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The Occupational Safety and Health Administration (OSHA)

Attestation Form

My signature below confirms that I have reviewed the Introduction to OSHA training material and understand that it is my responsibility to comply with the specific policies and standards of the facility where I am assigned to for my clinical placement.

Student Signature

Date

Print Name

**Please Note: This page must be signed, dated, and uploaded in
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An Introduction to OSHA

With the Occupational Safety and Health Act of 1970 (OSH Act), Congress created the Occupational Safety and Health Administration (OSHA) to ensure safe and healthful working conditions for working men and women by setting and enforcing standards and by providing training, outreach, education, and assistance (OSHA,2020).

OSHA is part of the United States Department of Labor. The administrator for OSHA is the Assistant Secretary of Labor for Occupational Safety and Health. OSHA's administrator answers to the Secretary of Labor, a member of the President of the United States (OSHA,2020).

The OSH Act covers most private sector employers and their workers and some public sector employers and workers in the 50 states and certain territories and jurisdictions under federal authority. Those jurisdictions include (OSHA,2020):

1. The District of Columbia
2. Puerto Rico
3. Virgin Islands
4. American Samoa
5. Guam
6. Northern Mariana Islands
7. Wake Island
8. Johnston Island
9. The Outer Continental Shelf Lands as defined in the Outer Continental Shelf Lands Act

Employers must also comply with the General Duty Clause of the OSHA Act of 1970. This clause requires employers to keep their workplaces free of serious recognized hazards and is generally cited when no specific OSHA standard applies to the hazard. OSHA covers most private sector employers and workers in all 50 states, the District of Columbia, and other US jurisdictions directly through Federal OSHA or through an OSHA-approved state program (as listed above). State-run safety and health programs must be at least as effective as the Federal OSHA program. Federal OSHA does not cover state and local government workers, but they have protections in states that operate their programs (OSHA,2020).

It is essential to understand what Employers must follow according to OSHA standards (OSHA,2020):

- Follow all relevant OSHA safety and health standards
- Find and correct safety and health hazards
- Inform employees about chemical hazards through training, labels, alarms, color-coded systems, chemical information sheets, and other methods

- Notify OSHA within 8 hours of a workplace fatality or 24 hours of any work-related inpatient hospitalization, amputation, or loss of an eye. Contact information for notifying OSHA is 1-800-321-OSHA or www.osha.gov/report_online
- Provide required personal protective equipment (PPE) at no cost to workers
- Keep accurate records of work-related injuries and illnesses
- Post OSHA citations, injury and illness summary data, and the OSHA Job Safety and Health, “It is the Law” poster where they are visible to all employees
- Not retaliate against any worker for using their rights under the law

A Note About Employer Responsibility & Personal Protective Equipment (PPE) in the New Viral Outbreak Era

With the emergence of novel viral outbreaks, such as COVID-19, from the coronavirus category of viruses, it is important to know that employers must pay for most types of required personal protective equipment (e.g., PPE) under American law (OSHA,2020).

“There is No Such Thing as an Accident, only a Failure to Recognize the Hand of Fate,” Napoleon Bonaparte.

Every time an individual decides to leave the comfort and control of their home environment and enter the work sphere, there are risks. Every American needs to know their rights under American law. Employees have the right to (OSHA,2020):

- Working conditions that do not pose a risk of serious harm
- Receive information and training (in a language that the workers can understand) about chemical and other hazards, methods to prevent harm, and OSHA standards that apply to their workplace
- Review records of work-related injuries and illnesses
- Obtain copies of test results performed to find and measure hazards in the workplace
- File a complaint asking OSHA to inspect their workplace if they believe there is a serious hazard or that their employer is not following OSHA rules
- Request that identity remains confidential
- Use their rights under the law without retaliation. If an employee is fired, demoted, transferred, or retaliated against for using their rights under the law, they can file a complaint with OSHA. This complaint must be filed within 30 days of the alleged retaliation

While OSHA may not be able to protect every worker from every possible accident or scenario, OSHA standards are created in order to establish a system from which risk, hazard, and responsibility may or may not be applicable.

Specifically, OSHA standards describe the methods employers are legally required to follow to protect their workers from hazards (OSHA,2020). Before OSHA can issue a standard, it must go through a very extensive and lengthy process that includes substantial public engagement, notice, and comment (OSHA,2020). The agency must show that a significant risk to workers exists and that there are feasible measures employers can take to protect their workers (OSHA,2020).

Construction, General Industry, Maritime, and Agriculture standards protect workers from many serious hazards. These standards limit the amount of hazardous chemicals workers can be exposed to, require certain safe practices and equipment, and require employers to monitor certain workplace hazards (OSHA,2020).

Examples of OSHA standards include (OSHA,2020):

- Requirements to provide fall protection
- Prevent trenching cave-ins
- Prevent exposure to some infectious diseases
- Ensure the safety of workers who enter confined spaces
- Prevent exposure to such harmful substances as asbestos and lead
- Put guards on machines
- Provide respirators or other safety equipment
- Provide training for certain dangerous jobs

Few workplaces are as complex as a healthcare facility. Such complex situations provide a lot of potential health and safety hazards (OSHA,2020). Compared with the total civilian workforce, hospital workers have a greater percentage of workers' compensation claims for sprains and strains, infectious and parasitic diseases, dermatitis, hepatitis, mental disorders, eye diseases, influenza, and toxic hepatitis (OSHA,2020).

Potential hazards include radiation, toxic chemicals, biological hazards, heat, noise, dust, and stress (OSHA,2020). The risks and exposures for blood and body fluids are important but not included in this course. Information about the risks and exposures to blood and body fluids are available in a separate course entitled [OSHA: Occupational Exposure to Blood and Body Fluids](#), at www.CEUFast.com.

Antineoplastic & Other Hazardous Drugs for the Healthcare Professionals

All healthcare facilities are required to have detailed information about the chemicals at the worksite. This information is in a standard format called a Material Safety Data Sheet (MSDS) (OSHA, 2020b).

The Material Safety Data Sheet (MSDS)

A typical MSDS will include the following sections (OSHA, 2020b):

1. Product and Company Identification
2. Hazards Identification
3. Composition/Information on Ingredients
4. First Aid Measures
5. Fire-Fighting Measures

6. Accidental Release Measures
7. Handling and Storage
8. Exposure Controls/Personal Protection
9. Physical and Chemical Properties
10. Stability and reactivity
11. Toxicological Information
12. Ecological Information
13. Disposal Considerations
14. Transport Information
15. Regulatory Information
16. Other Relevant Information for that chemical

The MSDS should be readily available to every worker. Access to the MSDS allows every worker to educate himself about the chemicals at the worksite (OSHA, 2020b).

Chemicals may exert either acute or chronic effects on workers. The effects depend on the extent (concentration and duration) of exposure, the route of exposure and the physical and chemical properties of the substance (OSHA, 2020b).

The effects exerted by a substance may also be influenced by the presence of other chemicals and physical agents or by an individual's use of tobacco, alcohol, or drugs (OSHA, 2020b).

The exposure dose is the amount of a substance that enters the body during exposure (OSHA, 2020b). The substance continues to be present in the body until it is metabolized or eliminated. Although some chemicals metabolize rapidly, others are not and might be excreted unchanged or stored in the fatty tissues (solvents), lungs (dust and fibers), bone (lead and radium), or blood (soluble gases) (OSHA, 2020b).

Toxic substances can enter the body through several routes, including the intact skin, the respiratory system (inhalation), the mouth (inhalation and ingestion), the eyes, and accidental needle punctures (OSHA, 2020b). Inhalation and skin exposure are the most likely (OSHA, 2020b).

Some substances can also damage the skin or eyes directly without being absorbed. Not all substances can enter the body through all routes. Inorganic lead, for example, can be inhaled or swallowed, but it does not penetrate the skin (OSHA, 2020b).

Exposures routes for antineoplastic and other hazardous drugs are inhalation, skin absorption, ingestion, and injection (OSHA, 2020b).

Although exposure to hazardous drugs and antineoplastics can put the healthcare worker at risk, there are guidelines for handling these drugs safely (OSHA, 2020b).

The National Institute of Occupational Health and Safety's (NIOSH) New Guidelines

The National Institute of Occupational Health and Safety (NIOSH) released new guidelines, in 2016, about the handling of antineoplastic and other hazardous drugs (OSHA, 2020b).

NIOSH warns that exposure to hazardous drugs may occur to clinical and non-clinical workers in the following settings (OSHA, 2016):

- During reconstitution of powdered or lyophilized drugs and further dilution of either the reconstituted powder or concentrated liquid forms of hazardous drugs
- When aerosols are generated by expelling air from syringes filled with hazardous drugs or during the administration of drugs by intramuscular, subcutaneous, or intravenous routes
- When dust is generated through counting out individual uncoated oral doses and tablets from multi-dose bottles or unit-dosing uncoated tablets in a unit-dose machine, presenting a possible inhalation hazard
- When crushing tablets to make oral liquid doses, thus presenting potential inhalation and dermal exposure
- When compounding potent powders into custom dosage capsules
- When measurable levels of drugs are present on drug vial exteriors, work surfaces, floors, final drug products (bottles, bags, cassettes, and syringes), and when airborne droplets of the drug are generated during reconstitution
- When aerosols are generated during the administration of drugs, either by direct IV push or by IV infusion
- When handling body fluids, clothing, dressings, linens, and other materials contaminated with body fluids by a hospital or home health personnel working with patients treated with hazardous drugs
- Through the handling of contaminated waste generated at all steps of the preparation and administration process
- When specialized procedures (intraoperative intraperitoneal chemotherapy) are performed in the operating room
- When handling unused hazardous drug waste, hazardous drug-contaminated waste, decontaminating and cleaning drug preparation or clinical areas, and transporting infectious, chemical, or hazardous waste containers
- When removing and disposing of PPE used during the handling of hazardous drugs or waste

NIOSH defines the healthcare workers' responsibilities in relation to antineoplastic and other hazardous drugs as the following (OSHA, 2016):

- Review guidance documents (e.g., the MSDSs) and other information resources for hazardous drugs handled
- Be familiar with and be able to recognize sources of exposure to hazardous drugs
- Prepare these agents in a dedicated area where access is restricted to authorized personnel only
- Prepare these agents within a ventilated cabinet designed to protect workers and adjacent personnel from exposure and to provide product protection for all drugs that require aseptic handling
- Use two pairs of powder-free, disposable chemotherapy gloves, with the outer one covering the gown cuff whenever there is the risk of exposure to hazardous drugs
- Avoid skin contact using a disposable gown made of a low-lint and low permeability fabric. The gown should have a closed front, long sleeves, elastic or knit closed cuffs, and should not be reused

- Wear a face shield to avoid splash incidents involving eyes, nose, or mouth when adequate engineering controls are not available
- Wash hands with soap and water immediately before using and after removing personal protective clothing, such as disposable gloves and gowns
- Use syringes and IV sets with Luer-lock fittings for preparing and administering these agents and place drug-contaminated syringes and needles in chemotherapy sharps containers for disposal
- When an IV line must be primed with a solution containing hazardous medication, it should be done in the pharmacy
- When additional protection is necessary, use closed-system, drug-transfer devices, glove bags, and needleless systems within the ventilated cabinet
- Handle hazardous wastes and contaminated materials separately from other trash
- Decontaminate work areas before and after each activity with hazardous drugs and at the end of each shift
- Clean up spills immediately while using appropriate safety precautions and PPE unless the spill is large enough to require an environmental services specialist

Following these guidelines and understanding a healthcare worker's responsibilities may differentiate between an injury or fatality and a safe employee experience. In the next section, a fictional case study describes how healthcare workers might decide to implement these guidelines in their everyday clinical practice.

A Case Study in Nursing Safety Protocols, PPE & Handling Hazardous Drugs

Ms. Marvel, a night Nursing Supervisor, was responsible for preparing any IV medications until a new night pharmacist was hired. She was instructed on how to prepare these agents within a ventilated cabinet designed to protect workers and adjacent personnel from exposure and provide product protection for all drugs requiring aseptic handling. Before preparing these medications, she had to dress the part and double glove while protecting her hands and wrists. If there was a chemical spill, she had to immediately use appropriate safety precautions and PPE unless the spill was large enough to require an environmental service specialist. She also had to educate the ICU nurses and medical-surgical nurses on how to administer these medications safely and their side effects. Working with the nursing educators, she prepared written instructions for all units where this information was needed to prevent dangerous workplace injuries. When making hospital rounds, she ensured that the nurses knew where the MSDs' information book was located and that it was up to date.

This case study is a great example of how OSHA guidelines and effective safety protocols can be implemented in everyday nursing practice! In the next section, we continue our discussion of safety, hazards, and other important concerns for the healthcare professional by looking further and the types of injuries a healthcare professional may expect.

Musculoskeletal Disorders (MSDs)

"The Injuries We Do and Those We Suffer Are Seldom Weighed in the Same Scales," Aesop (OSHA, 2020c).

In 2010, nursing aides, orderlies, and attendants had the highest musculoskeletal disorders (MSDs) rates. There were 27,020 cases, equating to an incidence rate (IR) of 249 per 10,000 workers, more than seven times the average for all industries. This incidence rate compares to the all-worker days-away from work rate of 34 per 10,000 workers. In 2010, the average incidence rate for MSD cases with days away from work increased 4 percent, while the MSD incidence rate for nursing aides, orderlies, and attendants increased ten percent (OSHA, 2020b).

These injuries are largely due to overexertion related to repeated manual patient handling activities, often involving heavy manual lifting associated with transferring, repositioning patients, and working in extremely awkward postures (Egan, 2015).

Nearly half of all compensation claims for hospital workers involved back injuries. (OSHA, 2020c).

The most common causes of all work-related back pain are (OSHA, 2020b):

1. Job performance by a worker who is unfit or unaccustomed to the task
2. Postural stress
3. Work that approaches the limit of a worker's strength

Factors that contribute to these causes of back pain are understaffing, the lack of regular training programs in proper procedures for lifting and other work motions, and inadequate general safety precautions. Written guides and programs for preventing back injuries are available for all workers. The primary approach to preventing back injury involves reducing manual lifting and other load-handling tasks that are biomechanically stressful. The secondary approach is to train workers to perform stressful tasks while minimizing the biomechanical forces on their backs, maintaining flexibility, and strengthening the back and abdominal muscles (Egan, 2015).

To prevent back injury, workers should (OSHA, 2020c):

- Use proper lifting techniques
- Request help. When in doubt whether a task may strain the back, a worker should request help rather than take a chance
- Use back exercises to strengthen the back muscles and help prevent back injuries. A physician or physical therapist should be consulted.

Patient transfers are particularly hazardous for hospital workers. The following fundamental points should be emphasized to prevent back injuries during transfers (OSHA, 2020b):

- Communicate the plan of action to the patient and other workers to ensure that the transfer will be smooth and without sudden, unexpected moves
- Position equipment and furniture effectively (for example, move a wheelchair next to the bed) and remove obstacles
- Ensure good footing for the workers and patient (patients should wear slippers that provide good traction)
- Maintain eye contact and communication with the patient. Be alert for trouble signs
- If help is needed, request that a coworker stand by before attempting the transfer
- Record any problems on the patient's chart so that other shifts will know how to cope with difficult transfers. Note the need for any special equipment, such as a lift

Accident hazards such as wet floors, stairway obstructions, and faulty ladders should be reduced. Wet-floor hazards can be reduced by proper housekeeping procedures such as marking wet areas, cleaning up spills immediately,

cleaning only one side of a passageway, keeping halls and stairways clear, and providing good lighting for all halls and stairwells. Workers should be instructed to use the handrail on stairs, avoid undue speed, and maintain an unobstructed view of the stairs ahead of them, even if that means requesting help to manage a bulky load (Egan, 2015).

The consequences of work-related musculoskeletal injuries among nurses are substantial. Along with higher employer costs due to medical expenses, disability compensation, and litigation, nurse injuries are also costly in chronic pain and functional disability, absenteeism, and turnover. Approximately 20% of nurses who leave direct patient care positions do so because of risks associated with the work. Many healthcare workers, who experience pain and fatigue, may be less attentive, less productive, more susceptible to further injury, and maybe more likely to affect the health and safety of others. Direct and indirect costs associated with only back injuries in the healthcare industry are estimated to be \$20 billion annually (OSHA, 2020c).

A Case Study in Preventing Back Injuries in the Workplace

David, afloat CNA, was educated on using the newest lift equipment and techniques to use when transferring patients from their wheelchairs to their beds and visa-versa. He constantly encouraged the staff he worked with to ask for assistance when handling residents who were unable to help themselves or required more than one person to assist them in moving. Prior to using any lift - equipment, he ensured all lines and hooks were secure, and the equipment functioned safely and properly. Especially in the secured units where many patients had dementia or Alzheimer's disease, he instructed the staff to always work as a cohesive team. The individual at the head of the patient was to be in charge, and they would discuss ahead of time the process they would use. Patients were told what would be done and why before staff transferred them. Questions were answered at the patient's level of understanding. David was always in demand!

A major point to remember is that the better healthcare workers take care of their bodies and protect themselves from diseases and injuries, the more patients they can help every day! Taking care of yourself is just as important as taking care of your patients. There are many ways to be injured in the healthcare workspace, and savvy healthcare professional knows how to navigate those risks while protecting their health & safety! Next, this course will explore the risks due to fire in healthcare.

Hospital Fires & Other Fire-Related Disasters

Hospital fires and disasters are especially dangerous because workers must protect themselves and evacuate large numbers of patients (OSHA, 2020d). Almost one-third of hospital fires originated within patient rooms or worker quarters, with matches and smoking as the most frequent cause (OSHA, 2020d). Other causes are malfunctioning or misused electrical equipment, including hot plates, coffeepots, and toaster ovens (OSHA, 2020d).

Deaths during hospital fires were overwhelmingly due to inhaling the toxic products of combustion rather than direct exposure to the fire. Another obvious fire hazard is the use of oxygen within patient areas. Fires can occur in an oxygen-enriched atmosphere because of patient smoking, electrical malfunctions, and the use of flammable liquids. Procedures should be developed and strictly enforced to prevent fire hazards within patient areas where oxygen is used. When entering a new work area, find fire alarms, fire extinguishers, exit signs, and oxygen cut-off valves (OSHA, 2020d).

One way to remember fire safety is the acronym RACE (OSHA, 2020d):

- **R:** rescue
- **A:** alarm
- **C:** contain the fire (if possible)
- **E:** extinguish or evacuate

When rescuing anyone in immediate danger, remember to stay low. Smoke rises to the ceiling and forms a heavy, dense cloud that slowly descends. This cloud is deadly because it contains toxic gases. Do not ever hesitate to sound the alarm with any suspicion of fire, but never yell fire. That will only create panic. Call out the facility's code for fire. Call the switchboard to report the fire and pull the fire alarm. When calling the switchboard, stay on the phone long enough to assure they got the correct information (OSHA, 2020d).

Healthcare units are separated by heavy fire doors that close automatically when the alarm is sounded to keep the fire from spreading. Additional measures to take to confine a fire include:

- Closing doors, windows, and all vertical openings like the laundry chute
- Stuffing wet towels under doors to keep smoke out
- Shutting off oxygen supplies if directed to do so

Usually, someone in supervision is designated to decide when to turn off oxygen supplies (OSHA, 2020d).

If a fire is small and confined, you may be able to extinguish it. If a patient's clothes are on fire, wrap the patient tightly in a large blanket to extinguish the flames. If a piece of equipment catches fire, pull the plug or cut the electricity as soon as possible (OSHA, 2020d).

If a fire cannot be extinguished and smoke, fumes, or flames threaten patient safety, you may have to evacuate. Evacuate ambulatory patients first. Stay calm and give clear directions. Evacuate horizontally as long as you can. Then evaluate vertically down to a lower level. Never use an elevator to escape during a fire. A sudden loss of power could leave you trapped inside the elevator (OSHA, 2020d).

Fire extinguishers come in different classes for use on fires of different sources. The extinguisher has small pictures on the label that help you identify the type of fire source material they should be used. Class A puts out fires involving ordinary combustibles. Class B extinguishers smother fires involving flammable liquids or gases. Class C extinguishers put out fires in or near electrical equipment. Type ABC extinguishers can be used to fight all three types of fires. To use an extinguisher, pull the pin, aim the nozzle at the base of the fire, and squeeze the trigger, while you make sweeping strokes (OSHA, 2020d).

A Case Study of Fire Safety in Acute Care

Max, an educator and environmental engineer was responsible for ensuring that staff from all departments knew what to do in case of a fire. He worked on all shifts, reviewed the emergency plan, and made sure the Charge Nurse knew he/she was responsible for turning off the oxygen in the units and assigning roles to her healthcare team. They all had to know the number/code to announce a fire and its location. Exits to be taken were reinforced, and the healthcare team had to make sure they worked together as a cohesive team without causing people to panic. Staff had to demonstrate to Max that they knew where the fire alarms and extinguishers were located and had to explain how to use them. Staff had to practice using the emergency sleds on the beds to transport disabled patients. Special mandatory hands-on workshops were held during the day. Max did this every quarter and provided documentation to the key administrators that this was completed.

For anyone at a healthcare site, having clear and explicit directions for fire safety and disseminating that knowledge to other colleagues at that site is critical to everyone's safety. Fires can get out of control very quickly. The more informed the staff is, and the more frequently the staff practices important fire safety protocols, the more lives will be saved should a terrible situation occur!

Flammable and Combustible Liquids, Vapors, and Gases

A major hazard in all hospitals is the widespread use and storage of flammable and combustible liquids. Many liquids have flammable or combustible vapors and can be ignited by a spark from a motor, friction, or static electricity. Handling and storage directions must be followed (OSHA, 2020d).

Compressed gases are flammable under pressure, so they must be handled with extreme care. An exploding cylinder can have the same destructive effect as a bomb. The proper handling of compressed gas cylinders requires training. Storage areas for compressed gas cylinders should be well ventilated, fireproof, and dry. Cylinders should not be stored near steam pipes, hot water pipes, boilers, highly flammable solvents, combustible wastes, unprotected electrical connections, open flames, or other potential sources of heat or ignition. Cylinders should be properly labeled. The valve protection cap should not be removed until the cylinder is secured and ready for use (OSHA, 2020d).

Compressed gases used in hospitals include (OSHA, 2020d):

- Acetylene
- Ammonia
- Anesthetic gases
- Argon
- Chlorine
- Ethylene oxide
- Helium
- Hydrogen
- Methyl chloride
- Nitrogen
- Sulfur dioxide

Acetylene, ethylene oxide, methyl chloride, and hydrogen are flammable, as are the anesthetic agents, cyclopropane, diethyl ether, ethyl chloride, and ethylene. Although oxygen and nitrous oxide are labeled nonflammable, they oxidize gases that will aid combustion (OSHA, 2020d).

In the next section, we will explore how fire safety standards at the risks in Acute Care are truly, global. Lessons from studies conducted in other countries have applicability here at home!

Case Study in India of Fire Safety Hazards: How Safe Are Our Hospitals?

Globally, every fifth fire-related death in 2017 took place in India. Fire can occur to anyone, at any time, and at anywhere, including healthcare facilities. Hospital fires can be devastating in terms of loss of life, injuries to patients/ staff, and loss of property/equipment, more so because hospitals house a large number of vulnerable people (old/sick/disabled/pregnant/children, immune-compromised, on life support, and incapable of moving) (Sharma et al., 2020).

People losing lives at the altar of cure are saddening tragedies leading to health, economic, and social ramifications. In the recent past, several fire incidents have been reported all over India. Some of them involved considerable loss of human life and drew wide media attention. Fire-related disasters in hospitals, including near-to-miss events, humanmade, or sequel to natural events, are more frequent than assumed and emerge from external or internal threats. A bomb blast exemplifies the external threat in Civil Hospital, Ahmedabad (Sharma et al., 2020).

There were 21 simultaneous bomb blasts in the entire city within 70 min, followed by another bomb blast in the trauma center of Civil Hospital, timed to cause bigger damage when the victims of earlier blasts arrived at the hospital (Sharma et al., 2020).

The affected people included two doctors and several volunteers who gathered to donate blood for the blast victims. Internal threats account for most instances of fires, for example, the accidental fire in a corporation-run public hospital of Ahmedabad, where patients were trapped on the top floor. As the building was centrally air-conditioned, there was no channel for the smoke to come out. It was tough even for firefighters to smash the glass windows to let the fumes out. According to some patients, there were no announcements on the public address system, and the staff abandoned them (Sharma et al., 2020).

It was observed that regular fire drills were not conducted, and several fire extinguishers were past the expiration date (Sharma et al., 2020). The 1500-bed GTB Hospital, Delhi, did not have a no-objection certificate from the fire department. In Odisha, too, only four of the 1700 odd hospitals had statutory fire safety clearances (Sharma et al., 2020).

In Nellore, 80%–90% of government hospitals still do not have NOC from the Fire Services Department. A compilation of 19 events since 2011 found (90%) in government hospitals. Internal errors responsible for the fire accidents were due to short-circuits except for one, which was an inappropriate use of the hospital basement. Basement, meant for parking, was used as a storehouse for liquefied petroleum gas cylinders, torn mattresses, and wooden boxes. It also housed a pharmacy, a central storeroom, and a biomedical department containing inflammable articles. Five hospitals reported repeated events, and that too for the same reason (electric short-circuit) (Sharma et al., 2020).

Overloaded electricity point, improper uninterrupted power supply load and acids in the battery, false ceiling panel lined with thermo coal, faulty electric wirings, and overheating leading to burning of wires were some of the causes of electrical fires reported (Sharma et al., 2020). Safety in healthcare institutions is not just a matter of poor planning/ regulation but also reflects deeper malaise prevalent in all sectors, including health care, as safety does not necessarily sell (Sharma et al., 2020).

Most of the short-circuit-related fire gutted the air-conditioning unit in areas such as intensive care unit (ICU) receiving ventilator support, X-ray room, an incubator of neonatology unit, pediatric ICU, children's ward, dialysis ward, operation theater, and biomedical equipment's storeroom. Sometimes, these places have equipment such as ventilators with heavy and fluctuating power loads, making them vulnerable to short-circuiting. Oxygen enrichment

of air is primarily responsible for many fires. The ignition energy needed to initiate fire reduces in the presence of higher oxygen concentration, and any heat/spark may be the source of ignition (Sharma et al., 2020).

Split air conditioners in ICUs, neonatal ICU, and operating rooms are the source of many such fires, though several other types of equipment in hospitals have a similar vulnerability (Sharma et al., 2020).

In air-conditioned buildings with no natural ventilation, most victims die due to inhaling carbon monoxide from smoke; smoke in the building also hampers rescue efforts. On the day of commissioning a hospital, the electricity load almost doubles from when the facility is designed, and it goes up nearly 25% annually (Sharma et al., 2020).

No hospital or authority ever estimates correctly, at the time of licensing, the patient load, how many machines it will have, and the required safety checks. The situation is worse in government hospitals, where many people overwhelm the resources in no time. Over time, minor repairs, haphazard extensions, and replacements might cause some wires to come in contact with each other or create a short-circuit, which may cause a very high current flow through wires and cause a fire (Sharma et al., 2020).

Because of this, the following suggestions can be made (Sharma et al., 2020):

- Intelligent building design to assure hazard prevention, risk mitigation, assurance of life safety, property protection, and continuity of operations and functioning
- No hospital building should be put to function unless a building utilization certificate is obtained from a competent authority
- Similar certificates should be obtained for electrical fittings, lifts, etc.
- Regulations as per the National Building Code should be adhered to, and NOC from the concerned Fire Department should be obtained before operationalizing the hospital and should be renewed annually
- An effective fire safety program should be in place which addresses and monitors the four important parameters, namely means of access through approach roads and open spaces and means of escapes such as external staircases and firefighting equipment
- In high-rise hospitals, escape chutes may be installed, which ensure the rapid and safe shifting of everyone, including the bedridden patients
- A disaster action plan, including four points based on rescue, alarm, confine, and extinguish, for firefighting procedures with standard operating procedures, should be prepared and prominently displayed with assigned roles to different persons, with their contact details
- Regular/periodic training of all the staff and mock drills for rapid, safe evacuation should be carried out
- An alarm system with a public address system in the hospital to inform everyone about the emergency/disaster must be in place
- It may not work in case of electricity failure
- Hence, it must have a power backup
- Suitable linkage with nearby hospitals is a must to avoid delay in the treatment of critical patients
- A simple solution for electrical accidents leading to fire is to estimate proper load and keep some buffer before operationalizing, not to make too many changes to the electrical circuiting
- If any alternation is done, the capacity of the wire used should be kept in mind

- Indian hospitals need to make several changes in the arrangement of equipment and practice of handling O₂ gas, as well as create awareness among hospital staff, doctors, and administrators

While it is shocking that nearly 1 in 5 fire-related deaths globally will occur in India, it is important to evaluate this situation and take lessons from it. This case study concludes that there are many reasons why a healthcare facility may begin to lax standards, but once it happens, it is a quick downward trend until an accident happens. Due to many flammable chemicals, pressurized tanks, and other flammable substances present at healthcare facilities, fires can sweep through an area faster than one could think is possible! Being prepared is key. In the next section, we will look further at how all that medical equipment may be an increased safety risk.

Electrical Equipment: The Likely Culprit

Violations of standards governing the use of electrical equipment are the most frequently cited causes of electrical fires (Sharma et al., 2020). Thorough electrical maintenance records should be kept, and considerable effort should be devoted to electrical safety, particularly in areas where patient care is involved. Equipment and appliances that are frequently ungrounded or incorrectly grounded include (Sharma et al., 2020):

- Three-wire plugs attached to two-wire cords
- Grounding prongs that are bent or cut off
- Ungrounded appliances resting on metal surfaces
- Extension cords with improper grounding
- Cords molded to plugs that are not properly wired
- Ungrounded, multiple-plug spiders that are often found in office areas and at nurses' stations
- Personal electrical appliances brought by the workers from home (radios, coffeepots, fans, electric heaters) that are not grounded, have frayed cords, poor insulation, or are otherwise in poor repair

As a healthcare professional, you can be the eyes and ears of the facility! If you are in a patient's room and something just does not look right, it is more important to ask and have it have been nothing than to remain silent, and then a fire breaks out! Whenever possible, take a look at your patient's room and report anything suspicious, in terms of electrical equipment or wiring, to your supervisor! Electrical fires and other hazardous events are largely out of our control, but we can be on the lookout in the hopes of preventing a terrible situation from occurring.

In the next sections, we will explore natural disasters, reproductive system-related risks, dermatological hazards, and other risks to the healthcare worker.

Bodily Safety Concerns for the Healthcare Professional

"I am Oz, the Great and Terrible." L. Frank Baum (2018)

Disaster plans should be prepared for natural events (e.g., tornadoes, earthquakes, and hurricanes), gas leaks, and bomb threats. The plans should be written and readily available. Supervisory workers will initiate the disaster plan and designate tasks for workers. Workers are responsible for knowing the alarm code for a disaster and the exit routes.

Reproductive Hazards

Up to 4 million women employed in hospitals may be exposed to reproductive hazards. However, there is no clear evidence that hospital exposure conditions have resulted in an excess rate of birth defects among the offspring of hospital workers (OSHA, 2020e).

Studies support more general associations between employment in hospitals or laboratories and an increased risk of adverse reproductive effects, primarily spontaneous abortion. Workers with immunity through vaccinations or earlier exposures are not generally at risk from diseases such as hepatitis B, human parvovirus B19, German measles, or chickenpox. However, pregnant workers should avoid contact with infected children or adults without prior immunity. Workers should also use good hygienic practices such as frequent handwashing to prevent infectious diseases and universal precautions (OSHA, 2020e).

In addition to many of these drugs being cytotoxic, the majority are hazardous to males or females who are actively trying to conceive, women who are pregnant or may become pregnant, and women who are breastfeeding because they may be present in breast milk. These drugs represent an occupational hazard to healthcare workers and should always be handled using recommended engineering controls and PPE, regardless of their formulation (intravenous, subcutaneous, topical, tablet, or capsule). Unopened, intact tablets and capsules may not pose the same occupational exposure risk as injectable drugs, which usually require extensive preparation. Cutting, crushing, or otherwise manipulating tablets and capsules will increase the risk of exposure to workers (OSHA, 2020e).

Table 1: Chemical and Physical Agents that are reproductive hazards in the workplace (OSHA, 2020e)

| Agent | Observed effects | Potentially exposed workers |
|---|---|--|
| Cancer treatment drugs (e.g., methotrexate) | Infertility, miscarriage, birth defects, low birth weight | Healthcare workers, pharmacists |
| Certain ethylene glycol ethers such as 2-ethoxyethanol (2EE) and 2-methoxyethanol (2ME) | Miscarriages | Electronic and semiconductor workers |
| Carbon disulfide (CS ₂) | Menstrual cycle changes | Viscose rayon workers |
| Lead | Infertility, miscarriage, low birth weight, developmental disorders | Battery makers, solderers, welders, radiator repairers, bridge repainters, firing range workers, home remodelers |
| Ionizing radiation (e.g., X-rays and gamma rays) | Infertility, miscarriage, birth defects, low birth weight, developmental disorders, childhood cancers | Healthcare workers, dental personnel, atomic workers |
| Strenuous physical labor (e.g., prolonged standing, heavy lifting) | Miscarriage late in pregnancy, premature delivery | Many types of workers |

Table 2: Additional Chemical and physical reproductive hazards for women in the workplace (OSHA, 2020e)

| Agent | Observed effects | Potentially exposed workers | Preventive measures |
|-----------------------|--|--|---|
| Cytomegalovirus (CMV) | Birth defects, low birth weight, developmental disorders | Healthcare workers, workers in contact with infants and children | Good hygienic practices such as handwashing |
| Hepatitis B virus | Low birth weight | Healthcare workers | Vaccination |

Table 1: Chemical and Physical Agents that are reproductive hazards in the workplace (OSHA, 2020e)

| Agent | Observed effects | Potentially exposed workers | Potentially exposed workers |
|--------------------------------------|---|--|---|
| Human immuno-deficiency virus (HIV) | Low birth weight, childhood cancer | Healthcare workers | Practice universal precautions |
| Human parvovirus B19 | Miscarriage | Healthcare workers, workers in contact with infants and children | Good hygienic practices such as handwashing |
| Rubella (German measles) | Birth defects, low birth weight | Healthcare workers, workers in contact with infants and children | Vaccination before pregnancy if no prior immunity |
| Toxoplas-mosis | Miscarriage, birth defects, developmental disorders | Animal care workers, veterinarians | Good hygiene practices such as handwashing |
| Varicella-zoster virus (chicken pox) | Birth defects, low birth weight | Healthcare workers, workers in contact with infants and children | Vaccination before pregnancy if no prior immunity |

Although classified as a vaccine, BCG is used in the treatment of certain cancers. BCG should be prepared with aseptic techniques. To avoid cross-contamination, parenteral drugs should not be prepared in areas where BCG has been prepared. A separate area for the preparation of BCG suspension is recommended. All equipment, supplies, and receptacles in contact with BCG should be handled and disposed of as biohazardous. If preparation cannot be performed in a containment device, respiratory protection, gloves, and a gown should be worn to avoid inhalation or contact with BCG organisms (OSHA, 2020e).

NIOSH performs a hazard identification for each drug listed based on its criteria, as described above. The actual risk to healthcare workers depends on the toxicity of the drugs, how the drugs can enter the body (e.g., dermal, inhalation, or ingestion), and how the drugs are handled/manipulated and how often; as well as the exposure controls in place, such as the type of engineering controls and PPE. For example (OSHA, 2020e):

1. Dispensing a single tablet to a patient may pose a relatively low risk to the healthcare worker. A single pair of gloves may be adequate.
2. Repeatedly counting, cutting, or crushing tablets may pose a higher risk for worker exposure than dispensing a single tablet and contamination to the workplace if exposure controls are not in place.
3. Suppose a containment device such as a BSC (Class II biological safety cabinet) or CACI (compounding aseptic containment isolator) is unavailable. In that case, double gloves, a protective gown, respiratory protection, and a disposable pad to protect the work surface should be used.
4. Preparing several intravenous doses of an antineoplastic drug typically poses a higher potential risk to the worker. In addition to double gloving and a protective gown, an engineering control such as a BSC or CACI, possibly supplemented with a CSTD (closed system drug transfer device), is necessary to protect the drug, environment, and healthcare worker.

Group 1: Antineoplastic drugs, including those with the manufacturer’s safe-handling guidance (MSHG) (OSHA, 2020e)

Abbreviations (OSHA, 2020e)

- AHFS: American Hospital Formulary Service
- MRHD: Maximum Recommended Human Dose

NIOSH 's updated list of the newest 2016 drugs is noted below and meets one or more of the NIOSH criteria for a hazardous drug. In addition to many of these drugs being cytotoxic, the majority are hazardous to males or females who are actively trying to conceive, women who are pregnant or may become pregnant, and women who are breastfeeding because they may be present in breast milk.

These drugs represent an occupational hazard to healthcare workers and should always be handled using recommended engineering controls and PPE, regardless of their formulation (intravenous, subcutaneous, topical, tablet, or capsule). Unopened, intact tablets and capsules may not pose the same occupational exposure risk as injectable drugs, which usually require extensive preparation. Cutting, crushing, or otherwise manipulating tablets and capsules will increase the risk of exposure to workers (OSHA, 2020e).

The manufacturer's safe-handling guidance (MSHG) is typically in Section 16 of the DPI. See Table 6 for safe-handling recommendations (OSHA, 2020e).

Table 3: Group 1 Antineoplastic drugs, including those with the manufacturer's safe handling guidance (MSHG) 2016 added drugs (OSHA, 2020e)

| Drug | AHFS classification | MSHG | Supplemental information |
|--------------|-----------------------------|------|---|
| afatinib | 10:00 antineoplastic agents | | Special warnings on contraception for females while taking and 2 weeks post-treatment; FDA Pregnancy Category D |
| axitinib | 10:00 antineoplastic agents | | Teratogenic, embryotoxic and fetotoxic in mice at exposures lower than human exposures; FDA Pregnancy category D |
| belinostat | 10:00 antineoplastic agents | yes | May cause teratogenicity and/or embryo-fetal lethality because it is a genotoxic drug and targets actively dividing cells; FDA Pregnancy Category D |
| bosutinib | 10:00 antineoplastic agents | | FDA Pregnancy Category D |
| cabozantinib | 10:00 antineoplastic agents | | Embryo-lethal in rats at exposures below the recommended human dose; FDA Pregnancy category D |
| carfilzomib | 10:00 antineoplastic agents | | Special warnings on contraception while taking and 2 weeks post-treatment; FDA Pregnancy category D |
| dabrafenib | 10:00 antineoplastic agents | | Special warnings on contraception for females while taking and 2 weeks post-treatment; FDA Pregnancy Category D |
| enzalutamide | 10:00 antineoplastic agents | | Embryo-fetal toxicity in mice at exposures that were lower than in patients receiving the recommended dose; FDA Pregnancy Category X |
| histrelin | 10:00 antineoplastic agents | | Can cause fetal harm when administered to a pregnant patient, with the possibility of spontaneous abortion; FDA Pregnancy Category X |
| ixazomib | 10:00 antineoplastic agents | yes | Male and female patients of childbearing potential must use effective contraceptive measures during and for 3 months following treatment |
| panobinostat | 10:00 antineoplastic agents | yes | Special warnings on contraception for females while taking and 1 month post-treatment |
| pertuzumab | 10:00 antineoplastic agents | | Black Box warning on embryo-fetal death and birth defects; FDA Pregnancy Category D |

Table 3: Group 1 Antineoplastic drugs, including those with the manufacturer's safe handling guidance (MSHG) 2016 added drugs (OSHA, 2020e)

| Drug | AHFS classification | MSHG | Supplemental information |
|------|----------------------|------|--|
| | | | |
| | 10:00 antineoplastic | | |
| | | | |
| | 10:00 antineoplastic | | |
| | | | Embryo-fetal lethality and embryo-fetal toxicity at doses lower than or similar to exposures at the recommended human dose |
| | | | Black Box warning on embryo-fetal death or severe birth defects; |
| | | | |
| | - | | |

Table 4: Group 2 Non antineoplastic drugs that meet one or more of the NIOSH criteria for a hazardous drug, including those with the manufacturer's safe handling guidance (MSHG) (OSHA, 2020e)

| Drug | AHFS classification | MSHG | Supplemental information |
|---------------|---|------|---|
| methimazole | 68:36:08 antithyroid agents | | Appears in human breast milk; FDA Pregnancy Category D |
| mipomersen | 24:06:92 antilipemic agents, miscellaneous | | Black Box warning on hepatotoxicity; FDA Pregnancy Category B |
| ospemifene | 68:16:12 estrogen agonists-antagonists | | Black Box warning on increased risk of endometrial cancer in certain populations; risk of adverse outcomes during pregnancy and labor; FDA Pregnancy Category X |
| paliperidone | 28:16:08:04 atypical antipsychotics | | Metabolite of risperidone; excreted in human breast milk; FDA Pregnancy Category |
| teriflunomide | 92:20 immunomodulatory agents | | Black Box warning on severe hepatotoxicity and teratogenicity, including major birth defects; FDA Pregnancy Category X |
| tofacitinib | 92:36 disease modifying antirheumatic drugs | | Black Box warning for lymphoma and other malignancies; FDA Pregnancy Category C |

Table 4: Group 3 Non antineoplastic drugs that primarily have adverse reproductive effects (OSHA, 2020e)

| Drug | AHFS classification | MSHG | Supplemental information |
|-----------------|---|------|--|
| clomiphene | 68:16:12 estrogen agonist-antagonists | | FDA Pregnancy Category X |
| eslicarbazepine | 28:12:92 anticonvulsants, miscellaneous | | Fetal malformations, fetal growth retardation, embryoletality, and reduced weights observed in animal studies; excreted in human breast milk; FDA Pregnancy Category C |

Table 4: Group 3 Non antineoplastic drugs that primarily have adverse reproductive effects (OSHA, 2020e)

| Drug | AHFS classification | MSHG | Supplemental information |
|------|---------------------------|------|---|
| | | | |
| | | | females while taking and 1 month post-treatment; FDA Pregnancy Category X |
| | | | |
| | | | human dose; FDA Pregnancy Category C |
| | 48:48 vasodilating agents | | Exclude pregnancy before the start of treatment, monthly during treatment, month after stopping treatment; FDA Pregnancy Category X |
| | 28:24:08 benzodiazepines | | third trimester of pregnancy; FDA Pregnancy Category X |

Table 5 would list drugs that were deleted from the 2014 NIOSH hazardous drug list for the 2016 update; however, deletions to report. (OSHA, 2020e)

Table 6: Personal Protective Equipment (PPE) and engineering controls for working with reproductive hazardous drugs in healthcare settings (OSHA, 2020e)

| Formulation | Activity | Double chemotherapy gloves | Protective gown | Eye/face protection | Respiratory protection | Ventilated engineering control |
|----------------------------------|---|--|----------------------------------|---------------------------------------|--------------------------------------|--|
| All types of hazardous drugs | Receiving, unpacking, and placing in storage | No (single glove can be used, unless spills occur) | Yes, when spills and leaks occur | No | Yes, when spills and leaks occur | No |
| Intact tablet or capsule | Administration from unit-dose package | No (single glove can be used) | No | No | No | N/A |
| Tablets or Capsules | Cutting, crushing, or manipulating tablets or capsules; handling uncoated tablets | Yes | Yes | No | Yes, if not done in a control device | Yes |
| | Administration | No (single glove can be used) | No | Yes, if vomit or potential to spit up | No | N/A |
| Oral liquid drug or feeding tube | Receiving, unpacking, and placing in storage | No (single glove can be used, unless spills occur) | Yes, when spills and leaks occur | No | Yes, when spills and leaks occur | No |
| Topical drug | Compounding | Yes | Yes | Yes, if not done in a control device | Yes, if not done in a control device | Yes, BSC or CACI (Note: carmustine and |

Table 6: Personal Protective Equipment (PPE) and engineering controls for working with reproductive hazardous drugs in healthcare settings (OSHA, 2020e)

| Formulation | Activity | Double chemo-therapy gloves | Protective gown | Eye/face protection | Respiratory protection | Ventilated engineering control |
|--|---|-----------------------------|-----------------|--------------------------------------|--------------------------------------|--|
| | | | | | | mustargen are volatile) |
| | Administration | Yes | Yes | Yes, if liquid that could splash | Yes, if inhalation potential | N/A |
| Subcutaneous/ intra-muscular injection from a vial | Preparation (withdrawing from vial) | Yes | Yes | Yes, if not done in a control device | Yes, if not done in a control device | Yes, BSC or CACI |
| | Administration | Yes | Yes | Yes, if liquid that could splash | No | N/A |
| Withdrawing and/or mixing intravenous or intramuscular solution from a vial or ampoule | Compounding | Yes | Yes | No | No | BSC or CACI; use of CSTD recommended |
| | Administration of prepared solution | Yes | Yes | Yes; if liquid that could splash | No | N/A; CSTD required per USP 800 if the dosage form allows |
| Solution for irrigation | Compounding | Yes | Yes | Yes, if not done in a control device | Yes, if not done in a control device | Yes, BSC or CACI; use of CSTD recommended |
| | Administration (bladder, HIPEC, limb perfusion, etc.) | Yes | Yes | Yes | Yes | N/A |
| Powder/solution for inhalation/ aerosol treatment | Compounding | Yes | Yes | Yes, if not done in a control device | Yes, if not done in a control device | Yes, BSC or CACI; use of CSTD recommended |
| | Aerosol administration | Yes | Yes | Yes | Yes | Yes, when applicable |
| | Administration | Yes | Yes | Yes, if liquid that could splash | Yes, if inhalation potential | N/A |
| Drugs and metabolites in body fluids | Disposal and cleaning | Yes | Yes | Yes, if liquid that could splash | Yes, if inhalation potential | N/A |
| Drug-contaminated waste | Disposal and cleaning | Yes | Yes | Yes, if liquid that could splash | Yes, if inhalation potential | N/A |
| Spills | Cleaning | Yes | Yes | Yes | Yes | N/A |

This course has presented many chemical and physical agents that may be a reproductive risk for men and women in the healthcare workplace. Further, we provided a detailed list of antineoplastic drugs that have documented

reproductive maladaptive side effects and lists of PPE and other engineering controls to handle these drugs. Next, we will continue our safety standards discussion by exploring possible dermatological hazards for healthcare professionals.

Dermatological Hazards

Skin injuries and diseases account for a large proportion of all occupational injuries and diseases. Skin injuries in the hospital environment include cuts, lacerations, punctures, abrasions, and burns. Skin diseases and conditions of hospital workers include dermatitis, allergic sensitization, infections such as herpes, and skin cancer. Chemicals can directly irritate the skin or cause allergic sensitization. Physical agents can also damage the skin, and skin that has been chemically or physically damaged is vulnerable to infection (OSHA, 2020f).

The most common and often the most easily preventable of all job-related health problems are skin reactions (dermatitis) (OSHA, 2020f). The skin is the body's natural defense system: it has a rough, waxy coating, a layer of protein, keratin, and an outer layer of dead cells to help prevent chemicals from penetrating the tissues and being absorbed into the blood (OSHA, 2020f).

Many chemicals cause irritation on contact with the skin, irritant contact dermatitis, dissolve the protective fats or keratin protein layer, dehydrate the skin, or kill skin cells. Symptoms of this kind of irritation are red, itchy, peeling, dry, or cracking skin. Some chemicals are not irritants under normal conditions, but they will irritate skin that has already been damaged by sunburn, scratching prolonged soaking, or other means. Tars, oils, and solvents can plug the skin pores and hair follicles, causing blackheads, pimples, and folliculitis (OSHA, 2020f).

Some persons become sensitized to chemicals days, months, or even years after their first exposure. This allergic reaction does not occur in every worker who contacts the chemical. Symptoms are red, itchy, and blistering skin, like poison oak or ivy reaction, and maybe much more severe than the direct irritation described in the previous subsection (OSHA, 2020f).

The association between basal and squamous cell carcinomas and ultraviolet radiation has been well established. The association between skin cancer and exposure to other agents is less well documented, but ionizing radiation and antineoplastic drugs have been implicated. Other evidence indicates that malignant transformation of cells damaged by chronic allergic contact dermatitis may occur (OSHA, 2020f).

The skin can be damaged by various microorganisms, including bacteria, fungi, viruses, and parasites. Herpes simplex is the most common dermatologic infection among dentists, physicians, and nurses (OSHA, 2020f).

Relatively simple precautions can considerably reduce skin hazards. Effective measures include work practices and engineering controls that limit solvent exposure, personal protective equipment, the substitution of less irritating chemicals, non-powdered gloves, and the institution of a good hygiene program (OSHA, 2020f).

Next, we explore a fundamental safety issue in the workplace and our everyday lives: Stress!

Stress!

Job stress refers to the harmful physical and emotional responses that occur when the job requirements do not match the capabilities, resources, or needs of the worker. Job stress can lead to poor health and injury (OSHA, 2020g). Hospital work often requires coping with some of the most stressful situations found in any workplace (OSHA, 2020h).

Hospital workers must deal with life-threatening injuries and illnesses complicated by complex hierarchies of authority and skills, dependent and demanding patients, and patient deaths, which all contribute to stress (OSHA, 2020g).

Other important stress factors include job specialization, discrimination, concerns about money, lack of autonomy, work schedules, ergonomic factors, and technological changes (OSHA, 2020h).

The increasing size and bureaucracy of many hospitals may depersonalize the environment and leave many workers feeling isolated, fatigued, angry, powerless, and frustrated (OSHA, 2020g).

These feelings may be apathy, loss of self-confidence, withdrawal, or absenteeism. Failure to recognize and treat the sources of stress results in workers who suffer burnout (OSHA, 2020h).

Factors commonly mentioned as causes of stress by all categories of hospital workers are (OSHA, 2020h):

- Understaffing
- Role conflict and ambiguity
- Inadequate resources
- Working in unfamiliar areas
- Excessive noise
- Lack of control (influence, power) and participation in planning and decision making
- Lack of administrative rewards
- Under-utilization of talents and abilities
- Rotating shift work
- Exposure to toxic substances
- Exposure to infectious patients

Stress has been associated with loss of appetite, ulcers, mental disorders, migraines, difficulty in sleeping, emotional instability, disruption of social and family life, and the increased use of cigarettes, alcohol, and drugs. Stress can also affect worker attitudes and behavior. Some frequently reported consequences of stress among hospital workers are difficulties communicating with very ill patients, maintaining pleasant relations with coworkers, and judging the seriousness of a potential emergency (OSHA, 2020g).

Understanding stress in the healthcare workplace could be vital in preventing a harmful, dangerous, or violent situation from erupting. In the final sections of this course, we look at violence in the workplace, environmental safety standards, and how OSHA will handle reporting and recordkeeping of safety incidents.

Workplace Violence

“Nonviolence Doesn’t Always Work, But Violence Never Does,” Isaac Asimov.

Workplace violence is a serious concern for the approximately 15 million health care workers in the United States (OSHA, 2020hi). OSHA is the federal agency responsible for protecting the safety and health of the nation's workers, although states may assume responsibility under an OSHA-approved plan. OSHA does not require

employers to implement workplace violence prevention programs, but it provides voluntary guidelines and may cite employers for failing to provide a workplace free from recognized serious hazards (OSHA, 2020hi).

The circumstances of hospital violence differ from the circumstances of workplace violence in general. In other workplaces such as convenience stores and taxicabs, violence most often relates to robbery. Violence in hospitals usually results from patients and occasionally from their family members who feel frustrated, vulnerable, and out of control (OSHA, 2020hi).

Common risk factors for hospital violence include the following (OSHA, 2020hi):

- Working directly with volatile people, especially if they are under the influence of drugs or alcohol or have a history of violence or certain psychotic diagnoses
- Working when understaffed-especially during mealtimes and visiting hours
- Transporting patients
- Long waits for service
- Overcrowded, uncomfortable waiting rooms
- Working alone
- Poor environmental design
- Inadequate security
- Lack of staff training and policies for preventing and managing crises with potentially volatile patients
- Drug and alcohol abuse
- Access to firearms
- Unrestricted movement of the public
- Poorly lit corridors, rooms, parking lots, and other areas

Violence may occur anywhere in the hospital, but it is most frequent in psychiatric wards, emergency rooms, waiting rooms, and geriatric units. Studies indicate that violence often occurs during times of high activity and interaction with patients. Assaults may occur when service is denied, when a patient is involuntarily admitted, or when a healthcare worker attempts to limit eating, drinking, or tobacco or alcohol use (OSHA, 2020hi).

Patients with the condition that causes confusion and impaired judgment are more likely to become violent than a patient with normal mentation (OSHA, 2020hi).

Confusion and impaired judgment may be caused by neurologic conditions, seizures, hypoglycemia, or dementia. Watch for signals that may be associated with impending violence (OSHA, 2020hi):

- Verbally expressed anger and frustration
- Body language such as threatening gestures
- Signs of drug or alcohol use

Note how your coworkers behave. If a colleague's demeanor or behavior has changed, notify your manager (OSHA, 2020hi). For example, slamming equipment around is red-flag behavior. Learn from their history. If a patient has a history of violent behavior (such as acting combative in the ambulance or waiting room), prepare yourself for potentially violent behavior and warn others who are caring for this patient. Let security know if you feel threatened

or find or suspect that the patient is carrying a weapon. Notify your nursing supervisor, manager, and hospital security or police if you suspect a patient will be violent. Keep your patient informed. Help relieve patient's tension and anxiety by keeping him/her informed about when examinations/treatments will be performed and what is going on (OSHA, 2020hi).

Be Alert (OSHA, 2020hi):

- Evaluate each situation for potential violence when you enter a room or begin to relate to a patient or visitor
- Be vigilant throughout the encounter
- Do not isolate yourself from a potentially violent person
- Plan your exit
- Watch your surroundings

Always keep an open path for exiting. Do not let the potentially violent person stand between you and the door. When you are with an upset patient or coworker, avoid areas of the room that do not have an accessible exit. If you are going to an isolated part of your facility, let others know where you are and when you expect to return. Consider asking for an escort. Observe your surroundings and note anyone who is not wearing staff ID and is lingering where they should not be. Ask politely if you can help and notify security if you are not satisfied with the answer. Call security and provide a full description if you would rather not approach someone. Evaluate the way you wear equipment to ensure it cannot be used as a weapon against you. For example, consider that a stethoscope or ID badge without a breakaway necklace can be used to choke you. Carry your stethoscope in a pocket and use an ID badge necklace with a breakaway feature. If you wear a necktie, opt for a clip-on style. If your hair is long, wear it in a way that is not easy to pull, and do not wear dangling jewelry (OSHA, 2020hi).

Healthcare Worker DOs & DON'Ts in Violent Situations in the Healthcare Workplace

In the presence of a potentially violent person, DO (OSHA, 2020hi):

- Plan a clear exit route
- Keep 5 to 7 feet between you and him/her, never turn your back, or let him/her get between you and the exit
- Keep your voice calm and quiet
- Acknowledge that he/she has a right to his/her feelings
- Assume that he/she has a valid concern and address it
- Try to meet reasonable demands
- Offer alternatives when possible
- For example, tell an angry patient that although he/she cannot order take-out pizza, you will see if you can get him/her an early dinner
- Tell an angry colleague that you see that he/she is angry and that you would like to work with him/her and your manager to resolve the situation
- Call for backup or security if a situation grows increasingly tense
- Ensure that he/she has access to bathrooms, a phone, a TV, and something to read

- Track equipment
- Return it to its rightful place
- When you take an item into a patient's room, dispose of it properly or take it with you when you leave

In the presence of a potentially violent person, DO NOT:

- Do not ignore the agitated person or avoid him/her
- Do not threaten or demand obedience
- Do not argue or become defensive or judgmental
- Do not laugh, move suddenly, make threatening gestures, or invade his/her personal space
- Do not try to handle a dangerous situation alone
- Call the security or initiate your facility's violence prevention protocol

Take these steps if you cannot defuse the situation quickly (OSHA, 2020hi):

- Remove yourself from the situation
- Call security for help
- Report any violent incidents to your management

In the presence of a weapon, maintain behavior that helps diffuse anger (OSHA, 2020hi):

- Present a calm, caring attitude
- Do not match the threats
- Do not give orders
- Acknowledge the person's feelings (for example, "I know you are frustrated")
- Avoid any behavior that may be interpreted as aggressive (for example, moving rapidly, getting too close, touching, or speaking loudly)

You can make all the difference in violent situations! Staying calm and following these quick tips might diffuse a violent situation from deteriorating into a worse one. Let us finish our safety and hazards discussion by looking at a case study of the types of hazards experienced by home health workers.

A Case Study in Environmental Health & Safety Hazards Experienced by Home Health Care Providers (Polivka et al., 2015)

The demand for home health care services is escalating with the aging population, resulting in an ever-growing number of paid caregivers providing in-home services for individuals with illnesses and disabilities. The number of home health aides and personal attendants is expected to increase by about 50% between 2008 and 2018, substantially more than the average increase for all other occupations. The unique physical environment of each home offers significant challenges when providing health care to clients while protecting caregivers' health and safety. The Oregon Home Care Commission (2008-2010) indicated that HHC providers in publicly funded programs incurred 352 lost-time injuries per 10,000 full-time workers (Polivka et al., 2015).

Multiple types of home hazards have been identified by diverse HHPs, including nurses, aides and technicians, administrators, social workers, physical therapists, and occupational therapists (Polivka et al., 2015). Homes can harbor a variety of hazards, including throw rugs, pests, tobacco smoke, mold, sharps, inadequate lighting, cluttered hallways and rooms, and inaccessible bathrooms (Polivka et al., 2015).

Despite high rates of work-related injuries and the identification of various hazards, scant research describes hazards by specific locations in the home. Hazards also negatively affect job performance, job satisfaction, and health (Polivka et al., 2015). In the only published study describing specific locations in the home of injuries incurred by HHC providers, researchers found that 60% of home health aide injuries occurred inside client homes, with the most common locations being the bedroom (24%), bathroom (18%), and kitchen (9%) (Polivka et al., 2015).

Half of the injuries were associated with client handling, 8% with specific objects (e.g., needles, pets), 8% with cleaning, 4% with lifting objects, 2% with trash disposal, and 28% were unspecified. Client handling tasks that resulted in injury included moving clients in bedding, bathing, and transferring clients (Polivka et al., 2015).

This case study explored environmental health and safety hazards encountered by HHPs in clients' homes and specific rooms within those homes (Polivka et al., 2015). Consistent with other studies, trip/slip/lift hazards were the most commonly identified hazards, and the specific sources for these types of hazards varied, a key finding with implications for enhanced HHP training (Polivka et al., 2015). Sprains and strains, commonly attributable to lifts, slips, and trips, have previously been documented as the most frequent lost-work-time injuries to HHC providers, resulting in almost one month of lost work time (Polivka et al., 2015).

Recommendations to reduce exposure to trip/slip/lift hazards include making changes in the work environment (e.g., removing throw rugs, securing cords, providing adequate lighting), using assistive devices such as transfer or gait belts, participating in ergonomics training, and wearing sturdy shoes with slip-resistant soles (Polivka et al., 2015).

These and other recommendations can be incorporated into specific training for HHPs on assessing and managing trip/slip/lift hazards, especially for home health aides who have the most exposure. Exposures to potential biohazards, such as human or pet waste and blood-borne pathogens, were commonly expressed concerns in this study and other researchers (Polivka et al., 2015).

OSHA regulations require agencies to have an exposure control plan and annual blood-borne pathogen training, but neither a control plan nor training is required for other biohazards (Polivka et al., 2015). Most participants in this study (73%) indicated they received training on standard precautions and were supplied with gloves, but not other forms of PPE, such as face shields, goggles, or protective clothing. These findings highlight the need for agency- and policy-level changes to assure that HHPs have the PPE necessary for personal safety (Polivka et al., 2015).

Air quality and allergen exposures from tobacco smoke, mold, and inadequate ventilation were considered highly hazardous by participants with asthma and allergies. Several participants commented that their agency had a tobacco smoking policy in which clients agreed not to smoke (nor allow others to smoke in their home) while the HHP was there (Polivka et al., 2015).

Although helpful, not all agencies have this type of policy, and not all HHPs insist their agencies' policies be followed. Although the consequences of exposure to secondhand tobacco smoke are well known, the NIOSH does not include this hazard in its 2010 Occupational Hazards in Home Care publication. The findings of this study highlight the need for policy- and individual-level interventions to reduce the risk of exposure to secondhand tobacco smoke (Polivka et al., 2015).

The US Surgeon General has stated that no risk-free level of exposure to tobacco smoke exists, so NIOSH and OSHA must develop a standardized smoke-free policy template that can be adapted and implemented by home health agencies to protect their workers. Participants in this study identified the most hazards in the kitchen, followed

by the bedroom and the bathroom. These locations were also the primary locations where studies reported injuries to home health aides. However, trip/slip/lift hazards were the most common hazard type reported in each room in the present study, except for throw rugs, which pose a hazard in every room, the specific types of risks differed (Polivka et al., 2015).

Water and grease spills were described frequently on kitchen floors; tight spaces and missing bathroom equipment; clutter, tight spaces, and lifting hazards in the bedroom; electrical cords and oxygen tubing in the living room; and clutter in the hallway. Similar differences in the types of biohazards encountered in each room were identified (Polivka et al., 2015).

Pet droppings were key biohazards in the kitchen and living room; human waste was commonly noted as bathroom and bedroom hazards (Polivka et al., 2015). The rooms in clients' homes in which HHPs work varied by type of HHP and clients' needs. For example, nurses may not go into a client's bedroom or kitchen if client care is provided in the living room (Polivka et al., 2015).

By contrast, home health aides are often in all rooms if they provide cleaning, meal preparation, and personal care services. A key implication of these findings is that health care agencies should provide tailored training that addresses the different hazards HHC providers are likely to encounter by room, also taking into account HHC provider job descriptions and client needs (Polivka et al., 2015).

A Summary of Fire & Safety Environmental Hazards reported for HHC Providers:

- Fire/Burn Hazards
 - Smoking with Oxygen in Use. Especially risk in smaller apartments with heavy smokers
 - Using Stove for Heat. Sometimes individuals will leave their burners on for heat
 - 8% of HHC Providers report incidents with fire or a burn
- Poor/Dim lighting (can cause falls and other risks)
- Electrical Hazards
 - Inadequate outlets
 - Faulty outlets
 - 3% of HHC Providers report incidents with electrical hazards
- Illicit Drugs that involved lighters, matches, or other combustible products
- Unsafe furniture, unsafe objects, or penetrating objects
- Inadequate, unclean or contaminated areas, especially if this area contains forms of gasoline or other combustible products
- The trip, slip or lift hazards due to clutter, hazardous objects, or addressing patient needs. Nearly 40% of HHC providers report incidents with a trip, slip, or lift hazards
- Chemical or other biohazards can include sharps, human or animal waste, and combustible products. 17% of HHC Providers report incidents with chemical or biohazards

- Air quality due to lack of appropriate ventilation or possibly a patient's chronic smoking habits. Other air quality hazards can occur if there is inappropriate ventilation in the setting during a fire incident
- Allergens

OSHA Injury & Illness Recordkeeping and Reporting Requirements

Up to this point, this course has largely been reporting to you, the participant, the OSHA guidelines, requirements, and standards that are important to the healthcare professional. Equally as important is the process for reporting and the records of safety violations. Without detailed recordkeeping and nationwide collaboration, the healthcare community's safety and quality of care might diminish. OSHA standards protect the patients, the employees, and the employers and, are vital to our healthcare system.

OSHA published a Final Rule to amend its recordkeeping regulation to remove the requirement to electronically submit to OSHA information from the OSHA Form 300 (Log of Work-Related Injuries and Illnesses) and OSHA Form 301 (Injury and Illness Incident Report) for establishments with 250 or more employees that are required to keep injury and illness records routinely. Covered establishments are only required to electronically submit information from the OSHA Form 300A (Summary of Work-Related Injuries and Illnesses). The requirement to keep and maintain OSHA Forms 300, 300A, and 301 for five years is not changed by this Final Rule.

Through this, OSHA continues to evolve into the digital landscape. Previously, paperwork was handled more physically, but this could increase wait times and delay important changes. Through revising its recordkeeping system and providing more digital options for submission and review, OSHA claims can be filed, recorded, and evaluated more efficiently. This system reduces overall waste, financial cost, and wait times for individuals who have safety concerns.

Recordkeeping Requirements

Many employers with more than ten employees are required to keep a record of serious work-related injuries and illnesses. Minor injuries requiring first aid only do not need to be recorded. This information helps employers, workers, and OSHA evaluate the safety of a workplace, understand industry hazards, and implement worker protections to reduce and eliminate hazards, preventing future workplace injuries and illnesses.

Maintaining and Posting Records

The records must be maintained at the worksite for at least five years. Each February through April, employers must post a summary of the previous year's injuries and illnesses. Also, if requested, copies of the records must be provided to current and former employees or their representatives.

Severe Injury Reporting

Employers must report any worker fatality within 8 hours and any amputation, loss of an eye, or hospitalization of a worker within 24 hours.

Contact OSHA!

For questions or to get information or advice, to report an emergency, report a fatality or catastrophe, order publications, sign up for OSHA's e-newsletter, or to file a confidential complaint, contact your nearest OSHA office, visit www.osha.gov or call OSHA at 1-800-321-OSHA (6742), TTY 1-877-889-5627.

Conclusions

Many healthcare workers must constantly deal with exposure to neoplastic and hazardous drugs. Every year new drugs are developed, and each has certain side effects. Fortunately, organizations such as NIOSH, CDC, and DHHS are constantly updating important information telling us how to be safe and the side effects of new chemical agents. Healthcare workers in all departments need to know where their MSDS book is located and have easy access to it. Educators must constantly update their safety manuals to educate workers on all shifts and departments. In today's volatile world, healthcare workers and others need to stay informed of how to handle fires and to be prepared for disasters, both man-made and natural. Knowing how to use equipment that can prevent injuries and practicing using this equipment is imperative. Workplace violence is everybody's concern. The key to success is to learn to listen effectively, know when to speak and what to say, respect everybody's distance, and show genuine concern for all those you are in contact with. People need to feel valued and appreciated and know their actions' consequences. Administrators are responsible for ensuring healthcare workers are protected from injuries while at work and enforce the consequences when a worker is physically or mentally abused by a patient, relative, or coworker. Healthcare facilities should be safe havens for all!

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