' rights to form trade unions and protect their own health and safety.

Occupational health and safety is officially regulated by the State Administration of Work Safety (SAWS) under the State Bureau of Safety Production Management and Ministry of Health, PRC. There are approximately 100 OH inspection officers in Beijing Institute of Health Inspection and Institutes of Health Inspection at the district and county levels. However, this results in only approximately 1 government inspector for every 6,600 workers exposed to occupational hazards.

New challenges and opportunities in occupational health and safety

New-high technology industries bring new occupational hazards

With the establishment of a capital economy (i.e., a knowledge economy), new-high technology industries and knowledge-intensive services have developed rapidly since 1997. Among these are information technology and related products, optic-mechatronic technology and related products, new biological and medical technologies and related products, new materials technology and related products, new power sources, energy-saving technologies and related products, environmental protection technologies and related products. Therefore, many hazardous agents have been introduced, and there have been many acute occupational poisonings (for example, hydrogen sulfide, methane, thallium, n-hexane and 1,1,1-trichloroethane poisoning, and waterproof coating poisoning,), occupation-related cancers, reproduction/

development-related injuries, and serious allergic reactions.

Stepping out to meet the demands of the World Trade Organization (WTO) for sanitary and phytosanitary (SPS) and Technological Barriers to Trade (TBT) agreement

China's participation in the WTO is a salute to economic globalization and to the SPS and TBT Agreements. The Government of China will hasten to improve its own occupational health and safety standards in keeping with international laws and standards in the interest of free economic development and international trade.

Developing whole quality systems in enterprises

It is necessary to set up enterprises with whole quality systems, which include ISO 9000 (quality management system), ISO14000 (environmental quality management system) and the occupational health quality management system (OHQMS) to promote coordination and sustainable development of the economy, society, resource base, environment, and population in the future.

Implementing a sustainable development strategy

According to the China of the 21st century agenda (1994) promoted by the State Council, PRC, Beijing must ensure a mutual and sustainable development policy for society and the economy, and at the same time protect against environmental pollutants, hazardous agents at workplaces, and conditions that would threaten the health and safety of workers. The Government of Beijing has drawn a Development Plan of Occupational Health and Safety for 2003–2005 and is drawing a Development Program for Occupational Health and Safety for 2010. Exploration and establishment of a new model and functional mechanism for occupational health and safety will be carried out among employment units (including enterprises, career organization, and individual economic organizations), service institutes of occupational health and safety certified by the government, institutes of health inspection authority belonging to the government, trade unions, and departments of occupational injury security.

Olympic games in Beijing in 2008

Beijing will host the Olympic games in 2008. Many construction projects have already been begun, both public and private. There is great potential for a rise in threats to health and the environment. Potential occupational hazards are physical (ventilation, microclimate, electromagnetic radiation), chemical (harmful raw materials and products), and biological factors (viruses, bacteria, fungi, mites).

Developmental Occupational Health and Safety Countermeasures in Beijing

Strengthening the management of occupational hygiene

The management of occupational hygiene in employment units needs to be enforced. According to the LPCOD, the function and responsibility of occupational hygiene are as follows: (1) the establishment of OHQMS; (2) the implementation and enforcement of occupational health and safety law; (3) qualified authentication for technological service organization of OH; (4) ensuring compliance with the standards of occupational health and safety, including the occupational exposure limits and biological exposure index (BEI), the occupational hygiene standards for industrial design and the diagnostic standards of ODs.

It is necessary to establish and improve the archives, databases, and information and techniques in employment units, including the OH structural and organizational data, environmental monitoring and evaluation of hazardous agents, OHS, diagnoses of ODs, hygiene engineering techniques, hazardous agents and the protective measures required for construction projects.

It is important to support internal reforms in China that are critical for protecting workers' health.

Encouraging and supporting the establishment of OHQMS in enterprises

The Government of Beijing encourages and supports employment units establishing OHQMS, in which the following are included: occupational health professionals, an occupational health and safety management system, a plan for prevention and control of occupational diseases, a method for implementation of safety operation rules, a system for detection of hazardous agents, archives of occupational hygiene and OHS, and an emergency response system and first aid measures for actual hazardous incidents.

Promoting research on the prevention and control of ODs

The following aspects are promoted for better research on the prevention and treatment of ODs: to promote the study of rapid and easy-to-use detection techniques for hazardous agents at workplaces; to find biological markers of exposure, health effect, and genetic susceptibility, with the aim of setting up an OHS index for early detection, early diagnosis and early treatment or control; to find alexipharmic drugs and preparations, products for personal protection, and equipment that can decrease and control exposure levels and accelerate detoxification; and to strengthen cooperative studies with foreign countries, international organizations, and

multinational firms that are currently based in China.

Improving transparency in occupational health and safety

To promote transparency, the Government of Beijing encourages firms to use the services of occupational health and safety specialists certificated by the government or third-party monitors to inspect factories and workplaces, and those of their subcontractors.

Under the revised Trade Union Laws and newly enacted workplace safety laws, workers' participation is critical to improving labor conditions and practices. Workers should be involved in the verification of compliance with safety regulations inside factories in protecting their own right to stop work under dangerous conditions, in establishment of health and safety committees, and ultimately in the creation of unions that are responsive to their needs and concerns.

Motivating government to improve regulations

The Government of Beijing provides the political support necessary for strict implementation of labor law, and sends the message down to district and county agencies to increase the human, financial, and technical resources necessary for effective regulatory enforcement. The Government of Beijing also creates the legal and political mechanisms necessary to block downward competition.

Health inspectors in Beijing need to hold the same standards as international auditing firms. The government's capacity to inspect factories and to remedy problems through aid and technical assistance must be strengthened. Political commitment should come before technical capabilities can influence factory conditions. Labor laws need to be enforced, the new Trade Union Laws and Workplace Safety Laws should be given force, and labor inspection must be increased to town and village enterprises, small private enterprises and rural industries, and the capacity and power of labor and health inspectors need to be strengthened.

Developing external occupational health and safety aid programs

In motivating multinational corporations to improve workplace conditions and protect workers' health, multinational firms must be brought into supporting, protecting, and even funding workers' participation and NGO's role in workers' organizations and advancing basic skills in communication and organization, and negotiation as well as in technical knowledge of health and safety risks evaluation.

Conclusion

This paper has briefly introduced the current status of networks and organization for occupational health in Beijing. The diagnostic identification of ODs and the current conditions of OH and OHS have been described, along with ODs personnel, the refitting of industrial structures, classification and regulation, sources of hazardous agents at workplaces. New occupational hazards facing workers in high-technology industries as well as occupational hazards in traditional workplaces have been outlined, along with incident rates and classification of ODs, occupational health and safety laws and the overall enforcement of occupational health and safety in Beijing between 1998 and 2003. To continue the development of occupational health and safety countermeasures in Beijing, we will need to: (1) strengthen the management of occupational hygiene; (2) encourage and support the establishment of OHQMS in enterprises; (3)

promote research on the prevention and control of OH; (4) improve transparency in occupational health and safety; (5) motivate the government to improve regulation and (6) develop external occupational health and safety aid programs.

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