Course Learning Outcomes for Unit VII

Upon completion of this unit, students should be able to:

4. Discuss the management of industrial hygiene issues from the perspectives of anticipation, recognition, evaluation, and control.
   4.1 Outline the basic exposure mechanisms for biological agents.
   4.2 Describe methods of evaluation and control for biological agents.
   4.3 Describe methods of sampling for biological agents.

5. Identify occupational health hazards that may exist in the workplace, including ergonomic, chemical, biological, radiological, and physical hazards.
   5.1 List the various types of biological agents and give examples of each.

Reading Assignment

Chapter 5: Biological Hazards

Unit Lesson

By this point in the course, you should be familiar with the practice of industrial hygiene and what it encompasses. As this course has shown, chemicals are the most common type of hazardous material encountered by the practicing industrial hygienist. In addition, this course has shown that some types of physical hazards, such as radiation, are very specialized and require additional education and training. Another specialized type of hazardous material will be discussed in this unit: biological agents.

History of Biosafety

As Charlton points out, the discipline of biosafety is only 50 years old! In that time, there has been an exponential growth in the knowledge of the biological sciences, including human medicine (as cited in Haight, 2012). In addition, you must consider the trends that are occurring relative to morbidity (the number of diseases in a population) and mortality (the number of deaths in a population). In general, people are living longer, healthier lives. Technology associated with the healthcare industry has allowed medical professionals to diagnose and treat a myriad of illnesses with unprecedented accuracy. As research in the healthcare field has increased, it is no wonder that the tenets of industrial hygiene (anticipation, recognition, evaluation, and control) have been applied to the world of biological hazards.

In terms of knowledge and education, a person that specializes in biosafety will most likely have a more specific and advanced education and training than an individual who trained as a traditional industrial hygienist. (This is similar to radiological hazards and the health physicist discussed in Unit VI). In fact, in order to sit for the exam to become a certified biological safety professional (CBSP), the American Biological Safety Association (ABSA) (n.d.) requires any of the following qualifications:

- Master's degree or doctorate with 30 semester hours or 45 quarter hours in microbiology AND four (4) years within the past seven full-time, post-baccalaureate experience as a professional with at least 50% time spent in biosafety program management.
- Bachelor's degree (BS or BA) with 20 semester hours or 30 quarter hours of microbiology AND seven (7) years within the past ten full-time, post-baccalaureate experience as a professional with at least 50% time spent in biosafety program management.
• Bachelor's degree (BS or BA) with 6 semester hours or 9 quarter hours of microbiology AND fifteen (15) years within the past twenty full-time, post-baccalaureate experience as a professional with at least 50% time spent in biosafety program management. (para. 2)

Clearly, the type of organization and the associated work activities involving biological agents will dictate the need for a biosafety professional. That being said, there are several elements of emergency preparedness that may have a biological agent component to them and, therefore, would affect the industrial hygienist or traditional safety professional.

Emergency Response

The Occupational Safety and Health Administration (OSHA) requires all organizations to have an emergency preparedness plan that is essentially a compilation of procedures that cover response actions to a variety of different types of emergencies. A significant topic that must be addressed is emergency medical response when an employee is injured or simply gets sick at work. Some organizations are so large in terms of number of employees that there may be a company nurse on staff. Other organizations might train a small number of employees in first aid and cardiopulmonary resuscitation (CPR) and ask them to respond to a situation.

In either case, the organization will need to comply with OSHA’s Bloodborne Pathogen Standard. Charlton (as cited in Haight, 2012) does a great job of providing an overview of the standard, but a few additional comments are appropriate. A key part of the standard is its applicability to those reasonably expected to come into contact with potentially infectious materials. Of course, this would obviously include any medical or emergency response personnel but may also include the safety professional or industrial hygienist (who might participate in a response involving blood) as well as a plumber (who may come into contact with potentially infectious materials in raw sewage).

OSHA’s Bloodborne Pathogen Standard is one of a handful of OSHA regulations that mandate annual refresher training. Another issue that comes up is related to the hepatitis B vaccination, which is required to be offered to all employees with reasonable potential to be exposed to infectious agents. It is interesting to note that hepatitis B and C are generally considered to be a more serious threat in an occupational setting than human immunodeficiency virus (HIV). According to the Centers for Disease Control (n.d.), there were a total of 38 outbreaks (20 of hepatitis B and 18 of hepatitis C) of viral hepatitis related to healthcare between 2008 and 2013. Of course, hepatitis C may be considered the more dangerous of the two because there is no preventative vaccination available.

Another issue that comes up related to emergency medical response capabilities is liability. The typical scenario is as follows: An employee gets injured at work. A fellow employee, acting in the capacity of a volunteer emergency medical responder, provides treatment that results in the injured employee suffering additional injuries. Is the volunteer emergency medical responder liable? In this case, since the person was a volunteer (and not required to provide a response as a part of their job), they were acting as a good samaritan and would most likely not be held liable. Note: Laws differ from state-to-state.

Biosecurity

A discussion of biosecurity is included in this unit because it is one of the most contemporary topics of discussion related to the hazards of biological agents.

When biosecurity is discussed, you must first understand the scope of what is covered by the term. The Food and Agricultural Organization of the United Nations (n.d.) has an excellent definition:

Biosecurity is a strategic and integrated approach that encompasses the policy and regulatory frameworks (including instruments and activities) that analyze and manage risks in the sectors of food safety, animal life and health, and plant life and health, including associated environmental risk. Biosecurity covers the introduction of plant pests, animal pests and diseases, and zoonoses, the introduction and release of genetically modified organisms (GMOs) and their products, and the introduction and management of invasive alien species and genotypes. Biosecurity is a holistic concept of direct relevance to the sustainability of agriculture, food safety, and the protection of the environment, including biodiversity. (para. 1)
While the Occupational Safety and Health Administration (OSHA) is the primary federal agency when it comes to occupational safety, it is mindboggling to think that biosecurity issues might involve interactions with the Department of Homeland Security, the Food and Drug Administration, or the Environmental Protection Agency just to name a few. Consider for a moment where a terrorist organization attempts to wreak havoc by purposefully contaminating the nation’s food supply with some sort of highly toxic biological agent! That is a pretty scary thought and part of the reason why there has been an emergence of new regulations related to biosecurity such as the Bioterrorism Act of 2002.

References


Suggested Reading

The Centers for Disease Control and Prevention offers a great discussion of bioterrorism: