



Biosafety at the Tropical Medicine Institute “Pedro Kourí” (IPK) of Havana

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Abstract

The Tropical Medicine Institute “Pedro Kourí” of Havana (IPK) was founded in 1937. Formerly engaged in parasitology, it has evolved into one of the top institutions in the Cuban Public Health System.

IPK comprises a complex of research laboratories and a 170-bed hospital. It is devoted to infectious and parasitic diseases and involved in research, teaching, reference diagnostic and medical services, special medical care, and epidemiological surveillance of communicable diseases.

The Institute employs about 700 workers who could be potentially exposed to different kinds and levels of physical, chemical, and biological hazards, so we are strongly motivated to employ a group with enough skill and expertise to implement a program to guarantee personnel safety, health, and environmental protection.

Some aspects of the evolution of biosafety in Cuba are described, as biosafety-related activities developed at IPK in the last 15 years and the improvements achieved by the organization are summarized.

Overview of IPK

Founded in 1937 by Professor Pedro Kourí, the Tropical Medicine Institute of Havana occupied the facilities of an ancient city hospital. Formally engaged in parasitological studies, it achieved its pinnacle in the 1940s and 1950s, but for some reason its activity declined sharply by the 1960s. However, its mission was expanded in late 1970s to address the risk of the introduction of exotic diseases as a consequence of growing Cu-

ban exchanges with many third-world countries from Africa and Latin America and to cooperate with these countries in controlling tropical diseases. At this time, the Tropical Medicine Institute took the name of its founder, who had died some years before after making outstanding contributions to the fields of parasitology and tropical diseases.

The Tropical Medicine Institute “Pedro Kourí” (IPK) is a public health institution devoted to infectious and parasitic diseases and involved in research, teaching, reference diagnostic and medical services, special medical care, and epidemiological surveillance of communicable diseases. It consists of two main areas: a complex of research laboratories and a 170-bed hospital.

The complex of research laboratories includes 1) the National Reference Microbiology Lab: virology, bacteriology-mycology, tissue culture, and general services, plus an adjoining building housing a BSL3+ lab for special diagnostic services (presently under construction) and 2) The National Reference Parasitology Lab: parasitology, vector control, animal house, and insectary.

The hospital also is a National Reference Service for AIDS diagnosis and treatment and has: 1) eight medical wards (166 beds) and an ICU (four beds); 2) diagnostic laboratories: clinical, microbiology, pathology, and pharmacology; 3) other diagnostic services such as radiology, endoscopy; and 4) outpatient services.

Many common services are provided to both the research laboratories and the hospital, e.g., energy supply, laundry, solid waste disposal, incinerator, liquid waste treatment plant, etc.

In general, IPK has about 700 workers and they,

like in most health care centers, are exposed to different kinds and levels of physical, chemical, and biological hazards (Gestal, 1993). Laboratory workers usually handle infectious substances and diagnostic specimens while performing research or diagnostic activities and can potentially be exposed to biological hazards. Hospital personnel and occasionally other workers from the Institute could be in contact with patients and/or clinical samples that may result in exposure to bloodborne pathogens (human immunodeficiency virus [HIV], hepatitis B virus [HBV], hepatitis C virus [HCV], etc.) and tuberculosis (mainly), but also to several more pathogens as a consequence of their jobs.

Additionally, the IPK participates in scientific and academic exchanges with national and international organizations. The institution receives many visitors, researchers, students, and trainees from countries all over the world. Its objective is to employ staff with enough skill and expertise to guarantee personnel safety, health, and environmental protection.

Background of Biosafety in Cuba

For many years, isolated scientific leaders in some microbiology laboratories were concerned about occupational biological hazards. They took some empirical safety measures to protect their own staff, but this did not occur in a comprehensive or organized manner.

In the mid-1960s Cuba experienced accelerated and intense scientific development, particularly in biomedical sciences. Hospitals increased in number and the variety of services and Cuba's public health laboratory network were expanded. New research centers were constructed and staffed, and a growing biotechnological and pharmaceutical industry was established. These advances and expansions in health care, research, and biotechnology also led to the potential for increased exposure to new or more biohazardous materials.

In the early 1980s, a very small group of researchers, representative of the Cuban scientific centres, formed the Biological Front, an organization under the Cuban Academy of Sciences and the progenitor of the present complex known as the Scientific Pole of Western Havana. They formed a taskforce to face the challenge of developing and implementing a comprehensive biosafety program.

In 1983, the Cuban Academy of Sciences conduc-

ted a survey to explore staff knowledge about biosafety in the 10 most representative research institutions. The results obtained were poor. Afterwards, the first biosafety courses were established to disseminate knowledge, sensitize people to the importance of biosafety, and create a culture regarding this subject. An exiguous group of novice biosafety specialists started looking at project designs for new investments from a biosafety perspective.

At the same time there was an attempt to develop laws and regulations regarding biological safety throughout the country. However, this effort was not successful and many initial efforts were marked with very few accomplishments and many difficulties. It was under these circumstances in the 1980s that the development of a national biosafety program began.

Recently, the importance of the discipline of biosafety has received additional support from high levels. Following a review of the comprehensive and coordinated knowledge in the area of biosafety, the Cuban government now appreciates its importance. As a state party, and having obligations to the Biological and Toxin Weapons Convention (Convention, 1992) and those derived from the BTWC Third Review Conference in 1990, the government has placed increased emphasis on the development of robust biosafety professionals in Cuba.

In the five-year period between 1991 and 1996, important results were achieved. In those years, specialists working in this field increased in number and diversity, forming true multidisciplinary groups, looking not only to issues of human safety but widening their scope to animal and plant biosafety.

In addition, national courses on biosafety have been implemented annually. At technical schools and universities, programs from different specialities have incorporated biosafety issues into their curriculum. We have been working to develop a national biosafety culture and trying to disseminate biosafety information and skills nationwide to occupations and activities where biological hazards are present.

The National Center for Biological Safety (NCBS) was created in 1996 (CITMA, 1996) to be a consultative scientific body and national authority that regulates and ensures compliance in all areas related to biological safety in Cuba. In addition, recently approved Cuban laws and regulations (CITMA, 1999 a, b; CITMA,

2000) create a rational basis to organize biosafety issues throughout the country. We believe Ministries and institutions should work to accomplish this goal in a proper manner and a reasonable time frame.

In the last few years, relationships with other organizations have been established and are increasing. Some of our specialists have had the opportunity to participate in different organizations, conferences, and events. Moreover, biosafety has become influential in solving problems of biodiversity, quality control, medical care, and other activities and aspects of the social and economic life in the country.

Main Achievements at IPK

Our general objective was to develop a comprehensive safety and occupational health program at the Tropical Medicine Institute "Pedro Kouri." To achieve this goal we have worked in a variety of areas and tried different approaches.

Since for many years attempts to organize biosafety at IPK were unsuccessful, in early 1996 we visited the Office of Health and Safety at the CDC and discussed various aspects of biosafety. After returning to IPK we conducted studies to develop and implement a biosafety program there. We established a biosafety group that has evolved into the Department of Safety and Occupational Health, which is staffed by eight individuals:

- Department Chief
- Physical/Chemical/Radiation/Fire and Environmental Safety Group: two specialists
- Biological Safety Group: one MD/microbiologist, one technician in hygiene and epidemiology and one vector control worker
- Occupational Medicine Group: one physician and one nurse

General Activities

We initiated an aggressive teaching and training program with our instructors often rapidly learning new biosafety information and then teaching it. Although we have been organizing local biosafety courses since 1983, recently we have greatly expanded our initial training program to include many other teaching activities.

We offer many biosafety courses and training classes. Every year internal biosafety courses are provided

for IPK personnel and are specific for requirements at IPK. Annually, an official course is offered to personnel from a wide array of outside institutions (public health laboratories, research institutions, production facilities, etc.), professionals who may work with biohazardous material (medical doctors, nurses, biochemists, biologists, engineers, etc.), and individuals who may have limited experience working with biohazards (technicians, undergraduate students, residents, post-graduates). In addition to providing technical information, the course curriculum also covers a wide variety of topic areas including program administration, development, and support as well as applications in health care and research settings. These courses are attended by national and international participants.

We also provide teaching modules required to earn a master's degree in biosafety. This graduate-level degree is sponsored by the NCBS. In addition, we provide annual infection control courses at IPK for microbiology residents and students involved in earning a master's degree in infectology. Finally, we provide training and tutorial classes and exercises for individuals earning diplomas and thesis of residence in microbiology. IPK is strongly committed to teaching and providing training to students seeking professions in biosafety and medicine.

The Department of Safety and Occupational Health is also responsible for conducting risk assessment in all areas of the facility. We review occupational incidents, accidents, and disease records in the institution and its different programs and make recommendations to prevent further incidents. Technical experts observe working conditions and practices, and conduct inspections, audits, and inquiries. The department is responsible for writing manuals, guidelines, and other safety-related documents.

We consider biosafety and infection control in many ways as being "two sides of the same coin." We work very closely with the hospital epidemiologist and the infection control nurse, strengthening relationships between those activities and biosafety activities at IPK. We promote the development of similar work relationships and goals in other hospitals and medical care settings. Two people from our staff also belong to the Infection Control Committee for the IPK hospital. Together we have implemented Universal Precautions (Fernández, 1998) and a tuberculosis control plan for

the hospital (Borroto et al., 2000) to assess the ventilation modifications made in the ICU at the IPK hospital and to design and establish an inpatient isolation unit for cholerae vaccine clinical trials, etc.

Currently we are preparing for the commissioning of a BSL3+ laboratory that is presently under construction. We are developing a number of programs that will be used in commissioning the facility and will be integral to facility operations and personnel work requirements. Several programs and protocols are focused on aspects of technical containment and personal and environmental protection. The certification program for biological safety cabinets and high efficiency particulate air filters has recently started.

We have also developed a program to control solid waste treatment and disposal as well as provide for environmental controls regarding the liquid waste treatment plant. Similarly, the vector control program has been implemented not only to provide better working conditions in the facility, but also to prevent the inadvertent egress of potentially contaminated vectors.

Some of our programs are directed at strengthening our existing personal protection programs. Individuals working with pathogens or in occupations that may place them at risk of exposure will participate in our newly established medical surveillance and vaccination program.

An Institutional Biosafety Committee was recently created to deal with the review and approval of research protocols and other biosafety issues.

The implementation of the safety and oHealth program at IPK has directly resulted in achieving a balance in providing adequate levels of personnel safety and health and environmental protection in the facility, while raising the performance in biosafety to a higher level in accordance with international standards (Richmond & McKinney, 1999; WHO, 1993). This has indirectly resulted in improving the quality of all services offered by IPK, and we hope this program serves as a model for similar institutions in other developing countries.

Lessons Learned and Advice

We have found that in order to grow and excel in biosafety it is important to interact with biosafety experts in other organizations. As such, we attend training and educational courses from several sources. In

1984, when present facilities were under design, we received a short advisory visit from two skilled and well-known specialists representing WHO's Special Program of Safety Measures in Microbiology. They made a number of valuable suggestions which we have tried to implement in our current program. Additionally, after many years of requesting budget funds, we have been successful in participating in biosafety courses in Canada/LCDC (1993) and U.S./Johns Hopkins (1994). At present, one of our biosafety specialists is pursuing a master's degree course in biosafety in Cuba.

To further strengthen national biosafety capabilities we have developed a robust collaboration program with other institutes in Cuba that includes:

- Teaching and attending regional and provincial courses for PHL in the country
- Participating in courses organized by the National Center for Biological Safety (CNSB), Faculty of Biology/Havana University, Genetic Engineering and Biotechnology Center (CIGB), National Center for Scientific Research (CNIC), pharmaceutical industries, and others
- Providing biosafety advisory activities to different national institutions

Our Department of Occupational Safety and Health provides service to our country at the highest levels. We participate as members of the following national groups:

- Technical Advisory Group on Biosafety for the National Center of Biological Safety, Ministry of Science, Technology & Environment (CITMA), Cuba
- National Commission on Biosafety for the Ministry of Public Health, Cuba
- National Technical Advisory Group for the Biological Warfare Convention under the Ministry of Foreign Affairs, Cuba

We are also involved in a number of international activities. These include:

- Advisory activities in biosafety to Nicaragua/CNDR (1987, 1989, and 1994) and Guatemala/LNS (1999)
- ABSA membership: One person since 1994. ABSA has become a personal source of inspiration, knowledge, friendship, and support.
- Attendance at the 4th and 6th National Symposia on Biosafety

- Participation in the meeting of the Biosafety Advisory Group, Washington, DC (PAHO/AMRO, 1997)
- Scientific visits to CDC/OHS and Harvard School of Public Health

Conclusion

Cuba's biomedical and biotechnical industries have grown and developed into diverse industries. The complexity of public health services has likewise grown rapidly. These changes and advances required us to regard subjects like safety, hygiene, and environmental health as first priority actions to guarantee the protection of our personnel, the community, and the environment.

Despite some difficulties, many economic restraints, and lack of expertise in some areas, we have worked intensely and enthusiastically for more than 15 years to improve biosafety in Cuba. We have achieved a modest but important level of success in our facilities and are seeing some success nationwide. There is still too much work to be done in order to achieve the complete, harmonized, and integrated development of Biosafety in Cuba as a country, and particularly at IPK, but it can not wait longer. We believe: "Biosafety is not an option. It is a crucial need for the development of biological sciences that can not be postponed."

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