MPH Final Presentation:

Improving Clinical Laboratory Safety Knowledge Through Multi-Modal Interventions

Brian Weiderman
MHA, MLS(AMT)
MPH Candidate

Experience:

Medical Laboratory Scientist Supervisor – 5 Years
Medical Laboratory Scientist Generalist – 3 Years
Veterinary Technician – 8 Years

Education History:

A.S. – Medical Laboratory Technology
B.S. – Biology
M.H.A. – Master of Health Administration
M.P.H. – Master of Public Health (Spring 2026)
D.H.A. – Doctorate of Health Care Administration (2028)

Presentation Overview

APE Site Overview
APE Objectives
Topic Background
APE Projects
MPH Foundational Competencies
Emphasis Area Competencies
Conclusions

Applied Practice Experience (APE)
08/2025 to 10/2025

Site Overview

- Irwin Army Community Hospital (IACH) is located in Fort Riley, Kansas
- The population directly involved with the APE is IACH Laboratory personnel (and patients), which includes phlebotomy staff, volunteers, students, Laboratory techs/scientists, and administration
- Originally established in the 1850's, IACH evolved through multiple expansions before the modern, 47 bed hospital opened in 2016
- The current 550,000-square-foot facility was built with evidence-based medicine in mind, including the use of glass walls for natural lighting, separation between inpatients/outpatients, healing gardens, and meditation lounges
- IACH supports ~1,500–1,600 clinical encounters, completes more than 1,500 laboratory procedures, and performs about 11 surgeries daily
- IACH serves a beneficiary population of nearly 50,000 Soldiers, families, and retirees

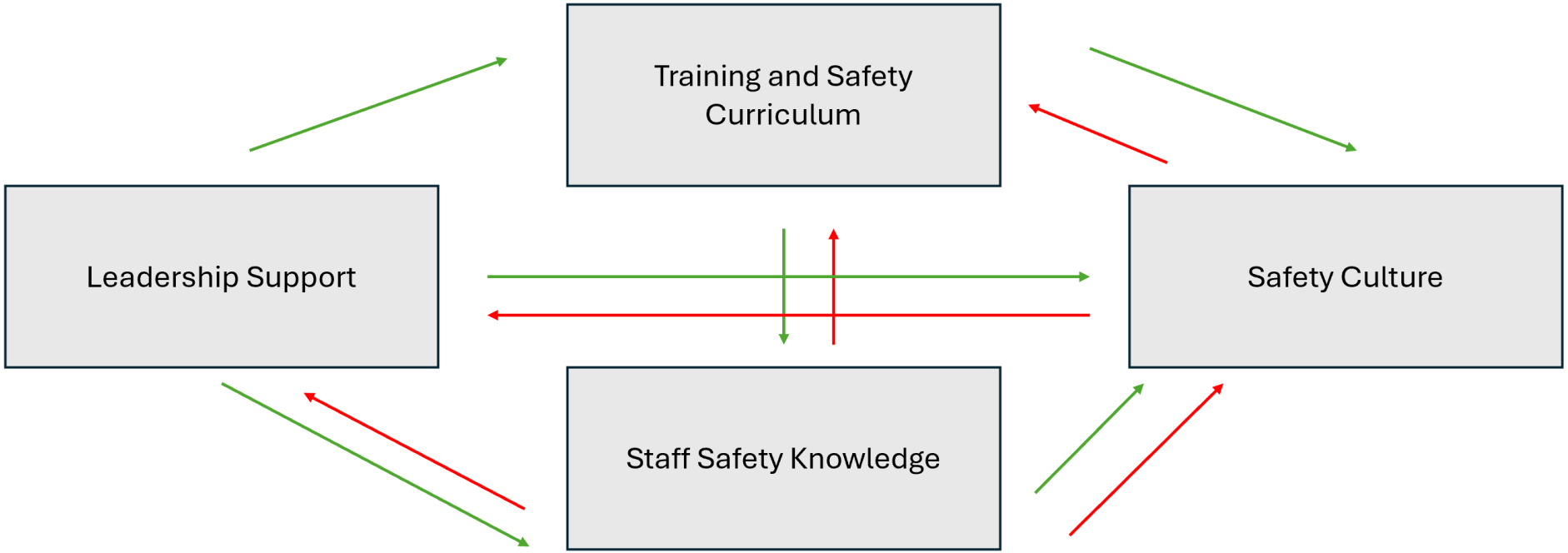
APE Learning Objectives

1. Assess and analyze safety knowledge and culture
2. Translate findings into program design
3. Apply system thinking into improving laboratory safety
4. Develop safety education and communication tools
5. Evaluate outcomes and provide recommendations for continues improvement

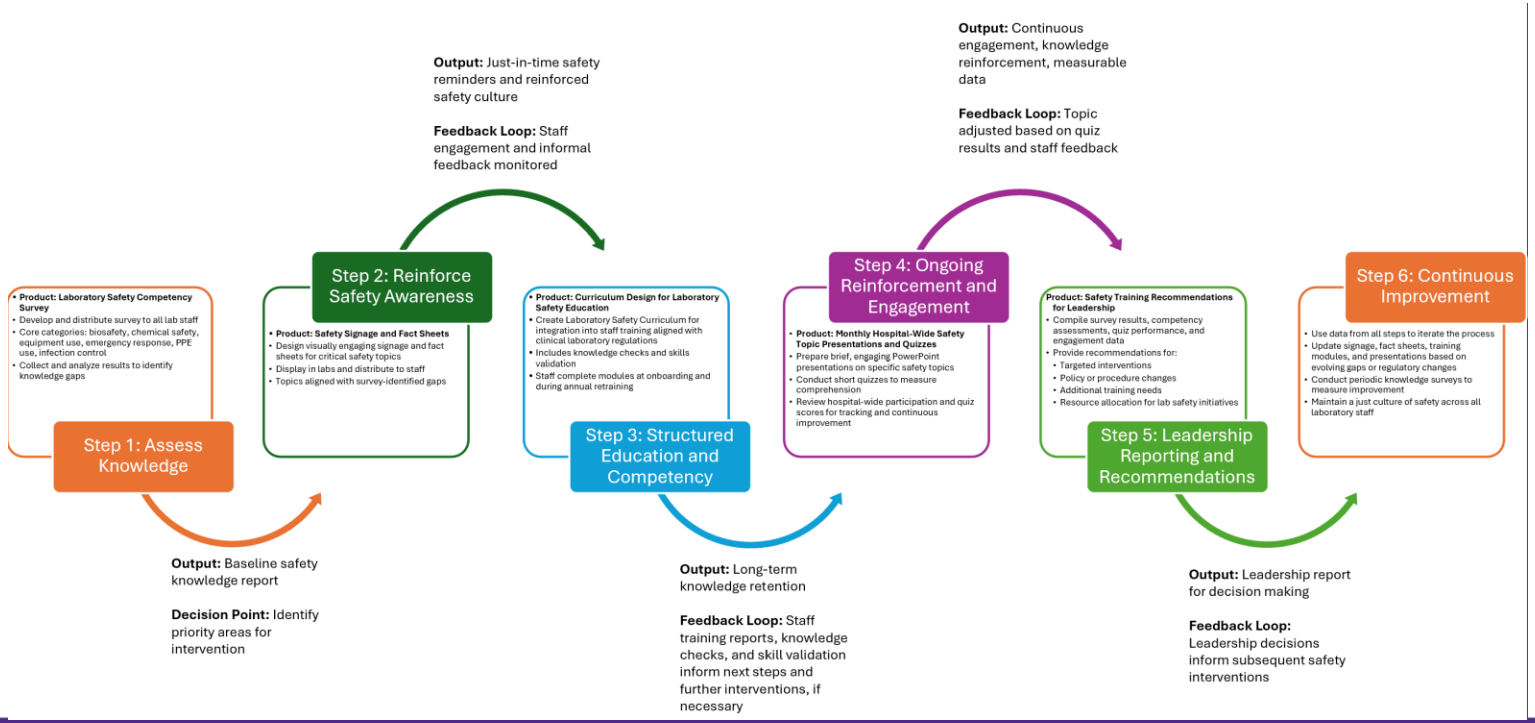
Topic Background

- General healthcare safety-culture tools may not fully capture lab-specific risks, such as specimen misidentification or bloodborne pathogen exposure (Schröder, Huang, Ellis, Gibson, & Wayne, 2016)
- Surveys are the most common approach to measure safety climate and culture. Standard instruments include the Hospital Survey on Patient Safety Culture (HSPSC) and adapted versions for laboratories (Ayi & Hon, 2018)
- Studies report correlations between high safety-climate scores and adherence to PPE and sharps protocols (Keckler, Anderson, McAllister, Rasheed, & Noble-Wang, 2019)
- Multi-component interventions that include leadership engagement, audits, and feedback improve compliance and safety outcomes (Faulconer et al., 2020)
- Structured training programs on bloodborne pathogens, biosafety, and standard precautions improve knowledge and, in some cases, behavior (Mahmoud & Sabry, 2019)
- Sustained behavior change often requires reinforcement, feedback, and integration with organizational policies (Bond, Lucero, & Marsh, 2020)

Stock and Flow Diagram



Process Map


Step 1: Assess Knowledge
Product: Laboratory Safety Competency Survey
Develop and distribute survey to all lab staff
Core categories: biosafety, chemical safety, equipment use, emergency response, PPE use, infection control
Collect and analyze results to identify knowledge gaps
Output: Baseline safety knowledge report
Decision Point: Identify priority areas for intervention
Step 2: Reinforce Safety Awareness
Product: Safety Signage and Fact Sheets
Design visually engaging signage and fact sheets for critical safety topics
Display in labs and distribute to staff
Topics aligned with survey-identified gaps
Output: Just-in-time safety reminders and reinforced safety culture
Feedback Loop: Staff engagement and informal feedback monitored
Step 3: Structured Education and Competency
Product: Curriculum Design for Laboratory Safety Education
Create Laboratory Safety Curriculum for integration into staff training aligned with clinical laboratory regulations
Includes knowledge checks and skills validation
Staff complete modules at onboarding and during annual retraining
Output: Long-term knowledge retention
Feedback Loop: Staff training reports, knowledge checks, and skill validation inform next steps and further interventions, if necessary
Step 4: Ongoing Reinforcement and Engagement
Product: Monthly Hospital-Wide Safety Topic Presentations and Quizzes
Prepare brief, engaging PowerPoint presentations on specific safety topics
Conduct short quizzes to measure comprehension
Review hospital-wide participation and quiz scores for tracking and continuous improvement
Output: Continuous engagement, knowledge reinforcement, measurable data
Feedback Loop: Topic adjusted based on quiz results and staff feedback
Step 5: Leadership Reporting and Recommendations
Product: Safety Training Recommendations for Leadership
Compile survey results, competency assessments, quiz performance, and engagement data
Provide recommendations for:
Targeted interventions
Policy or procedure changes
Additional training needs
Resource allocation for lab safety initiatives
Output: Leadership report for decision making
Feedback Loop: Leadership decisions inform subsequent safety interventions
Step 6: Continuous Improvement
Use data from all steps to iterate the process
Update signage, fact sheets, training modules, and presentations based on evolving gaps or regulatory changes
Conduct periodic knowledge surveys to measure improvement
Maintain a just culture of safety across all laboratory staff

APE Projects

1. Assess and analyze safety knowledge and culture
2. Translate assessment findings into immediate targeted interventions
3. Create a lesson plan for individuals that want to be safety leaders
4. Develop a sample lesson based on assessment needs findings for long-term intervention
5. Evaluate outcomes and provide recommendations for continues improvement

Project- Assess and analyze safety knowledge and culture

Assessment Development

Survey Section / Domain	Regulatory Body / Standard	Citation / Reference	Scope / Purpose
Biosafety & Bloodborne Pathogens	OSHA	29 CFR 1910.1030	Bloodborne Pathogen Standard – exposure prevention, PPE, training, post-exposure protocols
	CDC	BMBL (Biosafety in Microbiological and Biomedical Laboratories)	Lab biosafety levels, engineering and administrative controls
	CLSI	M29	Bloodborne pathogens and safety practices
	CLIA	42 CFR 493.1105	Lab personnel and safety requirements
Specimen Collection & Phlebotomy	CLSI	GP41	Venipuncture procedures, order of draw, collection practices
	OSHA	29 CFR 1910.1030	Bloodborne pathogen exposure prevention
	TJC	NPSG.01.01.01	Two patient identifiers to prevent misidentification
	CLIA	42 CFR 493.1252	Specimen labeling and handling standards
PPE & Hand Hygiene	OSHA	29 CFR 1910.132/.133/.134	PPE requirements, respirator use
	CDC	Hand Hygiene Guidelines	Handwashing and sanitizing best practices
	TJC	IC.02.01.01	Infection control standards

Survey Section / Domain	Regulatory Body / Standard	Citation / Reference	Scope / Purpose
Sharps Safety	OSHA	29 CFR 1910.1030(d)(2)	Engineering controls for sharps and disposal
	NIOSH	Bloodborne pathogen safety guidance	Sharps handling, prevention of injury
	FDA	Medical device regulations	Safety-engineered devices and sharps
Specimen Handling & Transport	DOT	49 CFR	Transport of hazardous and infectious materials
	IATA	Dangerous Goods Regulations (DGR)	International shipment of infectious substances
	CLIA	42 CFR 493.1103	Specimen transport and chain-of-custody
	CAP	GEN.40100	Accreditation requirements for specimen handling
Chemical Hygiene & Hazard Communication	OSHA	29 CFR 1910.1450	Chemical Hygiene Plan
	OSHA	29 CFR 1910.1200	Hazard Communication Standard
	NFPA	704	Chemical labeling (flammability, reactivity, health hazards)
	EPA	RCRA	Hazardous chemical waste management
	CLSI	GP17	Chemical safety in the lab

Survey Section / Domain	Regulatory Body / Standard	Citation / Reference	Scope / Purpose
Waste Management & Spill Response	EPA	40 CFR 261	Definition and management of regulated medical waste
	OSHA	29 CFR 1910.120	Hazardous waste operations & emergency response
	DOT	49 CFR	Hazardous materials transport
	TJC	EC.02.02.01	Emergency management standards for spills
Engineering Controls	OSHA	29 CFR 1910.1030	Bloodborne pathogen engineering controls (BSCs, sharps)
	CDC	BMBL	Biosafety cabinet practices, containment levels
	CLSI	M29	Laboratory safety engineering guidance
Equipment & Instrument Safety	OSHA	29 CFR 1910 Subpart O	Equipment safety, machine guarding
	CLIA	42 CFR 493.1252	Equipment maintenance, calibration, and QC
	FDA	Medical device regulations	Safe use of lab instruments
Ergonomics	NIOSH	–	Ergonomic hazards, workstation setup, lifting
	OSHA	General Duty Clause	Employer responsibility for safe workplace conditions

Survey Section / Domain	Regulatory Body / Standard	Citation / Reference	Scope / Purpose
Emergency Preparedness	TJC	EC.02.03.01	Emergency preparedness and response in hospitals
	OSHA	29 CFR 1910.38	Emergency action plan standard
	NFPA	10	Fire extinguisher classification and use
	CLIA	42 CFR 493.1202	Lab emergency preparedness standards
Radiation & Lasers	NRC	10 CFR Part 20	Radiation protection and dose limits
	OSHA	29 CFR 1910.1096	Ionizing radiation standards
	ANSI	Z136	Laser safety standards
Quality Systems & Accreditation	CLIA	42 CFR 493	Lab personnel, QC, proficiency testing, documentation
	CAP	GEN	Quality and accreditation standards
	TJC	Laboratory standards	Quality and patient safety requirements
	CMS	CLIA oversight	Compliance with federal regulations
	ISO	15189	International lab quality and competence standards
Information Security & Privacy	HIPAA	45 CFR 164	Patient privacy and health data protection

Survey Section / Domain	Regulatory Body / Standard	Citation / Reference	Scope / Purpose
	HITECH	–	Electronic health record privacy and security
	TJC	IM.02.01.01	Information management standards for patient data
Communication & Safety Culture	OSHA	29 CFR 1904	Recording and reporting workplace injuries
	TJC	LD.03.01.01	Leadership, accountability, and culture of safety
	ASCP / AMT	Code of Ethics	Professional ethical standards and safe practice
Role-Specific Safety Items	Various	FACT, ASHI, CAP subspecialty	Standards for stem cells, histocompatibility, BSL2/3 labs

Recognized 16 areas of laboratory safety and develop an assessment based on 15 of those areas (radiation/lasers are not used at IACH)

Forms

Clinical Laboratory Safety Knowledge and Competency Survey - Saved

Buy Microsoft 365

Style | Settings | Preview | Collect responses | View responses 12 | Present

Templates

Clinical Laboratory Safety Knowledge and Competency Survey

Purpose: Assess self-rated knowledge and objective understanding of critical safety topics for medical/clinical laboratory professionals (phlebotomists, technicians, technologists, pathologists, and management). Results will identify strengths, training needs, and compliance risks across regulatory domains (OSHA, CLIA, The Joint Commission, CAP, FDA, CDC/NIOSH, EPA, DOT/IATA, CLSI, ASCP/AMT competencies).

Instructions: Please answer honestly based on your knowledge and experience. This will be 100% anonymous.

Recommended Likert Anchors for Safety Knowledge

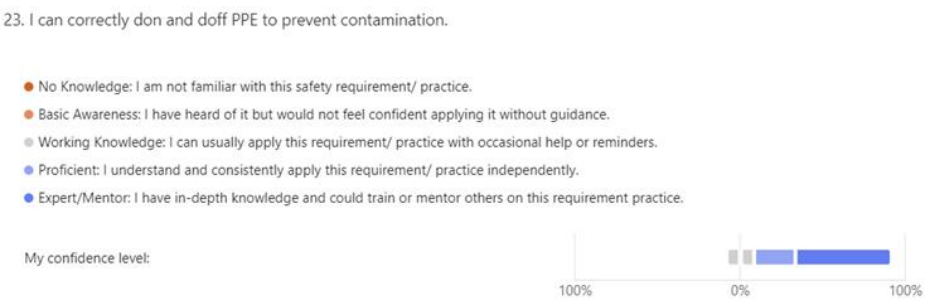
1. **No Knowledge** – I am not familiar with this safety requirement/practice.
2. **Basic Awareness** – I have heard of it but would not feel confident applying it without guidance.
3. **Working Knowledge** – I can usually apply this requirement/practice with occasional help or reminders.
4. **Proficient** – I understand and consistently apply this requirement/practice independently.
5. **Expert/Mentor** – I have in-depth knowledge and could train or mentor others on this requirement/practice.

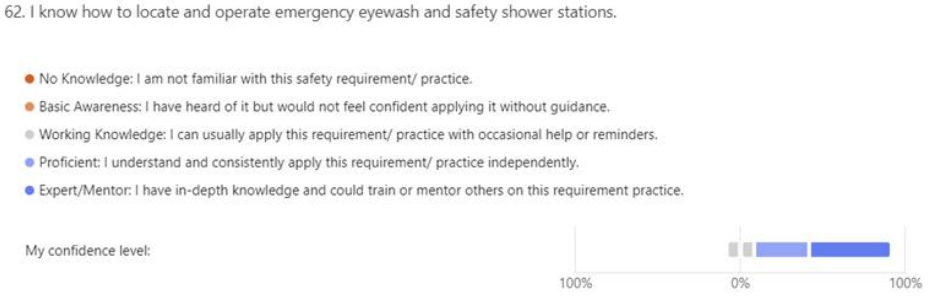
Section 1

Section 1

Survey Results - Strengths

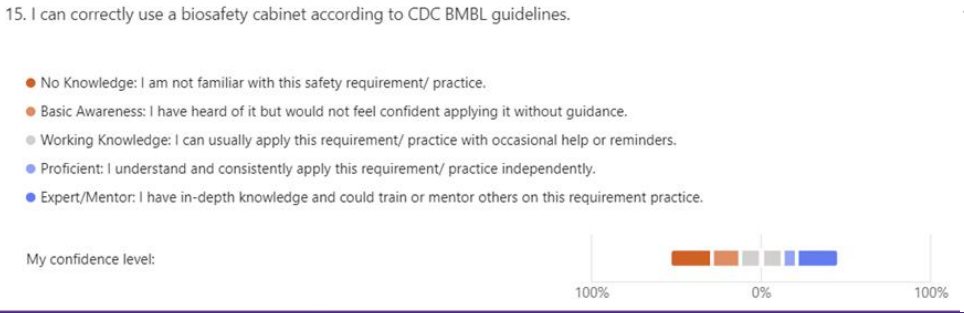
- Following manufacturer instructions for laboratory instruments
- Familiarity with PPE
- Emergency eyewash operation
- HIPAA regulations and data protection
- Safety Culture Perception

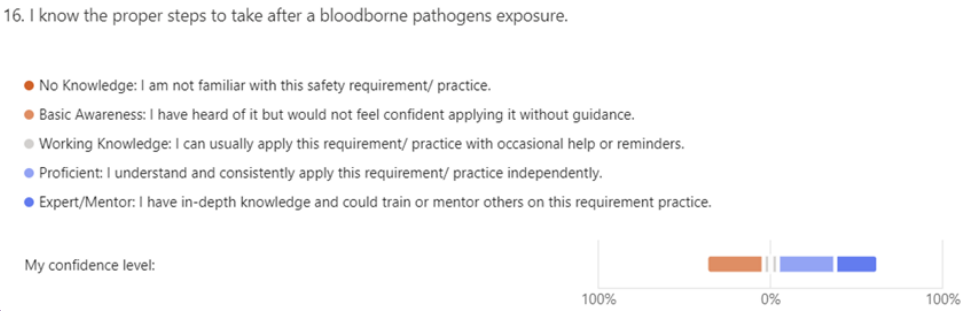




Survey Results - Gaps

- Knowledge of steps to take after a bloodborne pathogen exposure
- Waste management
- Ability to interpret safety data sheets and chemical hazards
- Knowledge of biosafety cabinets and fume hoods
- Patient identification and error handling





Project- Translate assessment findings into immediate targeted interventions

Safety Fact Sheet
Personal Protective Equipment (PPE) & Hand Hygiene

Introduction

Proper use of PPE and hand hygiene are critical to preventing laboratory-acquired infections. PPE must be selected based on the task, and hand hygiene must be performed consistently.

What you need to know:

Personal Protective Equipment

Always wear personal protective equipment while working with or around hazardous materials. This includes eye protection, hand protection, and body protection.

Risk Assessment

Personal protective equipment is selected based on risks of exposure, routes of exposure, and consequences of exposure. Always wear designated PPE to reduce your personal risk.

Donning and Doffing Matters

Don and doff PPE in the correct sequence to minimize risk of contamination and exposure. Don: lab coat, respiratory protection (if required), safety glasses, gloves. Doff: gloves, gown, safety glasses, respiratory protection (if required).

Practice Proactive Hand Hygiene

Wash hands immediately after exposure or when removing gloves. Wash hands before leaving the laboratory. Wash hands for at least 20 seconds.

Replace PPE

Replace PPE when it becomes damaged or contaminated. Do not rely on PPE to protect you once it is compromised or dirty. Remeber, PPE is the least effective control measure for preventing exposure. Use PPE in combination with engineering controls and administrative controls. Always follow laboratory procedures and use equipment in accordance with manufacturer specifications.

References

OSHA 29 CFR 1910.1030 – Bloodborne Pathogen Standard
CDC BMBL, 6th Edition
CLSI M29
CLIA 42 CFR 493.1105

Safety Fact Sheet
Specimen Collection and Phlebotomy Safety

Introduction

Proper specimen collection prevents patient misidentification, contamination, and exposure risk. Phlebotomists and lab staff must follow correct order-of-draw, labeling at bedside, and infection control procedures.

What you need to know:

Personal Protective Equipment

Always wear personal protective equipment while collecting specimens, including gloves, protective clothing, and eye protection. Treat all speciemens as infectious.

Sharps Safety

Follow proper sharps handling and disposal. Do not recap needles. Always dispose of needles in a designated sharps container. Know the post-exposure protocol and report exposures immediately.

Patient Identification and Labelling

Always use two patient identifiers for all specimen collections. Label specimens at the bedside, immediately after collection in the presence of the patient.

Order of Draw

Follow the correct order-of-draw to prevent cross-contamination: blood cultures, citrate (blue), serum (red and gold), heparin (green), EDTA (lavendar), and glycolytic inhibitor tubes (gray).

Practice Proactive Hand Hygiene

Wash hands immediately after exposure or when removing gloves. Wash hands before leaving the laboratory. Wash hands for at least 20 seconds.

Safety Eyewash Activation

In case of eye exposure to blood or other potentially infectious materials (OPIM), immediately go to the nearest eyewash station. Flush eyes with running water for 15 minutes minimum. Report the incident immediately to a supervisor.

References

OSHA 29 CFR 1910.1030 – Bloodborne Pathogen Standard
CDC BMBL, 6th Edition
CLSI M29
CLIA 42 CFR 493.1105

Safety Fact Sheet
Bloodborne Pathogens and Laboratory Biosafety

Introduction

Bloodborne pathogens, including HIV, HBV, and HCV, can be transmitted via exposure to blood and certain body fluids. Laboratories must implement engineering controls, PPE, safe work practices, and post-exposure procedures to minimize risk. Biosafety levels (BSL) define containment requirements for microorganisms.

What you need to know:

Personal Protective Equipment

Always wear personal protective equipment while working with or around hazardous materials, including a laboratory coat, gloves, and eye protection.

Sharps Safety

Follow proper sharps handling and disposal. Do not recap needles. Always dispose of needles in a designated sharps container. Know the post-exposure protocol and report exposures immediately.

Microbiological Practices

Understand the biosafety level of the laboratory (BSL-2) and use good microbiological practices to reduce aerosols and risk of infection.

Use a Biosafety Cabinet

When working with human blood or body fluids (other potentially infectious materials (OPIM)), work inside a biosafety cabinet when conducting aerosol producing procedures, including pipetting and opening of centrifuged tubes.

Practice Proactive Hand Hygiene

Wash hands immediately after exposure or when removing gloves. Wash hands before leaving the laboratory. Wash hands for at least 20 seconds.

Safety Eyewash Activation

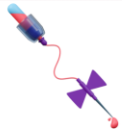
In case of eye exposure to blood or other potentially infectious materials (OPIM), immediately go to the nearest eyewash station. Flush eyes with running water for 15 minutes minimum. Report the incident immediately to a supervisor.

References

OSHA 29 CFR 1910.1030 – Bloodborne Pathogen Standard
CDC BMBL, 6th Edition
CLSI M29
CLIA 42 CFR 493.1105

Safety Fact Sheet
Needlestick Injury: Immediate Steps

Introduction



Needlestick injuries can occur even during routine phlebotomy, and rapid, correct action is essential to protect staff health and ensure compliance with hospital safety standards. This reminder outlines the immediate steps every team member must follow after any sharps exposure. Review these procedures regularly and follow them without delay to support a safe working environment in the draw station.

What you need to know:

1. Stop Work Immediately

Remove yourself from the task to prevent additional exposure.

2. Wash the Injury Site

Wash with soap and water for at least 20 seconds. Do NOT squeeze, scrub vigorously, or use bleach or harsh chemicals.

3. Report the Exposure

Report injury to supervisor. If supervisor is unavalible, report injury to laboratory manager. All needlestick injuries must be reported regardless if the needle was clean or used.

4. Seek Medical Evaluation with ER

Seek medical evaluation through the Emergency Department as directed by hospital protocol. Bringing information about the source patient, the device involved, and how the injury occurred.

5. Attend Required Follow-up Exams

Follow post-exposure management instructions, which may include baseline labs, source testing with consent, prophylaxis for HIV or hepatitis B when indicated, and scheduled follow-up testing.

Project- Create a lesson plan for individuals that want to be safety leaders

Course Description

This course provides a comprehensive orientation to the regulatory frameworks governing safety in the clinical laboratory environment focusing on OSHA, CDC, CLIA, TJC, and CAP regulations. Learners will examine the federal standards, accreditation requirements, and best-practice guidelines that ensure biosafety, chemical hygiene, emergency preparedness, specimen integrity, and patient/staff protection. This course will attempt to apply safety awareness and safety culture into the daily workflow in the clinical laboratory. The curriculum is designed for laboratory personnel of all skill levels.

Course Objectives

1. **Identify** all major regulatory bodies (OSHA, CDC, CLIA, TJC, CAP, DOT, NRC, FDA, EPA, NIOSH, etc.) and describe their authority and role in laboratory safety compliance.
2. **Interpret** key regulations and standards that govern biosafety, bloodborne pathogens, chemical hygiene, radiation protection, ergonomics, and emergency preparedness.
3. **Apply** the requirements for specimen collection, labeling, transport, and handling in accordance with CLIA, DOT, IATA, and accreditation standards.
4. **Differentiate** between engineering controls, administrative controls, PPE, and work practice controls, and explain their regulatory foundations.
5. **Evaluate** laboratory safety practices for compliance with national and international standards and identify opportunities for improvement.
6. **Develop** readiness for inspections by linking regulations to documentation, competency, training, and quality system requirements.
7. **Demonstrate** an understanding of how safety regulations integrate with information security, ethical expectations, and organizational culture.

Course Content

Module 1 – Introduction to Laboratory Regulatory Framework
Module 2 – Biosafety & Bloodborne Pathogen Compliance
Module 3 – Specimen Collection, Labeling & Phlebotomy Safety
Module 4 – PPE, Hand Hygiene & Infection Control Standards
Module 5 – Sharps Injury Prevention & Safety Devices
Module 6 – Specimen Handling, Packaging & Transport
Module 7 – Chemical Hygiene, Hazard Communication & Laboratory Chemicals
Module 8 – Waste Management & Spill Response
Module 9 – Engineering Controls & Laboratory Infrastructure
Module 10 – Equipment & Instrumentation Safety
Module 11 – Ergonomics & Workplace Safety
Module 12 – Emergency Preparedness & Response
Module 13 – Radiation & Laser Safety
Module 14 – Quality Systems, Accreditation & Inspection Readiness
Module 15 – Information Security, Privacy & Ethical Safety Culture

Project- Develop a sample lesson based on assessment needs findings for long-term intervention

Biosafety Cabinets & Fume Hoods in the Clinical Laboratory

Differences, Uses, Operation, and Relevant Regulations (CAP, CLIA, OSHA, TJC)

1 ★

Learning Objectives

1 2 3 4

2

Quick Overview

- Biosafety Cabinets (BSCs): Protect personnel, environment, and product (Class II most common)
- Fume Hoods: Protect personnel from chemical vapors/particulates — not designed to protect product
- Choose based on the hazard type: biological vs chemical

3

Key Differences (at a glance)

- Primary protection: BSC = personnel + environment + product; Fume hood = personnel only
- Airflow: BSC uses HEPA filtration and laminar flow; fume hood exhausts to outside (or filtered with appropriate cartridges)
- Typical uses: BSC for infectious material manipulation; fume hood for volatile/toxic chemicals and solvent handling

4

Types of Biosafety Cabinets

Class I	Class II	Class III
Personnel/environment protection, no product protection	Personnel, environment, and product protection; most clinical labs use Class II	Gas-tight, for high-containment work (double-glovebox)

5

Typical Uses — Biosafety Cabinets

- Manipulation of infectious clinical specimens (e.g., aliquoting, inoculation, uncap/transfer)
- Cell culture work requiring aseptic conditions
- Procedures that may generate aerosols from biological agents

6

Typical Uses — Fume Hoods

- Handling volatile organic solvents, strong acids/bases, toxic reagents
- Procedures that generate hazardous chemical vapors or gases
- Not appropriate for sterile biological work or to contain infectious aerosols

7

Operating a BSC — Best Practices

Verify	Verify cabinet certification (initial, after move, annually) before use
Don appropriate	Don appropriate PPE and minimize rapid movements in/out of cabinet
Arrange	Arrange work left-to-right; keep clean-to-dirty workflow; avoid blocking grills
Limit	Limit materials inside; disinfect surfaces before and after use
Allow	Allow cabinet to run 5–10 minutes before starting work (per SOP)

8

Operating a Fume Hood — Best Practices

Ensure	Ensure sash at recommended height (work sash position) and confirm airflow alarm/indicator
Keep	Keep work at least 6 inches inside the hood and maintain clutter-free sash opening
Use	Use appropriate chemical cartridges or ensure proper ducted exhaust for hazardous compounds
Rely on	Never rely on a fume hood to contain biological aerosols or sterilize products

9

Maintenance & Certification

- BSCs require annual certification and after relocation or major service (OSHA/NSF/ANSI guidance)
- Fume hoods require periodic face velocity testing and functional checks per institutional EHS
- Recordkeeping of tests, repairs, and training is required by accreditation and safety programs

10

Regulatory & Accreditation Highlights

- OSHA: Laboratory standard guidance; mandates risk assessment, training, and BSC certification practices. (See OSHA Lab Safety BSC factsheet)
- CDC/NIH (BMBL): Best-practice containment guidance for biological work and recommended use of certified BSCs
- CAP: Best practice documents and inspection checklists require appropriate use of BSCs, PPE, and documentation
- CLIA: Requires appropriate laboratory environment and quality systems—BSCs are part of compliance for safe testing
- The Joint Commission: Infection prevention standards and recent IC chapter updates emphasize environment of care and engineering controls

11

Training, SOPs & Practical Steps

- Develop written SOPs for BSC and fume hood selection, use, decontamination, and failure response
- Provide competency-based initial training and annual re-training with documented assessments
- Include emergency procedures for spills, power failure, and alarm conditions
- Implement routine environmental monitoring where applicable (e.g., surface contamination checks)

12

Quick Decision Guide

- Working with infectious agents or procedures generating aerosols → use a certified Class II BSC
- Working with toxic/volatile chemicals → use properly configured fume hood (ducted or filtered as required)
- Work requiring both chemical and biological hazard controls → perform risk assessment; consider specialized containment or workflow changes

13

References

- OSHA — Laboratory Safety: Biosafety Cabinets factsheet
- CDC — Biosafety in Microbiological and Biomedical Laboratories (BMBL, 6th edition)
- College of American Pathologists — Best Practices for Biologic Safety Cabinets
- The Joint Commission — New and Revised Infection Prevention Requirements (2025)
- CLIA — Clinical Laboratory Improvement Amendments (FDA summary)

14

Project- Evaluate outcomes and provide recommendations for continues improvement

Summary of Findings

Biosafety & Bloodborne Pathogens
Respondents report reasonably high confidence with biosafety fundamentals but lack knowledge in accident response.

Specimen Collection & Phlebotomy
Responses show a potential issue with proper patient identification, specimen labeling, and knowledge of misidentification procedures.

PPE & Hand Hygiene
All responses showed high confidence and knowledge of PPE and proper hand hygiene.

Sharp Safety
All responses showed high confidence and knowledge of sharp handling, but some respondents showed a lack of knowledge on proper needlestick response.

Specimen Handling & Transportation
Responses showed high confidence in transportation of infectious material; however, few responses demonstrated accurate knowledge of shipping requirements. A few respondents showed little confidence in chain-of-custody knowledge.

Chemical Hygiene & Hazards Communication
Responses showed a need for training in chemical labeling, hazard communication, and SDS interpretation.

Waste Management and Spill Response
Responses showed low knowledge of biological and chemical waste management.

Engineering Controls
Responses showed a need for training in biosafety cabinet and fume cabinet usage and maintenance.

Equipment & Instrument Safety
All responses showed high confidence and knowledge.

Ergonomics
All responses showed high confidence and knowledge.

Emergency Preparedness
All responses showed high confidence and knowledge. One individual requested training on defend-in-place procedure.

Radiation & Lasers
Radiation & laser standards were not a part of this survey.

Quality Assurance & Accreditation
All responses showed high confidence and knowledge.

Information Security & Privacy
All responses showed high confidence and knowledge.

Communication & Safety Culture
All responses showed high confidence and knowledge.

Role Specific Items
All responses showed high confidence and knowledge.

MPH Foundational Competencies

Competency	Coursework	Applied Learning
Assess population needs, assets, and capacities that affect communities' health.	MPH 720 "Administration of Health Care Organizations" MPH 802 "Environmental Health"	Assess and analyze safety knowledge and culture
Design a population-based policy, program, project, or intervention.	MPH 754 "Introduction to Epidemiology"	Assess and analyze safety knowledge and culture Create a lesson plan for individuals that want to be safety leaders
Apply leadership and/or management principles to address a relevant issue.	MPH 720 "Administration of Health Care Organizations" MPH 818 "Social and Behavioral Bases of Public Health"	Create a lesson plan for individuals that want to be safety leaders Develop safety education and communication tools5
Communicate audience-appropriate (i.e., non-academic, non-peer audience) public health content, both in writing and through oral presentation to a non-academic, non-peer audience with attention to factors such as literacy and health literacy	DMP 815 "Multidisciplinary Though and Presentation	Translate assessment findings into immediate targeted interventions Develop safety education and communication tools Evaluate outcomes and provide recommendations for continues improvement
Apply a systems thinking tool to visually represent a public health issue in a format other than a standard narrative.	MPH 754 "Introduction to Epidemiology" MPH 802 "Environmental Health"	Evaluate outcomes and provide recommendations for continues improvement

Emphasis Area Competencies

Competency	Coursework	Applied Learning
Pathogens/pathogenic mechanisms *"Evaluate modes of disease causation and infectious agents"*	AAI 852 "Vaccinology"	Assess and analyze safety knowledge and culture
Host response to pathogens/immunology *"Investigate the host response to infection"*	ASI 540 "Principles of Animal Disease Control"	
Environmental/ ecological influences *"Examine the influence of environmental and ecological forces on infectious diseases"*	DMP 710 "One Health"	Assess and analyze safety knowledge and culture
Disease surveillance *"Analyze disease risk factors and select appropriate surveillance"*	DMP 710 "One Health"	Assess and analyze safety knowledge and culture
Disease vectors *"Investigate the role of vectors, toxic plants, and other toxins in infectious disease"*	DMP 710 "One Health"	

Conclusion

References

Abu-Siniyeh, A., & Al-Shehri, S. S. (2021). Safety in medical laboratories: Perception and practice of university students and laboratory workers at major hospitals in Taif, Saudi Arabia. Applied Biosafety, 26(Suppl 1), S34–S42. https://doi.org/10.1089/apb.20.0050

Ayi, H.-R., & Hon, C.-Y. (2018). Safety culture and safety compliance in academic laboratories: A Canadian perspective. Journal of Chemical Health & Safety, 25(6). https://doi.org/10.1016/j.jchas.2018.05.002

Bond, M. R., Lucero, A., & Marsh, T. (2020). Developing a culture of safety in biomedical research training. Molecular Biology of the Cell, 31(18), 1903-1907. https://doi.org/10.1091/mbc.E20-03-0167

Faulconer, E., Dixon, Z., Griffith, J. C., & Frank, H. (2020). Surveying the safety culture of academic laboratories. Journal of College Science Teaching, 50(2). https://commons.erau.edu/cgi/viewcontent.cgi?article=2778&context=publication

Gao, X., & Deeprasert, J. (2025). The impact of safety culture on safety behavior in university chemistry laboratories. Journal of Information Systems Engineering & Management, 10(7 s), 138-160. https://doi.org/10.52783/jisem.v10i7s.850

Giménez-Marín, A., Marín-García, L. S., et al. (2015). Assessment of patient safety culture in clinical laboratories in the Spanish National Health System. Biochemia Medica, 25(2), 203-217. https://www.biochemia-medica.com/en/journal/25/3/10.11613/BM.2015.036/fullArticle

Keckler, M. S., Anderson, K., McAllister, S., Rasheed, J. K., & Noble-Wang, J. (2019). Development and implementation of evidence-based laboratory safety management tools for a public health laboratory. Safety Science, 117, 205-216. https://doi.org/10.1016/j.ssci.2019.04.003

Kim, N. Y., et al. (2021). Factors affecting patient safety culture in terms of prevention of transmitting blood-borne pathogens among nurses. Journal of Korean Academy of Nursing Administration, 27(4), 318-327. https://bmcnurs.biomedcentral.com/articles/10.1186/s12912-020-00529-4

Kimble-Hill, A. C. (2021). Incorporating identity safety into the laboratory safety culture. Journal of Chemical Health & Safety, 28(2), 103-111. https://doi.org/10.1021/acs.chas.0c00109

Lee, S. E., Scott, L. D., Dahinten, V., et al. (2019). Safety culture, patient safety, and quality of care outcomes: A literature review. Western Journal of Nursing Research, 41(2), 279-304. https://doi.org/10.1177/0193945917747416

Mahmoud, A. A. E., & Sabry, S. S. (2019). Safety training program for clinical laboratory workers regarding prevention of occupational hazards. American Journal of Nursing Research, 7(2), 116-127. https://doi.org/10.12691/ajnr-7-2-3

National Research Council (US) Committee on Prudent Practices in the Laboratory. (2011). *Prudent Practices in the Laboratory: Handling and management of chemical hazards: Updated version* (Chapter 11: Safety laws and standards pertinent to laboratory). Washington, DC: National Academies Press. https://www.ncbi.nlm.nih.gov/books/NBK55862/

Nieva, V., & Sorra, J. (2003). Safety culture assessment: A tool for improving patient safety in healthcare organizations. Quality and Safety in Health Care, 12(suppl 2), ii17-ii23. https://doi.org/10.1136/qhc.12.suppl_2.ii17

OSHA. (2022). Bloodborne pathogens standard 29 CFR 1910.1030. Occupational Safety and Health Administration. https://www.osha.gov/bloodborne-pathogens

Schröder, I. O., Huang, D. Y. Q., Ellis, O., Gibson, J. H., & Wayne, N. L. (2016). Laboratory safety attitudes and practices: A comparison of academic, government, and industry researchers. Journal of Chemical Health & Safety, 23(2), 10-18. https://doi.org/10.1016/j.jchas.2015.03.001