Systems of Safety

Training from the NJ Work Environment Council

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About WEC

The New Jersey Work Environment Council (WEC) is a non-profit collaboration of organizations working for safe, secure jobs, and a healthy, sustainable environment.

Visit WEC's website at www.njwec.org

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Injury and Illness Prevention Programs

Training from the New Jersey Work Environment Council

About Prevention Programs

Every employer should have an overall injury and illness prevention program. Prevention programs improve health and safety conditions for both large and small employers, reduce workplace injuries and illnesses, improve compliance with laws and regulations, and reduce workers' compensation premiums.

OSHA has announced that it will develop an Injury and Illness Prevention Program standard (rule) in the near future.

Effective training about Injury and Illness Preventions Programs can help achieve safer, healthier, and more productive workplaces.

WEC's curriculum covers key aspects of an effective workplace prevention program. Training introduces the concept of effective management systems and explain why facilities should establish a prevention program at their workplace.

The New Jersey Work Environment Council (WEC) can provide **free** training at your workplace. This training includes free materials. The training is supported by a grant from the U.S. Occupational Safety and Health Administration (OSHA). Training can be from two to eight hours.

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The Small Group Activity Method

Basic Structure

The Small Group Activity Method* is based on a series of problem-solving activities. An activity can take from 45 minutes to an hour. Each activity has a common basic structure:

- **Small Group Tasks**
- **Report-Back**
- **Summary**

1. Small Group Tasks: The training always begins with groups working together at their tables. Each activity has a task, or set of tasks, for the groups to work on. The task asks that the groups use their experience and the factsheets to solve problems and make judgments on key issues.

2. Report-Back: For each task, the group selects a scribe who takes notes on the small group discussion and reports back to the class as a whole. During the report-back, the scribe informs the entire class as to how his or her group solved the particular problem. The trainer records each scribe's report-back on large pads of paper in front of the class so that everyone can refer to them.

3. Summary: Before the discussion drifts too far, the trainer needs to bring it all together during the summary. Here, the trainer highlights the key points of the activity and brings up any problems or points that may have been overlooked during the report-back.

*The Small Group Activity Method (SGAM) is based on a training procedure developed by England's Trades Union Congress (TUC) in the 1970s. The Labor Institute and Oil, Chemical, and Atomic Workers Union (now part of the United Steelworkers) used a similar method around economic and health and safety issues for workers and further developed the procedure into SGAM. The New Jersey Work Environment Council has used SGAM since 1986.

Three Basic Learning Exchanges

The Small Group Activity Method (SGAM) is based on the idea that every training is a place where learning is shared. With SGAM, learning is not a one-way street that runs from trainer to worker. Rather SGAM is a structured procedure that allows us to share information. It is based on three learning exchanges:

- **Worker-to-Worker**
- **Worker-to-Trainer**
- **Trainer-to-Worker**

Worker-to-Worker: Most of us learn best from each other. SGAM is set up in such a way as to make the worker-to-worker exchange a key element of the training. The worker-to-worker exchange allows participants to learn from each other by solving problems in their small groups.

Worker-to-Trainer: Lecture-style training assumes that the trainer knows all the answers. With SGAM it is understood that the trainers also have a lot to learn and this is the purpose of the worker-to-trainer exchange. It occurs during the report-back and it is designed to give the trainer an opportunity to learn from the participants.

Trainer-to-Worker: This is the trainer's opportunity to clear up any confusion and make points they think are key. By waiting until the summary section, trainers know better what people need to know.

The Factsheet Reading Method

The process described below focuses everyone on the important information in the factsheets.

The process is as follows:

- **First, select a scribe for this Task.**

Each of you will be assigned a small number of factsheets to read. You will then share the factsheet information with your table.

- **Your trainer will assign your individual factsheets this way:**
- **Starting with the scribe and moving to the left, count out loud from one to eight. Keep going around the table until all numbers (factsheets) are distributed. The assigned numbers correspond to Factsheets 1 through 8 on the following pages.**

Once everyone has read their assigned factsheets individually, your scribe will go around the table and ask each of you to explain to the group what you have learned. Factsheets should be explained in the order assigned (1 through 8), since the factsheets build on the previous one. In this way, we all start at the same place and with the same information.

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Systems of Safety

Purpose

To introduce systems of safety and accident prevention.

This activity has two tasks.

Task 1

Scenario:

A healthcare worker was recently assaulted by a patient's family member at City Medical Center. The patient called her husband and informed him that the nurse was ignoring her and not responding to her emergency alert call button. The husband rushed to the hospital, confronted the nurse and pushed her down. The nurse suffered a back injury. A union health and safety committee investigation of the incident revealed the following:

1. The emergency alert call button was not working. Regular inspections and maintenance for the call buttons had not been performed for over two years.
2. When the husband entered the hospital he walked past the receptionist's desk and ignored her pleas to return to the desk. The security guard who should have been stationed at the desk was on another call. The hospital had recently made a decision to cut its security personnel.
3. The nurse was working alone at the time of the assault.
4. The nurse was working her third consecutive day of double shifts.
5. A previous incident with the same patient and family member had occurred only days before (with another member of the hospital staff on a different shift) but was never reported.
6. City Medical Center had no written policy or procedures for dealing with violent patients or family members.
7. Healthcare workers at City Medical Center were never trained to deal with potentially violent situations.

Review Factsheets 1 through 9 on pages 4 through 12. Then in your groups list the safety systems and sub-systems that are flawed for each problem identified by the health and safety committee investigation. You can list more than one failed system or sub-system for each problem.

Note: Factsheet 1 defines Systems of Safety. Factsheets 2 through 7 explain each of the systems. Factsheet 8 includes a chart showing all the systems and examples of sub-systems. (You will also find a tear-out version of Factsheet 8 on page 17.)

FLAWED SYSTEM(S) AND SUB-SYSTEM(S)
1. **System(s): Mechanical Integrity** **Sub-system(s): Preventive Maintenance, Inspections**
2. **System(s):** **Sub-system(s):**
3. **System(s):** **Sub-system(s):**
4. **System(s):** **Sub-system(s):**
5. **System(s):** **Sub-system(s):**
6. **System(s):** **Sub-system(s):**
7. **System(s):** **Sub-system(s):**

1. Systems of Safety

When we think about safety we usually focus on injuries and fatalities suffered by individual workers. We generally don't spend much time thinking about the safety systems that exist.

A system of safety can be defined as the use of specific labor/ management programs that actively seek to identify and control hazards (a proactive system). This begins in the conceptual (planning) phase of a new project or work application and continues throughout the entire process.

MAJOR SYSTEMS OF SAFETY
Design and Engineering
Mechanical Integrity
Mitigation Devices
Warning Devices
Training and Procedures
Personal Protective Factors

There are many sub-systems that make up these major systems of safety. For example, recordkeeping (including the OSHA 300 Log and Sharps Injury Log) would be a sub-system of work practice controls/procedures.

You may have additional systems of safety at your site. They may be organized differently and have different names, but all of our facilities have systems of safety in place.

Source: Adapted in part from Harold Roland and Brian Moriarty, *System Safety Engineering and Managemen*t, New York: John Wiley and Son, 1983.

2. The Design/Engineering System

Many important safety decisions are made long before hospital employees are asked to use new sharps devices or implement new and improved work practices. A central purpose of the design/engineering system of safety is to eliminate hazards through effective work organization, resource allocation, and the selection of safer or lower-risk equipment, chemicals, and medical devices. The design system of safety is the place where primary prevention takes place.

Examples of primary prevention would include the use of less hazardous cleaning fluids, needleless systems (devices that eliminate the use of needles altogether such as IV medication systems) and mechanical lifting equipment. Primary prevention eliminates or significantly reduces the possibility of injuries on the job.

Important elements of the design/engineering system may include:

- equipment that eliminates the need to lift patients/residents
- floor plan layout and design to accommodate equipment use and storage
- the implementation of needleless systems
- utilization of sharps with sharps injury protections, for example shielded or retracting catheters
- workplace violence policy
- safe patient handling policy
- staffing and workload

Sources: Occupational Safety and Health Administration (OSHA), *Revisions Pathogens Standard Technical Pathogens Standard Technical Background and Summary*, April 2001; and Nicholas Ashford, *The Encouragement of Technological Change for Preventing Chemical Accidents*, Environmental Protection Agency, 1993.

3. The Mechanical Integrity System

Properly designed equipment can become unsafe if it isn't appropriately maintained, inspected and repaired. An effective mechanical integrity system should be evaluated based on its performance in eliminating the use of breakdown maintenance.

Important elements of the maintenance and inspection system include:

- safety and skills training for employees and subcontractors involved in installing, maintaining, repairing or inspecting equipment
- maintaining regular preventive maintenance schedules
- keeping spare parts readily available
- adequate staffing to eliminate work order and preventive maintenance backlogs
- employee involvement in developing and overseeing this system
- written procedures for each task performed
- use of proper materials, equipment, tools and spare parts, including use of a quality control program

4. The Mitigation System

The mitigation system of safety involves the use of equipment that automatically acts to control or reduce the adverse consequences of hazardous incidents. Mitigation devices do not require any action on the part of employees in order for the equipment to function.

The mitigation system provides opportunities for secondary prevention. Mitigation equipment does not eliminate hazards; it only controls the severity of incidents.

Typical examples of mitigation devices are:

- backup generator systems
- other automatic trip devices
- automatic sprinkler systems

5. The Warning System

The warning system of safety includes the use of devices that warn employees that a dangerous or potentially dangerous situation is occurring. These warning components require worker intervention to control or mitigate the hazardous situation. Workers must be able to understand the warning. They must also be able to respond in a timely manner and understand what actions are necessary.

Examples of warning devices include:

- facility fire evacuation alarms
- patient monitors and alarms
- life support systems
- telemetric devices

6. The Training and Work Practice Controls/Procedures System

Work practice controls/procedures reduce the likelihood of exposures. The process relies on a comprehensive system of written procedures and training. The greater the hazard, the greater the need for controls/procedures and training.

Parts of an effective work practice controls/procedures and training system include:

- procedures and training that consistently incorporate an emphasis on the importance of the safety and well-being of both patients and staff
- employee involvement in developing and overseeing training and controls/procedures activities
- methods developed by management and employees to ensure that training is understood, promotes safety, and is not punitive
- an emergency response plan and training that are in place and routinely practiced
- workplace violence training
- procedures and training that identify all potential hazards, the possible consequences of these hazardous conditions and the actions needed to prevent or respond to each hazard or potential hazard.

7. Personal Protective Factors

Personal protective factors are the last line of defense among the various systems of safety. They define the traditional roles that employees play in health and safety and generally include obeying the rules (individual behavior) and wearing Personal Protective Equipment (PPE). Unfortunately, in far too many situations PPE and behavior are used to compensate for hazards that are built into the work process.

Being Proactive

A better approach is to view the role of healthcare workers as proactive and engaged in the process of making the facility a safe and healthy environment. This perspective requires the entire staff to look critically at the workplace, work together to identify the hazards, and then contribute ideas, experience and know-how to correct the system flaws.

When healthcare workers are actively engaged in the process of identifying systems flaws and correcting them using higher-level solutions such as Design and Engineering, the hazards can be eliminated or significantly reduced.

8. Safety Systems and Sub-Systems Worksheet

Safety Systems	Design/ Engineering	Mechanical Integrity	Mitigation Devices	Warning Devices	Training & Work Practice Controls/ Procedures	Personal Protective Factors
Type of Prevention	**Primary**	**Secondary**	**Secondary**	**Secondary**	**Secondary**	**Secondary**
Safety Sub-System	**Job Preplanning** **Resource Allocation** **Codes** Facility/ Room Design (Lighting, Floors, etc.) **Standards** Bloodborne Pathogen **Ergonomics Injury Prevention** Lifting Equipment and Technologies **Sharps Exposure Prevention** Selection/ Installation of New Devices (e.g., Sharps, Disposal Containers) Employee/ Equipment Interface Life Support Systems **Work Organization** Communications Staffing Workload Shift Schedule Committees Workplace Violence Policy Safe Patient Handling Policy	Inspections Preventive Maintenance Parts Quality Control	Shutdown Devices Back-up Generator System and Emergency Outlets	Monitors Facility Alarms Patient Monitors Life Support Systems Telemetric Devices	Operating Manuals Safety Information Standard (Universal) Precautions Recordkeeping OSHA 300 Log Sharps Injury Log Emergency Response Refresher Training Communications No-Lift Policy Lifting Team Practices Patient Assessments Workplace Violence Training	Personal Decision- Making and Actions PPE

Sources: Revisions to OSHA's Bloodborne Pathogens Standard Technical Background and Summary, April 2001; and Center for Chemical Process Safety, *Guidelines for Technical Management of Chemical Process Safety*, New York: American Institute of Chemical Engineers, 1989.

9. Symptoms, Systems and Root Causes

When we look at the causes of an injury, accident or needlestick exposure we have to look beyond employee behavior. Unsafe acts, unsafe conditions and accidents are symptoms of failed systems of safety. System failures are the "root" causes of accidents and exposures.

There are almost always several root causes involved in an incident, accident or exposure. For example, the root causes of an accident might include improperly designed or maintained equipment, poor procedures or inadequate training. Root causes are always found in safety systems. Effective prevention of similar incidents requires changing and improving the systems.

Examples of Root Causes

- Poor design of equipment
- Poor installation of containers/equipment
- Difficult access to equipment
- Lack of preventive maintenance or inspection
- Inadequate procedures or training for both normal and emergency situations
- Work schedules that create excessive employee fatigue
- Inadequate staffing levels

Sources: Occupational Safety and Health Administration (OSHA) Revisions to OSHA's Bloodborne Pathogens Standard Technical Background and Summary, April 2001; and Center for Chemical Process Safety, *Guidelines for Investigating Chemical Process Incidents*, New York: American Institute of Chemical Engineers, 1992.

Task 2

Based on your own experience and what you've learned today about systems of safety, select an incident or near-miss, and use it to complete the worksheet on the next page.

In the first column: Describe what happened.

In the second column: Identify the failed systems and sub-systems (there may be more than one system or sub-system involved). Also, list any systems and/or sub-systems you think may have failed but would need more information in order to determine if it is flawed.

What Happened? ***(Please explain in detail)***	**Flawed Systems/Sub-Systems**
	System: Sub-systems: Do you need more info – Yes or No? If so, where will you find it?
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Summary:

1. The design/engineering system can provide primary prevention by eliminating the possibility of a serious accident or exposure. The other systems of safety provide secondary prevention by reducing the probability, or severity, of an accident or exposure.
2. Proactive systems of safety are the key to preventing accidents and exposures.
3. Major systems of safety include:

    - design/engineering
    - maintenance and inspection
    - mitigation equipment
    - warning devices
    - work practice controls/procedures and training
    - personal protective factors

4. Your workplace may have different structures and names for its systems of safety, but all workplaces have systems of safety.
5. Active management and employee involvement are essential for these systems to be effective.
6. Unsafe acts, unsafe conditions and accidents are symptoms of failures in systems of safety. System failures are the "root" causes of accidents and exposures. Effective prevention of similar incidents requires changing and improving the systems.

Injury and Illness Prevention Programs
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PROGRAM EVALUATION FORM

Location:
Date:

Trainer(s): Cecelia G. Leto

Training Topic: Introduction to Workplace Prevention Programs, Hazard Mapping & Systems of Safety

1. Overall, how would you rate this training session?

   ___Excellent ___Good ___Fair ___Poor ___N/A

2. Were the teaching methods (activities, exercise) effective?
   ___Yes ___No ___Not sure

   Comments: _____
   _____

3. Were the hand-outs and materials useful?
   ___Yes ___No ___Not sure

   Comments: _____
   _____

4. Will the information you received in the training program be useful on your job?
   ___Yes ___No ___Not sure

   Comments: _____
   _____

5. How could this training program be improved?
   _____
   _____
   _____

6. What subjects/topics should be added to (or taken away from) this training program to make it more useful?
   _____
   _____

7. Additional comments: _____
   _____
   _____

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Safety Systems and Sub-Systems Worksheet

Safety Systems	Design/ Engineering	Mechanical Integrity	Mitigation Devices	Warning Devices	Training & Work Practice Controls/ Procedures	Personal Protective Factors
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Sources: Revisions to OSHA's Bloodborne Pathogens Standard Technical Background and Summary, April 2001; and Center for Chemical Process Safety, *Guidelines for Technical Management of Chemical Process Safety*, New York: American Institute of Chemical Engineers, 1989.

Injury and Illness Prevention Programs
Industrial Safety Systems and Sub-Systems Worksheet

Safety Systems	Design/ Engineering	Mechanical Integrity	Mitigation Devices	Warning Devices	Training & Work Practice Controls /Procedures	Personal Protective Factors
Type of Prevention	**Primary**	**Secondary**	**Secondary**	**Secondary**	**Secondary**	**Secondary**
Safety Sub-System	Technical Design and Engineering of Equipment, Procedures and Software **Management of Change **** **Chemical Selection and Substitution** **Safe Siting** **Organizational (must address a root cause)** Staffing (HF) Skills and Qualifications (HF) Management of Personnel Change Work Organization and Scheduling (HF) Workload Allocation of Resources Buddy System Codes, Standards and Policies **	Inspection and Testing Preventive Maintenance Quality Control **Turnarounds and Overhauls** Maintenance & Inspection	Enclosures, Barriers, Dikes and Containment Relief and Check Valves Shutdown and Isolation Devices Fire and Chemical Suppression Devices Machine Guarding Back-up Generator System and Emergency Outlets	Monitors **Process Alarms** Facility Alarms Community Alarms Emergency Notification Systems	Operating Manuals and Procedures Process Safety Information Process Job and Other Types of Hazard Assessment and Analysis **Permit Programs** Emergency Preparedness and Response Training Refresher Training **Information Resources** Communications Investigations and Lessons Learned Maintenance Procedures Pre-Startup Safety Review **Recordkeeping** OSHA 300 Log	Personal Decision-Making and Actions (HF) Personal Protective Equipment (HF) **Shop Work Authority**

(HF) Indicates that this sub-system is often included in a category call Human Factors.

* There may be additional sub-systems that are not included in this chart. Also, in the workplace many sub-systems are interrelated. It may not always be clear that an issue belongs to one sub-system rather than another.

** The Codes, Standards and Policies, and Management of Change subsystems listed here are related to Design and Engineering. These sub-systems may also be relevant to other systems; for example, Mitigation Devices. When these sub-systems relate to systems other than Design and Engineering, they should be considered as part of those other systems, not Design and Engineering.