**UNIVERSITY OF NORTH DAKOTA**

**LABORATORY RISK ASSESSMENT TOOL**

Risk assessments are an essential component of maintaining safety within a laboratory. The goal of a risk assessment is to identify and mitigate the risks of working in a laboratory environment. While all laboratories should be performing risk assessments, the content and design of the template may be unique to the facility. Risk assessments must be performed regularly based on procedure or agent, and when there are changes in agents, procedures, equipment or staff.

Risks identified by the assessment should be prioritized, and a mitigation plan should be established based on that prioritization. In other words, the highest risks should be mitigated relatively more than lower risks. The mitigation plan should be documented and clearly communicated to all relevant personnel. A risk assessment should follow the workflow from pre-analytical processes (sample receipt), through the laboratory (analytical), to post-analytical processes (waste disposal) and be reviewed by leadership (lab directors). It must be noted that risk assessments are dynamic documents that must be updated if any of the working assumptions for that protocol (equipment, personnel, materials) changes.

**COMPONENTS OF A RISK ASSESSMENT**

Key components of a risk assessment should address:

**Workforce**

* Identify personnel (individuals) who will be affected throughout the work-flow
* Assess the competency and experience of laboratory personnel
* Identify which trainings to offer staff
* Consider staff enrollment in occupational health programs

**Risk Characterization**

* Identify hazards
* Consider risk group of the agent
* Classify the potential for exposure (modes of transmission, potential for spill or inhalation, organism concentrations, virulence, etc.)
* Identify activities which may increase risk of exposure
* Classify which instruments will be used to process each sample and identify potential for exposure
* Evaluate and prioritize risks
* Determine the likelihood and consequences of a specific risk found during the assessment. Using that information, develop a strategy to mitigate that risk.

**Risk Mitigation**

* Develop Risk Mitigation Strategies
* Identify required safety practices to address the identified risks
  + Includes personal protective equipment, engineering controls, additional training, standard operating procedures, assessment strategies for staff proficiencies, and drills, etc.
* Determine whether additional risk mitigation strategies are necessary
  + For instance, consider upgrades of equipment and implementation of new training programs
* Communicate risks and mitigation strategies to staff
  + Provide a mechanism of communication within the laboratory and a known place of record for all risk assessments and mitigation strategies.
* Validate Risk Mitigation Strategies
  + Review risk assessment and mitigation strategies after implementation to ensure that measures were effective.

**OVERVIEW**

The UND Laboratory Risk Assessment Tool is intended to guide laboratory staff through the risk assessment process for

the work they regularly perform. Throughout this process, a mindset of **“WHAT COULD GO WRONG”** should be maintained. The goal of the risk assessment process is to identify and minimize all potential risks that may adversely affect 1) the health and safety of laboratory staff, 2) the health and safety of non-laboratory staff, 3) the health and safety of the general public, and 4) the quality of work being performed. For additional information on biosafety and the risk assessment process, please refer to the [list of resources](#_bookmark32) provided in this document.

**Step 1. Identify the hazards.**

Please select ALL potential hazards listed below that could affect the laboratory section being assessed. Where appropriate, provide additional details describing specific hazards. If more space is needed, please attach an additional page(s).

|  |
| --- |
| **Biological** |
| Blood/Body fluid  Bacteria  Viruses  Parasites  Fungus  Toxins  Waste  Other/Details: Enter other biological hazards or details here. |
| **Chemical (Refer to the label and Safety Date Sheet (SDS) for the classification and management of all chemicals)** |
| Non-hazardous chemical(s)  Hazardous Chemicals  Waste  Other/Details: Enter other chemical hazards or details here. |
| **Radiological (includes ultraviolet light sources)** |
| External radiation sources (resulting from close proximity to, limited shielding of, or prolonged exposure to source)  Internal radiation sources (e.g. resulting from ingestion, inhalation, inoculation, or skin absorption)  Waste  Other/Details: Enter other radiological hazards or details here. |
| **Physical and Environmental** |
| Heat  Cold  Sharps  Loud noise  Electrocution  Allergens  Pinch/crush/scrape  Repetitive movements (e.g. bending, crouching, pipetting)  Heavy lifting  Reaching  Slip/trip/fall  Other/Details: Enter other physical/environmental hazards or details here. |
| **Procedure, Equipment, and Instrumentation** |
| Aerosols  Splash/splatter/spray  Vapors  Steam  Small volume spills  Large volume spills  Surface contamination  Explosion (contents under pressure)  Projectiles (e.g. failed centrifuge)  Other/Details: Enter other procedure/equipment/instrumentation hazards or details here. |
| **Facilities and Systems** |
| Electricity (e.g. power outage)  Gas (e.g. interior lines)  Pressurized gas (e.g. gas cylinders)  Air handlers/HVAC  Other/Details: Enter other facilities/systems hazards or details here. |
| **Critical Incident** |
| Fire  Severe weather  Intruder  Lockdown  Evacuation  Disruption  Other/Details: Enter other critical incident hazards or details here. |
| **People** |
| Students  Visitors  Staff  Psychological/Stress  Other/Details: Enter other people hazards or details here. |
| **Other hazards and/or additional details (if more space is needed, please attach an additional page(s))** |
| Please provide additional hazard details here. |

**Step 2. Assess the level of risk.**

Use tables A through C below to assess the risk level associated with each hazard identified in Step 1, above.

**Table A.** Likelihood of hazard occurrence

|  |  |
| --- | --- |
| **Hazard Likelihood** | **Description of Likelihood** |
| 1. Rare | Will only occur in exceptional circumstances |
| 1. Unlikely | Not likely to occur within the foreseeable future |
| 1. Possible | May occur within the foreseeable future, sporadic exposure is possible |
| 1. Likely | Likely to occur within the foreseeable future, routine exposure is likely |
| 1. Highly | Almost certain to occur within the foreseeable future, consistent exposure is highly likely |

**Table B.** Consequence of hazard occurrence

|  |  |
| --- | --- |
| **Hazard Consequence** | **Description of Consequence** |
| 1. Insignificant | No treatment required |
| 1. Minor | Minor injury requiring First Aid treatment (e.g. minor cuts, bruises, bumps) |
| 1. Moderate | Injury requiring medical treatment or lost time |
| 1. Major | Serious injury (injuries) requiring specialist medical treatment or hospitalization |
| 1. Critical | Loss of life, permanent disability or multiple serious injuries |

**Table C.** Based on the likelihood and consequence determined above, identify the risk level of each hazard using the Risk Assessment Matrix below.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Risk Assessment Matrix** | | **Hazard Consequence** | | | | |
| **Insignificant** | **Minor** | **Moderate** | **Major** | **Critical** |
| **Hazard Likelihood** | **Highly likely** | Medium | Medium | High | Extreme | Extreme |
| **Likely** | Low | Medium | High | High | Extreme |
| **Possible** | Low | Medium | High | High | High |
| **Unlikely** | Low | Low | Medium | Medium | High |
| **Rare** | Low | Low | Low | Medium | Medium |

**Table D.** Based on the assessed risk level for each hazard, determine whether additional control measures should be implemented.

|  |  |  |  |
| --- | --- | --- | --- |
| **Assessed Risk Level** | | **Description of Risk Level** | **Actions** |
|  | Low | If an incident were to occur, there would be little likelihood that an injury would result. | Undertake the activity with the existing controls in place. |
|  | Medium | If an incident were to occur, there would be some chance that an injury requiring First Aid would result. | Additional controls are advised. |
|  | High | If an incident were to occur, it would be likely that an injury requiring medical treatment would result. | Control will need to be in place before the activity is undertaken. |
|  | Extreme | If an incident were to occur, it would be likely that a permanent, debilitating injury or death would result. | Consider alternatives to doing the activity. Significant control measures will need to be implemented to ensure safety. |

**Step 3. Identify control measures and complete the Laboratory Risk Management Worksheet.**

Using the following guidance, complete the Laboratory Risk Management Worksheet found in [Appendix A.](#_bookmark33)

1. List the specific task being performed.
2. List the identified hazard associated with that task.
3. List the risk level determined for that hazard in Step 2, above.
4. Describe the control measure you will implement to eliminate or mitigate the risk. Note: Control measures should be implemented in accordance with the preferred hierarchy of control (see Table E below). If a lower level control measure (such as Administrative Controls or PPE) is to be implemented without higher level controls, it is important that the reasons are approved by supervisor.
5. List the risk level (refer to Steps 1 and 2) remaining with the described control measure in place.
6. Describe how the described control measure will be implemented (e.g. implement precautions into SOP and/or ensure employees are trained in hazards/precautions).
7. Describe how this control measure will be supervised (e.g. daily by supervisor, monthly by safety committee, annually by associate director).

**NOTE:** The Laboratory Risk Management Worksheet should be completed by laboratory staff who regularly perform the work being assessed.

|  |  |  |
| --- | --- | --- |
| **Table E. Hierarchy of Control Measures** | | |
| **Most Effective** | **Engineering/Design Controls** | **Elimination:** remove the hazard completely from the workplace or activity |
| **(High Level)** |
| **Substitution:** replace a hazard with a less dangerous one (e.g. a less hazardous chemical) |
|  | **Redesign:** make equipment or processes safer (e.g. raise a bench to reduce bending) |
|  | **Isolation:** separate people from the hazard (e.g. perform work in biosafety cabinet) |
| **Least Effective** | **Administrative Controls** | **Administration:** putting rules, signage, or training in place to make a workplace safer (e.g. blood borne pathogens training) |
| **(Low Level)** | **PPE**  **(Personal Protective Equipment)** | **PPE:** Protective clothing and equipment (e.g. gloves, lab coat, safety glasses, respirator) |

**Step 4. Monitor and review the control measures and complete the Risk Management Hotwash Worksheet.**

After performing work with the implemented control measures identified in Step 3 above, complete the Risk Management Hotwash Worksheet found in [Appendix B.](#_bookmark34)

**NOTE:** The Risk Management Hotwash Worksheet should be completed by laboratory staff who regularly perform the work being assessed.

**RESOURCES**

The creation of this guidance document involved the review and integration of information from many resources, listed below. If additional information is desired, these resources should be consulted.

* Biosafety in Microbiological and Biomedical laboratories, 5th Edition (2009). U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, and National Institutes of Health.
* Chapter 12 Prevention of Lab-acquired Infections. (2015). Manual of Clinical Microbiology, 11th Edition.
* Chapter 12.6 Health and Lab Work. Section IV Humans. (2006). Exposure – A Guide to Sources of Infections.
* Department of the Army Form DA FORM 7566. Composite Risk Management Worksheet (2005). Department of the Army.
* Health and Safety Risk Assessment Template (2012). Queensland Government, Department of Education, Training and Employment.
* Hierarchy of Controls (2015). The National Institute for Occupational Safety and Health (NIOSH). Center for Disease Control and Prevention. [http://www.cdc.gov/niosh/topics/hierarchy/.](http://www.cdc.gov/niosh/topics/hierarchy/)
* Managing Health and Safety Risks (2012). Queensland Government, Department of Education, Training and Employment.
* Morbidity and Mortality Weekly Report (MMWR) Supplement/Vol.61 (2012). U.S. Department of Health and Human Services, Centers for Disease Control and Prevention.
* NIH Guidelines for Research Involving Recombinant or Synthetic Nucleic Acid Molecules (2013). Department of Health and Human Services, National Institutes of Health.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Appendix A**  **UND LABORATORY RISK MANAGEMENT WORKSHEET**  For instructions on use of this form, [see guidance information above.](#_bookmark30) Determine risk levels using the [Risk Assessment Matrix](#_bookmark31) above. | | | | | | | | |
| **LABORATORY SECTION AND/OR PROCEDURE:** Enter the name of the laboratory section and/or procedure here. | | | | | | **DATE PREPARED:** Select today’s date. | | |
| **PREPARED BY:** Enter your name here. | | | | **TITLE/POSITION:** Enter your title or position here. | | | | |
| **A. TASK** | **B. HAZARD** | **C. INITIAL RISK LEVEL** | **D. CONTROL MEASURES** | | **E. RESIDUAL RISK LEVEL** | | **F. HOW TO IMPLEMENT** | **G. HOW TO SUPERVISE**  **(WHO)** |
| Describe the task. | Describe the hazard. | Select the risk level. | Describe the appropriate control measures. | | Select the risk level. | | Describe how the control measures will be implemented. | Who will be responsible for this process? |
| Describe the task. | Describe the hazard. | Select the risk level. | Describe the appropriate control measures. | | Select the risk level. | | Describe how the control measures will be implemented. | Who will be responsible for this process? |
| Describe the task. | Describe the hazard. | Select the risk level. | Describe the appropriate control measures. | | Select the risk level. | | Describe how the control measures will be implemented. | Who will be responsible for this process? |
| Describe the task. | Describe the hazard. | Select the risk level. | Describe the appropriate control measures. | | Select the risk level. | | Describe how the control measures will be implemented. | Who will be responsible for this process? |
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| Describe the task. | Describe the hazard. | Select the risk level. | Describe the appropriate control measures. | | Select the risk level. | | Describe how the control measures will be implemented. | Who will be responsible for this process? |
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| Describe the task. | Describe the hazard. | Select the risk level. | Describe the appropriate control measures. | | Select the risk level. | | Describe how the control measures will be implemented. | Who will be responsible for this process? |
| Describe the task. | Describe the hazard. | Select the risk level. | Describe the appropriate control measures. | | Select the risk level. | | Describe how the control measures will be implemented. | Who will be responsible for this process? |

**Appendix B. Risk Management Hotwash Worksheet**

|  |  |  |
| --- | --- | --- |
| To be completed by laboratory staff during and/or after they perform work with control measures in place. | Yes | No |
| 1. Are the planned control measures sufficient and effective in minimizing the level of risk? |  |  |
| 1. Have there been any changes to the planned control measures? |  |  |
| 1. Are any changes and/or additional control measures required in the future? |  |  |
| **DETAILS: Please provide any additional information here.** | | |

**Risk Assessment Completed by:**

**Name: Click or tap here to enter text.**

**Position/Title: Click or tap here to enter text.**

**Department: Click or tap here to enter text.**

**Signature:Click or tap here to enter text.**

**Date: Click or tap here to enter text.**