

EDITORIAL

Recognizing and Preventing Occupational Health Hazards: A Critical Need for a Competent and Trained Healthcare Workforce and A Robust Public Health Surveillance System

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Occupational and Environmental Health involves a multidisciplinary approach aimed at identifying, diagnosing, treating, and preventing illnesses, injuries, and adverse health conditions that arise due to exposure to hazardous environmental factors in the workplace.¹ Review of literature indicates that there is a broad and extensive list of occupational and environmental safety and health hazards. This editorial will not address all the existing hazards that are inherently linked with various occupations. However, it is critically important to recognize these occupational health hazards and develop a systematic approach in establishing prevention program. In general, occupational safety and health hazards can lead to injuries stemming from various sources, such as electrical, thermal, chemical, or radiation energy. Some fundamental examples include hazardous equipment, accidents involving motor vehicles, exposure to unprotected electrical sources, and working at elevated heights without adequate fall protection measures. The list of Occupational Health Hazards can be classified under the following categories.¹

1. Chemical hazards encompass a range of substances, including heavy metals, pesticides, and organic solvents.
2. Physical hazards refer to environmental factors or conditions that can potentially cause harm or injury at the workplace. Commonly found physical hazards include slip and trip hazards, confined Spaces, electrical hazards, fire and explosion, noise, vibration, and radiation.
3. Biomechanical hazards are present in the workplace as well. They include activities such as lifting heavy

objects and performing repetitive or forceful movements, which can lead to musculoskeletal disorders such as low back pain, strains, and sprains.

4. Biological hazards are ubiquitous within the healthcare sector. Healthcare workers must be educated and protected from bloodborne pathogens such as human immunodeficiency virus (HIV), hepatitis B, hepatitis C, Influenza, SARS CoV-2. Additionally, there are other contagious bacteria, including *Mycobacterium tuberculosis*, Methicillin-resistant *Staphylococcus aureus* (MRSA), *Streptococcus pyogenes*, vancomycin-resistant enterococci (VRE), and *Bordetella pertussis*, all pose significant risks.

5. Certain recognized psychosocial hazards that have the potential to adversely impact work productivity are frequently observed in high-stress workplaces with limited control, among shift workers, and in environments lacking appropriate accommodations.

Preventing Occupational and Environmental Illnesses and Injuries

The healthcare workforce should receive training in conducting comprehensive occupational and environmental assessments to identify potential workplace hazards. This practice will enable early detection and treatment of work-related health issues. Additionally, it facilitates the implementation of prevention strategies and policies through the establishment of a robust public health surveillance program. These strategies are well-aligned with the three-level prevention approach in clinical medicine, and they can be effectively implemented in various workplace settings. For instance:

Primary Prevention	To avoid all types of injuries and illnesses at the forefront.
Secondary Prevention	Focuses on identifying and treating issues impacting workers to prevent the progression of a work-related illness and reducing the severity of injuries. This can be accomplished through screening, ongoing monitoring, and the establishment of educational programs. The overarching objective of secondary prevention is to prevent the progression of a disease, reduce its severity, and improve health outcomes.
Tertiary Prevention	Focused on treatment and rehabilitation. This level of prevention is used in managing complications resulting from work-related injuries and illness. After detecting the workplace hazard, it is important to continue to monitor and follow-up to limit the workplace exposures.

Another well-established preventive approach is the application of Prevention Pyramid also known as the “Hierarchy of Controls” at workplace settings. Figure-1 describes the hierarchy of controls which is a systematic approach used in occupational and environmental health and safety to prioritize and implement measures for reducing or mitigating hazards. It consists of a sequence of steps or preventive strategies, typically organized from most effective (base) to least effective (apex) in minimizing risks.²

1. Elimination:

At the top of the hierarchy is elimination. This is the most effective method since it involves the physical removal of the hazard directly from its source. For example, after eliminating a hazardous chemical from the process, the risk of exposures is entirely removed, ensuring worker's safety.

2. Substitution:

This method is based on replacing the hazard with a safer alternative. The goal of an effective substitution is to reduce the potential for harmful effects on workers. An example would be substituting a toxic cleaning agent with a non-toxic one to lower the risk of exposure.

3. Engineering controls:

These types of controls modify the workplace by isolating workers from workplace hazardous exposures. For example, modifying equipment by installing machine guards, employing protective barriers, or implementing noise enclosures. These control methods effectively prevent exposure at the source.

4. Administrative controls:

When applied, administrative controls modify work practices or procedures to reduce the frequency, duration, or intensity of hazardous exposures. Workers receive relevant and timely information through appropriate procedures, training, or warnings. Effective strategies include actions such as implementing shift rotation, adjusting work schedules, conducting pre and post-task evaluations, and limiting access to hazardous areas or machinery.

5. Personal protective equipment (PPE):

This represents the tip of the pyramid and is the least effective control method in reducing the direct impact of hazardous exposures. Examples of personal protective equipment (PPE) encompass safety goggles, respirators, hearing protectors (earplugs, canal caps, and earmuffs), and protective clothing.

As outlined above, the hierarchy of controls serves as a structured framework to guide decision-making in promoting occupational safety and health. Organizations should prioritize implementing controls at the upper levels of the hierarchy, such as elimination substitution, and engineering, before considering lower-level controls like administrative, or PPE measures. This systematic approach aids in reducing risks and creating safer work environments.

Importance of Occupational Health Surveillance and Reporting Systems

Occupational health surveillance entails the continuous and systematic collection, examination, and interpretation of occupational data with the aim of

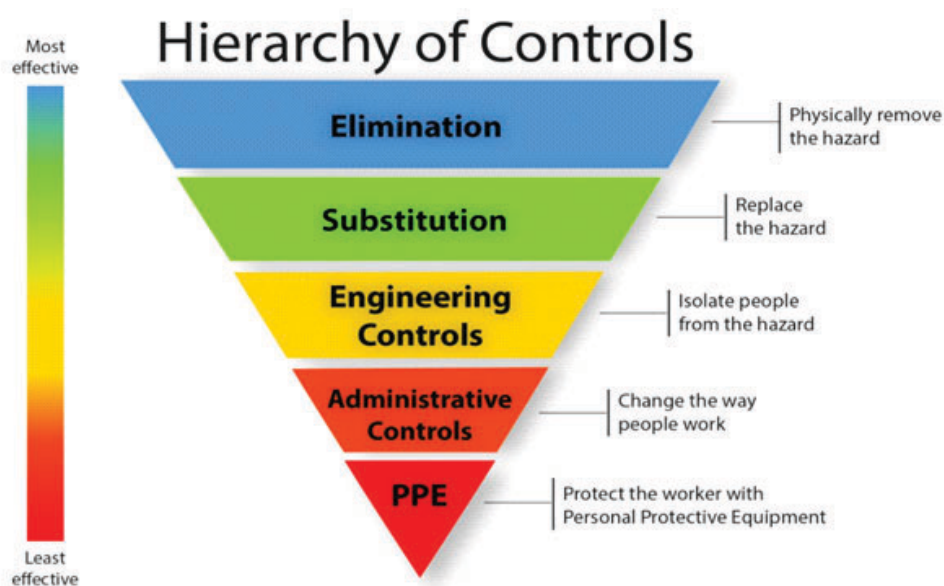


Figure 1: Source: Image by the National Institute for Occupational Safety and Health (NIOSH) <https://www.cdc.gov/niosh/topics/hierarchy/>

enhancing health outcomes related to work, including injuries, illnesses, and fatalities.

To establish an occupational and environmental health surveillance program, following objectives must be met¹²

Objective # 1	Defining the most prevalent health hazard and the occupational and environmental injuries and illnesses associated with them.
Objective # 2	Identification of the most susceptible workplaces and occupations requiring targeted intervention.
Objective # 3	Assessing the impact of safety promoting workplace interventions.

In terms of reporting, both case-based and population-based surveillance systems are essential tools in preventing and mitigating work-related injuries and illnesses. Case-based surveillance entails the continuous and timely identification of individual cases as a sentinel health event. However, population-based surveillance involves gathering data within a defined population across various timeframes, locations, and demographic characteristics.

Passive vs. Active Occupational Health Surveillance Systems

A passive surveillance system relies on the submission of reports on work-related injuries and illnesses to a public health agency. In contrast, active surveillance takes a more proactive and vigorous approach to identifying cases. While it can be more expensive and resource-intensive, active surveillance is particularly essential in healthcare system. Furthermore, these surveillance systems ensure that employers are devoting all their efforts to educate their workforce and providing adequate tools and resources to establish safe work environment while reporting occupational hazards.

Within the United States, there are well-established public health reporting systems intended for the identification of case-based surveillance related to occupational disorders. There is a strong push to include Occupational Data for Health (ODH) within the Electronic Health Records (EHR). ODH represent a framework for acquiring self-reported, structured, and standardized information pertaining to a patient's occupation. Hence, it provides relevant information during clinical encounter and is designed for supporting patient care, population health, and public health.³ Another system called Sentinel Event Notification System for Occupational Risks (SENSOR) is a program developed by the CDC's NIOSH to monitor and track work-related injuries, illnesses, and hazards.

It operates on a state level and provides pertinent data regarding occupational health and initiatives for prevention.⁴

In developing nations such as Pakistan, several critical sectors of the economy, including construction, agriculture, mining, and healthcare, encounter notable difficulties stemming from the absence of occupational and environmental safety initiatives.⁵ Moreover, there is no comprehensive national framework in place for reporting occupational injuries and work-related fatalities, and a substantial portion of both fatal and non-fatal accidents go unreported to the labor department.⁶

Training programs that incorporate multidisciplinary approaches can empower clinical providers with comprehensive expertise, enabling them to deliver evidence-based care for work-related issues.⁷ Furthermore, graduates of such programs will gain a deeper understanding of workplace dynamics, potential hazards, and the interplay between individual risk factors and occupational health outcomes.

In summary, emphasizing the importance of recognizing and preventing occupational illnesses and injuries is crucial, making them top priorities. Healthcare professionals in the 21st century must undergo comprehensive training to proficiently identify, diagnose, treat, and prevent these work-related health issues.⁸ As a result, it becomes imperative for both public and private medical colleges and universities to incorporate core competencies in Occupational and Environmental Medicine (OEM) into their academic curriculum. These actions will heighten awareness about occupational health hazards and facilitate the development of post-graduate training programs. Only through these measures can we establish a well-trained and competent healthcare workforce capable of adeptly recognizing occupational hazards and effectively utilizing a robust public health surveillance system at every stage of the prevention model.

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